



elmhurst  
energy



## SAP Report Submission for Building Regulations Compliance

Client:

Project: Plot 010

Contact: 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 010		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2318-Bay-MT	
Property	Plot 010			

SAP Rating	83 B	DER	19.42	TER	19.98
Environmental	84 B	% DER<TER	2.80		
CO <sub>2</sub> Emissions (t/year)	1.44	DFEE	57.33	TFEE	63.34
General Requirements Compliance	Pass	% DFEE<TFEE	9.49		

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	13.03	0.52	
External wall	E3 Sill	Independently assessed	0.027	9.58	0.26	
External wall	E4 Jamb	Independently assessed	0.029	35.70	1.04	
External wall	E5 Ground floor (normal)	Independently assessed	0.049	21.55	1.06	
External wall	E6 Intermediate floor within a dwelling	Independently assessed	0.003	21.55	0.06	
External wall	E10 Eaves (insulation at ceiling level)	Independently assessed	0.083	15.87	1.32	
External wall	E12 Gable (insulation at ceiling level)	Independently assessed	0.054	5.68	0.31	
External wall	E16 Corner (normal)	Independently assessed	0.050	9.97	0.50	
External wall	E18 Party wall between dwellings	Table K1 - Default	0.120	9.97	1.20	
Party wall	P1 Party wall - Ground floor	Table K1 - Default	0.160	5.68	0.91	
Party wall	P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	0.000	5.68	0.00	
Party wall	P4 Party wall - Roof (insulation at ceiling level)	Table K1 - Default	0.240	5.68	1.36	

Total: **8.53** W/mK:  
 Y-Value: **0.031** W/m<sup>2</sup>K:

# FULL SAP CALCULATION PRINTOUT

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<b>General Requirements Compliance</b>	Pass	<b>% DFEE&lt;TFEE</b>	9.49		
<b>Assessor Details</b>	Mr. Paul Bainbridge, Paul Bainbridge, Tel: 01904 674890, paul.bainbridge@thefesgroup.com			<b>Assessor ID</b>	p717-0001
<b>Client</b>	Larkfleet Group				

# 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 90 m<sup>2</sup>

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) 19.98 kgCO<sub>2</sub>/m<sup>2</sup>  
Dwelling Carbon Dioxide Emission Rate (DER) 19.42 kgCO<sub>2</sub>/m<sup>2</sup>OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 63.3 kWh/m<sup>2</sup>/yr  
Dwelling Fabric Energy Efficiency (DFEE) 57.3 kWh/m<sup>2</sup>/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	1.23 (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 835 VUW 356/6-3 (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: 7.69 m<sup>2</sup>, No overhang

Windows facing South West: 6.78 m<sup>2</sup>, No overhang

Air change rate: 8.00 ach

Blinds/curtains: None

10 Key features

Party wall U-value 0.00 W/m<sup>2</sup>K

Roof U-value 0.09 W/m<sup>2</sup>K

Door U-value 1.00 W/m<sup>2</sup>K

Thermal bridging y-value 0.031 W/m<sup>2</sup>K

# 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	45.1000 (1b)	2.3900 (2b)	107.7890 (1b) - (3b)
First floor	45.1000 (1c)	2.6000 (2c)	117.2600 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	90.2000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 225.0490 (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				4 * 10 =	40.0000 (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) =				40.0000 / (5) =	0.1777 (8)
Pressure test					Yes
Measured/design AP50					5.0000
Infiltration rate					0.4277 (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) =		0.3636 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	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												
Effective ac	0.4636	0.4545	0.4454	0.3999	0.3908	0.3454	0.3454	0.3363	0.3636	0.3908	0.4090	0.4272 (22b)
	0.6074	0.6033	0.5992	0.5800	0.5764	0.5597	0.5597	0.5566	0.5661	0.5764	0.5837	0.5913 (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)			11.3200	1.1450	12.9618		(27)
Patio Door (Uw = 1.40)			3.1500	1.3258	4.1761		(27)
Other Doors			1.9700	1.4000	2.7580		(26a)
Ground Floor			45.1000	0.1400	6.3140	75.0000	3382.5000 (28a)
External Wall	180.8700	18.5400	162.3300	0.2400	38.9592	60.0000	9739.8000 (29a)
Cold Roof	45.1000		45.1000	0.0900	4.0590	9.0000	405.9000 (30)
Total net area of external elements Aum(A, m2)			271.0700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	71.3282		(33)
Party Wall 1			28.3300	0.0000	0.0000	45.0000	1274.8500 (32)
GF - Dense Block			29.5600			75.0000	2217.0000 (32c)
GF - Timber Frame			35.0800			9.0000	315.7200 (32c)
FF - Timber Frame			118.4600			9.0000	1066.1400 (32c)
FF			45.1000			18.0000	811.8000 (32d)
GF			45.1000			18.0000	811.8000 (32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =	20025.5100	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							222.0123 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.5266 (36)
Total fabric heat loss						(33) + (36) =	79.8548 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	45.1126	44.8028	44.4990	43.0725	42.8056	41.5631	41.5631	41.3330	42.0417	42.8056	43.3455	43.9100 (38)
Heat transfer coeff	124.9674	124.6575	124.3538	122.9272	122.6603	121.4178	121.4178	121.1878	121.8964	122.6603	123.2003	123.7648 (39)
Average = Sum(39)m / 12 =												122.9260 (39)
HLP	1.3854	1.3820	1.3786	1.3628	1.3599	1.3461	1.3461	1.3435	1.3514	1.3599	1.3659	1.3721 (40)
HLP (average)												1.3628 (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												2.6284 (42)
Average daily hot water use (litres/day)												96.6256 (43)
Daily hot water use												

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Energy conte	106.2882	102.4232	98.5582	94.6931	90.8281	86.9631	86.9631	90.8281	94.6931	98.5582	102.4232	106.2882 (44)
Energy content (annual)	157.6223	137.8575	142.2566	124.0228	119.0028	102.6904	95.1577	109.1949	110.4990	128.7759	140.5690	152.6488 (45)
Distribution loss (46)m = 0.15 x (45)m	Total = Sum(45)m = 1520.2976 (45)											
23.6434	20.6786	21.3385	18.6034	17.8504	15.4036	14.2737	16.3792	16.5748	19.3164	21.0853	22.8973	(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	0.6709	0.6081	0.6309	0.5285	0.4864	0.4019	0.3724	0.4463	0.4709	0.5711	0.6201	0.6497 (61)
Total heat required for water heating calculated for each month	158.2933	138.4656	142.8875	124.5512	119.4892	103.0922	95.5301	109.6412	110.9699	129.3471	141.1891	153.2986 (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)
Output from w/h	158.2933	138.4656	142.8875	124.5512	119.4892	103.0922	95.5301	109.6412	110.9699	129.3471	141.1891	153.2986 (64)
Heat gains from water heating, kWh/month	52.5772	45.9896	47.4581	41.3697	39.6900	34.2450	31.7330	36.4189	36.8586	42.9608	46.8942	50.9182 (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
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	131.4224	131.4224	131.4224	131.4224	131.4224	131.4224	131.4224	131.4224	131.4224	131.4224	131.4224	131.4224 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	22.2591	19.7703	16.0783	12.1723	9.0989	7.6817	8.3004	10.7891	14.4811	18.3871	21.4605	22.8777 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	239.4452	241.9299	235.6686	222.3389	205.5126	189.6982	179.1333	176.6486	182.9099	196.2396	213.0659	228.8802 (68)
Pumps, fans	36.1422	36.1422	36.1422	36.1422	36.1422	36.1422	36.1422	36.1422	36.1422	36.1422	36.1422	36.1422 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-105.1379	-105.1379	-105.1379	-105.1379	-105.1379	-105.1379	-105.1379	-105.1379	-105.1379	-105.1379	-105.1379	-105.1379 (71)
Total internal gains	70.6682	68.4370	63.7877	57.4579	53.3468	47.5625	42.6519	48.9501	51.1925	57.7430	65.1308	68.4384 (72)
	397.7992	395.5639	380.9613	357.3958	333.3851	310.3692	295.5123	301.8145	314.0103	337.7964	365.0839	385.6231 (73)

#### 6. Solar gains

[Jan]	Area	Solar flux	g	Specific data	FF	Access	Gains					
	m <sup>2</sup>	Table 6a	W/m <sup>2</sup>	or Table 6b	or Table 6c	factor	W					
Northeast	4.5400	11.2829	0.6300		0.7000	0.7700	15.6549 (75)					
Southwest	6.7800	36.7938	0.6300		0.7000	0.7700	76.2389 (79)					
Northeast	3.1500	11.2829	0.6300		0.7000	0.7700	10.8619 (75)					
Solar gains	102.7556	183.8387	274.9312	379.8668	461.2750	473.6832	450.1292	386.9881	310.8914	209.4888	124.6816	86.8995 (83)
Total gains	500.5549	579.4026	655.8925	737.2626	794.6600	784.0524	745.6415	688.8027	624.9017	547.2852	489.7655	472.5226 (84)

#### 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	44.5128	44.6234	44.7324	45.2515	45.3500	45.8140	45.8140	45.9010	45.6342	45.3500	45.1512	44.9453
util living area	3.9675	3.9749	3.9822	4.0168	4.0233	4.0543	4.0543	4.0601	4.0423	4.0233	4.0101	3.9964
MIT	0.9974	0.9949	0.9886	0.9690	0.9154	0.7985	0.6519	0.7098	0.9004	0.9808	0.9953	0.9979 (86)
Th 2	19.2679	19.4383	19.7386	20.1530	20.5469	20.8340	20.9471	20.9246	20.6943	20.1899	19.6585	19.2416 (87)
util rest of house	19.7745	19.7772	19.7797	19.7919	19.7942	19.8049	19.8049	19.8069	19.8008	19.7942	19.7896	19.7848 (88)
MIT 2	0.9965	0.9932	0.9846	0.9569	0.8789	0.7078	0.5033	0.5669	0.8418	0.9712	0.9934	0.9973 (89)
Living area fraction	17.4816	17.7320	18.1708	18.7755	19.3215	19.6809	19.7826	19.7708	19.5292	18.8368	18.0625	17.4497 (90)
Temperature adjustment	17.8055	18.0415	18.4552	19.0253	19.5438	19.8900	19.9938	19.9801	19.7405	19.0822	18.3520	17.7747 (92)
adjusted MIT	17.6555	17.8915	18.3052	18.8753	19.3938	19.7400	19.8438	19.8301	19.5905	18.9322	18.2020	17.6247 (93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9941	0.9891	0.9772	0.9440	0.8632	0.7019	0.5087	0.5701	0.8282	0.9607	0.9895	0.9953 (94)
Ext temp.	497.5991	573.1088	640.9547	695.9540	685.9890	550.3270	379.3079	392.6911	517.5293	525.7503	484.6202	470.2963 (95)
Heat loss rate W	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)
Month fracti	1669.0079	1619.4878	1468.0197	1226.2381	943.7230	624.0901	393.8587	415.6862	669.2742	1022.0339	1367.7709	1661.5095 (97)
Space heating kWh	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	871.5281	703.1667	615.3364	381.8046	191.7542	0.0000	0.0000	0.0000	0.0000	369.2350	635.8685	886.2626 (98)
Space heating per m <sup>2</sup>												4654.9560 (98)
												(98) / (4) = 51.6071 (99)

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### 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													5160.7051 (211)
Space heating requirement	871.5281	703.1667	615.3364	381.8046	191.7542	0.0000	0.0000	0.0000	0.0000	369.2350	635.8685	886.2626	(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)	966.2175	779.5639	682.1911	423.2867	212.5878	0.0000	0.0000	0.0000	0.0000	409.3514	704.9540	982.5528	(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	158.2933	138.4656	142.8875	124.5512	119.4892	103.0922	95.5301	109.6412	110.9699	129.3471	141.1891	153.2986	(64)
Efficiency of water heater (217)m	87.7633	87.5969	87.2307	86.3629	84.3507	76.4000	76.4000	76.4000	76.4000	86.1624	87.3337	87.8597	(217)
Fuel for water heating, kWh/month	180.3638	158.0714	163.8041	144.2185	141.6576	134.9375	125.0394	143.5094	145.2485	150.1201	161.6661	174.4810	(219)
Water heating fuel used													1823.1173 (219)
Annual totals kWh/year													
Space heating fuel - main system													5160.7051 (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)													393.1020 (232)
Total delivered energy for all uses													7451.9245 (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	5160.7051	0.2160	1114.7123	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1823.1173	0.2160	393.7933	(264)
Space and water heating			1508.5057	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	393.1020	0.5190	204.0199	(268)
Total CO2, kg/year			1751.4506	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			19.4200	(273)

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

DER			19.4200	ZC1
Total Floor Area		TFA	90.2000	
Assumed number of occupants		N	2.6284	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			15.7306	ZC2
CO2 emissions from cooking, equation (L16)			2.0187	ZC3
Total CO2 emissions			37.1693	ZC4
Residual CO2 emissions offset from biofuel CHP			0.0000	ZC5
Additional allowable electricity generation, kWh/m <sup>2</sup> /year			0.0000	ZC6
Resulting CO2 emissions offset from additional allowable electricity generation			0.0000	ZC7
Net CO2 emissions			37.1693	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 <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor	45.1000 (1b)	2.3900 (2b)	107.7890 (1b) - (3b)
First floor	45.1000 (1c)	2.6000 (2c)	117.2600 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	90.2000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 225.0490 (5)

#### 2. Ventilation rate

	main heating	secondary heating	other	total	m <sup>3</sup> 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) =	0.1333 (8)							
Pressure test					Yes							
Measured/design AP50					5.0000							
Infiltration rate					0.3833 (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) =		0.3258 (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	0.4154	0.4073	0.3991	0.3584	0.3502	0.3095	0.3095	0.3014	0.3258	0.3502	0.3665	0.3828 (22b)
Effective ac	0.5863	0.5829	0.5796	0.5642	0.5613	0.5479	0.5479	0.5454	0.5531	0.5613	0.5672	0.5733 (25)

#### 3. Heat losses and heat loss parameter

Element	Gross m <sup>2</sup>	Openings m <sup>2</sup>	NetArea m <sup>2</sup>	U-value W/m <sup>2</sup> K	A x U W/K	K-value kJ/m <sup>2</sup> K	A x K kJ/K					
TER Semi-glazed door			4.0700	1.2000	4.8840		(26a)					
TER Opening Type (Uw = 1.40)			14.4700	1.3258	19.1837		(27)					
Ground Floor			45.1000	0.1300	5.8630		(28a)					
External Wall	180.8700	18.5400	162.3300	0.1800	29.2194		(29a)					
Cold Roof	45.1000		45.1000	0.1300	5.8630		(30)					
Total net area of external elements Aum(A, m <sup>2</sup> )			271.0700				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 65.0131		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							250.0000 (35)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.2880 (36)					
Total fabric heat loss							(33) + (36) = 75.3011 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 43.5409	Feb 43.2920	Mar 43.0481	Apr 41.9026	May 41.6882	Jun 40.6905	Jul 40.6905	Aug 40.5057	Sep 41.0748	Oct 41.6882	Nov 42.1218	Dec 42.5751 (38)
Heat transfer coeff	118.8420	118.5931	118.3492	117.2037	116.9894	115.9916	115.9916	115.8068	116.3759	116.9894	117.4229	117.8762 (39)
Average = Sum(39)m / 12 =												117.2027 (39)
HLP	Jan 1.3175	Feb 1.3148	Mar 1.3121	Apr 1.2994	May 1.2970	Jun 1.2859	Jul 1.2859	Aug 1.2839	Sep 1.2902	Oct 1.2970	Nov 1.3018	Dec 1.3068 (40)
HLP (average)												1.2994 (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												2.6284 (42)
Average daily hot water use (litres/day)												96.6256 (43)
Daily hot water use	106.2882	102.4232	98.5582	94.6931	90.8281	86.9631	86.9631	90.8281	94.6931	98.5582	102.4232	106.2882 (44)
Energy content (annual)	157.6223	137.8575	142.2566	124.0228	119.0028	102.6904	95.1577	109.1949	110.4990	128.7759	140.5690	152.6488 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1520.2976 (45)
Water storage loss:	23.6434	20.6786	21.3385	18.6034	17.8504	15.4036	14.2737	16.3792	16.5748	19.3164	21.0853	22.8973 (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

Combi 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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Total heat required for water heating calculated for each month	50.9589	46.0274	50.2242	46.6980	46.2850	42.8859	44.3154	46.2850	46.6980	50.2242	49.3151	50.9589	61											
Solar input	208.5812	183.8849	192.4808	170.7207	165.2878	145.5763	139.4731	155.4799	157.1970	179.0001	189.8841	203.6077	(62)											
Output from w/h	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)											
Heat gains from water heating, kWh/month	208.5812	183.8849	192.4808	170.7207	165.2878	145.5763	139.4731	155.4799	157.1970	179.0001	189.8841	203.6077	(64)											
	65.1492	57.3445	59.8564	52.9121	51.1397	44.8660	42.7188	47.8785	48.4154	55.3740	59.0680	63.4955	(65)											

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(66)
(66)m	131.4224	131.4224	131.4224	131.4224	131.4224	131.4224	131.4224	131.4224	131.4224	131.4224	131.4224	131.4224	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.2591	19.7703	16.0783	12.1723	9.0989	7.6817	8.3004	10.7891	14.4811	18.3871	21.4605	22.8777	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	239.4452	241.9299	235.6686	222.3389	205.5126	189.6982	179.1333	176.6486	182.9099	196.2396	213.0659	228.8802	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.1422	36.1422	36.1422	36.1422	36.1422	36.1422	36.1422	36.1422	36.1422	36.1422	36.1422	36.1422	(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)	-105.1379	-105.1379	-105.1379	-105.1379	-105.1379	-105.1379	-105.1379	-105.1379	-105.1379	-105.1379	-105.1379	-105.1379	(71)
Water heating gains (Table 5)	87.5661	85.3340	80.4521	73.4890	68.7361	62.3139	57.4177	64.3529	67.2436	74.4275	82.0388	85.3434	(72)
Total internal gains	414.6971	412.4610	397.6257	373.4269	348.7744	325.1206	310.2781	317.2173	330.0614	354.4809	381.9919	402.5280	(73)

#### 6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g Specific data or Table 6c	FF	Access factor Table 6d	Gains W	(75)					
Northeast	7.6900	11.2829	0.6300	0.7000	0.7700	26.5168	(75)						
Southwest	6.7800	36.7938	0.6300	0.7000	0.7700	76.2389	(79)						
Solar gains	102.7556	183.8387	274.9312	379.8668	461.2750	473.6832	450.1292	386.9881	310.8914	209.4888	124.6816	86.8995	(83)
Total gains	517.4527	596.2996	672.5569	753.2937	810.0493	798.8038	760.4073	704.2054	640.9528	563.9697	506.6735	489.4276	(84)

#### 7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, T <sub>hl</sub> (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	tau	52.7077	52.8183	52.9272	53.4445	53.5424	54.0030	54.0030	54.0891	53.8246	53.5424	53.3447	53.1395
alpha	4.5138	4.5212	4.5285	4.5630	4.5695	4.6002	4.6002	4.6059	4.5883	4.5695	4.5563	4.5426	
util living area	0.9983	0.9964	0.9912	0.9731	0.9177	0.7901	0.6317	0.6921	0.8998	0.9838	0.9967	0.9987	(86)
MIT	19.5167	19.6705	19.9387	20.3055	20.6506	20.8870	20.9695	20.9539	20.7703	20.3288	19.8579	19.4901	(87)
Th 2	19.8271	19.8293	19.8314	19.8413	19.8432	19.8519	19.8519	19.8535	19.8485	19.8432	19.8394	19.8355	(88)
util rest of house	0.9977	0.9951	0.9878	0.9616	0.8800	0.6960	0.4859	0.5490	0.8382	0.9749	0.9952	0.9982	(89)
MIT 2	17.8604	18.0865	18.4784	19.0129	19.4870	19.7726	19.8404	19.8336	19.6526	19.0537	18.3679	17.8273	(90)
Living area fraction	MIT	18.1608	18.3738	18.7433	19.2474	19.6981	19.9748	20.0452	19.8553	19.2850	18.6381	18.1289	(92)
Temperature adjustment	adjusted MIT	18.1608	18.3738	18.7433	19.2474	19.6981	19.9748	20.0452	19.8553	19.2850	18.6381	18.1289	(93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(94)
Useful gains	515.5434	591.9443	661.2445	718.3283	708.0977	565.1156	389.5079	404.3663	537.5206	546.2687	503.0686	488.0194	(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	1647.2456	1597.9022	1448.9814	1212.7491	935.6883	623.4260	399.6125	421.1701	669.7797	1016.0527	1354.8402	1641.8826	(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	841.9865	676.0037	586.0763	355.9830	169.3274	0.0000	0.0000	0.0000	0.0000	349.5194	613.2756	858.4742	(98)
Space heating												4450.6461	(98)
Space heating per m2												49.3420	(99)

#### 8c. Space cooling requirement

Not applicable

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

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF TARGET EMISSIONS 09 Jan 2014

	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 %)													93.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													4765.1457 (211)
Space heating requirement	841.9865	676.0037	586.0763	355.9830	169.3274	0.0000	0.0000	0.0000	0.0000	349.5194	613.2756	858.4742	(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)	901.4845	723.7727	627.4907	381.1381	181.2927	0.0000	0.0000	0.0000	0.0000	374.2177	656.6120	919.1373	(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	208.5812	183.8849	192.4808	170.7207	165.2878	145.5763	139.4731	155.4799	157.1970	179.0001	189.8841	203.6077	(64)
Efficiency of water heater (217)m	88.1975	88.0322	87.6737	86.8589	85.1120	80.3000	80.3000	80.3000	80.3000	86.7064	87.7894	88.2716	(217)
Fuel for water heating, kWh/month	236.4933	208.8838	219.5422	196.5495	194.2003	181.2905	173.6901	193.6237	195.7621	206.4439	216.2949	230.6606	(219)
Water heating fuel used													2453.4350 (219)
Annual totals kWh/year													
Space heating fuel - main system													4765.1457 (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)													393.1020 (232)
Total delivered energy for all uses													7686.6827 (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	4765.1457	0.2160	1029.2715 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2453.4350	0.2160	529.9420 (264)
Space and water heating			1559.2134 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	393.1020	0.5190	204.0199 (268)
Total CO2, kg/m2/year			1802.1584 (272)
Emissions per m2 for space and water heating			17.2862 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.2619 (272b)
Emissions per m2 for pumps and fans			0.4315 (272c)
Target Carbon Dioxide Emission Rate (TER) = (17.2862 * 1.00) + 2.2619 + 0.4315, rounded to 2 d.p.			19.9800 (273)

# U-VALUE CALCULATOR REPORT

Property Reference	007818 - Plot 010		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2318-Bay-MT	
Project	Plot 010			
Calculation Type	New Build (As Designed)			

SAP Rating	83 B	DER	19.42	TER	19.98
Environmental	84 B	% DER<TER	2.80		
CO <sub>2</sub> Emissions (t/year)	1.44	DFEE	57.33	TFEE	63.34
General Requirements Compliance	Pass	% DFEE<TFEE	9.49		

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

Total resistance: Upper limit = 11.610 m<sup>2</sup> K/W Lower limit = 11.610 m<sup>2</sup> K/W Average = 11.610 m<sup>2</sup> K/W  
Total correction = 0.0031 m<sup>2</sup> K/W U-value (unrounded) = 0.09 W/m<sup>2</sup> K

Unheated space: None

Total thickness: 513 mm

U-value: 0.09 W/m<sup>2</sup> K

Kappa: n/a

# U-VALUE CALCULATOR REPORT

Property Reference	007818 - Plot 010		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2318-Bay-MT	
Project	Plot 010			
Calculation Type	New Build (As Designed)			

SAP Rating	83 B	DER	19.42	TER	19.98
Environmental	84 B	% DER<TER	2.80		
CO <sub>2</sub> Emissions (t/year)	1.44	DFEE	57.33	TFEE	63.34
General Requirements Compliance	Pass	% DFEE<TFEE	9.49		

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 <sup>2</sup> K)	Resistance (m <sup>2</sup> K/W)	Fraction (%)
Ext surface				0.0400	
Layer 1	<b>Brick, outer leaf</b>				
	Main construction	100	0.7700	0.1299	82.81
	Main construction	100	0.9407	0.1063	17.19
Layer 2	<b>URSA Cavity BATT 32</b>				
	Main construction	100	0.0320	3.1250	100.00
	Corrections - Air Gap: Level 1, Fasteners: None or plastic				
Layer 3	<b>Thermalite Shield</b>				
	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	<b>airspace/plaster dabs</b>				
	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	<b>Plasterboard, standard</b>				
	Main construction	12.5	0.2100	0.0595	100.00
Int surface				0.1300	

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

Unheated space: None

**Total thickness: 328 mm**

**U-value: 0.24 W/m<sup>2</sup> K**

**Kappa: n/a**

# U-VALUE CALCULATOR REPORT

Property Reference	007818 - Plot 010		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2318-Bay-MT	
Project	Plot 010			
Calculation Type	New Build (As Designed)			

SAP Rating	83 B	DER	19.42	TER	19.98
Environmental	84 B	% DER<TER	2.80		
CO <sub>2</sub> Emissions (t/year)	1.44	DFEE	57.33	TFEE	63.34
General Requirements Compliance	Pass	% DFEE<TFEE	9.49		

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 = 45.10 m<sup>2</sup>, Perimeter = 21.55 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<sub>w</sub> = 1.500 m

Ventilation openings per perimeter length: e = 0.0015 %

Mean wind speed: v = 5.000 m/s

Resistance on solum: R<sub>g</sub> = 0.000 m<sup>2</sup>K/W

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

Total resistance: Upper limit = 6.047 m<sup>2</sup> K/W Lower limit = 5.988 m<sup>2</sup> K/W Average = 6.018 m<sup>2</sup> K/W

Total correction = 0.0082 m<sup>2</sup> K/W

U-value (unrounded) = 0.14 W/m<sup>2</sup> K

Unheated space: None

Total thickness: 345 mm

U-value: 0.14 W/m<sup>2</sup> K

Kappa: n/a

# BASIC COMPLIANCE REPORT

## Calculation Type: New Build (As Designed)

<b>Property Reference</b>	007818 - Plot 010	<b>Issued on Date</b>	15/03/2021
<b>Assessment Reference</b>	Rev A	<b>Prop Type Ref</b>	007818-SAP-2318-Bay-MT
<b>Property</b>	Plot 010		

<b>SAP Rating</b>	83 B	<b>DER</b>	19.42	<b>TER</b>	19.98
<b>Environmental</b>	84 B	<b>% DER&lt;TER</b>	2.80		
<b>CO<sub>2</sub> Emissions (t/year)</b>	1.44	<b>DFEE</b>	57.33	<b>TFEE</b>	63.34
<b>General Requirements Compliance</b>	Pass	<b>% DFEE&lt;TFEE</b>	9.49		

<b>Assessor Details</b>	Mr. Paul Bainbridge, Paul Bainbridge, Tel: 01904 674890, paul.bainbridge@thefesgroup.com	<b>Assessor ID</b>	p717-0001
<b>Client</b>	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)	19.98	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	19.42	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-0.56 (-2.8%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	63.34	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	57.33	kWh/m <sup>2</sup> /yr	
	-6.0 (-9.5%)	kWh/m <sup>2</sup> /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	1.23 (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 835 VUW 356/6-3 (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

7.69 m<sup>2</sup>, No overhang

Windows facing South West

6.78 m<sup>2</sup>, 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/m<sup>2</sup>K

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/m<sup>2</sup>K

Roof U-value

0.09 W/m<sup>2</sup>K

Door U-value

1.00 W/m<sup>2</sup>K

Thermal bridging  $\gamma$ -value

0.031 W/m<sup>2</sup>K

*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 010		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2318-Bay-MT	
Property	Plot 010			

SAP Rating	83 B	DER	19.42	TER	19.98
Environmental	84 B	% DER<TER	2.80		
CO <sub>2</sub> Emissions (t/year)	1.44	DFEE	57.33	TFEE	63.34
General Requirements Compliance	Pass	% DFEE<TFEE	9.49		

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

Orientation	South 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:	21.55 m	45.10 m <sup>2</sup>	2.39 m
1st Storey:	21.55 m	45.10 m <sup>2</sup>	2.60 m

7.0 Living Area	16.36	m <sup>2</sup>
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8.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	222.01	kJ/m <sup>2</sup> K

#### 9.0 External Walls

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Kappa (kJ/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.24	60.00	180.87	162.33

#### 9.1 Party Walls

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Kappa (kJ/m <sup>2</sup> K)	Area (m <sup>2</sup> )
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	28.33

#### 9.2 Internal Walls

Description	Construction	Kappa (kJ/m <sup>2</sup> K)	Area (m <sup>2</sup> )
GF - Dense Block	Dense block, plasterboard on dabs	75.00	29.56
GF - Timber Frame	Plasterboard on timber frame	9.00	35.08
FF - Timber Frame	Plasterboard on timber frame	9.00	118.46

#### 10.0 External Roofs



# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Kappa (kJ/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
Cold Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.09	9.00	45.10	45.10

### 10.2 Internal Ceilings

Description	Construction	Kappa (kJ/m <sup>2</sup> K)	Area (m <sup>2</sup> )
GF	Plasterboard ceiling, carpeted chipboard floor	9.00	45.10

### 11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Kappa (kJ/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Ground Floor	Ground Floor - Solid	Suspended concrete floor, carpeted	0.14	75.00	45.10

### 11.2 Internal Floors

Description	Construction	Kappa (kJ/m <sup>2</sup> K)	Area (m <sup>2</sup> )
FF	Plasterboard ceiling, carpeted chipboard floor	18.00	45.10

### 12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m <sup>2</sup> 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
Other Doors	Manufacture	Half Glazed Door	Double Low-E Soft 0.05			0.63		0.70	1.40

### 13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m <sup>2</sup> )	Curtain Closed
Front Entrance	Half Glazed Door	[1] External Wall	South West							2.10	
Front Windows	Window	[1] External Wall	South West	None	0.00					6.78	
Rear Windows	Window	[1] External Wall	North East	None	0.00					4.54	
Patio Doors	Window	[1] External Wall	North East	None	0.00					3.15	
Rear Entrance	Half Glazed Door	[1] External Wall	North East							1.97	

### 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)	13.03	0.040	No
Independently assessed	E3 Sill	9.58	0.027	No
Independently assessed	E4 Jamb	35.70	0.029	No
Independently assessed	E5 Ground floor (normal)	21.55	0.049	No
Independently assessed	E6 Intermediate floor within a dwelling	21.55	0.003	No
Independently assessed	E10 Eaves (insulation at ceiling level)	15.87	0.083	No
Independently assessed	E12 Gable (insulation at ceiling level)	5.68	0.054	No
Independently assessed	E16 Corner (normal)	9.97	0.050	No
Table K1 - Default	E18 Party wall between dwellings	9.97	0.120	No
Table K1 - Default	P1 Party wall - Ground floor	5.68	0.160	No
Table K1 - Default	P2 Party wall - Intermediate floor within a dwelling	5.68	0.000	No
Table K1 - Default	P4 Party wall - Roof (insulation at ceiling level)	5.68	0.240	No

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Y-value	<input type="text" value="0.031"/>	W/m <sup>2</sup> K		
<b>18.0 Pressure Testing</b>	<input type="text" value="Yes"/>			
Designed AP <sub>50</sub>	<input type="text" value="5.00"/>	m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa		
Property Tested ?	<input type="text"/>			
As Built AP <sub>50</sub>	<input type="text"/>	m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa		
<b>19.0 Mechanical Ventilation</b>				
<b>Summer Overheating</b>				
Windows open in hot weather	<input type="text" value="Windows fully open"/>			
Cross ventilation possible	<input type="text" value="Yes"/>			
Night Ventilation	<input type="text" value="No"/>			
Air change rate	<input type="text" value="8.00"/>			
<b>Mechanical Ventilation</b>				
Mechanical Ventilation System Present	<input type="text" value="No"/>			
<b>20.0 Fans, Open Fireplaces, Flues</b>				
	<b>MHS</b>	<b>SHS</b>	<b>Other</b>	<b>Total</b>
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				4
Number of passive vents				0
Number of flueless gas fires				0
<b>21.0 Fixed Cooling System</b>	<input type="text" value="No"/>			
<b>22.0 Lighting</b>				
<b>Internal</b>				
Total number of light fittings	<input type="text" value="1"/>			
Total number of L.E.L. fittings	<input type="text" value="1"/>			
Percentage of L.E.L. fittings	<input type="text" value="100.00"/>			%
<b>External</b>				
External lights fitted	<input type="text" value="No"/>			
<b>23.0 Electricity Tariff</b>	<input type="text" value="Standard"/>			
<b>24.0 Main Heating 1</b>	<input type="text" value="Database"/>			
Percentage of Heat	<input type="text" value="100"/>			%
Database Ref. No.	<input type="text" value="17960"/>			
Fuel Type	<input type="text" value="Mains gas"/>			
Main Heating	<input type="text" value="BGW"/>			
SAP Code	<input type="text" value="104"/>			
In Winter	<input type="text" value="90.2"/>			
In Summer	<input type="text" value="76.4"/>			
Controls	<input type="text" value="CBI Time and temperature zone control"/>			
PCDF Controls	<input type="text" value="0"/>			
Delayed Start Stat	<input type="text" value="Yes"/>			
Sap Code	<input type="text" value="2110"/>			
Flue Type	<input type="text" value="Balanced"/>			
Fan Assisted Flue	<input type="text" value="Yes"/>			
Is MHS Pumped	<input type="text" value="Pump in heated space"/>			
Heat Emitter	<input type="text" value="Radiators"/>			
Flow Temperature	<input type="text" value="Normal (&gt; 45°C)"/>			

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Combi boiler type	Standard Combi
Combi keep hot type	None
<b>25.0 Main Heating 2</b>	None
Community Heating	None
<b>28.0 Water Heating</b>	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
<b>29.0 Hot Water Cylinder</b>	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	£31	B 84	
	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 94	