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1.0 PROJECT DESCRIPTION

The project consists of construction of 354 Bed Student Accommodation arranged in 75 Clusters together with 8 Studio's. The building extends over 6 floors (ground, 1st, 2nd, 3rd, 4th and 5th floors).

The new construction will be assessed under 2010 Building Regulations.

2.0 CONSTRUCTION

The buildings construction and envelope including walls, floor, roof and windows will be enhanced to exceed minimum requirements of Building Regulations AD L2A 2010, values as follows: -

- Wall U-Value = 0.26 W/m².K
- Ground Floor U-Value = 0.15 W/m².K
- Roof U-Value = 0.18 W/m².K
- Window & curtain glazing U-Value = 1.6 W/m².K
- Door U-Value = 2.0 W/m².K
- Air Permeability Rate = 5 m³/h.m² @50Pa
- Clear solar glass with a g-value less than 0.5

3.0 MECHANICAL VENTILATION

The ventilation strategy has been developed and will include provision of heat recovery via MVHR ventilation units. The MVHR units will operate 24/7 at a flow speed of 0.5 air changes per hour. A boost speed will be initiated by the operation of a PIR within the en-suite bathroom or a hob-miser current switch on the kitchen hob/oven. The boost speed will provide background ventilation requirements of the Building Regulations AD F 2010.

Mechanical ventilation systems will be designed with Specific Fan Powers greater than minimum requirements of the Building Regulations. Ductwork ventilation systems will be designed and tested to ensure minimum energy wastage associated with air leakage.

4.0 LIGHTING

The lighting scheme will be provided utilising luminaires complete with HF ballast and hot start PIR absence dimming, this method of lighting control reduces energy consumption by 50% when compared to traditional methods of control. The luminaire efficiencies will exceed 55 circuit lumens per Watt.

The above complies / exceeds Non Domestic Building Services Compliance Guide.

5.0 SPACE HEATING

Space heating will be provided utilising electric panel heaters controlled via PIR sensors / boost buttons.

The above complies / exceeds Non Domestic Building Services Compliance Guide.

6.0 WATER USE REDUCTION

Low flow taps, showers and toilet flushing devices will be used in this development.

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7.0 HOT WATER GENERATION

The domestic hot water for the development will be generated using central high efficiency gas condensing gas fired hot water heaters which have an efficiency of 98% which is in excess of the minimum efficiency of 80% required by Building Regulations AD L2A.

Pumps associated with the hot water generation plant will be provided with Variable speed inverter drives.

8.0 WATER SERVICES THERMAL INSULATION

The hot and cold water services installations will be provided with increased plant and pipework insulation thicknesses to reduce mains losses.

Following table is based on thermal conductivity of 0.0250 W/m-K with foil faced finish. Heat loss figures calculated to the principles of BS EN ISO 12241 with an operating temperature of +60°C, in an ambient temperature of +15°C.

Pipe O/D (mm)	Insulation thickness	Max heat loss @ 60 °C (W/m)
17.2	20mm	5.04
21.3	25mm	5.11
26.9	30mm	5.33
33.7	30mm	6.07
42.4	30mm	6.98
48.3	30mm	7.58
60.3	35mm	8.03
76.1	3 mm	9.40
88.9	35mm	10.5
114.3	40mm	11.58

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9.0 RENEWABLE & LOW CARBON ENERGY TECHNOLOGIES

An assessment of renewable energy and LZC technologies has been undertaken.

It is considered that provision of a combined heat and power unit to provide a pre-heat for the domestic hot water will afford the most practical and economical renewable energy / LZC solution.

Initial Thermal Modelling of the buildings has been undertaken using IES Thermal Modelling software. Results indicate the following: -

Criterion 1 – Acceptable CO ₂ emission rate		L2A PASS
	Building with electric heating & gas DHW	
Target Emission Rate	kg.CO ₂ /m ² .annum	29.5
Building Emission Rate	kg.CO ₂ /m ² .annum	27.9
Estimated full load run time (from Simulation)	3869 hrs	
Building Carbon Emission Reduction due to CHP	10.5%	

10.0 BMS CONTROLS & AUTOMATIC METER READING

The mechanical and electrical services will be provided with a monitoring system capable of automatic meter reading and data collection facilities to allow the monitoring and targeting of energy use.

A controls will be provided to control and monitor all central plant.

Systems will be zoned to aid control and optimise energy efficiency.

11.0 BUILDING REGULATIONS L2A COMPLIANCE

The requirements of the Building Regulations AD L2A 2010 will be complied with in full.

IES Thermal Modelling software will be used to aid the development of low energy solutions to the building design and Building Regulations AD L2A compliance.

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MECHANICAL CONSULTANTS DESIGN REQUIREMENTS TO MEET L2A

The following table gives guidance for meeting compliance for this specific project as a result of the building simulation and design limits of criterion 2. The table is guidance and does not absolve the engineer's responsibility of meeting all DCLG requirements.

Description	Part L minimum	Requirement for this building	Further Details
Minimum mechanical ventilation to prevent overheating	None	✓	Boost ventilation Bedrooms/ bathrooms – 8l/s Kitchen – 13l/s
Ventilation to corridors	None	Recommended	Provide 4 ach/hr to corridor (switched by temp sensor)
Extract from ceiling void supply to corridor	None	Recommended	Recommended to have either natural or mechanical ventilation to provide a minimum of 2 ach/hr
Ventilation to staircases	None	Recommended	75 kWt and 45 kWt
CHP	None	✓	
Multiple Boiler efficiency (Nat gas)	86%	N/A	NDBSCG (2010: Section 2.4)
Variable Speed Heating Pumps	None	N/A	Variable speed with sensor across pump
VRF Heating	2.2	-	NDBSCG (2010: Section 3.4)
VRF Cooling	2.5	-	NDBSCG (2010: Section 9.4)
Split heat pump (Comms room) Heating	2.2	-	NDBSCG (2010: Section 3.4)
Split heat pump (Coms room) Cooling	2.5	-	NDBSCG (2010: Section 9.4)
DHW generation (Indirect nat. gas)	80%	98%	NDBSCG (2010: section 8.4)
Hot Water Storage loss	Varies	0.0047 kWh/l/day	Based on storage being multiple 1000 litre or greater vessel sizes. NDBSCG (2010: Table 28)
DHW Insulation	As table 41	Based on NES Y50 Spec	NDBSCG (2010: table 41)
System 1- SFP of mechanical ventilation system serving cluster (Note: Supply and extract fan added together)	1.4	1.7	NDBSCG (2010: table 36 & 37)
With heat recovery	+0.3		
System 1- Heat Recovery (Plate Heat exchanger)	50%	80%	NDBSCG (2010: table 40)
System 1- SFP	NDBSCG (2010: section 10.4 a)		
achieved at 25% of design flow			
System 1- Variable Speed Drives (VSD) used for fans	fans rated at >1100W	n/a	NDBSCG (2010: section 10.4 b)

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System 1- Ductwork- limiting air leakage	Meet DW144 requirements	No test requirement for low pressure ductwork	NDBSCG (2010: section 10.4 c) HVCA DW/144
System 1- AHU CEN Class – limiting air leakage	Class L2	L2	NDBSCG (2010: section 10.4 d) BS EN 1886:1998
System 2- Central mechanical extract system	1.4	1.4	NDBSCG (2010: table 36 & 37)
System 2- SFP	NDBSCG (2010: section 10.4 a)		
achieved at 25% of design flow			
System 2- Variable Speed Drives (VSD) used for fans	fans rated at >1100W	If Applicable	NDBSCG (2010: section 10.4 b)
System 2- Ductwork- limiting air leakage	Meet DW144 requirements	No test requirement for low pressure ductwork	NDBSCG (2010: section 10.4 c) HVCA DW/144
System 2- AHU CEN Class – limiting air leakage	Class L2	L2	NDBSCG (2010: section 10.4 d) BS EN 1886:1998
Automatic meter reading and data collection facilities	If total floor area is greater than 1000m ²	✓	Part L2A (2010: section 4.38c)
M&T system with Alarms for 'Out of Range' values	None	None	M & T software to be added to BMS
Installation of energy metering to enable 90% of estimated annual energy consumption to be assigned to end use	Part L2A (2010: section 4.38a)		
LZC technologies separately metered	CIBSE TM39		
Systems sub divided into separate control zones	Part L2A (2010: section 4.38 b)		
Each control zone to have independent timing and temperature control	Part L2A (2010: section 4.34 a)		
Heating and cooling interlocked	Part L2A (2010: section 4.34 b)		
Central plant default to off	Part L2A (2010: section 4.34 c)		
Controls requirements for mechanical ventilation	Part L2A (2010: section 4.34 d)		
Controls requirements for heating	NDBSCG (2010: Table 38)		
	NDBSCG (2010: Table 5)		

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Controls requirements for heat pumps	NDBSCG (2010: Table 12)
Control Requirements for domestic hot water	NDBSCG (2006: Table 27)
Control Requirements for Cooling	NDBSCG (2010: Table 35)
Requirements for Insulation for heating/cooling/ducting	NDBSCG (2010: Section 11)
Circulators & water pumps up to 2.5kW to be Europump A to G rated	NDBSCG (2010: table 48a)
Circulators to be variable speed on variable volume systems	NDBSCG (2010: table 48b)
Water pumps >750W to be variable speed on variable volume systems	NDBSCG (2010: table 48c)

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ELECTRICAL CONSULTANTS DESIGN REQUIREMENTS TO MEET L2A

The following table gives guidance for meeting compliance for this specific project as a result of the building simulation and design limits of criterion 2. The table is guidance and does not absolve the engineer's responsibility of meeting all DCLG requirements.

Description	Part L minimum	Requirement for this building	Further Details
Lighting to meet general lighting efficacy in office, industrial and storage buildings	55 luminaire-lumens/circuit Watt	✓	NDBSCG (2010: table 44)
And General lighting efficacy in all other types of space	55 Lamp lumens/circuit Watt	✓	NDBSCG (2010: table 44) Bathrooms 15W LED's
Display Lighting efficacy	22 Lamp lumens/circuit Watt	✓	NDBSCG (2010: table 44)
Daylight dimming	None	✓	Office type Areas and reception
Occupancy Sensing lighting control	None	✓	Absence- Communal/kitchen areas Auto On/Dim – circulation Presence - Bathrooms
Minimum standard for metering general and display lighting	✓	✓	NDBSCG (2010: table 46)
Recommended control of lighting to suit space classification	✓	✓	NDBSCG (2010: table 47)
Power Factor Correction	None	✓	PF to >0.95
Automatic meter reading and data collection facilities	If total floor area is greater than 1000m ²	✓	Part L2A (2010: section 4.38c)
M&T system with Alarms for 'Out of Range' values	None	None	
Installation of energy metering to enable 90% of estimated annual energy consumption to be assigned to end use	Part L2A (2010: section 4.38a) CIBSE TM39	None	
LZC technologies separately metered	Part L2A (2010: section 4.38 b)		

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ARCHITECT CONSULTANTS DESIGN REQUIREMENTS TO MEET AD L2A

The following table gives guidance for meeting compliance for this specific project as a result of the building simulation and design limits of criterion 2. The table is guidance and does not absolve the architect's responsibility of meeting all DCLG requirements.

Description	Part L minimum	Requirement for this building	Further Details
Wall U-Value	0.35 W/m ² .K area-weighted average	0.26 W/m ² .K	Part L2A (2010: section Table 4)
Ground Floor U-Value	0.25 W/m ² .K area-weighted average	0.15 W/m ² .K	Part L2A (2010: section Table 4)
Flat Roof U-Value	0.25 W/m ² .K area-weighted average	0.18 W/m ² .K	Part L2A (2010: section Table 4)
Window & curtain glazing U-Value	2.2 W/m ² .K area-weighted average	1.6 W/m ² .K	Part L2A (2010: section Table 4)
Door U-Value	2.2 W/m ² .K area-weighted average	2.0 W/m ² .K	Part L2A (2010: section Table 4)
Vehicle Access and similar large doors	1.5 W/m ² .K area-weighted average	N/A	Part L2A (2010: section Table 4)
High-usage entrance doors	3.5 W/m ² .K area-weighted average	N/A	Part L2A (2010: section Table 4)
Roof Ventilators (incl smoke vents)	3.5 W/m ² .K area-weighted average	N/A	Part L2A (2010: section Table 4)
Glazing thermal transmission for Student Group Work & Student Reception	-	✓ G-value ≤ 0.50	G-value is also known as 'total solar transmission'
Glazing thermal transmission to all other student areas	-	Recommended G-value ≤ 0.5	Light transmission to be equal or greater than 0.66
Building Air Permeability	10 m ³ /(h.m ²) @ 50 Pa	5 m ³ /(h.m ²) @ 50 Pa	Part L2A (2010: section Table 4)

J - BUILDING LIGHTING SCHEME

A scheme illustrating the principles of the building lighting has been completed and this is included within the application proposals.

The scheme identifies safety and on street lighting as well as feature lighting to highlight focal points on the building façade, without throwing light into bedrooms.