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ALEXANDRA PARK SCHOOL SIXTH FORM BLOCK EXTENSION

ENERGY STATEMENT

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All information provided here is based on plans and information available at the time of writing. Prior to implementation of the options discussed, further detailed study, design, and costing, based on ground surveys, structural analysis, over shading studies, etc., as relevant to each renewable/low carbon source, is necessary.

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1. EXECUTIVE SUMMARY

This energy statement has been prepared by CBG Consultants on behalf of Alexandra Park School in support of its planning application. It is proposed to extend the existing sixth form block.

This energy statement has been prepared using the GLA Energy Assessment Guidance document. The latest GLA carbon emission reporting spreadsheet has been used for the calculations. The requirements of the zero-carbon target are:

- Energy demand reduction measures need to contribute to more than 15% of the reduction.
- A minimum 35% reduction (over the baseline) is required from improvement measures on site.
- The remainder can be compensated with carbon offset payments.

Carbon savings have been demonstrated using the London Plan 2021 energy hierarchy (Policy SI 2):

- Be Lean: High specification of building fabric and energy efficient services will minimise energy demand.
- Be Clean: The site is not currently suitable for a local CHP system or connection to a district network. Therefore, no carbon savings are possible using this measure.
- Be Green: Space heating and cooling will be provided by Air Source Heat Pumps (ASHPs) with additional carbon offset from photovoltaics.
- Be Seen: The actual operational energy performance will be monitored and reported for at least five years.

Table 1 displays the site-wide carbon emissions and savings from the proposed design.

	Total regulated emissions (Tonnes CO ₂ / year)	CO ₂ savings (Tonnes CO ₂ / year)	Percentage savings (%)
Part L 2021 baseline	3.4		
Be Lean	3.2	0.2	7%
Be Clean	3.2	0.0	0%
Be Green	2.2	1.0	30%
Total Savings	-	2.2	37%
	-	CO ₂ savings off-set (Tonnes CO ₂)	-
Off-set	-	65	-

Table 1: Site-wide carbon emissions and savings.

The design has been developed to improve all aspects of the proposal such as: Improving insulation levels, glazing areas have been reviewed, high performance double glazing is proposed throughout, and the external building services efficiencies have been assessed.



2. INTRODUCTION

This energy statement has been prepared by CBG Consultants on behalf of Alexandra Park School in support of its planning application. It is proposed to extend the existing sixth form block.

This energy statement has been prepared using the GLA Energy Assessment Guidance document. It covers requirements set out in London Plan Policies.

2.1 London Plan 2021 Carbon Reduction Targets

In line with the London Plan, major developments are expected to achieve net zero-carbon by following the energy hierarchy:

- Be Lean: Use less energy and manage demand during operation through fabric and servicing improvements and the incorporation of flexibility measures.
- Be Clean: Exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly by connecting to district heating networks.
- Be Green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site.
- Be Seen: monitor, verify and report on energy performance through the Mayor's post construction monitoring platform.

The requirements of the zero-carbon target are:

- Non-domestic developments are expected to achieve 15% carbon reductions beyond Part L 2021 at the Be Lean stage.
- A minimum 35% on-site carbon reduction beyond Part L 2021 at the Be Green stage.
- The remainder can be compensated with carbon offset payments.

It should be noted that these targets apply to regulated carbon only. Regulated carbon refers to the emissions associated with internal lighting, heating, hot water, air conditioning and mechanical ventilation. Other consumptions such as small power equipment (PCs, TVs, laptops etc.) are "unregulated". Regulated energy calculations for the development has been carried out using IES Virtual Environment software which is accredited for Part L2 calculations.

3. CARBON REDUCTION CALCULATIONS

Carbon reduction calculations have been conducted in accordance with the GLA Energy Assessment Guidance document. The latest GLA carbon emission reporting spreadsheet has been used with a carbon offset fund price of £95 per tonne.

3.1 Baseline Case

The baseline CO₂ emissions are calculated from the 'notional' building using the Part L software tools. The 'notional' building consists of a standard set of fabric and services parameters which deliver the Target Emissions Rate. This is then used as the Baseline emissions from which savings from Be Lean, Be Clean, and Be Green measures are calculated. As stated by the guidance document, the baseline CO₂ emissions are determined by the Target Emission Rate (TER) from the final proposed building specification, i.e. the rate from the modelling results of the Be Green stage of the energy hierarchy.

	Carbon Dioxide Emissions for non-domestic buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	3.4	0

Table 2: Baseline carbon emissions.

3.2 Demand Reduction (Be Lean)

Insulation

U-values for external elements have been improved from the Part L2 minimum standards, as shown in the table below.

Element	Targeted U-Values (W/m ² K)	Part L2 Notional Values (W/m ² K)	Part L2 Minimum Values (W/m ² K)
Walls	0.16	0.18	0.26
Ground & Exposed Floors	0.13	0.15	0.18
Roof	0.13	0.15	0.18
Glazing	1.4	1.4	1.6

Table 3: Building fabric U-values.

Air Tightness

An air permeability of 3 m³/m²/hr (@50pa) has been allowed for these calculations, and this represents a low leakage rate for a new building. The intention will be to build the scheme to be as airtight as possible, however, this will remain speculative until construction is finished. Following completion, the result of the pressure test will be used to update the calculations.

Heating

As stated in paragraph 7.9 of the energy assessment guidance, the heating system matches the notional building system type and performance values from the Part L 2021 baseline as determined by the final proposed building specification. An ASHP is the proposed low carbon heating source.

Hot Water

As stated in paragraph 7.9 of the energy assessment guidance, the hot water system matches the notional building system type and performance values from the Part L 2021 baseline as determined by the final proposed building specification. In this case, hot water will be generated via the ASHP feeding a pre heat cylinder.

Ventilation

Mechanical ventilation with heat recovery (MVHR) system has been assumed throughout with at least 80% heat recovery efficiency and low specific fan powers as well as Natural ventilation with heat recovery (NVHR) system for the first and second floor seminar rooms with a heat recovery efficiency of at least 75%.

Lighting

Highly efficient LED lighting is proposed throughout with an average efficacy of at least 100 lm/W. Occupancy sensors in non-domestic type spaces will further reduce energy consumption, along with daylight sensors in appropriate spaces.

3.2.1 Be Lean Carbon Emissions Reduction

Table 4 shows the results after the Be Lean Stage. The energy efficiency measures have enabled a 7% carbon saving over the baseline.

	Total regulated emissions (Tonnes CO ₂ / year)	CO ₂ savings (Tonnes CO ₂ / year)	Percentage savings (%)
Part L 2021 baseline	3.4		
Be Lean	3.2	0.2	7%

Table 4: Carbon saving after Be Lean stage.

3.3 System Efficiency (Be Clean)

London Plan 2021 Policy SI 3 states developments within Heat Network Priority Areas should have a communal low-temperature heating system and should select a heat source in accordance with the following heating hierarchy:

- Connect to local existing or planned heat networks.
- Use zero-emission or local secondary heat sources (in conjunction with heat pump, if required).

- c) Use low-emission combined heat and power (only where there is a case for CHP to enable the delivery of an area-wide heat network, meet the development's electricity demand and provide demand response to the local electricity network).
- d) Use ultra-low NOx gas boilers.

Alexandra Park School is a Heat Network Priority Area (Figure 1), but the Energy Assessment Guidance also states that communal systems are also recommended for developments outside HNPA's. The following sections therefore address the heating hierarchy.

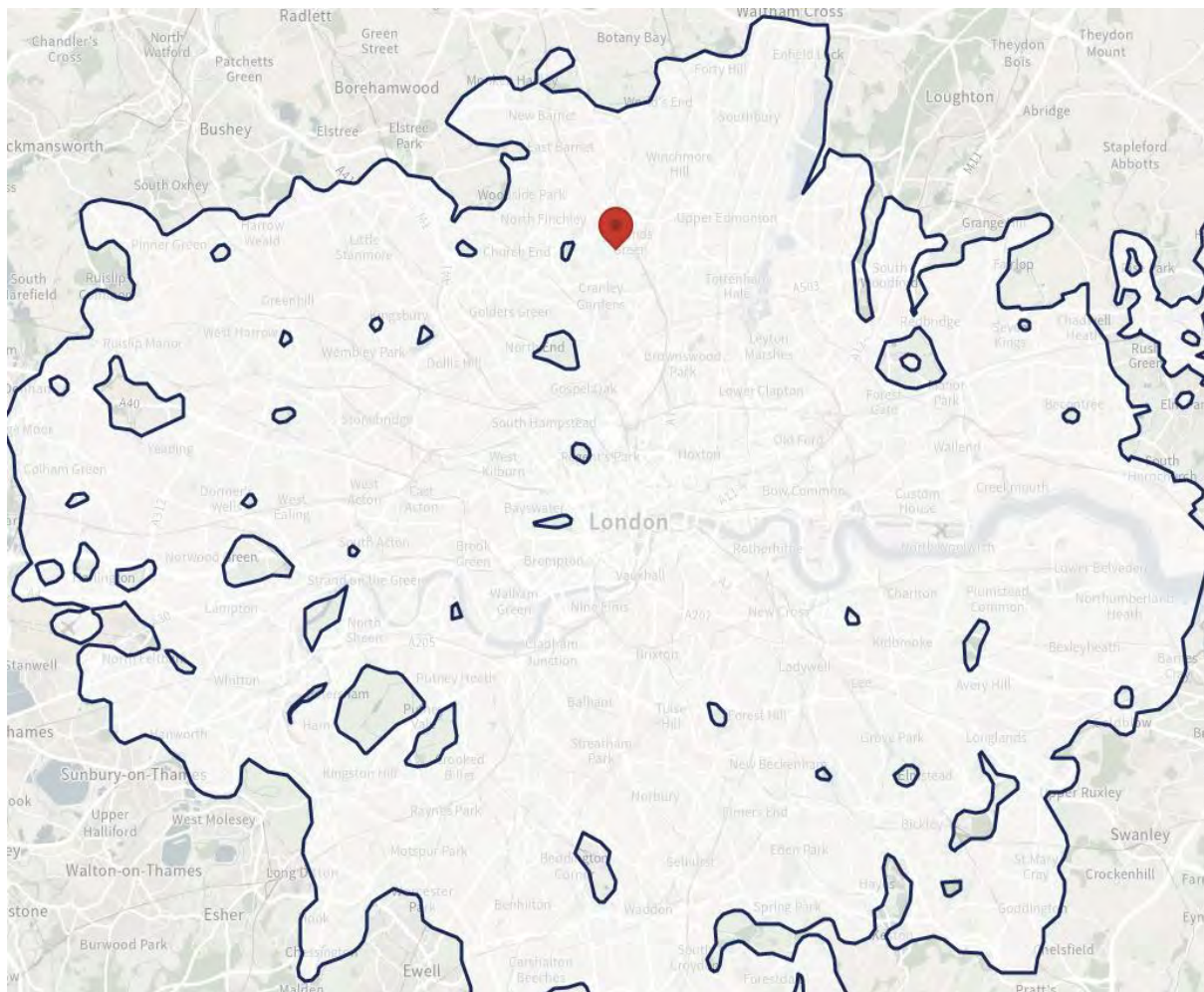


Figure 1: Heat Network Priority Areas (HNPA's). The red marker shows the development site.

3.3.1 Connection to District Heating Network

Figure 2 shows the proposed development (red marker) in relation to existing (red) and potential district heat networks (orange). As the nearest proposed district heating network is over 1km away it would not be economical to connect into a heat network at this stage.

3.3.2 Zero Emission and/or Local Secondary Heat Sources

3.3.3 Combined Heat and Power (CHP)

3.3.4 Use Ultra-Low Nox Gas Boilers

3.3.5 Carbon Emissions Reduction

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3.4 Renewable Energy (Be Green)

An initial review was conducted to eliminate any technologies which from the outset have been identified as unviable. This can be found in Appendix 1. From this study, air source heat pumps (ASHPs) and photovoltaics (PV) have been identified as the most appropriate for the site.

3.4.1 Air Source Heat Pumps

It is proposed that two air source heat pumps are installed to serve the extension.

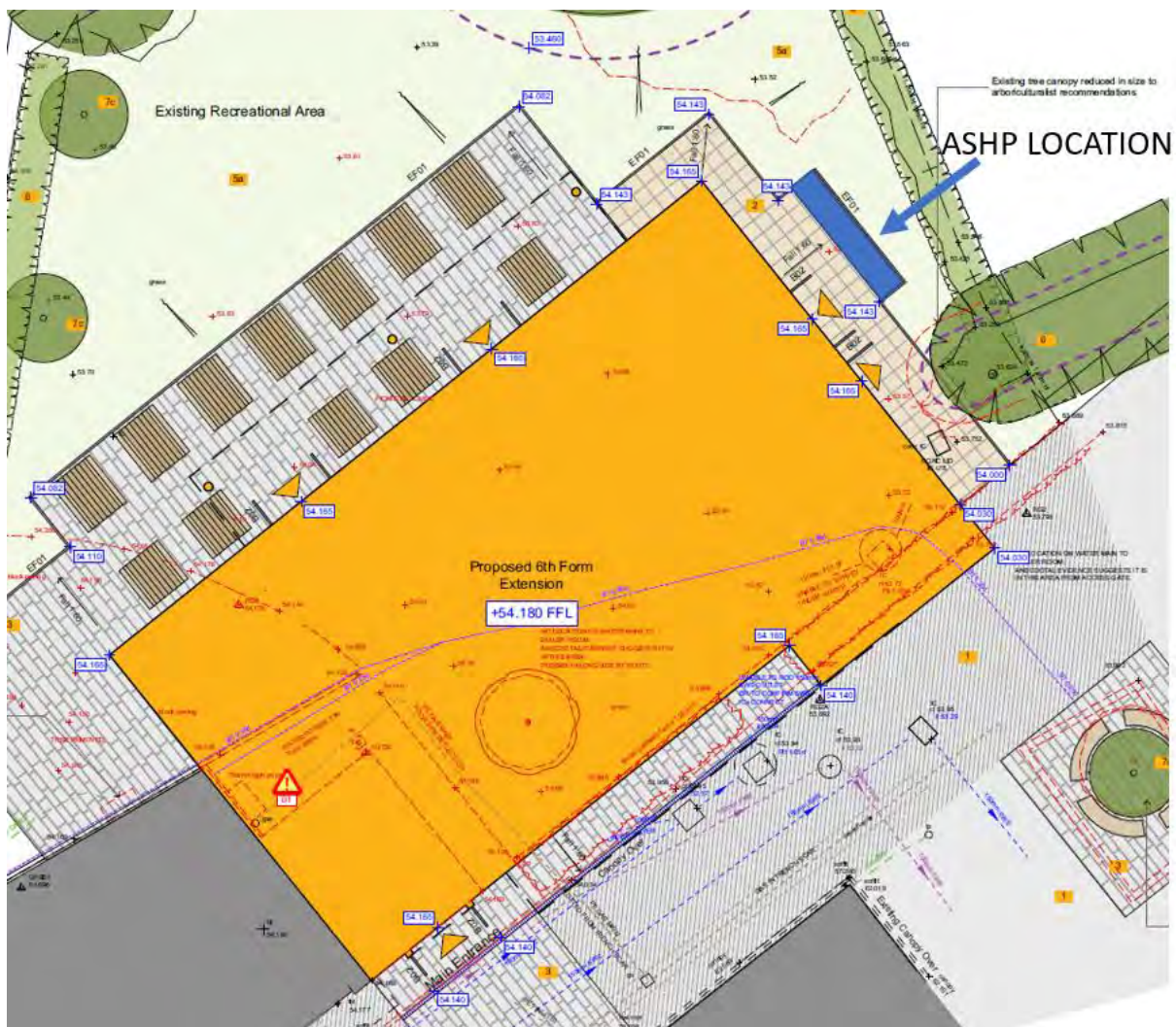


Figure 3: Location of Air Source Heat Pump.

At this stage a SCOP of 3.0 for the extension has been used based on an initial selection to suit the capacity.

3.4.2 Photovoltaics

The design proposal includes photovoltaic panels on the flat roof of the extension. It is proposed to include 32 PV panels on the roof facing south at an inclination of 10°. An increased number of panels have not been considered due to the shading from neighbouring buildings.

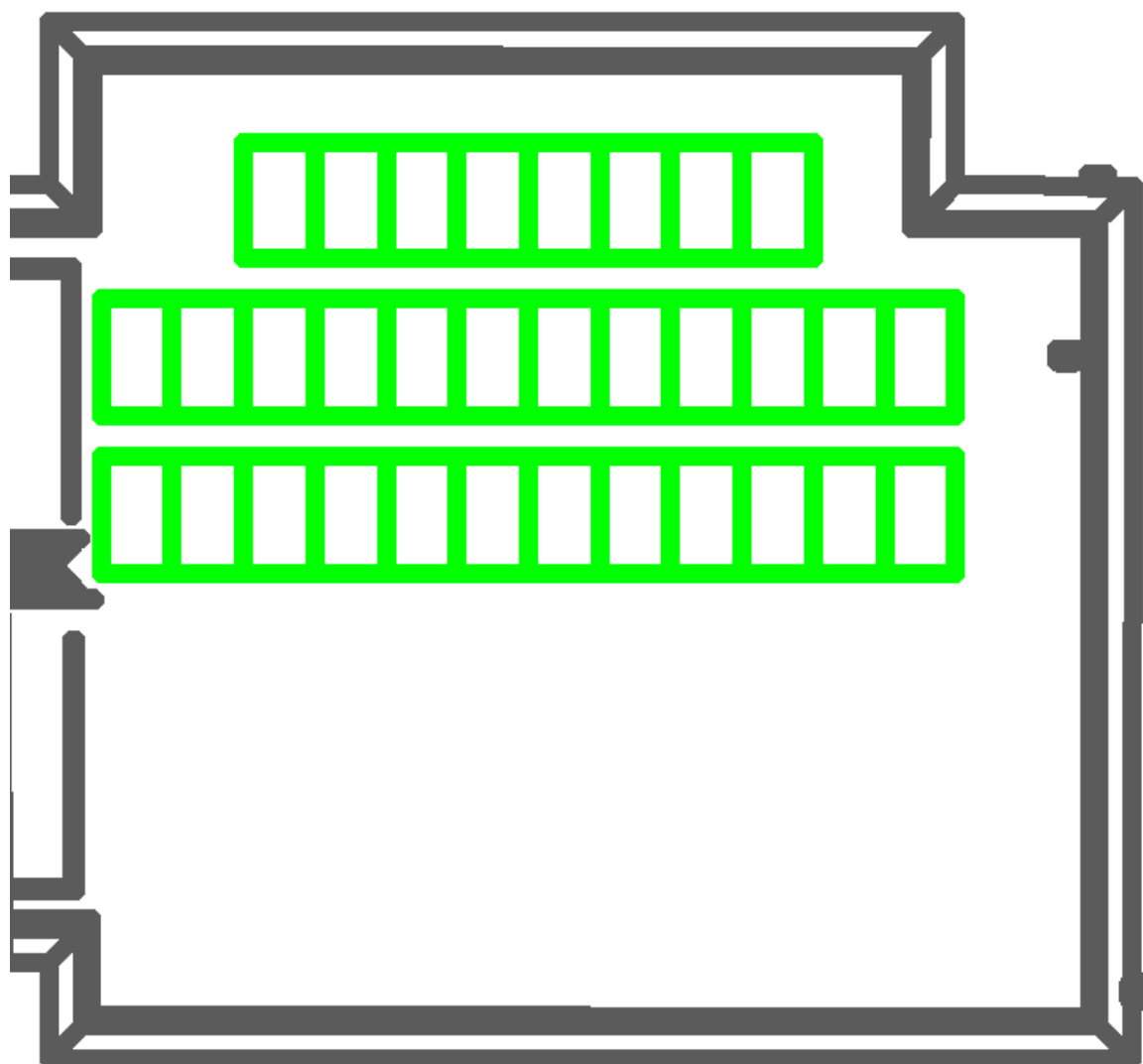


Figure 4: Proposed location of PV panels on Building A.

3.4.3 Be Green Carbon Emissions Reduction

Table 5 shows the carbon reduction when the proposed air-source heat pumps and photovoltaics are included in the design. Carbon emissions are now reduced to 9.0 tonnes, which is a 15% saving over the baseline.

	Total regulated emissions (Tonnes CO ₂ / year)	CO ₂ savings (Tonnes CO ₂ / year)	Percentage savings (%)
Part L 2021 baseline	3.4		
Be Lean	3.2	0.2	7%
Be Clean	3.2	0.0	0%
Be Green	2.2	1.0	30%
Total Savings	-	1.3	37%
	-	CO ₂ savings off-set (Tonnes CO ₂)	-
Off-set	-	65	-

Table 5: Carbon saving after Be Green stage.

3.5 Metering & Monitoring

As per the London Plan, metering will be provided to enable the school to monitor their energy consumption and understand how their energy is used.

3.6 Cost to Occupants

Energy demand reduction has been prioritised to reduce running costs. This has been achieved with a highly insulated and airtight envelope, the use of mechanical ventilation with heat recovery, and low energy lighting. With the energy demand reduced, the proposed energy systems have been selected with consideration to reduce running costs as well as carbon reduction.

3.7 Peak Energy Demand

The GLA is encouraging applicants to investigate the potential for energy flexibility in new developments to reduce the capacity required for each site and to the reduce the peak demand. This is particularly important as new developments move away from gas to an all-electric solution, like the Alexandra Park School Sixth Form Block extension development.

A key aspect of managing demand will be to reduce peak energy loadings. Opportunities for reducing the energy demand have been explored and implemented into the design as part of the energy hierarchy process.

3.8 Energy Monitoring (Be Seen)

The Be Seen Energy Monitoring Guidance document explains the process that needs to be followed to comply with the Be Seen post-construction monitoring requirement of Policy SI 2 of the London Plan. The 'be seen' stage requires monitoring and reporting of the actual operational energy performance of major developments for at least five years.



The development will be designed to enable post construction monitoring and the information set out in Be Seen guidance is submitted to the GLA at the appropriate stages.

3.9 Energy Use Intensity

As required by the GLA, the Energy Use Intensity (EUI) and space heating demand have been calculated in accordance with the Be Seen energy monitoring guidance document (September 2021). The following results are also provided in the GLA carbon emission reporting spreadsheet:

- EUI: 25.4 kWh/m²/year (Excluding renewable energy)
- Space heating demand: 4.7 kWh/m²/year (Excluding renewable energy)

The total EUI of 25.4 kWh/m²/year is well below the target of 65 kWh/m²/year.

4. CONCLUSIONS

The Be Lean, Clean, Green hierarchy has been followed to achieve a low energy, low carbon design for the Alexandra Park School Sixth Form Block Extension development:

- Be Lean: High specification of building fabric and energy efficient services will minimise energy demand.
- Be Clean: The site is not currently suitable for a local CHP system or connection to a district network. Therefore, no carbon savings are possible using this measure.
- Be Green: Space heating will be provided by Air Source Heat Pumps (ASHPs) with additional carbon offset from photovoltaics.

Table 6 shows the site-wide carbon emissions and savings from the proposed design. The total offset payment for the site is £6,144.

	Total regulated emissions (Tonnes CO ₂ / year)	CO ₂ savings (Tonnes CO ₂ / year)	Percentage savings (%)
Part L 2021 baseline	3.4		
Be Lean	3.2	0.2	7%
Be Clean	3.2	0.0	0%
Be Green	2.2	1.3	30%
Total Savings	-	2.2	37%
	-	CO ₂ savings off-set (Tonnes CO ₂)	-
Off-set	-	65	-

Table 6: Site-wide carbon emissions and savings.

The design has been developed to improve all aspects of the proposal such as: Improving insulation levels, glazing areas have been reviewed, triple glazing is proposed throughout, and the external building services efficiencies have been assessed.

APPENDIX 1: PRELIMINARY APPRIASAL OF RENEWABLE ENERGY OPTIONS

LZC Technology	Basic Technical Information	Technical, Environmental & Economic implications / Considerations	Suited Application	Site Specific Comment	Detailed Analysis?
Solar thermal	Solar collectors (flat plate or tube) transfer energy into transfer liquid to a closed loop twin coil hot water cylinder	+ Government grants available (RHIs) +/- Can meet a significant proportion of the DHW demand - Efficiency effected by site factors – shading, orientation and roof/ground space - Requires considerable hot water demand all year round to be finically beneficial	Domestic and commercial applications with high annual hot water load; leisure centres, canteens, washrooms	There is limited unshaded roof space available due to proposed PV and hot water storage would be required.	No
Wind turbine	Turbine/generator converts wind energy to electrical power.	+ Government grants available (FITs) + Allows on site generation of renewable electricity - Can create structural, vibrations and noise implications - Not suited for urban environments - Costs can be high in relation to the actual amount of electricity generated - Potential for additional planning issues	Large sized turbines in non-urban or offshore locations will be more effective	The site is located in a dense urban area and further planning approvals would be required.	No
Solar Photovoltaics	Converts sunlight to DC electrical power which then using an inverter to convert to DC.	+ Allows on site generation of renewable electricity + Generally payback between 7-12 years + Low maintenance requirements - No government grants available - Efficiency effected by site factors – shading, orientation and roof/ground space	Wide range of building types particularly buildings with limited solar shading and south facing roof	There is partial shading on the proposed building. PV will be maximised where feasible to generate electricity directly on site.	Yes

LZC Technology	Basic Technical Information	Technical, Environmental & Economic implications / Considerations	Suited Application	Site Specific Comment	Detailed Analysis?
Air source heat pump	Air Source Heat Pumps (ASHP) capture heat from the outside air and transfer the heat directly to the air inside the building or transferring the heat to a liquid medium that can be pumped around the building	+ Lower installation cost that ground source heat pump + Can provide heating and cooling + Government grants available (RHIs) - COP is not as good during the heating season when the outside air temperature is often less than the ground temperature - Can restrict distribution strategies	Wide range of building types particularly building designed to have low temperature heat emitters.	Heating can be provided by air source heat pumps.	Yes
Ground Source Heat Pump	Ground Source Heat Pumps (GSHP) capture heat from the ground and transfer the heat to a liquid medium that can be pumped around the building	+ COP is better than air source heat pumps + Government grants available (RHIs) - Requires area for ground collector or borehole - High initial capital cost - Can restrict distribution strategies	Suits building designed to have low temperature heat emitters with sufficient space for necessary ground works	The high capital cost of this is prohibitive.	No
Biomass	Uses biomass as a fuel source for space heating and hot water	+ Government grants available (RHIs) + Renewable source of heating - Requires large fuel storage capacity - Generally a large capital cost	Building/site with sufficient access and storage facilities and a capable maintenance team	Although it is a renewable heating source, an ASHP is better suited to provide heating and an option for cooling in future.	No



APPENDIX 2: OVERHEATING RESULTS

Overheating & Air Quality Results



Project Description:	Alexandra Park School Sixth Form Extension	
Project Number:	11557	A9
IES Model Reference:	11557_OH2	

School Summer Holiday:	Design Criteria:	Prep By	AM	1.09.2023
Unoccupied	BB101 (2018)	Chkd By	SA	1.09.2023
		Appr By	HdL	1.09.2023

Weather File:
ndon_DSY1_2020High50_.ep
Max. Temperature (°C)
31.5
Max. Temp. When Occupied (°C)
34.3
Ground Temperature (°C)
10.0

CIBSE A Permeability Calculation:	
Building Type:	
Schools	
Building Subtype:	
3 Storey: m²	
Exposure Type:	Exposed
Air Perm. (m³/h.m²@50Pa):	1
Air Permeability (ach):	0.050

Element Type	U Value (W/m²k)	G Value
Walls	0.10	-
Floor	0.10	-
Roof	0.10	-
Opaque Doors	1.00	-
Window Glazing	1.00	0.4
Window Frame	1.00	-

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General Data						Occupancy Data				Lighting Gains		Equipment Gains		Temperature Control																Overheating Results				Air Quality Results		Results
Room Name	Room Area (m ²)	Overheating Category	Cooling Set Point (°C)	Cold Draught Category	Template	Occupancy	Occupancy Sens. Gain (W/person)	Occupancy Latent Gain (W/person)	Occupancy Diversity	Lighting Gain (W)	Lighting Gain (W/m ²)	Equipment Gain (W)	Equipment Gain (W/m ²)	Temperature Control Strategy	Ventilation Reference	Nat Vent Free Area (% Floor Area)	Min Nat Vent Opening Temp (°C)	Day. Mech. Vent. Extract Rate (l/s)	Day. Mech. Vent. Supply Rate (l/s)	Boost Mech. Vent. Supply Rate (l/s)	Purge Mech. Vent. Supply Rate (l/s)	Min. Supply Temp @1.4m (°C)	Night Purge	Daytime boost >26°C	Daytime boost <200 hours/year	Blinds	Exposed Soffit	Peak Occupied Temp (°C)	Time of Exceedance (Hours)	Daily Weighted Exceedance	Maximum ΔT (°C)	Max Daily Average CO ₂ (ppm)	Peak CO ₂ Concentration (ppm)	Outcome		
																																			Result File: OH14	
G03_Sixth_Form_Social_Area	134.1	II	24	IV	Social Area	108	70	70	1	1341	10.0	4440	33.1	Mech. Vent.	MVHR.01	0.0	15	1080	1080				N	N	N	N	N	18.0	0	0	0	893	900	Pass		
G06_Kitchen_Servery	15.28	II	24	IV	Kitchen/Servery	3	70	70	1	153	10.0	8000	523.5	Mech. Vent.	MVHR.01	0.0	15	30	30				N	N	N	N	N	20.3	0	0	0	885	891	Pass		
G07_Stairs	16.95	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	169	10.0	0	0.0	None		0.0	15						N	N	N	N	N	-	0	0	1	400	400	Pass		
G0125_Circulation	54.98	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	550	10.0	0	0.0	Mech. Vent.	MVHR.02	0.0	15	20	20				N	N	N	N	N	-	0	0	0	400	400	Pass		
F10_Seminar_Room	42.39	II	24	IV	Classrooms	23	70	70	1	424	10.0	1530	36.1	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	23.7	0	0	0	877	882	Pass		
F11_Seminar_Room	42.08	II	24	IV	Classrooms	23	70	70	1	421	10.0	1530	36.4	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	23.9	0	0	0	878	882	Pass		
F12_Seminar_Room	42.59	II	24	IV	Classrooms	23	70	70	1	426	10.0	1530	35.9	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	24.1	0	0	0	877	881	Pass		
F13_Seminar_Room	42.05	II	24	IV	Classrooms	23	70	70	1	421	10.0	1530	36.4	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	23.8	0	0	0	878	882	Pass		
F09_Office	9.608	III	24	IV	Office	2	70	70	1	96	10.0	96	10.0	Mech. Vent.	MVHR.02	0.0	15	20	20				N	N	N	N	N	23.1	0	0	0	796	796	Pass		
F03_Circulation	23.18	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	232	10.0	0	0.0	Mech. Vent.	MVHR.02	0.0	15	20	20				N	N	N	N	N	26.4	0	0	0	512	531	Pass		
F05_Staircase	16.04	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	160	10.0	0	0.0	None		0.0	15						N	N	N	N	N	26.6	0	0	0	502	512	Pass		
F06_Circulation	28.46	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	285	10.0	0	0.0	Mech. Vent.	MVHR.02	0.0	15	20	20				N	N	N	N	N	25.7	0	0	0	400	400	Pass		
F07_Stairs	17.39	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	174	10.0	0	0.0	None		0.0	15						N	N	N	N	N	31.6	0	0	1	400	400	Pass		
S10_Seminar_Room	42.39	II	24	IV	Classrooms	23	70	70	1	424	10.0	1530	36.1	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	24.0	0	0	0	878	882	Pass		
S11_Seminar_Room	42.09	II	24	IV	Classrooms	23	70	70	1	421	10.0	1530	36.4	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	24.2	0	0	0	878	882	Pass		
S12_Seminar_Room	42.59	II	24	IV	Classrooms	23	70	70	1	426	10.0	1530	35.9	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	24.6	0	0	0	878	882	Pass		
S13_Seminar_Room	42.05	II	24	IV	Classrooms	23	70	70	1	421	10.0	1530	36.4	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	24.5	0	0	0	878	882	Pass		
S09_Office	9.608	II	24	IV	Office	2	70	70	1	96	10.0	96	10.0	Mech. Vent.	MVHR.02	0.0	15	20	20				N	N	N	N	N	23.1	0	0	0	796	796	Pass		
S03_Circulation	17.41	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	174	10.0	0	0.0	Mech. Vent.	MVHR.02	0.0	15	10	10				N	N	N	N	N	-	0	0	1	513	529	Pass		
S05_Stairs	16.04	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	160	10.0	0	0.0	None		0.0	15						N	N	N	N	N	-	0	0	1	503	512	Pass		
S06_Circulation	28.46	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	285	10.0	0	0.0	Mech. Vent.	MVHR.02	0.0	15	10	10				N	N	N	N	N	-	0	0	0	400	400	Pass		
S07_Stairs	17.39	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	174	10.0	0	0.0	None		0.0	15						N	N	N	N	N	-	1	0	3	400	400	Pass		

Overheating & Air Quality Results

Project Description:	Alexandra Park School Sixth Form Extension	
Project Number:	11557	A9
IES Model Reference:	11557_OH2	

School Summer Holiday:	Design Criteria:	Prep By	AM	1.09.2023
Unoccupied	BB101 (2018)	Chkd By	SA	1.09.2023
		Appr By	HdL	1.09.2023

Weather File:
ndon_DSY2_2020High50_.ep
Max. Temperature (°C)
31.8
Max. Temp. When Occupied (°C)
35.3
Ground Temperature (°C)
10.0

CIBSE A Permeability Calculation:	
Building Type:	
Schools	
Building Subtype:	
3 Storey: m²	
Exposure Type:	Exposed
Air Perm. (m³/h.m²@50Pa):	1
Air Permeability (ach):	0.050

Element Type	U Value (W/m²k)	G Value
Walls	0.10	-
Floor	0.10	-
Roof	0.10	-
Opaque Doors	1.00	-
Window Glazing	1.00	0.4
Window Frame	1.00	-

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LONDON



General Data						Occupancy Data				Lighting Gains		Equipment Gains		Temperature Control														Overheating Results				Air Quality Results		Results
Room Name	Room Area (m²)	Overheating Category	Cooling Set Point (°C)	Cold Draught Category	Template	Occupancy	Occupancy Sens. Gain (W/Person)	Occupancy Latent Gain (W/person)	Occupancy Diversity	Lighting Gain (W)	Lighting Gain (W/m²)	Equipment Gain (W)	Equipment Gain (W/m²)	Temperature Control Strategy	Ventilation Reference	Nat Vent Free Area (% Floor Area)	Min Nat Vent Opening Temp (°C)	Day. Mech. Vent. Extract Rate (l/s)	Day. Mech. Vent. Supply Rate (l/s)	Boost Mech. Vent. Supply Rate (l/s)	Purge Mech. Vent. Supply Rate (l/s)	Min. Supply Temp @1.4m (°C)	Night Purge	Daytime boost >26°C	Daytime boost <200 hours/year	Blinds	Exposed Soffit	Peak Occupied Temp (°C)	Time of Exceedance (Hours)	Daily Weighted Exceedance	Maximum ΔT (°C)	Max Daily Average CO₂ (ppm)	Peak CO₂ Concentration (ppm)	Outcome
G03_Sixth_Form_Social_Area	134.1	II	24	IV	Social Area	108	70	70	1	1341	10.0	4440	33.1	Mech. Vent.	MVHR.01	0.0	15	1080	1080				N	N	N	N	N	18.2	0	0	0	893	900	Pass
G06_Kitchen_Servery	15.28	II	24	IV	Kitchen/Servery	3	70	70	1	153	10.0	8000	523.5	Mech. Vent.	MVHR.01	0.0	15	30	30				N	N	N	N	N	20.7	0	0	0	885	891	Pass
G07_Stairs	16.95	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	169	10.0	0	0.0	None		0.0	15						N	N	N	N	N	-	0	0	4	400	400	Pass
G0125_Circulation	54.98	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	550	10.0	0	0.0	Mech. Vent.	MVHR.02	0.0	15	20	20				N	N	N	N	N	-	0	0	3	400	400	Pass
F10_Seminar_Room	42.39	II	24	IV	Classrooms	23	70	70	1	424	10.0	1530	36.1	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	26.3	0	0	1	877	882	Pass
F11_Seminar_Room	42.08	II	24	IV	Classrooms	23	70	70	1	421	10.0	1530	36.4	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	26.4	0	0	1	878	882	Pass
F12_Seminar_Room	42.59	II	24	IV	Classrooms	23	70	70	1	426	10.0	1530	35.9	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	26.7	0	0	1	877	881	Pass
F13_Seminar_Room	42.05	II	24	IV	Classrooms	23	70	70	1	421	10.0	1530	36.4	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	26.3	0	0	1	878	882	Pass
F09_Office	9.608	III	24	IV	Office	2	70	70	1	96	10.0	96	10.0	Mech. Vent.	MVHR.02	0.0	15	20	20				N	N	N	N	N	24.6	0	0	0	796	796	Pass
F03_Circulation	23.18	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	232	10.0	0	0.0	Mech. Vent.	MVHR.02	0.0	15	20	20				N	N	N	N	N	27.8	0	0	0	514	534	Pass
F05_Staircase	16.04	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	160	10.0	0	0.0	None		0.0	15						N	N	N	N	N	28.2	0	0	0	503	514	Pass
F06_Circulation	28.46	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	285	10.0	0	0.0	Mech. Vent.	MVHR.02	0.0	15	20	20				N	N	N	N	N	27.9	0	0	0	400	400	Pass
F07_Stairs	17.39	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	174	10.0	0	0.0	None		0.0	15						N	N	N	N	N	35.3	0	0	4	400	400	Pass
S10_Seminar_Room	42.39	II	24	IV	Classrooms	23	70	70	1	424	10.0	1530	36.1	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	26.6	0	0	2	878	882	Pass
S11_Seminar_Room	42.09	II	24	IV	Classrooms	23	70	70	1	421	10.0	1530	36.4	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	26.8	0	0	2	878	882	Pass
S12_Seminar_Room	42.59	II	24	IV	Classrooms	23	70	70	1	426	10.0	1530	35.9	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	27.1	0	0	2	878	882	Pass
S13_Seminar_Room	42.05	II	24	IV	Classrooms	23	70	70	1	421	10.0	1530	36.4	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	27.0	0	0	2	878	882	Pass
S09_Office	9.608	II	24	IV	Office	2	70	70	1	96	10.0	96	10.0	Mech. Vent.	MVHR.02	0.0	15	20	20				N	N	N	N	N	24.8	0	0	0	796	796	Pass
S03_Circulation	17.41	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	174	10.0	0	0.0	Mech. Vent.	MVHR.02	0.0	15	10	10				N	N	N	N	N	-	0	0	4	513	535	Pass
S05_Stairs	16.04	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	160	10.0	0	0.0	None		0.0	15						N	N	N	N	N	-	0	0	3	503	514	Pass
S06_Circulation	28.46	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	285	10.0	0	0.0	Mech. Vent.	MVHR.02	0.0	15	10	10				N	N	N	N	N	-	0	0	0	400	400	Pass
S07_Stairs	17.39	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	174	10.0	0	0.0	None		0.0	15						N	N	N	N	N	-	1	0	5	400	400	Pass

Overheating & Air Quality Results

Project Description:	Alexandra Park School Sixth Form Extension	
Project Number:	11557	A9
IES Model Reference:	11557_OH2	

School Summer Holiday:	Design Criteria:	Prep By	AM	1.09.2023
Unoccupied	BB101 (2018)	Chkd By	SA	1.09.2023
		Appr By	HdL	1.09.2023

Weather File:
ndon_DSY3_2020High50_.ep
Max. Temperature (°C)
31.6
Max. Temp. When Occupied (°C)
32.3
Ground Temperature (°C)
10.0

CIBSE A Permeability Calculation:	
Building Type:	
Schools	
Building Subtype:	
3 Storey: m²	
Exposure Type:	Exposed
Air Perm. (m³/h.m²@50Pa):	1
Air Permeability (ach):	0.050

Element Type	U Value (W/m²k)	G Value
Walls	0.10	-
Floor	0.10	-
Roof	0.10	-
Opaque Doors	1.00	-
Window Glazing	1.00	0.4
Window Frame	1.00	-

OXFORD
LONDON



General Data						Occupancy Data				Lighting Gains		Equipment Gains		Temperature Control														Overheating Results				Air Quality Results		Results
Room Name	Room Area (m²)	Overheating Category	Cooling Set Point (°C)	Cold Draught Category	Template	Occupancy	Occupancy Sens. Gain (W/Person)	Occupancy Latent Gain (W/person)	Occupancy Diversity	Lighting Gain (W)	Lighting Gain (W/m²)	Equipment Gain (W)	Equipment Gain (W/m²)	Temperature Control Strategy	Ventilation Reference	Nat Vent Free Area (% Floor Area)	Min Nat Vent Opening Temp (°C)	Day. Mech. Vent. Extract Rate (l/s)	Day. Mech. Vent. Supply Rate (l/s)	Boost Mech. Vent. Supply Rate (l/s)	Purge Mech. Vent. Supply Rate (l/s)	Min. Supply Temp @1.4m (°C)	Night Purge	Daytime boost >26°C	Daytime boost <200 hours/year	Blinds	Exposed Soffit	Peak Occupied Temp (°C)	Time of Exceedance (Hours)	Daily Weighted Exceedance	Maximum ΔT (°C)	Max Daily Average CO₂ (ppm)	Peak CO₂ Concentration (ppm)	Outcome
G03_Sixth_Form_Social_Area	134.1	II	24	IV	Social Area	108	70	70	1	1341	10.0	4440	33.1	Mech. Vent.	MVHR.01	0.0	15	1080	1080				N	N	N	N	N	18.6	0	0	0	893	900	Pass
G06_Kitchen_Servery	15.28	II	24	IV	Kitchen/Servery	3	70	70	1	153	10.0	8000	523.5	Mech. Vent.	MVHR.01	0.0	15	30	30				N	N	N	N	N	21.0	0	0	0	885	891	Pass
G07_Stairs	16.95	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	169	10.0	0	0.0	None		0.0	15						N	N	N	N	N	-	0	0	2	400	400	Pass
G0125_Circulation	54.98	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	550	10.0	0	0.0	Mech. Vent.	MVHR.02	0.0	15	20	20				N	N	N	N	N	-	0	0	1	400	400	Pass
F10_Seminar_Room	42.39	II	24	IV	Classrooms	23	70	70	1	424	10.0	1530	36.1	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	24.8	0	0	0	877	882	Pass
F11_Seminar_Room	42.08	II	24	IV	Classrooms	23	70	70	1	421	10.0	1530	36.4	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	24.9	0	0	1	878	882	Pass
F12_Seminar_Room	42.59	II	24	IV	Classrooms	23	70	70	1	426	10.0	1530	35.9	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	25.1	0	0	0	877	881	Pass
F13_Seminar_Room	42.05	II	24	IV	Classrooms	23	70	70	1	421	10.0	1530	36.4	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	24.9	0	0	0	878	882	Pass
F09_Office	9.608	III	24	IV	Office	2	70	70	1	96	10.0	96	10.0	Mech. Vent.	MVHR.02	0.0	15	20	20				N	N	N	N	N	24.4	0	0	0	796	796	Pass
F03_Circulation	23.18	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	232	10.0	0	0.0	Mech. Vent.	MVHR.02	0.0	15	20	20				N	N	N	N	N	28.0	0	0	0	512	535	Pass
F05_Staircase	16.04	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	160	10.0	0	0.0	None		0.0	15						N	N	N	N	N	28.1	0	0	0	504	513	Pass
F06_Circulation	28.46	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	285	10.0	0	0.0	Mech. Vent.	MVHR.02	0.0	15	20	20				N	N	N	N	N	27.4	0	0	0	400	400	Pass
F07_Stairs	17.39	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	174	10.0	0	0.0	None		0.0	15						N	N	N	N	N	32.3	0	0	2	400	400	Pass
S10_Seminar_Room	42.39	II	24	IV	Classrooms	23	70	70	1	424	10.0	1530	36.1	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	25.1	0	0	1	878	882	Pass
S11_Seminar_Room	42.09	II	24	IV	Classrooms	23	70	70	1	421	10.0	1530	36.4	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	25.4	0	0	1	878	882	Pass
S12_Seminar_Room	42.59	II	24	IV	Classrooms	23	70	70	1	426	10.0	1530	35.9	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	25.7	0	0	1	878	882	Pass
S13_Seminar_Room	42.05	II	24	IV	Classrooms	23	70	70	1	421	10.0	1530	36.4	Mech. Vent.	Gilberts	0.0	15	230	230				N	N	N	N	N	25.5	0	0	1	878	882	Pass
S09_Office	9.608	II	24	IV	Office	2	70	70	1	96	10.0	96	10.0	Mech. Vent.	MVHR.02	0.0	15	20	20				N	N	N	N	N	24.5	0	0	0	796	796	Pass
S03_Circulation	17.41	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	174	10.0	0	0.0	Mech. Vent.	MVHR.02	0.0	15	10	10				N	N	N	N	N	-	0	0	2	514	529	Pass
S05_Stairs	16.04	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	160	10.0	0	0.0	None		0.0	15						N	N	N	N	N	-	0	0	2	505	513	Pass
S06_Circulation	28.46	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	285	10.0	0	0.0	Mech. Vent.	MVHR.02	0.0	15	10	10				N	N	N	N	N	-	0	0	0	400	400	Pass
S07_Stairs	17.39	III	24	IV	Stair/Corridor/Lobby	-	70	70	1	174	10.0	0	0.0	None		0.0	15						N	N	N	N	N	-	3	0	3	400	400	Pass



APPENDIX 2: BRUKL DOCUMENTS

Project name

Alexandra Park School Sixth Form Block Extension (BE GREEN)

As designed

Date: Thu Sep 21 13:23:37 2023

Administrative information

Building Details

Address: Alexandra Park School, London, N11 2AZ

Certifier details

Name: CBG Consultants Ltd

Telephone number: 01865864500

Address: South House 3 Farmoor Court Cumnor Road, Oxford, OX2 9LU

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.22

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.22

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

Foundation area [m²]: 263.23The 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	4.32
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	2.73
Target primary energy rate (TPER), kWh _{PE} /m ² annum	45.7
Building primary energy rate (BPER), kWh _{PE} /m ² annum	27.63
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	0.16	0.16	SX000001:Surf[6]
Floors	0.18	0.13	0.13	G0000001:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.13	0.13	2F000002:Surf[0]
Windows** and roof windows	1.6	1.4	1.4	SX000001:Surf[1]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.4	1.4	SX000009: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/(m²K)]U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

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

^ For fire doors, limiting U-value is 1.8 W/m²K

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

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

Building services

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

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- ASHP I MVHR 1

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	-	0.5	-	0.85
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

2- ASHP I MVHR 2

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	-	0.5	-	0.8
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

3- ASHP I Nat Vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	-	0.5	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

4- ASHP I NVHR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	-	0.5	-	0.75
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

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

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I			
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard	
G03_Sixth_Form_Social_Area	-	-	-	1.3	-	-	-	-	-	-	N/A	
G06_Kitchen_Servery	-	-	-	1.3	-	-	-	-	-	-	N/A	
G11_Pupil_WC	-	-	-	1.2	-	-	-	-	-	-	N/A	
G10_Pupil_WC	-	-	-	1.2	-	-	-	-	-	-	N/A	
F09_Office	-	-	-	1.3	-	-	-	-	-	-	N/A	
F12_Seminar_Room	-	-	-	-	-	0.4	-	-	-	-	N/A	
F13_Seminar_Room	-	-	-	-	-	0.4	-	-	-	-	N/A	
F11_Seminar_Room	-	-	-	-	-	0.4	-	-	-	-	N/A	
F10_Seminar_Room	-	-	-	-	-	0.4	-	-	-	-	N/A	
F06_Circulation	-	-	-	1.3	-	-	-	-	-	-	N/A	
F01_WC	-	-	-	1.2	-	-	-	-	-	-	N/A	
S11_Seminar_Room	-	-	-	-	-	0.4	-	-	-	-	N/A	
S10_Seminar_Room	-	-	-	-	-	0.4	-	-	-	-	N/A	
S09_Office	-	-	-	1.3	-	-	-	-	-	-	N/A	
S03_Circulation	-	-	-	1.3	-	-	-	-	-	-	N/A	
S06_Circulation	-	-	-	1.3	-	-	-	-	-	-	N/A	
S01_WC	-	-	-	1.2	-	-	-	-	-	-	N/A	
S13_Seminar_Room	-	-	-	-	-	0.4	-	-	-	-	N/A	
S12_Seminar_Room	-	-	-	-	-	0.4	-	-	-	-	N/A	
G0125_Circulation	-	-	-	1.3	-	-	-	-	-	-	N/A	
F03_Circulation	-	-	-	1.3	-	-	-	-	-	-	N/A	

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value		95	80	0.3
G03_Sixth_Form_Social_Area		100	-	-
G06_Kitchen_Servery		100	-	-
G11_Pupil_WC		100	-	-
G10_Pupil_WC		100	-	-
G09_Store		100	-	-
G08_Plant		100	-	-
G07_Stairs		100	-	-
F07_Stairs		100	-	-
F09_Office		100	-	-
F12_Seminar_Room		100	-	-
F13_Seminar_Room		100	-	-
F11_Seminar_Room		100	-	-
F10_Seminar_Room		100	-	-
F06_Circulation		100	-	-
F01_WC		100	-	-
F02_Cleaners_Cupboard		100	-	-
F05_Staircase		100	-	-
S05_Stairs		100	-	-

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
S11_Seminar_Room		100	-	-
S10_Seminar_Room		100	-	-
S09_Office		100	-	-
S03_Circulation		100	-	-
S06_Circulation		100	-	-
S02_Cleaners_Cupboard		100	-	-
S01_WC		100	-	-
S13_Seminar_Room		100	-	-
S07_Stairs		100	-	-
S12_Seminar_Room		100	-	-
G0125_Circulation		100	-	-
F03_Circulation		100	-	-

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?
G03_Sixth_Form_Social_Area	NO (-50.7%)	NO
F09_Office	NO (-91.9%)	NO
F12_Seminar_Room	NO (-64.5%)	NO
F13_Seminar_Room	NO (-81%)	NO
F11_Seminar_Room	NO (-62.3%)	NO
F10_Seminar_Room	NO (-62.3%)	NO
S11_Seminar_Room	NO (-62.3%)	NO
S10_Seminar_Room	NO (-62.3%)	NO
S09_Office	NO (-91.4%)	NO
S13_Seminar_Room	NO (-71.6%)	NO
S12_Seminar_Room	NO (-55.3%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	789.7	789.7
External area [m ²]	1202.5	1202.5
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	379.66	503.36
Average U-value [W/m ² K]	0.32	0.42
Alpha value* [%]	25.2	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
 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	4.71	10.49
Cooling	0	0
Auxiliary	8.15	6.23
Lighting	6.56	6.09
Hot water	10.7	7.67
Equipment*	17.3	17.3
TOTAL **	30.11	30.48

* 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	12.6	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>12.6</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	47.76	104.97
Primary energy [kWh _{PE} /m ²]	27.63	45.7
Total emissions [kg/m ²]	2.73	4.32

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] Central heating using water: floor heating, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	88.3	0	8.7	0	2.1	2.82	0	3	0
Notional	114.8	0	11.5	0	1.1	2.78	0	----	----
[ST] Central heating using water: floor heating, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	45.5	0	4.5	0	18.3	2.82	0	3	0
Notional	28.2	0	2.8	0	5.1	2.78	0	----	----
[ST] Central heating using water: floor heating, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	28.4	0	2.8	0	7.9	2.82	0	3	0
Notional	34.4	0	3.4	0	2.7	2.78	0	----	----
[ST] Central heating using water: floor heating, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	48.4	0	4.8	0	2.5	2.82	0	3	0
Notional	176.8	0	17.7	0	5.1	2.78	0	----	----
[ST] No Heating or Cooling									
Actual	0	0	0	0	0	0	0	0	0
Notional	0	0	0	0	0	0	0	----	----

Key to terms

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

Project name

Alexandra Park School Sixth Form Block Extension (BE LEAN)

As designed

Date: Thu Sep 21 13:36:32 2023

Administrative information

Building Details

Address: Alexandra Park School, London, N11 2AZ

Certifier details

Name: CBG Consultants Ltd

Telephone number: 01865864500

Address: South House 3 Farmoor Court Cumnor Road, Oxford, OX2 9LU

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.22

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.22

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

Foundation area [m²]: 263.23The 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	4.32
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	4.01
Target primary energy rate (TPER), kWh _{PE} /m ² annum	45.7
Building primary energy rate (BPER), kWh _{PE} /m ² annum	43.16
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	0.1	0.1	SX000001:Surf[6]
Floors	0.18	0.1	0.1	G0000001:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.1	0.1	2F000002:Surf[0]
Windows** and roof windows	1.6	1	1	SX000001:Surf[1]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1	1	SX000009: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/(m²K)]U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

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

^ For fire doors, limiting U-value is 1.8 W/m²K

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

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	1

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	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- ASHP I MVHR 1

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	-	0.5	-	0.85
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

2- ASHP I MVHR 2

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	-	0.5	-	0.8
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

3- ASHP I Nat Vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	-	0.5	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

4- ASHP I NVHR

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	-	0.5	-	0.75
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

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

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I			
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard	
G03_Sixth_Form_Social_Area	-	-	-	1.3	-	-	-	-	-	-	N/A	
G06_Kitchen_Servery	-	-	-	1.3	-	-	-	-	-	-	N/A	
G11_Pupil_WC	-	-	-	1.2	-	-	-	-	-	-	N/A	
G10_Pupil_WC	-	-	-	1.2	-	-	-	-	-	-	N/A	
F09_Office	-	-	-	1.3	-	-	-	-	-	-	N/A	
F12_Seminar_Room	-	-	-	-	-	0.4	-	-	-	-	N/A	
F13_Seminar_Room	-	-	-	-	-	0.4	-	-	-	-	N/A	
F11_Seminar_Room	-	-	-	-	-	0.4	-	-	-	-	N/A	
F10_Seminar_Room	-	-	-	-	-	0.4	-	-	-	-	N/A	
F06_Circulation	-	-	-	1.3	-	-	-	-	-	-	N/A	
F01_WC	-	-	-	1.2	-	-	-	-	-	-	N/A	
S11_Seminar_Room	-	-	-	-	-	0.4	-	-	-	-	N/A	
S10_Seminar_Room	-	-	-	-	-	0.4	-	-	-	-	N/A	
S09_Office	-	-	-	1.3	-	-	-	-	-	-	N/A	
S03_Circulation	-	-	-	1.3	-	-	-	-	-	-	N/A	
S06_Circulation	-	-	-	1.3	-	-	-	-	-	-	N/A	
S01_WC	-	-	-	1.2	-	-	-	-	-	-	N/A	
S13_Seminar_Room	-	-	-	-	-	0.4	-	-	-	-	N/A	
S12_Seminar_Room	-	-	-	-	-	0.4	-	-	-	-	N/A	
G0125_Circulation	-	-	-	1.3	-	-	-	-	-	-	N/A	
F03_Circulation	-	-	-	1.3	-	-	-	-	-	-	N/A	

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value		95	80	0.3
G03_Sixth_Form_Social_Area		100	-	-
G06_Kitchen_Servery		100	-	-
G11_Pupil_WC		100	-	-
G10_Pupil_WC		100	-	-
G09_Store		100	-	-
G08_Plant		100	-	-
G07_Stairs		100	-	-
F07_Stairs		100	-	-
F09_Office		100	-	-
F12_Seminar_Room		100	-	-
F13_Seminar_Room		100	-	-
F11_Seminar_Room		100	-	-
F10_Seminar_Room		100	-	-
F06_Circulation		100	-	-
F01_WC		100	-	-
F02_Cleaners_Cupboard		100	-	-
F05_Staircase		100	-	-
S05_Stairs		100	-	-

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
S11_Seminar_Room		100	-	-
S10_Seminar_Room		100	-	-
S09_Office		100	-	-
S03_Circulation		100	-	-
S06_Circulation		100	-	-
S02_Cleaners_Cupboard		100	-	-
S01_WC		100	-	-
S13_Seminar_Room		100	-	-
S07_Stairs		100	-	-
S12_Seminar_Room		100	-	-
G0125_Circulation		100	-	-
F03_Circulation		100	-	-

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?
G03_Sixth_Form_Social_Area	NO (-50.2%)	NO
F09_Office	NO (-91.8%)	NO
F12_Seminar_Room	NO (-64.2%)	NO
F13_Seminar_Room	NO (-80.9%)	NO
F11_Seminar_Room	NO (-62%)	NO
F10_Seminar_Room	NO (-62%)	NO
S11_Seminar_Room	NO (-62%)	NO
S10_Seminar_Room	NO (-62%)	NO
S09_Office	NO (-91.4%)	NO
S13_Seminar_Room	NO (-71.3%)	NO
S12_Seminar_Room	NO (-54.9%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	789.7	789.7
External area [m ²]	1202.5	1202.5
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	1	3
Average conductance [W/K]	268.96	503.36
Average U-value [W/m ² K]	0.22	0.42
Alpha value* [%]	25.2	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
 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	2.91	10.49
Cooling	0	0
Auxiliary	8.15	6.23
Lighting	6.56	6.09
Hot water	10.7	7.67
Equipment*	17.3	17.3
TOTAL **	28.31	30.48

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	27.66	104.97
Primary energy [kWh _{PE} /m ²]	43.16	45.7
Total emissions [kg/m ²]	4.01	4.32

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] Central heating using water: floor heating, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
Actual	48.5	0	5.1	0	2.1	2.64	0	3	0	
Notional	114.8	0	11.5	0	1.1	2.78	0	----	----	
[ST] Central heating using water: floor heating, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
Actual	27.8	0	2.9	0	18.3	2.64	0	3	0	
Notional	28.2	0	2.8	0	5.1	2.78	0	----	----	
[ST] Central heating using water: floor heating, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
Actual	13.3	0	1.4	0	7.9	2.64	0	3	0	
Notional	34.4	0	3.4	0	2.7	2.78	0	----	----	
[ST] Central heating using water: floor heating, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
Actual	30.2	0	3.2	0	2.5	2.64	0	3	0	
Notional	176.8	0	17.7	0	5.1	2.78	0	----	----	
[ST] No Heating or Cooling										
Actual	0	0	0	0	0	0	0	0	0	
Notional	0	0	0	0	0	0	0	----	----	

Key to terms

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