Energy Statement

Project: Beauchamps Cottage, Wyddial, SG9 0EP
Date: 13/12/2023

Contents

1. General

This energy statement has been prepared by SAPeasy Ltd. in support of the following planning application:

Application Reference:	3/21/0012/FUL
Application Site:	Beauchamps Cottage Wyddial Buntingford Hertfordshire SG9 0EP
Proposed Development:	Demolition of dwelling and construction of new dwelling with basement.

The statement provides an initial assessment of the energy requirements of the proposed development using approved standard calculation methods (SAP 10), reviews the various options for renewable technologies and demonstrates how the planning condition (see below) will be met by implementing appropriate fabric efficiency measures and renewable and/or low energy technologies.

1.1. Planning Condition

The following condition is to be discharged:

5) Prior to the completion of foundations , details of the design and construction of the dwelling to demonstrate how the design, materials and operation of the development minimises overheating in summer and reduces the need for heating in the winter to reduce energy demand and reduces water demand, shall be submitted to and approved in writing by the Local Planning Authority. The development shall thereafter be implemented in accordance with the approved details.

Reason: To adapt to climate change, reduce carbon emissions and efficiently use water resources in accordance with Policies DES4, CC1, CC2, CC3 and WAT4 of the East Herts District Plan 2018.

The planning condition requires adaptation to climate change, this will be covered over the following topics:

- Reducing energy demand / carbon emissions
- Reducing overheating
- Reducing water consumption

1.2. Development

The development involves the construction of a new dwelling. The dwelling will comprise 3.no bedrooms across 2 storeys, with a total floor area of approximately 282m^2.

Construction will be traditional, utilising concrete slab floors and cavity walls. The build will comprise a highly insulated fabric with high performance double glazing glazing. Space heating will be provided by an air source heat pump - all elements will meet the requirements of Approved Document L1 (2021) of the Building Regulations.

2. Energy demand / carbon emissions

The following section will detail how the dwelling is designed and operated in a way to reduce energy demand and subsequent carbon emissions.

2.1 Baseline Energy Demand

The baseline energy demand for this development was calculated as per the minimum requirements of Approved Document L1 (2021) of the Building Regulations. Results of which can be seen in the TER calculation sheet within the SAP documentation, and in the table below:

- Target Emission Rate (TER) = 6.96 kgCO_2/year/m^2
- Target Primary Energy Rate (TPER) = 37.58 kWh/m^2/year
- Target Fabric Energy Efficiency (TFEE) = 41.25 kWh/m^2/year

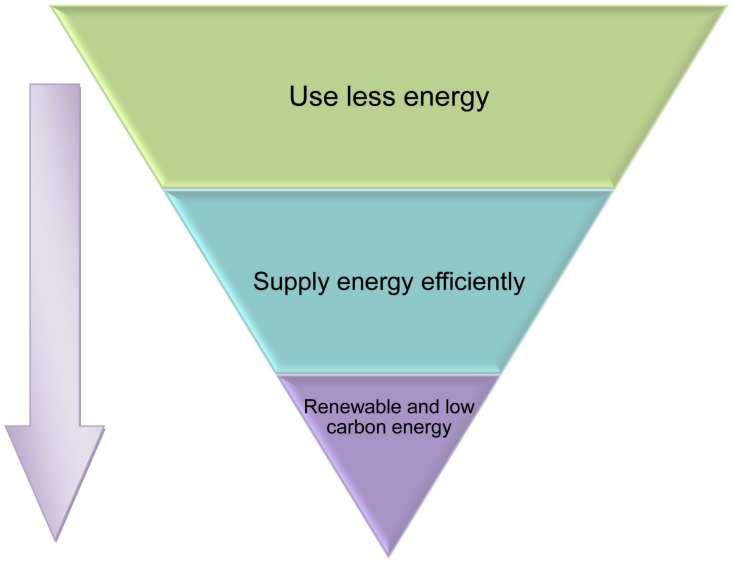
2.2 The Energy Hierarchy

The theory of the energy hierarchy is shown in the diagram below:

1 - Use less energy

2 - Supply energy efficiently

3 - Renewable and low carbon energy



Enhancing the thermal performance of the building envelope helps to future-proof the structure and yields the greatest CO_2 savings. Adding renewable technologies will then yield maximum emissions reductions with lower long-term costs for the developer.

2.2.1 Use Less Energy

The proposed development will incorporate efficient levels of insulation above the requirements of Approved Document L1 (2021) of the Building Regulations.

The table below is a summary of the proposed insulation specification for each element.

Element	U-value	Specification
Ground floor	0.11	Screed on 150mm PIR insulation on beam and block
Cavity Wall	0.15-0.17	Outer finish - either brick plinth or cladding on Celcon standard block, 150mm Dritherm 32 insulation, 100mm Celcon standard block inner leaf
Dormer wall	0.18	100mm PIR insulation in studs, 50mm PIR insulation internally lied
Raftered roof	0.16	100mm PIR insulation in rafters, 50mm PIR insulation internally lied (warm eaves spaces)
Joisted roof	0.11	400mm loft roll
Glazing	1.20	Low-E double glazed windows / glazed door units
Roof lights	1.60	Low-E double glazed roof windows units

where specific products are listed, an alternative with the same thermal conductivity (W/mK) may be used

Lintels	Thermally broken lintels - such as Keystone Hitherm
Thermal Bridging	Registered Construction Details
Air Tightness	Design air permeability rate = 5.00 $m^3h^1m^2$@50Pa

This specification ensures that the Dwelling Fabric Energy Efficiency (DFEE) is better than the Target Fabric Energy Efficiency (TFEE).

- TFEE = 41.25 kWh/m^2/year
- DFEE = 38.69 kWh/m^2/year
    - 6.19% variance

2.2.2 Supply Energy Efficiently

- Space heating will be provided via an air source heat pump
    - Mitsubishi Ecodan 14kw specified (it is advised to check any alternatives)
- Secondary heating via a wood burning stove
- Domestic hot water will be provided via an efficient cylinder
- Ventilation via intermittent extract fans - one in each kitchen and bathroom
- Lighting to be low energy throughout

This specification ensures that the Dwelling Primary Energy Rate (DPER) is better than the Target Primary Energy Rate (TPER)

- TPER = 37.58 kWh/m^2/year
- DPER = 35.86 kWh/m^2/year
    - 4.57% variance

2.2.3 Renewable And Low Carbon Energy

As mentioned above, the dwelling will be utilising an air source heat pump for space heating and hot water. These are considered to be low carbon technology, due to their extremely high efficiencies.

The inclusion of this meets the planning requirements. However, other options of renewable energy that could be implemented on this scheme include:

- Solar photovoltaic panels - these generate electricity. Due to the orientation of the dwelling, there are only East and West facing roofs, of which there are various roof windows and dormers. This means the amount of solar that could be installed is negligible, and the efficiency of these panels would be reduced due to the orientation.

- Solar thermal panels - these generate domestic hot water. Again, these could be installed on the West or East facing roof. However, space and orientation may be an issue.

2.3 Results

With the specification outlined above, the development is compliant with Approved Document L1 (2021) of the Building Regulations. The table below summaries these:

	Notional	Proposed	% Variance
Emissions (DER/TER)	6.96	3.47	50.14
Primary Energy (TPER/DPER)	37.58	35.86	4.57
Fabric Efficiency (TFEE/DFEE)	41.25	38.69	6.19

As the table shows, the carbon emissions for this particular dwelling are 50.14% lower than that of an equivalent dwelling built exactly to the requirements of Approved Document L1 (2021) of the Building Regulations.

The table below summarises the energy demand of the proposed dwelling:

Total Predicted Energy Demand	Space Heating Demand	Hot Water Demand	% of Total Demand Via Low Carbon Tech
6,481.65	4,154.50	1,873.30	92.99

As the table shows, the addition of an air source heat pump (which serves space heating and hot water), means 92.99% of the total predicted energy demand of this dwelling is served via a low carbon technology.

3. Overheating

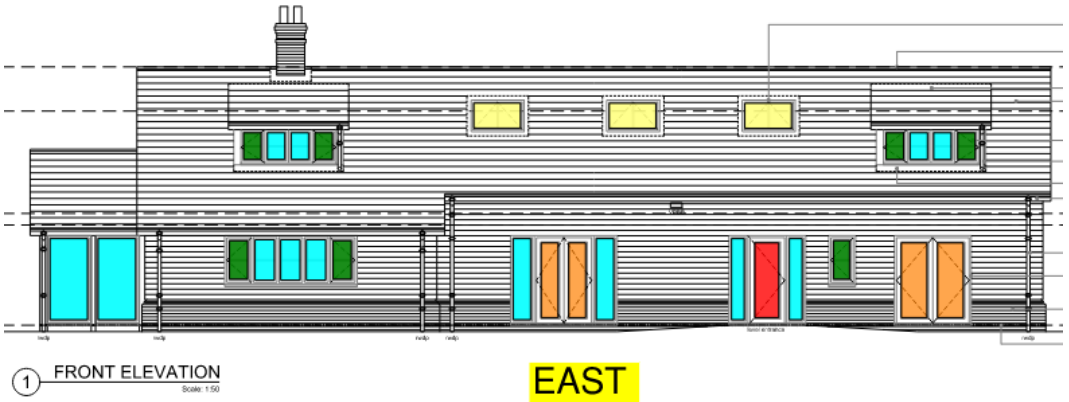
The following section will detail how the dwelling is designed in a way to reduce overheating in summer months. This is to ensure adaptation to climate change, in which drier, hotter summers are predicted.

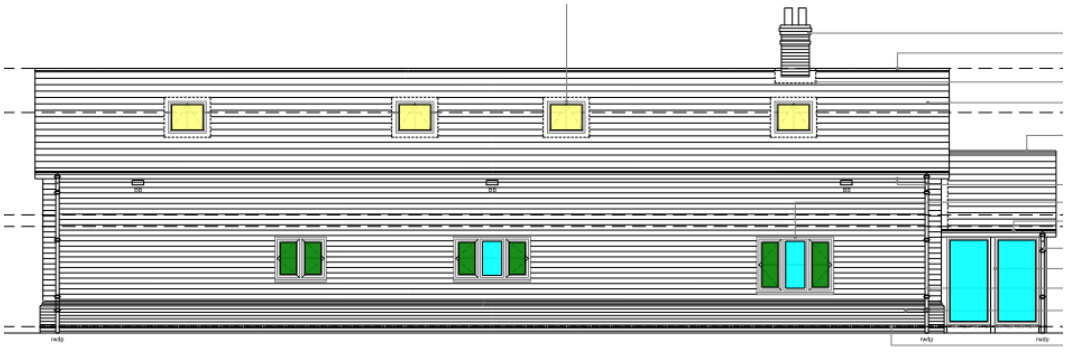
A simplified overheating assessment, inline with the requirements of Part O of the building regulations has been completed.

3.1 Property Details

The following drawings were used in this assessment:

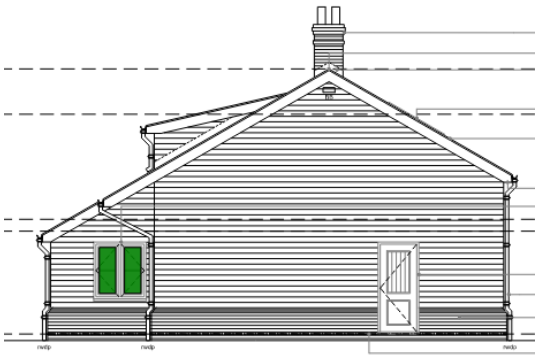
- **20683-W-005-1st**
- **20683-W-006-1st**





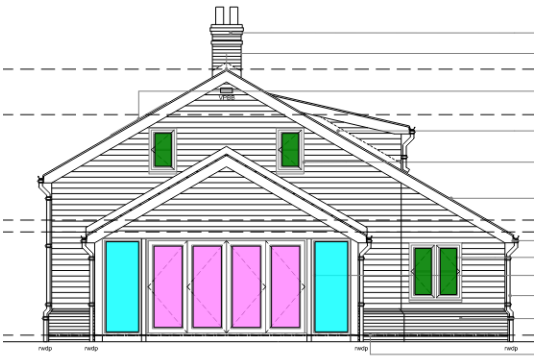
2 REAR ELEVATION

WEST



3 FLANK ELEVATION

NORTH



4 SIDE ELEVATION

SOUTH

The elevations above indicate the opening type:

- Blue = Fixed glazing
- Green = Side hung openable windows
- Orange = French doors
- Pink = Bifold doors
- Yellow = Openable roof windows

3.2 Results

The dwelling adheres to Section 1: limiting solar gains (i.e. not having too much glazed areas) and Section 2: removing excess heat (i.e. ensuring there is sufficient ventilation / openable windows).

Section 1: Limiting solar gains

	Target		Proposed	
	%	EQ m²	%	EQ m²
Maximum area of glazing[1] (% total floor area)	18%	50.68	14%	39.19
Maximum area of glazing in the most glazed room[1] (% floor area)	30%	21.11	27%	19.32

[1] **Glazing area** The area of transparent material, not including the window frame

Section 1: Maximum glazed area (pass/fail?)	**Pass**

Section 2: Removing excess heat

	Target Free Area		Proposed Equivalent Area	
	%	EQ m²	%	EQ m²
Total free area (% of the floor area)	9%	25.34	11%	30.00
Bedroom 1 (% room floor area)	4%	1.48	5%	1.72
Bedroom 2 (% room floor area)	4%	0.95	8%	1.79
Bedroom 3 (% room floor area)	4%	0.58	6%	0.81
Bedroom 4 (% room floor area)				
Bedroom 5 (% room floor area)				

Section 2: Minimum Free Area (pass/fail)	**Pass**

Limiting solar gains

Is this building high risk and shading strategy required?	No
Shading strategy included?	

4. Water Usage

In order to comply with Part G of the building regulations new homes must not exceed a water efficiency standard of 125 litres per person per day. However, planning condition 4 references WAT4 of the East Herts district plan, which requires a water efficiency to achieve a water standard of 110 litres per person per day.

The water consumption for this project has been calculated as per the standard calculation methodology issued by the DCLG which takes into account the dwelling's assumed occupancy and the number of fixtures/fittings and their associated water use.

4.1 Specification

The calculation has been based on the following fixtures / fittings and their corresponding water usage rates:

Fixture / Fitting	No. of Fittings	Water Usage
Basin Taps	5	5 litres per minute (or less)
Kitchen / Utility Tap	2	5 litres per minute (or less)
WCs	5	5 litres full flush, 3 litres part flush
Showers	4	8 litres per minute (or less)
Baths	1	180 litres to overflow
Washing Machine	1	(If supplied) - To use 6.50 litres per kg dry load
Dishwasher	1	(If supplied) - To use 0.90 litres per place setting

Notes

- *Water usage can be reduced further through the implementation of grey or rainwater harvesting.*

4.2 Results

The total predicted water consumption, is calculated as: 106.98 litres per person per day

Therefore, compliance with condition 4 is achieved.

Installation type	Unit of measure	Capacity/ flow rate	Use factor	Fixed use (litres/person/day)	Litres/person/day
WC (single flush)	Flush volume (litres)	0.00	4.42	0.00	0.00
WC (dual flush)	Full flush volume (litres)	5.00	1.46	0.00	7.30
	Part flush volume (litres)	3.00	2.96	0.00	8.88
WCs (multiple fittings)	Average effective flushing volume (litres)	0.00	4.42	0.00	0.00
Taps (excluding kitchen/utility room taps)	Flow rate (litres/minute)	5.00	1.58	1.58	9.48
Bath (where shower also present)	Capacity to overflow (litres)	180.00	0.11	0.00	19.80
Shower (where bath also present)	Flow rate (litres/minute)	8.00	4.37	0.00	34.96
Bath only	Capacity to overflow (litres)	0.00	0.50	0.00	0.00
Shower only	Flow rate (litres/minute)	0.00	5.60	0.00	0.00
Kitchen/utility room sink taps	Flow rate (litres/minute)	10.00	0.44	10.36	14.76
Washing machine	Litres/kg dry load	6.50	2.10	0.00	13.65
Dishwasher	Litres/place setting	0.90	3.60	0.00	3.24
Waste disposal unit	Litres/use	0.00	3.08	0.00	0.00
Water softener	Litres/person/day	0.00	1.00	0.00	0.00
	Total calculated use = (sum column (4))				112.07
	Contribution from greywater (litres/person/day) from table 4.6				0.00
	Contribution from rainwater (litres/person/day) from table 5.5				0.00
	Normalisation factor				0.91
	Total water consumption				101.98
	External water use (fixed)				5.00
	Total water consumption (litres/person/day)				106.98

PASS

5. Conclusion

The development makes every effort to reduce carbon emissions and predicted energy demand. The implementation of an air source heat pump means that 92.99% of the predicted energy demand is via a low carbon technology.

The dwelling will not overheat in summer - a simple overheating assessment, inline with the requirements of Approved Document L1 has been completed to ensure solar gains are limited, and there is sufficient cause to remove excess heat.

The installation of low water usage fixtures / fittings means that each flat will have a water usage rate of 106.98 litres per person per day. This exceeds the 110 litres per person per day requirement.

Therefore condition 7, is satisfied.