Applied Energy

Upper Farm, Bluebell Lane
Stoke d'Abernon, Surrey, KT11 3PW
Telephone 07803 924465 Facsimile 08702 865954

30th October 2012

Camden Council
Town Hall Extension
Argyle Street, London
WC1H 8NJ

Dear Planners,

REF 2011/1586/P UNITE / Travis Perkins Development, 11-13 St Pancras Way, London, NW1 0PT

This letter is in response to the Energy and Sustainability Statement dated 25th March 2011 and proposes to remove the planned solar Photovoltaic (PV) panels from the strategy by providing a more energy efficient building which will reduce CO_2 emissions by 45% over 2010 Building Regulations.

At the time of the application, the report was based upon the London Plan 2008 and PPS22 which asked for a 20% reduction in CO_2 emissions from renewable sources. The London Plan has since been revised and latest Plan (2011) focusses on CO_2 reduction (in line with the Governments targets) through the optimising the combination of energy efficiency measures, decentralised energy and low and zero carbon/renewable technology. This change was introduced as it was realised that requesting 20% renewable energy is not feasible without detrimental effects elsewhere in the design and servicing of the buildings.

Given the governments change in policy since the original planning application and reduced capacity for any potential PV, it is proposed that the solar PV is removed from the scheme and other measures are provided to offset the loss whilst meeting with the current London Plan's (2011) requirements of an onsite reduction of CO_2 emissions by 25%.

The following measures are proposed to be included over and above those detailed in the Energy and Sustainability statement:-

- Improved u-values, over 15% better than current Building Regulations
- Improved envelope construction to reduce air leakage from 7 to 5m3/(h.m2) @ 50 Pa LED lighting throughout
- Providing additional storage to allow CHP to run for longer periods and generate more low carbon electricity and heat
- Provide increased ventilation heat recovery efficiency from 70% to 80%

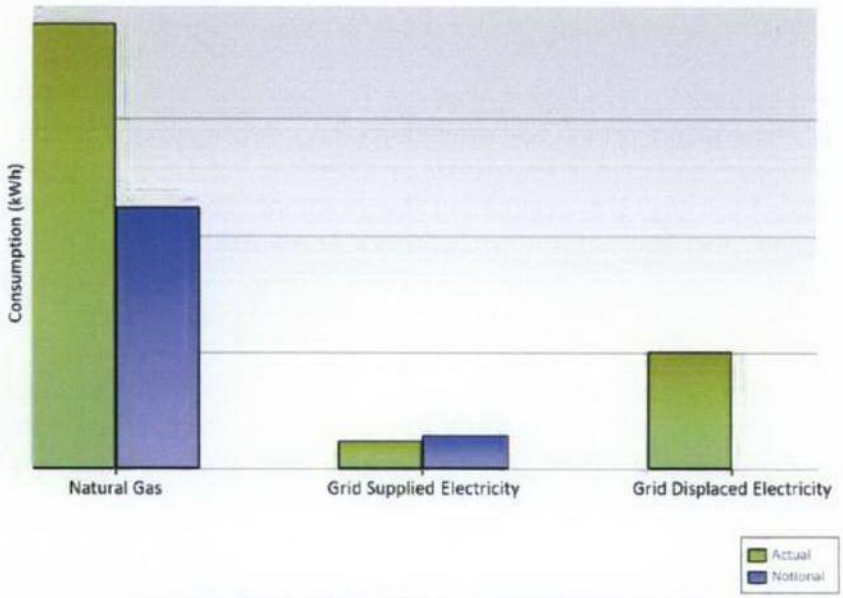
The above improvements have resulted in a 45.0% reduction in CO_2 emissions over the Target Emissions Rate (TER).

Model	Gross Internal Floor Area (m^2)	TER CO_2 Emissions (kg/m^2/annum)	BER CO_2 Emissions (kg/m^2/annum)	Percentage Reduction over TER
11-13 St Pancras Way	17,381	32.0	17.6	45.0%

The results provide nearly a 20% improvement over the London Plan 2011 requirement for a 25% reduction in CO_2 and so vastly exceeds current planning requirements.

The original Energy and Sustainability report (rev G) issued in March 2011, formed part of the planning application submission which did not include any solar PV panels. The modelling and calculations undertaken showed that the electricity generated by the Combined Heat and Power (CHP) unit alone would surpass the electrical demands of the site and result in surplus energy being export to the grid (section 8.5).

The results showed that the development would consume around 250,000 kWh of electricity per annum. The CHP would generate approximately 805,000 kWh of electricity per annum, meaning that nearly 555,000 kWh of surplus electricity would be exported to the grid. Even if the consumption from unregulated sources is taken into account, 181,000 kWh of electricity would still be exported to the grid. This would mean that any additional electricity generated from PV would not be consumed on site and exported directly to the grid which would not directly benefit the development in terms of Returns on Investments (ROI) and CO_2 savings.



Graph 4 from Energy and Sustainability Statement

The original proposed PV area will also not satisfy Planning Policy Statement 22 (PPS22) requirement for 20% of energy from renewable sources, falling short by around 13%.

It is potentially unrealistic to request 20% renewables without a net increase in energy i.e. the introduction of heat pumps for air conditioning. It is not within Unite's standard specification to provide rooms with air conditioning and all consideration has been taken into account in the design of the building and services to negate the need for cooling.

The design team are currently progressing through the detailed design stage which has highlighted issues with the proposed PV layout. As a result of the layouts of Blocks A & B and to comply with current regulations, natural ventilation via automatic opening vents is required on the top floor for smoke ventilation. These vents need maintenance access for future servicing and so the resultant area needed takes up a vast amount of the available roof space.

In addition, the proposed cleaning strategy for the building involves the use of abseilers from the roofs which require clear and unobstructed access.

Taking into account the access required for maintaining the automatic opening vents as well as rain water outlets and the access needed for window cleaning, the available area for any PV is drastically reduced. It is estimated that the maximum capacity that could be installed would be less than a 13kWp (original was over 50kWp) which would generate roughly 10,700 kWh per annum and provide carbon savings of only 6,100kg.CO_2. This would result in a 1.8% reduction in the developments overall carbon emissions and bring the overall reduction for the original scheme to 42.92%.

Given that the proposed energy efficiency measures and improvement to the building envelope now provides a 45% reduction in CO_2 emissions (surpassing the current London Plan requirements) which the reduced PV capacity cannot match, a PV scheme cannot provide the same level of sustainability and carbon savings and so it is proposed not to provide solar PV for the development.

We trust the above meets with your approval and look forward to your response.

Yours sincerely,

Stuart Daniels

Project Engineer
Applied Energy Ltd

BRUKL Output Document

HM Government

Compliance with England and Wales Building Regulations Part L 2010

Project name

As designed

Date: Wed Nov 07 12:11:47 2012

Administrative information

Building Details

Address: ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.2.1"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.2.1

BRUKL compliance check version: v4.1.d.0

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name:

Telephone number:

Address: , ,

Criterion 1: The calculated CO_2 emission rate for the building should not exceed the target

1.1	CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	32
1.2	Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	32
1.3	Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	17.6
1.4	Are emissions from the building less than or equal to the target?	BER =< TER
1.5	Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and the building services should achieve reasonable overall standards of energy efficiency

2.a Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.2	0.2	External Wall
Floor	0.25	0.2	0.2	Ground Floor
Roof	0.25	0.18	0.18	Exposed Floor
Windows***, roof windows, and rooflights	2.2	1.79	1.87	Window 1
Personnel doors	2.2	2.18	2.18	External Door
Vehicle access & similar large doors	1.5	1.31	1.31	Entrance Gate
High usage entrance doors	3.5	1.76	1.76	Entrance Door SGL

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

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

$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.

** 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.

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

Air Permeability	Worst acceptable standard	This building
$m^3/(h.m^2)$ at 50 Pa	10	5

2.b Building services

The building services parameters listed below are expected to be checked by the BCO against guidance. No automatic checking is performed by the tool.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- NV

Heating seasonal efficiency	**Cooling nominal efficiency**	**SFP [W/(l/s)]**	**HR seasonal efficiency**
0	-	-	-
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			NO

2- MVHR (141 Zones)

Heating seasonal efficiency	**Cooling nominal efficiency**	**SFP [W/(l/s)]**	**HR seasonal efficiency**
0.7	-	1	0.8
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			NO

3- Kitchen Extract (68 Zones)

Heating seasonal efficiency	**Cooling nominal efficiency**	**SFP [W/(l/s)]**	**HR seasonal efficiency**
0.7	-	0.3	-
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			NO

4- EO (6 Zones)

Heating seasonal efficiency	**Cooling nominal efficiency**	**SFP [W/(l/s)]**	**HR seasonal efficiency**
0.7	-	0.3	-
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			NO

5- AC + MVHR

Heating seasonal efficiency	**Cooling nominal efficiency**	**SFP [W/(l/s)]**	**HR seasonal efficiency**
0.7	-	1	0.8
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system			NO

1- New DHW Circuit

Heating seasonal efficiency	**Hot water storage loss factor [kWh/litre per day]**
Hot water provided by HVAC system	0

Local mechanical ventilation and exhaust

Zone	**Supply/extract SFP [W/(l/s)]**	**HR seasonal efficiency**	**Exhaust SFP [W/(l/s)]**
Staff WC1	-	-	0.3
Staff WC2	-	-	0.3
Staff WC3	-	-	0.3
Disabled WC1	-	-	0.3
TP Office1	1	-	-
TP Office2	1	-	-
TP Office3	1	-	-
TP Office4	1	-	-
TP Office5	1	-	-
BLK A Shared Lounge P1	1	-	-
BLK A Shared Lounge P2	1	-	-
BLK A Shared Kitchen1	-	-	0.3
BLK A Shared Kitchen2	-	-	0.3
BLK A Shared Kitchen3	-	-	0.3
BLK A Shared Kitchen4	-	-	0.3

Local mechanical ventilation and exhaust

Zone	Supply/extract SFP [W/(l/s)]	HR seasonal efficiency	Exhaust SFP [W/(l/s)]
BLK A Shared Kitchen5	-	-	0.3
BLK A Shared Kitchen6	-	-	0.3
BLK A Shared Kitchen7	-	-	0.3
BLK A Shared Kitchen8	-	-	0.3
BLK A Shared Kitchen9	-	-	0.3
BLK A Shared Kitchen10	-	-	0.3
BLK A Shared Kitchen11	-	-	0.3
BLK A Shared Kitchen12	-	-	0.3
BLK A Shared Kitchen13	-	-	0.3
BLK A Shared Kitchen14	-	-	0.3
BLK A Shared Kitchen15	-	-	0.3
BLK A Shared Kitchen16	-	-	0.3
BLK A Shared Kitchen17	-	-	0.3
BLK A Shared Kitchen18	-	-	0.3
BLK A P Beds1	1	-	-
BLK A P Beds2	1	-	-
BLK A P Beds3	1	-	-
BLK A P Beds4	1	-	-
BLK A P Beds5	1	-	-
BLK A P Beds6	1	-	-
BLK A P Baths1	1	-	-
BLK A P Baths2	1	-	-
BLK A P Baths3	1	-	-
BLK A P Baths4	1	-	-
BLK A P Baths5	1	-	-
BLK A P Baths6	1	-	-
BLK A P Studio Bed1	1	-	-
BLK A P Studio Bed2	1	-	-
BLK A P Studio Bed3	1	-	-
BLK A P Studio Bath1	1	-	-
BLK A P Studio Bath2	1	-	-
BLK A P Studio Bath3	1	-	-
BLK A P Studio Kitchen1	-	-	0.3
BLK A P Studio Kitchen2	-	-	0.3
BLK A P Studio Kitchen3	-	-	0.3
BLK A Common RM1	1	-	-
BLK A Laundry1	-	-	0.3
BLK A Inter Beds1	1	-	-
BLK A Inter Beds2	1	-	-
BLK A Inter Beds3	1	-	-
BLK A Inter Beds4	1	-	-
BLK A Inter Beds5	1	-	-
BLK A Inter Beds6	1	-	-
BLK A Inter Baths1	1	-	-
BLK A Inter Baths2	1	-	-
BLK A Inter Baths3	1	-	-
BLK A Inter Baths4	1	-	-

Local mechanical ventilation and exhaust

Zone	Supply/extract SFP [W/(l/s)]	HR seasonal efficiency	Exhaust SFP [W/(l/s)]
BLK A Inter Baths5	1	-	-
BLK A Inter Baths6	1	-	-
BLK A 6th Suite Beds1	1	-	-
BLK A 6th Suite Beds2	1	-	-
BLK A 6th Suite Beds3	1	-	-
BLK A 6th Suite Beds4	1	-	-
BLK A 6th Suite Beds5	1	-	-
BLK A 6th Suite Beds6	1	-	-
BLK A 6th Suite Baths1	-	-	0.3
BLK A 6th Suite Baths2	-	-	0.3
BLK A 6th Suite Baths3	-	-	0.3
BLK A 6th Suite Baths4	-	-	0.3
BLK A 6th Suite Baths5	-	-	0.3
BLK A 6th Suite Baths6	-	-	0.3
BLK A 6th Suite Kitch1	-	-	0.3
BLK A 6th Suite Kitch2	-	-	0.3
BLK A 6th Suite Kitch3	-	-	0.3
BLK A 6th Suite Kitch4	-	-	0.3
BLK A 6th Suite Kitch5	-	-	0.3
BLK A 6th Suite Kitch6	-	-	0.3
BLK B Lounge P1	1	-	-
BLK B LoungeP2	1	-	-
BLK B LoungeP3	1	-	-
BLK B Shared Kitchen1	-	-	0.3
BLK B Shared Kitchen2	-	-	0.3
BLK B Shared Kitchen3	-	-	0.3
BLK B Inter Kitchen 1	-	-	0.3
BLK B Inter Kitchen 2	-	-	0.3
BLK B Inter Kitchen 3	-	-	0.3
BLK B Inter Kitchen 4	-	-	0.3
BLK B Common RM1	1	-	-
BLK B P Beds1	1	-	-
BLK B P Beds2	1	-	-
BLK B P Beds3	1	-	-
BLK B P Beds4	1	-	-
BLK B P Beds5	1	-	-
BLK B P Beds6	1	-	-
BLK B P Baths1	1	-	-
BLK B P Baths2	1	-	-
BLK B P Baths3	1	-	-
BLK B P Baths4	1	-	-
BLK B P Baths5	1	-	-
BLK B P Baths6	1	-	-
BLK B Office1	1	-	-
BLK B P Suite Bed1	1	-	-
BLK B P Suite Bed2	1	-	-
BLK B P Suite Bed3	1	-	-

Local mechanical ventilation and exhaust

Zone	Supply/extract SFP [W/(l/s)]	HR seasonal efficiency	Exhaust SFP [W/(l/s)]
BLK P Suite Bath1	1	-	-
BLK P Suite Bath2	1	-	-
BLK P Suite Bath3	1	-	-
BLK B Suite Kitchen1	-	-	0.3
BLK B Suite Kitchen2	-	-	0.3
BLK B Suite Kitchen3	-	-	0.3
BLK B Inter Beds1	1	-	-
BLK B Inter Beds2	1	-	-
BLK B Inter Beds3	1	-	-
BLK B Inter Beds4	1	-	-
BLK B Inter Beds5	1	-	-
BLK B Inter Beds6	1	-	-
BLK B Inter Baths1	1	-	-
BLK B Inter Baths2	1	-	-
BLK B Inter Baths3	1	-	-
BLK B Inter Baths4	1	-	-
BLK B Inter Baths5	1	-	-
BLK B Inter Baths6	1	-	-
BLK B 9th Beds1	1	-	-
BLK B 9th Beds2	1	-	-
BLK B 9th Beds3	1	-	-
BLK B 9th Beds4	1	-	-
BLK B 9th Beds5	1	-	-
BLK B 9th Beds6	1	-	-
BLK B 9th Baths1	1	-	-
BLK B 9th Baths2	1	-	-
BLK B 9th Baths3	1	-	-
BLK B 9th Baths4	1	-	-
BLK B 9th Baths5	1	-	-
BLK B 9th Baths6	1	-	-
BLK B 9th Kitchen1	-	-	0.3
BLK B 9th Kitchen2	-	-	0.3
BLK B 9th Kitchen3	-	-	0.3
BLK B 9th Kitchen4	-	-	0.3
BLK B 9th Kitchen5	-	-	0.3
BLK B 9th Kitchen6	-	-	0.3
BLK C Pod Lounge1	1	-	-
BLK C Pod Lounge2	1	-	-
BLK C Pod Lounge3	1	-	-
BLK C Pod Lounge4	1	-	-
BLK C Pod Kitchen1	-	-	0.3
BLK C Pod Kitchen2	-	-	0.3
BLK C Pod Kitchen3	-	-	0.3
BLK C Pod Kitchen4	-	-	0.3
BLK C Inter Kitchen5	-	-	0.3
BLK C Inter Kitchen6	-	-	0.3
BLK C Inter Kitchen7	-	-	0.3

Local mechanical ventilation and exhaust

Zone	Supply/extract SFP [W/(l/s)]	HR seasonal efficiency	Exhaust SFP [W/(l/s)]
BLK C Inter Kitchen8	-	-	0.3
BLK C Inter Kitchen9	-	-	0.3
BLK C P Beds1	1	-	-
BLK C P Beds2	1	-	-
BLK C P Beds3	1	-	-
BLK C P Beds4	1	-	-
BLK C P Beds5	1	-	-
BLK C P Beds6	1	-	-
BLK C P Baths1	1	-	-
BLK C P Baths2	1	-	-
BLK C P Baths3	1	-	-
BLK C P Baths4	1	-	-
BLK C P Baths5	1	-	-
BLK C P Baths6	1	-	-
BLK C Laundry1	-	-	0.3
BLK C P Studio Beds1	1	-	-
BLK C P Studio Beds2	1	-	-
BLK C P Studio Baths1	1	-	-
BLK C P Studio Baths2	1	-	-
BLK C P Studio Kitchen1	-	-	0.3
BLK C P Studio Kitchen2	-	-	0.3
BLK C Inter Beds1	1	-	-
BLK C Inter Beds2	1	-	-
BLK C Inter Beds3	1	-	-
BLK C Inter Beds4	1	-	-
BLK C Inter Beds5	1	-	-
BLK C Inter Beds6	1	-	-
BLK C Inter Beds7	1	-	-
BLK C Inter Beds8	1	-	-
BLK C Inter Beds9	1	-	-
BLK C Inter Beds10	1	-	-
BLK C Inter Beds11	1	-	-
BLK C Inter Beds12	1	-	-
BLK C Inter Baths1	1	-	-
BLK C Inter Baths2	1	-	-
BLK C Inter Baths3	1	-	-
BLK C Inter Baths4	1	-	-
BLK C Inter Baths5	1	-	-
BLK C Inter Baths6	1	-	-
BLK C Inter Baths7	1	-	-
BLK C Inter Baths8	1	-	-
BLK C Inter Baths9	1	-	-
BLK C Inter Baths10	1	-	-
BLK C Inter Baths11	1	-	-
BLK C Inter Baths12	1	-	-
BLK C 7th Studio Beds1	1	-	-
BLK C 7th Studio Beds2	1	-	-

Local mechanical ventilation and exhaust

Zone	Supply/extract SFP [W/(l/s)]	HR seasonal efficiency	Exhaust SFP [W/(l/s)]
BLK C 7th Studio Beds3	1	-	-
BLK C 7th Studio Beds4	1	-	-
BLK C 7th Studio Beds5	1	-	-
BLK C 7th Studio Beds6	1	-	-
BLK C 7th Studio Baths1	1	-	-
BLK C 7th Studio Baths2	1	-	-
BLK C 7th Studio Baths3	1	-	-
BLK C 7th Studio Baths4	1	-	-
BLK C 7th Studio Baths5	1	-	-
BLK C 7th Studio Baths6	1	-	-
BLK C 7th Studio Kitchen1	-	-	0.3
BLK C 7th Studio Kitchen2	-	-	0.3
BLK C 7th Studio Kitchen3	-	-	0.3
BLK C 7th Studio Kitchen4	-	-	0.3
BLK C 7th Studio Kitchen5	-	-	0.3
BLK C 7th Studio Kitchen6	-	-	0.3
BLK B Shared Kitchen9	-	-	0.3
BLK B Shared Kitchen10	-	-	0.3

General lighting and display lighting

Zone	General lighting [W]	Display lamps efficacy [lm/W]
GF Plant1	2670	-
Security1	180	-
Staff WC1	160	-
Staff WC2	60	-
Staff WC3	90	-
Warehouse1	180	-
Warehouse2	1020	-
Warehouse3	1000	-
Loading1	650	-
Loading2	3340	-
Student Entrance Lobby1	340	22
North Stairs1	40	-
North Stairs2	50	-
Central Stairs1	110	-
South Stairs1	90	-
South Stairs2	90	-
Disabled WC1	20	-
Central Lift Lobby1	40	-
Central Lift Lobby2	20	-
Refuse1	120	-
TP Office1	1090	-
TP Office2	360	-
TP Office3	2390	-
TP Office4	390	-
TP Office5	200	-
TP Office Store1	10	-

General lighting and display lighting

Zone	General lighting [W]	Display lamps efficacy [lm/W]
TP Office Store2	70	-
TP Office Store3	10	-
BLK A Stairs1	40	-
BLK A Stairs2	40	-
BLK A Stairs3	40	-
BLK A Stairs4	40	-
BLK A Stairs5	40	-
BLK A Stairs6	40	-
BLK A Stairs7	40	-
BLK A Circ P	30	-
BLK A Circ Inter	890	-
BLK A Circ Top	160	-
BLK A Shared Lounge P1	40	-
BLK A Shared Lounge P2	40	-
BLK A Shared Kitchen1	190	-
BLK A Shared Kitchen2	190	-
BLK A Shared Kitchen3	340	-
BLK A Shared Kitchen4	340	-
BLK A Shared Kitchen5	330	-
BLK A Shared Kitchen6	330	-
BLK A Shared Kitchen7	340	-
BLK A Shared Kitchen8	340	-
BLK A Shared Kitchen9	330	-
BLK A Shared Kitchen10	330	-
BLK A Shared Kitchen11	340	-
BLK A Shared Kitchen12	340	-
BLK A Shared Kitchen13	330	-
BLK A Shared Kitchen14	330	-
BLK A Shared Kitchen15	340	-
BLK A Shared Kitchen16	340	-
BLK A Shared Kitchen17	330	-
BLK A Shared Kitchen18	330	-
BLK A LL1	650	-
BLK A P Beds1	30	-
BLK A P Beds2	140	-
BLK A P Beds3	30	-
BLK A P Beds4	30	-
BLK A P Beds5	160	-
BLK A P Beds6	30	-
BLK A P Baths1	0	-
BLK A P Baths2	30	-
BLK A P Baths3	0	-
BLK A P Baths4	10	-
BLK A P Baths5	30	-
BLK A P Baths6	10	-
BLK A P Studio Bed1	30	-
BLK A P Studio Bed2	30	-

General lighting and display lighting

Zone	General lighting [W]	Display lamps efficacy [lm/W]
BLK A P Studio Bed3	30	-
BLK A P Studio Bath1	10	-
BLK A P Studio Bath2	10	-
BLK A P Studio Bath3	10	-
BLK A P Studio Kitchen1	170	-
BLK A P Studio Kitchen2	160	-
BLK A P Studio Kitchen3	160	-
BLK A Common RM1	270	-
BLK A Laundry1	110	-
BLK A Inter Beds1	230	-
BLK A Inter Beds2	1150	-
BLK A Inter Beds3	230	-
BLK A Inter Beds4	110	-
BLK A Inter Beds5	1550	-
BLK A Inter Beds6	110	-
BLK A Inter Baths1	20	-
BLK A Inter Baths2	170	-
BLK A Inter Baths3	30	-
BLK A Inter Baths4	20	-
BLK A Inter Baths5	260	-
BLK A Inter Baths6	20	-
BLK A 6th Suite Beds1	30	-
BLK A 6th Suite Beds2	70	-
BLK A 6th Suite Beds3	30	-
BLK A 6th Suite Beds4	30	-
BLK A 6th Suite Beds5	100	-
BLK A 6th Suite Beds6	30	-
BLK A 6th Suite Baths1	0	-
BLK A 6th Suite Baths2	10	-
BLK A 6th Suite Baths3	10	-
BLK A 6th Suite Baths4	10	-
BLK A 6th Suite Baths5	20	-
BLK A 6th Suite Baths6	10	-
BLK A 6th Suite Kitch1	170	-
BLK A 6th Suite Kitch2	170	-
BLK A 6th Suite Kitch3	330	-
BLK A 6th Suite Kitch4	170	-
BLK A 6th Suite Kitch5	500	-
BLK A 6th Suite Kitch6	160	-
BLK B LL1	730	-
BLK B Stairs1	40	-
BLK B Stairs2	40	-
BLK B Stairs3	40	-
BLK B Stairs4	40	-
BLK B Stairs5	40	-
BLK B Stairs6	40	-
BLK B Stairs7	40	-

General lighting and display lighting

Zone	General lighting [W]	Display lamps efficacy [lm/W]
BLK B Stairs9	40	-
BLK B Lounge P1	40	-
BLK B LoungeP2	40	-
BLK B LoungeP3	40	-
BLK B Shared Kitchen1	170	-
BLK B Shared Kitchen2	180	-
BLK B Shared Kitchen3	180	-
BLK B Inter Kitchen 1	2170	-
BLK B Inter Kitchen 2	1640	-
BLK B Inter Kitchen 3	2270	-
BLK B Inter Kitchen 4	1550	-
BLK B Common RM1	590	-
BLK B Circ P	50	-
BLK B Circ Inter	1640	-
BLK B Circ Top	250	-
BLK B P Beds1	50	-
BLK B P Beds2	220	-
BLK B P Beds3	60	-
BLK B P Beds4	30	-
BLK B P Beds5	80	-
BLK B P Beds6	30	-
BLK B P Baths1	10	-
BLK B P Baths2	50	-
BLK B P Baths3	10	-
BLK B P Baths4	10	-
BLK B P Baths5	20	-
BLK B P Baths6	10	-
BLK B Office1	170	-
BLK B P Suite Bed1	30	-
BLK B P Suite Bed2	30	-
BLK B P Suite Bed3	30	-
BLK P Suite Bath1	10	-
BLK P Suite Bath2	10	-
BLK P Suite Bath3	10	-
BLK B Suite Kitchen1	160	-
BLK B Suite Kitchen2	170	-
BLK B Suite Kitchen3	170	-
BLK B Inter Beds1	390	-
BLK B Inter Beds2	1560	-
BLK B Inter Beds3	400	-
BLK B Inter Beds4	200	-
BLK B Inter Beds5	2320	-
BLK B Inter Beds6	190	-
BLK B Inter Baths1	60	-
BLK B Inter Baths2	250	-
BLK B Inter Baths3	60	-
BLK B Inter Baths4	30	-

General lighting and display lighting

Zone	General lighting [W]	Display lamps efficacy [lm/W]
BLK B Inter Baths5	380	-
BLK B Inter Baths6	30	-
BLK B 9th Beds1	130	-
BLK B 9th Beds2	30	-
BLK B 9th Beds3	30	-
BLK B 9th Beds4	30	-
BLK B 9th Beds5	170	-
BLK B 9th Beds6	30	-
BLK B 9th Baths1	0	-
BLK B 9th Baths2	20	-
BLK B 9th Baths3	10	-
BLK B 9th Baths4	10	-
BLK B 9th Baths5	30	-
BLK B 9th Baths6	10	-
BLK B 9th Kitchen1	160	-
BLK B 9th Kitchen2	670	-
BLK B 9th Kitchen3	170	-
BLK B 9th Kitchen4	170	-
BLK B 9th Kitchen5	830	-
BLK B 9th Kitchen6	170	-
BLK C Pod Lounge1	40	-
BLK C Pod Lounge2	40	-
BLK C Pod Lounge3	40	-
BLK C Pod Lounge4	40	-
BLK C Pod Kitchen1	170	-
BLK C Pod Kitchen2	170	-
BLK C Pod Kitchen3	180	-
BLK C Pod Kitchen4	180	-
BLK C Inter Kitchen5	1530	-
BLK C Inter Kitchen6	1610	-
BLK C Inter Kitchen7	1630	-
BLK C Inter Kitchen8	1570	-
BLK C Inter Kitchen9	1670	-
BLK C LL1	650	-
BLK C Stairs1	40	-
BLK C Stairs2	50	-
BLK C Stairs3	50	-
BLK C Stairs4	50	-
BLK C Stairs5	50	-
BLK C Stairs6	50	-
BLK C Stairs7	40	-
BLK C Stairs8	40	-
BLK C Pod Circ	230	-
BLK C Inter Circ	1330	-
BLK C Top Circ	270	-
BLK C P Beds1	30	-
BLK C P Beds2	320	-

General lighting and display lighting

Zone	General lighting [W]	Display lamps efficacy [lm/W]
BLK C P Beds3	30	-
BLK C P Beds4	50	-
BLK C P Beds5	160	-
BLK C P Beds6	60	-
BLK C P Baths1	10	-
BLK C P Baths2	60	-
BLK C P Baths3	0	-
BLK C P Baths4	10	-
BLK C P Baths5	40	-
BLK C P Baths6	10	-
BLK C Laundry1	110	-
BLK C Store1	20	-
BLK C Store2	20	-
BLK C Store3	20	-
BLK C Store4	20	-
BLK C Store5	20	-
BLK C P Studio Beds1	30	-
BLK C P Studio Beds2	30	-
BLK C P Studio Baths1	10	-
BLK C P Studio Baths2	0	-
BLK C P Studio Kitchen1	160	-
BLK C P Studio Kitchen2	160	-
BLK C Inter Beds1	140	-
BLK C Inter Beds2	1680	-
BLK C Inter Beds3	140	-
BLK C Inter Beds4	290	-
BLK C Inter Beds5	850	-
BLK C Inter Beds6	300	-
BLK C Inter Beds7	140	-
BLK C Inter Beds8	250	-
BLK C Inter Beds9	140	-
BLK C Inter Beds10	140	-
BLK C Inter Beds11	320	-
BLK C Inter Beds12	110	-
BLK C Inter Baths1	20	-
BLK C Inter Baths2	250	-
BLK C Inter Baths3	20	-
BLK C Inter Baths4	40	-
BLK C Inter Baths5	130	-
BLK C Inter Baths6	80	-
BLK C Inter Baths7	20	-
BLK C Inter Baths8	80	-
BLK C Inter Baths9	20	-
BLK C Inter Baths10	20	-
BLK C Inter Baths11	40	-
BLK C Inter Baths12	50	-
BLK C Store6	20	-

General lighting and display lighting

Zone	General lighting [W]	Display lamps efficacy [lm/W]
BLK C Store7	10	-
BLK C 7th Studio Beds1	30	-
BLK C 7th Studio Beds2	170	-
BLK C 7th Studio Beds3	30	-
BLK C 7th Studio Beds4	100	-
BLK C 7th Studio Beds5	30	-
BLK C 7th Studio Beds6	30	-
BLK C 7th Studio Baths1	0	-
BLK C 7th Studio Baths2	30	-
BLK C 7th Studio Baths3	10	-
BLK C 7th Studio Baths4	10	-
BLK C 7th Studio Baths5	20	-
BLK C 7th Studio Baths6	10	-
BLK C 7th Studio Kitchen1	170	-
BLK C 7th Studio Kitchen2	840	-
BLK C 7th Studio Kitchen3	170	-
BLK C 7th Studio Kitchen4	170	-
BLK C 7th Studio Kitchen5	520	-
BLK C 7th Studio Kitchen6	170	-
BLK B Shared Kitchen9	620	-
BLK B Shared Kitchen10	650	-
BLK B Stairs8	40	-

Criterion 3: The spaces in the building should have propriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Security1	N/A	N/A
Student Entrance Lobby1	YES (+207%)	NO
TP Office1	YES (+13%)	NO
TP Office2	NO (-3%)	NO
TP Office3	NO (-87%)	NO
TP Office4	N/A	N/A
TP Office5	N/A	N/A
BLK A P Beds1	NO (-90%)	NO
BLK A P Beds2	NO (-91%)	NO
BLK A P Beds3	NO (-90%)	NO
BLK A P Beds4	NO (-90%)	NO
BLK A P Beds5	NO (-90%)	NO
BLK A P Beds6	NO (-90%)	NO
BLK A P Baths1	N/A	N/A
BLK A P Baths2	N/A	N/A
BLK A P Baths3	N/A	N/A
BLK A P Baths4	N/A	N/A
BLK A P Baths5	N/A	N/A
BLK A P Baths6	N/A	N/A
BLK A P Studio Bed1	NO (-98%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
BLK A P Studio Bed2	NO (-95%)	NO
BLK A P Studio Bed3	NO (-90%)	NO
BLK A P Studio Bath1	N/A	N/A
BLK A P Studio Bath2	N/A	N/A
BLK A P Studio Bath3	N/A	N/A
BLK A Inter Beds1	NO (-61%)	NO
BLK A Inter Beds2	NO (-62%)	NO
BLK A Inter Beds3	NO (-62%)	NO
BLK A Inter Beds4	NO (-60%)	NO
BLK A Inter Beds5	NO (-61%)	NO
BLK A Inter Beds6	NO (-58%)	NO
BLK A Inter Baths1	N/A	N/A
BLK A Inter Baths2	N/A	N/A
BLK A Inter Baths3	N/A	N/A
BLK A Inter Baths4	N/A	N/A
BLK A Inter Baths5	NO (-90%)	NO
BLK A Inter Baths6	N/A	N/A
BLK A 6th Suite Beds1	NO (-90%)	NO
BLK A 6th Suite Beds2	NO (-91%)	NO
BLK A 6th Suite Beds3	NO (-97%)	NO
BLK A 6th Suite Beds4	NO (-90%)	NO
BLK A 6th Suite Beds5	NO (-90%)	NO
BLK A 6th Suite Beds6	NO (-97%)	NO
BLK A 6th Suite Baths1	N/A	N/A
BLK A 6th Suite Baths2	N/A	N/A
BLK A 6th Suite Baths3	N/A	N/A
BLK A 6th Suite Baths4	N/A	N/A
BLK A 6th Suite Baths5	N/A	N/A
BLK A 6th Suite Baths6	N/A	N/A
BLK B P Beds1	NO (-90%)	NO
BLK B P Beds2	NO (-91%)	NO
BLK B P Beds3	NO (-90%)	NO
BLK B P Beds4	NO (-90%)	NO
BLK B P Beds5	NO (-90%)	NO
BLK B P Beds6	NO (-90%)	NO
BLK B P Baths1	N/A	N/A
BLK B P Baths2	N/A	N/A
BLK B P Baths3	N/A	N/A
BLK B P Baths4	N/A	N/A
BLK B P Baths5	N/A	N/A
BLK B P Baths6	N/A	N/A
BLK B Office1	NO (-97%)	NO
BLK B P Suite Bed1	NO (-90%)	NO
BLK B P Suite Bed2	NO (-90%)	NO
BLK B P Suite Bed3	NO (-94%)	NO
BLK P Suite Bath1	N/A	N/A
BLK P Suite Bath2	N/A	N/A
BLK P Suite Bath3	N/A	N/A
BLK B Inter Beds1	NO (-33%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
BLK B Inter Beds2	NO (-34%)	NO
BLK B Inter Beds3	NO (-32%)	NO
BLK B Inter Beds4	NO (-31%)	NO
BLK B Inter Beds5	NO (-30%)	NO
BLK B Inter Beds6	NO (-30%)	NO
BLK B Inter Baths1	N/A	N/A
BLK B Inter Baths2	N/A	N/A
BLK B Inter Baths3	N/A	N/A
BLK B Inter Baths4	N/A	N/A
BLK B Inter Baths5	N/A	N/A
BLK B Inter Baths6	N/A	N/A
BLK B 9th Beds1	NO (-91%)	NO
BLK B 9th Beds2	NO (-91%)	NO
BLK B 9th Beds3	NO (-97%)	NO
BLK B 9th Beds4	NO (-90%)	NO
BLK B 9th Beds5	NO (-90%)	NO
BLK B 9th Beds6	NO (-97%)	NO
BLK B 9th Baths1	N/A	N/A
BLK B 9th Baths2	N/A	N/A
BLK B 9th Baths3	N/A	N/A
BLK B 9th Baths4	N/A	N/A
BLK B 9th Baths5	N/A	N/A
BLK B 9th Baths6	N/A	N/A
BLK C P Beds1	NO (-91%)	NO
BLK C P Beds2	NO (-90%)	NO
BLK C P Beds3	NO (-91%)	NO
BLK C P Beds4	NO (-91%)	NO
BLK C P Beds5	NO (-91%)	NO
BLK C P Beds6	NO (-93%)	NO
BLK C P Baths1	N/A	N/A
BLK C P Baths2	N/A	N/A
BLK C P Baths3	N/A	N/A
BLK C P Baths4	N/A	N/A
BLK C P Baths5	N/A	N/A
BLK C P Baths6	N/A	N/A
BLK C P Studio Beds1	NO (-97%)	NO
BLK C P Studio Beds2	NO (-98%)	NO
BLK C P Studio Baths1	N/A	N/A
BLK C P Studio Baths2	N/A	N/A
BLK C Inter Beds1	NO (-54%)	NO
BLK C Inter Beds2	NO (-52%)	NO
BLK C Inter Beds3	NO (-53%)	NO
BLK C Inter Beds4	NO (-53%)	NO
BLK C Inter Beds5	NO (-52%)	NO
BLK C Inter Beds6	NO (-63%)	NO
BLK C Inter Beds7	NO (-58%)	NO
BLK C Inter Beds8	NO (-62%)	NO
BLK C Inter Beds9	NO (-83%)	NO
BLK C Inter Beds10	NO (-74%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
BLK C Inter Beds11	NO (-87%)	NO
BLK C Inter Beds12	NO (-89%)	NO
BLK C Inter Baths1	N/A	N/A
BLK C Inter Baths2	N/A	N/A
BLK C Inter Baths3	N/A	N/A
BLK C Inter Baths4	N/A	N/A
BLK C Inter Baths5	N/A	N/A
BLK C Inter Baths6	N/A	N/A
BLK C Inter Baths7	N/A	N/A
BLK C Inter Baths8	NO (-92%)	NO
BLK C Inter Baths9	N/A	N/A
BLK C Inter Baths10	N/A	N/A
BLK C Inter Baths11	N/A	N/A
BLK C Inter Baths12	N/A	N/A
BLK C 7th Studio Beds1	NO (-91%)	NO
BLK C 7th Studio Beds2	NO (-91%)	NO
BLK C 7th Studio Beds3	NO (-97%)	NO
BLK C 7th Studio Beds4	NO (-90%)	NO
BLK C 7th Studio Beds5	NO (-90%)	NO
BLK C 7th Studio Beds6	NO (-97%)	NO
BLK C 7th Studio Baths1	N/A	N/A
BLK C 7th Studio Baths2	N/A	N/A
BLK C 7th Studio Baths3	N/A	N/A
BLK C 7th Studio Baths4	N/A	N/A
BLK C 7th Studio Baths5	N/A	N/A
BLK C 7th Studio Baths6	N/A	N/A

Criterion 4: The performance of the building, as built, should be consistent with the BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	17381	17381
External area [m^2]	19569	19569
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	5	5
Average conductance [W/K]	10656	7317.37
Average U-value [W/m^2K]	0.54	0.37
Alpha value* [%]	7.38	7.38

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
25	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Inst.: Hospitals and Care Homes
	C2 Residential Inst.: Residential schools
75	**C2 Residential Inst.: Universities and colleges**
	C2A Secure Residential Inst.
	Residential spaces
	D1 Non-residential Inst.: Community/Day Centre
	D1 Non-residential Inst.: Libraries, Museums, and Galleries
	D1 Non-residential Inst.: Education
	D1 Non-residential Inst.: Primary Health Care Building
	D1 Non-residential Inst.: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Telephone exchanges
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others - Stand alone utility block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	26.72	13.92
Cooling	0	0
Auxiliary	4.25	7.22
Lighting	11.59	11.89
Hot water	192.44	106.07
Equipment*	21.43	21.43
TOTAL	**235**	**139.09**

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

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	64.78	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Indicative Target
Heating + cooling demand [MJ/m^2]	66.64	39.67
Total consumption [kWh/m^2]	235	139.09
Total emissions [kg/m^2]	17.6	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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity										
	Actual	149.8	0	41.6	0	2	1	0	0	0
	Notional	124.7	0	43.7	0	1	0.79	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	110.8	0	46.6	0	7.2	0.66	0	0.7	0
	Notional	63.6	0	22.3	0	13.7	0.79	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	12.3	0	5.2	0	3.7	0.66	0	0.7	0
	Notional	6.8	0	2.4	0	4.5	0.79	0	----	----
[ST] Central heating using water: radiators, [HS] Unflued radiant heater, [HFT] Natural Gas, [CFT] Electricity										
	Actual	297.3	0	125	0	3.8	0.66	0	0.7	0
	Notional	194.1	0	68.1	0	4.7	0.79	0	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Natural Gas, [CFT] Electricity										
	Actual	154	0	64.7	0	19	0.66	0	0.7	0
	Notional	60	0	21	0	13.5	0.79	0	----	----

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

Key Features

The BCO can give particular attention to items with specifications that are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.2	External Wall
Floor	0.2	0.2	Ground Floor
Roof	0.15	0.18	Exposed Floor
Windows, roof windows, and rooflights	1.5	1.69	Curtain Walling
Personnel doors	1.5	2.18	External Door
Vehicle access & similar large doors	1.5	1.31	Entrance Gate
High usage entrance doors	1.5	1.76	Entrance Door SGL

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* There might be more than one surface where the minimum U-value occurs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	5