



elmhurst
energy



SAP Report Submission for Building Regulations Compliance

Client:

Project: Plot 131

Contact: Benjamin Wood
Benjamin Wood
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Report Issue Date: 15/03/2021

EXCELLENCE
IN ENERGY
ASSESSMENT

THERMAL BRIDGING

Calculation Type: New Build (As Designed)

Property Reference	007818 - Plot 131		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2328-Semi-MT	
Property	Plot 131			

SAP Rating	84 B	DER	17.35	TER	19.05
Environmental	87 B	% DER<TER	8.94		
CO ₂ Emissions (t/year)	1.07	DFEE	45.56	TFEE	53.32
General Requirements Compliance	Pass	% DFEE<TFEE	14.54		

Assessor Details	Mr. Paul Bainbridge, Paul Bainbridge, Tel: 01904 674890, paul.bainbridge@thefesgroup.com	Assessor ID	p717-0001
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Client	Larkfleet Group
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	Junction detail	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E2 Other lintels (including other steel lintels)	Independently assessed	0.040	10.07	0.40	
External wall	E3 Sill	Independently assessed	0.027	7.26	0.20	
External wall	E4 Jamb	Independently assessed	0.029	15.60	0.45	
External wall	E5 Ground floor (normal)	Independently assessed	0.049	24.60	1.21	
External wall	E6 Intermediate floor within a dwelling	Independently assessed	0.003	24.60	0.07	
External wall	E10 Eaves (insulation at ceiling level)	Independently assessed	0.083	9.25	0.77	
External wall	E12 Gable (insulation at ceiling level)	Independently assessed	0.054	8.05	0.43	
External wall	E16 Corner (normal)	Independently assessed	0.050	9.99	0.50	
External wall	E18 Party wall between dwellings	Table K1 - Default	0.120	9.99	1.20	
Party wall	P1 Party wall - Ground floor	Table K1 - Default	0.160	8.05	1.29	
Party wall	P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	0.000	8.05	0.00	
Party wall	P4 Party wall - Roof (insulation at ceiling level)	Table K1 - Default	0.240	8.05	1.93	

Total: **8.45** W/mK:
 Y-Value: **0.053** W/m²K:

FULL SAP CALCULATION PRINTOUT

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REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

DWELLING AS DESIGNED

Semi-Detached House, total floor area 74 m²

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

1a TER and DER

Fuel for main heating:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 19.05 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 17.35 kgCO₂/m²OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)53.3 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)45.6 kWh/m²/yrOK

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.24 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.14 (max. 0.25)	0.14 (max. 0.70)	OK
Roof	0.09 (max. 0.20)	0.09 (max. 0.35)	OK
Openings	1.22 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals: 5.00 (design value)
Maximum 10.0 OK

4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas

Data from database

Vaillant ecoFIT sustain 830 VUW 306/6-3 (H-GB)

Combi boiler

Efficiency: 89.3% SEDBUK2009

Minimum: 88.0% OK

Secondary heating system:

None

5 Cylinder insulation

Hot water storage No cylinder

6 Controls

Space heating controls: Time and temperature zone control OK

Hot water controls:

No cylinder

Boiler interlock

Yes

OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%

Minimum 75% OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Thames Valley): Not significant OK

Based on:

Overshading:

Average

Windows facing North East: 1.76 m², No overhang

Windows facing South East: 6.66 m², No overhang

Windows facing North West: 3.80 m², No overhang

Air change rate: 8.00 ach

Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m²K

Roof U-value 0.09 W/m²K

Door U-value 1.00 W/m²K

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
 CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

1. Overall dwelling dimensions

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	37.2100 (1b)	2.3900 (2b)	88.9319 (1b) - (3b)
First floor	37.2100 (1c)	2.6000 (2c)	96.7460 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4200		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 185.6779 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour							
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)							
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)							
Number of intermittent fans				3 * 10 =	30.0000 (7a)							
Number of passive vents				0 * 10 =	0.0000 (7b)							
Number of flueless gas fires				0 * 40 =	0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c)				30.0000 / (5) =	0.1616 (8)							
Pressure test					Yes							
Measured/design AP50					5.0000							
Infiltration rate					0.4116 (18)							
Number of sides sheltered					2 (19)							
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)							
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3498 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4460	0.4373	0.4285	0.3848	0.3761	0.3323	0.3323	0.3236	0.3498	0.3761	0.3936	0.4111 (22b)
Effective ac	0.5995	0.5956	0.5918	0.5740	0.5707	0.5552	0.5552	0.5524	0.5612	0.5707	0.5774	0.5845 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Half Glazed Door			2.1000	1.0000	2.1000		(26a)
Windows (Uw = 1.20)			8.4400	1.1450	9.6641		(27)
Patio Door (Uw = 1.40)			3.7800	1.3258	5.0114		(27)
Ground Floor			37.2100	0.1400	5.2094	75.0000	2790.7500 (28a)
External Wall	86.3900	14.3200	72.0700	0.2400	17.2968	60.0000	4324.2000 (29a)
Cold Roof	37.2100		37.2100	0.0900	3.3489	9.0000	334.8900 (30)
Total net area of external elements Aum(A, m2)			160.8100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	42.6306		(33)
Party Wall 1			40.1900	0.0000	0.0000	45.0000	1808.5500 (32)
GF			58.1200			9.0000	523.0800 (32c)
FF			85.6400			9.0000	770.7600 (32c)
FF			37.2100			18.0000	669.7800 (32d)
GF			37.2100			18.0000	669.7800 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	11891.7900 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							159.7929 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.4512 (36)
Total fabric heat loss						(33) + (36) =	51.0818 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	36.7321	36.4954	36.2634	35.1737	34.9698	34.0207	34.0207	33.8450	34.3863	34.9698	35.3823	35.8135 (38)
Average = Sum(39)m / 12 =	87.8138	87.5772	87.3452	86.2555	86.0516	85.1025	85.1025	84.9267	85.4681	86.0516	86.4640	86.8952 (39)
HLP	1.1800	1.1768	1.1737	1.1590	1.1563	1.1435	1.1435	1.1412	1.1485	1.1563	1.1618	1.1676 (40)
HLP (average)												1.1590 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.3485 (42)
Average daily hot water use (litres/day)												89.9765 (43)
Daily hot water use	98.9741	95.3751	91.7760	88.1770	84.5779	80.9788	80.9788	84.5779	88.1770	91.7760	95.3751	98.9741 (44)
Energy conte	146.7758	128.3710	132.4674	115.4883	110.8138	95.6239	88.6096	101.6808	102.8952	119.9144	130.8959	142.1445 (45)

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy content (annual)												Total = Sum(45)m =	1415.6806 (45)
Distribution loss (46)m = 0.15 x (45)m													
	22.0164	19.2557	19.8701	17.3232	16.6221	14.3436	13.2914	15.2521	15.4343	17.9872	19.6344	21.3217	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	1.6706	1.4080	1.3981	1.1711	1.0778	0.8905	0.8252	0.9890	1.0434	1.2656	1.4357	1.6179	(61)
Total heat required for water heating calculated for each month	148.4464	129.7790	133.8655	116.6594	111.8916	96.5144	89.4348	102.6698	103.9386	121.1800	132.3316	143.7624	(62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63)
Solar input (sum of months) = Sum(63)m =												0.0000 (63)	
Output from w/h	148.4464	129.7790	133.8655	116.6594	111.8916	96.5144	89.4348	102.6698	103.9386	121.1800	132.3316	143.7624	(64)
Total per year (kWh/year) = Sum(64)m =												1430.4735 (64)	
Heat gains from water heating, kWh/month	49.2206	43.0354	44.3949	38.6926	37.1150	32.0176	29.6690	34.0561	34.4735	40.1879	43.8818	47.6675	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(66)
	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.1919	17.0461	13.8628	10.4950	7.8452	6.6232	7.1566	9.3025	12.4857	15.8535	18.5034	19.7253	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	207.3859	209.5379	204.1149	192.5700	177.9965	164.2996	155.1492	152.9971	158.4201	169.9651	184.5385	198.2355	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.7424	34.7424	34.7424	34.7424	34.7424	34.7424	34.7424	34.7424	34.7424	34.7424	34.7424	34.7424	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-93.9394	-93.9394	-93.9394	-93.9394	-93.9394	-93.9394	-93.9394	-93.9394	-93.9394	-93.9394	-93.9394	-93.9394	(71)
Water heating gains (Table 5)	66.1567	64.0407	59.6706	53.7398	49.8858	44.4688	39.8777	45.7743	47.8799	54.0160	60.9470	64.0693	(72)
Total internal gains	353.9618	351.8520	338.8756	318.0320	296.9548	276.6189	263.4107	269.3012	280.0130	301.0619	325.2161	343.2573	(73)

6. Solar gains

[Jan]	Area		Solar flux		g		FF		Access		Gains	
	m2		Table 6a		Specific data		Specific data		factor		W	
			W/m2		or Table 6b		or Table 6c		Table 6d			
Northeast	1.7600		11.2829		0.6300		0.7000		0.7700		6.0689 (75)	
Southeast	2.8800		36.7938		0.6300		0.7000		0.7700		32.3847 (77)	
Northwest	3.8000		11.2829		0.6300		0.7000		0.7700		13.1032 (81)	
Southeast	3.7800		36.7938		0.6300		0.7000		0.7700		42.5049 (77)	
Solar gains	94.0616	166.5899	244.8506	331.7339	397.4482	405.9572	386.6489	335.8828	274.6645	188.6780	113.8238	79.7467 (83)
Total gains	448.0234	518.4419	583.7262	649.7660	694.4030	682.5761	650.0596	605.1840	554.6775	489.7399	439.0400	423.0040 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	37.6168	37.7185	37.8186	38.2964	38.3871	38.8153	38.8153	38.8956	38.6492	38.3871	38.2040	38.0145
alpha	3.5078	3.5146	3.5212	3.5531	3.5591	3.5877	3.5877	3.5930	3.5766	3.5591	3.5469	3.5343
util living area	0.9891	0.9810	0.9637	0.9208	0.8324	0.6867	0.5394	0.5907	0.8048	0.9434	0.9820	0.9911 (86)
MIT	19.2069	19.4193	19.7645	20.2154	20.6082	20.8657	20.9578	20.9413	20.7468	20.2369	19.6433	19.1709 (87)
Th 2	19.9361	19.9386	19.9411	19.9529	19.9551	19.9654	19.9654	19.9673	19.9615	19.9551	19.9507	19.9460 (88)
util rest of house	0.9867	0.9768	0.9552	0.9012	0.7894	0.6068	0.4273	0.4789	0.7401	0.9255	0.9772	0.9890 (89)
MIT 2	17.5467	17.8565	18.3565	19.0040	19.5364	19.8555	19.9430	19.9333	19.7274	19.0469	18.1921	17.5006 (90)
Living area fraction												fLA = Living area / (4) = 0.3265 (91)
MIT	18.0888	18.3668	18.8162	19.3995	19.8864	20.1854	20.2744	20.2624	20.0603	19.4354	18.6659	18.0460 (92)
Temperature adjustment												-0.1500
adjusted MIT	17.9388	18.2168	18.6662	19.2495	19.7364	20.0354	20.1244	20.1124	19.9103	19.2854	18.5159	17.8960 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9799	0.9670	0.9414	0.8849	0.7790	0.6127	0.4454	0.4957	0.7364	0.9104	0.9678	0.9832 (94)
Useful gains	439.0066	501.3326	549.5395	574.9509	540.9726	418.2035	289.5622	300.0133	408.4610	445.8504	424.9130	415.8943 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1197.6742	1166.2465	1062.6623	892.7029	691.5436	462.5635	299.9317	315.2840	496.5955	747.3966	987.0685	1190.1150 (97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh	564.4488	446.8221	381.7633	228.7814	112.0248	0.0000	0.0000	0.0000	0.0000	224.3504	404.7519	576.0203 (98)
Space heating												2938.9629 (98)
Space heating per m2												(98) / (4) = 39.4916 (99)

FULL SAP CALCULATION PRINTOUT

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

8c. Space cooling requirement

Not applicable

9a. Energy requirements - Individual heating systems, including micro-CHP

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.2000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3258.2737 (211)
Space heating requirement	564.4488	446.8221	381.7633	228.7814	112.0248	0.0000	0.0000	0.0000	0.0000	224.3504	404.7519	576.0203	(98)
Space heating efficiency (main heating system 1)	90.2000	90.2000	90.2000	90.2000	90.2000	0.0000	0.0000	0.0000	0.0000	90.2000	90.2000	90.2000	(210)
Space heating fuel (main heating system)	625.7747	495.3682	423.2409	253.6380	124.1960	0.0000	0.0000	0.0000	0.0000	248.7255	448.7272	638.6034	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	148.4464	129.7790	133.8655	116.6594	111.8916	96.5144	89.4348	102.6698	103.9386	121.1800	132.3316	143.7624	(64)
Efficiency of water heater (217)m	86.8763	86.6181	86.0935	84.9303	82.6152	76.2000	76.2000	76.2000	76.2000	84.7398	86.2936	76.2000	(216)
Fuel for water heating, kWh/month	170.8710	149.8290	155.4886	137.3589	135.4371	126.6593	117.3684	134.7372	136.4023	143.0024	153.3504	165.2305	(219)
Water heating fuel used													1725.7351 (219)
Annual totals kWh/year													
Space heating fuel - main system													3258.2737 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													75.0000 (231)
Electricity for lighting (calculated in Appendix L)													338.9354 (232)
Total delivered energy for all uses													5397.9442 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3258.2737	0.2160	703.7871	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1725.7351	0.2160	372.7588	(264)
Space and water heating			1076.5459	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	338.9354	0.5190	175.9074	(268)
Total CO2, kg/year			1291.3784	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			17.3500	(273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

	TFA	N	EF	
DER				17.3500 ZC1
Total Floor Area				74.4200
Assumed number of occupants				2.3485
CO2 emission factor in Table 12 for electricity displaced from grid				0.5190
CO2 emissions from appliances, equation (L14)				16.5134 ZC2
CO2 emissions from cooking, equation (L16)				2.3564 ZC3
Total CO2 emissions				36.2198 ZC4
Residual CO2 emissions offset from biofuel CHP				0.0000 ZC5
Additional allowable electricity generation, kWh/m ² /year				0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation				0.0000 ZC7
Net CO2 emissions				36.2198 ZC8

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
 CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	37.2100 (1b)	2.3900 (2b)	88.9319 (1b) - (3b)
First floor	37.2100 (1c)	2.6000 (2c)	96.7460 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.4200		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 185.6779 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour							
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)							
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)							
Number of intermittent fans				3 * 10 =	30.0000 (7a)							
Number of passive vents				0 * 10 =	0.0000 (7b)							
Number of flueless gas fires				0 * 40 =	0.0000 (7c)							
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				30.0000 / (5) =	0.1616 (8)							
Pressure test					Yes							
Measured/design AP50					5.0000							
Infiltration rate					0.4116 (18)							
Number of sides sheltered					2 (19)							
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)							
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3498 (21)							
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4460	0.4373	0.4285	0.3848	0.3761	0.3323	0.3323	0.3236	0.3498	0.3761	0.3936	0.4111 (22b)
Effective ac	0.5995	0.5956	0.5918	0.5740	0.5707	0.5552	0.5552	0.5524	0.5612	0.5707	0.5774	0.5845 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K					
TER Semi-glazed door			2.1000	1.2000	2.5200		(26a)					
TER Opening Type (Uw = 1.40)			12.2200	1.3258	16.2008		(27)					
Ground Floor			37.2100	0.1300	4.8373		(28a)					
External Wall	86.3900	14.3200	72.0700	0.1800	12.9726		(29a)					
Cold Roof	37.2100		37.2100	0.1300	4.8373		(30)					
Total net area of external elements Aum(A, m ²)			160.8100				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	41.3680	(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.7290 (36)					
Total fabric heat loss							(33) + (36) = 51.0970 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 36.7321	Feb 36.4954	Mar 36.2634	Apr 35.1737	May 34.9698	Jun 34.0207	Jul 34.0207	Aug 33.8450	Sep 34.3863	Oct 34.9698	Nov 35.3823	Dec 35.8135 (38)
Heat transfer coeff	87.8290	87.5924	87.3604	86.2707	86.0668	85.1177	85.1177	84.9419	85.4833	86.0668	86.4792	86.9104 (39)
Average = Sum(39)m / 12 =												86.2697 (39)
HLP	Jan 1.1802	Feb 1.1770	Mar 1.1739	Apr 1.1592	May 1.1565	Jun 1.1437	Jul 1.1437	Aug 1.1414	Sep 1.1487	Oct 1.1565	Nov 1.1620	Dec 1.1678 (40)
HLP (average)												1.1592 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.3485 (42)
Average daily hot water use (litres/day)												89.9765 (43)
Daily hot water use	98.9741	95.3751	91.7760	88.1770	84.5779	80.9788	80.9788	84.5779	88.1770	91.7760	95.3751	98.9741 (44)
Energy conte	146.7758	128.3710	132.4674	115.4883	110.8138	95.6239	88.6096	101.6808	102.8952	119.9144	130.8959	142.1445 (45)
Energy content (annual)												Total = Sum(45)m = 1415.6806 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	22.0164	19.2557	19.8701	17.3232	16.6221	14.3436	13.2914	15.2521	15.4343	17.9872	19.6344	21.3217 (46)
Total storage loss:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

CALCULATION OF TARGET EMISSIONS 09 Jan 2014

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													93.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3262.0555 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	599.9510	471.3430	394.9681	222.7968	93.2254	0.0000	0.0000	0.0000	0.0000	224.8728	426.7367	612.8660	(98)
Space heating efficiency (main heating system 1)	93.4000	93.4000	93.4000	93.4000	93.4000	0.0000	0.0000	0.0000	0.0000	93.4000	93.4000	93.4000	(210)
Space heating fuel (main heating system)	642.3459	504.6499	422.8780	238.5405	99.8130	0.0000	0.0000	0.0000	0.0000	240.7632	456.8915	656.1734	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	197.2119	172.2697	179.2355	158.9728	153.9138	135.5586	129.8755	144.7808	146.3797	166.6825	177.9302	192.5807	(64)
Efficiency of water heater (217)m	87.6719	87.4557	86.9849	85.9009	83.8331	80.3000	80.3000	80.3000	80.3000	85.8057	87.1736	80.3000	(216)
Fuel for water heating, kWh/month	224.9430	196.9794	206.0536	185.0654	183.5954	168.8152	161.7379	180.2998	182.2910	194.2557	204.1103	219.4383	(219)
Water heating fuel used													2307.5850 (219)
Annual totals kWh/year													
Space heating fuel - main system													3262.0555 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													75.0000 (231)
Electricity for lighting (calculated in Appendix L)													338.9354 (232)
Total delivered energy for all uses													5983.5758 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3262.0555	0.2160	704.6040 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2307.5850	0.2160	498.4384 (264)
Space and water heating			1203.0423 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	338.9354	0.5190	175.9074 (268)
Total CO2, kg/m2/year			1417.8748 (272)
Emissions per m2 for space and water heating			16.1656 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.3637 (272b)
Emissions per m2 for pumps and fans			0.5230 (272c)
Target Carbon Dioxide Emission Rate (TER) = (16.1656 * 1.00) + 2.3637 + 0.5230, rounded to 2 d.p.			19.0500 (273)

U-VALUE CALCULATOR REPORT

Property Reference	007818 - Plot 131		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2328-Semi-MT	
Project	Plot 131			
Calculation Type	New Build (As Designed)			

SAP Rating	84 B	DER	17.35	TER	19.05
Environmental	87 B	% DER<TER	8.94		
CO ₂ Emissions (t/year)	1.07	DFEE	45.56	TFEE	53.32
General Requirements Compliance	Pass	% DFEE<TFEE	14.54		

Assessor Details	Mr. Paul Bainbridge, Paul Bainbridge, Tel: 01904 674890, paul.bainbridge@thefesgroup.com	Assessor ID	p717-0001
Client	Larkfleet Group		

Building Elements

Roof 007818 - Cold Roof

Roof Type: Pitched Roof, insulated flat ceiling

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)
Ext surface				0.0400	
Layer 1	Standard cavity Main construction Corrections - Cavity Unventilated, Emissivity: Normal	50	0.3125	0.1600	100.00
Layer 2	Crown Loft Roll 40 Main construction Corrections - Air Gap: Level 1, Fasteners: None or plastic	150	0.0400	3.7500	100.00
Layer 3	Crown Loft Roll 40 Main construction Corrections - Air Gap: Level 1, Fasteners: None or plastic	150	0.0400	3.7500	100.00
Layer 4	Crown Loft Roll 40 Main construction Corrections - Air Gap: Level 1, Fasteners: None or plastic	150	0.0400	3.7500	100.00
Layer 5	Plasterboard, standard Main construction	12.5	0.2100	0.0595	100.00
Int surface				0.1000	

Total resistance: Upper limit = 11.610 m² K/W Lower limit = 11.610 m² K/W Average = 11.610 m² K/W
 Total correction = 0.0031 m² K/W U-value (unrounded) = 0.09 W/m² K

Unheated space:	None
Total thickness: 513 mm	U-value: 0.09 W/m² K
	Kappa: n/a

U-VALUE CALCULATOR REPORT

Property Reference	007818 - Plot 131		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2328-Semi-MT	
Project	Plot 131			
Calculation Type	New Build (As Designed)			

SAP Rating	84 B	DER	17.35	TER	19.05
Environmental	87 B	% DER<TER	8.94		
CO ₂ Emissions (t/year)	1.07	DFEE	45.56	TFEE	53.32
General Requirements Compliance	Pass	% DFEE<TFEE	14.54		

Assessor Details	Mr. Paul Bainbridge, Paul Bainbridge, Tel: 01904 674890, paul.bainbridge@thefesgroup.com	Assessor ID	p717-0001
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Client	Larkfleet Group
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Building Elements

Wall 007818 - External Wall

Wall Type: Standard Wall

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)
Ext surface				0.0400	
Layer 1	Brick, outer leaf				
	Main construction	100	0.7700	0.1299	82.81
	Main construction	100	0.9407	0.1063	17.19
Layer 2	URSA Cavity BATT 32				
	Main construction	100	0.0320	3.1250	100.00
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 3	Thermalite Shield				
	Main construction	100	0.1500	0.6667	93.43
	Main construction	100	0.8803	0.1136	6.57
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 4	airspace/plaster dabs				
	Main construction	15	0.0882	0.1700	80.00
	Main construction	15	0.0882	0.1700	20.00
	Corrections - Cavity Unventilated, Emissivity: Normal				
Layer 5	Plasterboard, standard				
	Main construction	12.5	0.2100	0.0595	100.00
Int surface				0.1300	

Total resistance:	Upper limit = 4.276 m ² K/W	Lower limit = 4.155 m ² K/W	Average = 4.215 m ² K/W
	Total correction = 0.0056 m ² K/W	U-value (unrounded) = 0.24 W/m ² K	

Unheated space: None

Total thickness: 328 mm

U-value: 0.24 W/m² K

Kappa: n/a

U-VALUE CALCULATOR REPORT

Property Reference	007818 - Plot 131		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2328-Semi-MT	
Project	Plot 131			
Calculation Type	New Build (As Designed)			

SAP Rating	84 B	DER	17.35	TER	19.05
Environmental	87 B	% DER<TER	8.94		
CO ₂ Emissions (t/year)	1.07	DFEE	45.56	TFEE	53.32
General Requirements Compliance	Pass	% DFEE<TFEE	14.54		

Assessor Details	Mr. Paul Bainbridge, Paul Bainbridge, Tel: 01904 674890, paul.bainbridge@thefesgroup.com	Assessor ID	p717-0001
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Client	Larkfleet Group
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Building Elements

Floor 007818 - Ground Floor

Floor Type: Suspended Floor

Area = 37.21 m², Perimeter = 17.30 m, Wall thickness = 275.00 mm, Soil: Unknown

Depth of underfloor space below ground: 0.200 m Floor wind shielding: Average (suburban)

Floor height above ground: h = 0.200 m

U-value of walls above ground: U_w = 1.500 m

Ventilation openings per perimeter length: e = 0.0015 %

Mean wind speed: v = 5.000 m/s

Resistance on solum: R_g = 0.000 m²K/W

Layer	Description	Thickness (mm)	Conductivity (W/m ² K)	Resistance (m ² K/W)	Fraction (%)
Ext surface				0.1700	
Layer 1	Standard cavity				
	Main construction	50	0.2381	0.2100	50.00
	Main construction	50	1.3500	0.0370	50.00
	Corrections - Cavity Unventilated, Emissivity: Normal				
Layer 2	Blockwork, dense				
	Main construction	100	1.5900	0.0629	77.78
	Main construction	100	1.3500	0.0741	22.22
Layer 3	Celotex XR4000				
	Main construction	120	0.0220	5.4545	100.00
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 4	Screed				
	Main construction	75	1.1500	0.0652	100.00
Int surface				0.1700	

Total resistance: Upper limit = 6.047 m² K/W Lower limit = 5.988 m² K/W Average = 6.018 m² K/W

Total correction = 0.0082 m² K/W

U-value (unrounded) = 0.14 W/m² K

Unheated space: None

Total thickness: 345 mm

U-value: 0.14 W/m² K

Kappa: n/a

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Property Reference	007818 - Plot 131	Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2328-Semi-MT
Property	Plot 131		

SAP Rating	84 B	DER	17.35	TER	19.05
Environmental	87 B	% DER<TER	8.94		
CO₂ Emissions (t/year)	1.07	DFEE	45.56	TFEE	53.32
General Requirements Compliance	Pass	% DFEE<TFEE	14.54		

Assessor Details	Mr. Paul Bainbridge, Paul Bainbridge, Tel: 01904 674890, paul.bainbridge@thefesgroup.com	Assessor ID	p717-0001
Client	Larkfleet Group		

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	19.05	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	17.35	kgCO ₂ /m ²	Pass
	-1.70 (-8.9%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	53.32	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	45.56	kWh/m ² /yr	
	-7.7 (-14.4%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.24 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.14 (max. 0.25)	0.14 (max. 0.70)	Pass
Roof	0.09 (max. 0.20)	0.09 (max. 0.35)	Pass
Openings	1.22 (max. 2.00)	1.40 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	5.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Main heating system

Boiler system with radiators or underfloor - Mains gas
Data from database
Vaillant ecoFIT sustain 830 VUW 306/6-3 (H-GB)
Combi boiler
Efficiency: 89.3% SEDBUK2009
Minimum: 88.0%

Pass

Secondary heating system

None

5 Cylinder insulation

Hot water storage

No cylinder

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

8 Mechanical ventilation

Not applicable

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (Thames Valley)

Not significant

Pass

Based on:

Overshading

Average

Windows facing North East

1.76 m², No overhang

Windows facing South East

6.66 m², No overhang

Windows facing North West

3.80 m², No overhang

Air change rate

8.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

Maximum

10.0

Pass

10 Key features

Party wall U-value

0.00

W/m²K

Roof U-value

0.09

W/m²K

Door U-value

1.00

W/m²K

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Property Reference	007818 - Plot 131		Issued on Date	15/03/2021	
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2328-Semi-MT		
Property	Plot 131				
SAP Rating	84 B	DER	17.35	TER	19.05
Environmental	87 B	% DER<TER	8.94		
CO ₂ Emissions (t/year)	1.07	DFEE	45.56	TFEE	53.32
General Requirements Compliance	Pass	% DFEE<TFEE	14.54		
Assessor Details	Mr. Paul Bainbridge, Paul Bainbridge, Tel: 01904 674890, paul.bainbridge@thefesgroup.com			Assessor ID	p717-0001
Client	Larkfleet Group				

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North West
Property Tenure	Unknown
Transaction Type	New dwelling
Terrain Type	Suburban
1.0 Property Type	House, Semi-Detached
2.0 Number of Storeys	2
3.0 Date Built	2020
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	17.30 m	37.21 m ²	2.39 m
1st Storey:	17.30 m	37.21 m ²	2.60 m

7.0 Living Area m²

8.0 Thermal Mass Parameter
 Thermal Mass
 kJ/m²K

9.0 External Walls

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area (m ²)	Nett Area (m ²)
External Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.24	60.00	86.39	72.07

9.1 Party Walls

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)
Party Wall 1	Filled Cavity with Edge Sealing	Plasterboard on dabs mounted on cement render on both sides, AAC blocks, cavity	0.00	45.00	40.19

9.2 Internal Walls

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
GF	Plasterboard on timber frame	9.00	58.12
FF	Plasterboard on timber frame	9.00	85.64

10.0 External Roofs

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area (m ²)	Nett Area (m ²)
Cold Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.09	9.00	37.21	37.21

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

10.2 Internal Ceilings

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
GF	Plasterboard ceiling, carpeted chipboard floor	9.00	37.21

11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)
Ground Floor	Ground Floor - Solid	Suspended concrete floor, carpeted	0.14	75.00	37.21

11.2 Internal Floors

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
FF	Plasterboard ceiling, carpeted chipboard floor	18.00	37.21

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m ² K)
Half Glazed Door	Manufacture	Half Glazed Door	Double Low-E Soft 0.05			0.63		0.70	1.00
Windows	Manufacture	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Patio Door	Manufacture	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Rooflights	Manufacture	Roof Window	Double Low-E Soft 0.05			0.63		0.70	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m ²)	Curtain Closed
Front Entrance	Half Glazed Door	[1] External Wall	North West							2.10	
Front Windows	Window	[1] External Wall	North West	None	0.00					3.80	
Rear Windows	Window	[1] External Wall	South East	None	0.00					2.88	
Patio Doors	Window	[1] External Wall	South East	None	0.00					3.78	
LHS Windows	Window	[1] External Wall	North East	None	0.00					1.76	

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	10.07	0.040	No
Independently assessed	E3 Sill	7.26	0.027	No
Independently assessed	E4 Jamb	15.60	0.029	No
Independently assessed	E5 Ground floor (normal)	24.60	0.049	No
Independently assessed	E6 Intermediate floor within a dwelling	24.60	0.003	No
Independently assessed	E10 Eaves (insulation at ceiling level)	9.25	0.083	No
Independently assessed	E12 Gable (insulation at ceiling level)	8.05	0.054	No
Independently assessed	E16 Corner (normal)	9.99	0.050	No
Table K1 - Default	E18 Party wall between dwellings	9.99	0.120	No
Table K1 - Default	P1 Party wall - Ground floor	8.05	0.160	No
Table K1 - Default	P2 Party wall - Intermediate floor within a dwelling	8.05	0.000	No
Table K1 - Default	P4 Party wall - Roof (insulation at ceiling level)	8.05	0.240	No

Y-value W/m²K

18.0 Pressure Testing

Designed AP₅₀ m³/(h.m²) @ 50 Pa

Property Tested ?

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

As Built AP₅₀

m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather	Windows fully open
Cross ventilation possible	Yes
Night Ventilation	No
Air change rate	8.00

Mechanical Ventilation

Mechanical Ventilation System Present	No
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20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				3
Number of passive vents				0
Number of flueless gas fires				0

21.0 Fixed Cooling System

No

22.0 Lighting

Internal

Total number of light fittings	1	
Total number of L.E.L. fittings	1	
Percentage of L.E.L. fittings	100.00	%

External

External lights fitted	No
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23.0 Electricity Tariff

Standard

24.0 Main Heating 1

Database	Database	
Percentage of Heat	100	%
Database Ref. No.	17959	
Fuel Type	Mains gas	
Main Heating	BGW	
SAP Code	104	
In Winter	90.2	
In Summer	76.2	
Controls	CBI Time and temperature zone control	
PCDF Controls	0	
Delayed Start Stat	Yes	
Sap Code	2110	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heat Emitter	Radiators	
Flow Temperature	Normal (> 45°C)	
Combi boiler type	Standard Combi	
Combi keep hot type	None	

25.0 Main Heating 2

None

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Community Heating	None
28.0 Water Heating	HWP From main heating 1
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
SAP Code	901
29.0 Hot Water Cylinder	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar water heating	£4,000 - £6,000	£30	B 85	
	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£345	A 96	