



Redwood SEN Hub

Energy and Sustainability Statement

July 2026

Document Revision Control

Revisions	Date	Reason for Issue	By	Approved
P01	06/03/26	For Information – Stage 2	ARC	AC
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P03	20/07/26	Updated to address planning queries	ARC	SS

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Executive Summary

This Energy and Sustainability Statement will be updated in line with the changes made to the proposed Redwood SEN Hub at RIBA Stage 3 from the Stage 2 design. The assessment will consider compliance with the relevant regulatory, planning and Department for Education performance requirements. The analysis will be undertaken using dynamic simulation modelling in IES Virtual Environment in accordance with the National Calculation Methodology, Approved Document Part L (2021), BB101, CIBSE TM52 and the DfE Technical Guidance (2026).

Key Assessment Criteria

The modelling will assess whether the proposed development achieves the following:

- Compliance with Part L (2021), with the Building Emission Rate (BER) and Primary Energy Rate assessed against the corresponding notional building values.
- Implementation of the energy hierarchy – Be Lean, Be Clean and Be Green, including:
 - A high-performance building envelope to minimise heat loss.
 - Efficient building services, including air source heat pumps and mechanical ventilation with heat recovery (MVHR).
 - On-site renewable energy generation through photovoltaic (PV) panels as part of the design.
- Compliance with BB101 will be assessed against the thermal comfort and indoor air quality requirements applicable to teaching spaces.
- Compliance with CIBSE TM52 will be assessed against the overheating criteria applicable to non-teaching areas.

The assessments will determine whether the proposed design provides a high-performing, energy-efficient educational building and supports the sustainability objectives of Rochdale Borough Council.

Next Steps

The modelling will be undertaken based on the Stage 3 design. As the design will remain subject to change at Stage 4, the model and associated assessments will be updated as required. Key actions for the next design stages will include:

- M&E design development to finalise plant selection, ventilation strategies and system efficiencies.
- Architectural development, including confirmation of fabric performance, air permeability, the inclusion of ceiling voids and internal reflectance values.
- Client engagement to refine operational assumptions such as occupancy, equipment loads and internal gains.
- Façade optimisation, including consideration of opportunities to reduce glazing on the elevations to mitigate overheating risk further and consideration of rooflights to optimise daylight.

1.0 Introduction

Harley Haddow will produce this Energy and Sustainability Statement for the new Redwood SEN Hub. The statement will build on the Stage 2 report and will set out how the changes to the design at RIBA Stage 3 will be assessed against the associated policies and design criteria.

- The objectives of this statement will be to assess the following:
- Compliance with Part L (2021) of the Building Regulations.
 - The route to Net Zero in Operation based on the compliance methodology.
 - Compliance with thermal comfort and daylight provision in accordance with the Department for Education Technical Manual, published on 11 February 2026.
 - Thermal comfort will be assessed against the criteria set out in BB101 and CIBSE TM52.
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The assessments will be completed using IES VE 2025 software.

Limitations

The assessment will be based on the Part L (2021) compliance methodology and dynamic thermal modelling in accordance with BB101 and TM52, using the information available at the current stage of design. The assessment will therefore represent the current design only and will be subject to change should the building design be altered. Consequently, the predicted building performance may vary at later stages.

2.0 Legislative Compliance

2.1 Building Regulations Compliance with Approved Document L: Conservation of Fuel and Power (England) 2021 (as amended 2023): Volume 2 – Buildings Other Than Dwellings

This legislative standard was established to reduce carbon dioxide emitted by the built environment, and all new commercial/non-domestic developments must comply with the energy performance requirements.

The CO₂ emissions and Primary Energy for the ‘Actual Building’—the Building Emission Rate (BER) and Building Primary Energy Rate (BPER)—will need to better the calculated Target Emission Rate (TER) and Target Primary Energy Rate (TPER).

The BER/TER and BPER/TPER will be obtained from the following process:

The data defining the actual building will be modelled, and the notional building will be generated automatically by applying the National Calculation Methodology (NCM). The notional building will have the same size, shape, orientation, conditioning strategy and zone activities as the actual building.

The TER and TPER for the actual building will be generated automatically by applying prescribed fabric and services specifications to the notional building—the concurrent specification. Values will be assigned automatically based upon both the activity and the conditioning strategy for each zone of the actual building.

The BER and BPER will be generated by applying the fabric and services specifications for the actual building as defined within this report.

2.2 Rochdale Borough Council Local Development Plan

The purpose of the Local Development Plan (LDP) is to set the framework to ensure that all new development within the borough contributes towards a sustainable, low-carbon and environmentally responsible built environment. The policies seek to minimise operational energy demand, encourage the use of renewable and low-carbon technologies, and ensure developments respond appropriately to climate change mitigation and adaptation requirements.

The specific policies and responses are summarised in the following table.

Policies	Harley Haddow Responses
Policy G2 – Energy and New Development: Requires developments to minimise energy demand through energy-efficient design and a fabric-first approach. Development should incorporate low or zero carbon technologies where feasible to reduce operational carbon emissions.	The proposed development adopts a fabric-first strategy and energy-efficient building services design. Energy modelling is undertaken using the National Calculation Methodology (NCM) to demonstrate compliance with Part L 2021.
Policy G1 – Climate Change: Requires development to mitigate and adapt to the impacts of climate change through sustainable design measures and efficient use of resources.	The building design incorporates high-efficiency building services and passive design strategies to minimise operational energy demand and reduce carbon emissions, supporting climate change mitigation objectives.
Policy G3 – Design Quality: Requires high quality design that considers environmental performance, including building orientation, façade design and internal environmental quality.	Building performance modelling assesses daylight availability, ventilation strategies and façade design performance to ensure a high-quality internal environment while supporting energy efficiency objectives.

Table 2.2 – Local Policies Response

The landscape design has been prepared by a suitably qualified landscape architect, as demonstrated in drawing 7660.01B – Landscape Masterplan (July 2026, reduced size). In addition, a Drainage Statement (316553-HAH-XX-XX-R-C-00001) has been produced as part of the planning application, outlining the proposed surface water drainage strategy and Sustainable Drainage Systems (SuDS) measures incorporated within the development.

2.3 Department for Education Technical Guidance (2026)

The building will be assessed against the Department for Education Technical Manual (11 February 2026) and relevant industry guidance to evaluate ventilation, overheating risk and daylight performance within teaching spaces.

BB101 – Ventilation and Indoor Air Quality:
Performance of the proposed ventilation strategy and internal environmental conditions will be assessed using dynamic thermal modelling in accordance with Building Bulletin 101 (BB101) to determine whether suitable indoor air quality and thermal comfort can be achieved within teaching spaces.

TM52 – Overheating:
Overheating risk will be assessed using CIBSE TM52 dynamic simulation criteria, considering hours of exceedance, daily weighted exceedance and upper temperature limits.

Climate-Based Daylight Modelling (CBDM):
Daylight performance will be assessed using CBDM to evaluate annual daylight availability within occupied spaces, supporting the design of well-daylit learning environments while managing solar gains and visual comfort.

2.4 Places for Everyone

Places for Everyone (PfE) is an infrastructure plan set out to provide ‘hope and confidence’ in the future for Greater Manchester as well as provide greater development in the area.

Policies	Harley Haddow Responses
Policy JP-S2: Carbon Energy: The policy is designed to reduce lifecycle emissions, environmental impact and improve energy efficiency for new and existing developments	The proposed development has been designed to maximise energy efficiency through a fabric first approach, with the use of high efficiency systems and renewable energy to minimize operational energy.

3.0 Methodology

3.1 Dynamic Simulation Modelling (DSM)

The building will be modelled using IES Virtual Environment 2025, which is an approved software package used for undertaking CO₂ emission calculations in accordance with the National Calculation Methodology (NCM). It is able to base its performance calculations upon incremental time steps as low as one minute. This will allow realistic variations in fabric thermal storage (thermal mass effects), weather conditions, occupancy, internal and solar gains to be considered and their implications upon building/plant operation to be modelled effectively.

Dynamic thermal simulation will use zone-specific operational profiles, including occupancy, lighting, ventilation and DHW demand, together with HVAC plant performance data, to effectively model and predict the energy performance of the building.

This comprehensive approach is considered the industry standard for assessing building energy performance.

3.2 Thermal Comfort – BB101

Three criteria have been developed which indicate when overheating is likely to be problematic. These criteria will be applied outside the heating season and for the hours of 09:00 to 16:00, Monday to Friday, from 1 May to 30 September, including the summer holiday period as if the school were occupied normally throughout the summer. A lunch break from 12:00 to 13:00, with no internal heat gains during this period, may be allowed for in classrooms. The three criteria are:

- **Criterion 1:** The number of hours for which an adaptive thermal comfort threshold temperature is exceeded (total hours of exceedance).
- **Criterion 2:** The degree to which the operative temperature exceeds the adaptive thermal comfort threshold temperature (daily weighted exceedance).
- **Criterion 3:** The maximum temperature experienced at any occupied time (upper-limit temperature).
-

Criterion 1 will define the minimum requirement for the overheating risk assessment. Criteria 2 and 3 will assess short-term thermal discomfort and will be reported for information only. Where these criteria are not met, the designers will consider and identify feasible overheating mitigation measures. Together, the three criteria will ensure that the design is guided by multiple performance factors rather than a single metric, allowing flexibility in the final design.

BB101 Criterion		
Thermal Comfort		
Criterion 1	Criterion 2	Criterion 3
Minimum Requirement For schools, the number of hours (H_e) that ΔT is greater than or equal to one degree (K) during the period 1st May to 30th September for the defined hours inclusive shall not be more than 40 hours.	Advisory To allow for the severity of overheating the weighted Exceedance (W_e) shall be less than or equal to 6 in any one day.	Advisory To set an absolute maximum value for the indoor operative temperature the value of ΔT shall not exceed 4K.

Table 3.2 – BB101 Criteria

The three criteria for overheating are all defined in terms of ΔT , the difference between the actual operative temperature in the room at any time (T_{Op}) and T_{max} , the limiting maximum acceptable temperature. ΔT is calculated as:

$\Delta T = T_{op} - T_{max} \text{ (}^{\circ}\text{C)}$

3.3 Indoor air quality – BB101

To comply with BB101 indoor air quality requirements, the following standards apply to general teaching spaces:

Mechanical ventilation or hybrid systems (mechanical mode):

- Maintain a daily average CO₂ concentration below 1000 ppm during occupied periods at design occupancy. CO₂ levels must not exceed 1500 ppm for more than 20 consecutive minutes per day.

Natural ventilation or hybrid systems (natural mode):

- Maintain a daily average CO₂ concentration below 1500 ppm during occupied periods at design occupancy. CO₂ levels must not exceed 2000 ppm for more than 20 consecutive minutes per day. Systems should also achieve CO₂ concentrations for the majority of occupied time of ≤1200 ppm for new buildings (Category II) and ≤1750 ppm for refurbished buildings (Category III).

Thermal Comfort – CIBSE TM52

For Non-Domestic Buildings to meet the overheating assessment criteria of CIBSE TM52 at least two out of three of the below criteria must pass and the building will be of significant risk of overheating.

CIBSE TM52 Criterion		
Thermal Comfort		
TM52 Criterion 1	TM52 Criterion 2	TM52 Criterion 3
Sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature	Assesses the severity of overheating within any one day. Considering frequency, temperature, and duration	Sets an absolute Maximum Daily Temperature for a room, beyond which the level of overheating is unacceptable.

Table 3.3 – CIBSE TM52

3.4 Weather Data

To accurately model the dynamic nature of the building’s thermal response, hourly recorded weather data will be used in the dynamic thermal simulations. Such weather data will contain records of radiation, temperature, humidity, sunshine duration and additionally wind speed and direction.

A CIBSE Test Reference Year (TRY) for Manchester will be used for this analysis in accordance with the National Calculation Method requirements for Part L compliance.

For the TM52 assessment, the Manchester 2050 High Emissions 50th Percentile Design Summer Year (DSY) weather file will be used.

3.5 Climate Based Daylight Modelling Assessment

The assessment will include a selection of classroom teaching spaces. The minimum requirements for compliance will be that 80% of the floor area achieves the Useful Daylight Index range of 100–3000 lux and a Daylight Autonomy of 50% across the floor area.

Daylight analysis will be undertaken to assess the Stage 3 design against the applicable daylight performance criteria.

4.0 Energy Modelling

4.1 Built Form

The 3D geometry and building construction materials will be modelled based on the architectural plans and elevations. The 3D model will describe the following aspects of the building:

- Orientation.
- Geometry of the building form and all associated surface exposures.
- Material constructions.
- Windows and glazing.

The 3D geometry will be subdivided into generic zone types based on activity, in accordance with the National Calculation Methodology (NCM) requirements.

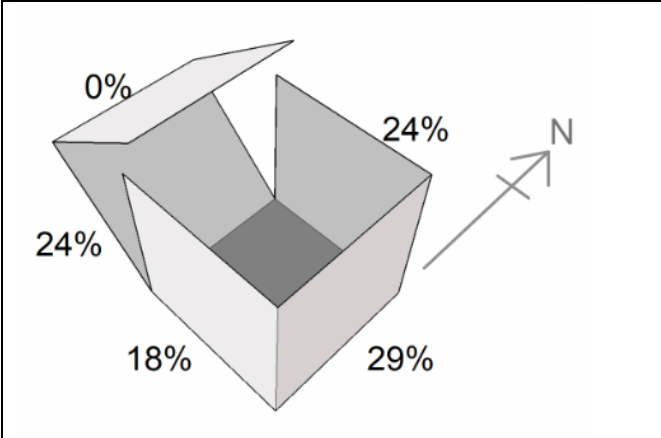
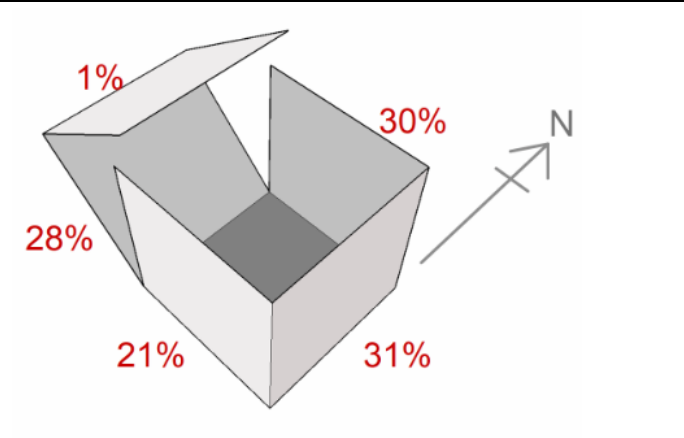
Built Form, Façade Analysis	
	
Notional Building	Actual – Redwood SEN Hub

Table 4.1 – Built Form Comparison

The glazing distribution of the Actual Building (Redwood SEN Hub) will be compared against the Notional Building to identify any variation across the façades.

The assessment will consider the proportion of glazing on each façade and whether the actual design remains generally aligned with the notional benchmark. Any increases in glazing will be reviewed to assess their potential influence on solar gains, daylight performance and summertime overheating risk, taking account of façade orientation.

4.2 Constructions

The performance of the fabric used for the model are listed below.

Construction Element	Overall U-value (W/m²K)
Walls	0.15
Floors	0.12
Roofs	0.12
Glazing	1.25 (g-value 0.45, light transmittance 70%, 20% frame factor) 1.25 (g-value 0.35, light transmittance 70%, 20% frame factor) – Activity Studio large glazing
Rooflights	1.20 (g-value 0.45, light transmittance 70%, 20% frame factor)
Door	1.20
Curtain Wall	1.20
Air permeability	3 m³/(h.m²) @50Pa

Table 4.2 – Construction detail

The fabric performance of the actual building will be compared against the notional benchmark across all envelope elements. The assessment will consider the overall fabric heat loss coefficient and the contribution of the proposed fabric specifications to reducing conductive heat losses. The fabric performance will be subject to confirmation by the architect and further development as the design progresses.

4.3 Energy Strategy Summary

The proposals to reduce carbon emissions, and annual and peak energy consumption, whilst providing energy in a manner which minimises adverse environmental impacts for the proposed development will be achieved through the proposed Energy Hierarchy: ‘Be Lean’, ‘Be Clean’, and ‘Be Green’.

- Be Lean: Use less energy and manage demand during operation.
- Be Clean: Exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly.
- Be Green: Maximise opportunities for renewable energy generation by producing, storing and integrating renewable generation on-site.

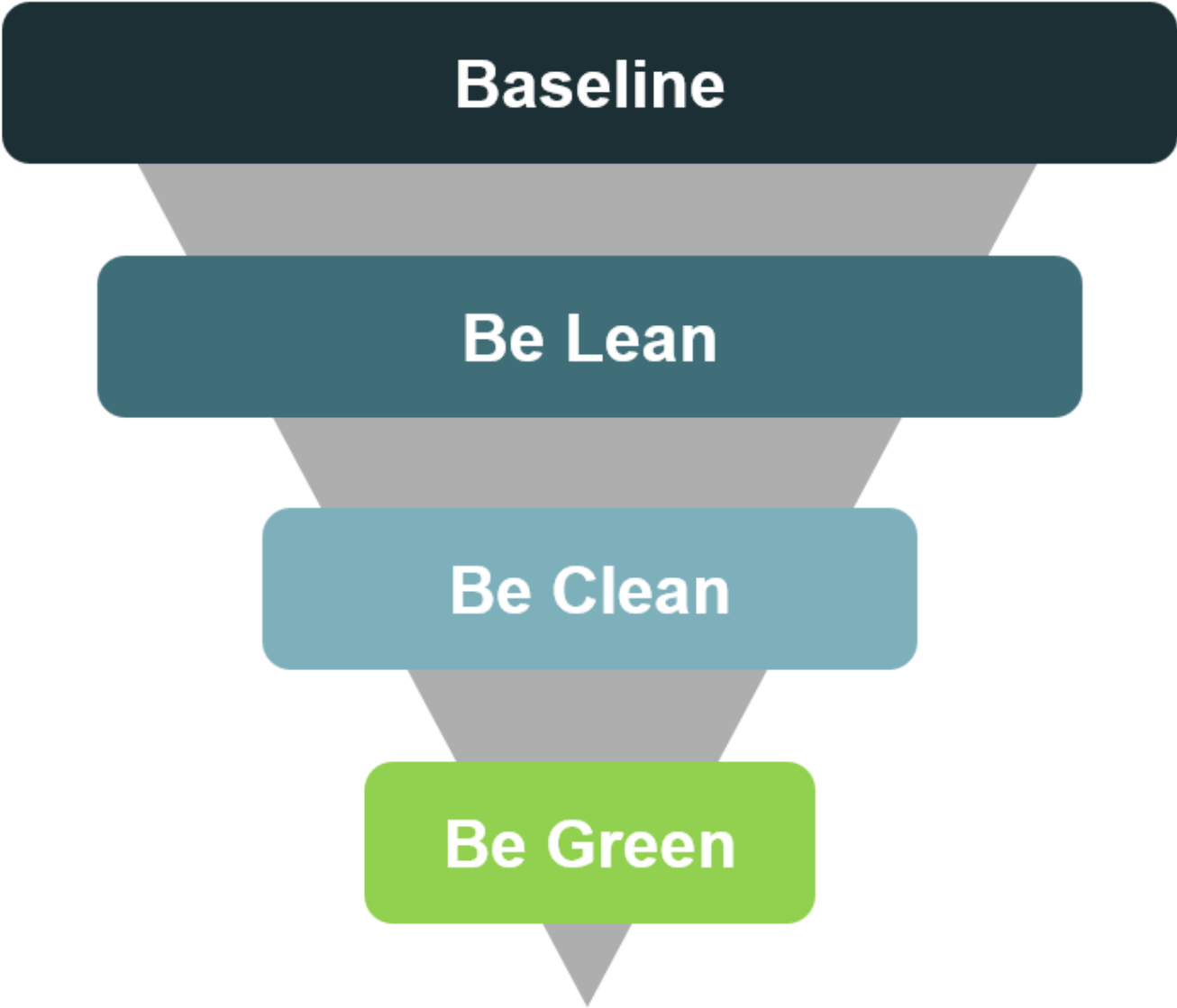


Figure 4.3 – The Energy Hierarchy

This hierarchy aligns with the PfE Policy JP-S2, showing the measures taken at each stage to minimize energy demand, maximise energy efficiency and the implementation of renewable energy. In addition, policy G2 of the Rochdale matches the intent of The Energy Hierarchy, prioritising a fabric first approach.

The recommended measures to address the relevant planning and Compliance requirements are summarised in the table below.

Energy Strategy Hierarchy		
Modelling Parameters		
Energy Hierarchy	Design Measures	Proposed measures
Be Lean	External Wall (U-Value)	0.15 W/m²K
	Ground Contact and Exposed Floors (U-Value)	0.12 W/m²K
	Roof (Flat/Sloping) (U-Value)	0.12 W/m²K
	Windows (U-Value including frame)	1.25 (g-value 0.45, light transmittance 70%, 20% frame factor) 1.25 (g-value 0.35, light transmittance 70%, 20% frame factor) – Activity Studio large glazing
	Roof light (U-Value including frame)	1.20 (g-value 0.45, light transmittance 70%, 20% frame factor)
	External Door	1.20 W/m²K
	Air Permeability	3.0 m³/(h.m²) @50Pa
	Lighting	• LED Lighting throughout. LUX designed as per the electrical drawings
	Ventilation	• MVHR – SFP 1.8 w/l/s with 79% heat recovery • Hybrid – SFP 0.5 w/l/s with 75% heat recovery • Extract only, SFP 0.5 w/l/s for WCs • Kitchen extract, SFP 0.7 w/l/s
	Space Heating	• ASHP – SCOP 3.72
	Space Cooling	• DX for comms room – EER 3, SEER 6
	DHW	• Direct Electric
Be Clean	Connection to District Heat Network	n/a – not applicable at this stage.
Be Green	Renewable Technologies	• System Module nominal efficiency of 20%. • Active PV area of 200 m² facing south at an inclination of 20° or a PV system size of 40.2 kWp.

Table 4.3 – Energy Strategy

5.0 Thermal Comfort Modelling

5.1 BB101 Assessment

BB101 Internal Conditions

The following internal conditions will be used in the analysis:

- Occupied hours will be assumed to be 09:00 to 16:00, Monday to Friday.
- Occupancy, lighting and small power will be set to zero during the lunch hour, from 12:00 to 13:00, in all classroom areas.
- The school will be assumed to be occupied throughout the summer period for the modelling of overheating. This will provide a degree of future-proofing.
- An external ambient CO₂ concentration of 400 ppm will be assumed.

5.2 CIBSE TM52 Assessment

TM52 Internal Conditions

The following internal conditions will be used in the analysis:

- Occupied hours will be assumed to be 09:00 to 16:00, Monday to Friday.
- Occupancy, lighting and small power will be set to zero during the lunch hour, from 12:00 to 13:00, in all classroom areas.
 - For dining spaces, the operational period will be set to 12:00 to 14:00.
- The school will be assumed to be occupied throughout the summer period for the modelling of overheating. This will provide a degree of future-proofing.

6.0 Conclusion

The next steps will include completing the Part L compliance assessment, reviewing the proposed building fabric, HVAC systems and renewable energy strategy, undertaking the BB101 thermal comfort and indoor air quality assessment for teaching spaces, completing the CIBSE TM52 overheating assessment for applicable non-teaching spaces, carrying out the Climate-Based Daylight Modelling assessment and identifying any design mitigation measures required to support compliance.