THE ROYAL BOROUGH OF WINDSOR AND MAIDENHEAD

HILLTOP FIRST SCHOOL
NEW NURSERY PLAYROOM AND SEN RESOURCE BASE

ENERGY STATEMENT (FOR PLANNING)

This energy statement has been prepared on behalf of the Royal Borough of Windsor and Maidenhead Property Company Ltd. in support of a planning application for the development of a new Playroom and SEN Resource Base at Hilltop First School in Berkshire.

The Royal Borough of Windsor and Maidenhead's declaration of a climate emergency in June 2020 sets out the Council's intention to implement national policy and ensure net-zero carbon emissions are achieved by no later than 2050.

The proposed scheme does not exceed 100m^2 of new space and the requirement for net zero carbon design does not apply for planning. However, an energy and carbon dioxide emission assessment has been undertaken using dynamic simulation modelling software EDSL TAS Version 9.5.0 that incorporates the SBEM calculation methodology in line with Building Regulations requirements to generate predicted annual CO2 emission rates.

This Energy Strategy will adopt a 'fabric first' approach and the construction of the new building is required to reduce operational CO_2 emissions below the Target Emission Rate (TER) as set out in Building Regulations, Part L2 (2021).

Passive Design Measures

Passive design measures are the most effective and robust measures for reducing CO_2 emissions as the performance of the solutions (eg. wall insulation), is unlikely to deteriorate significantly with time or be subject to change by future property owners and therefore it is likely that the benefits of these measures will continue at a similar level for the duration of their installation.

Glazing

Glazing ratio has been optimised to achieve a balance between providing natural daylighting to reduce the use of artificial lighting, the provision of passive solar heating to limit the need for space heating in winter and limiting summertime solar gains to reduce space cooling demands and limit the likelihood of high internal temperatures. Glazing on the south, east and west facing facades can lead to beneficial solar gains in winter months, whilst glazing on northerly orientations will typically loose heat.

Solar gains can be beneficial in winter months as a means of avoiding the need for active heating to maintain comfortable internal temperatures. However, in summer months excessive solar gains can lead to the potential for high internal temperatures. The solar energy transmittance (g-value) of the glass has been targeted to allow solar gains in winter but control solar gains in summer. A value of no more than 70% is targeted. Maximising the amount of natural daylight available in each internal space and reducing the need for artificial light sources.

Thermal Insulation

Demand for space heating can be significant but will be reduced through the provision of an efficient thermal envelope, by reducing the thermal transmittance of the building envelope

where appropriate and reducing heating and cooling requirements. The building fabric will consist of high-performing materials using accredited construction details to reduce heat lost through thermal bridging.

Air Permeability

Fabric air permeability is a measure of the volume (flowrate) of air that penetrates the fabric of a building, leading to ventilation heat loss and gain. High air permeability can lead to uncomfortable drafts and dramatically increase the demand for space heating in winter.

Building Regulations Part L 2021 sets a minimum standard for air permeability at $8m^3$ of air per hour per square meter of envelope area, as measured at a pressure difference of 50Pa. The development will target an air permeability of $3m^3/(m^2 \cdot h)$ at 50Pa. achieved with enhanced (architectural) construction details particularly at junctions to improve building leakage.

Thermal Bridging

Accredited Construction Details (ACD's) will be developed to provide the performance standards required to achieve the higher energy efficiency requirements of the Building Regulations. Based on the ACD's, the thermal bridging is assumed with a maximum Y-value of 0.08 W/m2·K.

Heating

Heating will be provided via the existing LTHW (gas-fired boiler) system and circuits will be extended to serve new LST emitters within the new building.

Local zone control will be provided in accordance with Building Regulations and new LST radiators shall be provided with an integral thermostatic valve pre-set to allow adjustment of room temperature with a cover to discourage unauthorized tampering together with a standard lock shield valve.

Distribution pipework will be insulated in accordance with the requirements of the Building Regulations.

Ventilation

The new building will follow the 'Build Tight, Ventilate Right' methodology and generally will be naturally ventilated via openable windows.

Overheating criteria set out in BB101 based on the adaptive comfort model shall also be satisfied and air quality levels shall be in accordance with the Air Quality Standards Regulations 2010.

Dedicated (local) mechanical extract ventilation systems will be provided in toilets. Fans will be two speed, normal operation providing trickle ventilation to the areas served with a boost facility during occupation, operated via a PIR above the entrance door within the area served.

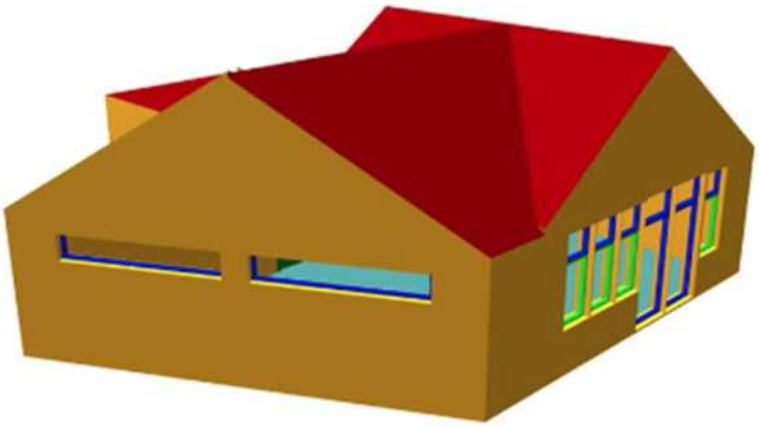
General Lighting

Lighting within the new building will consist of high efficiency LED fittings with intelligent control functions to dim and/or switch off individual fittings depending on available daylight where appropriate.

External lighting will also be of high-efficiency LED-type controlled via a combination of photocell and timeclock controls.

Energy Demand Assessment

Thermal modelling has been undertaken for the proposed development comprising a gross (internal) floor area circa 69m^2.



Notional Building

The notional building is the base line model that Building Regulations utilises to calculate the target emission rate (TER) and is determined on the assumption that any heating and hot water supply would be provided by gas boilers.

Actual Building

The comparison of the actual building against the notional building identifies that there is a predicted improvement of 31% in terms of the Building CO_2 Emissions Rate (BER) over the notional building (TER) which is sufficient to achieve compliance with Building Regulations, Part L (2021) requirements (See Table below).

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	140.36	147.6
Primary energy [kWh$_{PE}$/m^2]	-41.24	-36.68
Total emissions [kg/m^2]	1.32	1.92

Overheating Assessment

The Local Plan requires that developments should reduce potential overheating risk and reliance on air conditioning systems. BB101 provides guidance of predicting overheating risk for the building based on a standardised approach for building design using dynamic thermal analysis.

A BB101 assessment has been carried out using CIBSE weather data comprising future climate projections identifying the impacts of global warming and the table (overleaf), summarise the results of the assessment employing a natural ventilation strategy.

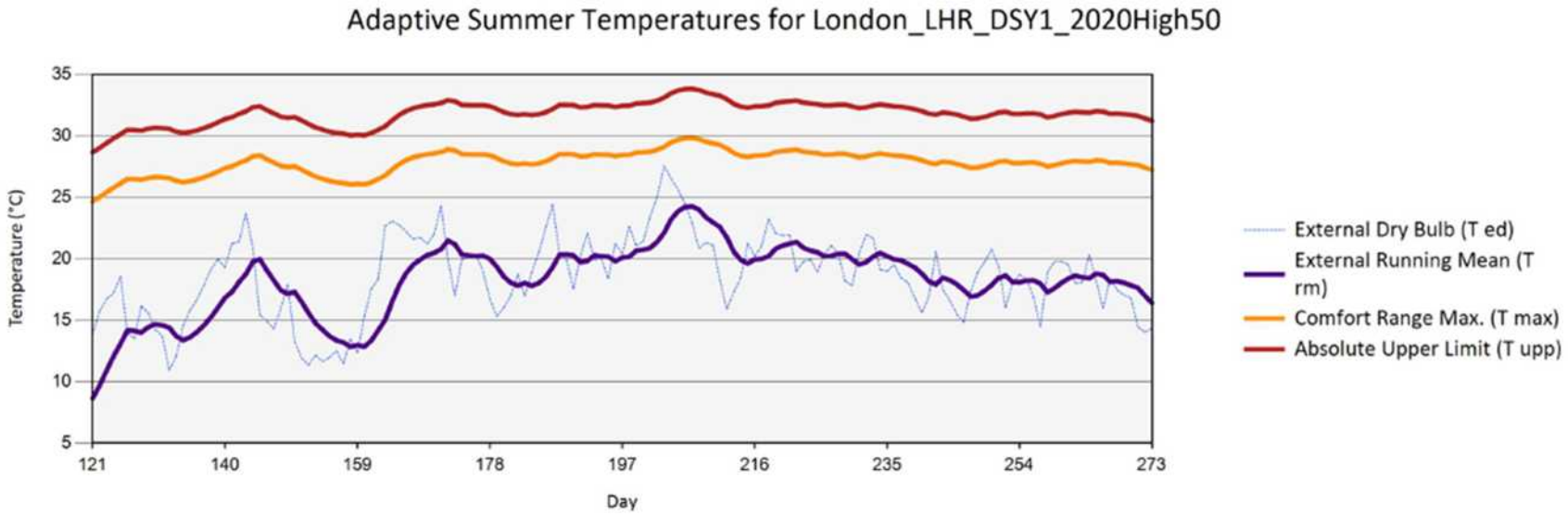
BB101 Report

BB101 Overheating Criteria

Zone Name	Space Type	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: #Hours Exceeding Comfort Range	Criterion 2: Peak Daily Weighted Exceedance	Criterion 3: #Hours Exceeding Absolute Limit	Result
Playroom 1	Teaching Spaces	654	40	14	6	0	Pass

*Zone names that have an orange coloured font do not have occupancy every Monday to Friday as per the BB101 Regulations.
**As per the 2018 regulations, sports halls used for exam purposes are only assessed between the 1st of May and the 8th July. Due to this, the max exceedable hours is reduced to 18 hours.

Weather Data



Conclusion

The focus of the energy strategy is on reducing greenhouse gas emissions and calculations have been undertaken to demonstrate the new (Nursery) building can achieve a carbon emission reduction over that of the Part L (2021) Building Regulations by adopting passive and low energy design techniques, a total CO_2 emission reduction of 31% is achievable. The potential risk of overheating and the need for cooling has also been mitigated.

It is important to note that the results from the calculations are based on energy consumption by regulated loads and will not reflect the actual energy use as they are based on standardised weather and occupancy profiles and do not include for unregulated energy sources. Users of the development will be encouraged to reduce their unregulated equipment energy use which could be provided in the form of building user/residence guides. In general, the fit out of the Development will endeavour to include the use of energy efficient domestic appliances rated A / A+ and above in accordance with the EU Energy Efficiency Labelling Scheme. Energy efficient appliances will not only reduce energy consumption but also reduce energy costs.