

THE BULMERSHE SCHOOL, WOODLEY SEND Cognition and Learning (C&L)

Job No. 9000335

Sustainability Statement

Author:	Robert Diamond CEng FCIBSE CEnv FEI
Checked by:	Geoff Reed AIEMA PIEMA
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Project Details	
Client:	Rivington Studio Architects
IW Job reference:	9000335
Supervising Lead:	Robert Diamond
Prepared at:	Ingleton Wood LLP 874 The Crescent, Highwoods, Colchester CO4 9YQ
Report prepared by:	Robert Diamond
Reviewed by:	Geoff Reed

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1.0 EXECUTIVE SUMMARY

This Statement has been prepared for detailing the sustainability credentials of the new SEND Cognition and Learning (C&L) Resource Base at The Bulmershe School, Woodley.

The scheme will provide a self-contained specialist environment supporting pupils requiring structured, small-group and individual learning. The building is located adjacent to the Table Tennis Building and close to the Goals Reading parking area, allowing a secure and independent arrival point.

The building has been assessed under building regulations Part L 2021.

Minimising carbon dioxide emissions has been calculated in accordance with the following energy hierarchy:

1. Be lean: use less energy
2. Be clean: supply energy efficiently
3. Be green: use renewable energy

The latest SBEM software have been used to provide independent results.

1.1 Building Fabric

Low 'U' values have been used to exceed the Building Regulations as follows (Be Lean)

Element	Value (W/m ² .K)	Building Regulations	Improvement
External Wall	0.16	0.26	38%
External Window	1.5	1.60	6%
Ground Floor	0.15	0.18	17%
Roof	0.12	0.18	33%

1.2 Building Technologies

The following table shows the regulated CO₂ emissions after all measures (lean/clean/green) have been implemented.

These consist of:

- Building massing which maximises natural daylight and solar passive heating.
- Building fabric and air tightness which outperforms Part L 2021.
- 100% low energy lighting.
- Heat pumps providing heating/cooling.
- Hot water generated via point of use
- 9.56 kWp PV (Area 65.45m²)

The following table shows the regulated CO₂ emissions after all measures have been implemented.

	Totals	
	kgCO ₂ /m ² /yr	% Reduction
Part L 2021 TER	3.62	-
Proposal	2.70	25.41%

Regulated CO₂ Emissions After Lean/Clean/Green Measures

The proposed energy strategy achieves the following savings in CO₂ emissions:

An overall 25.41% reduction in regulated CO₂ emissions compared to a Part L 2021 notional development.

Unit Type	Nr	Floor Area	BER	TER	Actual Emissions	Target Emissions	Savings
		m ²	kgCO ₂ /m ² /yr	kgCO ₂ /m ² /yr	kgCO ₂ /yr	kgCO ₂ /yr	%
Education	1	252.4	2.70	3.62	681.48	913.69	25.41

1.3 Carbon Reductions against Part L

The proposed development achieves regulated carbon emissions of 2.70 kgCO₂/m²/yr, compared with a Part L 2021 Target Emission Rate of 3.62 kgCO₂/m²/yr. This corresponds to annual regulated emissions of 681.48 kgCO₂/yr, compared with a target of 913.69 kgCO₂/yr, representing a 25.41% improvement over Building Regulations.

The development therefore complies with and exceeds the requirements of Part L 2021 and is considered to meet local Planning policy requirements in respect of regulated carbon emissions.

2.0 INTRODUCTION

2.1 Objective

This document outlines the energy strategy by use of isbem software to ascertain compliance with Part L along with reviewing current technologies for the site.

2.2 Background

The brief developed with the school and WBC focuses on delivering a flexible and calm C&L environment. Key requirements include:

- One larger classroom for whole-group teaching.
- Several smaller classrooms and resource rooms.
- Small-group / sensory / intervention spaces.
- Kitchen / Life Skills space.
- Office/meeting room for SEND staff.
- Student WCs, accessible WC, staff WC, storage and plant.

This aligns with the wider WBC SEND Resource Base programme, which seeks to provide integrated, flexible learning and life-skills development spaces across multiple school sites.

The design will need to meet the following requirements:

- Ensure safe, legible and independent access for pupils, including separation from mainstream circulation routes where beneficial.
- Maintain controlled access to outdoor learning space, with clear boundary definition and opportunities for outdoor learning.
- Achieve a design that is cost effective, robust, low maintenance and compliant with current Building Regulations, BB103/BB104 guidance, and WBC standards.

The overarching ambition is to create an environment that promotes pupil confidence, reduces anxiety, supports sensory regulation, and integrates seamlessly with the existing school layout. The students attending the unit will be part of the wider Bulmershe school and it is anticipated that pupils will spend approximately 60% of their time within the resource base and 40% within the main school.

The scheme must address national, regional and local planning policy on energy and sustainability. It also must address the regulatory framework at the post-planning detailed design stage. This document sets out the energy strategy and the sustainability strategy as required by both the local and the regional planning policy. The strategy put in place makes key commitments to the headline standards.

2.3 Site Location



3.0 POLICY CONTEXT

3.1 Part L 2021

Building Regulation Part L tightly controls the minimum performance of building fabric, equipment selection and CO₂ emissions by setting the baseline TER which must be achieved. It sets limits on the regulated CO₂ emissions arising from energy use within buildings related to lighting, space heating and cooling, ventilation, hot water, and associated pumps and fans.

Approved Document Part L1 is responsible for controlling new-build residential buildings, whilst Part L2 is for new-build non-residential buildings.

The new Building Regulations Part L 2021 came into force since 15th June 2022. The Part L 2021 specifications have been strengthened to deliver 31% CO₂ savings across the new domestic build mix and 27% CO₂ savings across the new non-domestic building mix relative to Part L 2013.

Part L of the Regulations (for new dwellings) now requires that “the calculated Dwelling Fabric Energy Efficiency (DFEE) rate must not be greater than the Target Fabric Energy Efficiency (TFEE) rate. The TFEE rate is expressed as the amount of energy (required for heating and cooling) consumed in units of kilowatt-hours per square metre of floor area per year; it is influenced by heat losses through fabric, ventilation rate, thermal mass, thermal bridging, air tightness and solar gains.

3.2 Future Standards

Building Regulation Part L 2021 is a steppingstone towards new regulations called The Future Homes Standard (for dwellings) and The Future Buildings Standard (for non-domestic buildings), which are currently being developed by Government and are expected to be adopted in 2025. These standards will introduce more stringent carbon reduction requirements than in the recently introduced version of Part L 2021 and are intended to support the Government’s ambition to achieve net zero emissions by 2050.

3.3 Sustainability credentials of the proposed development

This Sustainability Statement has been prepared for detailing the sustainability credentials of the proposed development.

It will cover any use of on-site low carbon/renewable energy technology and how the design, massing, layout, construction of the building and use of Green Infrastructure contributes to reducing carbon dioxide (CO₂) emissions.

The energy hierarchy set out in the Strategic Policies should be considered within the Sustainability Statement. The Sustainability Statement should also make clear how measures have been incorporated into the design of the development to ensure they are well integrated.

The Sustainability Statement will show how the implementation of the target total carbon dioxide (CO₂) reduction level, by using nationally recognised, independently audited schemes such as Energy Performance Certificates. The evidence should include a clear breakdown of the percentage of carbon savings delivered by building efficiency and the use of any low carbon or renewable energy technologies.

4.0 CLIMATE CHANGE

4.1 Background

The national policy on low carbon buildings reflects the wider climate change agenda, and is one of a raft of measures the Government is using to mitigate emissions. The Building Regulations are being used as the preferred vehicle for implementing this policy.

The historical purpose of the Building Regulations was to avoid condensation risk and to conserve fuel and power at a time when global energy price shocks were causing problems for the UK security of supply. Since this time, the regulations have been refined to focus first on energy efficiency, and then latterly on CO₂ emissions as climate change became the key issue.

Through the recent versions of Part L, regulated emissions in both domestic and non-domestic have been controlled through setting maximum emissions targets that buildings are permitted to achieve. These regulated emissions come from uses including heating, hot water, lighting, fans, pumps, and cooling. There are building-related emissions that are not covered by regulations, including cooking, industrial appliances and other uses too. Further, there are wider sources of CO₂ emissions that are not covered by the regulations.

4.2 Mitigation and Adaptation

The impacts of climate change are also only partially covered by regulation. The key impacts include the potential for buildings to over-heat in summer; for increased flooding events; and for increased water stress, and the knock-on impacts on landscape, ecology and potable water supply management. As part of an encompassing strategy for new development, these elements need to be addressed. The proposals address these issues as follows:

4.2.1 Overheating

Maximise the use of passive cooling techniques and if mechanical cooling is required and this is to be topped up by the use of heat pumps to occupied spaces.

4.2.2 Flooding

A flood risk assessment has been undertaken which accounts for the impacts of climate change. The Site sits within flood risk zone 1, meaning that it has little or no risk of flooding.

4.2.3 Water Stress

Low flow water appliances should be utilized throughout

5.0 PRELIMINARY SPECIFICATION

Current target U-values are listed below, to assist in the reduction of energy and carbon emissions.

Element	Value (W/m ² .K)	Building Regulations	Improvement
External Wall	0.16	0.26	38%
External Window	1.5	1.60	6%
Ground Floor	0.15	0.18	17%
Roof	0.12	0.18	33%

6.0 LEAN MEASURES

The following table demonstrates the passive and active energy efficiency measures that have been considered within the design in order to reduce energy and CO₂ emissions.

6.1 Passive Design Considerations

Passive Design Measure		Action
Optimise daylight	Including through dual aspect, optimal sill heights and window sizes, higher floor to ceiling heights, shallow floorplates, the use of lightwells and rooflights.	Large windows with high light transmittance incorporated into the design.
Control solar gain	Benefitting from the heat when required but not at the expense of overheating in the summer. Optimise the size and depth of windows on each elevation to control and enhance the effect of solar gain.	Included.
Optimise the use of shading	Limit overshadowing of windows to areas that require daylight or could benefit from solar gain or of the roof if solar renewable technologies are planned. Use shading devices and low g-value glazing to limit solar gains to areas which may be susceptible to overheating.	Maximise shading to facade, and low G- value glazing throughout.
Optimise the thermal envelope	An efficient thermal envelope is key to reducing the energy performance of the building.	Included.
Insulate the Building	This is one of the most cost-effective ways to make a building more energy efficient, reducing the impact of external temperatures on the internal environment.	Building insulated to achieve U-value below notional building.
Thermal bridging	Eliminate thermal bridging to prevent the loss of heat and to prevent the development of cold spots which can lead to condensation and mould.	Included.

Air Tightness	Maximise air tightness to minimise the impacts of uncontrolled infiltration and control the air entering and leaving the building.	Target air leakage of 3 m ³ /hour/m ² at 50 Pa.
Thermal Mass	Optimise the use of thermal mass – which can help retain heat and reduce internal temperature fluctuations. Use light coloured materials where possible to reduce the absorption of heat therefore reducing the likelihood of overheating.	May be considered as design progresses.
Natural Ventilation	Maximise the potential for natural ventilation – including through openable windows, shallow floorplates, dual aspect units, designing in the ‘stack effect’ system where pressure differences are used to draw air through a building and double façade where the inner façade has openings to release heat without occupants being exposed to external wind and noise.	Openable windows provided to office to naturally ventilate perimeter areas. Internal hybrid ventilation through central atrium assisted by solar chimney.
Minimise losses	Maximise the efficiency of heating infrastructure by increasing pipe and storage insulation and minimising the length of pipe runs. Size pipes appropriately to reduce pressure losses and select efficient pumps and motors capable of variable flow solutions.	Designed to high standard to minimise losses.

6.2 Active Design Considerations

Active Design Measure		Action
High efficiency systems	Include low emission and carbon dioxide efficient heating systems – such as heat pumps	Design includes highly efficient equipment.

Heat Recovery	Include heat recovery – collecting waste heat to pre-heat air or water increasing the efficiency of heating or hot water systems	Included in all supply and extract ventilation.
Minimise cooling	Maximise the use of passive cooling techniques and if mechanical cooling is required, use efficient systems.	Highly efficient VRF cooling to occupied spaces.
High efficiency ventilation	Select efficient ventilation systems with low total system pressure losses, high efficiency fans and motors and high ventilation efficiency within occupied zones.	Design includes highly efficient equipment with low SFPs.
Lighting	Maximise energy efficient lighting systems.	LED lighting and presence, absence and daylight dimming controls included.
Energy saving equipment	Incorporate other energy efficient and energy saving equipment such as heating controls, individual controls, zoning, movement sensors, photo sensors, timers, metering, building management and monitoring systems.	Power factor correction included HVAC and lighting metering without- of-range warnings included.

6.3 Building Fabric

Current target U-values are listed below, to assist in the reduction of energy and carbon emissions.

Element	Value (W/m ² .K)	Building Regulations	Improvement
External Wall	0.16	0.26	38%
External Window	1.5	1.60	6%
Ground Floor	0.15	0.18	17%
Roof	0.12	0.18	33%

6.4 Proposed M&E Design

The following design is based on the provided Building Services design assumptions.

6.5 Be Lean Carbon Emissions

Based on the input parameters in this section the Be Lean buildings CO₂ emissions have been calculated as the following:

Unit Type	Nr	Floor Area	BER	TER	Actual Emissions	Target Emissions	Savings
		m ²	kgCO ₂ /m ² /yr	kgCO ₂ /m ² /yr	kgCO ₂ /yr	kgCO ₂ /yr	%
Education	1	252.40	6.38	3.62	1,610.31	913.69	-76.20%

At the Be Lean stage alone, the Building Emission Rate is 6.38 kgCO₂/m²/yr, which exceeds the Part L 2021 Target Emission Rate of 3.62 kgCO₂/m²/yr. This corresponds to total annual regulated emissions of 1,610.31 kgCO₂/yr, compared with a target of 913.69 kgCO₂/yr.

As anticipated for a fabric-only scenario, the development does not achieve Part L 2021 compliance at the Be Lean stage in isolation. Further carbon reductions are therefore delivered through the subsequent Be Clean and Be Green measures, which together enable the proposed development to achieve compliance with Part L 2021 and deliver an overall reduction in regulated carbon emissions.

7.0 HEATING INFRASTRUCTURE (BE CLEAN)

7.1 District Heating

The London Heat Map (<https://maps.london.gov.uk/heatmap>) has been reviewed.

Currently there are no existing CHP or waste to energy plants within range of the development, and there is a low heat density in the area. Therefore, it is not viable for the proposed new building to be connected to a district heating system.

7.2 Combined Heat and Power (CHP)

CHP is the use of a heat engine to generate both electricity and heat. The rapid decarbonisation of the electricity grid means that technologies generating on-site electricity (such as gas-engine CHP) will not achieve the carbon savings they have to date. There are also growing air quality concerns associated with combustion-based systems.

To address air quality concerns and to continue to facilitate heat networks, only low-emission CHP is suitable and only where it is facilitating an area-wide heat network.

There is no proposed new CHP network, or existing network to connect to and therefore CHP is not considered for this building.

7.3 Be Clean Building Carbon

No clean energy efficiency measures have been included and therefore no additional energy or carbon savings are calculated here.

8.0 RENEWABLE ENERGY (BE GREEN)

The purpose of this section is to analyse the feasibility of each of low and zero carbon technology. Not all of these technologies will be appropriate however and the most suitable will be reviewed in more detail and should be considered for the development.

8.1 Low and Zero Carbon Technology

Technology		Development Notes	Viability
Photovoltaics (PV)	Photovoltaic cells directly convert sunlight into electrical current using semi-conductors. PV typically performs best when facing south with an inclination of 10-30°.	Included in design.	High
Solar Thermal	Solar collectors collect and absorb solar radiation, then transfer the solar heat directly to the interior space or to a storage system, from which the heat is distributed. If the system cannot provide adequate heat, an auxiliary or back-up system provides the additional heat.	No roof space available due to plant and PV placement.	Low
Biomass	Biomass boilers provide heat with a very low resulting net carbon emission taken over the life cycle of the fuel; CO ₂ emitted in the combustion process is nearly balanced by the CO ₂ absorbed by photosynthesis during the growth of the biomass vegetation.	Space restrictions on this site and lack of available space for the storage and delivery of the fuel. The high NO _x emissions and particle content of the exhaust gases from typical small biomass units may be issued for planning	Low
Air Source Heat Pump	An air source heat pump (ASHP) is a system which transfers heat from outside to inside a building. Under the principles of vapor	High efficiency heat pumps have the ability to reduce the heating energy consumption quite considerably. This	High

	compression refrigeration, an ASHP uses a refrigerant system involving a compressor and a condenser to absorb heat at one place and release it at another.	technology is included in the design for all heating and hot water.	
Ground/Water Source Heat Pumps	Ground-source heat pumps make use of the heat stored in the ground at this relatively stable temperature of around 9°C and 12°C and raise it to a more useful output temperature of around 40–50°C for use in heating buildings. These output temperatures are ideal for low temperature systems, such as underfloor heating and radiant panels.	Insufficient water course on site. Insufficient external space required for vertical bore holes or ground loop and cooling not required on this development.	Low
Wind Power	Wind power can be used to generate electricity, either in parallel with mains supplies, gear or for stand-alone applications with battery back-up. In order to generate worthwhile quantities of electricity, average wind speeds of more than 5–6 m/s are typically required.	Urban area, high capital costs, noise concerns and planning issues.	Low

8.2 Detailed Technology Review

The following section consists of a detailed reviewed the most appropriate technologies.

8.2.1 Air Source Heat Pump (ASHP)

A heat exchanger extracts heat from the air. The heat pump raises the temperature of refrigerant via the compression cycle and reverse for cooling. Used for space heating, hot water and cooling.

8.2.2 Photo-Voltaic (PV)

Photovoltaic modules convert sunlight directly to DC electricity. They can be integrated into buildings in numerous ways including sloping and flat roofs, building façades, glass roof structures, and solar shading devices. There are mainly three types of PV cells; multi-crystalline silicon, amorphous silicon, and mono-crystalline silicon with the latter being the most efficient.

The following array has been designed which can be spatially incorporated and provide a comprehensive energy and carbon saving.

- 20.00% efficient panels.
- Array total size 65.45m².
- 9.56 kWp

8.3 Be Green Building Carbon

Based on the input parameters in this section the Be Green buildings CO₂ emissions have been calculated as the following:

Unit Type	Nr	Floor Area	BER	TER	Actual Emissions	Target Emissions	Savings
		m ²	kgCO ₂ /m ² /yr	kgCO ₂ /m ² /yr	kgCO ₂ /yr	kgCO ₂ /yr	%
Education	1	252.40	2.70	3.62	681.48	913.69	25.41

At the Be Green stage, the Building Emission Rate is 2.70 kgCO₂/m²/yr, which is below the Part L 2021 Target Emission Rate of 3.62 kgCO₂/m²/yr. This corresponds to total annual regulated emissions of 681.48 kgCO₂/yr, compared with a target of 913.69 kgCO₂/yr.

The inclusion of on-site renewable energy generation enables the development to achieve compliance with Part L 2021 and delivers an overall reduction in regulated carbon emissions of 25.41% when compared with the notional building.

9.0 CONCLUSION

This report summarises the modelling undertaken to deliver a new SEND Cognition and Learning (C&L) Resource Base at The Bulmershe School, Woodley.

The report summarises the work undertaken to inform the energy strategy and building design in accordance with the preparation of energy assessments:

- The passive and active energy efficiency measures incorporated reduce the carbon emissions of the building by 25.41% by incorporating ASHPs and roof mounted PVs within the scheme.
- District heating was found to not a be viable option for this scheme.
- CHP was found to not a be viable option for this scheme due grid decarbonisation.
- The low and zero carbon technology review proposed that the most appropriate technology would be ASHPs which are proposed.

The proposals have been developed in accordance with Wokingham Borough Council local planning policy, applying the energy hierarchy and demonstrating a measurable reduction in regulated carbon emissions beyond Part L 2021.

The result of the assessment demonstrates that the development achieves a 25.41% reduction in Carbon Emissions over the baseline building as indicated within the Part L building regulations. which complies with the relevant planning policy requirements.

10.0 APPENDICES

10.1 SBEM Calculations Lean Measures

Project name

Modular and Portable

Bulmershe School Modular Building

As designed

Date: Fri Jan 23 11:00:40 2026

Administrative information

Building Details

Address: Modular Building, Bulmershe Secondary School,
Chequers Way, Reading, RG5 3EU

Certifier details

Name: Robert Diamond

Telephone number: 01206 442538

Address: Ingleton Wood, 874-876 The Crescent,
Colchester, CO4 9YQ

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.e.0

Interface to calculation engine: iSBEM

Interface to calculation engine version: v6.1.e

BRUKL compliance module version: v6.1.e.0

Foundation area [m²]: 252The CO₂ emission and primary energy rates of the building must not exceed the targets

The building does not comply with England Building Regulations Part L 2021

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	3.62
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	6.38
Target primary energy rate (TPER), kWh _{PE} /m ² annum	38.34
Building primary energy rate (BPER), kWh _{PE} /m ² annum	68.54
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	0.01/Resource 1/ne
Floors	0.18	0.15	0.15	0.01/Resource 1/f
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.12	0.12	0.01/Resource 1/c
Windows** and roof windows	1.6	1.5	1.5	0.01/Resource 1/ne/g
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	-	-	No external personnel doors
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

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

U_{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

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.5	5	-	-	-
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Default HWS

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.015
Standard value	1	N/A

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	Zone	Standard
	Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1		
0.03/Staff WC	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0.04/Student WC	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0.05/Student WC	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0.07/AWC	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0.11/Classroom 3	-	-	-	-	-	1.5	-	-	-	-	0.93	N/A
0.13/Kitchen/Life/Skills	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0.14/Classroom 2	-	-	-	-	-	1.5	-	-	-	-	0.93	N/A
0.18/Classroom 1	-	-	-	-	-	1.5	-	-	-	-	0.93	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
0.02/Plant		100	-	-
0.06/Corridor		100	-	-

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
0.08/Cleaners Cupboard		100	-	-
0.10/Corridor		100	-	-
0.12/Store		100	-	-
0.01/Resource 1		100	-	-
0.03/Staff WC		100	-	-
0.04/Student WC		100	-	-
0.05/Student WC		100	-	-
0.07/AWC		100	-	-
0.09/Office/Meeting Room		100	-	-
0.11/Classroom 3		100	-	-
0.13/Kitchen/Life/Skills		100	-	-
0.14/Classroom 2		100	-	-
0.15/Breakout		100	-	-
0.16/Small Group		100	-	-
0.17/Resource 2		100	-	-
0.18/Classroom 1		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?
0.01/Resource 1	NO (-51.5%)	NO
0.03/Staff WC	N/A	N/A
0.04/Student WC	N/A	N/A
0.05/Student WC	N/A	N/A
0.07/AWC	N/A	N/A
0.09/Office/Meeting Room	NO (-36.4%)	NO
0.11/Classroom 3	NO (-31.3%)	NO
0.13/Kitchen/Life/Skills	NO (-4.8%)	NO
0.14/Classroom 2	NO (-0.5%)	YES
0.15/Breakout	NO (-13%)	NO
0.16/Small Group	NO (-44.5%)	NO
0.17/Resource 2	NO (-7.2%)	YES
0.18/Classroom 1	NO (-4.5%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	252.4	252.4
External area [m ²]	725.3	725.3
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	197.73	228.44
Average U-value [W/m ² K]	0.27	0.31
Alpha value* [%]	28.54	19.54

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

Building Use

% Area Building Type

Retail/Financial and Professional Services
 Restaurants and Cafes/Drinking Establishments/Takeaways
 Offices and Workshop Businesses
 General Industrial and Special Industrial Groups
 Storage or Distribution
 Hotels
 Residential Institutions: Hospitals and Care Homes
 Residential Institutions: Residential Schools
 Residential Institutions: Universities and Colleges
 Secure Residential Institutions
 Residential Spaces
 Non-residential Institutions: Community/Day Centre
 Non-residential Institutions: Libraries, Museums, and Galleries

100 Non-residential Institutions: Education

Non-residential Institutions: Primary Health Care Building
 Non-residential Institutions: Crown and County Courts
 General Assembly and Leisure, Night Clubs, and Theatres
 Others: Passenger Terminals
 Others: Emergency Services
 Others: Miscellaneous 24hr Activities
 Others: Car Parks 24 hrs
 Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	7.86	6.3
Cooling	4.25	3.56
Auxiliary	10.35	3.96
Lighting	10.75	7.1
Hot water	11.73	9.88
Equipment*	20.33	20.33
TOTAL**	44.94	30.79

* 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	5.08
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>5.08</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	153.95	147.36
Primary energy [kWh _{PE} /m ²]	68.54	38.34
Total emissions [kg/m ²]	6.38	3.62

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] No Heating or Cooling									
Actual	74.1	136.6	0	0	0	0	0	0	0
Notional	73	121.9	0	0	0	0	0	----	----
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	78.5	64.6	9.4	5.1	12.3	2.33	3.55	2.5	5
Notional	71.2	67	7.5	4.2	4.7	2.64	4.4	----	----

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

10.2 SBEM Calculations Green Measures

Project name

Modular and Portable

Bulmershe School Modular Building

As designed

Date: Fri Jan 23 11:01:11 2026

Administrative information

Building Details

Address: Modular Building, Bulmershe Secondary School,
Chequers Way, Reading, RG5 3EU

Certifier details

Name: Robert Diamond

Telephone number: 01206 442538

Address: Ingleton Wood, 874-876 The Crescent,
Colchester, CO4 9YQ

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.e.0

Interface to calculation engine: iSBEM

Interface to calculation engine version: v6.1.e

BRUKL compliance module version: v6.1.e.0

Foundation area [m²]: 252The 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	3.62
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	2.7
Target primary energy rate (TPER), kWh _{PE} /m ² annum	38.34
Building primary energy rate (BPER), kWh _{PE} /m ² annum	26
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	0.01/Resource 1/ne
Floors	0.18	0.15	0.15	0.01/Resource 1/f
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.12	0.12	0.01/Resource 1/c
Windows** and roof windows	1.6	1.5	1.5	0.01/Resource 1/ne/g
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	-	-	No external personnel doors
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

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

U_{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

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.5	5	-	-	-
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Default HWS

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.015
Standard value	1	N/A

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	Zone	Standard
	Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1		
0.03/Staff WC	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0.04/Student WC	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0.05/Student WC	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0.07/AWC	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0.11/Classroom 3	-	-	-	-	-	1.5	-	-	-	-	0.93	N/A
0.13/Kitchen/Life/Skills	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0.14/Classroom 2	-	-	-	-	-	1.5	-	-	-	-	0.93	N/A
0.18/Classroom 1	-	-	-	-	-	1.5	-	-	-	-	0.93	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
0.02/Plant		100	-	-
0.06/Corridor		100	-	-

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
0.08/Cleaners Cupboard		100	-	-
0.10/Corridor		100	-	-
0.12/Store		100	-	-
0.01/Resource 1		100	-	-
0.03/Staff WC		100	-	-
0.04/Student WC		100	-	-
0.05/Student WC		100	-	-
0.07/AWC		100	-	-
0.09/Office/Meeting Room		100	-	-
0.11/Classroom 3		100	-	-
0.13/Kitchen/Life/Skills		100	-	-
0.14/Classroom 2		100	-	-
0.15/Breakout		100	-	-
0.16/Small Group		100	-	-
0.17/Resource 2		100	-	-
0.18/Classroom 1		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?
0.01/Resource 1	NO (-51.5%)	NO
0.03/Staff WC	N/A	N/A
0.04/Student WC	N/A	N/A
0.05/Student WC	N/A	N/A
0.07/AWC	N/A	N/A
0.09/Office/Meeting Room	NO (-36.4%)	NO
0.11/Classroom 3	NO (-31.3%)	NO
0.13/Kitchen/Life/Skills	NO (-4.8%)	NO
0.14/Classroom 2	NO (-0.5%)	YES
0.15/Breakout	NO (-13%)	NO
0.16/Small Group	NO (-44.5%)	NO
0.17/Resource 2	NO (-7.2%)	YES
0.18/Classroom 1	NO (-4.5%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

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Floor area [m ²]	252.4	252.4
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Weather	LON	LON
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Average conductance [W/K]	197.73	228.44
Average U-value [W/m ² K]	0.27	0.31
Alpha value* [%]	28.54	19.54

* 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
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Hot water	11.73	9.88
Equipment*	20.33	20.33
TOTAL**	44.94	30.79

* 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	29.04	5.08
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>29.04</i>	<i>5.08</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	153.95	147.36
Primary energy [kWh _{PE} /m ²]	26	38.34
Total emissions [kg/m ²]	2.7	3.62

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] No Heating or Cooling									
Actual	74.1	136.6	0	0	0	0	0	0	0
Notional	73	121.9	0	0	0	0	0	----	----
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	78.5	64.6	9.4	5.1	12.3	2.33	3.55	2.5	5
Notional	71.2	67	7.5	4.2	4.7	2.64	4.4	----	----

Key to terms	
Heat dem [MJ/m2]	= Heating energy demand
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Cool SSEER	= Cooling system seasonal energy efficiency ratio
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ST	= System type
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CFT	= Cooling fuel type