



elmhurst  
energy



## SAP Report Submission for Building Regulations Compliance

Client:

Project: Plot 082

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 082		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2308-MT	
Property	Plot 082			

SAP Rating	84 B	DER	17.29	TER	18.40
Environmental	86 B	% DER<TER	6.05		
CO <sub>2</sub> Emissions (t/year)	1.21	DFEE	45.62	TFEE	52.41
General Requirements Compliance	Pass	% DFEE<TFEE	12.96		

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	10.64	0.43	
External wall	E3 Sill	Independently assessed	0.027	8.14	0.22	
External wall	E4 Jamb	Independently assessed	0.029	24.90	0.72	
External wall	E5 Ground floor (normal)	Independently assessed	0.049	19.78	0.97	
External wall	E6 Intermediate floor within a dwelling	Independently assessed	0.003	19.78	0.06	
External wall	E10 Eaves (insulation at ceiling level)	Independently assessed	0.083	9.86	0.82	
External wall	E12 Gable (insulation at ceiling level)	Independently assessed	0.054	9.92	0.54	
External wall	E16 Corner (normal)	Independently assessed	0.050	14.96	0.75	
External wall	E17 Corner (inverted – internal area greater than external area)	Independently assessed	-0.091	4.98	-0.45	
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	9.96	1.59	
Party wall	P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	0.000	9.96	0.00	
Party wall	P4 Party wall - Roof (insulation at ceiling level)	Table K1 - Default	0.240	9.96	2.39	

Total: **9.23** W/mK:  
 Y-Value: **0.050** W/m<sup>2</sup>K:

# FULL SAP CALCULATION PRINTOUT

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Client	Larkfleet Group				

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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 86 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) 18.40 kgCO<sub>2</sub>/m<sup>2</sup>  
Dwelling Carbon Dioxide Emission Rate (DER) 17.29 kgCO<sub>2</sub>/m<sup>2</sup>OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)52.4 kWh/m<sup>2</sup>/yr  
Dwelling Fabric Energy Efficiency (DFEE)45.6 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 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: 4.95 m<sup>2</sup>, No overhang

Windows facing South East: 0.66 m<sup>2</sup>, No overhang

Windows facing South West: 6.13 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 (m <sup>2</sup> )	Storey height (m)	Volume (m <sup>3</sup> )
Ground floor	42.8300 (1b)	2.3800 (2b)	101.9354 (1b) - (3b)
First floor	42.8300 (1c)	2.6000 (2c)	111.3580 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.6600		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 213.2934 (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				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) =	0.1875 (8)							
Pressure test					Yes							
Measured/design AP50					5.0000							
Infiltration rate					0.4375 (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) =		0.3719 (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	0.4742	0.4649	0.4556	0.4091	0.3998	0.3533	0.3533	0.3440	0.3719	0.3998	0.4184	0.4370 (22b)
Effective ac	0.6124	0.6081	0.6038	0.5837	0.5799	0.5624	0.5624	0.5592	0.5692	0.5799	0.5875	0.5955 (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
Half Glazed Door			2.1000	1.0000	2.1000		(26a)
Windows (Uw = 1.20)			8.5900	1.1450	9.8359		(27)
Patio Door (Uw = 1.40)			3.1500	1.3258	4.1761		(27)
Ground Floor			42.8300	0.1400	5.9962	75.0000	3212.2500 (28a)
External Wall 1	98.6100	13.8400	84.7700	0.2400	20.3448	60.0000	5086.2000 (29a)
Cold Roof	42.8300		42.8300	0.0900	3.8547	9.0000	385.4700 (30)
Total net area of external elements Aum(A, m <sup>2</sup> )			184.2700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	46.3077		(33)
Party Wall 1			109.7900	0.0000	0.0000	45.0000	4940.5500 (32)
GF			63.7800			9.0000	574.0200 (32c)
FF			28.3700			9.0000	255.3300 (32c)
FF			42.8300			18.0000	770.9400 (32d)
GF			42.8300			18.0000	770.9400 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15995.7000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K							186.7348 (35)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.2253 (36)
Total fabric heat loss						(33) + (36) =	55.5330 (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	43.1065	42.7992	42.4980	41.0833	40.8187	39.5865	39.5865	39.3583	40.0611	40.8187	41.3541	41.9139 (38)
Average = Sum(39)m / 12 =	98.6395	98.3322	98.0311	96.6164	96.3517	95.1196	95.1196	94.8914	95.5942	96.3517	96.8871	97.4469 (39)
HLP	1.1515	1.1479	1.1444	1.1279	1.1248	1.1104	1.1104	1.1078	1.1160	1.1248	1.1311	1.1376 (40)
HLP (average)												1.1279 (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												2.5615 (42)
Average daily hot water use (litres/day)												95.0365 (43)
Daily hot water use	104.5402	100.7387	96.9373	93.1358	89.3344	85.5329	85.5329	89.3344	93.1358	96.9373	100.7387	104.5402 (44)
Energy conte	155.0301	135.5903	139.9171	121.9831	117.0457	101.0015	93.5928	107.3991	108.6817	126.6581	138.2572	150.1384 (45)

# FULL SAP CALCULATION PRINTOUT

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

Energy content (annual)													Total = Sum(45)m =	1495.2949 (45)
Distribution loss (46)m = 0.15 x (45)m														
	23.2545	20.3385	20.9876	18.2975	17.5569	15.1502	14.0389	16.1099	16.3023	18.9987	20.7386	22.5208	(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	0.6707	0.6072	0.6103	0.5112	0.4705	0.3888	0.3602	0.4317	0.4555	0.5525	0.6192	0.6496	(61)	
Total heat required for water heating calculated for each month	155.7008	136.1975	140.5274	122.4943	117.5162	101.3903	93.9530	107.8308	109.1372	127.2106	138.8764	150.7879	(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	155.7008	136.1975	140.5274	122.4943	117.5162	101.3903	93.9530	107.8308	109.1372	127.2106	138.8764	150.7879	(64)	
Heat gains from water heating, kWh/month	51.7152	45.2356	46.6750	40.6872	39.0353	33.6802	31.2096	35.8181	36.2506	42.2519	46.1253	50.0834	(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	22.1831	19.7028	16.0234	12.1307	9.0679	7.6555	8.2720	10.7523	14.4317	18.3243	21.3872	22.7996	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	230.8630	233.2587	227.2217	214.3698	198.1466	182.8991	172.7128	170.3172	176.3541	189.2060	205.4292	220.6767	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.8077	35.8077	35.8077	35.8077	35.8077	35.8077	35.8077	35.8077	35.8077	35.8077	35.8077	35.8077	(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)	-102.4616	-102.4616	-102.4616	-102.4616	-102.4616	-102.4616	-102.4616	-102.4616	-102.4616	-102.4616	-102.4616	-102.4616	(71)
Water heating gains (Table 5)	69.5097	67.3149	62.7352	56.5100	52.4668	46.7780	41.9485	48.1426	50.3480	56.7902	64.0629	67.3164	(72)
Total internal gains	386.9789	384.6994	370.4035	347.4337	324.1044	301.7557	287.3564	293.6352	305.5569	328.7437	355.3025	375.2158	(73)

#### 6. Solar gains

[Jan]	Area	Solar flux	Specific data	FF	Access factor	Gains							
	m2	Table 6a	g		Table 6d	W							
		W/m2	or Table 6b	or Table 6c									
Northeast	4.9500	11.2829	0.6300	0.7000	0.7700	17.0687 (75)							
Southeast	0.6600	36.7938	0.6300	0.7000	0.7700	7.4215 (77)							
Southwest	2.9800	36.7938	0.6300	0.7000	0.7700	33.5091 (79)							
Southwest	3.1500	36.7938	0.6300	0.7000	0.7700	35.4207 (79)							
Solar gains	93.4200	164.7983	240.5435	323.2867	385.1474	392.4965	374.1911	326.4908	268.9539	186.1976	112.9281	79.2800	(83)
Total gains	480.3988	549.4977	610.9470	670.7203	709.2518	694.2522	661.5474	620.1260	574.5107	514.9413	468.2305	454.4958	(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	45.0453	45.1861	45.3249	45.9886	46.1149	46.7123	46.7123	46.8246	46.4804	46.1149	45.8601	45.5966	
alpha	4.0030	4.0124	4.0217	4.0659	4.0743	4.1142	4.1142	4.1216	4.0987	4.0743	4.0573	4.0398	
util living area	0.9949	0.9906	0.9806	0.9526	0.8842	0.7484	0.5936	0.6451	0.8551	0.9666	0.9910	0.9959	(86)
MIT	19.3979	19.5756	19.8715	20.2698	20.6293	20.8766	20.9642	20.9496	20.7675	20.3048	19.7849	19.3720	(87)
Th 2	19.9590	19.9619	19.9647	19.9781	19.9806	19.9923	19.9923	19.9945	19.9878	19.9806	19.9755	19.9702	(88)
util rest of house	0.9936	0.9881	0.9752	0.9384	0.8471	0.6683	0.4744	0.5279	0.7955	0.9539	0.9882	0.9949	(89)
MIT 2	17.8172	18.0779	18.5092	19.0885	19.5828	19.8931	19.9744	19.9667	19.7738	19.1475	18.3934	17.7868	(90)
Living area fraction													fLA = Living area / (4) =
MIT	18.4620	18.6888	19.0649	19.5704	20.0097	20.2943	20.3781	20.3676	20.1791	19.6195	18.9610	18.4334	(92)
Temperature adjustment													-0.1500
adjusted MIT	18.3120	18.5388	18.9149	19.4204	19.8597	20.1443	20.2281	20.2176	20.0291	19.4695	18.8110	18.2834	(93)

#### 8. Space heating requirement

Utilisation	0.9905	0.9834	0.9678	0.9286	0.8420	0.6816	0.5039	0.5559	0.7984	0.9454	0.9836	0.9923	(94)
Useful gains	475.8158	540.3529	591.2951	622.8023	597.1649	473.1836	333.3355	344.7086	458.6859	486.8074	460.5627	450.9832	(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	1382.1347	1341.1311	1217.0439	1016.4382	786.1995	527.3694	345.1079	362.2592	566.7879	854.5960	1134.6432	1372.3860	(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	674.3012	538.1230	465.5571	283.4178	140.6417	0.0000	0.0000	0.0000	0.0000	273.6347	485.3379	685.5237	(98)
Space heating													3546.5372 (98)
Space heating per m2													(98) / (4) = 41.4025 (99)

# FULL SAP CALCULATION PRINTOUT

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

8c. Space cooling requirement

Not applicable

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													90.2000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3931.8594 (211)
Space heating requirement	674.3012	538.1230	465.5571	283.4178	140.6417	0.0000	0.0000	0.0000	0.0000	273.6347	485.3379	685.5237	(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)	747.5623	596.5886	516.1387	314.2104	155.9221	0.0000	0.0000	0.0000	0.0000	303.3644	538.0687	760.0041	(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	155.7008	136.1975	140.5274	122.4943	117.5162	101.3903	93.9530	107.8308	109.1372	127.2106	138.8764	150.7879	(64)
Efficiency of water heater (217)m	87.2438	87.0251	86.5742	85.5374	83.3469	76.4000	76.4000	76.4000	76.4000	85.3098	86.7152	76.4000	(216)
Fuel for water heating, kWh/month	178.4663	156.5038	162.3202	143.2055	140.9965	132.7098	122.9751	141.1398	142.8498	149.1161	160.1523	172.6150	(219)
Water heating fuel used													1803.0501 (219)
Annual totals kWh/year													
Space heating fuel - main system													3931.8594 (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)													391.7601 (232)
Total delivered energy for all uses													6201.6696 (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	3931.8594	0.2160	849.2816	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1803.0501	0.2160	389.4588	(264)
Space and water heating			1238.7405	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	391.7601	0.5190	203.3235	(268)
Total CO2, kg/year			1480.9889	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			17.2900	(273)

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

DER			17.2900	ZC1
Total Floor Area		TFA	85.6600	
Assumed number of occupants		N	2.5615	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			15.9706	ZC2
CO2 emissions from cooking, equation (L16)			2.1069	ZC3
Total CO2 emissions			35.3675	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			35.3675	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	42.8300 (1b)	2.3800 (2b)	101.9354 (1b) - (3b)
First floor	42.8300 (1c)	2.6000 (2c)	111.3580 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.6600		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 213.2934 (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) =	0.1407 (8)							
Pressure test				Yes								
Measured/design AP50				5.0000								
Infiltration rate				0.3907 (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) =		0.3321 (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	0.4234	0.4151	0.4068	0.3653	0.3570	0.3155	0.3155	0.3071	0.3321	0.3570	0.3736	0.3902 (22b)
Effective ac	0.5896	0.5861	0.5827	0.5667	0.5637	0.5498	0.5498	0.5472	0.5551	0.5637	0.5698	0.5761 (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)			11.7400	1.3258	15.5644		(27)					
Ground Floor			42.8300	0.1300	5.5679		(28a)					
External Wall 1	98.6100	13.8400	84.7700	0.1800	15.2586		(29a)					
Cold Roof	42.8300		42.8300	0.1300	5.5679		(30)					
Total net area of external elements Aum(A, m <sup>2</sup> )			184.2700				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 44.4788		(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)							10.0240 (36)					
Total fabric heat loss							(33) + (36) = 54.5028 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 41.5015	Feb 41.2566	Mar 41.0165	Apr 39.8887	May 39.6777	Jun 38.6955	Jul 38.6955	Aug 38.5136	Sep 39.0738	Oct 39.6777	Nov 40.1046	Dec 40.5508 (38)
Heat transfer coeff	96.0043	95.7593	95.5192	94.3915	94.1805	93.1983	93.1983	93.0164	93.5766	94.1805	94.6074	95.0536 (39)
Average = Sum(39)m / 12 =												94.3905 (39)
HLP	Jan 1.1208	Feb 1.1179	Mar 1.1151	Apr 1.1019	May 1.0995	Jun 1.0880	Jul 1.0880	Aug 1.0859	Sep 1.0924	Oct 1.0995	Nov 1.1045	Dec 1.1097 (40)
HLP (average)												1.1019 (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												2.5615 (42)
Average daily hot water use (litres/day)												95.0365 (43)
Daily hot water use	104.5402	100.7387	96.9373	93.1358	89.3344	85.5329	85.5329	89.3344	93.1358	96.9373	100.7387	104.5402 (44)
Energy conte	155.0301	135.5903	139.9171	121.9831	117.0457	101.0015	93.5928	107.3991	108.6817	126.6581	138.2572	150.1384 (45)
Energy content (annual)												Total = Sum(45)m = 1495.2949 (45)
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:	23.2545	20.3385	20.9876	18.2975	17.5569	15.1502	14.0389	16.1099	16.3023	18.9987	20.7386	22.5208 (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												



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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	(57)
Total heat required for water heating calculated for each month	50.9589	46.0274	49.3982	45.9300	45.5238	42.1806	43.5866	45.5238	45.9300	49.3982	49.3151	50.9589	61									
Solar input	205.9890	181.6177	189.3152	167.9131	162.5695	143.1821	137.1794	152.9229	154.6117	176.0563	187.5723	201.0973	(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	205.9890	181.6177	189.3152	167.9131	162.5695	143.1821	137.1794	152.9229	154.6117	176.0563	187.5723	201.0973	(64)									
	64.2872	56.5906	58.8720	52.0419	50.2986	44.1282	42.0162	47.0911	47.6192	54.4634	58.2993	62.6607	(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
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	128.0769	128.0769	128.0769	128.0769	128.0769	128.0769	128.0769	128.0769	128.0769	128.0769	128.0769	128.0769	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	22.1831	19.7028	16.0234	12.1307	9.0679	7.6555	8.2720	10.7523	14.4317	18.3243	21.3872	22.7996	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	230.8630	233.2587	227.2217	214.3698	198.1466	182.8991	172.7128	170.3172	176.3541	189.2060	205.4292	220.6767	(68)
Pumps, fans	35.8077	35.8077	35.8077	35.8077	35.8077	35.8077	35.8077	35.8077	35.8077	35.8077	35.8077	35.8077	(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)	-102.4616	-102.4616	-102.4616	-102.4616	-102.4616	-102.4616	-102.4616	-102.4616	-102.4616	-102.4616	-102.4616	-102.4616	(71)
Total internal gains	86.4076	84.2122	79.1290	72.2804	67.6057	61.2891	56.4734	63.2945	66.1377	73.2034	80.9712	84.2214	(72)
	403.8768	401.5968	386.7972	363.2041	339.2433	316.2668	301.8814	308.7871	321.3466	345.1569	372.2107	392.1209	(73)

#### 6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W							
Northeast	4.9500	11.2829	0.6300	0.7000	0.7700	17.0687 (75)							
Southeast	0.6600	36.7938	0.6300	0.7000	0.7700	7.4215 (77)							
Southwest	6.1300	36.7938	0.6300	0.7000	0.7700	68.9298 (79)							
Solar gains	93.4200	164.7983	240.5435	323.2867	385.1474	392.4965	374.1911	326.4908	268.9539	186.1976	112.9281	79.2800	(83)
Total gains	497.2968	566.3951	627.3407	686.4907	724.3907	708.7632	676.0724	635.2779	590.3005	531.3545	485.1388	471.4008	(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)	61.9619	62.1204	62.2766	63.0206	63.1618	63.8275	63.8275	63.9523	63.5694	63.1618	62.8768	62.5817	
tau	5.1308	5.1414	5.1518	5.2014	5.2108	5.2552	5.2552	5.2635	5.2380	5.2108	5.1918	5.1721	
util living area	0.9983	0.9963	0.9907	0.9705	0.9072	0.7600	0.5885	0.6435	0.8748	0.9807	0.9964	0.9987	(86)
MIT	19.7800	19.9221	20.1575	20.4736	20.7579	20.9359	20.9865	20.9789	20.8568	20.4928	20.0806	19.7562	(87)
Th 2	19.9839	19.9862	19.9885	19.9993	20.0013	20.0106	20.0106	20.0124	20.0070	20.0013	19.9972	19.9930	(88)
util rest of house	0.9977	0.9951	0.9873	0.9588	0.8692	0.6725	0.4654	0.5200	0.8109	0.9708	0.9950	0.9983	(89)
MIT 2	18.3541	18.5631	18.9073	19.3683	19.7546	19.9658	20.0054	20.0032	19.8868	19.4023	18.8031	18.3258	(90)
Living area fraction	18.9357	19.1174	19.4172	19.8191	20.1639	20.3615	20.4056	20.4012	fLA = Living area / (4) =	20.2824	19.8471	19.3241	0.4079 (91)
MIT	18.9357	19.1174	19.4172	19.8191	20.1639	20.3615	20.4056	20.4012	20.2824	19.8471	19.3241	18.9092	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.9357	19.1174	19.4172	19.8191	20.1639	20.3615	20.4056	20.4012	20.2824	19.8471	19.3241	18.9092	(93)

#### 8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9969	0.9935	0.9847	0.9561	0.8763	0.7058	0.5161	0.5708	0.8311	0.9689	0.9936	0.9976 (94)	
Useful gains	495.7365	562.7370	617.7349	656.3776	634.7830	500.2272	348.8884	362.5991	490.6090	514.8028	482.0276	470.2704 (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	1405.0900	1361.4510	1233.8439	1030.6737	797.1325	536.9613	354.6736	372.1747	578.5315	870.8958	1156.4941	1398.1665 (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	676.5590	536.7358	458.3850	269.4932	120.7880	0.0000	0.0000	0.0000	0.0000	264.9332	485.6159	690.3547 (98)	
Space heating												3502.8648 (98)	
Space heating per m2												(98) / (4) =	40.8927 (99)

#### 8c. Space cooling requirement

Not applicable

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#### 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													3750.3906 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	676.5590	536.7358	458.3850	269.4932	120.7880	0.0000	0.0000	0.0000	0.0000	264.9332	485.6159	690.3547	(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)	724.3672	574.6636	490.7763	288.5366	129.3233	0.0000	0.0000	0.0000	0.0000	283.6544	519.9314	739.1378	(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	205.9890	181.6177	189.3152	167.9131	162.5695	143.1821	137.1794	152.9229	154.6117	176.0563	187.5723	201.0973	(64)
Efficiency of water heater (217)m	87.8218	87.6139	87.1944	86.2362	84.3156	80.3000	80.3000	80.3000	80.3000	86.0777	87.3391	80.3000	(216)
Fuel for water heating, kWh/month	234.5533	207.2933	217.1185	194.7131	192.8107	178.3090	170.8336	190.4394	192.5426	204.5319	214.7632	228.7645	(219)
Water heating fuel used													2426.6732 (219)
Annual totals kWh/year													
Space heating fuel - main system													3750.3906 (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)													391.7601 (232)
Total delivered energy for all uses													6643.8239 (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	3750.3906	0.2160	810.0844 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2426.6732	0.2160	524.1614 (264)
Space and water heating			1334.2458 (265)
Pumps and fans	75.0000	0.5190	38.9250 (267)
Energy for lighting	391.7601	0.5190	203.3235 (268)
Total CO2, kg/m2/year			1576.4943 (272)
Emissions per m2 for space and water heating			15.5761 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.3736 (272b)
Emissions per m2 for pumps and fans			0.4544 (272c)
Target Carbon Dioxide Emission Rate (TER) = (15.5761 * 1.00) + 2.3736 + 0.4544, rounded to 2 d.p.			18.4000 (273)

# U-VALUE CALCULATOR REPORT

Property Reference	007818 - Plot 082		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2308-MT	
Project	Plot 082			
Calculation Type	New Build (As Designed)			

SAP Rating	84 B	DER	17.29	TER	18.40
Environmental	86 B	% DER<TER	6.05		
CO <sub>2</sub> Emissions (t/year)	1.21	DFEE	45.62	TFEE	52.41
General Requirements Compliance	Pass	% DFEE<TFEE	12.96		

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 082		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2308-MT	
Project	Plot 082			
Calculation Type	New Build (As Designed)			

SAP Rating	84 B	DER	17.29	TER	18.40
Environmental	86 B	% DER<TER	6.05		
CO <sub>2</sub> Emissions (t/year)	1.21	DFEE	45.62	TFEE	52.41
General Requirements Compliance	Pass	% DFEE<TFEE	12.96		

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 082		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2308-MT	
Project	Plot 082			
Calculation Type	New Build (As Designed)			

SAP Rating	84 B	DER	17.29	TER	18.40
Environmental	86 B	% DER<TER	6.05		
CO <sub>2</sub> Emissions (t/year)	1.21	DFEE	45.62	TFEE	52.41
General Requirements Compliance	Pass	% DFEE<TFEE	12.96		

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 = 42.83 m<sup>2</sup>, Perimeter = 19.78 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 082	<b>Issued on Date</b>	15/03/2021
<b>Assessment Reference</b>	Rev A	<b>Prop Type Ref</b>	007818-SAP-2308-MT
<b>Property</b>	Plot 082		

<b>SAP Rating</b>	84 B	<b>DER</b>	17.29	<b>TER</b>	18.40
<b>Environmental</b>	86 B	<b>% DER&lt;TER</b>	6.05		
<b>CO<sub>2</sub> Emissions (t/year)</b>	1.21	<b>DFEE</b>	45.62	<b>TFEE</b>	52.41
<b>General Requirements Compliance</b>	Pass	<b>% DFEE&lt;TFEE</b>	12.96		

<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)	18.40	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	17.29	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-1.11 (-6.0%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	52.41	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	45.62	kWh/m <sup>2</sup> /yr	
	-6.8 (-13.0%)	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 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

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

Windows facing South East

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

Windows facing South West

6.13 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

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 082		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2308-MT	
Property	Plot 082			

SAP Rating	84 B	DER	17.29	TER	18.40
Environmental	86 B	% DER<TER	6.05		
CO <sub>2</sub> Emissions (t/year)	1.21	DFEE	45.62	TFEE	52.41
General Requirements Compliance	Pass	% DFEE<TFEE	12.96		

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	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:	19.78 m	42.83 m <sup>2</sup>	2.38 m
1st Storey:	22.48 m	42.83 m <sup>2</sup>	2.60 m

7.0 Living Area	34.94	m <sup>2</sup>
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8.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	186.73	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 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.24	60.00	98.61	84.77

#### 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	109.79

#### 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	63.78
FF	Plasterboard on timber frame	9.00	28.37

#### 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	42.83	42.83



# 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	42.83

### 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	42.83

### 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	42.83

### 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 1	North East							2.10	
Front Windows	Window	[1] External Wall 1	North East	None	0.00					4.95	
Rear Windows	Window	[1] External Wall 1	South West	None	0.00					2.98	
Patio Doors	Window	[1] External Wall 1	South West	None	0.00					3.15	
LHS Windows	Window	[1] External Wall 1	South East	None	0.00					0.66	

### 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)	10.64	0.040	No
Independently assessed	E3 Sill	8.14	0.027	No
Independently assessed	E4 Jamb	24.90	0.029	No
Independently assessed	E5 Ground floor (normal)	19.78	0.049	No
Independently assessed	E6 Intermediate floor within a dwelling	19.78	0.003	No
Independently assessed	E10 Eaves (insulation at ceiling level)	9.86	0.083	No
Independently assessed	E12 Gable (insulation at ceiling level)	9.92	0.054	No
Independently assessed	E16 Corner (normal)	14.96	0.050	No
Independently assessed	E17 Corner (inverted – internal area greater than external area)	4.98	-0.091	No
Table K1 - Default	E18 Party wall between dwellings	9.97	0.120	No
Table K1 - Default	P1 Party wall - Ground floor	9.96	0.160	No
Table K1 - Default	P2 Party wall - Intermediate floor within a dwelling	9.96	0.000	No
Table K1 - Default	P4 Party wall - Roof (insulation at ceiling level)	9.96	0.240	No

Y-value  W/m<sup>2</sup>K

### 18.0 Pressure Testing

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

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

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

Cross ventilation possible

Night Ventilation

Air change rate

#### Mechanical Ventilation

Mechanical Ventilation System Present

### 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				4
Number of passive vents				0
Number of flueless gas fires				0

### 21.0 Fixed Cooling System

### 22.0 Lighting

#### Internal

Total number of light fittings

Total number of L.E.L. fittings

Percentage of L.E.L. fittings  %

#### External

External lights fitted

### 23.0 Electricity Tariff

### 24.0 Main Heating 1

Percentage of Heat  %

Database Ref. No.

Fuel Type

Main Heating

SAP Code

In Winter

In Summer

Controls

PCDF Controls

Delayed Start Stat

Sap Code

Flue Type

Fan Assisted Flue

Is MHS Pumped

Heat Emitter

Flow Temperature

Combi boiler type

Combi keep hot type

### 25.0 Main Heating 2

# 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	£31	B 85	
	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar photovoltaic panels, 2.5 kWp	£3,500 - £5,500	£345	A 96	