

Energy Statement

J5114 Borde Hill Stables

Ref: J5114-E-RP-0001

Revision: 04

Status: S4

Webb Yates Engineers Ltd
48-50 Scrutton Street
London. EC2A 4HH
020 3696 1550
london@webbyates.com
www.webbyates.com

Registered in England & Wales No.: 5393930

CONTENTS

REVISION HISTORY	2
1. EXECUTIVE SUMMARY	3
2. INTRODUCTION	5
3. PLANNING POLICY BACKGROUND	6
3.1. Building Regulation Compliance	6
3.2. Mid Sussex District Plan 2014-2031	8
3.3. Planning Conditions	9
4. ENVIRONMENTAL DESIGN STRATEGY	10
4.1. Be Lean.....	10
4.2. Be Clean.....	12
4.3. Be Green	13
4.4. Be Seen	14
5. LOW AND ZERO CARBON TECHNOLOGIES	15
5.1. Feasibility of Selected Technologies	16
5.2. Feasibility study of the discarded technologies.....	17
6. COOLING HIERARCHY	18
7. OVERHEATING RISK ANALYSIS	19
8. ENERGY ASSESSMENT	23
8.1. TAS Model	24
8.2. Results.....	26
9. CONCLUSION	28
APPENDIX A – BRUKL REPORTS	30

REVISION HISTORY

Revision	Status	Date	Author	Reviewer	Approver
00	S3	27.02.2023	AE	ES	AL
01	S3	05.06.2023	AE	ES	AL
02	S3	07.06.2023	AE	ES	AL
03	S4	11.08.2023	AE	ES	AL
04	S4	26.06.2025	AE	ES	AL

© Copyright 2025 Webb Yates Engineers Ltd.

This document has been prepared in accordance with the scope of Webb Yates Engineers' appointment and is subject to the terms of that appointment. Webb Yates Engineers accepts no liability or responsibility to any other party in respect of any use or reliance upon this document. Any modification to this document subsequent to issue by Webb Yates Engineers' shall not be considered valid.

I. EXECUTIVE SUMMARY

This report develops the energy and sustainability strategy for the proposed Phase I redevelopment of Borde Hill Stables.

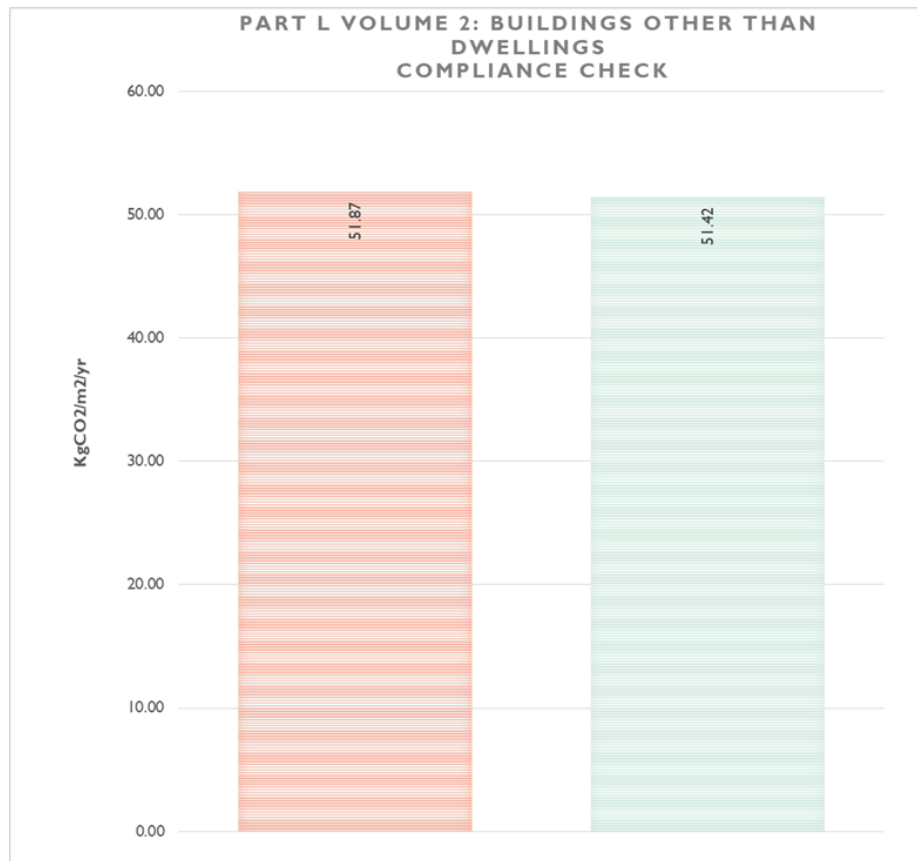
The proposed development consists of the conversion of the existing gym, café, restaurant and office spaces into a combined brasserie/café and staff quarters. It is proposed to provide an extension to the existing building and to reuse the existing heating system and associated equipment as much as technically possible. The thermal performance of constructions within the extension will be in line with Building Regulations Part L 2021.

The guidance and policies used in formulating this report are listed below and the resulting findings are compliant with content of each;

- Mid Sussex District Plan 2014-2031;
- Building Regulations Part L 2021 Volume 2: Buildings other than dwellings

The energy strategy proposed meets the Building Regulations Part L requirements and is aimed to achieve the best outcome in terms of sustainability and energy efficiency, based on constraints of the site. Impact from future upgrades and extensions to the development have also been considered.

CO2 EMISSIONS (kgCO ₂ /m ² /year)		
	TOT REGULATED EMISSIONS (kgCO ₂ /m ² /year)	CO2 emissions (kgCO ₂ /year)
Building + Notional Extension	51.87	55350
Building + Proposed Extension	51.42	54863



2. INTRODUCTION

Borde Hill Stables is an existing 3-storey building and part of Borde Hill Garden in Haywards Heath, Sussex.

The project scope for Phase I of the redevelopment scheme will include the full fit out of services within the building which will include heating, ventilation, hot and cold-water services, and drainage. Existing building services will largely be stripped out as part of the works. Heating and hot water will be provided through existing and additional new boiler, with the existing services serving the former gym retained and reused to serve the same area, including the farm shop. An ASHP system is proposed to provide heating and cooling to the Greenhouse extension.

The works on Borde Hill Stables are part of a larger redevelopment of the Borde Hill estate with instalment of green infrastructure.

This report sets out the energy strategy for the proposed Phase I portion of development. As part of Phase I works an extension in the form of the Greenhouse, a restaurant, will be constructed. Building services to the existing building will consist of a combination of reusing existing plant along with new provision which will be outlined in this report. In developing this strategy, local and regional planning policies have been addressed.

The format of this report follows the Local Plan to ensure that energy needs are met in the most efficient way.

The energy consumption of the development has been assessed in line with the local policy and the CO₂ emission savings have been estimated using TAS software.

This report identifies the proposed energy strategy to meet requirements set out in Part L2 of the Building Regulations. The proposed Sustainability Principles and Engineering Concepts incorporate the requirements and guidelines of the relevant British Standards and CIBSE Guides.

3. PLANNING POLICY BACKGROUND

The main planning documents which constitute the statutory development plan for Mid Sussex and form the basis on which decisions will be made for the proposed development are:

- Building Regulations Part L 2021 Volume 2: Buildings other than dwellings;
- Mid Sussex District Plan 2014-2031;
- CIBSE Technical Manuals and Guide;

The main planning documents which constitute the statutory development plan and form the basis on which decisions will be made for the proposed development are outlined below.

3.1. Building Regulation Compliance

Building Regulations apply to all developments, and are in place to ensure buildings meet health, safety, welfare, convenience and sustainability standards; they focus on the technical aspects of designing and constructing a building.

The proposed development of Borde Hill Stables will be fully compliant with all revisions of the Building Regulations relevant to MEPH design. The most relevant document is the Part L Approved Document: Part L 2021 Volume 2: Conservation of Fuel and Power in Buildings Other Than Dwellings.

In accordance with Section 10.7, the proposed extension to the development is;

- Greater than 100m², and
- Greater than 25% of the total useful floor area

It therefore needs to be treated as a major extension and is required to comply with paragraph L1 of Schedule in accordance with Part L. The openings of the extension should not exceed the following sizes, unless the window to wall ratio matches that of the remaining building and need to have a minimum thermal performance as seen below. New thermal elements will similarly need to achieve the outlined standards.

Table 10.1 Maximum area of openings in the extension

Building type	Windows and pedestrian doors as % of exposed wall	Rooflights as % of area of roof
Residential buildings where people temporarily or permanently reside	30	20
Places of assembly, offices and shops	40	20
Industrial and storage buildings	15	20

Table 4.1 Limiting U-values for new or replacement elements in new and existing buildings and air permeability in new buildings

Element type	Maximum U-value ⁽¹⁾ W/(m ² ·K) or air permeability
Roof (flat roof) ⁽²⁾	0.18
Roof (pitched roof) ⁽²⁾	0.16
Wall ⁽²⁾⁽³⁾	0.26
Floor ⁽⁴⁾⁽⁵⁾	0.18
Swimming pool basin ⁽⁶⁾	0.25
Windows in buildings similar to dwellings ⁽⁷⁾⁽⁸⁾	1.6 or Window Energy Rating ⁽⁹⁾ Band B
All other windows ⁽⁸⁾⁽⁹⁾⁽¹⁰⁾ roof windows, curtain walling	1.6
Rooflights ⁽¹²⁾⁽¹³⁾	2.2
Pedestrian doors (including glazed doors) ⁽¹⁴⁾	1.6
Vehicle access and similar large doors	1.3
High-usage entrance doors	3.0
Roof ventilators (including smoke vents)	3.0
Air permeability (for new buildings)	8.0m ³ /(h·m ²) @ 50Pa

Less than 25% of the existing external envelope will undergo renovation. The existing portion of the development is therefore not classified as a major renovation and will not need to comply with paragraph L1 of Schedule L. The existing building also has a total floor area smaller than 1000m², meaning the requirement for consequential improvements is not triggered.

Compliance at the design stage is demonstrated by calculating and comparing the CO₂ emissions rate for the proposed development, known as the Building Emissions Rate (BER), and an equivalent notional building of the same geometry but with a set of benchmark performance characteristics as specified in the 2010 NCM modelling guide, known as the Target Emissions Rate (TER). NCM methodologies using TAS software were employed to demonstrate compliance with these regulations.

In accordance with Section 10.11, Building Regulation compliance will be demonstrated by proving a lower building primary energy rate and building emission rate for the building plus proposed extension in comparison to building plus notional extension.

3.2. Mid Sussex District Plan 2014-2031

In accordance with Policy DP39: Sustainable Design and Construction, the development will seek to minimise energy use through the design and layout of the scheme. The development is proposed to be naturally ventilated and daylight lighting controls installed throughout in order to reduce energy consumption.

The possibility of the biomass heating system acting as a communal network has been explored but as been opted against as the small heat loads from other potential buildings to connect to the system would lead to the system running in an inefficient manner.

The development will connect to the sitewide electricity generation network via photovoltaic panels in order to reduce onsite emissions.

In accordance with Policy DP42: Water infrastructure and the Water Environment, the development will be designed in order to minimise water use to a maximum of 110 litres/person/day.

3.3. Planning Conditions

Prior to commencement of the development, an energy statement shall be submitted to and approved in writing by the Local Planning Authority. The development shall be carried out in accordance with the approved development thereafter.

4. ENVIRONMENTAL DESIGN STRATEGY

It is proposed to use a number of energy efficiency measures to reduce the energy demand of the development. As a good basis of design, the development has been designed in line with the energy hierarchy of Be Lean, Be Clean, Be Green and Be Seen.

4.1. Be Lean

The first step of the energy hierarchy is to reduce energy use through both passive and active lean design measures. A number of sustainable design and construction methods have been incorporated into the design of the building which comply with the requirement to reduce energy demand. These include:

High Performance Building Envelope

Element	Building Regulation Part L Limit U-Value [W/m ² K]	Proposed U-Value [W/m ² K] Design
New External Wall	0.26	0.15
Existing External Wall	N/A	1.50
New Floor	0.18	0.10
Existing Floor	N/A	1.10
New Roof	0.18	0.12
Retained Roof	0.35	0.16
Existing Roof	N/A	2.50
New Glazing	1.60	1.60
Existing Glazing	N/A	5.80

Enhanced Air Tightness and Good Detailing

Where construction elements and thermal fabric are either being replaced or upgraded, good detailing shall be achieved in order to avoid the creation of thermal bridges in the fabric and meeting points of elements such as between walls and floors and ceilings. The development should aim to achieve a greater building airtightness than currently present to reduce heat losses in the building. For the extension and refurbishment to the development a minimum airtightness of 5m³/hm² at 50Pa shall be achieved.

Limit Overheating

Systems have been designed to minimise internal heat gains by creating as short as possible service runs and the use of low energy lighting. The façade will be designed in such a way as to maximise solar gains in colder winter months while limiting them in summer months. The development will have large openable windows to allow for natural ventilation which will ensure a comfortable indoor environment in summer months.

Daylight

The maximisation of daylight is one of the most important environmental factors for buildings. Artificial lighting contributes up to 25% of the energy costs of a typical building, despite operation largely within daylight hours. Anecdotal evidence also suggests that the provision of good levels of natural light can contribute to enhanced health and well-being. The design shall maximise daylight while limiting solar gains during summer months.

Ventilation

The building is naturally ventilated via large openable windows throughout the development. Mechanical extract will be installed in kitchens and toilets.

Efficient Systems

Use of efficient systems and equipment with suitable time and temperature controls which have been appropriately commissioned such that the systems can be operated efficiently.

Minimization of lengths and diameters of 'dead legs'. Efficient components i.e. fans, pumps, refrigeration equipment have been appropriately sized to have no more capacity for demand and standby than is required for the task to operate at their optimum levels.

Insulation of pipework, ductwork and hot water systems have been selected to be in line with the future highest standards.

Minimising Water Usage

The design shall incorporate water saving strategies, such as low flush toilets, and non-concussive spray taps in order to keep the maximum water usage to 110 litres/person per day (in accordance with Policy DP42 Water Infrastructure and the Water Environment). Water consumption will be monitored. Other features shall include mains leak detection and sanitary shut-off.

Energy Efficient Lighting and Appliances

Provision of the required lighting levels whilst minimizing energy consumption by appropriate specification of light fittings and effective control of lighting systems by:

- Specifying 100% of the fixed internal light fittings as dedicated energy efficient fixtures.
- Having suitable energy consumption metering.
- Ensuring systems have been appropriately commissioned.
- Using lighting systems which are efficient and make use of daylight where possible/practical.
- Provision of low output or energy efficient external lighting.
- Avoiding the use of external lighting when communal spaces are unoccupied or during the day by means PIR, daylight sensors and time controls.

A lighting efficacy of average 105 lumens per circuit watt has been used as the design standard. This will be achieved including LED lighting sources throughout.

4.2. Be Clean**New Community heat network / Connection to Existing Low Carbon Heating Infrastructure**

Due to its rural location, there is no opportunity to connect to an existing heat network. The possibility of using a biomass boiler system to supply heating to additional buildings than the Stables was considered but ultimately opted against as the small heating loads and distances would lead to the system becoming oversized and operating in an inefficient manner. It is proposed to retain existing systems for existing building with ASHP providing heating and cooling for the Greenhouse Restaurant.

4.3. Be Green

The final reductions in energy consumption and related carbon emissions should be through the use of on-site renewable energy sources in the bid to reach as large carbon reductions as possible. As part of Phase I of the redevelopment of the project, it is proposed to install an ASHP system to provide heating and cooling to the Restaurant. This low-carbon technology significantly reduces reliance on fossil fuels and contributes to lower operational emissions. The ASHP will operate with high seasonal efficiency, supporting the development's commitment to long-term sustainability. A new gas boiler will provide heating to all remaining areas of the development, excluding the staff wing.

In addition to the low-carbon ASHP system at Phase I, the property will connect to the sitewide renewable energy generation system provided via photovoltaic panels. The extension will need a minimum output of approximately 1.4kWp for Phase I to meet Building Regulations primary energy compliance.

4.4. Be Seen

Sufficient information about the building, the fixed building services and their maintenance requirements will be provided to the users so that the building can be operated in such a manner as to use no more fuel and power than is reasonable in the circumstances. The systems provided within the development will allow for monitoring to ensure they are run at optimum performance. Energy consumption and performance of the proposed design is to be monitored.

5. LOW AND ZERO CARBON TECHNOLOGIES

The following section provides a feasibility analysis of Low or Zero Carbon (LZC) technologies for use at Borde Hill Stables. There are various options when it comes to LZC technology, but a combination of project constraints rules the majority of these out. The constraints are:

- Capital expenditure
- Return on Investment
- Carbon savings potential
- Clean energy output potential
- Spatial requirements
- Operation and maintenance requirements
- Planning requirements

Out of the technologies considered the following were discounted immediately for this site:

- Hydroelectric: there are no suitable water courses or hydroelectric plants near the site.
- Hydrogen: generation and storage are still in the experimental stage at this scale and no systems are currently commercially available.
- CHP: planning energy and carbon targets rule out the use of a gas boilers or alternatives.
- Wind Turbines: wind turbine technology is not suitable due to the implications on the listed status of the site and visual impact it may have

The feasibility study therefore reviewed the use of the following technologies to offset CO2 emissions:

- Air Source Heat Pumps
- Photovoltaics
- Solar Thermal Panels
- Open/Closed Loop Ground Source Heat Pumps
- Biomass Boiler

The following types of green/renewable energy technologies have been selected in order to maximise on-site renewable energy generation at Phase I:

- ASHP
- Photovoltaics

Additionally, a study has been carried out which provided a comparison in installation and running costs and associated carbon emissions between gas boilers, biomass boilers, ASHP and GSHP. This study showed that for a Part L compliant design, biomass boiler plus photovoltaics was the most carbon effective solution for the development.

5.1. Feasibility of Selected Technologies

Air Source Heat Pump Systems

Individual high efficiency air source heat pumps providing heating and cooling were considered; this allows a lower flow temperature. The heating controls will incorporate external temperature compensation allowing fast response to external temperature change, which saves energy by reducing the need for sudden demands of duty.

An air to water heat pump uses the air as a heat sink and transfers the heat in the external space into the heating system. The temperature of the Low Temperature Hot Water (LTHW) providing the heating also affects the COP of the units, with the ideal flow and return temperatures being 45°C/35°C.

The end-users will be supplied with regular information to control and operate the system e.g. at point of occupancy and maintenance visits. The performance of the heat pump system will need to be monitored postconstruction to ensure it is achieving the expected performance approved during planning as will be specified in the Mechanical Specifications.

On the basis of economic and technical application ASHP are considered appropriate for the project as part of Phase I.

Distribution

The heating system will be designed to be as efficient as possible, with an inverter driven pump to adjust the pumping power required dependent on the heating demand.

The building maintenance personnel will be supplied with regular information to control and operate the system e.g. at point of occupancy and maintenance visits.

The difference of temperature will be minimised to ensure the system runs efficiently.

The performance of the ASHP system will be monitored postconstruction to ensure that the heat pumps will be achieving the expected performance approved during planning.

Solar Photovoltaic (PV) Panels

Photovoltaic (PV) Panels are a renewable technology which will decrease the amount of electricity from the grid used in the building, particularly during the summer months when the solar irradiance is at its peak. Panels can be integrated within the building roof or stand alone; most efficient when south facing and angled at 30° from the horizontal. Such panels would reduce carbon emissions from the electrical uses within the building.

With connection to sitewide PV generation system available, this technology has been deemed suitable and therefore adopted to help reduce onsite electric consumption. The extension will need a minimum output of approximately 1.4kWp for Phase I to meet Building Regulations primary energy compliance.

5.2. Feasibility study of the discarded technologies

Ground Source Heating and Cooling Systems

A Ground Source Heat Pump (GSHP) is a system that extracts heat from the ground, upgrades it to a higher temperature and releases it where required for use for space and water heating. Most systems are 'closed loop' and comprise of plastic piping buried in the ground and connected to a heat pump. A water or water-antifreeze mixture is passed around the looped pipe where it absorbs heat from the ground. The fluid flows into an electrically powered heat pump, comprising a compressor and a pair of heat exchangers before discharging back to the underground loop. Pipes can either be buried in trenches, usually in a slinky arrangement to reduce the amount of surface area that is required, or in a borehole, in a vertical loop system. Vertical loop systems require less surface space but are considerably more expensive.

Although their efficiency and potential for significant carbon reductions are attractive, the capital expenditure and on-going maintenance would add unnecessary costs and complications to the construction process. Extensive ground works would be required. Therefore GSHPs are deemed not the preferred option.

Feasibility of Solar Thermal Systems

Similarly to PV panels, solar thermal panels can either be integrated into the sloped roof structure. Either flat plate or evacuated tube type panels could be used. The solar thermal panels will be used to heat water which can be used for the domestic hot water supply.

It has identified that it would be more efficient for this kind of development to make use of PV generation and therefore ST panels are not recommended for this site.

Biomass Boiler Systems

A biomass boiler system works similarly to a conventional boiler in that it generates heat via the burning of fuel. Biomass fuel come in the form of wood, plants and other organic matter. Biomass heating systems burn wood pellets, chips or logs to power a central heating system.

In addition to boiler, sufficient storage for the chosen fuel needs to be provided. The storage space shall have good ventilation in order to limit the build-up of moisture to allow as efficient burning of fuel as possible. Provision shall also be made for delivery of fuel to storage space.

While the boiler runs at a lower efficiency than a heat pump, the carbon factor of biomass is significantly lower than electricity meaning that overall the carbon consumption associated with the system is smaller. With woodchips available from the local lumberyard, the manufacture and transport of fuel is heavily reduced. The possibility of using a biomass boiler system to supply heating to additional buildings than the Stables was considered but ultimately opted against as the small heating loads and distances would lead to the system becoming oversized and operating in an inefficient manner.

6. COOLING HIERARCHY

The development has been designed in line with the cooling hierarchy providing a good basis of design in order to ensure a comfortable internal environment in summer months. The following measures have been taken at each stage of the hierarchy in order to reduce the demand for cooling.

Minimising Internal Heat Gains

Stage one of the Cooling Hierarchy is to minimise internal heat generation through energy efficient design.

Heat distribution infrastructure will be designed to minimise pipe lengths. This will be achieved at coordination stage, ensuring pipework is well insulated and that pipe configurations minimise heat loss. Good daylighting and high efficiency light fittings with occupancy control will also help to reduce excess heat gains from artificial lighting. Low energy lighting has been specified with occupancy controls to be provided for the luminaires.

Reducing Heat Entering the Building

The design of the façade will help to limit solar gains in the summer.

Passive Ventilation

Large openable windows will allow sufficient natural cross ventilation during occupied hours, and when acoustic requirements allow, to prevent overheating.

Mechanical Ventilation

Mechanical extract will be provided to kitchens and toilets in order to remove moisture and odours, which will help expel warm air from the development.

Active Cooling

Due to the nature of the building and its use, it is proposed to provide active cooling to the Greenhouse along with retaining the existing cooling system to office spaces.

7. OVERHEATING RISK ANALYSIS

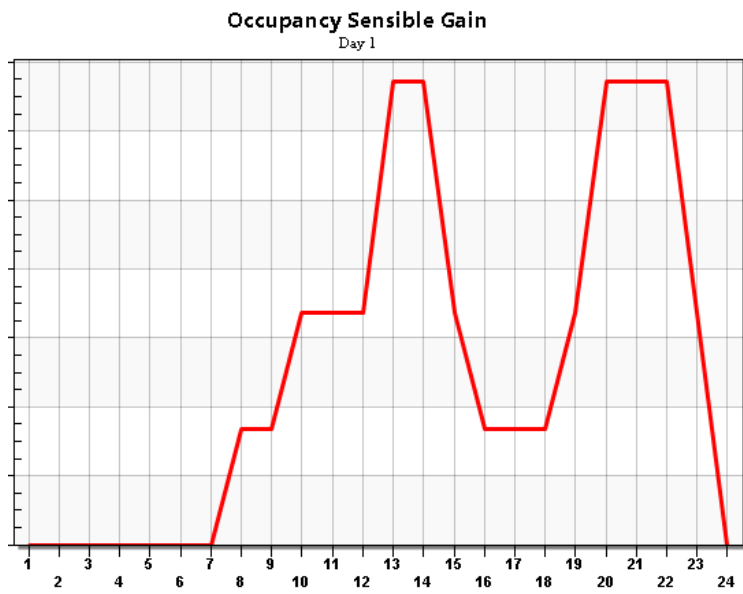
The measures described in the Cooling Hierarchy set out how overheating risk will be mitigated through passive design measures. The Greenhouse will be provided with heating and cooling units supplied via a ASHP system.

The Greenhouse has been tested for overheating in order to inform its design and reduce the need for active cooling. CIBSE TM52: The limits of thermal comfort: avoiding overheating in European buildings was used to assess to assess this. In accordance with TM52 two of the following criteria need to be met.

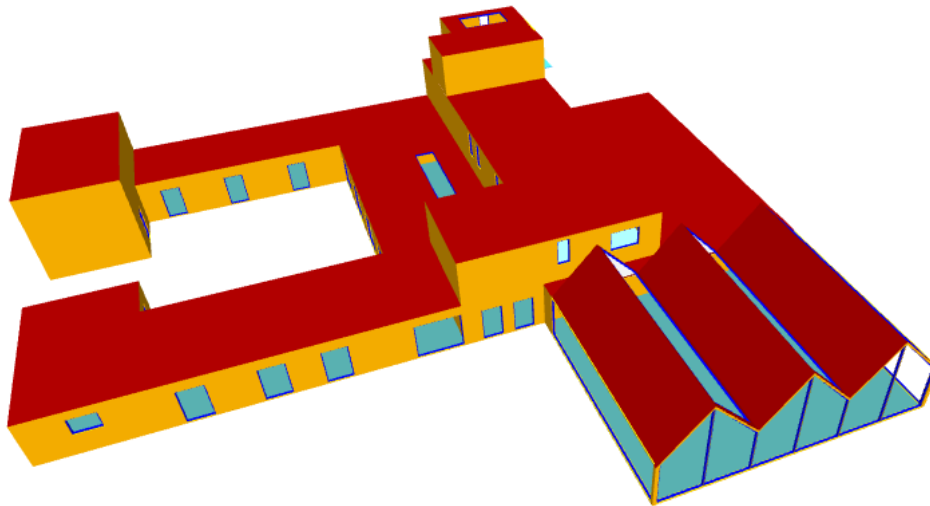
- 1) The number of hours during which delta T of indoor air temperature to outdoor is greater than or equal to one degree (K) during the period of May to September shall not exceed 3% of occupied hours.
- 2) The weighted exceedance (We) shall be less than or equal to 6 in any one day.
- 3) Delta T of indoor air temperature to outdoor shall not exceed 4K.

The U-values were assigned as previously discussed. Glazing assumed to have a g-value of 0.4. Windows were modelled as having approximately 50% openable area and open whenever the tested zone is occupied and internal temperature exceeds external. The rooflights have been modelled with an external temperature cut-off meaning windows remain closed if external air would have an adverse effect on internal temperature.

The space has been modelled as having an occupancy of 5m²/person which corresponds to approximately 95 people at maximum occupancy. As can be seen on the graph, the space is modelled as fully occupied between 13:00-14:00 and 20:00-22:00 with lower occupancy levels at other times. This is simulating the space when used as a restaurant. When used as a wedding venue, the space is expected to house 120 guests from 15:00 to 24:00.



Upon discussion with the architect it was understood that there is a desire to keep the horizontal elements as glazed as possible. Therefore reductions to vertical windows as a means of reducing overheating risk was not considered, with only variations to the roof design tested. As a starting point, it was decided that solidity will be required for the roof structure to limit solar gains. In the initial design the roof structure runs in a North-South direction. The effect of changing to roof structure running East-West, in order to cut out sun from the South, was also tested.



Baseline

Upon initial results, additional mitigation measures were tested in the following order.

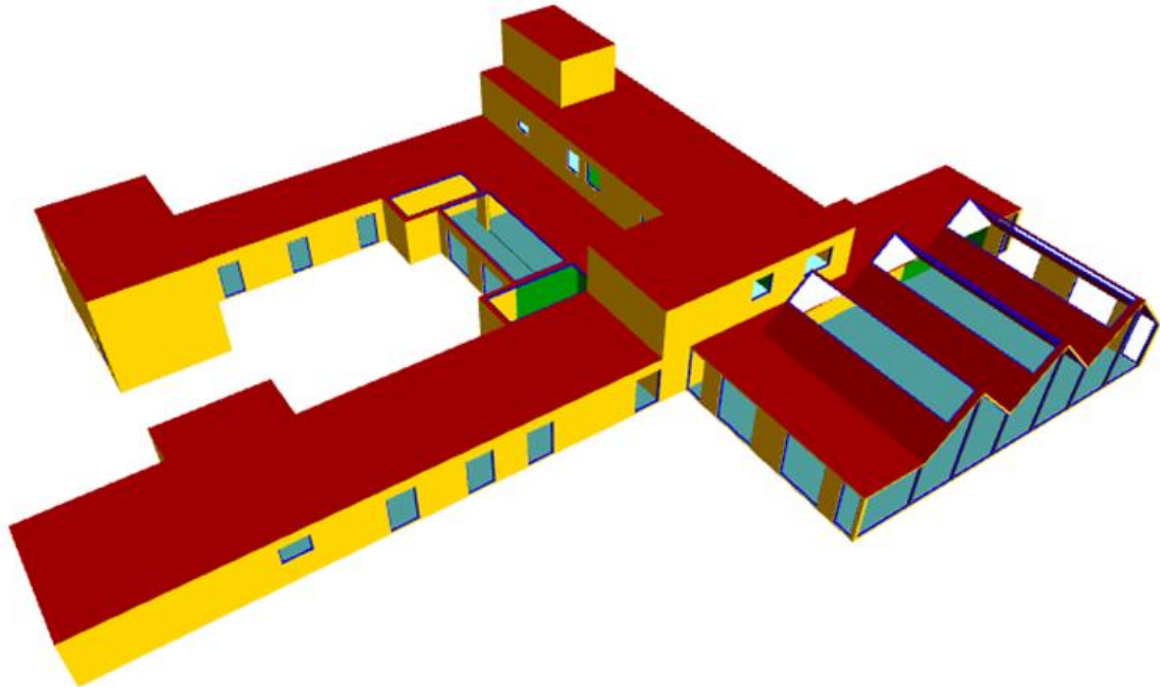
1. Baseline
2. Improved glazing g-value to 0.3
3. Improved g-value + internal blinds (approx. transparency 7%)
4. Improved g-value + external blinds (approx. transparency 7%)
5. Improved g-value + external blinds (approx. transparency 7%) + exposed thermal mass

Results show that the baseline scenario for both roof orientations fail overheating criteria. The rotated is a lot more effective in preventing heat from entering the space. Reducing the solar transmittance of the glazing will further reduce overheating risk. Increasing openable natural ventilation areas was tested but shown not to have a significant impact on results as during the days of highest overheating risk more natural ventilation will have a warming effect on the space. Internal blinds does not have a big impact on results as the solar gains are already inside the room. Utilising external blinds is much more effective in order to meet compliance. For spaces of high occupancies that are not in use during night-time hours, exposed thermal mass is a very effective method of stabilising internal temperatures. The mass absorbs heat during high temperature hours and releases it during unoccupied hours. Night-time ventilation is required for this to work effectively. By introducing approximately 200mm exposed thermal mass to the floor, a comfortable internal environment is achieved.

It is worth noting that both options fail Criterion 3 by 1 hour so are therefore not fully compliant with TM52. However, there is no requirement for the Local Plan to be fully compliant. Results show that a combination of these passive measures can achieve a comfortable indoor environment throughout the year.

	Baseline	Improved g-value (0.3)	Improved g-value + Internal Blinds	Improved g-value + External Blinds	Improved g-value + External Blinds + Exposed Thermal Mass
	Criterion I	Criterion I	Criterion I	Criterion I	Criterion I
	Hours Exceeded	Hours Exceeded	Hours Exceeded	Hours Exceeded	Hours Exceeded
Proposed Design	430	265	186	37	20

Based on the study carried out, the massing of the Greenhouse was developed to the figure seen below. Through the use of passive measures outlined in the study, a comfortable internal environment will be achieved. As part of the services provision to this space, supplementary mechanical cooling is proposed to mitigate overheating during periods of excessive summer temperatures.



8. ENERGY ASSESSMENT

An energy assessment has been carried out to demonstrate how the targets for regulated CO₂ emissions reduction over and above 2021 Building Regulations will be met using the energy hierarchy outlined previously.

As part of planning policy, the following criteria apply:

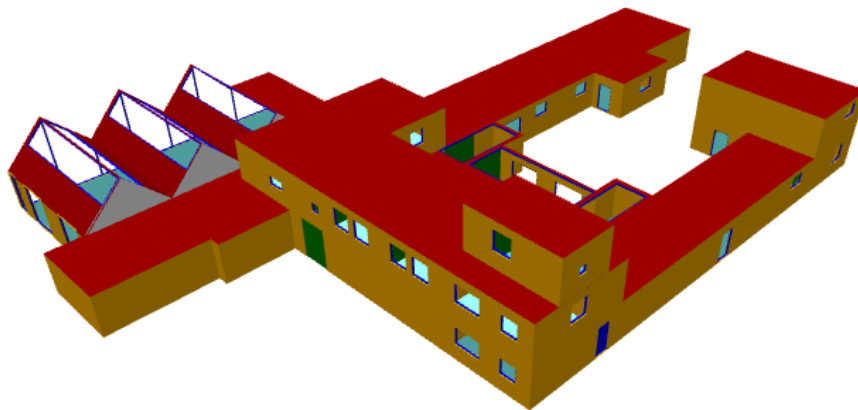
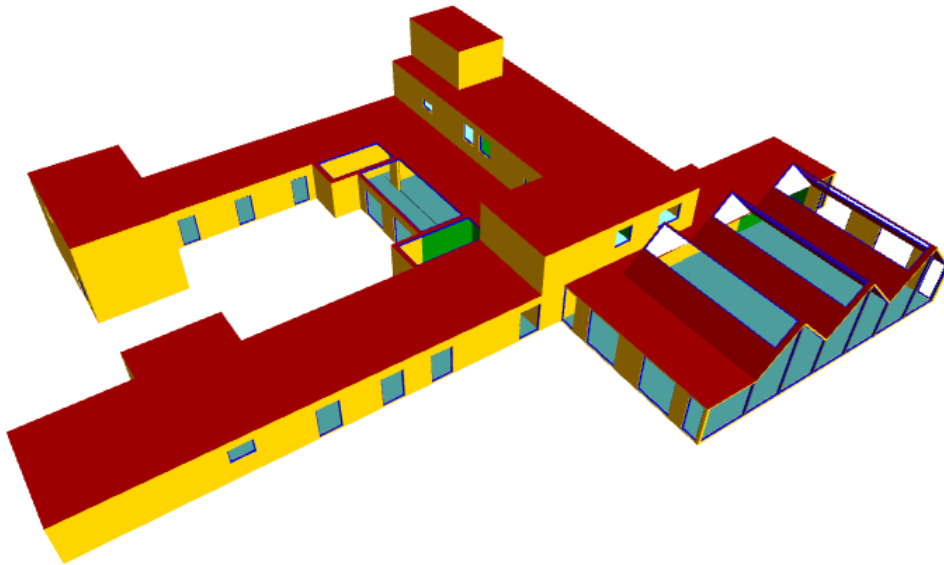
- The development should minimise carbon emissions to as high a degree possible

For the purpose of the energy assessment, the energy demand has been calculated using the approved TAS software.

TAS software was used to output a Target Emissions Rate (TER) based on the notional building and a Dwelling Emissions Rate (DER) for the development which has incorporated each stage of the energy hierarchy outlined below:

- Lean – energy efficiency measures
- Clean – No design implementations
- Green – ASHP system providing heating and hot water, PV sitewide network providing onsite generation of electricity

See Appendix A for full BRUKL results.

8.1. TAS Model

Each floor has been divided into the rooms based on layouts of the proposed building and assigned internal conditions of NCM Activity A3/A4/A5: Restaurant and Cafes.

The following fabric U-values have been assigned based on information from the Architect.

Element	Proposed U-Value [W/m ² K] Design
New External Wall	0.15
Existing External Wall	1.50
New Floor	0.10
Existing Floor	1.10
New Roof	0.12
Retained Roof	0.16
Existing Roof	2.50
New Glazing	1.60
Existing Glazing	5.80

The buildings services provision can be summarised as follows.

- Greenhouse – Natural ventilation, heating and cooling VRF system via a dedicated heat pump. Hot water via new gas boiler.
- Existing Building – Natural ventilation, mechanical extract provided to bathrooms and kitchens, hot water and heating via a new gas boiler.
- Staff Wing – Natural ventilation, heating and hot water by existing boiler system (2017) for current phase and existing hot water cylinders.

The lighting has been assumed to have a luminous efficacy of roughly 105 lm/W.

Efficiencies of all systems have been based on MEP Contractor information.

8.2. Results

Extension

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	34.44	18.34
Cooling	23.73	13.65
Auxiliary	0.27	3.72
Lighting	12.72	18.46
Hot water	107.83	126.27
Equipment*	103.48	103.48
TOTAL**	178.99	180.43

* 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	4.81	2.02
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>4.81</i>	<i>2.02</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	619.6	385.78
Primary energy [kWh _{PE} /m ²]	217.96	217.98
Total emissions [kg/m ²]	32.16	33.92

Proposed Refurbishment

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	195.77	25.25
Cooling	7.4	16.48
Auxiliary	15.36	8.02
Lighting	20.63	19.1
Hot water	60.84	64.82
Equipment*	109.96	109.96
TOTAL**	299.99	133.67

* 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	15.22
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>15.22</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	858.92	369.32
Primary energy [kWh _{PE} /m ²]	361.15	146.08
Total emissions [kg/m ²]	58.17	22.08

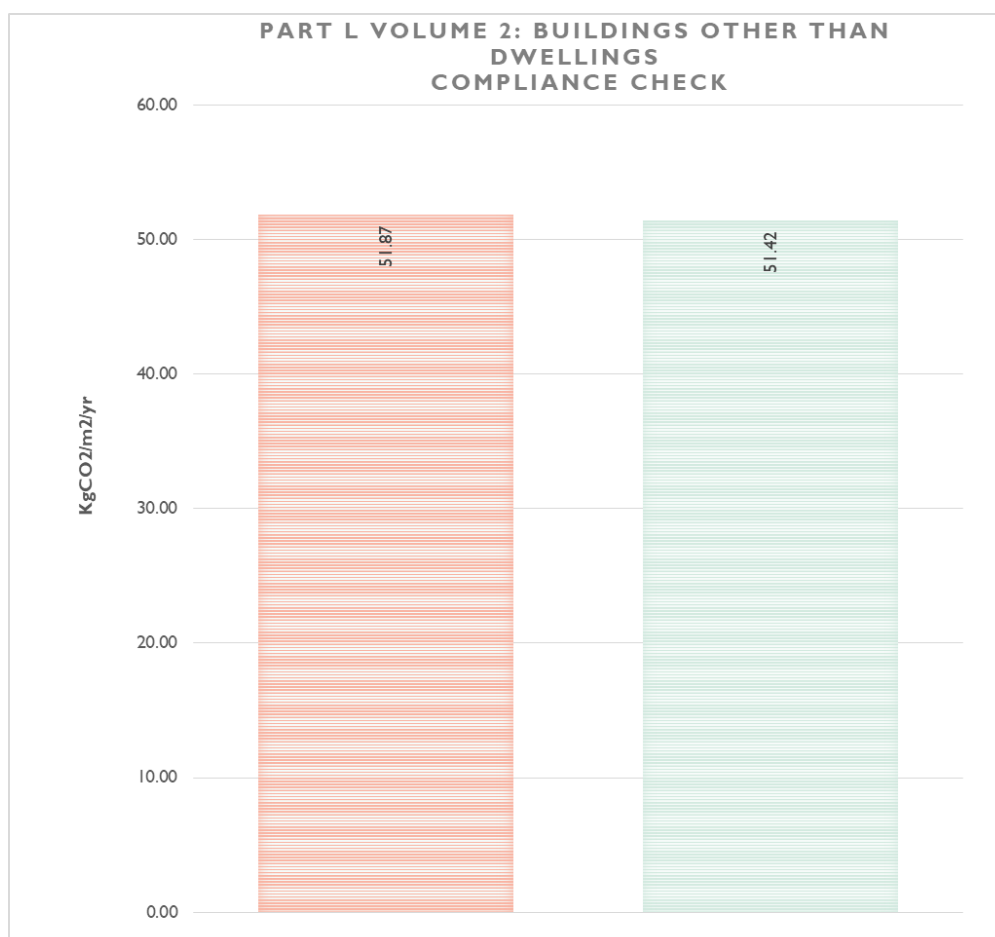
Full BRUKL reports of the development can be found in Appendix.

9. CONCLUSION

In line with the Local Plan, Planning Policy, and the project Planning conditions, this energy statement outlines the Environmental Design Strategy for the development and demonstrates the energy efficiency and renewable energy measures applied are able to achieve the required onsite carbon reductions in line with the energy hierarchy.

	Area (m ²)	TER (kgCO ₂ /m ² /annum)	BER (kgCO ₂ /m ² /annum)
Building	790	N/A	58.17
Extension	277	33.92	32.16

CO2 EMISSIONS (kgCO ₂ /m ² /year)		
	TOT REGULATED EMISSIONS (kgCO ₂ /m ² /year)	CO2 emissions (kgCO ₂ /year)
Building + Notional Extension	51.87	55350
Building + Proposed Extension	51.42	54863



As can be seen the building emission rate for the building and proposed extension is lower than that of the building plus notional extension, therefore demonstrating full compliance with Building Regulations Part L Volume 2.

When applying proposed construction details and U-Values to all new and retained thermal elements, high levels of energy efficient lighting, and low carbon heating system the measures equate to an annual carbon emission of 55,029kgCO₂.

Proposed connection to the sitewide PV system will result in annual carbon emissions of 54,863 kg CO₂.

APPENDIX A – BRUKL REPORTS

BRUKL Output Document



HM Government

Compliance with England Building Regulations Part L 2021

Project name

**The Stabes Borde Hill - Current Proposal
- Existing Building**

As designed

Date: Wed Jun 25 14:56:29 2025

Administrative information

Building Details

Address:

Certifier details

Name:

Telephone number:

Address: , ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.6"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.6

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

Foundation area [m²]: 446.76

The 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	22.08
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	58.17
Target primary energy rate (TPER), kWh _{eq} /m ² annum	146.08
Building primary energy rate (BPER), kWh _{eq} /m ² annum	361.15
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	1.71	2.06	External Wall Retained
Floors	0.18	0.71	1.07	Ground Floor
Pitched roofs	0.16	2.15	2.82	Roof Retained
Flat roofs	0.18	-	-	No flat roofs in project
Windows** and roof windows	1.6	3.68	5.68	Brasserie Cafe D1,2
Rooflights***	2.2	2.29	5.72	Teahouse Rooflight
Personnel doors^	1.6	5	5.61	West Door
Vehicle access & similar large doors	1.3	-	-	No vehicle access or similar large doors in project
High usage entrance doors	3	-	-	No high usage entrance doors in project
U _a -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)] * 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/m ² K 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	15*
* Buildings with less than 500 m ² total useful floor area may avoid the need for a pressure test provided that the air permeability used to calculate the BER and BPER is taken as 15 m ³ /(h.m ²) at 50 Pa.		

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	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- Existing Boiler Extract (3 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.85	-	-	-	-
Standard value	0.93*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.					

2- Existing Boiler Nat Vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.85	-	-	-	-
Standard value	0.93*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.					

3- New Boiler Extract (2 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.93	-	-	-	-
Standard value	0.93*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.					

4- New Boiler Nat Vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.93	-	-	-	-
Standard value	0.93*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.					

5- Kitchen AHU

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.93	3.6	-	0.96	0.7
Standard value	0.93*	3	N/A	1.9^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.					
^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

6- Office A/C Nat Vent (8 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.5	3.6	-	-	-
Standard value	0.93*	3	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.					

7- Office Toilets (2 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

1- Direct Electric

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0
Standard value	1	N/A

2- New Boiler

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	0.93	0
Standard value	0.91	N/A

3- Existing Boiler

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	0.85	0
Standard value	0.91	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			
Ground Floor - Prep Kitchen	0.4	-	-	-	-	-	-	-	-	-	-	N/A
First Floor - WCs	0.7	-	-	-	-	-	-	-	-	-	-	N/A
Ground Floor - Staff WC	0.6	-	-	-	-	-	-	-	-	-	-	N/A
Ground Floor - Prep WCs	0.4	-	-	-	-	-	-	-	-	-	-	N/A
First Floor - Showers	0.7	-	-	-	-	-	-	-	-	-	-	N/A
Ground Floor - North WCs	0.6	-	-	-	-	-	-	-	-	-	-	N/A
Ground Floor - Staff Showers	0.6	-	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
Standard value		95	80	0.3
Ground Floor - Staff Area		105	-	-

General lighting and display lighting		Display light source	
Zone name	General luminaire	Efficacy [lm/W]	Power density [W/m ²]
Standard value	95	80	0.3
Ground Floor - Workshop	105	105	-
Ground Floor - Prep Kitchen	105	-	-
Ground Floor - G14 Stairs	105	-	-
First Floor - Office 1	105	-	-
First Floor - Staff Storage/Office	105	-	-
First Floor - Office 2	105	-	-
First Floor - Office 3	105	-	-
First Floor - Office 4	105	-	-
First Floor - WCs	105	-	-
Second Floor - Office	105	-	-
Second Floor - Stairs	105	-	-
First Floor - Hallway	105	-	-
Ground Floor - Staff WC	105	-	-
Ground Floor - Prep WCs	105	-	-
Ground Floor - Circulation	105	-	-
Ground Floor - Lobby Conservatory	105	-	-
Ground Floor - Washing Station	105	-	-
Ground Floor - Greenhouse	105	105	-
Ground Floor - Cloakroom	105	-	-
Ground Floor - Kitchen	105	-	-
First Floor - Showers	105	-	-
First Floor - Office 5	105	-	-
First Floor - F09 Office	105	-	-
Ground Floor - Greenhouse WC	105	-	-
Ground Floor - North WCs	105	-	-
Ground Floor - Store	105	-	-
Ground Floor - Staff Circulation	105	-	-
Ground Floor - Staff Showers	105	-	-
Ground Floor - Cafe	105	95	-
Ground Floor - Bar	105	95	-
Ground Floor - Stairs	105	-	-
Ground Floor - Staff Store	105	-	-

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?
Ground Floor - Staff Area	YES (+8%)	NO
Ground Floor - Workshop	NO (-19%)	NO
First Floor - Office 1	NO (-21%)	NO
First Floor - Staff Storage/Office	YES (+5%)	NO
First Floor - Office 2	YES (+12%)	NO
First Floor - Office 3	YES (+5%)	NO
First Floor - Office 4	YES (+11%)	NO
Second Floor - Office	NO (-30%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Ground Floor - Washing Station	NO (-68%)	NO
Ground Floor - Greenhouse	N/A	N/A
Ground Floor - Kitchen	YES (+354%)	NO
First Floor - Office 5	NO (-13%)	NO
First Floor - F09 Office	NO (-99%)	NO
Ground Floor - Cafe	YES (+15%)	NO
Ground Floor - Bar	NO (-32%)	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			Building Use	
	Actual	Notional	% Area	Building Type
Floor area [m ²]	790	790		Retail/Financial and Professional Services
External area [m ²]	3124	3124	67	Restaurants and Cafes/Drinking Establishments/Takeaways
Weather	LON	LON	33	Offices and Workshop Businesses
Infiltration [m ³ /hm ² @ 50Pa]	15	3		General Industrial and Special Industrial Groups
Average conductance [W/K]	5264	743		Storage or Distribution
Average U-value [W/m ² K]	1.69	0.24		Hotels
Alpha value* [%]	25.57	10.57		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
				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

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

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	195.77	25.25
Cooling	7.4	16.48
Auxiliary	15.36	8.02
Lighting	20.63	19.1
Hot water	60.84	64.82
Equipment*	109.96	109.96
TOTAL**	299.99	133.67

* 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	15.22
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>15.22</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	858.92	369.32
Primary energy [kWh _{PE} /m ²]	361.15	146.08
Total emissions [kg/m ²]	58.17	22.08

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] Natural Gas, [CFT] Electricity									
Actual	742.8	0	242.7	0	1.9	0.85	0	0.85	0
Notional	95.9	0	30.8	0	1.9	0.86	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	1382.6	0	451.8	0	1.5	0.85	0	0.85	0
Notional	183.6	0	59.3	0	1.7	0.86	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	1133	0	338.4	0	2.1	0.93	0	0.93	0
Notional	139.6	0	45.1	0	2.1	0.86	0	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	1537.7	0	459.3	0	2	0.93	0	0.93	0
Notional	190.6	0	61.6	0	2	0.86	0	----	----
[ST] Central heating using air distribution, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	51.9	438.5	15.5	33.8	70.6	0.93	3.6	0.93	3.6
Notional	0	1182.2	0	74.6	24.4	0	4.4	----	----
[ST] Split or multi-split system, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity									
Actual	651.5	25.9	72.4	2	0	2.5	3.6	2.5	3.6
Notional	36.1	82.1	3.8	5.2	0	2.64	4.4	----	----
[ST] Central heating using water: radiators, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	568.9	0	158	0	1.1	1	0	1	0
Notional	61.9	0	17.3	0	1.1	1	0	----	----

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

BRUKL Output Document



HM Government

Compliance with England Building Regulations Part L 2021

Project name

**The Stabes Borde Hill - Current Proposal
- Extension**

As designed

Date: Thu Jun 26 12:21:52 2025

Administrative information

Building Details

Address:

Certifier details

Name:

Telephone number:

Address: , ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.6"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.6

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

Foundation area [m²]: 277.44

The 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	33.92
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	32.16
Target primary energy rate (TPER), kWh _{FE} /m ² annum	217.98
Building primary energy rate (BPER), kWh _{FE} /m ² annum	217.96
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	1.71	2.06	External Wall Retained
Floors	0.18	0.71	1.07	Ground Floor
Pitched roofs	0.16	2.15	2.82	Roof Retained
Flat roofs	0.18	-	-	No flat roofs in project
Windows** and roof windows	1.6	3.68	5.68	Brasserie Cafe D1,2
Rooflights***	2.2	2.29	5.72	Teahouse Rooflight
Personnel doors^	1.6	5	5.61	West Door
Vehicle access & similar large doors	1.3	-	-	No vehicle access or similar large doors in project
High usage entrance doors	3	-	-	No high usage entrance doors in project
U _a -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)] * 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/m ² K 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*
* Buildings with less than 500 m ² total useful floor area may avoid the need for a pressure test provided that the air permeability used to calculate the BER and BPER is taken as 15 m ³ /(h.m ²) at 50 Pa.		

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	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- ASHP Nat Vent (Ground Floor - Greenhouse)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.5	3.6	-	-	-
Standard value	2.5*	3	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

2- ASHP Extract (Ground Floor - Greenhouse WC)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.93	-	-	-	-
Standard value	0.93*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.					

1- new boiler

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	0.93	0
Standard value	0.91	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			
Ground Floor - Greenhouse WC	0.4	-	-	-	-	-	-	-	-	-	-	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
Ground Floor - Staff Area		105	-	-

General lighting and display lighting		Display light source	
Zone name	General luminaire	Efficacy [lm/W]	Power density [W/m ²]
Standard value	95	80	0.3
Ground Floor - Workshop	105	105	-
Ground Floor - Prep Kitchen	105	-	-
Ground Floor - G14 Stairs	105	-	-
First Floor - Office 1	105	-	-
First Floor - Staff Storage/Office	105	-	-
First Floor - Office 2	105	-	-
First Floor - Office 3	105	-	-
First Floor - Office 4	105	-	-
First Floor - WCs	105	-	-
Second Floor - Office	105	-	-
Second Floor - Stairs	105	-	-
First Floor - Hallway	105	-	-
Ground Floor - Staff WC	105	-	-
Ground Floor - Prep WCs	105	-	-
Ground Floor - Circulation	105	-	-
Ground Floor - Lobby Conservatory	105	-	-
Ground Floor - Washing Station	105	-	-
Ground Floor - Greenhouse	105	105	-
Ground Floor - Cloakroom	105	-	-
Ground Floor - Kitchen	105	-	-
First Floor - Showers	105	-	-
First Floor - Office 5	105	-	-
First Floor - F09 Office	105	-	-
Ground Floor - Greenhouse WC	105	-	-
Ground Floor - North WCs	105	-	-
Ground Floor - Store	105	-	-
Ground Floor - Staff Circulation	105	-	-
Ground Floor - Staff Showers	105	-	-
Ground Floor - Cafe	105	95	-
Ground Floor - Bar	105	95	-
Ground Floor - Stairs	105	-	-
Ground Floor - Staff Store	105	-	-

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?
Ground Floor - Staff Area	YES (+8%)	NO
Ground Floor - Workshop	NO (-19%)	NO
First Floor - Office 1	NO (-21%)	NO
First Floor - Staff Storage/Office	YES (+5%)	NO
First Floor - Office 2	YES (+12%)	NO
First Floor - Office 3	YES (+5%)	NO
First Floor - Office 4	YES (+11%)	NO
Second Floor - Office	NO (-30%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Ground Floor - Washing Station	NO (-68%)	NO
Ground Floor - Greenhouse	YES (+489%)	NO
Ground Floor - Kitchen	YES (+50%)	NO
First Floor - Office 5	NO (-13%)	NO
First Floor - F09 Office	NO (-99%)	NO
Ground Floor - Cafe	YES (+40%)	NO
Ground Floor - Bar	NO (-43%)	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]	277	277
External area [m ²]	3124	3124
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	5264	599
Average U-value [W/m ² K]	1.69	0.19
Alpha value* [%]	25.57	10.57

* 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
100	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
	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	34.44	18.34
Cooling	23.73	13.65
Auxiliary	0.27	3.72
Lighting	12.72	18.46
Hot water	107.83	126.27
Equipment*	103.48	103.48
TOTAL**	178.99	180.43

* 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	4.81	2.02
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>4.81</i>	<i>2.02</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	619.6	385.78
Primary energy [kWh _{PE} /m ²]	217.96	217.98
Total emissions [kg/m ²]	32.16	33.92

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] Variable refrigerant flow, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity									
Actual	321.2	374.3	35.7	28.9	0	2.5	3.6	2.5	3.6
Notional	6.8	263.2	0.7	16.6	0	2.64	4.4	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	133.5	0	39.9	0	2.1	0.93	0	0.93	0
Notional	90.7	0	29.3	0	2.1	0.86	0	----	----

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