Regulations Compliance Report

Approved Document L1A 2010 edition assessed by Stroma FSAP 2009 program, Version: 1.5.1.8
Printed on 30 March 2022 at 12:20:33

Project Information:

Assessed By:	Matthew Stainrod (STRO023501)	**Building Type:**	Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Site Reference :	Beaulieu Zone Q	**Plot Reference:**	OPP-074343 Plot 98 (Block 21)
Address :	Plot 98 (Block 21), Beaulieu Zone Q, Chelmsford		

Client Details:

Name:	Countryside Properties
Address :	Countryside House, The Drive, Brentwood, CM13 3AT

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

1 TER and DER

Fuel for main heating system: Natural gas
Fuel factor: 1.00 (natural gas)

Target Carbon Dioxide Emission Rate (TER)	18.19 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	17.14 kg/m²	**OK**

2 Fabric U-values

Element	**Average**	**Highest**	
External wall	0.23 (max. 0.30)	0.24 (max. 0.70)	**OK**
Party wall	0.00 (max. 0.20)	-	**OK**
Floor	(no floor)		
Roof	(no roof)		
Openings	1.16 (max. 2.00)	1.20 (max. 3.30)	**OK**

3 Air permeability

Air permeability at 50 pascals	5.00	
Maximum	10.0	**OK**

4 Heating efficiency

Main Heating system:	Database: (rev 492, product index 017616): Boiler system with radiators or underfloor - mains gas Brand name: Potterton Model: Promax Ultra Model qualifier: Combi 33 ErP (Combi boiler) Efficiency 89.1 % 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**

Regulations Compliance Report

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	**OK**
8 Mechanical ventilation		
Continuous extract system (decentralised)		
Specific fan power:	0.19 0.18	
Maximum	0.7	**OK**
9 Summertime temperature		
Overheating risk (East Anglia):	Slight	**OK**
Based on:		
Overshading:	Average or unknown	
Windows facing: North	4.53m², Overhang twice as wide as window, ratio NaN	
Windows facing: West	4.53m², Overhang twice as wide as window, ratio NaN	
Ventilation rate:	4.00	
Blinds/curtains:	Dark-coloured curtain or roller blind shutter closed 100% of daylight hours	
10 Key features		
Windows U-value	1.2 W/m²K	
Doors U-value	1 W/m²K	

SAP Input

Property Details: OPP-074343 Plot 98 (Block 21)

Address:	Plot 98 (Block 21), Beaulieu Zone Q, Chelmsford
Located in:	England
Region:	East Anglia
UPRN:	
Date of assessment:	30 March 2022
Date of certificate:	30 March 2022
Assessment type:	New dwelling design stage
Transaction type:	New dwelling
Tenure type:	Unknown
Related party disclosure:	No related party
Thermal Mass Parameter:	Calculated 150.61
Dwelling designed to use less than 125 litres per Person per day:	True

Property description:

Dwelling type:	Flat	
Detachment:		
Year Completed:	2022	
Floor Location:	**Floor area:**	**Storey height:**
Floor 0	49.28 m²	2.37 m
Living area:	24.02 m² (fraction 0.487)	
Front of dwelling faces:	South	

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
Front Door	Manufacturer	Solid			PVC-U
Rear	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U
Side	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	PVC-U

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
Front Door	mm	0.7	0	1	2.1	1
Rear	16mm or more	0.7	0.63	1.2	4.53	1
Side	16mm or more	0.7	0.63	1.2	4.53	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Front Door		Staircase Wall	South	0	0
Rear		External Wall	North	0	0
Side		External Wall	West	0	0

Overshading: Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
External Wall	35.64	9.06	26.58	0.24	0	False	60
Staircase Wall	14.22	2.1	12.12	0.27	0.82	False	60
Internal Elements							
IW Timber	100						9
Party Elements							
Party Wall	16.68						45
PC	49.28						30
PF	49.28						40

Thermal bridges:

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.1285

	Length	PSI-value	
Approved source	6.02	0.3	Steel lintel with perforated steel base plate

SAP Input

Approved source	5	0.013	Sill
Approved source	14.44	0.05	Jamb
Approved source	42.08	0.07	Intermediate floor between dwellings
Approved source	4.74	0.068	Corner (normal)
Approved source	4.74	-0.0035	Party wall between dwellings
Approved source	14.08	0.04	Intermediate floor between dwellings (in blocks of flats)

Ventilation:

Pressure test:	Yes (As designed)
Ventilation:	Decentralised whole house extract Brand/Model: Greenwood Unity CV2GIP Number of fans in Wetroom: Kitchen 1 Other 1 Ductwork: , Approved Installation Scheme: True
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of sides sheltered:	2
Pressure test:	5

Main heating system:

Main heating system:	Central heating systems with radiators or underfloor heating Gas boilers and oil boilers Fuel: mains gas Info Source: Boiler Database Database: (rev 492, product index 017616) SEDBUK2009 89.1% Brand name: Potterton Model: Promax Ultra Model qualifier: Combi 33 ErP (Combi boiler) Systems with radiators Pump in heat space: Yes Weather Compensator Delayed start

Main heating Control:

Main heating Control:	Time and temperature zone control Control code: 2110 Boiler interlock: Yes

Secondary heating system:

Secondary heating system:	None

Water heating:

Water heating:	From main heating system Water code: 901 Fuel :mains gas No hot water cylinder Solar panel: False

Others:

Electricity tariff:	standard tariff
In Smoke Control Area:	Unknown
Conservatory:	No conservatory
Low energy lights:	100%
Terrain type:	Low rise urban / suburban
EPC language:	English
Wind turbine:	No
Photovoltaics:	None

SAP Input

Assess Zero Carbon Home: No

SAP WorkSheet: New dwelling design stage

User Details:

Assessor Name:	Matthew Stainrod	**Stroma Number:**	STRO023501
Software Name:	Stroma FSAP 2009	**Software Version:**	Version: 1.5.1.8

Property Address: OPP-074343 Plot 98 (Block 21)

Address : Plot 98 (Block 21), Beaulieu Zone Q, Chelmsford

1. Overall dwelling dimensions:

	Area(m²)			Ave Height(m)			Volume(m³)	
Ground floor	49.28	(1a)	x	2.37	(2a)	=	116.79	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+.....(1n)	49.28	(4)						
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)+.....(3n)		=	116.79	(5)

2. Ventilation rate:

	main heating		Secondary heating		other		total		m³ per hour	
Number of chimneys	0	+	0	+	0	=	0	x 40 =	0	(6a)
Number of open flues	0	+	0	+	0	=	0	x 20 =	0	(6b)
Number of intermittent fans							0	x 10 =	0	(7a)
Number of passive vents							0	x 10 =	0	(7b)
Number of flueless gas fires							0	x 40 =	0	(7c)

Air changes per hour

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	0	÷ (5) =	0	(8)

If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)

Number of storeys in the dwelling (ns)		0	(9)
Additional infiltration	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0	(11)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35			
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0	(12)
If no draught lobby, enter 0.05, else enter 0		0	(13)
Percentage of windows and doors draught stripped		0	(14)
Window infiltration	0.25 - [0.2 x (14) ÷ 100] =	0	(15)
Infiltration rate	(8) + (10) + (11) + (12) + (13) + (15) =	0	(16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area		5	(17)
If based on air permeability value, then	(18) = [(17) ÷ 20]+(8), otherwise (18) = (16)	0.25	(18)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used			
Number of sides on which sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.85	(20)
Infiltration rate incorporating shelter factor	(21) = (18) x (20) =	0.21	(21)

Infiltration rate modified for monthly wind speed

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly average wind speed from Table 7												
(22)m=	5.4	5.1	5.1	4.5	4.1	3.9	3.7	3.7	4.2	4.5	4.8	5.1
Wind Factor (22a)m = (22)m ÷ 4												
(22a)m=	1.35	1.27	1.27	1.12	1.02	0.98	0.92	0.92	1.05	1.12	1.2	1.27

SAP WorkSheet: New dwelling design stage

Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m

0.29	0.27	0.27	0.24	0.22	0.21	0.2	0.2	0.22	0.24	0.26	0.27

Calculate effective air change rate for the applicable case

If mechanical ventilation: 0.5 (23a)

If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a) 0.5 (23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 0 (23c)

a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 100]

(24a)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24a)

b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)

(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24b)

c) If whole house extract ventilation or positive input ventilation from outside

if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b)

(24c)m=	0.54	0.52	0.52	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.52	(24c)

d) If natural ventilation or whole house positive input ventilation from loft

if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5]

(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0	(24d)

Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)

(25)m=	0.54	0.52	0.52	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.52	(25)

3. Heat losses and heat loss parameter:

ELEMENT	Gross area (m²)	Openings m²	Net Area A ,m²		U-value W/m2K		A X U (W/K)	k-value kJ/m²·K	A X k kJ/K	
Doors			2.1	x	1	=	2.1			(26)
Windows Type 1			4.53	x1/[1/(1.2)+ 0.04]		=	5.19			(27)
Windows Type 2			4.53	x1/[1/(1.2)+ 0.04]		=	5.19			(27)
Walls Type1	35.64	9.06	26.58	x	0.24	=	6.38	60	1594.8	(29)
Walls Type2	14.22	2.1	12.12	x	0.22	=	2.68	60	727.2	(29)
Total area of elements, m²			49.86							(31)
Party wall			16.68	x	0	=	0	45	750.6	(32)
Party floor			49.28					40	1971.2	(32a)
Party ceiling			49.28					30	1478.4	(32b)
Internal wall **			100					9	900	(32c)

** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2*

*** include the areas on both sides of internal walls and partitions*

Fabric heat loss, W/K = S (A x U) (26)…(30) + (32) = 21.53 (33)

Heat capacity Cm = S(A x k) ((28)…(30) + (32) + (32a)…(32e) = 7422.1999 (34)

Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K = (34) ÷ (4) = 150.6128 (35)

For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation.

Thermal bridges : S (L x Y) calculated using Appendix K 6.41 (36)

if details of thermal bridging are not known (36) = 0.15 x (31)

Total fabric heat loss (33) + (36) = 27.94 (37)

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

(38)m=	20.69	20.08	20.08	19.27	19.27	19.27	19.27	19.27	19.27	19.27	19.46	20.08	(38)

Heat transfer coefficient, W/K (39)m = (37) + (38)m

(39)m=	48.63	48.02	48.02	47.21	47.21	47.21	47.21	47.21	47.21	47.21	47.4	48.02	

Average = Sum(39)1…12 /12= 47.55 (39)

Heat loss parameter (HLP), W/m²K (40)m = (39)m ÷ (4)

(40)m=	0.99	0.97	0.97	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.97	

Average = Sum(40)1…12 /12= 0.96 (40)

Number of days in month (Table 1a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirement: kWh/year:

Assumed occupancy, N 1.67 (42)
if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9)
if TFA £ 13.9, N = 1

Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 73.84 (43)
Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)

(44)m=	81.22	78.27	75.31	72.36	69.41	66.45	66.45	69.41	72.36	75.31	78.27	81.22

Total = Sum(44)1…12 = 886.04 (44)

Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)

(45)m=	120.74	105.6	108.97	95	91.15	78.66	72.89	83.64	84.64	98.64	107.67	116.93

Total = Sum(45)1…12 = 1164.52 (45)

If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)

(46)m=	18.11	15.84	16.34	14.25	13.67	11.8	10.93	12.55	12.7	14.8	16.15	17.54	(46)

Water storage loss:

a) If manufacturer's declared loss factor is known (kWh/day): 0 (47)

Temperature factor from Table 2b 0 (48)

Energy lost from water storage, kWh/year (47) x (48) = 0 (49)

If manufacturer's declared cylinder loss factor is not known:

Cylinder volume (litres) including any solar storage within same 0 (50)

If community heating and no tank in dwelling, enter 110 litres in box (50)

Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in box (50)

Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51)

Volume factor from Table 2a 0 (52)

Temperature factor from Table 2b 0 (53)

Energy lost from water storage, kWh/year ((50) x (51) x (52) x (53) = 0 (54)

Enter (49) or (54) in (55) 0 (55)

Water storage loss calculated for each month ((56)m = (55) × (41)m

(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)

If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H

(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57)

SAP WorkSheet: New dwelling design stage

Primary circuit loss (annual) from Table 3 | 0 | (58)

Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m

(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)

(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59)

Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m

(61)m=	21.69	19.57	21.62	20.87	21.53	20.8	21.47	21.51	20.84	21.58	20.94	21.68	(61)

Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m + (46)m + (57)m + (59)m + (61)m

(62)m=	142.43	125.16	130.59	115.87	112.69	99.46	94.36	105.15	105.48	120.22	128.62	138.6	(62)

Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating)

(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)

(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)

Output from water heater

(64)m=	142.43	125.16	130.59	115.87	112.69	99.46	94.36	105.15	105.48	120.22	128.62	138.6	

Output from water heater (annual)1…12 | 1418.63 | (64)

Heat gains from water heating, kWh/month 0.25 x [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]

(65)m=	45.57	40	41.64	36.81	35.69	31.35	29.6	33.19	33.35	38.19	41.04	44.3	(65)

include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating

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=	100.14	100.14	100.14	100.14	100.14	100.14	100.14	100.14	100.14	100.14	100.14	100.14	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
(67)m=	32.98	29.29	23.82	18.04	13.48	11.38	12.3	15.99	21.46	27.24	31.8	33.9	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
(68)m=	216.96	219.21	213.54	201.46	186.21	171.89	162.31	160.06	165.73	177.81	193.06	207.39	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
(69)m=	46.68	46.68	46.68	46.68	46.68	46.68	46.68	46.68	46.68	46.68	46.68	46.68	(69)
Pumps and fans gains (Table 5a)													
(70)m=	10	10	10	10	10	10	10	10	10	10	10	10	(70)
Losses e.g. evaporation (negative values) (Table 5)													
(71)m=	-66.76	-66.76	-66.76	-66.76	-66.76	-66.76	-66.76	-66.76	-66.76	-66.76	-66.76	-66.76	(71)
Water heating gains (Table 5)													
(72)m=	61.25	59.53	55.96	51.12	47.97	43.55	39.79	44.61	46.32	51.34	57	59.54	(72)
Total internal gains =						(66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m							
(73)m=	401.25	398.09	383.39	360.68	337.73	316.88	304.46	310.72	323.58	346.45	371.91	390.89	(73)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:		Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	4.53	x	10.73	x	0.63	x	0.7	=	14.85	(74)
North	0.9x	0.77	x	4.53	x	20.36	x	0.63	x	0.7	=	28.19	(74)

SAP WorkSheet: New dwelling design stage

North	0.9x	0.77	x	4.53	x	33.31	x	0.63	x	0.7	=	46.11	(74)
North	0.9x	0.77	x	4.53	x	54.64	x	0.63	x	0.7	=	75.64	(74)
North	0.9x	0.77	x	4.53	x	75.22	x	0.63	x	0.7	=	104.13	(74)
North	0.9x	0.77	x	4.53	x	84.09	x	0.63	x	0.7	=	116.42	(74)
North	0.9x	0.77	x	4.53	x	79.12	x	0.63	x	0.7	=	109.54	(74)
North	0.9x	0.77	x	4.53	x	61.56	x	0.63	x	0.7	=	85.23	(74)
North	0.9x	0.77	x	4.53	x	41.09	x	0.63	x	0.7	=	56.88	(74)
North	0.9x	0.77	x	4.53	x	24.81	x	0.63	x	0.7	=	34.35	(74)
North	0.9x	0.77	x	4.53	x	13.22	x	0.63	x	0.7	=	18.3	(74)
North	0.9x	0.77	x	4.53	x	8.94	x	0.63	x	0.7	=	12.38	(74)
West	0.9x	0.77	x	4.53	x	19.87	x	0.63	x	0.7	=	27.51	(80)
West	0.9x	0.77	x	4.53	x	38.52	x	0.63	x	0.7	=	53.33	(80)
West	0.9x	0.77	x	4.53	x	61.57	x	0.63	x	0.7	=	85.23	(80)
West	0.9x	0.77	x	4.53	x	91.41	x	0.63	x	0.7	=	126.55	(80)
West	0.9x	0.77	x	4.53	x	111.22	x	0.63	x	0.7	=	153.98	(80)
West	0.9x	0.77	x	4.53	x	116.05	x	0.63	x	0.7	=	160.67	(80)
West	0.9x	0.77	x	4.53	x	112.64	x	0.63	x	0.7	=	155.94	(80)
West	0.9x	0.77	x	4.53	x	98.03	x	0.63	x	0.7	=	135.72	(80)
West	0.9x	0.77	x	4.53	x	73.6	x	0.63	x	0.7	=	101.9	(80)
West	0.9x	0.77	x	4.53	x	46.91	x	0.63	x	0.7	=	64.94	(80)
West	0.9x	0.77	x	4.53	x	24.71	x	0.63	x	0.7	=	34.2	(80)
West	0.9x	0.77	x	4.53	x	16.39	x	0.63	x	0.7	=	22.69	(80)

Solar gains in watts, calculated for each month (83)m = Sum(74)m …(82)m

(83)m=	42.36	81.51	131.35	202.19	258.11	277.08	265.48	220.95	158.78	99.3	52.5	35.08	(83)

Total gains – internal and solar (84)m = (73)m + (83)m , watts

(84)m=	443.61	479.61	514.73	562.87	595.84	593.96	569.94	531.67	482.35	445.75	424.42	425.96	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)

Utilisation factor for gains for living area, h1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(86)m=	0.95	0.93	0.89	0.81	0.66	0.49	0.34	0.36	0.61	0.83	0.93	0.95	(86)

Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)

(87)m=	19.89	20.06	20.35	20.63	20.87	20.97	20.99	20.99	20.93	20.67	20.21	19.93	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

(88)m=	20.1	20.11	20.11	20.12	20.12	20.12	20.12	20.12	20.12	20.12	20.12	20.11	(88)

Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)

(89)m=	0.94	0.92	0.87	0.78	0.61	0.43	0.27	0.28	0.54	0.79	0.92	0.94	(89)

Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)

(90)m=	18.65	18.89	19.29	19.69	19.98	20.09	20.12	20.12	20.06	19.75	19.12	18.71	(90)

fLA = Living area ÷ (4) = 0.49 (91)

Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × T2

(92)m=	19.26	19.46	19.81	20.15	20.42	20.52	20.54	20.54	20.48	20.2	19.65	19.3	(92)

SAP WorkSheet: New dwelling design stage

Apply adjustment to the mean internal temperature from Table 4e, where appropriate

(93)m=	19.11	19.31	19.66	20	20.27	20.37	20.39	20.39	20.33	20.05	19.5	19.15	(93)

8. Space heating requirement

Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains, hm:													
(94)m=	0.93	0.91	0.86	0.77	0.62	0.45	0.29	0.31	0.56	0.79	0.9	0.93	(94)
Useful gains, hmGm , W = (94)m x (84)m													
(95)m=	412.95	435.91	442.47	435.91	370.86	265.27	164.08	163.77	268.8	351.22	383.71	397.34	(95)
Monthly average external temperature from Table 8													
(96)m=	4.5	5	6.8	8.7	11.7	14.6	16.9	16.9	14.3	10.8	7	4.9	(96)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]													
(97)m=	710.29	687.36	617.29	533.41	404.38	272.42	165	164.94	284.88	436.47	592.59	684.35	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m													
(98)m=	221.22	168.98	130.07	70.2	24.94	0	0	0	0	63.43	150.39	213.53	

Total per year (kWh/year) = Sum(98)$_{1...5,9...12}$ = 1042.76 (98)

Space heating requirement in kWh/m²/year 21.16 (99)

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

Space heating:

Fraction of space heat from secondary/supplementary system		0	(201)
Fraction of space heat from main system(s)	(202) = 1 – (201) =	1	(202)
Fraction of total heating from main system 1	(204) = (202) × [1 – (203)] =	1	(204)
Efficiency of main space heating system 1		93	(206)
Efficiency of secondary/supplementary heating system, %		0	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/year
Space heating requirement (calculated above)													
	221.22	168.98	130.07	70.2	24.94	0	0	0	0	63.43	150.39	213.53	
(211)m = {[(98)m x (204)]} x 100 ÷ (206)													(211)
	237.87	181.7	139.86	75.48	26.82	0	0	0	0	68.2	161.71	229.61	

Total (kWh/year) =Sum(211)$_{1...5,10....12}$= 1121.24 (211)

Space heating fuel (secondary), kWh/month

= {[(98)m x (201)] } x 100 ÷ (208)

(215)m=	0	0	0	0	0	0	0	0	0	0	0	0

Total (kWh/year) =Sum(215)$_{1...5,10....12}$= 0 (215)

Water heating

Output from water heater (calculated above)

	142.43	125.16	130.59	115.87	112.69	99.46	94.36	105.15	105.48	120.22	128.62	138.6

Efficiency of water heater 86.7 (216)

(217)m=	88.68	88.57	88.32	87.92	87.28	86.7	86.7	86.7	86.7	87.81	88.45	88.67	(217)

Fuel for water heating, kWh/month

(219)m = (64)m x 100 ÷ (217)m

(219)m=	160.61	141.32	147.86	131.8	129.11	114.72	108.83	121.28	121.66	136.91	145.42	156.31

Total = Sum(219a)$_{1...12}$ = 1615.83 (219)

SAP WorkSheet: New dwelling design stage

Annual totals		**kWh/year**	**kWh/year**	
Space heating fuel used, main system 1			1121.24	
Water heating fuel used			1615.83	
Electricity for pumps, fans and electric keep-hot				
mechanical ventilation - balanced, extract or positive input from outside		34.49		(230a)
central heating pump:		130		(230c)
boiler with a fan-assisted flue		45		(230e)
Total electricity for the above, kWh/year	sum of (230a)…(230g) =		209.49	(231)
Electricity for lighting			232.99	(232)

10a. Fuel costs - individual heating systems:

	Fuel kWh/year		**Fuel Price** (Table 12)		**Fuel Cost** £/year	
Space heating - main system 1	(211)	x	3.1	x 0.01 =	34.7586	(240)
Space heating - main system 2	(213)	x	0	x 0.01 =	0	(241)
Space heating - secondary	(215)	x	0	x 0.01 =	0	(242)
Water heating cost (other fuel)	(219)		3.1	x 0.01 =	50.09	(247)
Pumps, fans and electric keep-hot	(231)		11.46	x 0.01 =	24.01	(249)
(if off-peak tariff, list each of (230a) to (230g) separately as applicable and apply fuel price according to Table 12a						
Energy for lighting	(232)		11.46	x 0.01 =	26.7	(250)
Additional standing charges (Table 12)					106	(251)
Appendix Q items: repeat lines (253) and (254) as needed						
Total energy cost	(245)...(247) + (250)…(254) =				241.5573	(255)

11a. SAP rating - individual heating systems

Energy cost deflator (Table 12)		0.47	(256)
Energy cost factor (ECF)	[(255) x (256)] ÷ [(4) + 45.0] =	1.2042	(257)
SAP rating (Section 12)		83.2014	(258)

12a. CO2 emissions – Individual heating systems including micro-CHP

	Energy kWh/year		**Emission factor** kg CO2/kWh		**Emissions** kg CO2/year	
Space heating (main system 1)	(211)	x	0.198	=	222.01	(261)
Space heating (secondary)	(215)	x	0	=	0	(263)
Water heating	(219)	x	0.198	=	319.94	(264)
Space and water heating	(261) + (262) + (263) + (264) =				541.94	(265)
Electricity for pumps, fans and electric keep-hot	(231)	x	0.517	=	108.31	(267)
Electricity for lighting	(232)	x	0.517	=	120.45	(268)
Total CO2, kg/year			sum of (265)…(271) =		770.7	(272)

CO2 emissions per m²	(272) ÷ (4) =		15.64	(273)
EI rating (section 14)			89	(274)

13a. Primary Energy

	Energy kWh/year	**Primary** factor		**P. Energy** kWh/year	
Space heating (main system 1)	(211) x	1.02	=	1143.67	(261)
Space heating (secondary)	(215) x	0	=	0	(263)
Energy for water heating	(219) x	1.02	=	1648.15	(264)
Space and water heating	(261) + (262) + (263) + (264) =			2791.82	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	2.92	=	611.71	(267)
Electricity for lighting	(232) x	0	=	680.32	(268)
'Total Primary Energy		sum of (265)…(271) =		4083.85	(272)
Primary energy kWh/m²/year		(272) ÷ (4) =		82.87	(273)

Predicted Energy Assessment

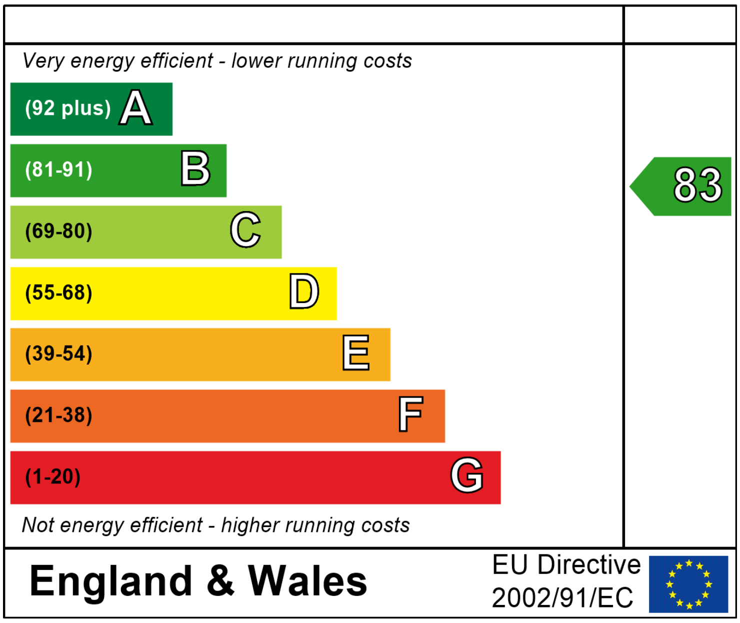
Plot 98 (Block 21)
Beaulieu Zone Q
Chelmsford

Dwelling type:	Mid floor Flat
Date of assessment:	30 March 2022
Produced by:	Matthew Stainrod
Total floor area:	49.28 m²

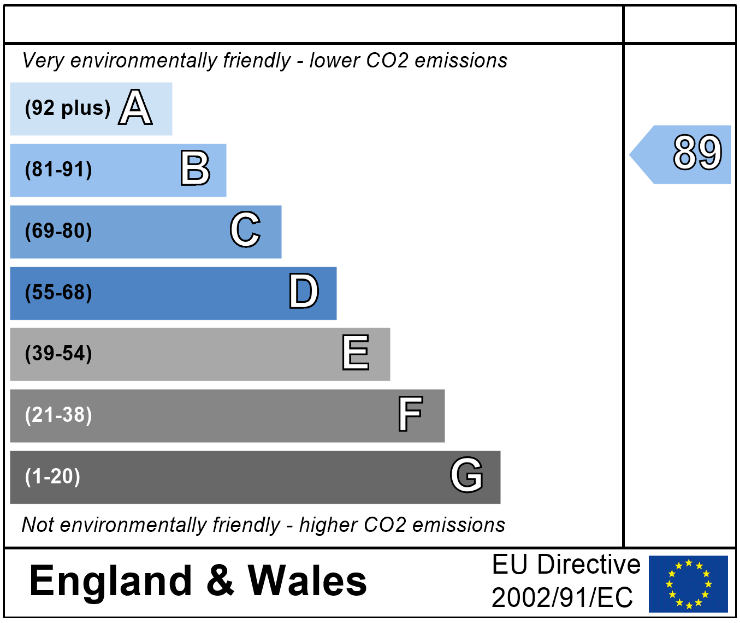
This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2009 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



Environmental Impact (CO_2) Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbonn dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

Code for Sustainable Homes Report

Assessor and House Details

Assessor Name:	Matthew Stainrod	**Assessor Number:**	STRO023501
Property Address:	Plot 98 (Block 21) Beaulieu Zone Q Chelmsford		

Buiding regulation assessment

	kg/m²/year
TER	18.19
DER	17.14

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		17.14	*(ZC1)*
TER		18.19	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		3.23	
DER accounting for SAP Section 16 allowances		17.14	
% improvement DER/TER	0		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	17.14	*(ZC1)*
CO2 emissions from appliances, equation (L14)	17.41	*(ZC2)*
CO2 emissions from cooking, equation (L16)	3.23	*(ZC3)*
Net CO2 emissions	37.8	*(ZC8)*

Result:

Credits awarded for Ene 1 = NaN

Code Level = 0

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 39.05

Credits awarded for Ene 2 = 7

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year
Standard Case CO2 emissions		40.93
Standard DER		20.29
Actual Case CO2 emissions		40.93
Actual DER		20.29
Reduction in CO2 emissions	0	

Credits awarded for Ene 7 = 0

Technologies eligible to contribute to achieving the requirements of this issue must produce energy from renewable sources and meet all other ancillary requirements as defined by Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

The following requirements must also be met:

- Where not provided by accredited external renewables there must be a direct supply of energy produced to the dwelling under assessment.
- Where covered by the Microgeneration Certification Scheme (MCS), technologies under 50kWe or 300kWth must be certified.
- Combined Heat and Power (CHP) schemes above 50kWe must be certified under the CHPQA standard.
- All technologies must be accounted for by SAP.

CHP schemes fuelled by mains gas are eligible to contribute to performance against this issue. Where these schemes are above 50kWe they must be certified under the CHPQA.

It is the responsibly of the Accredited OCDEA and Code Assessor to ensure all technologies use in the calculation are appropriate before awarding credits.