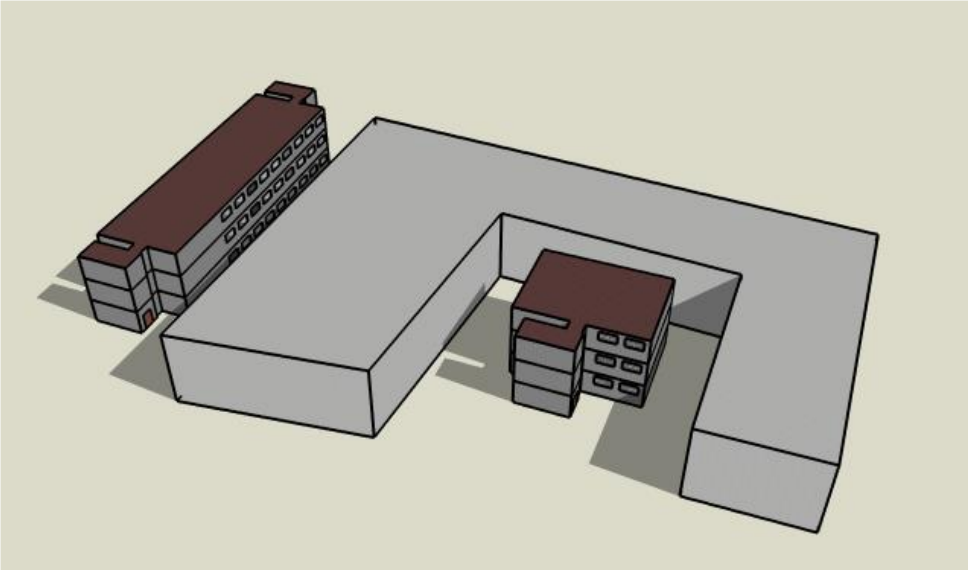
Energy Statement

London Realty Lambeth College

Project number: 10889

Date: 25/09/2023



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Revision	Issue Date	Author	Checked	Description
0	26/07/2023	JR	PK	First Issue
1	25/09/2023	JR	PK	Minor revisions

This document and any calculations herein have been produced based on information supplied by the client and their agents and design team. Any amendments to the technical specification on which this report is based may invalidate the results.

Contents

1 Executive Summary

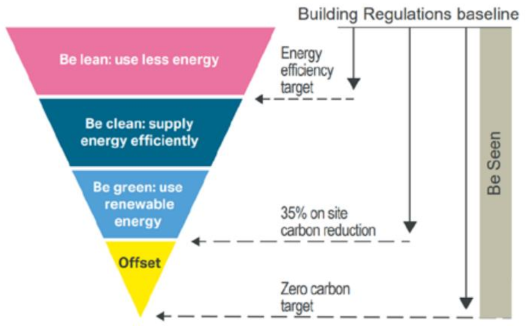
This report has been produced by Base Energy on behalf of Crestwood Environmental Ltd and in support of the planning application for the development named as London Realty Lambeth College comprising of 2 No. temporary 3 Storey Portacabin classroom units falling under the requirements of Lambeth London Borough Council.

It sets out the design approach with regards to energy, carbon dioxide emissions, and sustainability in order to ensure the development complies with:

- National Planning Policy
- The London Plan Policies SI 2
- The Lambeth London Borough Council Local Plan Policy EN4

The above policies require:

- A 35 per cent reduction in CO_2 over Part L 2021
- Designers are encouraged to apply the principles of the energy hierarchy and aim to achieve net zero carbon emissions
- All new non-residential development and non-self-contained residential accommodation, must meet at least BREEAM 'Excellent'.



The design of the development will incorporate energy efficient building fabric and services in addition to low carbon technology:

- Thermal specification targeting Part L 2021 notional U-values
- A design which limits air permeability, targeting 5m3/h-m2
- A design which limits thermal bridging by incorporating Accredited psi values
- Energy saving building services including low energy lighting and heating controls
- Low carbon Air Source Heat Pumps

This results in a 16.4% reduction in CO_2 emissions over Part L 2021.

2 Existing and Proposed Development

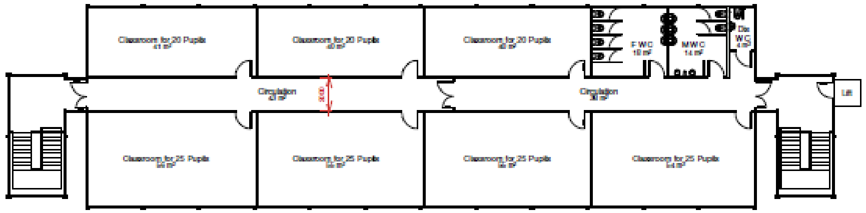
The development site is located on land at 45 Clapham Common South Side, London, SW4 9BL.

The site is currently used as a college and is undergoing some renovation/refurbishment works which have included the demolition of at least one building. There are numerous buildings on site used for education and sports activities falling under use class D1 – non-residential institutions – Education. There are no proposals for any further demolition works.

The development proposals are for the erection of 2 No. temporary 3 Storey Portacabin classroom units within the curtilage of the current site while renovation works are being carried out at the college.

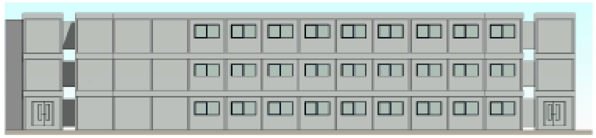
Aspects of the site location, shape, and surroundings (in particular the adjacent buildings), along with any other requirements of planning, use type, and scale will naturally constrain the development proposals in terms of the layout, positioning, and orientation of the proposed development. Subsequently, these constraints will impact on the feasibility of certain renewable technologies (as discussed in Section 4 of this report).

Figure 2.1: Site Location and proposals

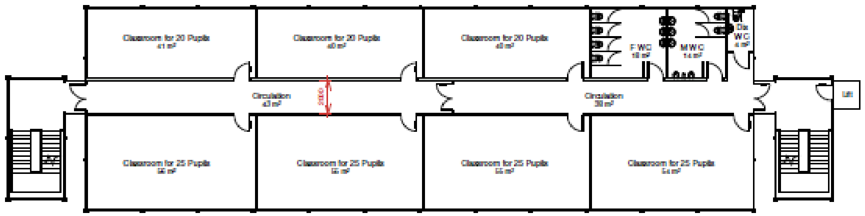


3 **Second Floor**
1 : 200

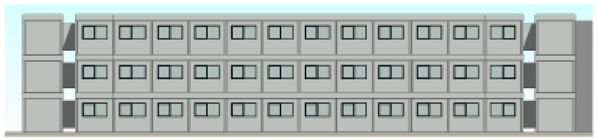
Example Visuals



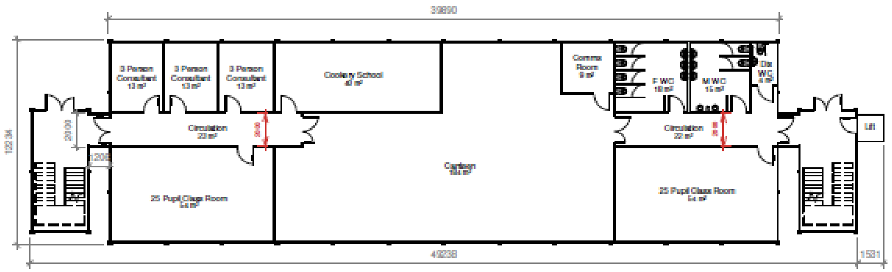
4 **North Elevation**
1 : 300



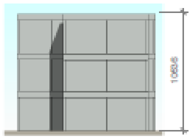
2 **First Floor**
1 : 200



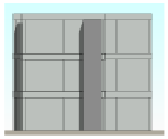
5 **South Elevation**
1 : 300



1 **Ground Floor**
1 : 200

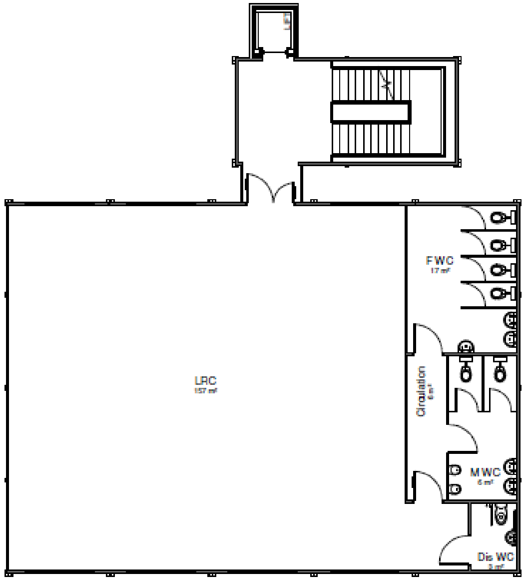


7 **West Elevation**
1 : 300

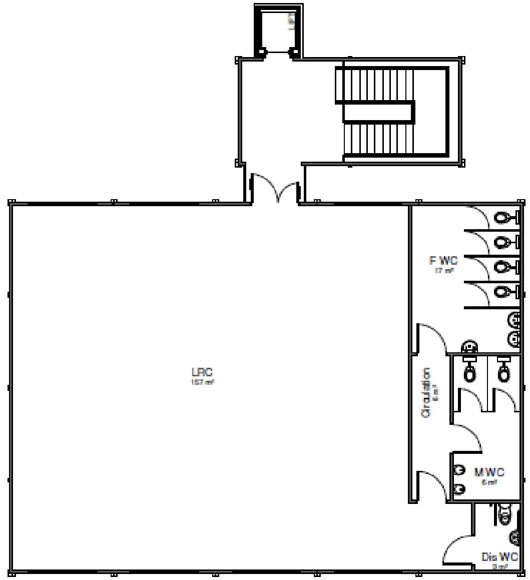


6 **East Elevation**
1 : 300

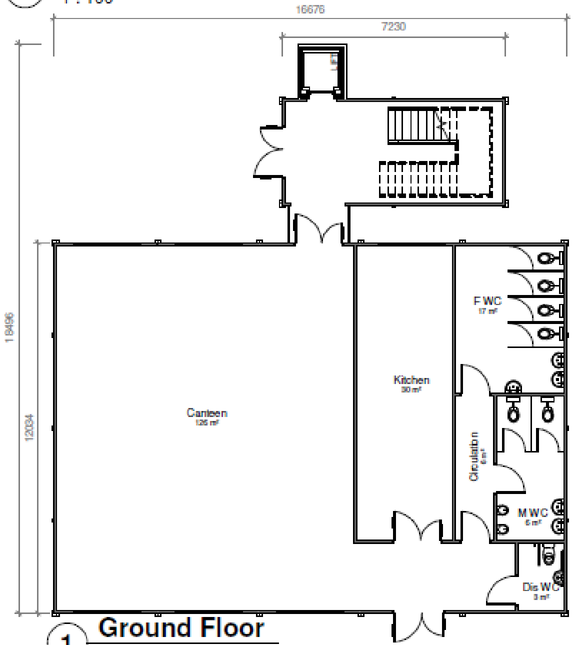
Total Floor Area: 1553m²



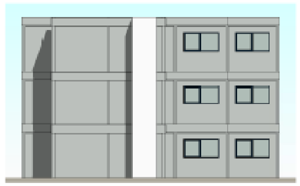
2 First Floor
1 : 100



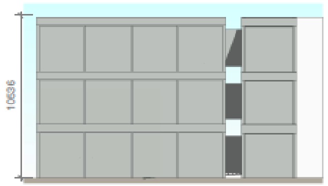
3 Second Floor
1 : 100



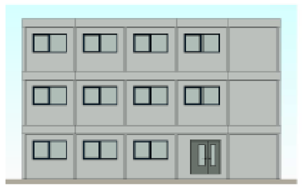
1 Ground Floor
1 : 100



4 North Elevation
1 : 200



5 East Elevation
1 : 200



6 South Elevation
1 : 200

7 West Elevation
1 : 200

Total Floor Area - 661m²

3 Planning Policy

National Planning Policy Framework 2021

The NPPF was updated in July 2021 to place greater emphasis on beauty, place-making, the environment, and sustainable development. The strengthened environmental objectives aim to protect and enhance the natural, built, and historic environment, and encourage effective land use, greater biodiversity, prudent use of natural resources, minimisation of waste and pollution, and adaptation to climate change alongside a move to a low carbon economy.

Local Planning Policy

The relevant Lambeth London Borough Council Local Planning Policy requirements are as follows.

The development should target:

- To meet high standards of sustainable design and construction
- Designers are encouraged to apply the principles of the energy hierarchy and aim to achieve net zero carbon emissions
- A minimum 35 per cent reduction in CO_2 over Part L 2021

4 Methodology

The Standard Assessment Procedure (SAP) is the UK Government methodology for assessing and calculating the energy performance of dwellings.

The Simplified Building Energy Model (SBEM) is the UK Government methodology for assessing and calculating the energy performance of non-domestic buildings.

SAP and SBEM calculations take into account a range of factors that contribute to energy efficiency, including:

- Materials used for the construction and the thermal insulation of the building fabric (u-values[1] and thermal mass)
- Air permeability
- Efficiency, fuel source, and control of heating and cooling systems
- Ventilation system energy use and heat recovery
- Lighting energy
- Low carbon and energy saving or generating technologies

Approved Document Part L of current Building Regulations addresses the conservation of fuel and power. Part L is divided into two separate documents:

- Part L1 Newly constructed and extended or renovated existing dwellings
- Part L2 Newly constructed and extended or renovated existing non-domestic buildings

To comply with Part L, the calculations should demonstrate how the building will either meet or achieve a percentage reduction in the Building Emission Rate (BER) under the required Target Emission Rate (TER).

The calculation software has been used to calculate a baseline of energy demand and carbon dioxide emissions as appropriate from which any reductions or contributions have been measured.

[1] U-values (Thermal Transmittance) - the measure of the overall rate of heat transfer by all mechanisms under standard conditions, through a particular section of a construction. Lower u-values mean better thermal insulation

5 Baseline Energy & CO_2

Energy modelling software has been used to calculate a baseline for the development. This forms the basis from which compliance with planning policy has been measured.

Table 5.1: Baseline CO2

	CO2 Emission Rate (kg CO2/m2/year)	Floor Area (m2)	Total Baseline Emissions (kg CO2/year)
Baseline	4.7	2,140	10,058

The **Total Baseline CO2 Emissions** for the development are shown to be **10,058 kg/year.**

Table 5.2: Baseline Energy Demand

	Energy Demand (kWh/m2/year)	Floor Area (m2)	Total Baseline Energy Demand (kWhyear)
Baseline	50.35	2,140	107,749

The **Baseline Energy Demand** for the development is shown to be **107,749 kWh per year**

6 Low Carbon Design – Fabric First – Be Lean

Before considering low carbon energy generating technology the development has been designed to reduce energy demand through the first step of the energy hierarchy by considering 'fabric first'. A thermally efficient building envelope will follow the design standards as set out below.

Table 6.0: Building Fabric Standards (including u-values W/m²K)

	Part L 2013 Limiting Parameters	Part L 2021 Limiting Parameters	Proposed Development
Walls	0.30	0.26	**0.25**
Ground Floor	0.25	0.18	**0.35**
Flat Roof	0.20	0.18	**0.25**
Windows	2.00	1.6	**1.6**
Doors	2.00	1.6	**1.6**
Air permeability	10.00	8.00	**5.00**

- Insulation: The specified building envelope does not meet the Building Regulation Part L 2021 due to the proposal being a temporary building with a maximum lifespan of 2 years.

The next step is to ensure energy consuming building services are efficient.

- Lighting: Low energy LED lighting throughout with a minimum efficacy of 110 lumens per watt
- Space & Water Heating: Air Source Heat Pump
- Heating Controls: Comprising time & temperature zone control
- Ventilation: Natural ventilation with localised extract fans

Table 6.1: Baseline vs Be Lean CO2

	CO2 Emission Rate (kg CO2/m2/year)	Floor Area (m2)	Total Baseline Emissions (kg CO2/year)	Reduction in CO2
Baseline	4.7	2,140	10,058	N/A
Be Lean	3.93	2,140	8,410.2	**16.4 %**

The **CO2 Emissions reduction** as a result of energy efficient fabric and services is shown to be **1,647.8 kg/year.**

Table 6.2: Baseline vs Be Lean Energy Demand

	Energy Demand (kWh/m2/year)	Floor Area (m2)	Total Baseline Energy Demand (kWhyear)	Reduction in Energy Demand
Baseline	50.35	2,140	107,749	N/A
Be Lean	42.05	2,140	89,987	**16.5 %**

The **Energy Demand reduction** as a result of energy efficient fabric and services is shown to be **17,762 kWh per year**

7 Low Carbon Technology Review & Recommendations

Having set out an energy efficient design, the nest step is to incorporate low carbon technology for energy generation. A number of technologies exist and should be specified where they:

- compliance with planning policy
- are feasible for the site
- are cost efficient
- are appropriate for proposed development form and function
- protect against fuel poverty
- promote fuel security
- reduce reliance on fossil fuels
- reduce carbon emissions
- reduce resource depletion
- reduce pollution

Site location and development form and function will influence the suitability of different technologies through:

- Orientation
- Space (inside and outside of the buildings)
- Surrounding topography, structures, and natural features
- Wind speed
- Overshading
- Geology and ground conditions
- Building form, function, and density

In determining the most feasible renewable technologies for the dwelling, the following have been reviewed:

- Wind turbines
- Ground Source Heat Pumps
- Air Source Heat Pumps
- Biomass
- Combined Heat and Power
- Photovoltaic Panels
- Solar water heating

WIND TURBINES

Wind turbines are used to produce electricity. They can be either pole mounted (in a suitably exposed position) or building mounted; building mounted systems need a sufficient wind speed at the structural height and both a structural survey and planning permission.

- Wind speed can be too low on low rise buildings
- Taller systems need sufficient space
- Wind resources very variable and unpredictable
- May need planning permission

Wind turbines technology is **not recommended** for this development

GROUND SOURCE HEAT PUMP (GSHP)

GSHPs use naturally occurring underground low-level heat in areas with appropriate geological features. Heat is transferred from the ground by either extracting and discharging (re-charging) water from/to the ground directly (open loop) or circulating water through pipes buried within the ground, (closed loop). The water is passed through a heat pump to transfer the heat from this water into a higher temperature water circuit to provide heating. The loop can be fitted horizontally (laid in a shallow trench) or vertically (in a borehole).

- Feasibility analysis is costly
- Suitable ground conditions required
- More capital intensive than air source heat pumps
- Can be more efficient and lower running costs than ASHPs
- Well suited to highly insulated buildings

Ground source heat pump technology is **not recommended** for this development

AIR SOURCE HEAT PUMP (ASHP)

ASHP systems absorb heat from outside air at a low temperature into a fluid which is then passed through an electrically driven compressor where its temperature is increased. There are two main types of ASHP systems: Air to Water systems distribute heat through wet central heating; Air to air produce warm air which is circulated by fans For an ASHP system to be installed, there needs to be ample outdoor space for the external condensing unit; these units can also be noisy and blow out colder air to the neighbouring environment.

- Requires space for external plant and internal hot water tank for wet systems supplying DHW
- Can generate noise though quieter systems have been developed
- Least efficient when most needed
- Longer life than fossil fuel boilers
- High capital costs vs gas systems but lower than GSHPs
- Well suited to highly insulated buildings

Air source heat pump technology **is recommended** for this development

BIOMASS

Biomass systems burn wood pellets, chips, or logs to provide heat in a single room, or to power central heating and hot water boilers. There needs to be ample space available for both the boiler and the storage of fuel. There will also be regular deliveries of fuel and therefore adequate site access is required.

- Carbon emissions are cyclical unlike fossil fuel
- Requires fuel storage space and bulk delivery
- Carbon 'neutral' fuel in isolation but supply side emissions are still present so not neutral overall
- Harmful particulate emissions impact air quality and health

Biomass technology **is not recommended** for this development

COMBINED HEAT AND POWER (CHP)

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

- Reduces consumption of and reliance on grid electricity
- Works best with high and consistent heat and hot water demand
- Recovers waste energy
- Can export to the grid
- Uses fossil fuel
- Emissions on site rather than upstream
- Efficiency is sensitive to sizing

CHP **is not recommended** for this development

DISTRICT HEATING

District Heating systems provide multiple buildings or dwellings with heat and hot water from a central boiler house, or 'energy centre'. The system can provide heating or cooling which is transferred from the energy centre through a network of highly insulated pipes carrying the heated water to each dwelling.

- Economies of scale
- Frees up space in habitable areas of development
- Variety of systems
- Can make use of waste heat from industry
- Can be fossil fuel based and dependent

District heating **is not recommended** for this development

SOLAR PHOTOVOLTAIC (PV)

Solar PV cells (which are mounted together in panels or tiles on the roof) convert sunlight into electricity. The cells are made from layers of semi-conducting material; when the light shines on the cell, an electric field is created across the layers. Although PV cells are most effective in bright sunlight, they can still generate electricity on a cloudy day. The power of a PV cell is measured in kilowatts peak (kWp). Each PV panel produces 0.25Watts to 0.35Watts depending on the manufacture.

- Passive technology, requires no energy input from grid
- Does not require sunny days to generate power
- Capital costs can be high although payback is effective
- Needs sufficient roof space and orientation
- Zero site or upstream emissions
- Can export to the grid

Solar PV technology **is not recommended** for this development as the buildings are temporary and a payback period within 7 years would not be possible

SOLAR HOT WATER

Solar hot water systems absorb energy from the sun and transfer this energy using heat exchangers to heat water which can then be stored. Systems should be roof mounted and oriented to face between a south-east and south-west direction.

- Mostly passive technology but requires pump energy
- Not suitable for combi boilers and developments without roof space
- Lower CO2 reductions than other technologies

Solar hot water technology **is not recommended** for this development

Low Carbon Technology Summary

The low carbon technology review indicates that Air Source Heat Pumps would be potentially feasible. The following low carbon technology is recommended:

Air Source Heat Pumps

This technology is deemed optimal for meeting the needs of the development and achieving policy compliance. It has been incorporated into the energy model and the results are presented in the next section.

8 Conclusion

Proposals are for the development named London Realty Lambeth College comprising the erection of 2 No. temporary 3 Storey Portacabin classroom units falling under the requirements of Lambeth London Borough Council

Under the local planning policy the proposed development is required to:

- To meet high standards of sustainable design and construction
- Designers are encouraged to apply the principles of the energy hierarchy and aim to achieve net zero carbon emissions
- A 35 per cent reduction in CO_2 over Part L 2021

Energy modelling software has been used to calculate a baseline against which compliance with the above can be measured.

The proposed development will be designed to limit energy demand through the inclusion of a thermally efficient building fabric and energy efficient services.

Low carbon technology will be incorporated and is to comprise of Air Source Heat pumps and low energy lighting with occupancy controls.

This results in 16.4% reduction in CO_2 Emissions and 16.5% reduction in energy demand.

This Energy Statement and the calculations on which it is based demonstrate that the proposed development does not comply with all the local planning policy requirements. However, with the proposed buildings having a lifespan of a maximum of 2 years, these buildings are classed as temporary and therefore should be exempt from having to obtain a BRUKL Report 'PASS'. Implementing Green energy production technology such as Solar PV or Solar Hot Water would not get a payback within the lifespan of the buildings. We therefore consider this energy statement shows reasonable measures have been implemented in order to achieve an improvement in CO_2 emissions and energy usage over the current Building Regulations Part L 2021.

10 Appendix 1

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Lambeth College Portacabins - As Designed — As designed

Date: Wed Jul 26 11:59:17 2023

Administrative information

Building Details

Address:

Certifier details

Name: Mr Robert Rossall
Telephone number: 0151 933 0328
Address: Base Energy 202 Stanley Road, Bootle, L20 3EN

Certification tool

Calculation engine: SBEM
Calculation engine version: v6.1.e.0
Interface to calculation engine: DesignBuilder SBEM
Interface to calculation engine version: v7.2.0
BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 713.28

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

Target CO_2 emission rate (TER), $kgCO_2/m^2annum$	4.7	
Building CO_2 emission rate (BER), $kgCO_2/m^2annum$	3.93	
Target primary energy rate (TPER), kWh_{PE}/m^2annum	50.35	
Building primary energy rate (BPER), kWh_{PE}/m^2annum	42.05	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

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

Fabric element	$U_{a-Limit}$	U_{a-Calc}	U_{i-Calc}	First surface with maximum value
Walls*	0.26	0.32	0.32	Block 1 FF - Dis WC_W_5
Floors	0.18	0.25	0.25	Block 1 GF - Kitchen_S_3
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.25	0.25	Block 1 GF - Stairwell_R_12
Windows** and roof windows	1.6	1.6	1.6	Block 1 GF - Canteen_G_8
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	1.6	1.6	Block 1 GF - Canteen_D_11
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

$U_{a-Limit}$ = Limiting area-weighted average U-values [W/(m²K)]
U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]
U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]
* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
** Display windows and similar glazing are excluded from the U-value check.
*** Values for rooflights refer to the horizontal position.
^ For fire doors, limiting U-value is 1.8 W/m²K
NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m³/(h.m²) at 50 Pa	8	5

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Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	2139.8	2139.8
External area [m²]	3776.1	3776.1
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	5	3
Average conductance [W/K]	1409.29	1754.69
Average U-value [W/m²K]	0.37	0.46
Alpha value* [%]	17.26	19.85

* 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
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
100	**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	7.65	10.87
Cooling	3.02	5.73
Auxiliary	1.27	1.69
Lighting	5.99	5.3
Hot water	10.28	10.28
Equipment*	21.12	21.12
TOTAL**	**28.21**	**33.88**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0.04
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*0*	*0.04*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	164.66	194.06
Primary energy [kWh_{PE}/m^2]	42.05	50.35
Total emissions [kg/m²]	3.93	4.7

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