

SUSTAINABILITY & ENERGY EFFICIENCY STATEMENT

Client: Hill
Site Address: The Willows, Eynsham Road, Cassington.
Local Authority: West Oxfordshire District Council
Project Details: 1 new dwelling



PREPARED BY: AP CONSULTING ENGINEERS LTD
ELMHURST ACCREDITED ENERGY ASSESSOR 8075-0001
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BRE CODE FOR SUSTAINABLE HOMES ASSESSOR
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MAY 2023 REVISION [1]

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BACKGROUND

This statement has been prepared to support of a residential development comprising 1 new dwelling formed from change of use and associated external works in land located off Eynsham Road, Cassington in Oxfordshire.

AIMS & OBJECTIVES

This statement will demonstrate how the proposed development complies with policy CAS8 of the Neighbourhood plans and policies in the West Oxfordshire Local plan and meets the criteria set out in the sustainability standards checklist.

EXECUTIVE SUMMARY

This statement and associated energy and water calculation checklists demonstrate that the proposed development meets the requirements of the Council's policies.

1. SUSTAINABILITY CHECKLIST

Energy & carbon reduction		
Ref	Checklist criteria	Summary of approach to address the criteria
A1	Has the building fabric been designed to standards of ultra- low energy demand?	The proposed development achieves in excess of 60% reduction in CO ₂ emissions as set out by building regulations part L 2021. The dwelling EUI is <35kwh/m ² /yr <i>Refer to the energy calculations in appendix 1.</i>
A2	Has thermal comfort and the risk of overheating been assessed and passive design measures been prioritised?	The dwelling has been designed to limit solar gains and will be equipped with mechanical ventilation with heat recovery.
A3	Is the development fossil fuel free?	The dwelling incorporates air source heating
A4	Does the development achieve a net zero operational carbon balance and deliver 100% of energy consumption using renewables?	The proposed development provides 10% of the predicted site wide energy requirement from renewable sources. <i>Refer to the energy calculations on a page 5.</i>
A5	Have embodied carbon emissions been minimised?	<i>Refer to materials lifecycle summary table in appendix 2.</i>
C1	Will water consumption be minimised?	The calculated water consumption has been limited to less than 110L/person/day. <i>Refer to calculations in appendix 2.</i>
C2	Will water be conserved through rainwater harvesting or grey water recycling?	A rainwater harvesting system will be incorporated and will utilise rainwater for washing and toilet flushing
C3	Has the flood risk assessment accounted for climate change and sustainable drainage proposed?	The development is a conversion project so the no impact on the existing flood risk is anticipated.
D1	Is the construction company registered with the Considerate Construction Scheme?	The developer will be registered with a CCS
D2	Will a Site Waste Management Plan be followed and targets set for construction waste recycling and disposal?	A SWMP will be provided and followed throughout the construction phase.
D3	Will there be safe and convenient access for waste recycling?	The construction waste recycling strategy will be incorporated within the SWMP.

2. RESIDENTIAL ENERGY STRATEGY

Due to the design and layout of the dwellings the following renewable technologies have been assessed.

LZC option	Type	Suitability	Justification
1	Solar PV	Yes	Suitable roof area available & low visual impact
2	Solar hot water	No	Hot water demand of residential units is relatively low
3	GSHP	No	Limited space for ground source loops or boreholes
4	ASHP	Yes	Site suitable for heating plant
5	Biomass	No	Limited storage area for biomass fuels.

LZC CONCLUSIONS

Based on the above analysis the most suitable method of achieving the required energy contribution from renewable technologies for this development would be air source heating and solar PV.

RESIDENTIAL ENERGY RESULTS

Plot No	Space heating Kwh/yr	Water heating Kwh/yr	Pumps & fans Kwh/yr	Lighting Kwh/yr	Total Kwh/yr
1	3629.3	1571.6	436.2	290.6	5927.7

Note: Energy demand taken from calculated SAP calculation using section 12a and rounded to 2sf

Representative site wide energy consumption: = 5928 Kwh/yr

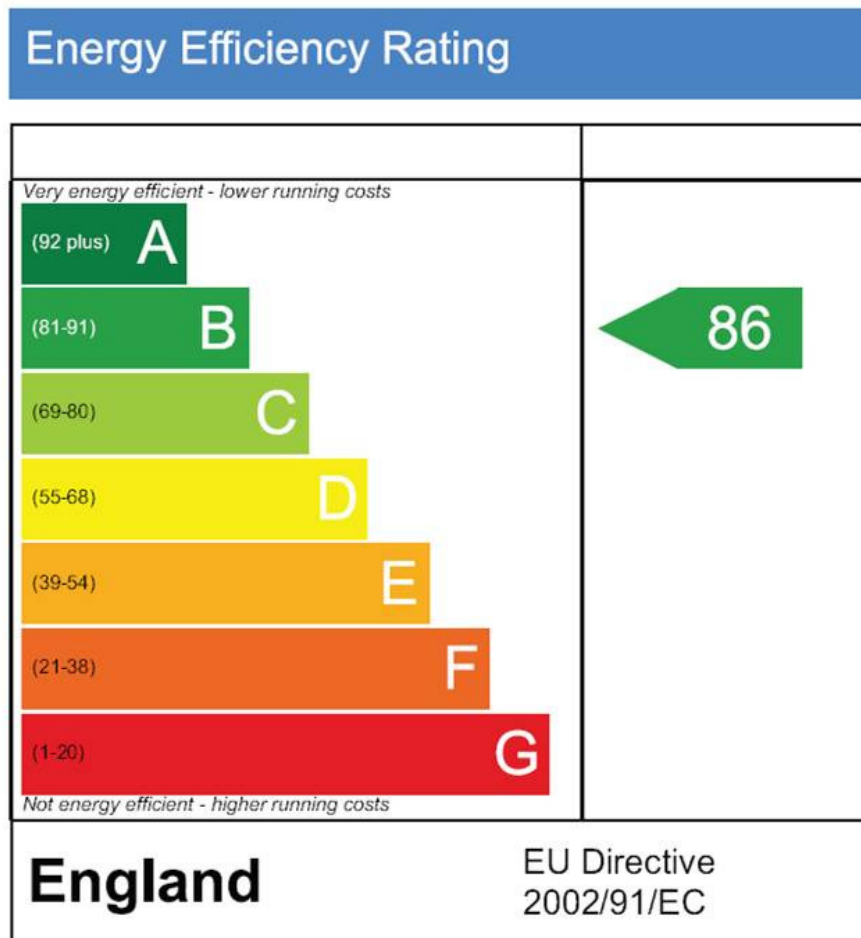
In order to provide a 100% contribution of the site wide annual energy consumption from renewable technology an additional 6.00kWp solar photovoltaic array with 10Kwh battery storage is proposed.

3. WATER CONSUMPTION RESULTS:

Internal water usage for each dwelling will be limited to 110L per person/day. This will be achieved by specifying the following:

Outlet	Target capacity
Toilet	Dual flush 6/3 L
Basin tap	5.00L/min
Kitchen/Utility tap	10.00L/min
Bath	170 L to overflow
Shower	9.00L/min
Washing machine	5.00L per kg dry load
Dishwasher	0.75L per place setting

4. PREDICTED ENERGY PERFORMANCE:



APPENDIX 1: ENERGY CALCULATIONS

Title	Calculation file reference	Key design features:		TER (Target) (CO ₂ /m ² /yr)	DER (CO ₂ /m ² /yr)
Proposed Building (built to Building Regulations 2021 Standards)	23.125	Wall U-value	0.18W/m ² k	19.29	3.14
		Floor U-value	0.12W/m ² k		
		Roof U-value	0.12W/m ² k		
		Window U-value	1.30W/m ² k		
		Door U-value	1.20W/m ² k		
		Air Permeability	4.00 m ³ /hr/m ² at Δ50Pa		
		Primary heating	Air source heat pump COP >3.5		
		Ventilation	System 4 MVHR (mechanical ventilation with heat recovery)		
		Thermal bridging	Registered details		
		Mechanical cooling	None		
		Renewables	None		

Note: Green cells indicate areas of improvement.

BRE approved methodology has been employed to undertake this part of the statement. The SAP 2021 calculations below demonstrate that the baseline DER (Dwelling Emission Rate) can be reduced by 83%.

APPENDIX 2

Aim:

In order to comply with this part of the “code” 3 of the 5 categories below are required to achieve an A+ to D rating:

- Roof Structure
- External walls
- Upper floor
- Internal walls
- Windows and doors

Results:

The table below demonstrates that the dwellings comply with the requirements.

Element	Summary rating	Climate change	Fossil fuel depletion	Ozone depletion	Freight transport	Human Toxicity	Waste disposal	Water extraction	Acid deposition	Ecotoxicity	Eutrophication	Summer smog	Mineral Extraction	Typical replacement interval	Recycled input	Recyclability	Currently recycled	Energy saved by recycling
Roof structure	B	A	A	A	A	A	A	B	A	A	B	A	A	50	B	A	A	A
Wall	A	A	A	A	A	A	B	B	A	A	A	A	A	35	A	A	A	A
Floor	C	A	A	A	A	C	C	C	A	A	B	A	C	60	C	A	A	A
Internal walls	A	A	A	A	A	A	A	A	A	A	A	C	A	60	A	B	B	B
Windows & doors	A	A	A	A	A	A	C	A	C	C	A	A	A	25	A	A	A	A



Job no:	23.125
Date:	10/05/2023
Assessor name:	Paul Allen
Registration no:	APCOE-12
Development name:	THE WILLOWS, CASSINGTON
Issue Date:	10/05/2023

Rainwater

Greywater

Results

WATER EFFICIENCY CALCULATOR FOR NEW DWELLINGS
 (for use with the Code for Sustainable Homes issues Wat 1 for the May 2009 and subsequent versions)

Dwelling Description	PLOT 1
-----------------------------	--------

1st step - Select from options below:

Is a Rain and/or Greywater system specified?	No	
Is a shower AND bath present?	Yes	
Has a washing machine been specified?	Yes	
Has a dishwasher been specified?	Yes	

2nd step - Build spreadsheet (click button below)

BUILD SPREADSHEET

As soon as this button is pressed the spreadsheet will change according to the options selected previously in the 1st step. Scroll down to see the changes.

3rd step - Enter consumption details for the specified fittings

TAPS <small>(excluding kitchen taps)</small>	Fitting type	Flow rate (litres/min)	Number of fittings
1	TARGET FLOW RATE	5.00	1
2			
3			
4			
Proportionate flow rate (litres/min)			3.50
Consumption / person / day (Litres)			9.48

BATHS		Fitting type	Capacity to overflow (litres)	Number of fittings
	1	TARGET CAPACITY	170.00	1
	2			
	3			
	4			
	Proportionate capacity to overflow (litres)			119.00
Consumption / person / day (Litres)			18.70	

SHOWERS		Fitting type	Flow rate (litres/min)	Number of fittings
	1	TARGET FLOW RATE	9.00	2
	2			
	3			
	4			
	Proportionate flow rate (litres/min)			6.30
Consumption / person / day (Litres)			39.33	

DISHWASHER		Fitting Type	Litres per place setting	Number of fittings
	1	TARGET CONSUMPTION	0.75	1
	2			
	3			
	4			
	Proportionate litres per place setting			0.53
Consumption / person / day (Litres)			2.70	

WASHING MACHINES		Fitting Type	Litres per kilogram of dry load	Number of fittings
	1	TARGET CONSUMPTION	5.00	1
	2			
	3			

4		
Where no washing machines have been specified but plumbing for future supply of grey/rainwater was installed, please enter details:		
	Proportionate of litres/kg of dry load	3.50
	Consumption / person / day (Litres)	10.50

WC's				
Fitting Type	Flush Type	Volume**	Number of fittings	
1	TARGET FLUSH	Full Flush	6.00	4
		Part Flush	3.00	
2		Full Flush		
		Part Flush		
3		Full Flush		
		Part Flush		
4		Full Flush		
		Part Flush		
Average effective flushing volume (litres)				3.99
Consumption / person / day (Litres)				17.64

KITCHEN SINK TAPS			
Fitting Type	Flow rate (litres/minute)	Number of fittings	
1	TARGET FLOW RATE	10.00	2
2			
3			
4			
Proportionate flow rate (litres/min)			7.00
Consumption / person / day (Litres)			14.76

WASTE DISPOSAL UNIT	
Is a waste disposal unit specified for the dwelling?	No
Consumption / person / day (Litres)	0.00

WATER SOFTENER	
Water Softener in use?	No
Total capacity used per regeneration (%)	

Water consumed per regeneration (litres)	
Average number of regeneration cycles per day (No.)	
Number of occupants served by the system (No.)	
Water consumed beyond 4% person / day (Litres)	0.00

4th step - Analyse Results [Go to Start](#)

INTERNAL WATER CONSUMPTION		
NET INTERNAL WATER CONSUMPTION	(litres/person/day)	113.11
RAINWATER ONLY COLLECTION SAVING	(litres/person/day)	0.00
GREYWATER ONLY RECYCLING SAVING	(litres/person/day)	0.00
RAIN/GREYWATER COLLECTION SAVING (combined system)	(litres/person/day)	0.00
NORMALISATION FACTOR	(litres/person/day)	0.91
TOTAL WATER CONSUMPTION	(litres/person/day)	102.9
CSH CREDITS ACHIEVED		3
CSH MANDATORY LEVEL:		Level 3/4

17. K COMPLIANCE		
EXTERNAL WATER USE	(litres / person / day)	5.00
TOTAL WATER CONSUMPTION	(litres / person / day)	107.9
17. K COMPLIANCE?		Yes

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PRINTING: before printing please make sure that in "Page Setup" you have selected the page to be as "Landscape" and that the Scale has been set up to 75% (maximum)

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Wed 10 May 2023 10:35:31

Project Information			
Assessed By	Paul Allen	Building Type	House, Detached
OCDEA Registration	EES/017061	Assessment Date	2023-05-10

Dwelling Details			
Assessment Type	As designed	Total Floor Area	138 m ²
Site Reference	COU	Plot Reference	PLOT 1
Address	The Willows Eynsham Road, Cassington, OX		

Client Details	
Name	Duncan Chadwick
Company	Chadwick Town Planning Limited
Address	7 Rectory Road, Hook Norton, Oxfordshire, Banbury, OX15 5QQ

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate			
Fuel for main heating system	Electricity		
Target carbon dioxide emission rate	19.29 kgCO ₂ /m ²		
Dwelling carbon dioxide emission rate	3.14 kgCO ₂ /m ²	OK	
1b Target primary energy rate and dwelling primary energy			
Target primary energy	104.94 kWh _{PE} /m ²		
Dwelling primary energy	31.56 kWh _{PE} /m ²	OK	
1c Target fabric energy efficiency and dwelling fabric energy efficiency			
Target fabric energy efficiency	100.1 kWh/m ²		
Dwelling fabric energy efficiency	95.6 kWh/m ²	OK	

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m ² K]	Dwelling average U-Value [W/m ² K]	Element with highest individual U-Value	
External walls	0.26	0.18	Walls (1) (0.18)	OK
Party walls	0.2	N/A	N/A	N/A
Curtain walls	1.6	N/A	N/A	N/A
Floors	0.18	0.12	Heatloss Floor 1 (0.12)	OK
Roofs	0.16	0.12	Roof (1) (0.12)	OK
Windows, doors, and roof windows	1.6	1.29	WDW FR (1.3)	OK
Rooflights	2.2	N/A	N/A	N/A

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))			
Name	Net area [m ²]	U-Value [W/m ² K]	
Exposed wall: Walls (1)	127.46	0.18	
Ground floor: Heatloss Floor 1, Heatloss Floor 1	1380.05	0.12	
Exposed roof: Roof (1)	140	0.12	

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
DOOR FR, SOLID DOOR	2.1	South West	N/A	1.2
WDW FR, WINDOW	13.38	South West	0.7	1.3
WDW RR, WINDOW	6.21	North East	0.7	1.3
WDW LH, WINDOW	6.33	North West	0.7	1.3
WDW RH, WINDOW	0.63	South East	0.7	1.3
DOOR RR, SOLID DOOR	1.89	North East	N/A	1.2

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part 1 - Main Dwelling: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E2: Other lintels (including other steel lintels)	Calculated by person with suitable expertise	0.215	CATNIC

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E3: Sill	Calculated by person with suitable expertise	0.018 (!)	SUPERGLASS 32
External wall	E4: Jamb	Calculated by person with suitable expertise	0.02 (!)	SUPERGLASS 32
External wall	E5: Ground floor (normal)	Calculated by person with suitable expertise	0.1	SUPERGLASS 32
External wall	E11: Eaves (insulation at rafter level)	Calculated by person with suitable expertise	0.008 (!)	SUPERGLASS 32
External wall	E13: Gable (insulation at rafter level)	Calculated by person with suitable expertise	0.087	KNAUF
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.048	SUPERGLASS 32
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	-0.06	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))

Maximum permitted air permeability at 50Pa	8 m ³ /hm ²	
Dwelling air permeability at 50Pa	4 m ³ /hm ² , Design value	OK
Air permeability test certificate reference		

4 Space heating

Main heating system 1: Heat pump with radiators or underfloor heating - Electricity

Efficiency	337.5%
Emitter type	Both radiators and underfloor
Flow temperature	45°C
System type	Heat Pump
Manufacturer	Vaillant Group UK Ltd
Model	flexoTHERM 8kW
Commissioning	

Secondary heating system: N/A

Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water

Cylinder/store - type: Cylinder

Capacity	210 litres
Declared heat loss	1.8 kWh/day
Primary pipework insulated	Yes
Manufacturer	
Model	
Commissioning	

Waste water heat recovery system 1 - type: N/A

Efficiency	
Manufacturer	
Model	

6 Controls

Main heating 1 - type: Time and temperature zone control by arrangement of plumbing and electrical services

Function	
Ecodesign class	
Manufacturer	
Model	

Water heating - type: Cylinder thermostat and HW separately timed

Manufacturer	
Model	

7 Lighting

Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	106.25 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	1.5 W/(l/s)	
Specific fan power	0.74 W/(l/s)	OK
Minimum permitted heat recovery efficiency	73%	
Heat recovery efficiency	89%	OK
Manufacturer/Model	Sentinel Kinetic Plus B	
Commissioning		
9 Local generation		
Technology type: Photovoltaic system (1)		
Peak power	5 kWp	
Orientation	South	
Pitch	30°	
Overshading	Modest	
Manufacturer		
MCS certificate		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		
12 Declarations		
a. Assessor Declaration		
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed:	Assessor ID:	
Name:	Date:	
b. Client Declaration		
N/A		