



elmhurst  
energy



## SAP Report Submission for Building Regulations Compliance

Client:

Project: Plot 081

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 081		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2308-MT	
Property	Plot 081			

SAP Rating	84 B	DER	17.36	TER	18.48
Environmental	86 B	% DER<TER	6.08		
CO <sub>2</sub> Emissions (t/year)	1.21	DFEE	45.93	TFEE	52.81
General Requirements Compliance	Pass	% DFEE<TFEE	13.02		

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				

# FULL SAP CALCULATION PRINTOUT

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

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

DWELLING AS DESIGNED

Semi-Detached House, total floor area 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) 18.48 kgCO<sub>2</sub>/m<sup>2</sup>  
Dwelling Carbon Dioxide Emission Rate (DER) 17.36 kgCO<sub>2</sub>/m<sup>2</sup>OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 52.8 kWh/m<sup>2</sup>/yr  
Dwelling Fabric Energy Efficiency (DFEE) 45.9 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 West: 6.13 m<sup>2</sup>, No overhang

Windows facing North West: 0.66 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 (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	Solar input (sum of months) = Sum(63)m =					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		g		FF		Access		Gains	
	m2		Table 6a		Specific data		Specific data		factor		W	
			W/m2		or Table 6b		or Table 6c		Table 6d			
Northeast	4.9500		11.2829		0.6300		0.7000		0.7700		17.0687 (75)	
Southwest	2.9800		36.7938		0.6300		0.7000		0.7700		33.5091 (79)	
Northwest	0.6600		11.2829		0.6300		0.7000		0.7700		2.2758 (81)	
Southwest	3.1500		36.7938		0.6300		0.7000		0.7700		35.4207 (79)	
Solar gains	88.2743	156.7893	231.5931	315.5622	379.5673	388.3079	369.5906	320.0840	260.3953	177.8873	106.9024	74.7873 (83)
Total gains	475.2532	541.4887	601.9966	662.9959	703.6717	690.0637	656.9469	613.7192	565.9522	506.6310	462.2049	450.0031 (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	0.9951	0.9911	0.9815	0.9543	0.8865	0.7511	0.5969	0.6501	0.8601	0.9683	0.9914	0.9961 (86)	
MIT	19.3910	19.5650	19.8602	20.2611	20.6247	20.8749	20.9635	20.9481	20.7613	20.2949	19.7770	19.3659 (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	0.9938	0.9887	0.9764	0.9405	0.8499	0.6712	0.4774	0.5327	0.8016	0.9561	0.9887	0.9950 (89)	
MIT 2	17.8072	18.0626	18.4931	19.0766	19.5772	19.8915	19.9740	19.9658	19.7670	19.1338	18.3819	17.7780 (90)	
Living area fraction	fLA = Living area / (4) =												
MIT	18.4532	18.6754	19.0507	19.5598	20.0045	20.2926	20.3776	20.3665	20.1726	19.6074	18.9509	18.4257 (92)	
Temperature adjustment													
adjusted MIT	18.3032	18.5254	18.9007	19.4098	19.8545	20.1426	20.2276	20.2165	20.0226	19.4574	18.8009	18.2757 (93)	

#### 8. Space heating requirement

Utilisation	0.9908	0.9841	0.9692	0.9307	0.8445	0.6843	0.5069	0.5606	0.8040	0.9477	0.9843	0.9925 (94)
Useful gains	470.8774	532.8853	583.4544	617.0301	594.2728	472.2224	333.0244	344.0560	455.0375	480.1570	454.9422	446.6397 (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	1381.2719	1339.8206	1215.6569	1015.4180	785.6963	527.2108	345.0558	362.1508	566.1633	853.4256	1133.6678	1371.6355 (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	677.3335	542.2605	470.3586	286.8393	142.4191	0.0000	0.0000	0.0000	0.0000	277.7118	488.6824	688.1969 (98)
Space heating												
Space heating per m2												(98) / (4) = 41.7208 (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													3962.0866 (211)
Space heating requirement	677.3335	542.2605	470.3586	286.8393	142.4191	0.0000	0.0000	0.0000	0.0000	277.7118	488.6824	688.1969	(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)	750.9241	601.1757	521.4619	318.0037	157.8925	0.0000	0.0000	0.0000	0.0000	307.8845	541.7765	762.9677	(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	87.2542	87.0438	86.6016	85.5744	83.3902	76.4000	76.4000	76.4000	76.4000	85.3563	86.7331	76.4000	(216)
Fuel for water heating, kWh/month	178.4450	156.4702	162.2689	143.1437	140.9232	132.7098	122.9751	141.1398	142.8498	149.0347	160.1193	172.5976	(219)
Water heating fuel used													1802.6771 (219)
Annual totals kWh/year													
Space heating fuel - main system													3962.0866 (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													6231.5238 (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	3962.0866	0.2160	855.8107	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1802.6771	0.2160	389.3783	(264)
Space and water heating			1245.1890	(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			1487.4374	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			17.3600	(273)

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

	TFA	N	EF	
DER				17.3600 ZC1
Total Floor Area				85.6600
Assumed number of occupants				2.5615
CO2 emission factor in Table 12 for electricity displaced from grid				0.5190
CO2 emissions from appliances, equation (L14)				15.9706 ZC2
CO2 emissions from cooking, equation (L16)				2.1069 ZC3
Total CO2 emissions				35.4375 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				35.4375 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	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)
(66)m	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)
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)	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)
Total internal gains	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	Solar flux	g	FF	Access	Gains							
	m2	Table 6a	Specific data	Specific data	factor	W							
		W/m2	or Table 6b	or Table 6c	Table 6d								
Northeast	4.9500	11.2829	0.6300	0.7000	0.7700	17.0687	(75)						
Southwest	6.1300	36.7938	0.6300	0.7000	0.7700	68.9298	(79)						
Northwest	0.6600	11.2829	0.6300	0.7000	0.7700	2.2758	(81)						
Solar gains	88.2743	156.7893	231.5931	315.5622	379.5673	388.3079	369.5906	320.0840	260.3953	177.8873	106.9024	74.7873	(83)
Total gains	492.1511	558.3861	618.3903	678.7663	718.8106	704.5747	671.4719	628.8711	581.7419	523.0442	479.1132	466.9081	(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	61.9619	62.1204	62.2766	63.0206	63.1618	63.8275	63.8275	63.9523	63.5694	63.1618	62.8768	62.5817		
alpha	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	0.9984	0.9965	0.9912	0.9718	0.9094	0.7629	0.5920	0.6489	0.8801	0.9819	0.9966	0.9988	(86)	
MIT	19.7744	19.9134	20.1481	20.4663	20.7541	20.9347	20.9861	20.9780	20.8519	20.4845	20.0741	19.7513	(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	0.9978	0.9954	0.9880	0.9605	0.8721	0.6757	0.4684	0.5249	0.8175	0.9726	0.9952	0.9984	(89)	
MIT 2	18.3459	18.5505	18.8937	19.3582	19.7501	19.9648	20.0053	20.0028	19.8818	19.3907	18.7936	18.3186	(90)	
Living area fraction	fLA = Living area / (4) =												0.4079	(91)
MIT	18.9285	19.1064	19.4054	19.8102	20.1596	20.3604	20.4053	20.4006	20.2775	19.8369	19.3159	18.9030	(92)	
Temperature adjustment													0.0000	
adjusted MIT	18.9285	19.1064	19.4054	19.8102	20.1596	20.3604	20.4053	20.4006	20.2775	19.8369	19.3159	18.9030	(93)	

#### 8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Useful gains	490.6758	554.9902	609.4447	650.1445	631.7478	499.3975	348.6967	362.1500	486.9281	507.6709	476.1999	465.8354	(94)		
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	1404.4037	1360.3988	1232.7131	1029.8281	796.7338	536.8616	354.6506	372.1213	578.0651	869.9319	1155.7103	1397.5704	(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	679.8136	541.2346	463.7117	273.3722	122.7496	0.0000	0.0000	0.0000	0.0000	269.5222	489.2475	693.2108	(98)		
Space heating													3532.8623	(98)	
Space heating per m2													(98) / (4) =	41.2428	(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													3782.5078 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	679.8136	541.2346	463.7117	273.3722	122.7496	0.0000	0.0000	0.0000	0.0000	269.5222	489.2475	693.2108	(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)	727.8518	579.4803	496.4793	292.6898	131.4235	0.0000	0.0000	0.0000	0.0000	288.5677	523.8196	742.1958	(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	87.8310	87.6307	87.2197	86.2711	84.3546	80.3000	80.3000	80.3000	80.3000	86.1201	87.3550	80.3000	(216)
Fuel for water heating, kWh/month	234.5288	207.2535	217.0557	194.6342	192.7215	178.3090	170.8336	190.4394	192.5426	204.4312	214.7242	228.7444	(219)
Water heating fuel used													2426.2181 (219)
Annual totals kWh/year													
Space heating fuel - main system													3782.5078 (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													6675.4859 (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	3782.5078	0.2160	817.0217 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	2426.2181	0.2160	524.0631 (264)
Space and water heating			1341.0848 (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			1583.3333 (272)
Emissions per m2 for space and water heating			15.6559 (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) = (15.6559 * 1.00) + 2.3736 + 0.4544, rounded to 2 d.p.			18.4800 (273)

# U-VALUE CALCULATOR REPORT

Property Reference	007818 - Plot 081		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2308-MT	
Project	Plot 081			
Calculation Type	New Build (As Designed)			

SAP Rating	84 B	DER	17.36	TER	18.48
Environmental	86 B	% DER<TER	6.08		
CO <sub>2</sub> Emissions (t/year)	1.21	DFEE	45.93	TFEE	52.81
General Requirements Compliance	Pass	% DFEE<TFEE	13.02		

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 081		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2308-MT	
Project	Plot 081			
Calculation Type	New Build (As Designed)			

SAP Rating	84 B	DER	17.36	TER	18.48
Environmental	86 B	% DER<TER	6.08		
CO <sub>2</sub> Emissions (t/year)	1.21	DFEE	45.93	TFEE	52.81
General Requirements Compliance	Pass	% DFEE<TFEE	13.02		

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 081		Issued on Date	15/03/2021
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2308-MT	
Project	Plot 081			
Calculation Type	New Build (As Designed)			

SAP Rating	84 B	DER	17.36	TER	18.48
Environmental	86 B	% DER<TER	6.08		
CO <sub>2</sub> Emissions (t/year)	1.21	DFEE	45.93	TFEE	52.81
General Requirements Compliance	Pass	% DFEE<TFEE	13.02		

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 081	<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 081		

<b>SAP Rating</b>	84 B	<b>DER</b>	17.36	<b>TER</b>	18.48
<b>Environmental</b>	86 B	<b>% DER&lt;TER</b>	6.08		
<b>CO<sub>2</sub> Emissions (t/year)</b>	1.21	<b>DFEE</b>	45.93	<b>TFEE</b>	52.81
<b>General Requirements Compliance</b>	Pass	<b>% DFEE&lt;TFEE</b>	13.02		

<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)	18.48	kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling Carbon Dioxide Emission Rate (DER)	17.36	kgCO <sub>2</sub> /m <sup>2</sup>	Pass
	-1.12 (-6.1%)	kgCO <sub>2</sub> /m <sup>2</sup>	

##### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	52.81	kWh/m <sup>2</sup> /yr	
Dwelling Fabric Energy Efficiency (DFEE)	45.93	kWh/m <sup>2</sup> /yr	
	-6.9 (-13.1%)	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
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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	4.95 m <sup>2</sup> , No overhang
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Windows facing South West	6.13 m <sup>2</sup> , No overhang
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Windows facing North West	0.66 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 081		Issued on Date	15/03/2021	
Assessment Reference	Rev A	Prop Type Ref	007818-SAP-2308-MT		
Property	Plot 081				
SAP Rating	84 B	DER	17.36	TER	18.48
Environmental	86 B	% DER<TER	6.08		
CO <sub>2</sub> Emissions (t/year)	1.21	DFEE	45.93	TFEE	52.81
General Requirements Compliance	Pass	% DFEE<TFEE	13.02		
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:	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	
RHS Windows	Window	[1] External Wall 1	North West	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	