



elmhurst  
energy



## SAP Report Submission for Building Regulations Compliance

Client:

Project: Plot 017

Contact: Benjamin Wood  
Benjamin Wood  
[ben.wood@thefesgroup.com](mailto:ben.wood@thefesgroup.com)

Report Issue Date: 15/03/2021

EXCELLENCE  
IN ENERGY  
ASSESSMENT

# THERMAL BRIDGING

## Calculation Type: New Build (As Designed)

Property Reference	007818 - Plot 017		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2328-Semi-MT	
Property	Plot 017			

SAP Rating	84 B	DER	17.15	TER	18.82
Environmental	87 B	% DER<TER	8.88		
CO <sub>2</sub> Emissions (t/year)	1.06	DFEE	44.71	TFEE	52.16
General Requirements Compliance	Pass	% DFEE<TFEE	14.28		

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/m<sup>2</sup>K:

# FULL SAP CALCULATION PRINTOUT

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<b>SAP Rating</b>	84 B	<b>DER</b>	17.15	<b>TER</b>	18.82
<b>Environmental</b>	87 B	<b>% DER&lt;TER</b>	8.88		
<b>CO<sub>2</sub> Emissions (t/year)</b>	1.06	<b>DFEE</b>	44.71	<b>TFEE</b>	52.16
<b>General Requirements Compliance</b>	Pass	<b>% DFEE&lt;TFEE</b>	14.28		
<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

## Calculation Type: New Build (As Designed)

### 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 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) 18.82 kgCO<sub>2</sub>/m<sup>2</sup>  
Dwelling Carbon Dioxide Emission Rate (DER) 17.15 kgCO<sub>2</sub>/m<sup>2</sup>OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)52.2 kWh/m<sup>2</sup>/yr  
Dwelling Fabric Energy Efficiency (DFEE)44.7 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	1.22 (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: 3.80 m<sup>2</sup>, No overhang

Windows facing South East: 1.76 m<sup>2</sup>, No overhang

Windows facing South West: 6.66 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

# 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)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), 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)
Cooking gains (calculated in Appendix L, equation L15 or L15a), 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)
Pumps, fans	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)
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)	-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)
Total internal gains	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)
	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	Specific data	FF	Access factor	Gains							
	m <sup>2</sup>	Table 6a	g	or Table 6c	Table 6d	W							
		W/m <sup>2</sup>	or Table 6b										
Northeast	3.8000	11.2829	0.6300	0.7000	0.7700	13.1032 (75)							
Southeast	1.7600	36.7938	0.6300	0.7000	0.7700	19.7906 (77)							
Southwest	2.8800	36.7938	0.6300	0.7000	0.7700	32.3847 (79)							
Southwest	3.7800	36.7938	0.6300	0.7000	0.7700	42.5049 (79)							
Solar gains	107.7834	187.9473	268.7183	352.3324	412.3285	417.1266	398.9169	352.9678	297.4874	210.8388	129.8922	91.7272	(83)
Total gains	461.7452	539.7993	607.5939	670.3645	709.2833	693.7455	662.3276	622.2690	577.5004	511.9008	455.1084	434.9846	(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	(86)
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	(86)
util living area	0.9880	0.9786	0.9594	0.9144	0.8252	0.6795	0.5311	0.5781	0.7896	0.9364	0.9799	0.9902	(86)
MIT	19.2298	19.4537	19.8003	20.2413	20.6210	20.8704	20.9599	20.9452	20.7638	20.2674	19.6694	19.1911	(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	0.9854	0.9739	0.9500	0.8937	0.7813	0.5994	0.4200	0.4673	0.7229	0.9167	0.9747	0.9881	(89)
MIT 2	17.5799	17.9061	18.4071	19.0388	19.5517	19.8598	19.9442	19.9358	19.7455	19.0883	18.2296	17.5300	(90)
Living area fraction	fLA = Living area / (4) =												
MIT	18.1186	18.4114	18.8620	19.4315	19.9009	20.1898	20.2758	20.2654	20.0780	19.4733	18.6997	18.0724	(92)
Temperature adjustment													
adjusted MIT	17.9686	18.2614	18.7120	19.2815	19.7509	20.0398	20.1258	20.1154	19.9280	19.3233	18.5497	17.9224	(93)

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9781	0.9634	0.9356	0.8773	0.7714	0.6057	0.4382	0.4843	0.7205	0.9013	0.9647	0.9818	(94)
Useful gains	451.6513	520.0271	568.4791	588.1123	547.1319	420.1690	290.2138	301.3562	416.0621	461.3993	439.0218	427.0769	(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	1200.2965	1170.1544	1066.6571	895.4577	692.7913	462.9376	300.0564	315.5399	498.1074	750.6543	989.9895	1192.4097	(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	556.9920	436.8856	370.6444	221.2887	108.3706	0.0000	0.0000	0.0000	0.0000	215.2057	396.6967	569.4076	(98)
Space heating													
Space heating per m <sup>2</sup>												(98) / (4) = 38.6387 (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													3187.9062 (211)
Space heating requirement	556.9920	436.8856	370.6444	221.2887	108.3706	0.0000	0.0000	0.0000	0.0000	215.2057	396.6967	569.4076	(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)	617.5078	484.3521	410.9140	245.3312	120.1448	0.0000	0.0000	0.0000	0.0000	238.5873	439.7968	631.2722	(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	86.8425	86.5578	86.0072	84.8205	82.5001	76.2000	76.2000	76.2000	76.2000	84.6006	86.2368	76.2000	(216)
Fuel for water heating, kWh/month	170.9375	149.9333	155.6446	137.5368	135.6260	126.6593	117.3684	134.7372	136.4023	143.2377	153.4515	165.2847	(219)
Water heating fuel used													1726.8195 (219)
Annual totals kWh/year													
Space heating fuel - main system													3187.9062 (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													5328.6611 (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	3187.9062	0.2160	688.5877	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1726.8195	0.2160	372.9930	(264)
Space and water heating			1061.5808	(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			1276.4132	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			17.1500	(273)

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

	TFA	N	EF	
DER				17.1500 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				36.0198 ZC4
Residual CO2 emissions offset from biofuel CHP				0.0000 ZC5
Additional allowable electricity generation, kWh/m²/year				0.0000 ZC6
Resulting CO2 emissions offset from additional allowable electricity generation				0.0000 ZC7
Net CO2 emissions				36.0198 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	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 <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) =	0.1616 (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 <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			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 <sup>2</sup> )			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 <sup>2</sup> 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)												
Jan	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)
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

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	(57)	
Total heat required for water heating calculated for each month	50.4361	43.8987	46.7681	43.4845	43.1000	39.9348	41.2659	43.1000	43.4845	46.7681	47.0343	50.4361	50.4361	50.4361	50.4361	50.4361	50.4361	50.4361	50.4361	50.4361	50.4361	50.4361	50.4361	(61)
Solar input	197.2119	172.2697	179.2355	158.9728	153.9138	135.5586	129.8755	144.7808	146.3797	166.6825	177.9302	192.5807	192.5807	192.5807	192.5807	192.5807	192.5807	192.5807	192.5807	192.5807	192.5807	192.5807	192.5807	(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	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	197.2119	172.2697	179.2355	158.9728	153.9138	135.5586	129.8755	144.7808	146.3797	166.6825	177.9302	192.5807	192.5807	192.5807	192.5807	192.5807	192.5807	192.5807	192.5807	192.5807	192.5807	192.5807	192.5807	(64)
	61.4120	53.6580	55.7374	49.2710	47.6206	41.7786	39.7792	44.5839	45.0838	51.5636	55.2815	59.8721	59.8721	59.8721	59.8721	59.8721	59.8721	59.8721	59.8721	59.8721	59.8721	59.8721	59.8721	(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)m
(66)m	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	117.4242	(66)
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)	82.5430	79.8483	74.9159	68.4319	64.0062	58.0259	53.4666	59.9245	62.6164	69.3059	76.7798	80.4732	(72)
Total internal gains	370.3481	367.6596	354.1209	332.7242	311.0751	290.1759	276.9997	283.4514	294.7495	316.3517	341.0490	359.6613	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data g or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	(75)						
Northeast	3.8000	11.2829	0.6300	0.7000	0.7700	13.1032	(75)						
Southeast	1.7600	36.7938	0.6300	0.7000	0.7700	19.7906	(77)						
Southwest	6.6600	36.7938	0.6300	0.7000	0.7700	74.8895	(79)						
Solar gains	107.7834	187.9473	268.7183	352.3324	412.3285	417.1266	398.9169	352.9678	297.4874	210.8388	129.8922	91.7272	(83)
Total gains	478.1315	555.6069	622.8392	685.0567	723.4036	707.3025	675.9166	636.4192	592.2369	527.1906	470.9412	451.3885	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (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)	58.8422	59.0012	59.1579	59.9051	60.0470	60.7166	60.7166	60.8422	60.4569	60.0470	59.7607	59.4642	(85)
tau	4.9228	4.9334	4.9439	4.9937	5.0031	5.0478	5.0478	5.0561	5.0305	5.0031	4.9840	4.9643	(86)
util living area	0.9973	0.9939	0.9846	0.9544	0.8726	0.7105	0.5412	0.5927	0.8325	0.9697	0.9943	0.9980	(86)
MIT	19.7576	19.9225	20.1789	20.5086	20.7867	20.9467	20.9890	20.9829	20.8778	20.5161	20.0760	19.7300	(87)
Th 2	19.9359	19.9384	19.9410	19.9527	19.9550	19.9653	19.9653	19.9672	19.9613	19.9550	19.9505	19.9458	(88)
util rest of house	0.9964	0.9918	0.9791	0.9374	0.8258	0.6186	0.4206	0.4702	0.7576	0.9550	0.9920	0.9973	(89)
MIT 2	18.2872	18.5291	18.9023	19.3782	19.7462	19.9298	19.9612	19.9602	19.8645	19.3980	18.7625	18.2539	(90)
Living area fraction	18.7673	18.9841	19.3191	19.7473	20.0860	20.2619	20.2968	20.2941	20.1953	19.7631	19.1914	18.7359	(92)
Temperature adjustment	18.7673	18.9841	19.3191	19.7473	20.0860	20.2619	20.2968	20.2941	20.1953	19.7631	19.1914	18.7359	(93)
adjusted MIT	18.7673	18.9841	19.3191	19.7473	20.0860	20.2619	20.2968	20.2941	20.1953	19.7631	19.1914	18.7359	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(94)
Useful gains	475.6980	549.5868	607.1569	639.3392	602.2095	457.3721	311.0841	324.8564	459.9276	501.6094	466.0419	449.6321	(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	1270.6506	1233.6595	1119.8827	935.8021	721.7525	481.9252	314.6648	330.7766	521.0497	788.6354	1045.6533	1263.3227	(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	591.4448	459.6969	381.4680	213.4532	88.9401	0.0000	0.0000	0.0000	0.0000	213.5474	417.3202	605.3858	(98)
Space heating												2971.2564	(98)
Space heating per m2												39.9255	(99)

8c. Space cooling requirement  
Not applicable

# 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													3181.2167 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	591.4448	459.6969	381.4680	213.4532	88.9401	0.0000	0.0000	0.0000	0.0000	213.5474	417.3202	605.3858	(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)	633.2385	492.1808	408.4240	228.5367	95.2249	0.0000	0.0000	0.0000	0.0000	228.6374	446.8097	648.1647	(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	87.6434	87.4033	86.9058	85.7938	83.7258	80.3000	80.3000	80.3000	80.3000	85.6760	87.1244	80.3000	(216)
Fuel for water heating, kWh/month	225.0162	197.0976	206.2411	185.2965	183.8307	168.8152	161.7379	180.2998	182.2910	194.5497	204.2256	219.4983	(219)
Water heating fuel used													2308.8997 (219)
Annual totals kWh/year													
Space heating fuel - main system													3181.2167 (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													5904.0517 (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	3181.2167	0.2160	687.1428 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2308.8997	0.2160	498.7223 (264)
Space and water heating			1185.8651 (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			1400.6976 (272)
Emissions per m2 for space and water heating			15.9348 (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) = (15.9348 * 1.00) + 2.3637 + 0.5230, rounded to 2 d.p.			18.8200 (273)

# U-VALUE CALCULATOR REPORT

Property Reference	007818 - Plot 017		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2328-Semi-MT	
Project	Plot 017			
Calculation Type	New Build (As Designed)			

SAP Rating	84 B	DER	17.15	TER	18.82
Environmental	87 B	% DER<TER	8.88		
CO <sub>2</sub> Emissions (t/year)	1.06	DFEE	44.71	TFEE	52.16
General Requirements Compliance	Pass	% DFEE<TFEE	14.28		

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 017		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2328-Semi-MT	
Project	Plot 017			
Calculation Type	New Build (As Designed)			

SAP Rating	84 B	DER	17.15	TER	18.82
Environmental	87 B	% DER<TER	8.88		
CO <sub>2</sub> Emissions (t/year)	1.06	DFEE	44.71	TFEE	52.16
General Requirements Compliance	Pass	% DFEE<TFEE	14.28		

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
<b>Total thickness: 328 mm</b>	<b>U-value: 0.24 W/m<sup>2</sup> K</b>
	<b>Kappa: n/a</b>

# U-VALUE CALCULATOR REPORT

Property Reference	007818 - Plot 017		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2328-Semi-MT	
Project	Plot 017			
Calculation Type	New Build (As Designed)			

SAP Rating	84 B	DER	17.15	TER	18.82
Environmental	87 B	% DER<TER	8.88		
CO <sub>2</sub> Emissions (t/year)	1.06	DFEE	44.71	TFEE	52.16
General Requirements Compliance	Pass	% DFEE<TFEE	14.28		

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 m<sup>2</sup>, 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<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 017	<b>Issued on Date</b>	15/03/2021
<b>Assessment Reference</b>	Rev A	<b>Prop Type Ref</b>	007818-SAP-2328-Semi-MT
<b>Property</b>	Plot 017		

<b>SAP Rating</b>	84 B	<b>DER</b>	17.15	<b>TER</b>	18.82
<b>Environmental</b>	87 B	<b>% DER&lt;TER</b>	8.88		
<b>CO<sub>2</sub> Emissions (t/year)</b>	1.06	<b>DFEE</b>	44.71	<b>TFEE</b>	52.16
<b>General Requirements Compliance</b>	Pass	<b>% DFEE&lt;TFEE</b>	14.28		

<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)	18.82	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	17.15	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-1.67 (-8.9%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	52.16	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	44.71	kWh/m <sup>2</sup> /yr	
	-7.5 (-14.4%)	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	1.22 (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
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Secondary heating system	None	
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### 5 Cylinder insulation

Hot water storage	No cylinder	
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### 6 Controls

Space heating controls	Time and temperature zone control	Pass
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Hot water controls	No cylinder	
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Boiler interlock	Yes	Pass
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### 7 Low energy lights

Percentage of fixed lights with low-energy fittings	100	%	
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Minimum	75	%	Pass
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### 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
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Based on:

Overshading	Average
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Windows facing North East	3.80 m <sup>2</sup> , No overhang
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Windows facing South East	1.76 m <sup>2</sup> , No overhang
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Windows facing South West	6.66 m <sup>2</sup> , No overhang
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Air change rate	8.00 ach
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Blinds/curtains	None
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## Criterion 4 – Building performance consistent with DER and DFEE rate

### Party Walls

Type	U-value	W/m <sup>2</sup> K	
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)
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Maximum	10.0	Pass
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### 10 Key features

Party wall U-value	0.00	W/m <sup>2</sup> K
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Roof U-value	0.09	W/m <sup>2</sup> K
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Door U-value	1.00	W/m <sup>2</sup> K
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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 017		Issued on Date	15/03/2021	
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2328-Semi-MT		
Property	Plot 017				
SAP Rating	84 B	DER	17.15	TER	18.82
Environmental	87 B	% DER<TER	8.88		
CO <sub>2</sub> Emissions (t/year)	1.06	DFEE	44.71	TFEE	52.16
General Requirements Compliance	Pass	% DFEE<TFEE	14.28		
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 East
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 <sup>2</sup>	2.39 m
1st Storey:	17.30 m	37.21 m <sup>2</sup>	2.60 m

7.0 Living Area  m<sup>2</sup>

8.0 Thermal Mass Parameter  
 Thermal Mass   
 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	86.39	72.07

#### 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	40.19

#### 9.2 Internal Walls

Description	Construction	Kappa (kJ/m <sup>2</sup> K)	Area (m <sup>2</sup> )
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 <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	37.21	37.21



# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

### 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	37.21

### 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	37.21

### 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	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 <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

### 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	North East							2.10	
Front Windows	Window	[1] External Wall	North East	None	0.00					3.80	
Rear Windows	Window	[1] External Wall	South West	None	0.00					2.88	
Patio Doors	Window	[1] External Wall	South West	None	0.00					3.78	
LHS Windows	Window	[1] External Wall	South 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/m<sup>2</sup>K

### 18.0 Pressure Testing

Designed AP<sub>50</sub>  m<sup>3</sup>/(h.m<sup>2</sup>) @ 50 Pa

Property Tested ?

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

As Built AP<sub>50</sub>

m<sup>3</sup>/(h.m<sup>2</sup>) @ 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
------------------------	----

### 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
<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	£30	B 85	
	Typical Cost	Typical savings per year	Ratings after improvement	
Solar photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£345	A 97	