

ELDER

GREYFRIARS HOUSE
20 - 30 GREYFRIARS ROAD , READING

ENERGY & OVERHEATING ASSESSMENT
MEINHARDT



Greyfriars House, Reading

Energy and Overheating Assessment Report
P01

Issue For Comment – 07 November 2024

GREYFRIARS HOUSE, READING

ENERGY AND OVERHEATING ASSESSMENT REPORT

Quality Assurance Page

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1 Executive Summary

This energy and overheating assessment has been prepared by Meinhardt (UK) Ltd. in support of the development proposals for Greyfriars House, Reading.

The purpose of this Energy and Overheating Assessment report is to demonstrate how the climate change mitigation measures proposed for Greyfriars House development address the relevant local and national planning policies. It also demonstrates that energy efficiency is an integral part of the proposed development's design. This report should be read in conjunction with the other documents which form part of the planning application.

The scheme demonstrates an **8%** Carbon Dioxide saving against Part L 2021 standards and a **40.55%** saving against the planning policy requirements set out in Part L2 2013.

2 Introduction

This energy strategy aims to achieve:

- 1) Full Planning Permission for the Demolition of the existing building and the erection of a part-7, part-13 storey building comprising 266 co-living units (Sui Generis) and associated communal amenity facilities, refuse storage, cycle parking and plant equipment.

2.1 Site and Surroundings

The proposed development is sited at 20-30 Greyfriars Road in an area of mixed commercial and residential buildings, comprising of offices, local amenities, a construction site and residential blocks. The orientation of Greyfriars House is indicated in Figure 1 with the top of the image representing North.

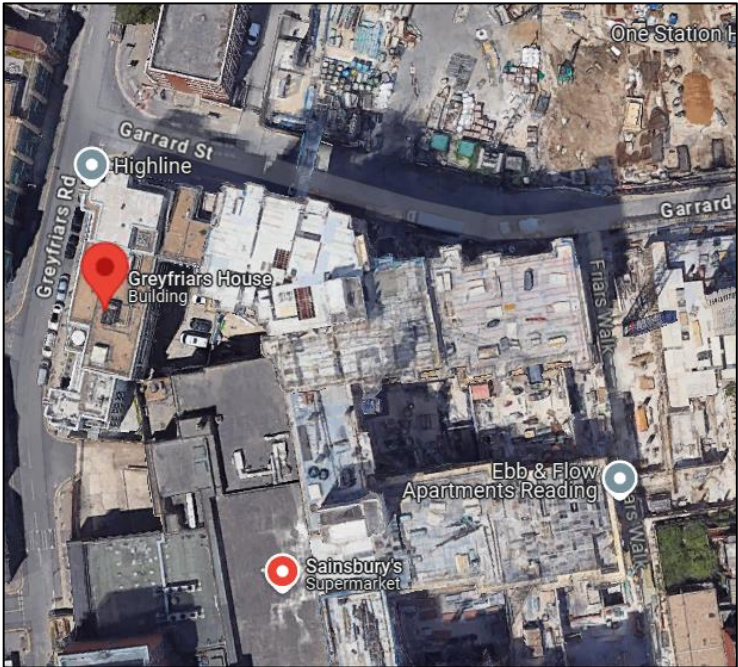


Figure 1 Screenshot of Building from Google Maps

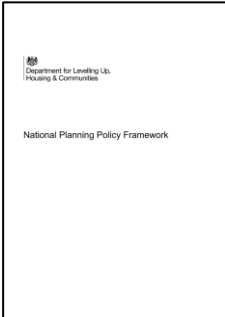
2.2 Proposed Development

The proposed development includes the demolition of existing buildings and structures and comprehensive redevelopment of a part-7, part-13 story co-living building including communal living spaces.

3 Relevant Policies

3.1 National

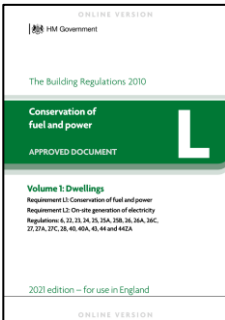
3.1.1 National Planning Policy Framework (2023)



The National Planning Policy Framework (NPPF) set out the Government's planning policies for England and how these should be applied. It provides a framework within which locally prepared plans for housing and other development can be produced.

The current version was issued in September 2023.

3.1.2 Building Regulations



The Building Regulations set out the statutory standards that developments are to meet. These standards cover measures including energy efficiency, water efficiency, sound resistance and ventilation.

Part L of the Building Regulations covers energy efficiency requirements.

The current version of Part L was issued in 2021 (with minor amendments in 2023).

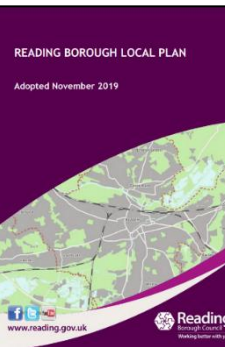


This approved document is Approved Document O: Overheating gives guidance for new build residential buildings on how to comply with Part O of the Building Regulations.

This document was issued in 2021.

3.2 Local

3.2.1 Reading Borough Local Plan



The Local Plan is the main planning document for Reading. It replaces the three previous development plan documents – the Core Strategy (adopted 2008, amended 2015), Reading Central Area Action Plan (adopted 2009) and Sites and Detailed Policies Document (adopted 2012, amended 2015). The document contains policies for how Reading will develop up to 2036, which is the end date of the plan.

The objectives include ensuring that the new development and existing areas are accessible and sustainable, in accordance with the sustainability appraisal objectives, including reducing its effects on, and adapting to, climate change.

3.2.2
 Reading Borough Sustainable Design and Construction Supplementary Planning Document

Reading Borough Sustainable Design and Construction Supplementary Planning Document

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This SPD is intended to guide developers and decision-makers on the implementation of key sustainability policies set out in the Reading Local Plan, namely CC2-CC5, EN18 and H5. It will be a material consideration in the determination of planning applications.

It was developed alongside the Local Plan in 2019.

4
 Establishing Energy Demand and Emissions

4.1
 Carbon Reduction Policy and Targets

4.1.1
 National Policy

The United Kingdom (UK) Government has made a commitment to bring all greenhouse gas emissions in the UK to net zero by 2050. Further commitments have been made to reducing economy-wide greenhouse gas emissions by at least 68% by 2030 and by 78% by 2035, compared to 1990 levels.

4.1.2
 Building Regulations

An updated Building Regulations Part L Conservation of Fuel and Power (Part L 2021) and a new Building Regulations Part O Overheating (Part O 2021) were introduced in June 2022.

Further consultation is expected on the new Future Homes Standard and Future Buildings Standard which are intended to be introduced in 2025.

4.1.3
 Reading Borough Local Plan (2019)

Policy H5

Requires all major residential developments to achieve zero-carbon standards, with a minimum 35% reduction in CO₂ emissions relative to Part L 2013. Any shortfall in achieving zero carbon on-site must be compensated through a carbon offset contribution of £1,800 per tonne.

Policy CC2

All major non-residential developments or conversions to residential are required to meet the most up-to-date BREEAM ‘Excellent’ standards, where possible. All non-residential development or conversions to residential should incorporate water conservation measures so that predicted per capita consumption does not exceed the appropriate levels set out in the applicable BREEAM standard. Both residential and non-residential development should include recycling greywater and rainwater harvesting where systems are energy and cost effective.

Policy CC4

Promotes decentralized energy solutions and encourages the integration of CHP or other low-carbon technologies for developments exceeding 20 units.

4.1.4
 Reading Borough Sustainable Design and Construction Supplementary Planning Document

Echoing Policy CC2, as shown in Figure 2, the supplementary document requires that the development achieve a BREEAM “Excellent” standard of sustainability.

However, the document also acknowledges “... some types of development, such as industrial uses and schools might find it more difficult to meet these standards. In these cases, developments must demonstrate that the standard to be achieved is the highest possible for the development, and at a minimum meets the BREEAM ‘Very Good’ standard.”

	Size of Development	Required Standard
New-build residential	Minor (fewer than 10 dwellings)	19% improvement in the dwelling emission rate over the target emission rate, as defined in the 2013 Building Regulations
	Major (10 dwellings or more)	Zero Carbon (or if unachievable, a minimum 35% improvement in the dwelling emission rate over the target emission rate, as defined in the 2013 Building Regulations and planning contribution to offset remaining carbon emissions to zero)
Creation of new residential units through conversion from other uses and/or major refurbishment	Minor (fewer than 10 dwellings)	BREEAM ‘Very Good’
	Major (10 dwellings or more)	BREEAM ‘Excellent’
Non-residential development (including development for non-C3 residential)	Minor (less than 1,000 sq. m of floorspace)	BREEAM ‘Very Good’
	Major (1,000 sq. m of floorspace or more)	BREEAM ‘Excellent’
Non-residential refurbishment (including refurbishment for non-C3 residential)	Minor (less than 1,000 sq. m of floorspace)	BREEAM ‘Very Good’
	Major (1,000 sq. m of floorspace or more)	BREEAM ‘Excellent’

Figure 2 Screenshot of the different energy standard requirements from SPD

5
 Proposed Approach

The energy strategy for this application follows the energy hierarchy approach of ‘Be Lean’, ‘Be Clean’, and ‘Be Green’ as illustrated in Figure 3.

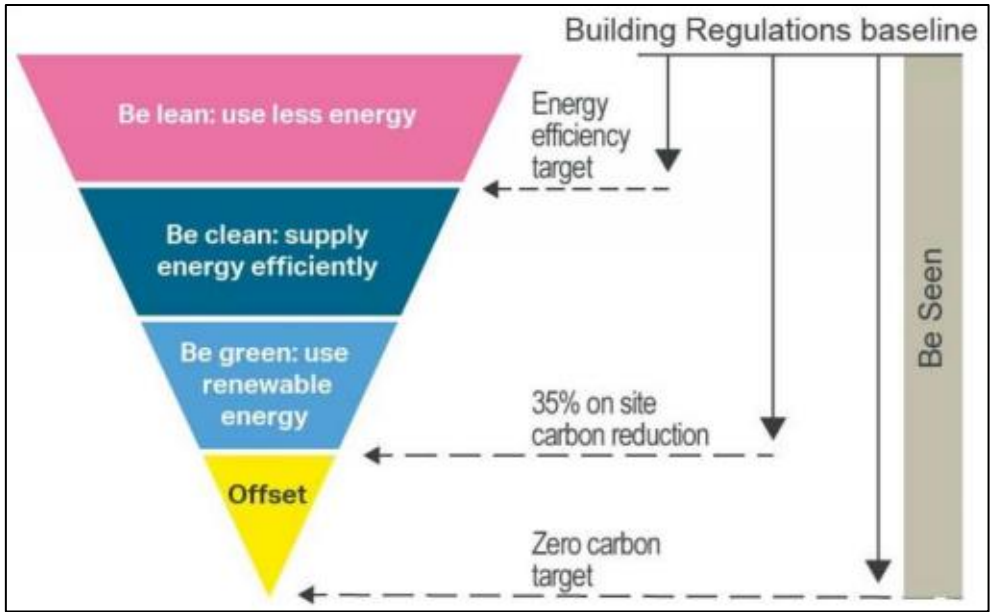


Figure 3: The energy hierarchy and associated targets.

5.1 Methodology

Building Regulations Part L2 2021 modelling has been undertaken for the development using IES thermal modelling software which employs ApacheSIM to complete Simplified Building Energy Model (SBEM) methodology in line with the relevant National Calculation Methodology (NCM) guidance.

The modelling includes the commercial and multi-residential areas of the building as well as other non-residential spaces such as entrance area, offices, plant rooms, circulation etc.

The BRUKL output sheets are provided in Appendix A.1 for the 'Be Lean' stage of the hierarchy and in Appendix A.2 and for the 'Be Green' stage.

5.2 Baseline Emissions

To determine the CO₂ emissions, baseline the Target Emission Rate (TER) has been used from the final proposed building specification i.e. the 'Be Green' stage of the hierarchy.

As the final proposed building specification includes heat pumps, the current version of SBEM for Part L 2021 now calculates the TER using a heat pump with a seasonal efficiency of 2.64 for space heating and 2.86 for hot water.

This is a significant change from the previous assessment methodology against Part L 2013 which calculated the baseline TER using a gas fired boiler. The current Part L 2021 SBEM methodology results in a significantly lower Target Emission Rate making it extremely challenging to achieve 35% carbon reduction targets.

According to Part L2 the TER normally includes an area of photovoltaic panels in accordance with the building area and arrangement.

5.2.1 Carbon Reductions

Carbon Emissions and Savings

The graph below demonstrates that the development achieves an overall reduction of 8% in regulated carbon dioxide emissions over Part L 2021.

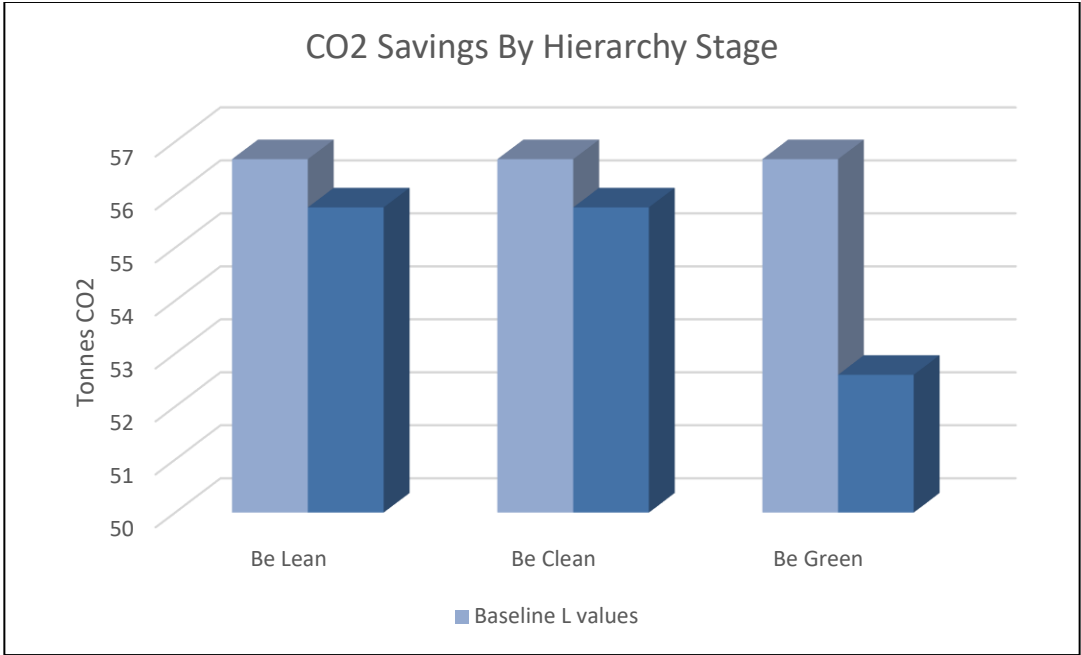


Figure 4 Bar chart of the CO₂ savings at each hierarchy level in tonnes

As aforementioned the current Part L 2021 SBEM methodology results in a significantly lower Target Emission Rate making it extremely challenging to achieve the non-domestic carbon reduction targets.

Energy demand has been reduced, achieving a reduction of 8% in regulated carbon emissions over Part L 2021 at the 'Be Green' stage of the hierarchy, through passive design and energy efficiency measures.

The tables below detail the carbon dioxide emissions from each system, based on a carbon factor of 0.14 kgCO₂/KWh for electricity and the overall savings expected at each stage of the energy hierarchy for the development.

Regulated Carbon dioxide emissions of the building (Tonnes CO ₂)	Heating	Hot Water	Auxiliary	Cooling	Lighting
Baseline Part L values	40.75	6.67	1.93	0.23	7.09
Be Lean	39.42	6.52	1.17	0.36	4.27
Be Clean	-	-	-	-	-
Be Green	39.41	3.38	1.17	0.36	4.27

Table 1: Regulated CO₂ emissions from each system within in the building at each hierarchy level

	Regulated carbon dioxide savings	
	Kg CO ₂ per annum	%
Be lean	1184	2
Be clean	-	-
Be green	3098	6
Cumulative on-site savings	4282	8
Carbon shortfall	52,661	-
	Tonnes CO ₂	
Cumulative savings for off-set payment	52.6	
Cash-in-lieu contribution (£1800 per tonne)	£94,790	

Table 2: Regulated carbon dioxide savings from each stage of the energy hierarchy

The table above demonstrates that the application achieves an on-site reduction of 8% in regulated carbon dioxide emissions over Part L 2021.

Additionally, based on the requirements from Reading Borough council the development was simulated against the Part L2 2013 Regulations. The table below illustrates the overall CO2 emissions as 40.55% lower than these regulations in compliance with policy H5 which states a 35% reduction.

Energy and CO2 Emissions	Be Green	Part L 2013 Baseline
Heating and Cooling (MJ/m ²)	98.46	153.37
Primary Energy (kWh/m ²)	170.73	241.99
Total emissions (kg/m ²)	28	47.1

Table 3 Development CO2 emissions simulated against Part L2 2013

6 Demand Reduction (Be Lean)

6.1 Be Lean Reductions

Energy demand will be significantly reduced beyond Part L requirements, achieving an overall saving of 1184 kg CO2 per year in regulated carbon dioxide emissions through passive design and energy efficiency measures alone (based on ApacheSIM calculations).

The demand reduction will be achieved by a combination of the measures including those detailed below; -

6.1.1 Building Fabric Insulation

The thermal performance of the building fabric will be significantly improved over Part L 2021 minimum requirements as illustrated below: -

Fabric Element	Baseline U-value (Part L)	Be Lean U-values
External Walls	0.26	0.13
Floor	0.18	0.10
Roof	0.18	0.11
Windows	1.6	1.4

Table 4: Proposed fabric ‘U’ values for the detailed part of the application

6.1.2 Cold Bridging

Thermal bridging will be minimised to reduce the loss of heat and to prevent the development of cold spots which can lead to mould.

At this early stage of design, detailed construction joint details are not available, so a target y-value has been set as detailed below.

At the appropriate stages of design and construction, the thermal bridges will be demonstrated to the Building Control Body in accordance with the requirements of Building Regulations Part L 2021.

IES VE software calculates thermal bridge heat losses for the actual building using default y-values that are 25% of the construction element ‘U’ values, in accordance with the NCM Modelling Guide.

The target improved y-values have been set at 10% of the construction element ‘U’ values, in accordance with the notional building in the NCM Modelling Guide.

6.1.3 Air Tightness

The target air permeability has been set at 3 m³/ (h m²) in residential dwellings and non-residential areas, as compared to the Part L minimum requirement of 8 m³/ (h m²) to reduce heat loss in winter.

6.1.4 Solar Gain

The size and g-value of the glazing has been optimised using the SBEM calculations and the dynamic thermal modelling for the overheating assessment, to provide a balance between minimising summer heat gain to prevent overheating, maximising winter heat gain to reduce heating loads, and maximising natural daylight to reduce lighting energy.

This has resulted in the g-value of the glazing being set as 0.40.

6.1.5 Heating Systems

In SBEM Compliance, where heat pumps are proposed as the final specification, the notional building uses a heat pump with a seasonal efficiency of 2.64 for space heating and 2.86 for hot water. This scheme is proposing to use heat pumps for communal areas and direct electric for the minimal space heating requirements in the co-living units only.

6.1.6 Hot Water

The domestic Hot Water throughout the proposed development shall be delivered via heat pumps.

6.1.7 Pipework Heat Losses

The site heating systems will be designed to minimise heat losses in accordance with the recommendations of CIBSE “Heat Networks Code of Practice for the UK” (CP1) including measures such as minimising pipework lengths and installing high level of insulation (in excess of British Standards).

6.1.8 Cooling

There was no cooling applied to the co-living units. In the commercial areas active cooling is proposed via air-to-refrigerant heat pump (VRF) systems.

Part L 2021 requires a minimum seasonal efficiency ratio of 2.5 for VRF heat pump systems operating in cooling mode, so this has also been assumed for the commercial spaces at 'Be Lean' stage.

6.1.9 Ventilation Systems

Residential

Ventilation to the residential apartments to provide fresh air and extract moisture/pollutants in accordance with Building Regulations Part F will be via low profile individual Mechanical Ventilation with Heat Recovery (MVHR) units as outlined in Figure 4. Natural ventilation through opening of windows could not be assumed based on the acoustic report issued by Sol Acoustics.

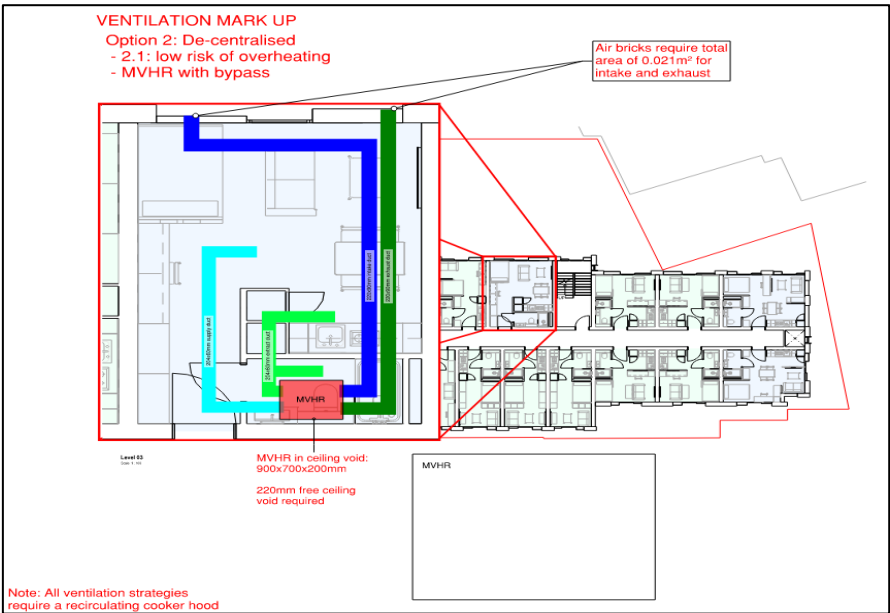


Figure 5 Illustration of proposed MVHR system

Commercial

It is expected that the commercial areas will be provided with local commercial MVHR units that will achieve ventilation values inline with Part L requirements.

6.1.10 Lighting

Energy efficient LED lighting will be used throughout the proposed development at a value of 120 Lm/W.

6.1.11 Appliances

Where appliances are provided by the developer, they will be of an energy efficient type, which generally generate less heat and can help minimise the build-up of heat within the buildings. Where appliances are not provided by the developer, owners/tenants will be encouraged to supply energy efficient equipment.

7 Heating Infrastructure (Be Clean)

7.1 Heating Infrastructure

7.1.1 Existing and Planned Heat Networks

As illustrated in figure 5, AECOM have completed a heat network feasibility study for Reading Borough Council in 2021. At the moment there is currently no heat network available which could be tapped into for this development.



Figure 6 Screenshot of the heating network feasibility study carried out

The scheme shall be future proofed with connection points to be district heating ready should a system ever materialise within Reading Town Centre. There is a centralised low temperature heat network as part of this schemes MEP solution.

7.1.2 Proposed Heat Supply Hierarchy

Using London Plan Policy SI 3 as a guide, heat source for the communal heating system is selected in accordance with the heating hierarchy shown below; -

- connect to local existing or planned heat networks
- use zero-emission or local secondary heat sources (in conjunction with heat pump, if required)
- use low-emission combined heat and power (only where there is a case for it 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)
- use ultra-low nitrogen oxides (NOx) gas boilers

As described above, it is not feasible to connect to an existing or proposed heat network.

It is therefore proposed to serve the site neat network from an on-site storage tank which uses heat pumps as the primary energy source.

8 Renewable Energy (Be Green)

8.1.1 Renewable Energy Systems (Be Green)

An assessment of the feasibility of including on-site renewable energy has been carried out and is further developed in section 8.1.2.

8.1.2 Review of Renewable Energy Technologies

Following an analysis of potential on-site renewable energy systems the development with the following technologies were considered:

- Biomass boilers.
- Photovoltaics (PVs).
- Solar thermal.
- Ground source heat pumps.
- Air source heat pumps; and

8.1.3 Biomass Boilers

Biomass boilers are better operating as the lead heat source (and not as top up) as they are not suited to operating with variable load.

Biomass boilers would also adversely impact on local air quality due to their emissions, and vehicular delivery of fuel would be required resulting in increased traffic movements.

Biomass boilers are therefore not proposed for the development.

8.1.4 Photovoltaics (PVs)

The inclusion of PV was explored as can be seen in appendix B. This would allow for a small further reduction of 0.21kg/m² of CO₂ emissions. Unfortunately, the area available on the roof for PV is limited to 80m² due to plant space, man safe system, and guard rails. This means the resulting CO₂ reduction is relatively insignificant, especially when taking into consideration the large cost and duration of repayment which would be endured.

Photovoltaics are therefore not proposed for the development.

8.1.5 Solar Thermal

A solar thermal system could provide a proportion of the hot water load but would compete with the site LTHW network serving the domestic hot water requirements of the development. Greater carbon reductions are achieved by installing photovoltaics in the limited roof space available.

Solar thermal is therefore not proposed for the development.

8.1.6 Ground Source Heat Pumps

The overall cooling load is low, resulting in a poor balance between heating and cooling demand, which would adversely impact on the potential yield from any ground source system. Additionally there would not be sufficient surrounding land for the boreholes and the system would be quite costly.

Ground source heat pumps are therefore not proposed for the development.

8.1.7 Air / Water Source Heat Pumps

As described above, heat pumps are assumed in the notional building requirements for this application.

Heat Pumps with an enhanced seasonal efficiency of 5.0, and SCoP of 5 KW/KW were employed for the “Be Green” element of this development.

Air / water source heat pumps are therefore proposed for the development.

9 Overheating Assessment

9.1 Overview

Utilising measures including solar shading, heating and ventilation of the building and appropriately coloured materials in areas of direct sunlight ensures that the proposed development is climate resistant and resilient.

The modelling and simulation of the Greyfriars residential building was completed using Integrated Environmental Solutions Virtual Environment 2023 (IESVE). This software complies with CIBSE AM11: Building performance modelling (2015b).

TM59 outlines methodology using dynamic thermal modelling tools, defined internal gains profiles and specific weather files with clearly defined thresholds to provide a clear pass/fail result. The following data was obtained by following this methodology.

The assessment aims to identify any dwellings at risk of overheating. These are likely to be those with large glazing areas, on the topmost floor, having less shading, having large sun-facing windows, or having limited opening windows.

Prior to running a SunCast simulation, as illustrated in Figures 7 and 8, the spaces seen to be experiencing the largest solar gains were those on the highest floors on the south-west of the building.

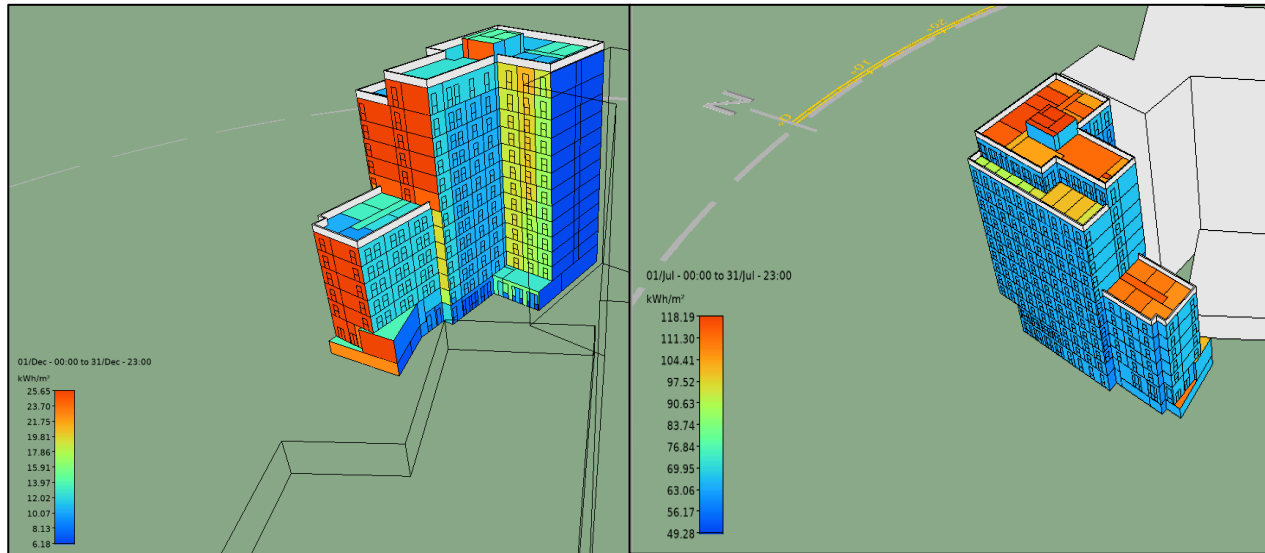


Figure 7 SunCast of the building in December

Figure 8 SunCast of the building in July

The glazing sizing was not as relevant in this case, as all the habitable areas have almost homogeneous layouts and windows. Similarly, as per the acoustic report recommendations, all windows were modelled as shut, so this did not have a great effect on the sample selection.

Additionally, TM59 outlines that communal corridors should be included in the assessment sample where heating pipework runs through them.

Taking all this information into account, the top two floors at the south-west side of the building were chosen as highlighted in Figure 9.

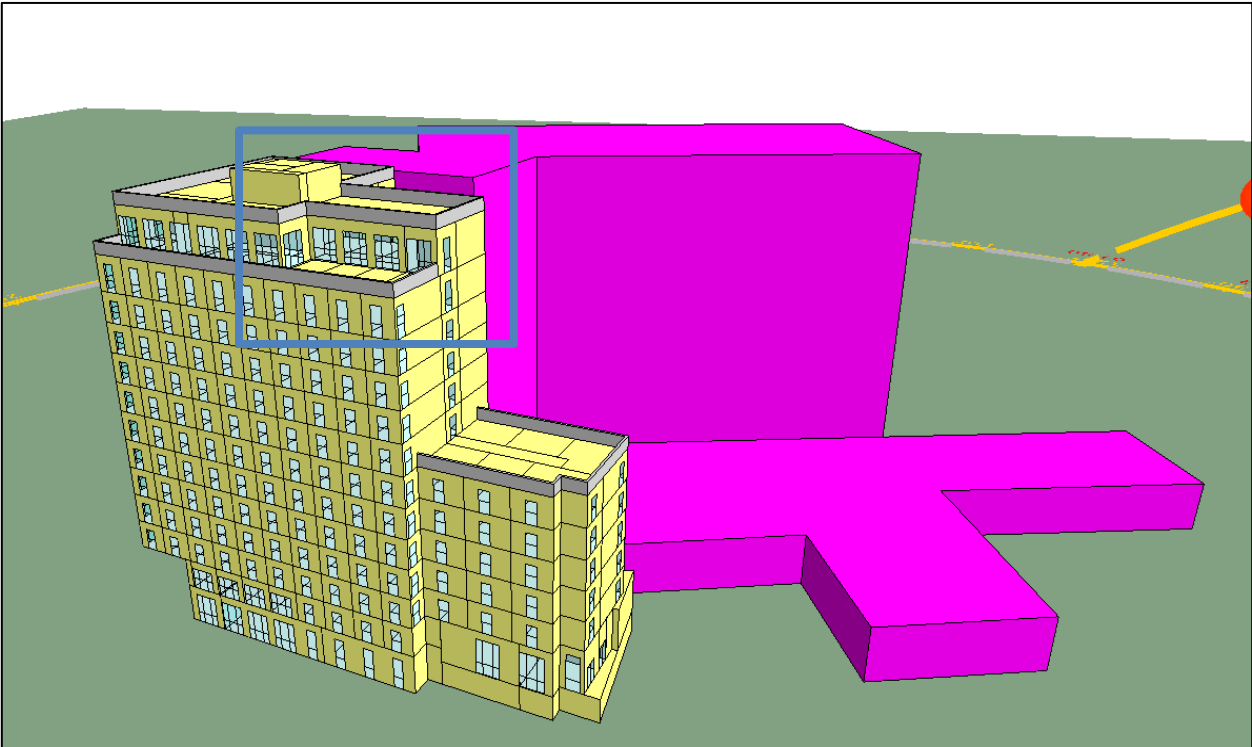


Figure 9 Illustration of selected area for sample

9.2 Weather File

A local ASHRAE Design Weather Database weather file is ordinarily prescribed on IESVE. In this case, a weather file for Reading does not exist and therefore the nearby London, Heathrow dataset, as illustrated in Figure 5, is implemented. In the event that the results of the simulation suggested a cause for concern, alternative nearby weather sets would also have been applied, for example Swindon.

Design Weather Data Source and Statistics					
Source of design weather: ASHRAE design weather database v7.0					
ASHRAE weather location: London Heathrow, United Kingdom (37720)					
Annual percentile for Heating Loads design weather (%): 99.60					
Monthly percentile for Cooling Loads design weather (%): 0.40					
Heating Loads Weather Data					
Outdoor Winter Design Temperature (°C): -2.30					
Cooling Loads Weather Data					
Adjust max. outside temps (°C)...					
Dry-bulb: 31.50 Wet-bulb: 19.90 Apply					
Display: ☐ ASHRAE / ☒ CIBSE Hourly temp. variation: ☐ Sinusoidal / ☒ ASHRAE standard					
Time lag: 3.00 hour(s)					
	Min Tdb (°C)	Max Tdb (°C)	Min Twb (°C)	Twb at Max Tdb (°C)	Linke Turbidity Factor
January	7.80	13.50	6.20	11.60	2.100
February	8.30	14.80	6.00	10.90	2.200
March	9.10	18.10	6.10	11.50	2.500
April	12.40	23.50	8.90	14.60	2.900
May	14.00	26.00	11.00	16.80	3.200
June	17.60	29.90	13.40	18.90	3.400
July	19.00	31.50	15.20	19.90	3.500
August	19.50	31.20	15.40	19.90	3.300
September	16.50	26.70	13.30	18.00	2.900
October	14.10	21.60	12.20	16.80	2.600
November	10.80	16.40	9.90	14.40	2.300
December	9.50	14.40	7.90	12.50	2.200

Figure 10 Weather data set for Heathrow, London

9.3 Internal Gains

Lighting, occupancy, and equipment were all modelled in accordance with TM59.

9.3.1 Lighting

The lighting was assumed to be proportional to the floor area, measured in W/m². From 6pm-11pm 2W/m² was applied. This is a worst-case scenario, however, in communal spaces the introduction of Passive Infrared sensors would allow this value to be zero.

9.3.2 Occupancy and Equipment

Based on CIBSE Guide A(2015a) a maximum sensible heat gain of 75W and a maximum latent heat gain of 55W/person was applied with a 30% reduction during sleeping hours based on addendum g to ANSI/ASHRAE standard 55-2010.

The chosen occupancy profiles consider there to be no difference between weekdays and weekends. Occupied hours were totaled as described in CIBSE TM52 from May to September inclusive.

Based on TM59, both the standard and large apartment types follow a thermal profile of a studio:

- 2 people are always present.
- Peak Load of 450 W from 6pm-8pm
- 200W from 8pm-10pm
- 110W from 9am-6pm and from 10pm-12pm
- Base load of 85W for the rest of the day

9.3.3 Pipework

Heat loss from piping was calculated as per TM59, and a 5W/m loss was applied.

9.4 Results

The thermal comfort category assumed based on CIBSE TM52 was category II. It can be concluded from the following results that the building **passes** CIBSE TM59 which includes TM52 Criterion 1. This confirms that enhanced ventilation will not be required. It can be noted that Criterion 2 and 3 of TM52 may fail to be met for a residential building, as long as part a and b of TM59 are passed for all relevant rooms. Compliance is based on passing the following tests:

9.4.1 TM59 4.2(A) / TM52 Criterion 1

“For living rooms, kitchens and bedrooms: the number of hours during which ΔT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3% of occupied hours.”

Figure 7 illustrates the results of all living areas. It can be seen that the Operative Temperature exceeds the Max Adaptive Temperature in May.

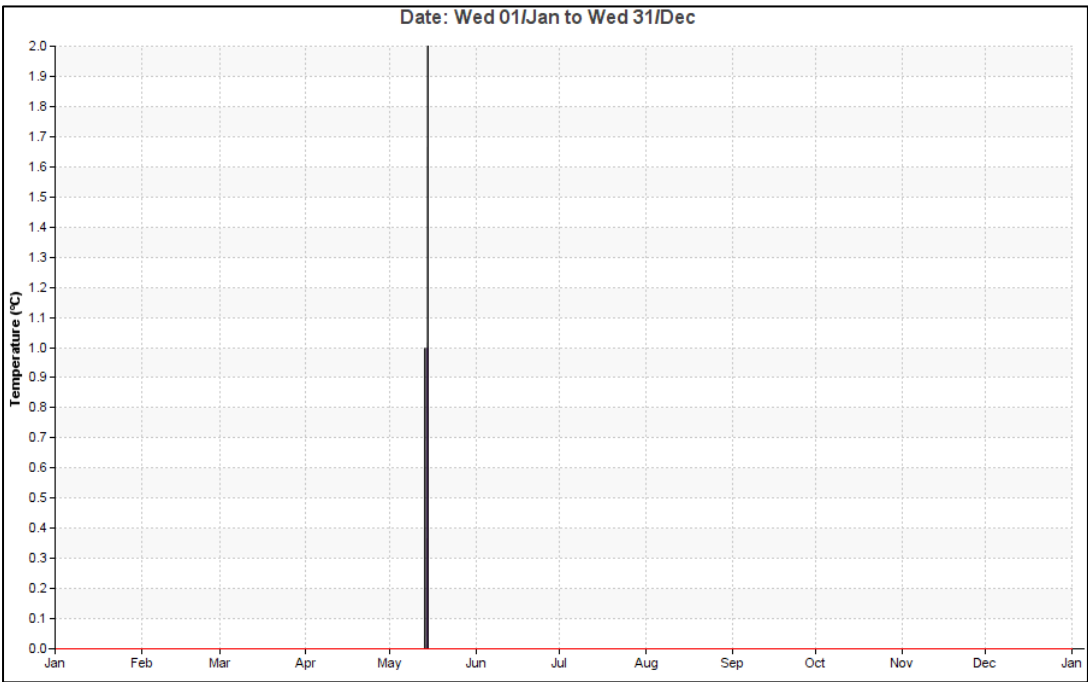


Figure 11 Operative Temperatures exceedance of max adaptive Temperature

Further assessment found that it was exclusively on the 14th May when this occurred. Outlined in the region above the shaded area in Figure 8 is the hours for which this exceedance by 1K was reached. The 2.5-hour incident represents less than 1% of the 3672 hours occupied.

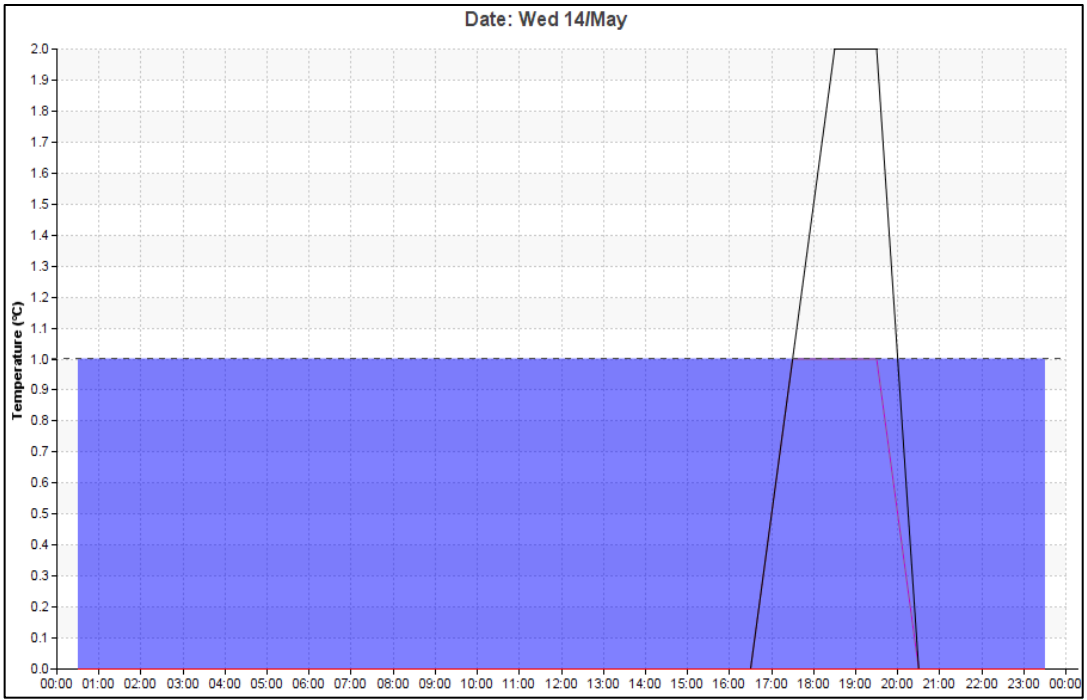


Figure 12 Exceedance of Max Adaptive Temperature on 14th May

9.4.2 TM59 4.2(B)

“For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7am shall not exceed 26°C for more than 1% of annual hours.”

Figure 9 outlines the Operative Temperatures of bedrooms within the May-September time period. This total time above 26°C amounts to a value of 15 hours or 0.005%.

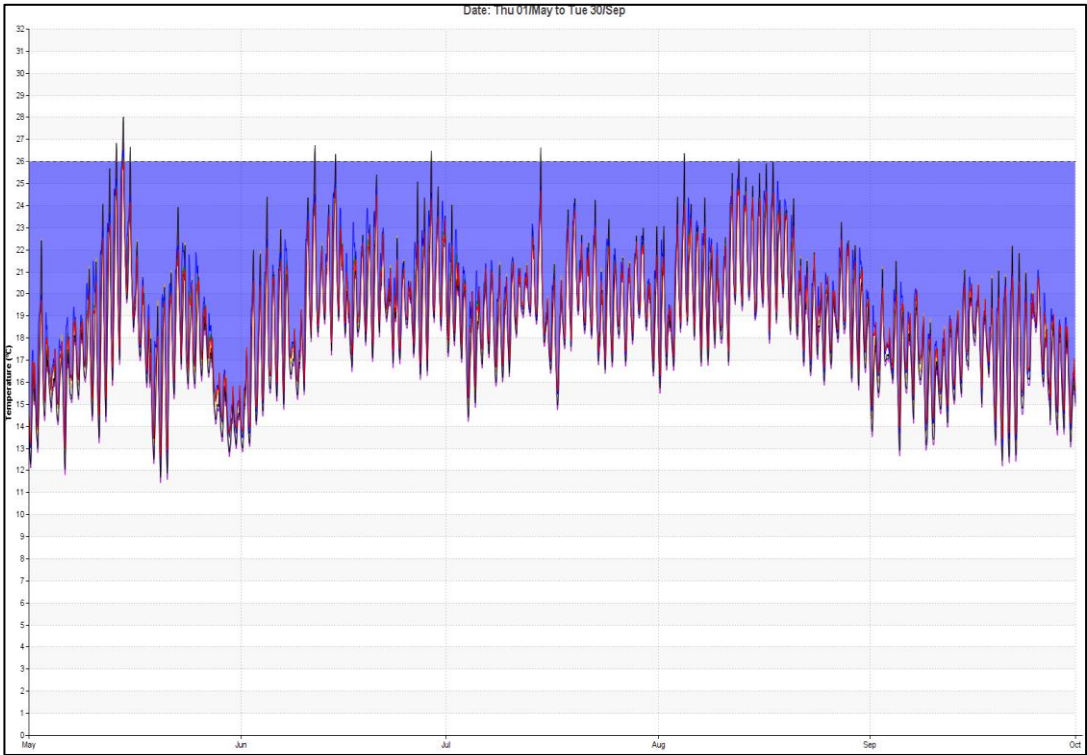


Figure 13 Exceedance of 26 degrees between May and September

9.4.3 TM59 4.3 / CIBSE Guide A (2015a)

“For homes with restricted window openings, the CIBSE fixed temperature test must be followed, i.e. all occupied rooms should not exceed an operative temperature of 26°C for more than 3% of the annual occupied hours.”

A value of 17 hours exceedance can be seen in Figure 10 which is equivalent to under 1%

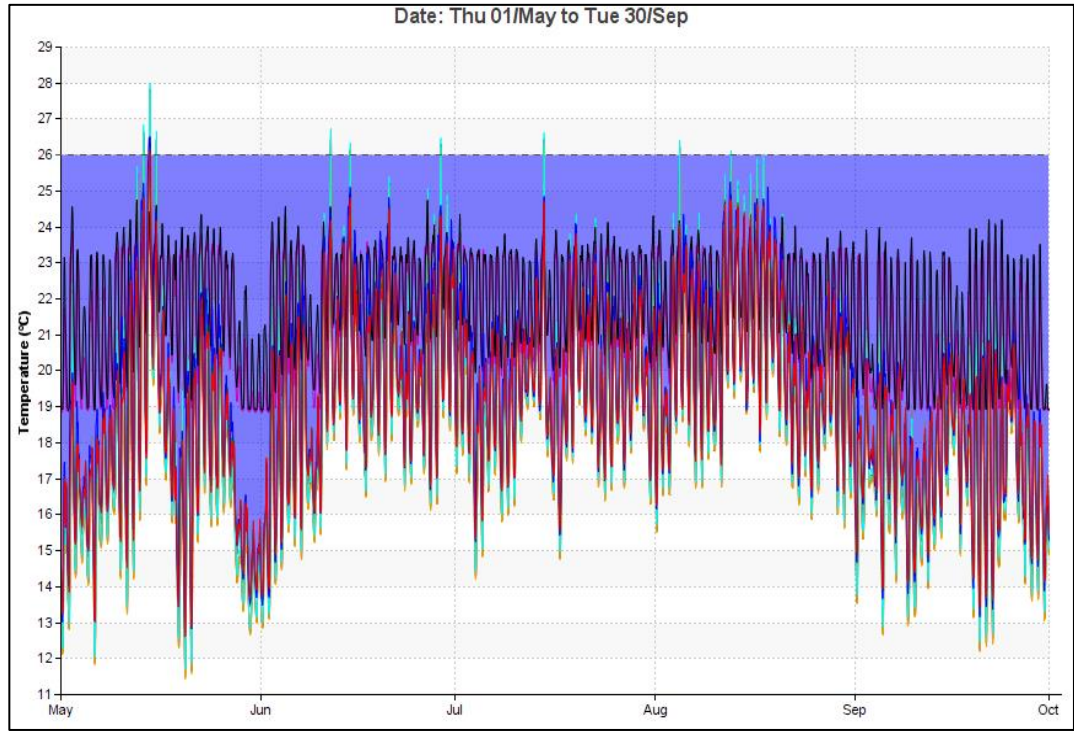


Figure 14 Exceedance of 26 degrees between May and September

9.4.4 Corridor

There is no existing mandatory target to meet in communal corridors, however according to TM59, if an operative temperature of 28°C is exceeded for more than 3% of the total annual hours, then this should be identified as a significant risk.

It can be seen from Figure 11 that the operative temperature of the corridor remains under 24°C for the entirety of May – September and therefore is no cause for concern.

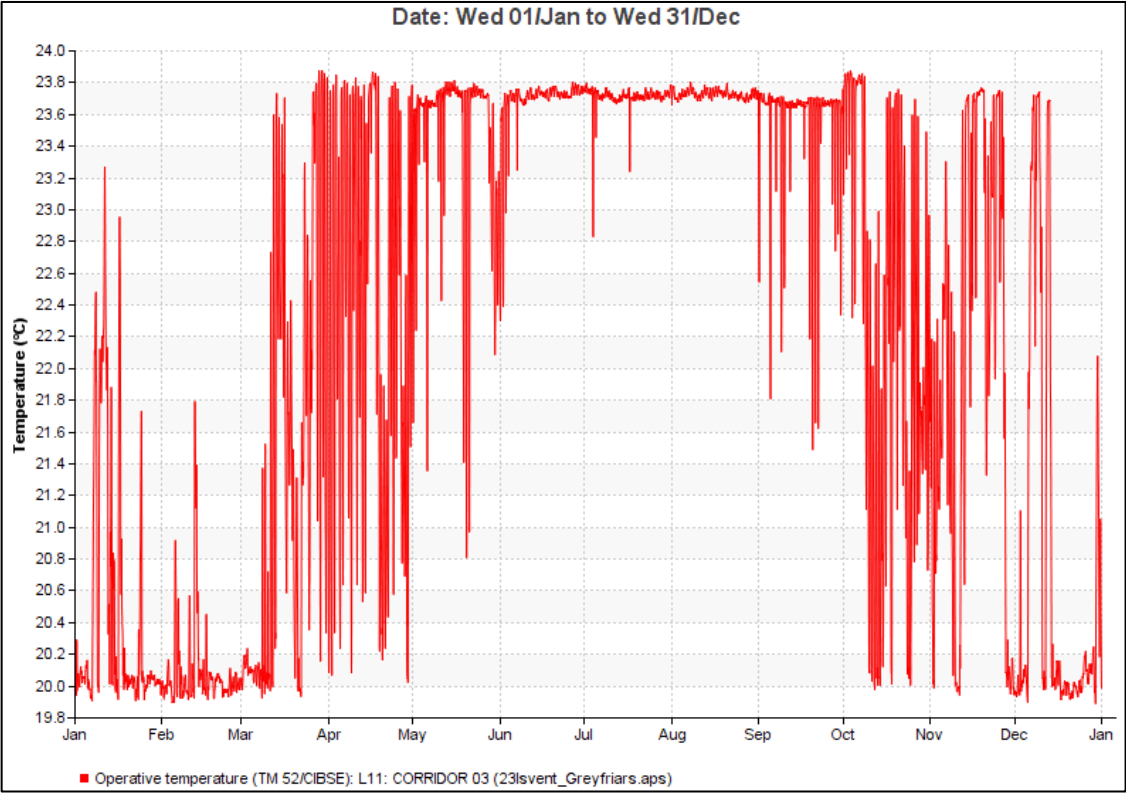


Figure 15 Operative Corridor Temperature in May

Appendix A.1 – BRUKL REPORT (Be Lean)

BRUKL Output Document



Compliance with England Building Regulations Part L 2021

Project name

241005_Greyfriars

As designed

Date: Mon Nov 04 17:11:10 2024

Administrative information

Building Details

Address: Address 1, City, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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]: 544.01

The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	6.25
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	6.12
Target primary energy rate (TPER), kWh _{PE} /m ² annum	64.57
Building primary energy rate (BPER), kWh _{PE} /m ² annum	63.21
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-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.13	0.16	L0000036:Surf[3]
Floors	0.18	0.1	0.11	L0000000:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.11	0.11	L00000F3:Surf[5]
Windows** and roof windows	1.6	1.4	1.4	L0000000:Surf[2]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1	1	L1000014:Surf[1]
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-Limit} = Limiting area-weighted average U-values [W/(m ² K)] U _{a-Calc} = Calculated area-weighted average U-values [W/(m ² K)] U _{i-Calc} = Calculated maximum individual element U-values [W/(m ² K)] * Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows. ** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position. ^ For fire doors, limiting U-value is 1.8 W/m ² K NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				

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

Building services

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

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

1- Commercial

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5	5	0	1.2	0.85
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- Dwellings Systems (New)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	-	-
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

3- Resident's kitchen

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	5	0	0.3	-
Standard value	N/A	4.5**	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 air-cooled chillers >=400 kW. For chillers <400 kW, limiting SEER is 4.					
^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

1- hot water- commercial

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.5	-
Standard value	2*	N/A
* Standard shown is for all types except absorption and gas engine heat pumps.		

2- hot water- resi

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.5	-
Standard value	2*	N/A
* Standard shown is for all types except absorption and gas engine heat pumps.		

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

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
L00: GYM	120	-	-
L00: STAIR 01	120	-	-
L00: LIFT	120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
L00: LIFT LOBBY		120	-	-
L00: CO-WORK		120	-	-
L00: ANCILLARY 01		120	-	-
L02: CORRIDOR 04		120	-	-
L04: CORRIDOR 03		120	-	-
L04: CORRIDOR 02		120	-	-
L04: STANDARD 19		120	-	-
L04: STANDARD 18		120	-	-
L04: STANDARD 06		120	-	-
L04: STANDARD 07		120	-	-
L04: LARGE 03		120	-	-
L04: STANDARD 08		120	-	-
L04: STANDARD 09		120	-	-
L04: CORRIDOR 04		120	-	-
L04: LARGE 02		120	-	-
L04: CORRIDOR 01		120	-	-
L04: STAIR 02		120	-	-
L05: STANDARD 01		120	-	-
L05: STAIR 01		120	-	-
L05: LIFT LOBBY		120	-	-
L05: STANDARD 02		120	-	-
L05: STANDARD 03		120	-	-
L05: STANDARD 24		120	-	-
L05: STANDARD 23		120	-	-
L05: STANDARD 22		120	-	-
L05: STANDARD 21		120	-	-
L05: STANDARD 20		120	-	-
L05: STANDARD 04		120	-	-
L05: LARGE 01		120	-	-
L05: STANDARD 05		120	-	-
L05: STANDARD 10		120	-	-
L05: STANDARD 11		120	-	-
L05: STANDARD 12		120	-	-
L05: STANDARD 13		120	-	-
L05: STANDARD 14		120	-	-
L05: STANDARD 15		120	-	-
L05: STANDARD 16		120	-	-
L05: STANDARD 17		120	-	-
L05: LIFT		120	-	-
L05: CORRIDOR 03		120	-	-
L05: CORRIDOR 02		120	-	-
L05: STANDARD 19		120	-	-
L05: STANDARD 18		120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
L05: STANDARD 06		120	-	-
L05: STANDARD 07		120	-	-
L05: LARGE 03		120	-	-
L05: STANDARD 08		120	-	-
L05: STANDARD 09		120	-	-
L05: CORRIDOR 04		120	-	-
L05: LARGE 02		120	-	-
L05: CORRIDOR 01		120	-	-
L05: STAIR 02		120	-	-
L06: STANDARD 01		120	-	-
L06: STAIR 01		120	-	-
L06: LIFT LOBBY		120	-	-
L06: STANDARD 02		120	-	-
L06: STANDARD 03		120	-	-
L06: STANDARD 24		120	-	-
L06: STANDARD 23		120	-	-
L06: STANDARD 22		120	-	-
L06: STANDARD 21		120	-	-
L06: STANDARD 20		120	-	-
L06: STANDARD 04		120	-	-
L06: LARGE 01		120	-	-
L06: STANDARD 05		120	-	-
L06: STANDARD 10		120	-	-
L06: STANDARD 11		120	-	-
L06: STANDARD 12		120	-	-
L06: STANDARD 13		120	-	-
L06: STANDARD 14		120	-	-
L06: STANDARD 15		120	-	-
L06: STANDARD 16		120	-	-
L06: STANDARD 17		120	-	-
L06: LIFT		120	-	-
L06: CORRIDOR 03		120	-	-
L06: CORRIDOR 02		120	-	-
L06: STANDARD 19		120	-	-
L06: STANDARD 18		120	-	-
L06: STANDARD 06		120	-	-
L06: STANDARD 07		120	-	-
L06: LARGE 03		120	-	-
L06: STANDARD 08		120	-	-
L06: STANDARD 09		120	-	-
L06: CORRIDOR 04		120	-	-
L06: LARGE 02		120	-	-
L06: CORRIDOR 01		120	-	-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]	
	Standard value	95	80	0.3	
L06: STAIR 02		120	-	-	
L07: STANDARD 01		120	-	-	
L07: STAIR 01		120	-	-	
L00: FITNESS STUDIO		120	-	-	
L01: STAIR 01		120	-	-	
L01: LIFT LOBBY		120	-	-	
L01: CORRIDOR 03		120	-	-	
L01: LARGE 01		120	-	-	
L01: STANDARD 07		120	-	-	
L01: STANDARD 08		120	-	-	
L01: STANDARD 09		120	-	-	
L00: CORRIDOR 01		120	-	-	
L02: LIFT LOBBY		120	-	-	
L02: STANDARD 02		120	-	-	
L02: STANDARD 03		120	-	-	
L02: STANDARD 24		120	-	-	
L02: STANDARD 23		120	-	-	
L02: STANDARD 22		120	-	-	
L00: CORRIDOR 02		120	-	-	
L02: STANDARD 09		120	-	-	
L02: STANDARD 10		120	-	-	
L02: STANDARD 11		120	-	-	
L02: STANDARD 12		120	-	-	
L02: STANDARD 13		120	-	-	
L02: STANDARD 14		120	-	-	
L00: LOUNGE		120	-	-	
L02: CORRIDOR 02		120	-	-	
L02: STANDARD 06		120	-	-	
L02: STANDARD 07		120	-	-	
L01: CORRIDOR 01		120	-	-	
L02: LARGE 02		120	-	-	
L00: CORRIDOR 03		120	-	-	
L03: STANDARD 21		120	-	-	
L03: STANDARD 20		120	-	-	
L03: STANDARD 04		120	-	-	
L03: LARGE 01		120	-	-	
L03: STANDARD 05		120	-	-	
L03: STANDARD 10		120	-	-	
L00: ANCILLARY 02		120	-	-	
L03: CORRIDOR 03		120	-	-	
L03: CORRIDOR 02		120	-	-	
L03: STANDARD 19		120	-	-	
L03: STANDARD 18		120	-	-	

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]		Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95		80	0.3
L03: STANDARD 06		120		-	-
L03: STANDARD 07		120		-	-
L00: ENTRANCE LOUNGE+CAFE		120		-	-
L04: STAIR 01		120		-	-
L04: LIFT LOBBY		120		-	-
L04: STANDARD 02		120		-	-
L04: STANDARD 03		120		-	-
L04: STANDARD 24		120		-	-
L04: STANDARD 23		120		-	-
L01: STAIR 02		120		-	-
L04: STANDARD 14		120		-	-
L04: STANDARD 15		120		-	-
L04: STANDARD 16		120		-	-
L04: STANDARD 17		120		-	-
L04: LIFT		120		-	-
L01: LIFT		120		-	-
L07: STANDARD 05		120		-	-
L07: STANDARD 10		120		-	-
L07: STANDARD 11		120		-	-
L07: STANDARD 12		120		-	-
L07: STANDARD 13		120		-	-
L00: CORRIDOR 05		120		-	-
L07: STAIR 02		120		-	-
L07: CORRIDOR 04		120		-	-
L08: STANDARD 01		120		-	-
L08: STAIR 01		120		-	-
L08: LIFT LOBBY		120		-	-
L08: STANDARD 04		120		-	-
L08: LARGE 01		120		-	-
L08: STANDARD 05		120		-	-
L07: STANDARD 18		120		-	-
L08: STANDARD 10		120		-	-
L08: STANDARD 11		120		-	-
L08: STANDARD 17		120		-	-
L08: STANDARD 19		120		-	-
L08: CORRIDOR 01		120		-	-
L08: STAIR 02		120		-	-
L09: STANDARD 17		120		-	-
L09: STANDARD 04		120		-	-
L09: LARGE 01		120		-	-
L09: STANDARD 05		120		-	-
L08: STANDARD 18		120		-	-
L09: STANDARD 10		120		-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
L01: STANDARD 01		120	-	-
L09: CORRIDOR 02		120	-	-
L09: STANDARD 17		120	-	-
L09: STANDARD 19		120	-	-
L09: CORRIDOR 01		120	-	-
L01: STANDARD 18		120	-	-
L10: STANDARD 18		120	-	-
L10: STANDARD 17		120	-	-
L10: STANDARD 04		120	-	-
L10: LARGE 01		120	-	-
L10: STANDARD 05		120	-	-
L09: STANDARD 18		120	-	-
L10: CORRIDOR 03		120	-	-
L10: CORRIDOR 02		120	-	-
L10: STANDARD 17		120	-	-
L10: STANDARD 19		120	-	-
L10: CORRIDOR 01		120	-	-
L01: STANDARD 02		120	-	-
L01: CORRIDOR 04		120	-	-
L01: STANDARD 06		120	-	-
L01: STANDARD 03		120	-	-
L01: STANDARD 17		120	-	-
L01: STANDARD 16		120	-	-
L01: STANDARD 15		120	-	-
L01: STANDARD 14		120	-	-
L01: STANDARD 04		120	-	-
L01: STANDARD 05		120	-	-
L01: CORRIDOR 02		120	-	-
L01: STANDARD 10		120	-	-
L01: STANDARD 11		120	-	-
L01: STANDARD 12		120	-	-
L01: STANDARD 13		120	-	-
L01: LARGE 02		120	-	-
L00: CORRIDOR 04		120	-	-
L00: CORRIDOR 06		120	-	-
L00: STAIR 02		120	-	-
L02: STANDARD 01		120	-	-
L02: STAIR 01		120	-	-
L02: STANDARD 21		120	-	-
L02: STANDARD 20		120	-	-
L02: LARGE 03		120	-	-
L02: STAIR 02		120	-	-
L02: STANDARD 04		120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
L02: LARGE 01		120	-	-
L02: STANDARD 05		120	-	-
L02: STANDARD 19		120	-	-
L02: STANDARD 08		120	-	-
L02: STANDARD 15		120	-	-
L02: STANDARD 16		120	-	-
L02: STANDARD 17		120	-	-
L02: STANDARD 18		120	-	-
L02: LIFT		120	-	-
L02: CORRIDOR 01		120	-	-
L02: CORRIDOR 03		120	-	-
L01: CORRIDOR 04		120	-	-
L03: STANDARD 01		120	-	-
L03: STAIR 01		120	-	-
L03: LIFT LOBBY		120	-	-
L03: STANDARD 02		120	-	-
L03: STANDARD 03		120	-	-
L03: STANDARD 24		120	-	-
L03: STANDARD 23		120	-	-
L03: STANDARD 22		120	-	-
L03: STANDARD 11		120	-	-
L03: STANDARD 12		120	-	-
L03: STANDARD 13		120	-	-
L03: STANDARD 14		120	-	-
L03: STANDARD 15		120	-	-
L03: STANDARD 16		120	-	-
L03: STANDARD 17		120	-	-
L03: LIFT		120	-	-
L03: LARGE 03		120	-	-
L03: STANDARD 08		120	-	-
L03: STANDARD 09		120	-	-
L03: CORRIDOR 04		120	-	-
L03: LARGE 02		120	-	-
L03: CORRIDOR 01		120	-	-
L03: STAIR 02		120	-	-
L04: STANDARD 01		120	-	-
L04: STANDARD 22		120	-	-
L04: STANDARD 21		120	-	-
L04: STANDARD 20		120	-	-
L04: STANDARD 04		120	-	-
L04: LARGE 01		120	-	-
L04: STANDARD 05		120	-	-
L04: STANDARD 10		120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
L04: STANDARD 11		120	-	-
L04: STANDARD 12		120	-	-
L04: STANDARD 13		120	-	-
L07: LIFT LOBBY		120	-	-
L07: STANDARD 02		120	-	-
L07: STANDARD 03		120	-	-
L07: STANDARD 21		120	-	-
L07: STANDARD 20		120	-	-
L07: STANDARD 19		120	-	-
L07: STANDARD 18		120	-	-
L07: STANDARD 17		120	-	-
L07: STANDARD 04		120	-	-
L07: LARGE 01		120	-	-
L07: STANDARD 14		120	-	-
L07: STANDARD 15		120	-	-
L07: STANDARD 16		120	-	-
L07: LIFT		120	-	-
L07: CORRIDOR 03		120	-	-
L07: CORRIDOR 02		120	-	-
L07: STANDARD 17		120	-	-
L07: STANDARD 19		120	-	-
L08: STANDARD 02		120	-	-
L07: CORRIDOR 01		120	-	-
L08: STANDARD 03		120	-	-
L08: STANDARD 21		120	-	-
L08: STANDARD 20		120	-	-
L08: STANDARD 19		120	-	-
L08: STANDARD 18		120	-	-
L08: STANDARD 17		120	-	-
L08: STANDARD 12		120	-	-
L08: STANDARD 13		120	-	-
L08: STANDARD 14		120	-	-
L08: STANDARD 15		120	-	-
L08: STANDARD 16		120	-	-
L08: LIFT		120	-	-
L08: CORRIDOR 03		120	-	-
L08: CORRIDOR 02		120	-	-
L08: CORRIDOR 04		120	-	-
L09: STANDARD 01		120	-	-
L09: STAIR 01		120	-	-
L09: LIFT LOBBY		120	-	-
L09: STANDARD 02		120	-	-
L09: STANDARD 03		120	-	-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]		Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95		80	0.3
L09: STANDARD 21		120		-	-
L09: STANDARD 20		120		-	-
L09: STANDARD 19		120		-	-
L09: STANDARD 18		120		-	-
L09: STANDARD 11		120		-	-
L09: STANDARD 12		120		-	-
L09: STANDARD 13		120		-	-
L09: STANDARD 14		120		-	-
L09: STANDARD 15		120		-	-
L09: STANDARD 16		120		-	-
L09: LIFT		120		-	-
L09: CORRIDOR 03		120		-	-
L09: STAIR 02		120		-	-
L09: CORRIDOR 04		120		-	-
L10: STANDARD 01		120		-	-
L10: STAIR 01		120		-	-
L10: LIFT LOBBY		120		-	-
L10: STANDARD 02		120		-	-
L10: STANDARD 03		120		-	-
L10: STANDARD 21		120		-	-
L10: STANDARD 20		120		-	-
L10: STANDARD 19		120		-	-
L10: STANDARD 10		120		-	-
L10: STANDARD 11		120		-	-
L10: STANDARD 12		120		-	-
L10: STANDARD 13		120		-	-
L10: STANDARD 14		120		-	-
L10: STANDARD 15		120		-	-
L10: STANDARD 16		120		-	-
L10: LIFT		120		-	-
L10: STAIR 02		120		-	-
L10: CORRIDOR 04		120		-	-
L10: STANDARD 18		120		-	-
L11: STANDARD 04		120		-	-
L11: LARGE 01		120		-	-
L11: STANDARD 05		120		-	-
L12: RESIDENTS KITCHEN		120		-	-
L12: PRIVET EVENT ROOM		120		-	-
L12: CORRIDOR 01		120		-	-
L13: LIFT		120		-	-
L11: CORRIDOR 01		120		-	-
L11: STAIR 02		120		-	-
L11: STANDARD 10		120		-	-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80		0.3
L11: STANDARD 11		120	-		-
L11: STANDARD 12		120	-		-
L11: STANDARD 13		120	-		-
L11: STANDARD 14		120	-		-
L11: STANDARD 15		120	-		-
L11: STANDARD 01		120	-		-
L11: STAIR 01		120	-		-
L11: LIFT LOBBY		120	-		-
L11: STANDARD 02		120	-		-
L11: STANDARD 03		120	-		-
L11: STANDARD 21		120	-		-
L11: STANDARD 20		120	-		-
L11: STANDARD 19		120	-		-
L11: STANDARD 18		120	-		-
L11: STANDARD 17		120	-		-
L12: MEETING ROOM		120	-		-
L12: CORRIDOR 01		120	-		-
L12: AMENITY		120	-		-
L13: STAIR 01		120	-		-
L13: LIFT LOBBY		120	-		-
L11: LIFT		120	-		-
L11: CORRIDOR 03		120	-		-
L11: CORRIDOR 02		120	-		-
L11: CORRIDOR 04		120	-		-
L12: STANDARD 01		120	-		-
L12: STAIR 01		120	-		-
L12: LIFT LOBBY		120	-		-
L12: STANDARD 02		120	-		-
L12: STANDARD 03		120	-		-
L12: STANDARD 06		120	-		-
L12: STANDARD 05		120	-		-
L12: STANDARD 04		120	-		-
L11: STANDARD 16		120	-		-
L11: STANDARD 17		120	-		-
L11: STANDARD 19		120	-		-
L11: STANDARD 18		120	-		-
L12: LIFT		120	-		-
L12: STAIR 02		120	-		-
L12: CORRIDOR 04		120	-		-

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

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L00: GYM	NO (-56.6%)	NO
L00: CO-WORK	YES (+66.7%)	NO
L04: STANDARD 19	NO (-58.8%)	NO
L04: STANDARD 18	NO (-43.2%)	NO
L04: STANDARD 06	NO (-63.8%)	NO
L04: STANDARD 07	NO (-60%)	NO
L04: LARGE 03	NO (-67.3%)	NO
L04: STANDARD 08	NO (-57.8%)	NO
L04: STANDARD 09	NO (-60.8%)	NO
L04: LARGE 02	NO (-64.3%)	NO
L05: STANDARD 01	NO (-91.2%)	NO
L05: STANDARD 02	NO (-71.2%)	NO
L05: STANDARD 03	NO (-76.8%)	NO
L05: STANDARD 24	NO (-88.2%)	NO
L05: STANDARD 23	NO (-62.6%)	NO
L05: STANDARD 22	NO (-63.2%)	NO
L05: STANDARD 21	NO (-62.6%)	NO
L05: STANDARD 20	NO (-66.3%)	NO
L05: STANDARD 04	NO (-81.7%)	NO
L05: LARGE 01	NO (-62.8%)	NO
L05: STANDARD 05	NO (-78.8%)	NO
L05: STANDARD 10	NO (-40.5%)	NO
L05: STANDARD 11	NO (-42.3%)	NO
L05: STANDARD 12	NO (-43.2%)	NO
L05: STANDARD 13	NO (-42.3%)	NO
L05: STANDARD 14	NO (-42.3%)	NO
L05: STANDARD 15	NO (-43.2%)	NO
L05: STANDARD 16	NO (-42.3%)	NO
L05: STANDARD 17	NO (-42.3%)	NO
L05: STANDARD 19	NO (-58.8%)	NO
L05: STANDARD 18	NO (-43.2%)	NO
L05: STANDARD 06	NO (-62.3%)	NO
L05: STANDARD 07	NO (-57.8%)	NO
L05: LARGE 03	NO (-67.3%)	NO
L05: STANDARD 08	NO (-57.8%)	NO
L05: STANDARD 09	NO (-60.8%)	NO
L05: LARGE 02	NO (-62.8%)	NO
L06: STANDARD 01	NO (-91.2%)	NO
L06: STANDARD 02	NO (-70.6%)	NO
L06: STANDARD 03	NO (-76.7%)	NO
L06: STANDARD 24	NO (-88.2%)	NO
L06: STANDARD 23	NO (-62.6%)	NO
L06: STANDARD 22	NO (-63.2%)	NO
L06: STANDARD 21	NO (-62.6%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L06: STANDARD 20	NO (-66.3%)	NO
L06: STANDARD 04	NO (-81.6%)	NO
L06: LARGE 01	NO (-60.1%)	NO
L06: STANDARD 05	NO (-77.6%)	NO
L06: STANDARD 10	NO (-38.3%)	NO
L06: STANDARD 11	NO (-42.3%)	NO
L06: STANDARD 12	NO (-43.2%)	NO
L06: STANDARD 13	NO (-42.3%)	NO
L06: STANDARD 14	NO (-42.3%)	NO
L06: STANDARD 15	NO (-43.2%)	NO
L06: STANDARD 16	NO (-42.3%)	NO
L06: STANDARD 17	NO (-42.3%)	NO
L06: STANDARD 19	NO (-58.8%)	NO
L06: STANDARD 18	NO (-43.2%)	NO
L06: STANDARD 06	NO (-58.8%)	NO
L06: STANDARD 07	NO (-55.2%)	NO
L06: LARGE 03	NO (-67.3%)	NO
L06: STANDARD 08	NO (-57.8%)	NO
L06: STANDARD 09	NO (-60.8%)	NO
L06: LARGE 02	NO (-62.2%)	NO
L07: STANDARD 01	NO (-90.8%)	NO
L00: FITNESS STUDIO	NO (-52%)	NO
L01: LARGE 01	NO (-69.5%)	NO
L01: STANDARD 07	NO (-42.3%)	NO
L01: STANDARD 08	NO (-43.2%)	NO
L01: STANDARD 09	NO (-43%)	NO
L02: STANDARD 02	NO (-71.5%)	NO
L02: STANDARD 03	NO (-76.9%)	NO
L02: STANDARD 24	NO (-88.2%)	NO
L02: STANDARD 23	NO (-62.6%)	NO
L02: STANDARD 22	NO (-63.2%)	NO
L02: STANDARD 09	NO (-60.9%)	NO
L02: STANDARD 10	NO (-42.3%)	NO
L02: STANDARD 11	NO (-42.3%)	NO
L02: STANDARD 12	NO (-43.2%)	NO
L02: STANDARD 13	NO (-42.3%)	NO
L02: STANDARD 14	NO (-42.3%)	NO
L00: LOUNGE	NO (-17.3%)	NO
L02: STANDARD 06	NO (-66.8%)	NO
L02: STANDARD 07	NO (-64.1%)	NO
L02: LARGE 02	NO (-65.2%)	NO
L03: STANDARD 21	NO (-62.6%)	NO
L03: STANDARD 20	NO (-66.3%)	NO
L03: STANDARD 04	NO (-82.3%)	NO
L03: LARGE 01	NO (-67.4%)	NO
L03: STANDARD 05	NO (-80.4%)	NO
L03: STANDARD 10	NO (-42.2%)	NO
L03: STANDARD 19	NO (-58.8%)	NO
L03: STANDARD 18	NO (-43.2%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L03: STANDARD 06	NO (-65.9%)	NO
L03: STANDARD 07	NO (-61.8%)	NO
L00: ENTRANCE LOUNGE+CAFE	YES (+11.5%)	NO
L04: STANDARD 02	NO (-71.5%)	NO
L04: STANDARD 03	NO (-76.9%)	NO
L04: STANDARD 24	NO (-88.2%)	NO
L04: STANDARD 23	NO (-62.6%)	NO
L04: STANDARD 14	NO (-42.3%)	NO
L04: STANDARD 15	NO (-43.2%)	NO
L04: STANDARD 16	NO (-42.3%)	NO
L04: STANDARD 17	NO (-42.3%)	NO
L07: STANDARD 05	NO (-76.2%)	NO
L07: STANDARD 10	NO (-64.7%)	NO
L07: STANDARD 11	NO (-42.3%)	NO
L07: STANDARD 12	NO (-43.2%)	NO
L07: STANDARD 13	NO (-42.3%)	NO
L08: STANDARD 01	NO (-90.3%)	NO
L08: STANDARD 04	NO (-80.3%)	NO
L08: LARGE 01	NO (-54.9%)	NO
L08: STANDARD 05	NO (-75.3%)	NO
L07: STANDARD 18	NO (-43.2%)	NO
L08: STANDARD 10	NO (-64.2%)	NO
L08: STANDARD 11	NO (-42.3%)	NO
L08: STANDARD 17	NO (-42.3%)	NO
L08: STANDARD 19	NO (-58.8%)	NO
L09: STANDARD 17	NO (-66.3%)	NO
L09: STANDARD 04	NO (-79.4%)	NO
L09: LARGE 01	NO (-50.5%)	NO
L09: STANDARD 05	NO (-74.6%)	NO
L08: STANDARD 18	NO (-43.2%)	NO
L09: STANDARD 10	NO (-64.2%)	NO
L01: STANDARD 01	NO (-91.8%)	NO
L09: STANDARD 17	NO (-42.3%)	NO
L09: STANDARD 19	NO (-58.8%)	NO
L01: STANDARD 18	NO (-72.8%)	NO
L10: STANDARD 18	NO (-62.6%)	NO
L10: STANDARD 17	NO (-66.3%)	NO
L10: STANDARD 04	NO (-77%)	NO
L10: LARGE 01	NO (-46.8%)	NO
L10: STANDARD 05	NO (-71.8%)	NO
L09: STANDARD 18	NO (-43.2%)	NO
L10: STANDARD 17	NO (-42.3%)	NO
L10: STANDARD 19	NO (-58.8%)	NO
L01: STANDARD 02	NO (-71.8%)	NO
L01: STANDARD 06	NO (-64.6%)	NO
L01: STANDARD 03	NO (-76.9%)	NO
L01: STANDARD 17	NO (-13.7%)	NO
L01: STANDARD 16	NO (-15%)	NO
L01: STANDARD 15	NO (-14%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L01: STANDARD 14	NO (-24.5%)	NO
L01: STANDARD 04	NO (-82.4%)	NO
L01: STANDARD 05	NO (-80.6%)	NO
L01: STANDARD 10	YES (+33.2%)	NO
L01: STANDARD 11	YES (+31.2%)	NO
L01: STANDARD 12	YES (+33.2%)	NO
L01: STANDARD 13	YES (+33.2%)	NO
L01: LARGE 02	NO (-53.6%)	NO
L02: STANDARD 01	NO (-91.4%)	NO
L02: STANDARD 21	NO (-62.6%)	NO
L02: STANDARD 20	NO (-66.3%)	NO
L02: LARGE 03	NO (-67.3%)	NO
L02: STANDARD 04	NO (-82.3%)	NO
L02: LARGE 01	NO (-68.5%)	NO
L02: STANDARD 05	NO (-80.4%)	NO
L02: STANDARD 19	NO (-58.8%)	NO
L02: STANDARD 08	NO (-57.8%)	NO
L02: STANDARD 15	NO (-43.2%)	NO
L02: STANDARD 16	NO (-42.3%)	NO
L02: STANDARD 17	NO (-42.3%)	NO
L02: STANDARD 18	NO (-43.2%)	NO
L03: STANDARD 01	NO (-91.4%)	NO
L03: STANDARD 02	NO (-71.5%)	NO
L03: STANDARD 03	NO (-76.9%)	NO
L03: STANDARD 24	NO (-88.2%)	NO
L03: STANDARD 23	NO (-62.6%)	NO
L03: STANDARD 22	NO (-63.2%)	NO
L03: STANDARD 11	NO (-42.3%)	NO
L03: STANDARD 12	NO (-43.2%)	NO
L03: STANDARD 13	NO (-42.3%)	NO
L03: STANDARD 14	NO (-42.3%)	NO
L03: STANDARD 15	NO (-43.2%)	NO
L03: STANDARD 16	NO (-42.3%)	NO
L03: STANDARD 17	NO (-42.3%)	NO
L03: LARGE 03	NO (-67.3%)	NO
L03: STANDARD 08	NO (-57.8%)	NO
L03: STANDARD 09	NO (-60.8%)	NO
L03: LARGE 02	NO (-64.8%)	NO
L04: STANDARD 01	NO (-91.3%)	NO
L04: STANDARD 22	NO (-63.2%)	NO
L04: STANDARD 21	NO (-62.6%)	NO
L04: STANDARD 20	NO (-66.3%)	NO
L04: STANDARD 04	NO (-81.9%)	NO
L04: LARGE 01	NO (-64.5%)	NO
L04: STANDARD 05	NO (-79.6%)	NO
L04: STANDARD 10	NO (-41.6%)	NO
L04: STANDARD 11	NO (-42.3%)	NO
L04: STANDARD 12	NO (-43.2%)	NO
L04: STANDARD 13	NO (-42.3%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L07: STANDARD 02	NO (-70.4%)	NO
L07: STANDARD 03	NO (-76.4%)	NO
L07: STANDARD 21	NO (-88.2%)	NO
L07: STANDARD 20	NO (-62.6%)	NO
L07: STANDARD 19	NO (-63.2%)	NO
L07: STANDARD 18	NO (-62.6%)	NO
L07: STANDARD 17	NO (-66.3%)	NO
L07: STANDARD 04	NO (-81.4%)	NO
L07: LARGE 01	NO (-57.9%)	NO
L07: STANDARD 14	NO (-42.3%)	NO
L07: STANDARD 15	NO (-43.2%)	NO
L07: STANDARD 16	NO (-42.3%)	NO
L07: STANDARD 17	NO (-42.3%)	NO
L07: STANDARD 19	NO (-58.8%)	NO
L08: STANDARD 02	NO (-70.1%)	NO
L08: STANDARD 03	NO (-75.9%)	NO
L08: STANDARD 21	NO (-88.2%)	NO
L08: STANDARD 20	NO (-62.6%)	NO
L08: STANDARD 19	NO (-63.2%)	NO
L08: STANDARD 18	NO (-62.6%)	NO
L08: STANDARD 17	NO (-66.3%)	NO
L08: STANDARD 12	NO (-43.2%)	NO
L08: STANDARD 13	NO (-42.3%)	NO
L08: STANDARD 14	NO (-42.3%)	NO
L08: STANDARD 15	NO (-43.2%)	NO
L08: STANDARD 16	NO (-42.3%)	NO
L09: STANDARD 01	NO (-90%)	NO
L09: STANDARD 02	NO (-68.5%)	NO
L09: STANDARD 03	NO (-74.3%)	NO
L09: STANDARD 21	NO (-88.2%)	NO
L09: STANDARD 20	NO (-62.6%)	NO
L09: STANDARD 19	NO (-63.2%)	NO
L09: STANDARD 18	NO (-62.6%)	NO
L09: STANDARD 11	NO (-42.3%)	NO
L09: STANDARD 12	NO (-43.2%)	NO
L09: STANDARD 13	NO (-42.3%)	NO
L09: STANDARD 14	NO (-42.3%)	NO
L09: STANDARD 15	NO (-43.2%)	NO
L09: STANDARD 16	NO (-42.3%)	NO
L10: STANDARD 01	NO (-89.6%)	NO
L10: STANDARD 02	NO (-65.5%)	NO
L10: STANDARD 03	NO (-72.5%)	NO
L10: STANDARD 21	NO (-88.2%)	NO
L10: STANDARD 20	NO (-62.6%)	NO
L10: STANDARD 19	NO (-63.2%)	NO
L10: STANDARD 10	NO (-64.1%)	NO
L10: STANDARD 11	NO (-42.3%)	NO
L10: STANDARD 12	NO (-43.2%)	NO
L10: STANDARD 13	NO (-42.3%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L10: STANDARD 14	NO (-42.3%)	NO
L10: STANDARD 15	NO (-43.2%)	NO
L10: STANDARD 16	NO (-42.3%)	NO
L10: STANDARD 18	NO (-43.2%)	NO
L11: STANDARD 04	NO (-64.3%)	NO
L11: LARGE 01	NO (-28.1%)	NO
L11: STANDARD 05	NO (-59.2%)	NO
L12: RESIDENTS KITCHEN	YES (+10.6%)	NO
L12: PRIVET EVENT ROOM	YES (+11.4%)	NO
L11: STANDARD 10	NO (-55.9%)	NO
L11: STANDARD 11	NO (-29.1%)	NO
L11: STANDARD 12	NO (-30.2%)	NO
L11: STANDARD 13	NO (-29.1%)	NO
L11: STANDARD 14	NO (-29.1%)	NO
L11: STANDARD 15	NO (-30.2%)	NO
L11: STANDARD 01	NO (-85.6%)	NO
L11: STANDARD 02	NO (-51.7%)	NO
L11: STANDARD 03	NO (-63.6%)	NO
L11: STANDARD 21	NO (-85.5%)	NO
L11: STANDARD 20	NO (-54%)	NO
L11: STANDARD 19	NO (-54.7%)	NO
L11: STANDARD 18	NO (-54%)	NO
L11: STANDARD 17	NO (-58.5%)	NO
L12: MEETING ROOM	NO (-52%)	NO
L12: AMENITY	YES (+47%)	NO
L12: STANDARD 01	NO (-80.1%)	NO
L12: STANDARD 02	NO (-34.6%)	NO
L12: STANDARD 03	NO (-52.4%)	NO
L12: STANDARD 06	NO (-84%)	NO
L12: STANDARD 05	NO (-49.3%)	NO
L12: STANDARD 04	NO (-50.1%)	NO
L11: STANDARD 16	NO (-29.1%)	NO
L11: STANDARD 17	NO (-29.1%)	NO
L11: STANDARD 19	NO (-49.5%)	NO
L11: STANDARD 18	NO (-30%)	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 [m ²]	9111	9111
External area [m ²]	7319.6	7213.4
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	2356.91	3699.55
Average U-value [W/m ² K]	0.32	0.51
Alpha value* [%]	26.01	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
 Offices and Workshop Businesses
 General Industrial and Special Industrial Groups
 Storage or Distribution
 Hotels
 Residential Institutions: Hospitals and Care Homes
 Residential Institutions: Residential Schools

100 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	30.9	31.95
Cooling	0.28	0.18
Auxiliary	0.92	1.51
Lighting	3.35	5.56
Hot water	5.11	5.23
Equipment*	13.55	13.55
TOTAL **	40.57	44.43

* 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	1.89
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>1.89</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	119.89	166.87
Primary energy [kWh _{PE} /m ²]	63.21	64.57
Total emissions [kg/m ²]	6.12	6.25

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 SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	65.5	64.4	3.6	3.6	11.2	5	5	5	5
	Notional	83.7	22.5	8.4	2.2	17.3	2.78	2.84	----	----
[ST] Constant volume system (fixed fresh air rate), [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	88.5	67.2	24.6	3.7	15.1	1	5	1	5
	Notional	41.8	29.3	8.2	2.9	15.9	1.41	2.84	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	156.8	0	43.6	0	0	1	0	1	0
	Notional	227.8	0	44.9	0	0	1.41	0	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

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

Appendix A.2 – BRUKL REPORT (Be Green)

Project name

241005_Greyfriars

As designed

Date: Mon Nov 04 11:37:09 2024

Administrative information

Building Details

Address: Address 1, City, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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]: 544.01The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	6.25
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	5.78
Target primary energy rate (TPER), kWh _{PE} /m ² annum	64.57
Building primary energy rate (BPER), kWh _{PE} /m ² annum	59.49
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-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.13	0.16	L0000036:Surf[3]
Floors	0.18	0.1	0.11	L0000000:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.11	0.11	L00000F3:Surf[5]
Windows** and roof windows	1.6	1.4	1.4	L0000000:Surf[2]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1	1	L1000014:Surf[1]
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-Limit} = Limiting area-weighted average U-values [W/(m ² K)] U _{a-Calc} = Calculated area-weighted average U-values [W/(m ² K)] U _{i-Calc} = Calculated maximum individual element U-values [W/(m ² K)] * Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows. ** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position. ^ For fire doors, limiting U-value is 1.8 W/m ² K NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				

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

Building services

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

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

1- Commercial

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5	5	0	1.2	0.85
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- Dwellings Systems (New)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	-	-
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

3- Resident's kitchen

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	5	0	0.3	-
Standard value	N/A	4.5**	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 air-cooled chillers >=400 kW. For chillers <400 kW, limiting SEER is 4.					
^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

1- hot water- commercial

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	5	-
Standard value	2*	N/A
* Standard shown is for all types except absorption and gas engine heat pumps.		

2- hot water- resi

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	5	-
Standard value	2*	N/A
* Standard shown is for all types except absorption and gas engine heat pumps.		

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

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
L00: GYM	120	-	-
L00: STAIR 01	120	-	-
L00: LIFT	120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
L00: LIFT LOBBY		120	-	-
L00: CO-WORK		120	-	-
L00: ANCILLARY 01		120	-	-
L02: CORRIDOR 04		120	-	-
L04: CORRIDOR 03		120	-	-
L04: CORRIDOR 02		120	-	-
L04: STANDARD 19		120	-	-
L04: STANDARD 18		120	-	-
L04: STANDARD 06		120	-	-
L04: STANDARD 07		120	-	-
L04: LARGE 03		120	-	-
L04: STANDARD 08		120	-	-
L04: STANDARD 09		120	-	-
L04: CORRIDOR 04		120	-	-
L04: LARGE 02		120	-	-
L04: CORRIDOR 01		120	-	-
L04: STAIR 02		120	-	-
L05: STANDARD 01		120	-	-
L05: STAIR 01		120	-	-
L05: LIFT LOBBY		120	-	-
L05: STANDARD 02		120	-	-
L05: STANDARD 03		120	-	-
L05: STANDARD 24		120	-	-
L05: STANDARD 23		120	-	-
L05: STANDARD 22		120	-	-
L05: STANDARD 21		120	-	-
L05: STANDARD 20		120	-	-
L05: STANDARD 04		120	-	-
L05: LARGE 01		120	-	-
L05: STANDARD 05		120	-	-
L05: STANDARD 10		120	-	-
L05: STANDARD 11		120	-	-
L05: STANDARD 12		120	-	-
L05: STANDARD 13		120	-	-
L05: STANDARD 14		120	-	-
L05: STANDARD 15		120	-	-
L05: STANDARD 16		120	-	-
L05: STANDARD 17		120	-	-
L05: LIFT		120	-	-
L05: CORRIDOR 03		120	-	-
L05: CORRIDOR 02		120	-	-
L05: STANDARD 19		120	-	-
L05: STANDARD 18		120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
L05: STANDARD 06		120	-	-
L05: STANDARD 07		120	-	-
L05: LARGE 03		120	-	-
L05: STANDARD 08		120	-	-
L05: STANDARD 09		120	-	-
L05: CORRIDOR 04		120	-	-
L05: LARGE 02		120	-	-
L05: CORRIDOR 01		120	-	-
L05: STAIR 02		120	-	-
L06: STANDARD 01		120	-	-
L06: STAIR 01		120	-	-
L06: LIFT LOBBY		120	-	-
L06: STANDARD 02		120	-	-
L06: STANDARD 03		120	-	-
L06: STANDARD 24		120	-	-
L06: STANDARD 23		120	-	-
L06: STANDARD 22		120	-	-
L06: STANDARD 21		120	-	-
L06: STANDARD 20		120	-	-
L06: STANDARD 04		120	-	-
L06: LARGE 01		120	-	-
L06: STANDARD 05		120	-	-
L06: STANDARD 10		120	-	-
L06: STANDARD 11		120	-	-
L06: STANDARD 12		120	-	-
L06: STANDARD 13		120	-	-
L06: STANDARD 14		120	-	-
L06: STANDARD 15		120	-	-
L06: STANDARD 16		120	-	-
L06: STANDARD 17		120	-	-
L06: LIFT		120	-	-
L06: CORRIDOR 03		120	-	-
L06: CORRIDOR 02		120	-	-
L06: STANDARD 19		120	-	-
L06: STANDARD 18		120	-	-
L06: STANDARD 06		120	-	-
L06: STANDARD 07		120	-	-
L06: LARGE 03		120	-	-
L06: STANDARD 08		120	-	-
L06: STANDARD 09		120	-	-
L06: CORRIDOR 04		120	-	-
L06: LARGE 02		120	-	-
L06: CORRIDOR 01		120	-	-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]		Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95		80	0.3
L06: STAIR 02		120		-	-
L07: STANDARD 01		120		-	-
L07: STAIR 01		120		-	-
L00: FITNESS STUDIO		120		-	-
L01: STAIR 01		120		-	-
L01: LIFT LOBBY		120		-	-
L01: CORRIDOR 03		120		-	-
L01: LARGE 01		120		-	-
L01: STANDARD 07		120		-	-
L01: STANDARD 08		120		-	-
L01: STANDARD 09		120		-	-
L00: CORRIDOR 01		120		-	-
L02: LIFT LOBBY		120		-	-
L02: STANDARD 02		120		-	-
L02: STANDARD 03		120		-	-
L02: STANDARD 24		120		-	-
L02: STANDARD 23		120		-	-
L02: STANDARD 22		120		-	-
L00: CORRIDOR 02		120		-	-
L02: STANDARD 09		120		-	-
L02: STANDARD 10		120		-	-
L02: STANDARD 11		120		-	-
L02: STANDARD 12		120		-	-
L02: STANDARD 13		120		-	-
L02: STANDARD 14		120		-	-
L00: LOUNGE		120		-	-
L02: CORRIDOR 02		120		-	-
L02: STANDARD 06		120		-	-
L02: STANDARD 07		120		-	-
L01: CORRIDOR 01		120		-	-
L02: LARGE 02		120		-	-
L00: CORRIDOR 03		120		-	-
L03: STANDARD 21		120		-	-
L03: STANDARD 20		120		-	-
L03: STANDARD 04		120		-	-
L03: LARGE 01		120		-	-
L03: STANDARD 05		120		-	-
L03: STANDARD 10		120		-	-
L00: ANCILLARY 02		120		-	-
L03: CORRIDOR 03		120		-	-
L03: CORRIDOR 02		120		-	-
L03: STANDARD 19		120		-	-
L03: STANDARD 18		120		-	-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]	
	Standard value	95	80	0.3	
L03: STANDARD 06		120	-	-	
L03: STANDARD 07		120	-	-	
L00: ENTRANCE LOUNGE+CAFE		120	-	-	
L04: STAIR 01		120	-	-	
L04: LIFT LOBBY		120	-	-	
L04: STANDARD 02		120	-	-	
L04: STANDARD 03		120	-	-	
L04: STANDARD 24		120	-	-	
L04: STANDARD 23		120	-	-	
L01: STAIR 02		120	-	-	
L04: STANDARD 14		120	-	-	
L04: STANDARD 15		120	-	-	
L04: STANDARD 16		120	-	-	
L04: STANDARD 17		120	-	-	
L04: LIFT		120	-	-	
L01: LIFT		120	-	-	
L07: STANDARD 05		120	-	-	
L07: STANDARD 10		120	-	-	
L07: STANDARD 11		120	-	-	
L07: STANDARD 12		120	-	-	
L07: STANDARD 13		120	-	-	
L00: CORRIDOR 05		120	-	-	
L07: STAIR 02		120	-	-	
L07: CORRIDOR 04		120	-	-	
L08: STANDARD 01		120	-	-	
L08: STAIR 01		120	-	-	
L08: LIFT LOBBY		120	-	-	
L08: STANDARD 04		120	-	-	
L08: LARGE 01		120	-	-	
L08: STANDARD 05		120	-	-	
L07: STANDARD 18		120	-	-	
L08: STANDARD 10		120	-	-	
L08: STANDARD 11		120	-	-	
L08: STANDARD 17		120	-	-	
L08: STANDARD 19		120	-	-	
L08: CORRIDOR 01		120	-	-	
L08: STAIR 02		120	-	-	
L09: STANDARD 17		120	-	-	
L09: STANDARD 04		120	-	-	
L09: LARGE 01		120	-	-	
L09: STANDARD 05		120	-	-	
L08: STANDARD 18		120	-	-	
L09: STANDARD 10		120	-	-	

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
L01: STANDARD 01		120	-	-
L09: CORRIDOR 02		120	-	-
L09: STANDARD 17		120	-	-
L09: STANDARD 19		120	-	-
L09: CORRIDOR 01		120	-	-
L01: STANDARD 18		120	-	-
L10: STANDARD 18		120	-	-
L10: STANDARD 17		120	-	-
L10: STANDARD 04		120	-	-
L10: LARGE 01		120	-	-
L10: STANDARD 05		120	-	-
L09: STANDARD 18		120	-	-
L10: CORRIDOR 03		120	-	-
L10: CORRIDOR 02		120	-	-
L10: STANDARD 17		120	-	-
L10: STANDARD 19		120	-	-
L10: CORRIDOR 01		120	-	-
L01: STANDARD 02		120	-	-
L01: CORRIDOR 04		120	-	-
L01: STANDARD 06		120	-	-
L01: STANDARD 03		120	-	-
L01: STANDARD 17		120	-	-
L01: STANDARD 16		120	-	-
L01: STANDARD 15		120	-	-
L01: STANDARD 14		120	-	-
L01: STANDARD 04		120	-	-
L01: STANDARD 05		120	-	-
L01: CORRIDOR 02		120	-	-
L01: STANDARD 10		120	-	-
L01: STANDARD 11		120	-	-
L01: STANDARD 12		120	-	-
L01: STANDARD 13		120	-	-
L01: LARGE 02		120	-	-
L00: CORRIDOR 04		120	-	-
L00: CORRIDOR 06		120	-	-
L00: STAIR 02		120	-	-
L02: STANDARD 01		120	-	-
L02: STAIR 01		120	-	-
L02: STANDARD 21		120	-	-
L02: STANDARD 20		120	-	-
L02: LARGE 03		120	-	-
L02: STAIR 02		120	-	-
L02: STANDARD 04		120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
L02: LARGE 01		120	-	-
L02: STANDARD 05		120	-	-
L02: STANDARD 19		120	-	-
L02: STANDARD 08		120	-	-
L02: STANDARD 15		120	-	-
L02: STANDARD 16		120	-	-
L02: STANDARD 17		120	-	-
L02: STANDARD 18		120	-	-
L02: LIFT		120	-	-
L02: CORRIDOR 01		120	-	-
L02: CORRIDOR 03		120	-	-
L01: CORRIDOR 04		120	-	-
L03: STANDARD 01		120	-	-
L03: STAIR 01		120	-	-
L03: LIFT LOBBY		120	-	-
L03: STANDARD 02		120	-	-
L03: STANDARD 03		120	-	-
L03: STANDARD 24		120	-	-
L03: STANDARD 23		120	-	-
L03: STANDARD 22		120	-	-
L03: STANDARD 11		120	-	-
L03: STANDARD 12		120	-	-
L03: STANDARD 13		120	-	-
L03: STANDARD 14		120	-	-
L03: STANDARD 15		120	-	-
L03: STANDARD 16		120	-	-
L03: STANDARD 17		120	-	-
L03: LIFT		120	-	-
L03: LARGE 03		120	-	-
L03: STANDARD 08		120	-	-
L03: STANDARD 09		120	-	-
L03: CORRIDOR 04		120	-	-
L03: LARGE 02		120	-	-
L03: CORRIDOR 01		120	-	-
L03: STAIR 02		120	-	-
L04: STANDARD 01		120	-	-
L04: STANDARD 22		120	-	-
L04: STANDARD 21		120	-	-
L04: STANDARD 20		120	-	-
L04: STANDARD 04		120	-	-
L04: LARGE 01		120	-	-
L04: STANDARD 05		120	-	-
L04: STANDARD 10		120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
L04: STANDARD 11		120	-	-
L04: STANDARD 12		120	-	-
L04: STANDARD 13		120	-	-
L07: LIFT LOBBY		120	-	-
L07: STANDARD 02		120	-	-
L07: STANDARD 03		120	-	-
L07: STANDARD 21		120	-	-
L07: STANDARD 20		120	-	-
L07: STANDARD 19		120	-	-
L07: STANDARD 18		120	-	-
L07: STANDARD 17		120	-	-
L07: STANDARD 04		120	-	-
L07: LARGE 01		120	-	-
L07: STANDARD 14		120	-	-
L07: STANDARD 15		120	-	-
L07: STANDARD 16		120	-	-
L07: LIFT		120	-	-
L07: CORRIDOR 03		120	-	-
L07: CORRIDOR 02		120	-	-
L07: STANDARD 17		120	-	-
L07: STANDARD 19		120	-	-
L08: STANDARD 02		120	-	-
L07: CORRIDOR 01		120	-	-
L08: STANDARD 03		120	-	-
L08: STANDARD 21		120	-	-
L08: STANDARD 20		120	-	-
L08: STANDARD 19		120	-	-
L08: STANDARD 18		120	-	-
L08: STANDARD 17		120	-	-
L08: STANDARD 12		120	-	-
L08: STANDARD 13		120	-	-
L08: STANDARD 14		120	-	-
L08: STANDARD 15		120	-	-
L08: STANDARD 16		120	-	-
L08: LIFT		120	-	-
L08: CORRIDOR 03		120	-	-
L08: CORRIDOR 02		120	-	-
L08: CORRIDOR 04		120	-	-
L09: STANDARD 01		120	-	-
L09: STAIR 01		120	-	-
L09: LIFT LOBBY		120	-	-
L09: STANDARD 02		120	-	-
L09: STANDARD 03		120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
L09: STANDARD 21		120	-	-
L09: STANDARD 20		120	-	-
L09: STANDARD 19		120	-	-
L09: STANDARD 18		120	-	-
L09: STANDARD 11		120	-	-
L09: STANDARD 12		120	-	-
L09: STANDARD 13		120	-	-
L09: STANDARD 14		120	-	-
L09: STANDARD 15		120	-	-
L09: STANDARD 16		120	-	-
L09: LIFT		120	-	-
L09: CORRIDOR 03		120	-	-
L09: STAIR 02		120	-	-
L09: CORRIDOR 04		120	-	-
L10: STANDARD 01		120	-	-
L10: STAIR 01		120	-	-
L10: LIFT LOBBY		120	-	-
L10: STANDARD 02		120	-	-
L10: STANDARD 03		120	-	-
L10: STANDARD 21		120	-	-
L10: STANDARD 20		120	-	-
L10: STANDARD 19		120	-	-
L10: STANDARD 10		120	-	-
L10: STANDARD 11		120	-	-
L10: STANDARD 12		120	-	-
L10: STANDARD 13		120	-	-
L10: STANDARD 14		120	-	-
L10: STANDARD 15		120	-	-
L10: STANDARD 16		120	-	-
L10: LIFT		120	-	-
L10: STAIR 02		120	-	-
L10: CORRIDOR 04		120	-	-
L10: STANDARD 18		120	-	-
L11: STANDARD 04		120	-	-
L11: LARGE 01		120	-	-
L11: STANDARD 05		120	-	-
L12: RESIDENTS KITCHEN		120	-	-
L12: PRIVET EVENT ROOM		120	-	-
L12: CORRIDOR 01		120	-	-
L13: LIFT		120	-	-
L11: CORRIDOR 01		120	-	-
L11: STAIR 02		120	-	-
L11: STANDARD 10		120	-	-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80		0.3
L11: STANDARD 11		120	-		-
L11: STANDARD 12		120	-		-
L11: STANDARD 13		120	-		-
L11: STANDARD 14		120	-		-
L11: STANDARD 15		120	-		-
L11: STANDARD 01		120	-		-
L11: STAIR 01		120	-		-
L11: LIFT LOBBY		120	-		-
L11: STANDARD 02		120	-		-
L11: STANDARD 03		120	-		-
L11: STANDARD 21		120	-		-
L11: STANDARD 20		120	-		-
L11: STANDARD 19		120	-		-
L11: STANDARD 18		120	-		-
L11: STANDARD 17		120	-		-
L12: MEETING ROOM		120	-		-
L12: CORRIDOR 01		120	-		-
L12: AMENITY		120	-		-
L13: STAIR 01		120	-		-
L13: LIFT LOBBY		120	-		-
L11: LIFT		120	-		-
L11: CORRIDOR 03		120	-		-
L11: CORRIDOR 02		120	-		-
L11: CORRIDOR 04		120	-		-
L12: STANDARD 01		120	-		-
L12: STAIR 01		120	-		-
L12: LIFT LOBBY		120	-		-
L12: STANDARD 02		120	-		-
L12: STANDARD 03		120	-		-
L12: STANDARD 06		120	-		-
L12: STANDARD 05		120	-		-
L12: STANDARD 04		120	-		-
L11: STANDARD 16		120	-		-
L11: STANDARD 17		120	-		-
L11: STANDARD 19		120	-		-
L11: STANDARD 18		120	-		-
L12: LIFT		120	-		-
L12: STAIR 02		120	-		-
L12: CORRIDOR 04		120	-		-

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

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L00: GYM	NO (-56.6%)	NO
L00: CO-WORK	YES (+66.7%)	NO
L04: STANDARD 19	NO (-58.8%)	NO
L04: STANDARD 18	NO (-43.2%)	NO
L04: STANDARD 06	NO (-63.8%)	NO
L04: STANDARD 07	NO (-60%)	NO
L04: LARGE 03	NO (-67.3%)	NO
L04: STANDARD 08	NO (-57.8%)	NO
L04: STANDARD 09	NO (-60.8%)	NO
L04: LARGE 02	NO (-64.3%)	NO
L05: STANDARD 01	NO (-91.2%)	NO
L05: STANDARD 02	NO (-71.2%)	NO
L05: STANDARD 03	NO (-76.8%)	NO
L05: STANDARD 24	NO (-88.2%)	NO
L05: STANDARD 23	NO (-62.6%)	NO
L05: STANDARD 22	NO (-63.2%)	NO
L05: STANDARD 21	NO (-62.6%)	NO
L05: STANDARD 20	NO (-66.3%)	NO
L05: STANDARD 04	NO (-81.7%)	NO
L05: LARGE 01	NO (-62.8%)	NO
L05: STANDARD 05	NO (-78.8%)	NO
L05: STANDARD 10	NO (-40.5%)	NO
L05: STANDARD 11	NO (-42.3%)	NO
L05: STANDARD 12	NO (-43.2%)	NO
L05: STANDARD 13	NO (-42.3%)	NO
L05: STANDARD 14	NO (-42.3%)	NO
L05: STANDARD 15	NO (-43.2%)	NO
L05: STANDARD 16	NO (-42.3%)	NO
L05: STANDARD 17	NO (-42.3%)	NO
L05: STANDARD 19	NO (-58.8%)	NO
L05: STANDARD 18	NO (-43.2%)	NO
L05: STANDARD 06	NO (-62.3%)	NO
L05: STANDARD 07	NO (-57.8%)	NO
L05: LARGE 03	NO (-67.3%)	NO
L05: STANDARD 08	NO (-57.8%)	NO
L05: STANDARD 09	NO (-60.8%)	NO
L05: LARGE 02	NO (-62.8%)	NO
L06: STANDARD 01	NO (-91.2%)	NO
L06: STANDARD 02	NO (-70.6%)	NO
L06: STANDARD 03	NO (-76.7%)	NO
L06: STANDARD 24	NO (-88.2%)	NO
L06: STANDARD 23	NO (-62.6%)	NO
L06: STANDARD 22	NO (-63.2%)	NO
L06: STANDARD 21	NO (-62.6%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L06: STANDARD 20	NO (-66.3%)	NO
L06: STANDARD 04	NO (-81.6%)	NO
L06: LARGE 01	NO (-60.1%)	NO
L06: STANDARD 05	NO (-77.6%)	NO
L06: STANDARD 10	NO (-38.3%)	NO
L06: STANDARD 11	NO (-42.3%)	NO
L06: STANDARD 12	NO (-43.2%)	NO
L06: STANDARD 13	NO (-42.3%)	NO
L06: STANDARD 14	NO (-42.3%)	NO
L06: STANDARD 15	NO (-43.2%)	NO
L06: STANDARD 16	NO (-42.3%)	NO
L06: STANDARD 17	NO (-42.3%)	NO
L06: STANDARD 19	NO (-58.8%)	NO
L06: STANDARD 18	NO (-43.2%)	NO
L06: STANDARD 06	NO (-58.8%)	NO
L06: STANDARD 07	NO (-55.2%)	NO
L06: LARGE 03	NO (-67.3%)	NO
L06: STANDARD 08	NO (-57.8%)	NO
L06: STANDARD 09	NO (-60.8%)	NO
L06: LARGE 02	NO (-62.2%)	NO
L07: STANDARD 01	NO (-90.8%)	NO
L00: FITNESS STUDIO	NO (-52%)	NO
L01: LARGE 01	NO (-69.5%)	NO
L01: STANDARD 07	NO (-42.3%)	NO
L01: STANDARD 08	NO (-43.2%)	NO
L01: STANDARD 09	NO (-43%)	NO
L02: STANDARD 02	NO (-71.5%)	NO
L02: STANDARD 03	NO (-76.9%)	NO
L02: STANDARD 24	NO (-88.2%)	NO
L02: STANDARD 23	NO (-62.6%)	NO
L02: STANDARD 22	NO (-63.2%)	NO
L02: STANDARD 09	NO (-60.9%)	NO
L02: STANDARD 10	NO (-42.3%)	NO
L02: STANDARD 11	NO (-42.3%)	NO
L02: STANDARD 12	NO (-43.2%)	NO
L02: STANDARD 13	NO (-42.3%)	NO
L02: STANDARD 14	NO (-42.3%)	NO
L00: LOUNGE	NO (-17.3%)	NO
L02: STANDARD 06	NO (-66.8%)	NO
L02: STANDARD 07	NO (-64.1%)	NO
L02: LARGE 02	NO (-65.2%)	NO
L03: STANDARD 21	NO (-62.6%)	NO
L03: STANDARD 20	NO (-66.3%)	NO
L03: STANDARD 04	NO (-82.3%)	NO
L03: LARGE 01	NO (-67.4%)	NO
L03: STANDARD 05	NO (-80.4%)	NO
L03: STANDARD 10	NO (-42.2%)	NO
L03: STANDARD 19	NO (-58.8%)	NO
L03: STANDARD 18	NO (-43.2%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L03: STANDARD 06	NO (-65.9%)	NO
L03: STANDARD 07	NO (-61.8%)	NO
L00: ENTRANCE LOUNGE+CAFE	YES (+11.5%)	NO
L04: STANDARD 02	NO (-71.5%)	NO
L04: STANDARD 03	NO (-76.9%)	NO
L04: STANDARD 24	NO (-88.2%)	NO
L04: STANDARD 23	NO (-62.6%)	NO
L04: STANDARD 14	NO (-42.3%)	NO
L04: STANDARD 15	NO (-43.2%)	NO
L04: STANDARD 16	NO (-42.3%)	NO
L04: STANDARD 17	NO (-42.3%)	NO
L07: STANDARD 05	NO (-76.2%)	NO
L07: STANDARD 10	NO (-64.7%)	NO
L07: STANDARD 11	NO (-42.3%)	NO
L07: STANDARD 12	NO (-43.2%)	NO
L07: STANDARD 13	NO (-42.3%)	NO
L08: STANDARD 01	NO (-90.3%)	NO
L08: STANDARD 04	NO (-80.3%)	NO
L08: LARGE 01	NO (-54.9%)	NO
L08: STANDARD 05	NO (-75.3%)	NO
L07: STANDARD 18	NO (-43.2%)	NO
L08: STANDARD 10	NO (-64.2%)	NO
L08: STANDARD 11	NO (-42.3%)	NO
L08: STANDARD 17	NO (-42.3%)	NO
L08: STANDARD 19	NO (-58.8%)	NO
L09: STANDARD 17	NO (-66.3%)	NO
L09: STANDARD 04	NO (-79.4%)	NO
L09: LARGE 01	NO (-50.5%)	NO
L09: STANDARD 05	NO (-74.6%)	NO
L08: STANDARD 18	NO (-43.2%)	NO
L09: STANDARD 10	NO (-64.2%)	NO
L01: STANDARD 01	NO (-91.8%)	NO
L09: STANDARD 17	NO (-42.3%)	NO
L09: STANDARD 19	NO (-58.8%)	NO
L01: STANDARD 18	NO (-72.8%)	NO
L10: STANDARD 18	NO (-62.6%)	NO
L10: STANDARD 17	NO (-66.3%)	NO
L10: STANDARD 04	NO (-77%)	NO
L10: LARGE 01	NO (-46.8%)	NO
L10: STANDARD 05	NO (-71.8%)	NO
L09: STANDARD 18	NO (-43.2%)	NO
L10: STANDARD 17	NO (-42.3%)	NO
L10: STANDARD 19	NO (-58.8%)	NO
L01: STANDARD 02	NO (-71.8%)	NO
L01: STANDARD 06	NO (-64.6%)	NO
L01: STANDARD 03	NO (-76.9%)	NO
L01: STANDARD 17	NO (-13.7%)	NO
L01: STANDARD 16	NO (-15%)	NO
L01: STANDARD 15	NO (-14%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L01: STANDARD 14	NO (-24.5%)	NO
L01: STANDARD 04	NO (-82.4%)	NO
L01: STANDARD 05	NO (-80.6%)	NO
L01: STANDARD 10	YES (+33.2%)	NO
L01: STANDARD 11	YES (+31.2%)	NO
L01: STANDARD 12	YES (+33.2%)	NO
L01: STANDARD 13	YES (+33.2%)	NO
L01: LARGE 02	NO (-53.6%)	NO
L02: STANDARD 01	NO (-91.4%)	NO
L02: STANDARD 21	NO (-62.6%)	NO
L02: STANDARD 20	NO (-66.3%)	NO
L02: LARGE 03	NO (-67.3%)	NO
L02: STANDARD 04	NO (-82.3%)	NO
L02: LARGE 01	NO (-68.5%)	NO
L02: STANDARD 05	NO (-80.4%)	NO
L02: STANDARD 19	NO (-58.8%)	NO
L02: STANDARD 08	NO (-57.8%)	NO
L02: STANDARD 15	NO (-43.2%)	NO
L02: STANDARD 16	NO (-42.3%)	NO
L02: STANDARD 17	NO (-42.3%)	NO
L02: STANDARD 18	NO (-43.2%)	NO
L03: STANDARD 01	NO (-91.4%)	NO
L03: STANDARD 02	NO (-71.5%)	NO
L03: STANDARD 03	NO (-76.9%)	NO
L03: STANDARD 24	NO (-88.2%)	NO
L03: STANDARD 23	NO (-62.6%)	NO
L03: STANDARD 22	NO (-63.2%)	NO
L03: STANDARD 11	NO (-42.3%)	NO
L03: STANDARD 12	NO (-43.2%)	NO
L03: STANDARD 13	NO (-42.3%)	NO
L03: STANDARD 14	NO (-42.3%)	NO
L03: STANDARD 15	NO (-43.2%)	NO
L03: STANDARD 16	NO (-42.3%)	NO
L03: STANDARD 17	NO (-42.3%)	NO
L03: LARGE 03	NO (-67.3%)	NO
L03: STANDARD 08	NO (-57.8%)	NO
L03: STANDARD 09	NO (-60.8%)	NO
L03: LARGE 02	NO (-64.8%)	NO
L04: STANDARD 01	NO (-91.3%)	NO
L04: STANDARD 22	NO (-63.2%)	NO
L04: STANDARD 21	NO (-62.6%)	NO
L04: STANDARD 20	NO (-66.3%)	NO
L04: STANDARD 04	NO (-81.9%)	NO
L04: LARGE 01	NO (-64.5%)	NO
L04: STANDARD 05	NO (-79.6%)	NO
L04: STANDARD 10	NO (-41.6%)	NO
L04: STANDARD 11	NO (-42.3%)	NO
L04: STANDARD 12	NO (-43.2%)	NO
L04: STANDARD 13	NO (-42.3%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L07: STANDARD 02	NO (-70.4%)	NO
L07: STANDARD 03	NO (-76.4%)	NO
L07: STANDARD 21	NO (-88.2%)	NO
L07: STANDARD 20	NO (-62.6%)	NO
L07: STANDARD 19	NO (-63.2%)	NO
L07: STANDARD 18	NO (-62.6%)	NO
L07: STANDARD 17	NO (-66.3%)	NO
L07: STANDARD 04	NO (-81.4%)	NO
L07: LARGE 01	NO (-57.9%)	NO
L07: STANDARD 14	NO (-42.3%)	NO
L07: STANDARD 15	NO (-43.2%)	NO
L07: STANDARD 16	NO (-42.3%)	NO
L07: STANDARD 17	NO (-42.3%)	NO
L07: STANDARD 19	NO (-58.8%)	NO
L08: STANDARD 02	NO (-70.1%)	NO
L08: STANDARD 03	NO (-75.9%)	NO
L08: STANDARD 21	NO (-88.2%)	NO
L08: STANDARD 20	NO (-62.6%)	NO
L08: STANDARD 19	NO (-63.2%)	NO
L08: STANDARD 18	NO (-62.6%)	NO
L08: STANDARD 17	NO (-66.3%)	NO
L08: STANDARD 12	NO (-43.2%)	NO
L08: STANDARD 13	NO (-42.3%)	NO
L08: STANDARD 14	NO (-42.3%)	NO
L08: STANDARD 15	NO (-43.2%)	NO
L08: STANDARD 16	NO (-42.3%)	NO
L09: STANDARD 01	NO (-90%)	NO
L09: STANDARD 02	NO (-68.5%)	NO
L09: STANDARD 03	NO (-74.3%)	NO
L09: STANDARD 21	NO (-88.2%)	NO
L09: STANDARD 20	NO (-62.6%)	NO
L09: STANDARD 19	NO (-63.2%)	NO
L09: STANDARD 18	NO (-62.6%)	NO
L09: STANDARD 11	NO (-42.3%)	NO
L09: STANDARD 12	NO (-43.2%)	NO
L09: STANDARD 13	NO (-42.3%)	NO
L09: STANDARD 14	NO (-42.3%)	NO
L09: STANDARD 15	NO (-43.2%)	NO
L09: STANDARD 16	NO (-42.3%)	NO
L10: STANDARD 01	NO (-89.6%)	NO
L10: STANDARD 02	NO (-65.5%)	NO
L10: STANDARD 03	NO (-72.5%)	NO
L10: STANDARD 21	NO (-88.2%)	NO
L10: STANDARD 20	NO (-62.6%)	NO
L10: STANDARD 19	NO (-63.2%)	NO
L10: STANDARD 10	NO (-64.1%)	NO
L10: STANDARD 11	NO (-42.3%)	NO
L10: STANDARD 12	NO (-43.2%)	NO
L10: STANDARD 13	NO (-42.3%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L10: STANDARD 14	NO (-42.3%)	NO
L10: STANDARD 15	NO (-43.2%)	NO
L10: STANDARD 16	NO (-42.3%)	NO
L10: STANDARD 18	NO (-43.2%)	NO
L11: STANDARD 04	NO (-64.3%)	NO
L11: LARGE 01	NO (-28.1%)	NO
L11: STANDARD 05	NO (-59.2%)	NO
L12: RESIDENTS KITCHEN	YES (+10.6%)	NO
L12: PRIVET EVENT ROOM	YES (+11.4%)	NO
L11: STANDARD 10	NO (-55.9%)	NO
L11: STANDARD 11	NO (-29.1%)	NO
L11: STANDARD 12	NO (-30.2%)	NO
L11: STANDARD 13	NO (-29.1%)	NO
L11: STANDARD 14	NO (-29.1%)	NO
L11: STANDARD 15	NO (-30.2%)	NO
L11: STANDARD 01	NO (-85.6%)	NO
L11: STANDARD 02	NO (-51.7%)	NO
L11: STANDARD 03	NO (-63.6%)	NO
L11: STANDARD 21	NO (-85.5%)	NO
L11: STANDARD 20	NO (-54%)	NO
L11: STANDARD 19	NO (-54.7%)	NO
L11: STANDARD 18	NO (-54%)	NO
L11: STANDARD 17	NO (-58.5%)	NO
L12: MEETING ROOM	NO (-52%)	NO
L12: AMENITY	YES (+47%)	NO
L12: STANDARD 01	NO (-80.1%)	NO
L12: STANDARD 02	NO (-34.6%)	NO
L12: STANDARD 03	NO (-52.4%)	NO
L12: STANDARD 06	NO (-84%)	NO
L12: STANDARD 05	NO (-49.3%)	NO
L12: STANDARD 04	NO (-50.1%)	NO
L11: STANDARD 16	NO (-29.1%)	NO
L11: STANDARD 17	NO (-29.1%)	NO
L11: STANDARD 19	NO (-49.5%)	NO
L11: STANDARD 18	NO (-30%)	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 [m ²]	9111	9111
External area [m ²]	7319.6	7213.4
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	2356.91	3699.55
Average U-value [W/m ² K]	0.32	0.51
Alpha value* [%]	26.01	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
 Offices and Workshop Businesses
 General Industrial and Special Industrial Groups
 Storage or Distribution
 Hotels
 Residential Institutions: Hospitals and Care Homes
 Residential Institutions: Residential Schools

100 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	30.9	31.95
Cooling	0.28	0.18
Auxiliary	0.92	1.51
Lighting	3.35	5.56
Hot water	2.65	5.23
Equipment*	13.55	13.55
TOTAL **	38.11	44.43

* 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	1.89
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>1.89</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	119.89	166.87
Primary energy [kWh _{PE} /m ²]	59.49	64.57
Total emissions [kg/m ²]	5.78	6.25

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 SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	65.5	64.4	3.6	3.6	11.2	5	5	5	5
	Notional	83.7	22.5	8.4	2.2	17.3	2.78	2.84	----	----
[ST] Constant volume system (fixed fresh air rate), [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	88.5	67.2	24.6	3.7	15.1	1	5	1	5
	Notional	41.8	29.3	8.2	2.9	15.9	1.41	2.84	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	156.8	0	43.6	0	0	1	0	1	0
	Notional	227.8	0	44.9	0	0	1.41	0	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

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

Appendix B – BRUKL REPORT (With PV)

Project name

241005_Greyfriars

As designed

Date: Mon Nov 04 12:08:31 2024

Administrative information

Building Details

Address: Address 1, City, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

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]: 544.01The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	6.25
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	5.57
Target primary energy rate (TPER), kWh _{PE} /m ² annum	64.57
Building primary energy rate (BPER), kWh _{PE} /m ² annum	57.09
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-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.13	0.16	L0000036:Surf[3]
Floors	0.18	0.1	0.11	L0000000:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.11	0.11	L00000F3:Surf[5]
Windows** and roof windows	1.6	1.4	1.4	L0000000:Surf[2]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1	1	L1000014:Surf[1]
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-Limit} = Limiting area-weighted average U-values [W/(m ² K)] U _{a-Calc} = Calculated area-weighted average U-values [W/(m ² K)] U _{i-Calc} = Calculated maximum individual element U-values [W/(m ² K)] * Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows. ** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position. ^ For fire doors, limiting U-value is 1.8 W/m ² K NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				

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

Building services

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

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

1- Commercial

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5	5	0	1.2	0.85
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- Dwellings Systems (New)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	-	-
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

3- Resident's kitchen

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	5	0	0.3	-
Standard value	N/A	4.5**	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 air-cooled chillers >=400 kW. For chillers <400 kW, limiting SEER is 4.					
^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

1- hot water- commercial

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	5	-
Standard value	2*	N/A
* Standard shown is for all types except absorption and gas engine heat pumps.		

2- hot water- resi

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	5	-
Standard value	2*	N/A
* Standard shown is for all types except absorption and gas engine heat pumps.		

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

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
L00: GYM	120	-	-
L00: STAIR 01	120	-	-
L00: LIFT	120	-	-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]		Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95		80	0.3
L00: LIFT LOBBY		120		-	-
L00: CO-WORK		120		-	-
L00: ANCILLARY 01		120		-	-
L02: CORRIDOR 04		120		-	-
L04: CORRIDOR 03		120		-	-
L04: CORRIDOR 02		120		-	-
L04: STANDARD 19		120		-	-
L04: STANDARD 18		120		-	-
L04: STANDARD 06		120		-	-
L04: STANDARD 07		120		-	-
L04: LARGE 03		120		-	-
L04: STANDARD 08		120		-	-
L04: STANDARD 09		120		-	-
L04: CORRIDOR 04		120		-	-
L04: LARGE 02		120		-	-
L04: CORRIDOR 01		120		-	-
L04: STAIR 02		120		-	-
L05: STANDARD 01		120		-	-
L05: STAIR 01		120		-	-
L05: LIFT LOBBY		120		-	-
L05: STANDARD 02		120		-	-
L05: STANDARD 03		120		-	-
L05: STANDARD 24		120		-	-
L05: STANDARD 23		120		-	-
L05: STANDARD 22		120		-	-
L05: STANDARD 21		120		-	-
L05: STANDARD 20		120		-	-
L05: STANDARD 04		120		-	-
L05: LARGE 01		120		-	-
L05: STANDARD 05		120		-	-
L05: STANDARD 10		120		-	-
L05: STANDARD 11		120		-	-
L05: STANDARD 12		120		-	-
L05: STANDARD 13		120		-	-
L05: STANDARD 14		120		-	-
L05: STANDARD 15		120		-	-
L05: STANDARD 16		120		-	-
L05: STANDARD 17		120		-	-
L05: LIFT		120		-	-
L05: CORRIDOR 03		120		-	-
L05: CORRIDOR 02		120		-	-
L05: STANDARD 19		120		-	-
L05: STANDARD 18		120		-	-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]	
	Standard value	95	80	0.3	
L05: STANDARD 06		120	-	-	
L05: STANDARD 07		120	-	-	
L05: LARGE 03		120	-	-	
L05: STANDARD 08		120	-	-	
L05: STANDARD 09		120	-	-	
L05: CORRIDOR 04		120	-	-	
L05: LARGE 02		120	-	-	
L05: CORRIDOR 01		120	-	-	
L05: STAIR 02		120	-	-	
L06: STANDARD 01		120	-	-	
L06: STAIR 01		120	-	-	
L06: LIFT LOBBY		120	-	-	
L06: STANDARD 02		120	-	-	
L06: STANDARD 03		120	-	-	
L06: STANDARD 24		120	-	-	
L06: STANDARD 23		120	-	-	
L06: STANDARD 22		120	-	-	
L06: STANDARD 21		120	-	-	
L06: STANDARD 20		120	-	-	
L06: STANDARD 04		120	-	-	
L06: LARGE 01		120	-	-	
L06: STANDARD 05		120	-	-	
L06: STANDARD 10		120	-	-	
L06: STANDARD 11		120	-	-	
L06: STANDARD 12		120	-	-	
L06: STANDARD 13		120	-	-	
L06: STANDARD 14		120	-	-	
L06: STANDARD 15		120	-	-	
L06: STANDARD 16		120	-	-	
L06: STANDARD 17		120	-	-	
L06: LIFT		120	-	-	
L06: CORRIDOR 03		120	-	-	
L06: CORRIDOR 02		120	-	-	
L06: STANDARD 19		120	-	-	
L06: STANDARD 18		120	-	-	
L06: STANDARD 06		120	-	-	
L06: STANDARD 07		120	-	-	
L06: LARGE 03		120	-	-	
L06: STANDARD 08		120	-	-	
L06: STANDARD 09		120	-	-	
L06: CORRIDOR 04		120	-	-	
L06: LARGE 02		120	-	-	
L06: CORRIDOR 01		120	-	-	

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]	
	Standard value	95	80	0.3	
L06: STAIR 02		120	-	-	
L07: STANDARD 01		120	-	-	
L07: STAIR 01		120	-	-	
L00: FITNESS STUDIO		120	-	-	
L01: STAIR 01		120	-	-	
L01: LIFT LOBBY		120	-	-	
L01: CORRIDOR 03		120	-	-	
L01: LARGE 01		120	-	-	
L01: STANDARD 07		120	-	-	
L01: STANDARD 08		120	-	-	
L01: STANDARD 09		120	-	-	
L00: CORRIDOR 01		120	-	-	
L02: LIFT LOBBY		120	-	-	
L02: STANDARD 02		120	-	-	
L02: STANDARD 03		120	-	-	
L02: STANDARD 24		120	-	-	
L02: STANDARD 23		120	-	-	
L02: STANDARD 22		120	-	-	
L00: CORRIDOR 02		120	-	-	
L02: STANDARD 09		120	-	-	
L02: STANDARD 10		120	-	-	
L02: STANDARD 11		120	-	-	
L02: STANDARD 12		120	-	-	
L02: STANDARD 13		120	-	-	
L02: STANDARD 14		120	-	-	
L00: LOUNGE		120	-	-	
L02: CORRIDOR 02		120	-	-	
L02: STANDARD 06		120	-	-	
L02: STANDARD 07		120	-	-	
L01: CORRIDOR 01		120	-	-	
L02: LARGE 02		120	-	-	
L00: CORRIDOR 03		120	-	-	
L03: STANDARD 21		120	-	-	
L03: STANDARD 20		120	-	-	
L03: STANDARD 04		120	-	-	
L03: LARGE 01		120	-	-	
L03: STANDARD 05		120	-	-	
L03: STANDARD 10		120	-	-	
L00: ANCILLARY 02		120	-	-	
L03: CORRIDOR 03		120	-	-	
L03: CORRIDOR 02		120	-	-	
L03: STANDARD 19		120	-	-	
L03: STANDARD 18		120	-	-	

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]		Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95		80	0.3
L03: STANDARD 06		120		-	-
L03: STANDARD 07		120		-	-
L00: ENTRANCE LOUNGE+CAFE		120		-	-
L04: STAIR 01		120		-	-
L04: LIFT LOBBY		120		-	-
L04: STANDARD 02		120		-	-
L04: STANDARD 03		120		-	-
L04: STANDARD 24		120		-	-
L04: STANDARD 23		120		-	-
L01: STAIR 02		120		-	-
L04: STANDARD 14		120		-	-
L04: STANDARD 15		120		-	-
L04: STANDARD 16		120		-	-
L04: STANDARD 17		120		-	-
L04: LIFT		120		-	-
L01: LIFT		120		-	-
L07: STANDARD 05		120		-	-
L07: STANDARD 10		120		-	-
L07: STANDARD 11		120		-	-
L07: STANDARD 12		120		-	-
L07: STANDARD 13		120		-	-
L00: CORRIDOR 05		120		-	-
L07: STAIR 02		120		-	-
L07: CORRIDOR 04		120		-	-
L08: STANDARD 01		120		-	-
L08: STAIR 01		120		-	-
L08: LIFT LOBBY		120		-	-
L08: STANDARD 04		120		-	-
L08: LARGE 01		120		-	-
L08: STANDARD 05		120		-	-
L07: STANDARD 18		120		-	-
L08: STANDARD 10		120		-	-
L08: STANDARD 11		120		-	-
L08: STANDARD 17		120		-	-
L08: STANDARD 19		120		-	-
L08: CORRIDOR 01		120		-	-
L08: STAIR 02		120		-	-
L09: STANDARD 17		120		-	-
L09: STANDARD 04		120		-	-
L09: LARGE 01		120		-	-
L09: STANDARD 05		120		-	-
L08: STANDARD 18		120		-	-
L09: STANDARD 10		120		-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
L01: STANDARD 01		120	-	-
L09: CORRIDOR 02		120	-	-
L09: STANDARD 17		120	-	-
L09: STANDARD 19		120	-	-
L09: CORRIDOR 01		120	-	-
L01: STANDARD 18		120	-	-
L10: STANDARD 18		120	-	-
L10: STANDARD 17		120	-	-
L10: STANDARD 04		120	-	-
L10: LARGE 01		120	-	-
L10: STANDARD 05		120	-	-
L09: STANDARD 18		120	-	-
L10: CORRIDOR 03		120	-	-
L10: CORRIDOR 02		120	-	-
L10: STANDARD 17		120	-	-
L10: STANDARD 19		120	-	-
L10: CORRIDOR 01		120	-	-
L01: STANDARD 02		120	-	-
L01: CORRIDOR 04		120	-	-
L01: STANDARD 06		120	-	-
L01: STANDARD 03		120	-	-
L01: STANDARD 17		120	-	-
L01: STANDARD 16		120	-	-
L01: STANDARD 15		120	-	-
L01: STANDARD 14		120	-	-
L01: STANDARD 04		120	-	-
L01: STANDARD 05		120	-	-
L01: CORRIDOR 02		120	-	-
L01: STANDARD 10		120	-	-
L01: STANDARD 11		120	-	-
L01: STANDARD 12		120	-	-
L01: STANDARD 13		120	-	-
L01: LARGE 02		120	-	-
L00: CORRIDOR 04		120	-	-
L00: CORRIDOR 06		120	-	-
L00: STAIR 02		120	-	-
L02: STANDARD 01		120	-	-
L02: STAIR 01		120	-	-
L02: STANDARD 21		120	-	-
L02: STANDARD 20		120	-	-
L02: LARGE 03		120	-	-
L02: STAIR 02		120	-	-
L02: STANDARD 04		120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
L02: LARGE 01		120	-	-
L02: STANDARD 05		120	-	-
L02: STANDARD 19		120	-	-
L02: STANDARD 08		120	-	-
L02: STANDARD 15		120	-	-
L02: STANDARD 16		120	-	-
L02: STANDARD 17		120	-	-
L02: STANDARD 18		120	-	-
L02: LIFT		120	-	-
L02: CORRIDOR 01		120	-	-
L02: CORRIDOR 03		120	-	-
L01: CORRIDOR 04		120	-	-
L03: STANDARD 01		120	-	-
L03: STAIR 01		120	-	-
L03: LIFT LOBBY		120	-	-
L03: STANDARD 02		120	-	-
L03: STANDARD 03		120	-	-
L03: STANDARD 24		120	-	-
L03: STANDARD 23		120	-	-
L03: STANDARD 22		120	-	-
L03: STANDARD 11		120	-	-
L03: STANDARD 12		120	-	-
L03: STANDARD 13		120	-	-
L03: STANDARD 14		120	-	-
L03: STANDARD 15		120	-	-
L03: STANDARD 16		120	-	-
L03: STANDARD 17		120	-	-
L03: LIFT		120	-	-
L03: LARGE 03		120	-	-
L03: STANDARD 08		120	-	-
L03: STANDARD 09		120	-	-
L03: CORRIDOR 04		120	-	-
L03: LARGE 02		120	-	-
L03: CORRIDOR 01		120	-	-
L03: STAIR 02		120	-	-
L04: STANDARD 01		120	-	-
L04: STANDARD 22		120	-	-
L04: STANDARD 21		120	-	-
L04: STANDARD 20		120	-	-
L04: STANDARD 04		120	-	-
L04: LARGE 01		120	-	-
L04: STANDARD 05		120	-	-
L04: STANDARD 10		120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
L04: STANDARD 11		120	-	-
L04: STANDARD 12		120	-	-
L04: STANDARD 13		120	-	-
L07: LIFT LOBBY		120	-	-
L07: STANDARD 02		120	-	-
L07: STANDARD 03		120	-	-
L07: STANDARD 21		120	-	-
L07: STANDARD 20		120	-	-
L07: STANDARD 19		120	-	-
L07: STANDARD 18		120	-	-
L07: STANDARD 17		120	-	-
L07: STANDARD 04		120	-	-
L07: LARGE 01		120	-	-
L07: STANDARD 14		120	-	-
L07: STANDARD 15		120	-	-
L07: STANDARD 16		120	-	-
L07: LIFT		120	-	-
L07: CORRIDOR 03		120	-	-
L07: CORRIDOR 02		120	-	-
L07: STANDARD 17		120	-	-
L07: STANDARD 19		120	-	-
L08: STANDARD 02		120	-	-
L07: CORRIDOR 01		120	-	-
L08: STANDARD 03		120	-	-
L08: STANDARD 21		120	-	-
L08: STANDARD 20		120	-	-
L08: STANDARD 19		120	-	-
L08: STANDARD 18		120	-	-
L08: STANDARD 17		120	-	-
L08: STANDARD 12		120	-	-
L08: STANDARD 13		120	-	-
L08: STANDARD 14		120	-	-
L08: STANDARD 15		120	-	-
L08: STANDARD 16		120	-	-
L08: LIFT		120	-	-
L08: CORRIDOR 03		120	-	-
L08: CORRIDOR 02		120	-	-
L08: CORRIDOR 04		120	-	-
L09: STANDARD 01		120	-	-
L09: STAIR 01		120	-	-
L09: LIFT LOBBY		120	-	-
L09: STANDARD 02		120	-	-
L09: STANDARD 03		120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
L09: STANDARD 21		120	-	-
L09: STANDARD 20		120	-	-
L09: STANDARD 19		120	-	-
L09: STANDARD 18		120	-	-
L09: STANDARD 11		120	-	-
L09: STANDARD 12		120	-	-
L09: STANDARD 13		120	-	-
L09: STANDARD 14		120	-	-
L09: STANDARD 15		120	-	-
L09: STANDARD 16		120	-	-
L09: LIFT		120	-	-
L09: CORRIDOR 03		120	-	-
L09: STAIR 02		120	-	-
L09: CORRIDOR 04		120	-	-
L10: STANDARD 01		120	-	-
L10: STAIR 01		120	-	-
L10: LIFT LOBBY		120	-	-
L10: STANDARD 02		120	-	-
L10: STANDARD 03		120	-	-
L10: STANDARD 21		120	-	-
L10: STANDARD 20		120	-	-
L10: STANDARD 19		120	-	-
L10: STANDARD 10		120	-	-
L10: STANDARD 11		120	-	-
L10: STANDARD 12		120	-	-
L10: STANDARD 13		120	-	-
L10: STANDARD 14		120	-	-
L10: STANDARD 15		120	-	-
L10: STANDARD 16		120	-	-
L10: LIFT		120	-	-
L10: STAIR 02		120	-	-
L10: CORRIDOR 04		120	-	-
L10: STANDARD 18		120	-	-
L11: STANDARD 04		120	-	-
L11: LARGE 01		120	-	-
L11: STANDARD 05		120	-	-
L12: RESIDENTS KITCHEN		120	-	-
L12: PRIVET EVENT ROOM		120	-	-
L12: CORRIDOR 01		120	-	-
L13: LIFT		120	-	-
L11: CORRIDOR 01		120	-	-
L11: STAIR 02		120	-	-
L11: STANDARD 10		120	-	-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80		0.3
L11: STANDARD 11		120	-		-
L11: STANDARD 12		120	-		-
L11: STANDARD 13		120	-		-
L11: STANDARD 14		120	-		-
L11: STANDARD 15		120	-		-
L11: STANDARD 01		120	-		-
L11: STAIR 01		120	-		-
L11: LIFT LOBBY		120	-		-
L11: STANDARD 02		120	-		-
L11: STANDARD 03		120	-		-
L11: STANDARD 21		120	-		-
L11: STANDARD 20		120	-		-
L11: STANDARD 19		120	-		-
L11: STANDARD 18		120	-		-
L11: STANDARD 17		120	-		-
L12: MEETING ROOM		120	-		-
L12: CORRIDOR 01		120	-		-
L12: AMENITY		120	-		-
L13: STAIR 01		120	-		-
L13: LIFT LOBBY		120	-		-
L11: LIFT		120	-		-
L11: CORRIDOR 03		120	-		-
L11: CORRIDOR 02		120	-		-
L11: CORRIDOR 04		120	-		-
L12: STANDARD 01		120	-		-
L12: STAIR 01		120	-		-
L12: LIFT LOBBY		120	-		-
L12: STANDARD 02		120	-		-
L12: STANDARD 03		120	-		-
L12: STANDARD 06		120	-		-
L12: STANDARD 05		120	-		-
L12: STANDARD 04		120	-		-
L11: STANDARD 16		120	-		-
L11: STANDARD 17		120	-		-
L11: STANDARD 19		120	-		-
L11: STANDARD 18		120	-		-
L12: LIFT		120	-		-
L12: STAIR 02		120	-		-
L12: CORRIDOR 04		120	-		-

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

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L00: GYM	NO (-56.6%)	NO
L00: CO-WORK	YES (+66.7%)	NO
L04: STANDARD 19	NO (-58.8%)	NO
L04: STANDARD 18	NO (-43.2%)	NO
L04: STANDARD 06	NO (-63.8%)	NO
L04: STANDARD 07	NO (-60%)	NO
L04: LARGE 03	NO (-67.3%)	NO
L04: STANDARD 08	NO (-57.8%)	NO
L04: STANDARD 09	NO (-60.8%)	NO
L04: LARGE 02	NO (-64.3%)	NO
L05: STANDARD 01	NO (-91.2%)	NO
L05: STANDARD 02	NO (-71.2%)	NO
L05: STANDARD 03	NO (-76.8%)	NO
L05: STANDARD 24	NO (-88.2%)	NO
L05: STANDARD 23	NO (-62.6%)	NO
L05: STANDARD 22	NO (-63.2%)	NO
L05: STANDARD 21	NO (-62.6%)	NO
L05: STANDARD 20	NO (-66.3%)	NO
L05: STANDARD 04	NO (-81.7%)	NO
L05: LARGE 01	NO (-62.8%)	NO
L05: STANDARD 05	NO (-78.8%)	NO
L05: STANDARD 10	NO (-40.5%)	NO
L05: STANDARD 11	NO (-42.3%)	NO
L05: STANDARD 12	NO (-43.2%)	NO
L05: STANDARD 13	NO (-42.3%)	NO
L05: STANDARD 14	NO (-42.3%)	NO
L05: STANDARD 15	NO (-43.2%)	NO
L05: STANDARD 16	NO (-42.3%)	NO
L05: STANDARD 17	NO (-42.3%)	NO
L05: STANDARD 19	NO (-58.8%)	NO
L05: STANDARD 18	NO (-43.2%)	NO
L05: STANDARD 06	NO (-62.3%)	NO
L05: STANDARD 07	NO (-57.8%)	NO
L05: LARGE 03	NO (-67.3%)	NO
L05: STANDARD 08	NO (-57.8%)	NO
L05: STANDARD 09	NO (-60.8%)	NO
L05: LARGE 02	NO (-62.8%)	NO
L06: STANDARD 01	NO (-91.2%)	NO
L06: STANDARD 02	NO (-70.6%)	NO
L06: STANDARD 03	NO (-76.7%)	NO
L06: STANDARD 24	NO (-88.2%)	NO
L06: STANDARD 23	NO (-62.6%)	NO
L06: STANDARD 22	NO (-63.2%)	NO
L06: STANDARD 21	NO (-62.6%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L06: STANDARD 20	NO (-66.3%)	NO
L06: STANDARD 04	NO (-81.6%)	NO
L06: LARGE 01	NO (-60.1%)	NO
L06: STANDARD 05	NO (-77.6%)	NO
L06: STANDARD 10	NO (-38.3%)	NO
L06: STANDARD 11	NO (-42.3%)	NO
L06: STANDARD 12	NO (-43.2%)	NO
L06: STANDARD 13	NO (-42.3%)	NO
L06: STANDARD 14	NO (-42.3%)	NO
L06: STANDARD 15	NO (-43.2%)	NO
L06: STANDARD 16	NO (-42.3%)	NO
L06: STANDARD 17	NO (-42.3%)	NO
L06: STANDARD 19	NO (-58.8%)	NO
L06: STANDARD 18	NO (-43.2%)	NO
L06: STANDARD 06	NO (-58.8%)	NO
L06: STANDARD 07	NO (-55.2%)	NO
L06: LARGE 03	NO (-67.3%)	NO
L06: STANDARD 08	NO (-57.8%)	NO
L06: STANDARD 09	NO (-60.8%)	NO
L06: LARGE 02	NO (-62.2%)	NO
L07: STANDARD 01	NO (-90.8%)	NO
L00: FITNESS STUDIO	NO (-52%)	NO
L01: LARGE 01	NO (-69.5%)	NO
L01: STANDARD 07	NO (-42.3%)	NO
L01: STANDARD 08	NO (-43.2%)	NO
L01: STANDARD 09	NO (-43%)	NO
L02: STANDARD 02	NO (-71.5%)	NO
L02: STANDARD 03	NO (-76.9%)	NO
L02: STANDARD 24	NO (-88.2%)	NO
L02: STANDARD 23	NO (-62.6%)	NO
L02: STANDARD 22	NO (-63.2%)	NO
L02: STANDARD 09	NO (-60.9%)	NO
L02: STANDARD 10	NO (-42.3%)	NO
L02: STANDARD 11	NO (-42.3%)	NO
L02: STANDARD 12	NO (-43.2%)	NO
L02: STANDARD 13	NO (-42.3%)	NO
L02: STANDARD 14	NO (-42.3%)	NO
L00: LOUNGE	NO (-17.3%)	NO
L02: STANDARD 06	NO (-66.8%)	NO
L02: STANDARD 07	NO (-64.1%)	NO
L02: LARGE 02	NO (-65.2%)	NO
L03: STANDARD 21	NO (-62.6%)	NO
L03: STANDARD 20	NO (-66.3%)	NO
L03: STANDARD 04	NO (-82.3%)	NO
L03: LARGE 01	NO (-67.4%)	NO
L03: STANDARD 05	NO (-80.4%)	NO
L03: STANDARD 10	NO (-42.2%)	NO
L03: STANDARD 19	NO (-58.8%)	NO
L03: STANDARD 18	NO (-43.2%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L03: STANDARD 06	NO (-65.9%)	NO
L03: STANDARD 07	NO (-61.8%)	NO
L00: ENTRANCE LOUNGE+CAFE	YES (+11.5%)	NO
L04: STANDARD 02	NO (-71.5%)	NO
L04: STANDARD 03	NO (-76.9%)	NO
L04: STANDARD 24	NO (-88.2%)	NO
L04: STANDARD 23	NO (-62.6%)	NO
L04: STANDARD 14	NO (-42.3%)	NO
L04: STANDARD 15	NO (-43.2%)	NO
L04: STANDARD 16	NO (-42.3%)	NO
L04: STANDARD 17	NO (-42.3%)	NO
L07: STANDARD 05	NO (-76.2%)	NO
L07: STANDARD 10	NO (-64.7%)	NO
L07: STANDARD 11	NO (-42.3%)	NO
L07: STANDARD 12	NO (-43.2%)	NO
L07: STANDARD 13	NO (-42.3%)	NO
L08: STANDARD 01	NO (-90.3%)	NO
L08: STANDARD 04	NO (-80.3%)	NO
L08: LARGE 01	NO (-54.9%)	NO
L08: STANDARD 05	NO (-75.3%)	NO
L07: STANDARD 18	NO (-43.2%)	NO
L08: STANDARD 10	NO (-64.2%)	NO
L08: STANDARD 11	NO (-42.3%)	NO
L08: STANDARD 17	NO (-42.3%)	NO
L08: STANDARD 19	NO (-58.8%)	NO
L09: STANDARD 17	NO (-66.3%)	NO
L09: STANDARD 04	NO (-79.4%)	NO
L09: LARGE 01	NO (-50.5%)	NO
L09: STANDARD 05	NO (-74.6%)	NO
L08: STANDARD 18	NO (-43.2%)	NO
L09: STANDARD 10	NO (-64.2%)	NO
L01: STANDARD 01	NO (-91.8%)	NO
L09: STANDARD 17	NO (-42.3%)	NO
L09: STANDARD 19	NO (-58.8%)	NO
L01: STANDARD 18	NO (-72.8%)	NO
L10: STANDARD 18	NO (-62.6%)	NO
L10: STANDARD 17	NO (-66.3%)	NO
L10: STANDARD 04	NO (-77%)	NO
L10: LARGE 01	NO (-46.8%)	NO
L10: STANDARD 05	NO (-71.8%)	NO
L09: STANDARD 18	NO (-43.2%)	NO
L10: STANDARD 17	NO (-42.3%)	NO
L10: STANDARD 19	NO (-58.8%)	NO
L01: STANDARD 02	NO (-71.8%)	NO
L01: STANDARD 06	NO (-64.6%)	NO
L01: STANDARD 03	NO (-76.9%)	NO
L01: STANDARD 17	NO (-13.7%)	NO
L01: STANDARD 16	NO (-15%)	NO
L01: STANDARD 15	NO (-14%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L01: STANDARD 14	NO (-24.5%)	NO
L01: STANDARD 04	NO (-82.4%)	NO
L01: STANDARD 05	NO (-80.6%)	NO
L01: STANDARD 10	YES (+33.2%)	NO
L01: STANDARD 11	YES (+31.2%)	NO
L01: STANDARD 12	YES (+33.2%)	NO
L01: STANDARD 13	YES (+33.2%)	NO
L01: LARGE 02	NO (-53.6%)	NO
L02: STANDARD 01	NO (-91.4%)	NO
L02: STANDARD 21	NO (-62.6%)	NO
L02: STANDARD 20	NO (-66.3%)	NO
L02: LARGE 03	NO (-67.3%)	NO
L02: STANDARD 04	NO (-82.3%)	NO
L02: LARGE 01	NO (-68.5%)	NO
L02: STANDARD 05	NO (-80.4%)	NO
L02: STANDARD 19	NO (-58.8%)	NO
L02: STANDARD 08	NO (-57.8%)	NO
L02: STANDARD 15	NO (-43.2%)	NO
L02: STANDARD 16	NO (-42.3%)	NO
L02: STANDARD 17	NO (-42.3%)	NO
L02: STANDARD 18	NO (-43.2%)	NO
L03: STANDARD 01	NO (-91.4%)	NO
L03: STANDARD 02	NO (-71.5%)	NO
L03: STANDARD 03	NO (-76.9%)	NO
L03: STANDARD 24	NO (-88.2%)	NO
L03: STANDARD 23	NO (-62.6%)	NO
L03: STANDARD 22	NO (-63.2%)	NO
L03: STANDARD 11	NO (-42.3%)	NO
L03: STANDARD 12	NO (-43.2%)	NO
L03: STANDARD 13	NO (-42.3%)	NO
L03: STANDARD 14	NO (-42.3%)	NO
L03: STANDARD 15	NO (-43.2%)	NO
L03: STANDARD 16	NO (-42.3%)	NO
L03: STANDARD 17	NO (-42.3%)	NO
L03: LARGE 03	NO (-67.3%)	NO
L03: STANDARD 08	NO (-57.8%)	NO
L03: STANDARD 09	NO (-60.8%)	NO
L03: LARGE 02	NO (-64.8%)	NO
L04: STANDARD 01	NO (-91.3%)	NO
L04: STANDARD 22	NO (-63.2%)	NO
L04: STANDARD 21	NO (-62.6%)	NO
L04: STANDARD 20	NO (-66.3%)	NO
L04: STANDARD 04	NO (-81.9%)	NO
L04: LARGE 01	NO (-64.5%)	NO
L04: STANDARD 05	NO (-79.6%)	NO
L04: STANDARD 10	NO (-41.6%)	NO
L04: STANDARD 11	NO (-42.3%)	NO
L04: STANDARD 12	NO (-43.2%)	NO
L04: STANDARD 13	NO (-42.3%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L07: STANDARD 02	NO (-70.4%)	NO
L07: STANDARD 03	NO (-76.4%)	NO
L07: STANDARD 21	NO (-88.2%)	NO
L07: STANDARD 20	NO (-62.6%)	NO
L07: STANDARD 19	NO (-63.2%)	NO
L07: STANDARD 18	NO (-62.6%)	NO
L07: STANDARD 17	NO (-66.3%)	NO
L07: STANDARD 04	NO (-81.4%)	NO
L07: LARGE 01	NO (-57.9%)	NO
L07: STANDARD 14	NO (-42.3%)	NO
L07: STANDARD 15	NO (-43.2%)	NO
L07: STANDARD 16	NO (-42.3%)	NO
L07: STANDARD 17	NO (-42.3%)	NO
L07: STANDARD 19	NO (-58.8%)	NO
L08: STANDARD 02	NO (-70.1%)	NO
L08: STANDARD 03	NO (-75.9%)	NO
L08: STANDARD 21	NO (-88.2%)	NO
L08: STANDARD 20	NO (-62.6%)	NO
L08: STANDARD 19	NO (-63.2%)	NO
L08: STANDARD 18	NO (-62.6%)	NO
L08: STANDARD 17	NO (-66.3%)	NO
L08: STANDARD 12	NO (-43.2%)	NO
L08: STANDARD 13	NO (-42.3%)	NO
L08: STANDARD 14	NO (-42.3%)	NO
L08: STANDARD 15	NO (-43.2%)	NO
L08: STANDARD 16	NO (-42.3%)	NO
L09: STANDARD 01	NO (-90%)	NO
L09: STANDARD 02	NO (-68.5%)	NO
L09: STANDARD 03	NO (-74.3%)	NO
L09: STANDARD 21	NO (-88.2%)	NO
L09: STANDARD 20	NO (-62.6%)	NO
L09: STANDARD 19	NO (-63.2%)	NO
L09: STANDARD 18	NO (-62.6%)	NO
L09: STANDARD 11	NO (-42.3%)	NO
L09: STANDARD 12	NO (-43.2%)	NO
L09: STANDARD 13	NO (-42.3%)	NO
L09: STANDARD 14	NO (-42.3%)	NO
L09: STANDARD 15	NO (-43.2%)	NO
L09: STANDARD 16	NO (-42.3%)	NO
L10: STANDARD 01	NO (-89.6%)	NO
L10: STANDARD 02	NO (-65.5%)	NO
L10: STANDARD 03	NO (-72.5%)	NO
L10: STANDARD 21	NO (-88.2%)	NO
L10: STANDARD 20	NO (-62.6%)	NO
L10: STANDARD 19	NO (-63.2%)	NO
L10: STANDARD 10	NO (-64.1%)	NO
L10: STANDARD 11	NO (-42.3%)	NO
L10: STANDARD 12	NO (-43.2%)	NO
L10: STANDARD 13	NO (-42.3%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
L10: STANDARD 14	NO (-42.3%)	NO
L10: STANDARD 15	NO (-43.2%)	NO
L10: STANDARD 16	NO (-42.3%)	NO
L10: STANDARD 18	NO (-43.2%)	NO
L11: STANDARD 04	NO (-64.3%)	NO
L11: LARGE 01	NO (-28.1%)	NO
L11: STANDARD 05	NO (-59.2%)	NO
L12: RESIDENTS KITCHEN	YES (+10.6%)	NO
L12: PRIVET EVENT ROOM	YES (+11.4%)	NO
L11: STANDARD 10	NO (-55.9%)	NO
L11: STANDARD 11	NO (-29.1%)	NO
L11: STANDARD 12	NO (-30.2%)	NO
L11: STANDARD 13	NO (-29.1%)	NO
L11: STANDARD 14	NO (-29.1%)	NO
L11: STANDARD 15	NO (-30.2%)	NO
L11: STANDARD 01	NO (-85.6%)	NO
L11: STANDARD 02	NO (-51.7%)	NO
L11: STANDARD 03	NO (-63.6%)	NO
L11: STANDARD 21	NO (-85.5%)	NO
L11: STANDARD 20	NO (-54%)	NO
L11: STANDARD 19	NO (-54.7%)	NO
L11: STANDARD 18	NO (-54%)	NO
L11: STANDARD 17	NO (-58.5%)	NO
L12: MEETING ROOM	NO (-52%)	NO
L12: AMENITY	YES (+47%)	NO
L12: STANDARD 01	NO (-80.1%)	NO
L12: STANDARD 02	NO (-34.6%)	NO
L12: STANDARD 03	NO (-52.4%)	NO
L12: STANDARD 06	NO (-84%)	NO
L12: STANDARD 05	NO (-49.3%)	NO
L12: STANDARD 04	NO (-50.1%)	NO
L11: STANDARD 16	NO (-29.1%)	NO
L11: STANDARD 17	NO (-29.1%)	NO
L11: STANDARD 19	NO (-49.5%)	NO
L11: STANDARD 18	NO (-30%)	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 [m ²]	9111	9111
External area [m ²]	7319.6	7213.4
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	2356.91	3699.55
Average U-value [W/m ² K]	0.32	0.51
Alpha value* [%]	26.01	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
 Offices and Workshop Businesses
 General Industrial and Special Industrial Groups
 Storage or Distribution
 Hotels
 Residential Institutions: Hospitals and Care Homes
 Residential Institutions: Residential Schools

100 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	30.9	31.95
Cooling	0.28	0.18
Auxiliary	0.92	1.51
Lighting	3.35	5.56
Hot water	2.65	5.23
Equipment*	13.55	13.55
TOTAL **	38.11	44.43

* 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	1.63	1.89
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>1.63</i>	<i>1.89</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	119.89	166.87
Primary energy [kWh _{PE} /m ²]	57.09	64.57
Total emissions [kg/m ²]	5.57	6.25

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 SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	65.5	64.4	3.6	3.6	11.2	5	5	5	5
	Notional	83.7	22.5	8.4	2.2	17.3	2.78	2.84	----	----
[ST] Constant volume system (fixed fresh air rate), [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	88.5	67.2	24.6	3.7	15.1	1	5	1	5
	Notional	41.8	29.3	8.2	2.9	15.9	1.41	2.84	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	156.8	0	43.6	0	0	1	0	1	0
	Notional	227.8	0	44.9	0	0	1.41	0	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

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

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