



Compliance with England Building Regulations Part L 2013

Shell and Core Project name

Highgate Road

As designed

Date: Wed Jun 23 14:01:22 2021

Administrative information

Building Details Address: London,

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0 Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v6.1.8 BRUKL compliance check version: v5.6.b.0

Certifier details

Name: George Farr Telephone number:

Address: , ,

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	14.2
Target CO₂ emission rate (TER), kgCO₂/m².annum	14.2
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	11.9
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _{a-Limit}	Ua-Calc	Ui-Calc	Surface where the maximum value occurs*
Wall**	0.35	0.18	0.18	"Ground Floor - Social Enterprise_P_6"
Floor	0.25	0.13	0.13	"Ground Floor - Social Enterprise_S_3"
Roof	0.25	0.13	0.13	"Ground Floor - Social Enterprise_R_5"
Windows***, roof windows, and rooflights	2.2	1.4	1.4	"Ground Floor - Social Enterprise_G_11"
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

U_{a-Limit} = Limiting area-weighted average U-values [W/(m²K)]

U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

Ui-Calc = Calculated maximum individual element U-values [W/(m²K)]

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
m3/(h.m2) at 50 Pa	10	3

^{*} There might be more than one surface where the maximum U-value occurs.

^{**} Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

^{***} Display windows and similar glazing are excluded from the U-value check.

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(I/s)]	HR efficiency		
This system	4.35	3.2	-	-	=		
Standard value	2.5*	N/A	N/A	N/A	N/A		
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system NO							
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.							

1- POU

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
Α	Local supply or extract ventilation units serving a single area
В	Zonal supply system where the fan is remote from the zone
С	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
Ε	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
Н	Fan coil units
1	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	SFP [W/(I/s)]						UD officiones				
ID of system type	Α	В	С	D	E	F	G	Н	1	HR efficiency	
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
Ground Floor - Social Enterprise	-	-	-	1	-	-	-	-	-	0.8	0.5

Shell and core configuration

Zone	Assumed shell?
Ground Floor - Store	NO
Ground Floor - Plant	NO
Ground Floor - Social Enterprise	NO

General lighting and display lighting	Lumino	us effic		
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Ground Floor - Store	110	-	-	10
Ground Floor - Plant	110	-	-	133
Ground Floor - Social Enterprise	110	-	-	552

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Ground Floor - Social Enterprise	YES (+11.1%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	156.3	156.3
External area [m²]	330.4	330.4
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	3	5
Average conductance [W/K]	120.17	144.54
Average U-value [W/m²K]	0.36	0.44
Alpha value* [%]	19.16	12.38

^{*} Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways

B1 Offices and Workshop businesses

B2 to B7 General Industrial and Special Industrial Groups

B8 Storage or Distribution

C1 Hotels

C2 Residential Institutions: Hospitals and Care Homes

C2 Residential Institutions: Residential schools

C2 Residential Institutions: Universities and colleges

C2A Secure Residential Institutions

Residential spaces

D1 Non-residential Institutions: Community/Day Centre

D1 Non-residential Institutions: Libraries, Museums, and Galleries

D1 Non-residential Institutions: Education

D1 Non-residential Institutions: Primary Health Care Building

D1 Non-residential Institutions: Crown and County Courts

D2 General Assembly and Leisure, Night Clubs, and Theatres

Others: Passenger terminals Others: Emergency services

Others: Miscellaneous 24hr activities

Others: Car Parks 24 hrs Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	1.02	2
Cooling	6.53	5.39
Auxiliary	2.52	1.73
Lighting	11	17.58
Hot water	1.85	2.14
Equipment*	87.75	87.75
TOTAL**	22.92	28.84

Energy used by equipment does not count towards the total for consumption or calculating emissions.
 ** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO, Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	126.56	99.35
Primary energy* [kWh/m²]	70.37	82.26
Total emissions [kg/m ²]	11.9	14.2

^{*} Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

H	HVAC Systems Performance													
Sys	stem Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER				
[ST	[ST] No Heating or Cooling													
	Actual	27.6	0	0	0	0	0	0	0	0				
	Notional	33.6	0.1	0	0	0	0	0						
[ST] Split or m	ulti-split sy	stem, [HS] I	Heat pump	(electric): a	ir source, [HFT] Electr	icity, [CFT]	Electricity					
	Actual	23.2	158.6	1.6	10.2	3.9	4.05	4.33	4.35	6.1				
	Notional	27.2	108.8	3.1	8.4	2.7	2.43	3.6						

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption

Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)

Cool SSEER = Cooling system seasonal energy efficiency ratio

Heat gen SSEFF = Heating generator seasonal efficiency

Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type

ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Тур}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.18	"Ground Floor - Social Enterprise_P_6"
Floor	0.2	0.13	"Ground Floor - Social Enterprise_S_3"
Roof	0.15	0.13	"Ground Floor - Social Enterprise_R_5"
Windows, roof windows, and rooflights		1.4	"Ground Floor - Social Enterprise_G_11"
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"
U _{i-Typ} = Typical individual element U-values [W/(m²K)]		U _{i-Min} = Minimum individual element U-values [W/(m²K)]
* There might be more than one surface where the	minimum L	J-value oc	curs.

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	3

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 11:02:03

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 63.84m²

Site Reference: Highgate Road - GREEN

Plot Reference: 00 - A

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 21.44 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 18.52 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 63.3 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 52.5 kWh/m²

OK
2 Fabric U-values

Element Average Highest

External wall 0.17 (max. 0.30) 0.18 (max. 0.70) OK Party wall 0.00 (max. 0.20) OK Floor 0.13 (max. 0.25) 0.13 (max. 0.70) OK Roof 0.13 (max. 0.20) 0.13 (max. 0.35) OK Openings 1.40 (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 3.00 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ок
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	5.49m ²	
Windows facing: South West	5.49m ²	
Ventilation rate:	3.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		l lser I	Details:						
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa	are Ve				010943 on: 1.0.5.50	
Address :	F	Property	Address	: 00 - A					
1. Overall dwelling dime	ensions:								
		Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Ground floor			63.84	(1a) x	2	2.65	(2a) =	169.18	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	63.84	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	169.18	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	_ + [0	= [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	+ [0	=	0	x 2	20 =	0	(6b)
Number of intermittent fa	ins				0	x ′	10 =	0	(7a)
Number of passive vents	;			Ē	0	x ′	10 =	0	(7b)
Number of flueless gas fi	ires			F	0	X 4	40 =	0	(7c)
				L					
							Air ch	nanges per ho	our
	ys, flues and fans = $(6a)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6a)+(6b)+(6b)+(6a)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b$				0		÷ (5) =	0	(8)
Number of storeys in the	peen carried out or is intended, procee he dwelling (ns)	ed to (17),	otherwise (continue ti	rom (9) to	(16)		0	(9)
Additional infiltration	no awaming (no)					[(9)-	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame o	r 0.35 fc	r masoni	ry consti	ruction			0	(11)
if both types of wall are p deducting areas of openi	resent, use the value corresponding t	o the grea	ter wall are	ea (after					
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	,	`	,,					0	(13)
Percentage of window	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	2 x (14) ÷ 1	100] =			0	(15)
Infiltration rate			(8) + (10)					0	(16)
•	q50, expressed in cubic metro	•	•	•	etre of e	envelope	area	3	(17)
•	lity value, then $(18) = [(17) \div 20] + (18)$ if a pressurisation test has been do				is haina u	sad		0.15	(18)
Number of sides sheltere		ne or a de	gree an pe	тпеаышу	is being u	seu		0	(19)
Shelter factor			(20) = 1 -	[0.075 x (19)] =			1	(20)
Infiltration rate incorporate	ting shelter factor		(21) = (18	s) x (20) =				0.15	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4								
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18]	
<u> </u>		•	•	•		•	•	•	

Adjusted infiltration i	ate (allow	ina for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.19 0.19	`	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18]	
Calculate effective a	_	rate for t	he appli	cable ca	se		•	!	ļ.		,	_
If mechanical vent		andiv NL (O	12h) (22a	a) Em. /	aguatian (l	VIEVV otho	muiaa (22h) (220)			0.5	(23a)
If exhaust air heat pur		•	, ,	,			•) = (23a)			0.5	(23b)
If balanced with heat re	-	-	_					21.) (001) [4 (00.)	75.65	(23c)
a) If balanced med (24a)m= 0.31 0.31		0.29	0.28	at recove	0.26	7R) (248	a)m = (27)	2b)m + (0.28	23b) × [0.29	1 - (23c)) ÷ 100]]	(24a)
` '			<u> </u>				ļ			0.3		(Z+a)
b) If balanced med (24b)m= 0 0	nanicai ve	entilation 0	without 0	neat red	overy (r	0	$\int_{0}^{\infty} \int_{0}^{\infty} dt = (22)$	20)m + (. 0	230)	0	1	(24b)
c) If whole house		ļ	ļ	<u> </u>						"		(2.0)
if (22b)m < 0.5			•	•				.5 × (23b	o)			
(24c)m = 0 0	0	0	0	0	0	0	0	0	0	0]	(24c)
d) If natural ventila	ation or wh	ole hous	e positiv	ve input	ventilatio	on from	loft	!	ļ	ļ.	J	
if (22b)m = 1,			•	•				0.5]			_	
(24d)m = 0 0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air chang	ge rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in bo	x (25)					
(25)m= 0.31 0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25)
3. Heat losses and	heat loss	paramete	er:									
	ross ea (m²)	Openin m		Net Ar A ,r		U-val W/m2		A X U (W/I		k-value kJ/m²-		
Doors	, ,							•	,			
				2.55	X	1.4	=	3.57				(26)
Windows Type 1				2.55 5.49		1.4 /[1/(1.4)+		3.57 7.28				(26) (27)
Windows Type 1 Windows Type 2					x1		0.04] =					` ,
				5.49	x1	/[1/(1.4)+	0.04] =	7.28		110	7022.4	(27)
Windows Type 2 Floor	7.27	13.53	3	5.49	x1 x1 x	/[1/(1.4)+ /[1/(1.4)+	0.04] =	7.28 7.28		110	7022.4 824.4	(27)
Windows Type 2 Floor Walls Type1 2		13.55	3	5.49 5.49 63.84	x1 x1 x x x x x	/[1/(1.4)+ /[1/(1.4)+	0.04] =	7.28 7.28 8.2992 2.47			824.4	(27) (27) (28) (29)
Windows Type 2 Floor Walls Type1 2 Walls Type2 5	7.27 6.63		3	5.49 5.49 63.84	x1 x1 x x x x x x x x x x x x x x x x x	/[1/(1.4)+ /[1/(1.4)+ 0.13	0.04] =	7.28 7.28 8.2992		60	=	(27) (27) (28) (29)
Windows Type 2 Floor Walls Type1 2 Walls Type2 5 Roof 3	6.63	0	3	5.49 5.49 63.8 ² 13.7 ² 56.63 3.74	x1 x1 x x x x x x x x	/[1/(1.4)+ /[1/(1.4)+ 0.13 0.18	0.04] =	7.28 7.28 8.2992 2.47 9.46		60	824.4 3397.8	(27) (27) (28) (29) (29) (29) (30)
Windows Type 2 Floor Walls Type1 2 Walls Type2 5 Roof 3 Total area of elemen	6.63	0	3	5.49 5.49 63.84 13.74 56.63 3.74	x1 x1 x x1 x x x x x x x x x x	/[1/(1.4)+ /[1/(1.4)+	- 0.04] = - 0.04]	7.28 7.28 8.2992 2.47 9.46 0.49		60	824.4 3397.8 33.66	(27) (27) (28) (29) (29) (29) (30) (31)
Windows Type 2 Floor Walls Type1 2 Walls Type2 5 Roof 3 Total area of element Party wall	6.63	0	3	5.49 5.49 63.8 ² 13.7 ² 56.63 3.74 151.4	x1 x1 x x1 x x x x x x x x x x x x x x	/[1/(1.4)+ /[1/(1.4)+ 0.13 0.18	0.04] =	7.28 7.28 8.2992 2.47 9.46		60 60 9 45	824.4 3397.8 33.66	(27) (27) (28) (29) (29) (30) (31) (32)
Windows Type 2 Floor Walls Type1 2 Walls Type2 5 Roof 3 Total area of elemen	6.63	0	3	5.49 5.49 63.84 13.74 56.63 3.74 151.4 21.76 60.09	x1 x1 x x x x x x x x x x x x x x x x x	/[1/(1.4)+ /[1/(1.4)+	- 0.04] = - 0.04]	7.28 7.28 8.2992 2.47 9.46 0.49		60 60 9 45 30	824.4 3397.8 33.66 979.2 1802.7	(27) (27) (28) (29) (29) (30) (31) (32) (32b)
Windows Type 2 Floor Walls Type1 2 Walls Type2 5 Roof 3 Total area of element Party wall Party ceiling Internal wall ** * for windows and roof windows and roof windows are seen as a seen are seen as a se	6.63 3.74 hts, m²	0 0	indow U-va	5.49 5.49 63.8 ² 13.7 ² 56.63 3.74 151.4 21.76 60.09 89.09	x1 x1 x x1 x x x x x x x x x x x x x x	/[1/(1.4)+ /[1/(1.4)+ / 0.13 0.18 0.17 0.13	- 0.04] = - 0.04] = = = = =	7.28 7.28 8.2992 2.47 9.46 0.49		60 60 9 45 30 9	824.4 3397.8 33.66 979.2 1802.7 801.809	(27) (27) (28) (29) (29) (30) (31) (32) (32b)
Windows Type 2 Floor Walls Type1 2 Walls Type2 5 Roof 3 Total area of element Party wall Party ceiling Internal wall ** * for windows and roof windows and windows and roof windows and w	6.63 3.74 hts, m ² ndows, use eath sides of in	0 0	indow U-va	5.49 5.49 63.8 ² 13.7 ² 56.63 3.74 151.4 21.76 60.09 89.09	x1 x1 x x1 x x x x x x x x x x x x x x	/[1/(1.4)+ /[1/(1.4)+ / 0.13 0.18 0.17 0.13	- 0.04] = - 0.04] = - 0.04] = - = - = - =	7.28 7.28 8.2992 2.47 9.46 0.49		60 60 9 45 30 9	824.4 3397.8 33.66 979.2 1802.7 801.8099	(27) (27) (28) (29) (29) (30) (31) (32) (32b) 9 (32c)
Windows Type 2 Floor Walls Type1 2 Walls Type2 5 Roof 3 Total area of element Party wall Party ceiling Internal wall ** * for windows and roof	6.63 3.74 Ints, m² Indows, use experts sides of interpretation of the control	0 0	indow U-va	5.49 5.49 63.8 ² 13.7 ² 56.63 3.74 151.4 21.76 60.09 89.09	x1 x1 x x1 x x x x x x x x x x x x x x	0.13 0.18 0.17 0.13	- 0.04] = - 0.04] = - 0.04] = = = = - - - - - - - -	7.28 7.28 8.2992 2.47 9.46 0.49	as given in	60 60 9 45 30 9	824.4 3397.8 33.66 979.2 1802.7 801.8099	(27) (27) (28) (29) (29) (30) (31) (32) (32b) (32c)
Windows Type 2 Floor Walls Type1 2 Walls Type2 5 Roof 3 Total area of element Party wall Party ceiling Internal wall ** * for windows and roof windows and windows and roof windows and w	ndows, use each sides of in K = S (A x k)	0 0 effective winternal wall	indow U-va	5.49 5.49 63.8 ² 13.7 ² 56.63 3.74 151.4 21.76 60.09 89.09 alue calcultitions	x1 x1 x1 x1 x2 x1 x2 x2 x3 x4 x5 x6	0.13 0.18 0.17 0.13	- 0.04] = - 0.04] = = = = = - 0.04] = = = - 0.04] = = = - 0.04] = - 0.0	7.28 7.28 8.2992 2.47 9.46 0.49 0	as given in	60 60 9 45 30 9	824.4 3397.8 33.66 979.2 1802.7 801.8099	(27) (27) (28) (29) (29) (30) (31) (32) (32b) 9 (32c)
Windows Type 2 Floor Walls Type1 2 Walls Type2 5 Roof 3 Total area of element Party wall Party ceiling Internal wall ** * for windows and roof	ndows, use each sides of in K = S (A x k) neter (TMI)	o o o o o o o o o o o o o o o o o o o	indow U-ve ls and pan	5.49 5.49 63.84 13.74 56.63 3.74 151.4 21.76 60.09 89.09 alue calculatitions	x1 x1 x1 x1 x2 x1 x2 x2 x3 x2 x3 x4	0.13 0.18 0.17 0.13 0.18 0.17 0.13	- 0.04] = - 0.04] = = = = = = = =	7.28 7.28 8.2992 2.47 9.46 0.49 0 ue)+0.04] a :.(30) + (32) ÷ (4) =	as given in [2] + (32a).	60 60 9 45 30 9 paragraph (32e) =	824.4 3397.8 33.66 979.2 1802.7 801.8099 38.85 14861.97	(27) (27) (28) (29) (29) (30) (31) (32) (32b) (32c) (33) (34)
Windows Type 2 Floor Walls Type1 2 Walls Type2 5 Roof 3 Total area of element Party wall Party ceiling Internal wall ** * for windows and roof	ndows, use eath sides of in K = S (A x K) The standard of the	o o o o o o o o o o o o o o o o o o o	indow U-vals and pan	5.49 5.49 63.8 ² 13.7 ² 56.63 3.74 151.4 21.76 60.09 89.09 alue calculatitions	x1 x1 x1 x1 x1 x2 x1 x2 x2 x3 x4 x5 x5 x6 x6 x7 x6 x6 x7 x7 x1	0.13 0.18 0.17 0.13 0.18 0.17 0.13	- 0.04] = - 0.04] = = = = = = = =	7.28 7.28 8.2992 2.47 9.46 0.49 0 ue)+0.04] a :.(30) + (32) ÷ (4) =	as given in [2] + (32a).	60 60 9 45 30 9 paragraph (32e) =	824.4 3397.8 33.66 979.2 1802.7 801.8099 38.85 14861.97	(27) (27) (28) (29) (29) (30) (31) (32) (32b) (32c) (33) (34) (35)
Windows Type 2 Floor Walls Type1 2 Walls Type2 5 Roof 3 Total area of element Party wall Party ceiling Internal wall ** * for windows and roof	ndows, use each sides of in K = S (A x k) meter (TMI where the deddeddeddeddedddddddddddddddddddd	o o o o o o o o o o o o o o o o o o o	TFA) ir construct	5.49 5.49 63.84 13.74 56.63 3.74 151.4 21.76 60.09 89.09 alue calculatitions h kJ/m²K cion are no	x1 x1 x1 x1 x1 x2 x1 x2 x2 x3 x4 x5 x5 x6 x6 x7 x6 x6 x7 x7 x1	0.13 0.18 0.17 0.13 0.18 0.17 0.13	- 0.04] = - 0.04] = = = = = = = =	7.28 7.28 8.2992 2.47 9.46 0.49 0 ue)+0.04] a :.(30) + (32) ÷ (4) =	as given in [2] + (32a).	60 60 9 45 30 9 paragraph (32e) =	824.4 3397.8 33.66 979.2 1802.7 801.8099 7 3.2 38.85 14861.97 232.8	(27) (27) (28) (29) (29) (30) (31) (32) (32b) (32c) (33) (34)

Ventilat	tion hea	nt loss ca	alculated	l monthly	y				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	17.47	17.26	17.06	16.01	15.8	14.75	14.75	14.54	15.17	15.8	16.22	16.64		(38)
Heat tra	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (37)	38)m			
(39)m=	67.46	67.25	67.04	65.99	65.79	64.74	64.74	64.53	65.16	65.79	66.2	66.62		
Heat lo	ss para	meter (H	HLP), W	m²K				-		Average = = (39)m ÷	Sum(39) _{1.} · (4)	12 /12=	65.94	(39)
(40)m=	1.06	1.05	1.05	1.03	1.03	1.01	1.01	1.01	1.02	1.03	1.04	1.04		
Numbe	r of day	s in moi	nth (Tab	le 1a)				•		Average =	Sum(40) ₁ .	12 /12=	1.03	(40
	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
			rgy requi	irement:								kWh/ye	ear:	(4)
if TF				[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	ΓFA -13.		09		(42
Reduce t	the annua	ıl average	•	usage by	5% if the α	lwelling is	designed i	(25 x N) to achieve		se target o		.79		(43
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
lot wate	r usage ir	n litres per	day for ea	ach month	Vd,m = fa	ctor from 7	Table 1c x	(43)						
44)m=	92.17	88.81	85.46	82.11	78.76	75.41	75.41	78.76	82.11	85.46	88.81	92.17		
Energy c	ontent of	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	т х пт х <u>Г</u>	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1005.44	(44
45)m=	136.68	119.54	123.35	107.54	103.19	89.05	82.51	94.69	95.82	111.67	121.89	132.37		
f instanta	aneous w	ater heati	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	•	1318.29	(45
46)m=	20.5	17.93	18.5	16.13	15.48	13.36	12.38	14.2	14.37	16.75	18.28	19.85		(4
	storage		منام برام منا		- lo = o = \A	WALLDO		م ماطانات		مما				(4-
f comm Otherw	nunity h	eating a	ind no ta	ınk in dw	velling, e	nter 110	litres in	within sa (47) ombi boil				0		(47
a) If ma	anufact	urer's de	eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(4
empe	rature fa	actor fro	m Table	2b								0		(4
•			storage eclared o	-		or is not		(48) x (49) =		1	10		(50
		_	factor fr ee secti		e 2 (kW	h/litre/da	ıy)				0.	02		(5
/olume	e factor	from Ta	ble 2a								1.	03		(5
empe	rature fa	actor fro	m Table	2b							0	.6		(5
•			storage	, kWh/ye	ear			(47) x (51) x (52) x (53) =	1.	03		(5
	. , ,	54) in (5	•					44-63			1.	03		(5
vater s			culated 1	or each				((56)m = (55) × (41)					
56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(5

If cylinder contain	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where ((H11) is fro	om Append	lix H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circui	t loss (ar	nual) fro	m Table	• 3	!	!	!	!	!	<u>'</u>	0		(58)
Primary circui	`	,			59)m = ((58) ÷ 36	65 × (41)	m				•	
(modified by	y factor f	rom Tab	le H5 if t	here is	solar wat	ter heati	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat req	uired for	water he	eating ca	alculated	for eacl	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 191.96	169.47	178.63	161.04	158.47	142.54	137.79	149.96	149.31	166.94	175.39	187.64		(62)
Solar DHW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	•	
(add additiona	al lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	iter											
(64)m= 191.96	169.47	178.63	161.04	158.47	142.54	137.79	149.96	149.31	166.94	175.39	187.64		
							Outp	out from w	ater heate	r (annual)	112	1969.13	(64)
Heat gains fro	m water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m= 89.67	79.69	85.24	78.55	78.53	72.4	71.66	75.7	74.65	81.35	83.32	88.23		(65)
include (57)	m in cal	culation of	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fı	om com	munity h	i leating	
5. Internal g	ains (see	e Table 5	and 5a):			-				·		
Metabolic gair	,			,									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 104.39	104.39	104.39	104.39	104.39	104.39	104.39	104.39	104.39	104.39	104.39	104.39		(66)
Lighting gains	(calcula	ted in Ar	pendix	L. equat	ion L9 o	r L9a). a	lso see	Table 5		•			
(67)m= 16.75	14.87	12.1	9.16	6.85	5.78	6.24	8.12	10.9	13.83	16.15	17.21		(67)
Appliances ga	ins (calc	ulated in	Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5	•	•		
(68)m= 182.52	184.41	179.64	169.48	156.65	144.6	136.54	134.65	139.42	149.58	162.41	174.46		(68)
Cooking gains	(calcula	ated in A	ppendix	L. egua	tion L15	or L15a), also se	ee Table	· 5	!	1		
(69)m= 33.44	33.44	33.44	33.44	33.44	33.44	33.44	33.44	33.44	33.44	33.44	33.44		(69)
Pumps and fa	ns gains	(Table 5	 5а)	l	l	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u>!</u>	<u> </u>	ı	
(70)m= 0	0	0	0	0	0	0	0	0	0	0	0		(70)
Losses e.g. ev	vaporatio	n (nega	tive valu	es) (Tab	le 5)	ı	ı			1			
(71)m= -83.51	-83.51	-83.51	-83.51	-83.51	-83.51	-83.51	-83.51	-83.51	-83.51	-83.51	-83.51		(71)
Water heating	gains (٦	rable 5)		!	!	!	!	!	!		•	•	
(72)m= 120.52	118.58	114.57	109.1	105.55	100.56	96.31	101.75	103.69	109.34	115.73	118.59		(72)
Total internal	gains =	:		!	(66)	m + (67)m	n + (68)m -	+ (69)m +	(70)m + (7	(1)m + (72))m		
(73)m= 374.1	372.19	360.62	342.06	323.37	305.25	293.42	298.84	308.32	327.08	348.6	364.59		(73)
6. Solar gain	s:			l.						•			
6. Solar gain Solar gains are		using sola	r flux from	Table 6a	and assoc	iated equa	itions to co	onvert to th	ne applicat	ole orienta	tion.		

Table 6a

Table 6b

Table 6c

m²

Table 6d

(W)

Northeast 0.9x			_		١			1		- 1.	. г		\neg			7(75)
<u> </u>	0.77	×		49	X		1.28] X]	0.63	,	F	0.7	믁	=	18.93	(75)
Northeast 0.9x	0.77	X	5.	49	X	2	2.97	X	0.63	,	' 	0.7	_	=	38.53	(75)
Northeast _{0.9x}	0.77	×	5.	49	X	4	1.38	X	0.63	,	٠ <u> </u>	0.7	_	=	69.43	(75)
Northeast _{0.9x}	0.77	X	5.	49	X	6	7.96	X	0.63	· ·	٠ <u>ا</u>	0.7		=	114.02	(75)
Northeast 0.9x	0.77	X	5.	49	X	9	1.35	Х	0.63	,	٠ <u>ا</u>	0.7		=	153.26	(75)
Northeast _{0.9x}	0.77	X	5.	49	X	9	7.38	X	0.63	>	٠ [0.7		=	163.39	(75)
Northeast 0.9x	0.77	X	5.	49	X	9	91.1	X	0.63	>	· [0.7		=	152.85	(75)
Northeast _{0.9x}	0.77	X	5.	49	X	7	2.63	X	0.63	>	· [0.7		=	121.85	(75)
Northeast _{0.9x}	0.77	х	5.	49	x	5	0.42	X	0.63	>	· [0.7		=	84.6	(75)
Northeast 0.9x	0.77	X	5.	49	x	2	8.07	x	0.63)	(0.7		=	47.09	(75)
Northeast _{0.9x}	0.77	х	5.	49	x	1	14.2	X	0.63	>	· [0.7		=	23.82	(75)
Northeast _{0.9x}	0.77	x	5.	49	х	9	9.21	х	0.63	>	· [0.7		=	15.46	(75)
Southwest _{0.9x}	0.77	x	5.	49	x	3	6.79	ĺ	0.63	<u> </u>	, [0.7		=	61.73	(79)
Southwest _{0.9x}	0.77	x	5.	49	x	6	2.67	Ī	0.63	<u> </u>	, [0.7		=	105.15	(79)
Southwest _{0.9x}	0.77	x	5.	49	x	8	5.75	ĺ	0.63	>	, [0.7		=	143.88	(79)
Southwest _{0.9x}	0.77	x	5.	49	х	10	06.25	ĺ	0.63	,	ζĪ	0.7		=	178.27	(79)
Southwest _{0.9x}	0.77	x	5.	49	х	1	19.01	ĺ	0.63	,	ζĪ	0.7		=	199.68	(79)
Southwest _{0.9x}	0.77	X	5.	49	x	1	18.15	j	0.63	,	, [0.7		=	198.23	(79)
Southwest _{0.9x}	0.77	x	5.	49	х	1	13.91	j	0.63	<u> </u>	ζĪ	0.7		=	191.12	(79)
Southwest _{0.9x}	0.77	x	5.	49	х	10	04.39	j	0.63	,	, [0.7		=	175.15	(79)
Southwest _{0.9x}	0.77	x	5.	49	х	9	2.85	1	0.63	,	, [0.7		=	155.79	(79)
Southwest _{0.9x}	0.77	x	5.	49	х	6	9.27	i	0.63	,	, ן	0.7	\equiv	=	116.22	(79)
Southwest _{0.9x}	0.77	×	5.	49	x	4	4.07	j	0.63	= ,	ζĪ	0.7		=	73.94	(79)
Southwest _{0.9x}	0.77	×	_	49	x	3	1.49	i	0.63		, [0.7	_	=	52.83	(79)
								J			_					
Solar gains in	watts, cal	lculated	d for eac	h mon	h			(83)m	n = Sum(74)m	(82)	m					
7	143.69		Y	•		61.63			7 240.38	_		97.76	68.	29		(83)
Total gains –	internal ar	nd sola	r (84)m	= (73)n	1 + (83)m	, watts	!		<u>.</u>					l	
(84)m= 454.77	515.88	573.92	634.34	676.3	1 6	66.88	637.39	595	.84 548.71	490	.39	446.36	432	.88		(84)
7. Mean inte	rnal tempe	erature	(heating	r seaso	n)					•						
Temperature			•			area f	rom Tah	ole 9	Th1 (°C)						21	(85)
Utilisation fa	_	٠.			•			0.00	, (3)							(0.07)
Jan	Feb	Mar	Apr	Ma	Ť	Jun	Jul	Δ	ug Sep	Το	ct	Nov	D	ec		
(86)m= 0.99	0.99	0.97	0.92	0.79	+	0.6	0.44	0.4		0.9		0.99	1			(86)
` '	<u>!</u>				_ _					1		1				` '
Mean interna				1	` 					T 00		1 00 04	40	0.4	1	(07)
(87)m= 19.93	20.09	20.34	20.66	20.88		20.98	21	20.	99 20.94	20.	65	20.24	19.	91		(87)
Temperature	, , ,	eating p	eriods i	n rest o	_		from Ta	able 9	9, Th2 (°C)	,		, ,			İ	
(88)m= 20.04	20.04	20.04	20.06	20.06	2	20.07	20.07	20.	07 20.07	20.	06	20.05	20.	05		(88)
Utilisation fa	ctor for ga	ins for	rest of c	lwelling	, h2	,m (se	e Table	9a)								
(89)m= 0.99	0.98	0.96	0.89	0.74		0.52	0.35	0.4	4 0.67	0.9	92	0.98	0.9	99		(89)
Mean interna	al tempera	ture in	the rest	of dwe	lling	T2 (fo	ollow ste	eps 3	to 7 in Tab	ole 9c)					
	•				3	,		•								

(90)m= 18.62 18.85 19.22 19.66 19.94 20.06 20.07	20.07 20.02	19.66	19.08	18.59	1	(90)
(30)1112 10.02 10.03 10.22 10.00 10.04 20.00 20.07		fLA = Living			0.58	(91)
			,	,	0.00	(0.)
Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (92)m = 19.38 19.57 19.87 20.24 20.49 20.59 20.61$	$\frac{(1 - fLA) \times 12}{20.61}$ 20.55	20.23	19.75	19.35		(92)
Apply adjustment to the mean internal temperature from Table 4		<u> </u>	10.70	10.00		(02)
	20.61 20.55	20.23	19.75	19.35		(93)
8. Space heating requirement						
Set Ti to the mean internal temperature obtained at step 11 of T	able 9b, so tha	at Ti,m=(7	76)m an	d re-calc	culate	
the utilisation factor for gains using Table 9a	A Cara	0-4	Nierr	Dan	1	
Jan Feb Mar Apr May Jun Jul Utilisation factor for gains, hm:	Aug Sep	Oct	Nov	Dec		
(94)m= 0.99 0.98 0.96 0.9 0.77 0.57 0.4	0.45 0.71	0.92	0.98	0.99		(94)
Useful gains, hmGm , W = (94)m x (84)m		!			l	
	269.01 390.04	453.43	438.07	429.65		(95)
Monthly average external temperature from Table 8	<u>'</u>					
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6	16.4 14.1	10.6	7.1	4.2		(96)
Heat loss rate for mean internal temperature, Lm , W = $[(39)$ m x	· · · · · · · · · · · · · · · · · · ·				1	(07)
	271.38 420.18	633.55	837.42	1009.54		(97)
Space heating requirement for each month, kWh/month = 0.024 (98)m= 421.65 322.54 256.66 128.28 44.56 0 0	$\frac{x [(97)m - (95)]}{0}$	134.01	287.53	431.44		
(30)III= 42 1.30 022.04 200.00 120.20 44.00 0 0	Total per year	<u> </u>			2026.67	(98)
Space heating requirement in kWh/m²/year		(*************************************		- /10,012	31.75	(99)
					31.73	
9b. Energy requirements – Community heating scheme This part is used for space heating, space cooling or water heating.						
This part is used for space fleating, space cooling or water fleating	a nravidad hv	a commi	inity ech	ama		
Fraction of space heat from secondary/supplementary heating (T			unity sch	ieme.	0	(301)
			unity sch	ieme.	0	(301)
Fraction of space heat from secondary/supplementary heating (T	able 11) '0' if n	ione	·		1	==
Fraction of space heat from secondary/supplementary heating (T Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See	able 11) '0' if n	ione	·		1 he latter	(302)
Fraction of space heat from secondary/supplementary heating (T Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers	able 11) '0' if n	one up to four c	other heat	sources; t	1	(302)
Fraction of space heat from secondary/supplementary heating (T Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See	able 11) '0' if n	one up to four c	·	sources; t	1 he latter	(302)
Fraction of space heat from secondary/supplementary heating (T Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers	able 11) '0' if n lows for CHP and se Appendix C.	one up to four o	other heat	sources; t	1 he latter	(302)
Fraction of space heat from secondary/supplementary heating (T Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers Fraction of total space heat from Community boilers	able 11) '0' if no lows for CHP and the Appendix C.	one up to four o	other heat	sources; t	1 he latter 1	(302) (303a) (304a)
Fraction of space heat from secondary/supplementary heating (T Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers Fraction of total space heat from Community boilers Factor for control and charging method (Table 4c(3)) for community	able 11) '0' if no lows for CHP and the Appendix C.	one up to four o	other heat	sources; t	1 he latter 1 1	(302) (303a) (304a) (305) (306)
Fraction of space heat from secondary/supplementary heating (T Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers Fraction of total space heat from Community boilers Factor for control and charging method (Table 4c(3)) for community boilers Distribution loss factor (Table 12c) for community heating system	able 11) '0' if no lows for CHP and the Appendix C.	one up to four o	other heat	sources; t	1 he latter 1 1 1 1 1.05	(302) (303a) (304a) (305) (306)
Fraction of space heat from secondary/supplementary heating (T Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers Fraction of total space heat from Community boilers Factor for control and charging method (Table 4c(3)) for community Distribution loss factor (Table 12c) for community heating system Space heating	able 11) '0' if no lows for CHP and see Appendix C.	one up to four o	other heat	sources; ti	1 he latter 1 1 1 1 1.05 kWh/yea	(302) (303a) (304a) (305) (306)
Fraction of space heat from secondary/supplementary heating (T Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers Fraction of total space heat from Community boilers Factor for control and charging method (Table 4c(3)) for community Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement	able 11) '0' if no lows for CHP and see Appendix C. ity heating sys	up to four o (30 stem	other heat 02) x (303:	sources; ti	1 he latter 1 1 1 1.05 kWh/yea 2026.67	(302) (303a) (304a) (305) (306)
Fraction of space heat from secondary/supplementary heating (T Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers Fraction of total space heat from Community boilers Factor for control and charging method (Table 4c(3)) for community Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement Space heat from Community boilers	able 11) '0' if nows for CHP and the Appendix C. ity heating sys (98) x (3)	up to four o (30 stem	i) x (306) = E)	sources; ti	1 he latter 1 1 1 1.05 kWh/yea 2026.67 2128.01	(302) (303a) (304a) (305) (306) ar
Fraction of space heat from secondary/supplementary heating (T Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. Set Fraction of heat from Community boilers Fraction of total space heat from Community boilers Factor for control and charging method (Table 4c(3)) for community Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement Space heat from Community boilers Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system) Water heating	able 11) '0' if nows for CHP and the Appendix C. ity heating sys (98) x (3)	up to four o (30 stem 04a) x (305 Appendix	i) x (306) = E)	sources; ti	1 he latter 1 1 1 1.05 kWh/yea 2026.67 2128.01 0	(302) (303a) (304a) (305) (306) ar (307a) (308
Fraction of space heat from secondary/supplementary heating (T Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers Fraction of total space heat from Community boilers Factor for control and charging method (Table 4c(3)) for community Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement Space heat from Community boilers Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement	able 11) '0' if nows for CHP and the Appendix C. ity heating sys (98) x (3)	up to four o (30 stem 04a) x (305 Appendix	i) x (306) = E)	sources; ti	1 he latter 1 1 1 1.05 kWh/yea 2026.67 2128.01 0	(302) (303a) (304a) (305) (306) ar (307a) (308
Fraction of space heat from secondary/supplementary heating (T Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. Set Fraction of heat from Community boilers Fraction of total space heat from Community boilers Factor for control and charging method (Table 4c(3)) for community Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement Space heat from Community boilers Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system) Water heating	able 11) '0' if no lows for CHP and the Appendix C. ity heating system (98) x (3 in Table 4a or Aim (9	up to four of (30) stem 04a) × (305)	other heat 02) x (303) 6) x (306) = E) • (308) =	sources; ti	1 he latter 1 1 1 1.05 kWh/yea 2026.67 2128.01 0	(302) (303a) (304a) (305) (306) ar (307a) (308
Fraction of space heat from secondary/supplementary heating (T Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers Fraction of total space heat from Community boilers Factor for control and charging method (Table 4c(3)) for community Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement Space heat from Community boilers Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme:	able 11) '0' if no lows for CHP and the Appendix C. ity heating system (98) x (3 in Table 4a or Aim (9	(30 (30 (30 (30 (305 (305 (305) (305) (305) (305) (305)	i) x (306) = E) (308) =	sources; ti	1 he latter 1 1 1 1.05 kWh/yes 2026.67 2128.01 0 0	(302) (303a) (304a) (305) (306) ar (307a) (308 (309)

Cooling System Energy Efficiency Ratio)				0	(314)
Space cooling (if there is a fixed cooling	g system, if not enter 0	$= (107) \div (314)$	=		0	(315)
Electricity for pumps and fans within dw mechanical ventilation - balanced, extra	O (m outside		Г	121.26	(330a)
warm air heating system fans				F	0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330b	b) + (330g) =	Ē	121.26	(331)
Energy for lighting (calculated in Appen	dix L)			Ē	295.76	(332)
Total delivered energy for all uses (307) + (309) + (310) + (31	2) + (315) + (331) + (33	32)(237b) =	Ī	4612.61	(338)
12b. CO2 Emissions – Community hea	ting scheme					
		Energy kWh/year	Emission factors kg CO2/kWh		missions g CO2/year	
		KIIII you	Mg GG = MIII	,	,, -u.	
CO2 from other sources of space and v Efficiency of heat source 1 (%)	• •	•	J	·	96	(367a)
•	If there is CHP us	· P)	J	·		(367a) (367)
Efficiency of heat source 1 (%)	If there is CHP us	P) sing two fuels repeat (363) to	(366) for the secon	nd fuel	96	
Efficiency of heat source 1 (%) CO2 associated with heat source 1	If there is CHP us	P) sing two fuels repeat (363) to b)+(310b)] x 100 ÷ (367b) x	0.22 0.52	nd fuel =	96	(367)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution	If there is CHP us [(307) systems	P) sing two fuels repeat (363) to b)+(310b)] x 100 ÷ (367b) x [(313) x	0.22 0.52	nd fuel = =	96 944.01 21.78	(367)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community s	If there is CHP us [(307) systems condary)	(309) x	(366) for the secon 0.22 0.52	nd fuel = = = =	96 944.01 21.78 965.78	(367) (372) (373)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so	If there is CHP us [(307) systems condary) sion heater or instanta	(309) x	(366) for the secon 0.22 0.52 0	and fuel = = = = = = = = = = = = = = = = = = =	96 944.01 21.78 965.78	(367) (372) (373) (374)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community source 1 CO2 associated with space heating (see CO2 associated with water from immerse	If there is CHP us [(307th systems condary) sion heater or instanta vater heating	(309) x (373) + (374) + (375) =	(366) for the secon 0.22 0.52 0	and fuel = = = = = = = = = = = = = = = = = = =	96 944.01 21.78 965.78 0	(367) (372) (373) (374) (375)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so CO2 associated with space heating (see CO2 associated with water from immersory Total CO2 associated with space and water	If there is CHP us [(307) systems condary) sion heater or instanta vater heating ps and fans within dwa	(309) x (373) + (374) + (375) =	(366) for the secon 0.22 0.52 0 0.22	= = = =	96 944.01 21.78 965.78 0 0	(367) (372) (373) (374) (375) (376)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so CO2 associated with space heating (see CO2 associated with water from immersory Total CO2 associated with space and we CO2 associated with electricity for pum	If there is CHP us [(307) systems condary) sion heater or instanta vater heating ps and fans within dwa	(363)(366) + (368)(372) (309) x (373) + (374) + (375) = elling (331)) x	(366) for the secon 0.22 0.52 0 0 0.22	= = =	96 944.01 21.78 965.78 0 0 965.78 62.93	(367) (372) (373) (374) (375) (376) (378)

El rating (section 14)

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 06 December 2021 at 11:01:31*

Project Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 60.42m²

Site Reference: Highgate Road - GREEN

Plot Reference: 00 - B

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 22.43 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 19.42 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 65.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 54.0 kWh/m²

OK

2 Fabric U-values

Element Highest Average External wall 0.17 (max. 0.30) 0.18 (max. 0.70) OK Party wall 0.00 (max. 0.20) **OK** Floor 0.13 (max. 0.25) 0.13 (max. 0.70) OK Roof 0.13 (max. 0.20) 0.13 (max. 0.35) OK Openings 1.40 (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 3.00 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	oK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	ОК
Based on:	-	
Overshading:	Average or unknown	
Windows facing: North East	6.56m ²	
Ventilation rate:	3.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		Lleor	Details:						
A No	No il la ale ave	Usei		- M	L		CTDO	040040	
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Stroma Softwa					010943 on: 1.0.5.50	
Contware Hame.	0.10111a 1 07 11 20 12		y Address:		31011.		7 01010	71. 110.0.00	
Address :		·	·						
1. Overall dwelling dime	ensions:								
Ground floor		Aı	rea(m²)	(10) v		ight(m)	(2a) =	Volume(m³	(3a)
	a) . (4 la) . (4 a) . (4 a) . (4 a)	. (4.7)		(1a) x	2	65	(2a) =	160.11	(Sa)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)-	+(1n)	60.42	(4)) (O.) (O.)	I) (O)	(0.)		_
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	160.11	(5)
2. Ventilation rate:	main sec	condary	other		total			m³ per hou	r
Number of altimospess	heating he	ating		1 _ F			40 =		_
Number of chimneys			0] = [0			0	(6a)
Number of open flues	0 +	0 +	0] = [0		20 =	0	(6b)
Number of intermittent fa				Ĺ	0		10 =	0	(7a)
Number of passive vents	;			L	0	X '	10 =	0	(7b)
Number of flueless gas fi	ires				0	X 4	40 =	0	(7c)
							Air ch	nanges per ho	our
Infiltration due to chimne	vs_flues and fans = (6a)	+(6b)+(7a)+(7b))+(7c) =	Г	0		÷ (5) =	0	(8)
•	peen carried out or is intended			ontinue fr			. (0) =	0	
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber fra resent, use the value correspo			•	ruction			0	(11)
deducting areas of openii		oriding to the gre	aler wall are	a (anter					
If suspended wooden f	floor, enter 0.2 (unseale	d) or 0.1 (sea	aled), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
ŭ	s and doors draught stri	pped						0	(14)
Window infiltration			0.25 - [0.2	, ,	_	. (45)		0	(15)
Infiltration rate	arron avanced in subject		(8) + (10)	, , ,	, , ,	, ,		0	(16)
If based on air permeabil	q50, expressed in cubic	-	•	•	etre or e	envelope	area	3	$= \begin{pmatrix} (17) \\ (49) \end{pmatrix}$
•	es if a pressurisation test has b				is beina u	sed		0.15	(18)
Number of sides sheltere			,	,	3			0	(19)
Shelter factor			(20) = 1 -	0.075 x (1	19)] =			1	(20)
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.15	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ∸ 4								
	1.23 1.1 1.08	0.95 0.95	0.92	1	1.08	1.12	1.18]	
		<u>l</u>						J	

Adjusted infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effe		•	rate for t	пе аррп	саріе са	ise						0.5	(23
If exhaust air h	eat pump	using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b	o) = (23a)			0.5	(23
If balanced with	n heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				75.65	(23
a) If balance	ed mech	anical ve	entilation	with he	at recov	ery (MVI	HR) (24a	a)m = (2	2b)m + (23b) × [1 – (23c)	÷ 100]	_
(24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(24
b) If balance	ed mech	anical ve	entilation	without	heat red	covery (N	ЛV) (24b	o)m = (2	2b)m + (23b)		_	
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)r				•	•				.5 × (23b	o)			
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)r		on or wh en (24d)			•				0.5]				
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in box	x (25)				_	
(25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25
3. Heat losse	s and he	eat loss	paramet	er:									
ELEMENT	Gros area		Openin m	=	Net Ar A ,r		U-val W/m2		A X U (W/I	K)	k-value kJ/m²-l		X k /K
Doors					3.49	X	1.4	=	4.886				(20
Vindows					6.56	x1.	/[1/(1.4)+	0.04] =	8.7				(2
Floor					60.42	2 x	0.13	=	7.85459	9	110	6646.2	2 (28
Nalls Type1	19.8	35	10.0	5	9.8	X	0.18	=	1.76		60	588	(29
Walls Type2	51.	2	0		51.2	X	0.17	=	8.55		60	3072	(29
Roof	5.6	8	0		5.68	X	0.13	=	0.74		9	51.12	(30
Total area of e	elements	s, m²			137.1	5							(3
Party wall					21.92	2 x	0	=	0		45	986.4	(3:
Party ceiling					54.74	1					30	1642.2	2 (3:
nternal wall **	•				85.22	2				Ī	9	766.98	3 (32
for windows and it include the area						lated using	ı formula 1	/[(1/U-valu	ue)+0.04] a	as given in	paragraph	1 3.2	_
Fabric heat los				o ana par			(26)(30)) + (32) =				32.49	(3:
Heat capacity		,	,					((28).	(30) + (32	2) + (32a).	(32e) =	13752.9	 (3
hermal mass		` '	c = Cm +	- TFA) ir	n kJ/m²K	, <u>.</u>		= (34)	÷ (4) =			227.62	(3
For design assessan be used inste				construct	ion are no	t known pr	ecisely the	e indicative	e values of	TMP in Ta	able 1f		`
Thermal bridg	es : S (L	x Y) cal	culated (using Ap	pendix l	K						10.25	(3
f details of therma		are not kn	own (36) =	= 0.05 x (3	11)								_
Total fabric he									- (36) =			42.75	(3
entilation hea	ı —	1	·		1 .	1		``	= 0.33 × (<u>, , , , , , , , , , , , , , , , , , , </u>	<u> </u>	1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	

			i		i								4
(38)m= 16.54		16.14	15.15	14.95	13.96	13.96	13.76	14.36	14.95	15.35	15.75		(38)
Heat transfe				T		T	l		= (37) + (
(39)m= 59.28	59.09	58.89	57.9	57.7	56.71	56.71	56.51	57.1	57.7	58.09	58.49		(39)
Heat loss pa	rameter (I	HLP), W	m²K						= (39)m ÷	Sum(39) _{1.} · (4)	12 /12=	57.85	(39)
(40)m= 0.98	0.98	0.97	0.96	0.95	0.94	0.94	0.94	0.95	0.95	0.96	0.97		_
Number of d	lavs in mo	nth (Tab	le 1a)					/	Average =	Sum(40) ₁ .	12 /12=	0.96	(40)
Jar	-i	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 he	eating ene	rgy requi	irement:								kWh/ye	ar:	
A soumed so	oun on ou	NI.											(40)
Assumed oc if TFA > 1 if TFA £ 1	3.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		99		(42)
Annual aver	•	ater usad	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		81	.55		(43)
Reduce the ani	nual average	hot water	usage by	5% if the a	lwelling is	designed			se target o		.00		(- /
not more that 1		· ·	r day (all w	ater use, i I	not and co	<u> </u>	1			1			
Jar Hot water usag		Mar	Apr	May	Jun	Jul Table 10 Y	Aug	Sep	Oct	Nov	Dec		
			1	1	1	1							
(44)m= 89.7	86.44	83.18	79.91	76.65	73.39	73.39	76.65	79.91	83.18	86.44	89.7	070.54	7,40
Energy content	of hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	m x nm x E	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1	L	978.54	(44)
(45)m= 133.0	2 116.34	120.05	104.67	100.43	86.66	80.31	92.15	93.25	108.68	118.63	128.82		
If instantaneous	s water heati	na at point	of use (no	n hot water	r storage)	enter () in	hoxes (46		Γotal = Su	m(45) ₁₁₂ =	=	1283.02	(45)
		18.01	15.7	15.06	13	12.05	13.82	13.99	16.3	17.79	19.32		(46)
(46)m= 19.98 Water storage		10.01	13.7	15.00	13	12.05	13.02	13.99	10.3	17.79	19.32		(40)
Storage volu	ıme (litres)) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community	/ heating a	and no ta	ınk in dw	/elling, e	nter 110	litres in	(47)						
Otherwise if		hot wate	er (this in	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storag	-	oclarod I	oss fact	or ie kna	wn (k\//k	2/d2v/).							(40)
Temperature				JI IS KIIO	wii (Kvvi	i/uay).					0		(48) (49)
Energy lost f				aar			(48) x (49)	١ _			0		
b) If manufa		_	-		or is not		(40) X (43)	_		1	10		(50)
Hot water st			-							0.	.02		(51)
If community	•		on 4.3										
Volume factor Temperature			2h							—	.03		(52)
·							(47) (54)	· · · (50) · · · (1	50)		.6		(53)
Energy lost f Enter (50) o		_	, KVVII/ye	ear			(47) x (51)) X (52) X (53) =		03		(54) (55)
Water storage			for each	month			((56)m = (55) × (41)r	m	<u> </u>	.03		(00)
(56)m= 32.0°		32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder conta												кH	(50)
(57)m= 32.0°		32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
					!								

Primary circuit loss (annual) from Table 3					()		(58)
Primary circuit loss calcula	ted for each month	(59) m = $(58) \div 3$	365 × (41)	m	,				
(modified by factor from	Table H5 if there is	solar water hea	ting and a	cylinder	thermos	stat)		ı	
(59)m= 23.26 21.01 23.	26 22.51 23.26	22.51 23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss calculated for e	ach month (61)m =	(60) ÷ 365 × (4	1)m						
(61)m = 0 0 0	0 0	0 0	0	0	0	0	0		(61)
Total heat required for water	er heating calculate	d for each mon	th (62)m =	0.85 × (4	45)m + (46)m +	(57)m +	(59)m + (61)m	
(62)m= 188.3 166.27 175	.33 158.16 155.71	140.16 135.58	8 147.43	146.75	163.95	172.12	184.1		(62)
Solar DHW input calculated using	Appendix G or Append	ix H (negative quan	tity) (enter '0'	if no solar	contribution	on to wate	r heating)		
(add additional lines if FGH	IRS and/or WWHR	S applies, see A	Appendix G	6)					
(63)m = 0 0 0	0 0	0 0	0	0	0	0	0		(63)
Output from water heater									
(64)m= 188.3 166.27 175	.33 158.16 155.71	140.16 135.58	8 147.43	146.75	163.95	172.12	184.1		
			Outp	ut from wa	iter heater	(annual) _{1.}	12	1933.86	(64)
Heat gains from water heat	ing, kWh/month 0.2	25 ´ [0.85 × (45)	m + (61)m] + 0.8 x	[(46)m -	+ (57)m	+ (59)m]	
(65)m= 88.45 78.63 84.	14 77.6 77.61	71.61 70.92	74.86	73.8	80.36	82.24	87.06		(65)
include (57)m in calculati	on of (65)m only if	cylinder is in the	e dwelling	or hot wa	ater is fro	om comi	munity h	eating	
5. Internal gains (see Tab	ole 5 and 5a):								
Metabolic gains (Table 5),	Watts								
Jan Feb M	lar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 99.67 99.67 99.	67 99.67 99.67	99.67 99.67	99.67	99.67	99.67	99.67	99.67		(66)
Lighting gains (calculated in	n Appendix L, equa	tion L9 or L9a),	also see	Table 5					
(67)m= 17.6 15.63 12.	71 9.62 7.19	6.07 6.56	8.53	11.45	14.54	16.97	18.09		(67)
Appliances gains (calculate	ed in Appendix L, e	quation L13 or L	_13a), also	see Tab	ole 5				
(68)m= 174 175.81 171	.26 161.57 149.35	137.85 130.18	8 128.37	132.92	142.61	154.84	166.33		(68)
Cooking gains (calculated i	n Appendix L, equa	ation L15 or L15	a), also se	e Table	5				
(69)m= 32.97 32.97 32.	97 32.97 32.97	32.97 32.97	32.97	32.97	32.97	32.97	32.97		(69)
Pumps and fans gains (Tab	ole 5a)								
(70)m= 0 0 0	0 0	0 0	0	0	0	0	0		(70)
Losses e.g. evaporation (ne	egative values) (Ta	ble 5)							
(71)m= -79.74 -79.74 -79	.74 -79.74 -79.74	-79.74 -79.74	4 -79.74	-79.74	-79.74	-79.74	-79.74		(71)
Water heating gains (Table	5)								
(72)m= 118.89 117 113	.09 107.77 104.32	99.46 95.33	100.62	102.5	108.01	114.22	117.01		(72)
Total internal gains =		(66)m + (67)m + (68)m +	(69)m + (7	70)m + (71)m + (72)	m		
(73)m= 363.39 361.35 349	.97 331.87 313.76	296.29 284.9	7 290.43	299.78	318.06	338.93	354.33		(73)
6. Solar gains:									
Solar gains are calculated using		·	uations to co	nvert to the	e applicabl		on.		
Orientation: Access Facto Table 6d	r Area m²	Flux Table 6a	т	g_ able 6b	Та	FF ble 6c		Gains (W)	
N. d								, ,	1,
Northeast 0.9x 0.77	X 6.56	X 11.28	_ X	0.63	_	0.7	=	22.62	[(75)
Northeast _{0.9x} 0.77	x 6.56	x 22.97	x	0.63	x	0.7	=	46.04	(75)

Northeast _{0.9x}	0.77	X	6.5	56	x	4	1.38	x		0.63	x	0.7	=	82.96	(75)
Northeast _{0.9x}	0.77	X	6.5	56	x	6	7.96	X		0.63	x	0.7	=	136.24	(75)
Northeast _{0.9x}	0.77	X	6.5	56	x	9	1.35	X		0.63	x	0.7	=	183.13	(75)
Northeast _{0.9x}	0.77	X	6.5	56	x	9	7.38	X		0.63	x	0.7	=	195.24	(75)
Northeast _{0.9x}	0.77	Х	6.5	56	x	9	91.1	X		0.63	х	0.7	=	182.64	(75)
Northeast _{0.9x}	0.77	х	6.5	56	x	7	2.63	X		0.63	x	0.7	=	145.6	(75)
Northeast 0.9x	0.77	x	6.5	56	x	5	0.42	X		0.63	x	0.7	=	101.08	(75)
Northeast _{0.9x}	0.77	X	6.5	56	x	2	8.07	x		0.63	x	0.7	=	56.27	(75)
Northeast _{0.9x}	0.77	х	6.5	56	x	1	14.2	X		0.63	x	0.7	=	28.46	(75)
Northeast 0.9x	0.77	x	6.5	56	x	9	9.21	х		0.63	x	0.7		18.47	(75)
_					•										_
Solar gains in	watts. ca	alculated	d for eac	h month	1			(83)m	ı = Sı	um(74)m .	(82)m				
(83)m= 22.62	46.04	82.96	136.24	183.13	1	95.24	182.64	145		101.08	56.27	28.46	18.47		(83)
Total gains – i	nternal a	ınd sola	r (84)m =	- (73)m		33)m	, watts		!			_!	!		
(84)m= 386.01	407.39	432.92	468.11	496.9	·	91.53	467.61	436.	.03	400.86	374.32	367.39	372.8		(84)
7 Moon inter	nal tamp	oroturo	(hooting		. \			<u> </u>				1	ı		
7. Mean inter	•		,		<u> </u>	oroo f	rom Tok	olo O	Th	1 (00)					7(05)
Temperature	•				-			ые 9,	In	I (°C)				21	(85)
Utilisation fac		l e			Ť						0 1	T		1	
Jan	Feb	Mar	Apr	May	_	Jun	Jul	Αι	-	Sep	Oct	Nov	Dec		(00)
(86)m= 1	0.99	0.99	0.96	0.87		0.7	0.53	0.5	8	0.84	0.97	0.99	1		(86)
Mean interna	l temper	ature in	living ar	ea T1 (f	ollo	w ste	ps 3 to 7	7 in T	able	9c)				_	
(87)m= 19.95	20.05	20.26	20.56	20.82	2	0.96	20.99	20.9	99	20.9	20.59	20.23	19.94		(87)
Temperature	durina h	eating r	eriods i	n rest of	dw	ellina	from Ta	able 9). Th	n2 (°C)					
(88)m= 20.1	20.1	20.1	20.12	20.12	Т	0.13	20.13	20.1	-	20.13	20.12	20.12	20.11		(88)
Utilisation fac	tor for a	aine for	rest of d	welling	h2	 m (sa	a Tahla	02)					!		
(89)m= 0.99		0.98	0.95	0.83	_).62	0.43	0.4	8	0.77	0.96	0.99	1		(89)
				!	_							1 0.00	<u> </u>		, ,
Mean interna	· ·	ı	1	T .	Ť	<u> </u>		ri –				T	T	1	(00)
(90)m= 18.7	18.85	19.15	19.59	19.94	2	0.11	20.13	20.1	13	20.04	19.63	19.12	18.69		(90)
										Ť	LA = Liv	ing area ÷ (4) =	0.6	(91)
Mean interna	l temper	ature (fo	or the wh	ole dwe	lling	g) = fl	_A × T1	+ (1 -	– fL	A) × T2					
(92)m= 19.45	19.57	19.82	20.18	20.47	2	0.62	20.65	20.6	65	20.56	20.21	19.79	19.44		(92)
Apply adjustr	nent to tl	he mear	n interna	l temper	atu	re fro	m Table	4e, v	whe	re appro	priate	•	•	•	
(93)m= 19.45	19.57	19.82	20.18	20.47	2	0.62	20.65	20.6	65	20.56	20.21	19.79	19.44		(93)
8. Space hea	ting requ	uiremen	t												
Set Ti to the	mean int	ernal te	mperatu	re obtair	ned	at ste	ep 11 of	Table	e 9b	, so tha	t Ti,m=	(76)m an	d re-cald	culate	
the utilisation	factor fo	or gains	using Ta	able 9a										•	
Jan	Feb	Mar	Apr	May		Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm	n:		_							_		•	
(94)m= 0.99	0.99	0.98	0.95	0.85).66	0.49	0.5	54	0.81	0.96	0.99	0.99		(94)
Useful gains,	hmGm	, W = (9	4)m x (8	4)m	_									•	
(95)m= 383.49	403.45	424.54	443.16	423.22	32	25.98	227.32	235.	.95	323.86	358.55	363	370.76		(95)
Monthly aver	age exte	rnal tem	perature	from T	abl	e 8								•	
(96)m= 4.3	4.9	6.5	8.9	11.7	1	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2		(96)

Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m- (96)m] (97)m=		(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m		,
(98)m= 383.06 311.54 267.69 150.99 61.66 0 0 0 145.68 269.33 387.45		
Total per year (kWh/year) = Sum(98) _{15,912} =	1977.39	(98)
Space heating requirement in kWh/m²/year	32.73	(99)
9b. Energy requirements – Community heating scheme		
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none	0	(301)
Fraction of space heat from community system 1 – (301) =	1	(302)
The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.	he latter	1.
Fraction of heat from Community boilers	1	(303a)
Fraction of total space heat from Community boilers (302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for community heating system	1	(305)
Distribution loss factor (Table 12c) for community heating system	1.05	(306)
Space heating	kWh/year	1
Annual space heating requirement	1977.39]],
Space heat from Community boilers (98) x (304a) x (305) x (306) =	2076.26	(307a)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0	(308
Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement	1933.86]
If DHW from community scheme:		-
Matanka at Cons. On the St. In all and (000)		7,040
Water heat from Community boilers (64) x (303a) x (305) x (306) =	2030.56	(310a)
Electricity used for heat distribution 0.01 × [(307a)(307e) + (310a)(310e)] =	2030.56	(313)
Electricity used for heat distribution 0.01 × [(307a)(307e) + (310a)(310e)] = Cooling System Energy Efficiency Ratio		(313)
Electricity used for heat distribution 0.01 × [(307a)(307e) + (310a)(310e)] =	41.07	(313)
Electricity used for heat distribution 0.01 × [(307a)(307e) + (310a)(310e)] = Cooling System Energy Efficiency Ratio	41.07	(313)
Electricity used for heat distribution $0.01 \times [(307a)(307e) + (310a)(310e)] = $ Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) $= (107) \div (314) = $ Electricity for pumps and fans within dwelling (Table 4f):	41.07 0 0	(313) (314) (315)
Electricity used for heat distribution 0.01 × [(307a)(307e) + (310a)(310e)] = Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) = (107) ÷ (314) = Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside	41.07 0 0 128.53	(313) (314) (315) (330a)
Electricity used for heat distribution $0.01 \times [(307a)(307e) + (310a)(310e)] = $ Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) $= (107) \div (314) = $ Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside warm air heating system fans	41.07 0 0 128.53	(313) (314) (315) (330a) (330b)
Electricity used for heat distribution 0.01 × [(307a)(307e) + (310a)(310e)] = Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) = (107) ÷ (314) = Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside warm air heating system fans pump for solar water heating	41.07 0 0 128.53 0	(313) (314) (315) (330a) (330b) (330g)

12b. CO2 Emissions – Community heating scheme

Energy Emission factor Emissions kWh/year kg CO2/kWh kg CO2/year

CO2 from other sources of space and v Efficiency of heat source 1 (%)	ũ (P) sing two fuels repeat (363) to (3	366) for the secor	nd fuel	96	(367a)
CO2 associated with heat source 1	[(307b	b)+(310b)] x 100 ÷ (367b) x	0.22] = [924.03	(367)
Electrical energy for heat distribution		[(313) x	0.52] = [21.31	(372)
Total CO2 associated with community s	systems	(363)(366) + (368)(372)		= [945.35	(373)
CO2 associated with space heating (se	condary)	(309) x	0	= [0	(374)
CO2 associated with water from immers	sion heater or instanta	neous heater (312) x	0.22] = [0	(375)
Total CO2 associated with space and w	ater heating	(373) + (374) + (375) =		[945.35	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	= [66.71	(378)
CO2 associated with electricity for lighting	ng	(332))) x	0.52] = [161.32	(379)
Total CO2, kg/year	sum of (376)(382) =				1173.38	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				19.42	(384)
El rating (section 14)					85.09	(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 06 December 2021 at 11:00:58*

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 59.22m²Site Reference:Highgate Road - GREENPlot Reference:00 - C

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 21.78 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 18.95 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 63.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 52.3 kWh/m²

2 Fabric U-values

Element Average Highest

External wall 0.17 (max. 0.30) 0.18 (max. 0.70) OK Party wall 0.00 (max. 0.20) OK Floor 0.13 (max. 0.25) 0.13 (max. 0.70) OK Roof 0.13 (max. 0.20) 0.13 (max. 0.35) OK Openings 1.40 (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 3.00 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	oK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	9.01m²	
Ventilation rate:	2.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		Heor	Details:							
Access an Name	Nailleabare	USEI		- M	L		CTDO	010943		
Assessor Name:	Assessor Name: Neil Ingham Stroma Number Software Name: Stroma FSAP 2012 Software Vers									
Continuito Humo.	5.101.101.107.11 2012		y Address:		0.011.		7 0 10 10	on: 1.0.5.50		
Address :		·								
1. Overall dwelling dime	ensions:									
Ground floor		Ar	ea(m²)	(10) v		ight(m)	(2a) =	Volume(m³	(3a)	
	-) . (4 -) . (4 -) . (4 -) . (4 -)	(4.5)		(1a) x	2	65	(2a) =	156.93	(3a)	
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	F(1II)	59.22	(4)	\	I) (O)	(0.)		_	
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	156.93	(5)	
2. Ventilation rate:	main sec	ondary	other		total			m³ per hou	r	
Number of altimospess	heating he	ating		, ₋ -			40 =	-	_	
Number of chimneys			0] = [0			0	(6a)	
Number of open flues	0 +	0 +	0] = [0		20 =	0	(6b)	
Number of intermittent fa				Ĺ	0		10 =	0	(7a)	
Number of passive vents	;			L	0	X '	10 =	0	(7b)	
Number of flueless gas fi	ires				0	X 4	40 =	0	(7c)	
							Air ch	nanges per ho	our	
Infiltration due to chimne	vs_flues and fans = (6a)	+(6b)+(7a)+(7b)	+(7c) =	Г	0		÷ (5) =	0	(8)	
•	peen carried out or is intended,			ontinue fr			- (3) =	0	(0)	
Number of storeys in the	he dwelling (ns)							0	(9)	
Additional infiltration						[(9)	-1]x0.1 =	0	(10)	
	.25 for steel or timber fra resent, use the value correspo			•	ruction			0	(11)	
deducting areas of openii		inding to the gre	aler wall are	a (anter						
If suspended wooden f	floor, enter 0.2 (unsealed	d) or 0.1 (sea	iled), else	enter 0				0	(12)	
If no draught lobby, en								0	(13)	
ŭ	s and doors draught strip	oped						0	(14)	
Window infiltration			_	$0.25 - [0.2 \times (14) \div 100] = 0$ $(8) + (10) + (11) + (12) + (13) + (15) = 0$						
Infiltration rate	arron avance and in authin		. , , , ,	, , ,	, , ,	, ,		0	(16)	
If based on air permeabil	q50, expressed in cubic $(18) = (17)$	•	•	•	etre or e	envelope	area	3	$= \begin{pmatrix} (17) \\ (49) \end{pmatrix}$	
•	es if a pressurisation test has b				is beina u	sed		0.15	(18)	
Number of sides sheltere			.,	,	3			0	(19)	
Shelter factor			(20) = 1 -	0.075 x (1	19)] =			1	(20)	
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.15	(21)	
Infiltration rate modified f	or monthly wind speed									
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec			
Monthly average wind sp	peed from Table 7							_		
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7			
Wind Factor (22a)m = (2	2)m ∸ 4									
	1.23 1.1 1.08	0.95 0.95	0.92	1	1.08	1.12	1.18			
		!						I		

Adjusted infiltr	ation rate	e (allowi	ina for sl	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effe		•	rate for t	he appli	cable ca	se							¬,,,,
If mechanical			andiv N. (C	93h) — (93 <i>a</i>	a) v Emy (aguatian (I	VEVV otho	ruino (22h) - (22a)			0.5	(23a)
If exhaust air h) = (23a)			0.5	(23b)
		•	-	_					Oh)m ı (22h) v [-	1 (220)	75.65	(23c)
a) If balance (24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3	- 100j	(24a)
b) If balance	<u>.</u>	<u> </u>	Į	<u> </u>	Į		ļ	ļ.	ļ	ļ	0.0		,
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole h	nouse ex	tract ver	ntilation o	r positiv	/e input	ventilatio	n from o	utside	ļ	ļ		I	
,	n < 0.5 ×			•					.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural if (22b)r	ventilation								0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	change	rate - er	nter (24a	or (24l	o) or (24	c) or (24	d) in bo	x (25)	-	-	-		
(25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25)
3. Heat losse	es and he	eat loss	paramet	er:									
ELEMENT	Gros area	SS	Openir		Net Ar A ,r		U-val W/m2		A X U (W/l		k-value kJ/m²-l		X k I/K
Doors		,			2.94		1.4	=	4.116	$\stackrel{\prime}{\Box}$			(26)
Windows					9.01	x1	/[1/(1.4)+	0.04] =	11.95	一			(27)
Floor					59.22	2 x	0.13		7.6986		110	6514.	2 (28)
Walls Type1	23.4	17	11.9	5	11.52	2 x	0.18	<u> </u>	2.07	₹ i	60	691.2	(29)
Walls Type2	35.2	26	0	一	35.26	3 X	0.17	-	5.89	₹ i	60	2115.	6 (29)
Roof	6.9	1	0	一	6.91	x	0.13	<u> </u>	0.9	₹ i	9	62.19	(30)
Total area of e	elements	, m²			124.8	6							(31)
Party wall					26	x	0	=	0		45	1170	(32)
Party ceiling					52.3						30	1569	(32b)
Internal wall **	ŧ				101.8	1				Ĭ	9	916.2	9 (32c)
* for windows and ** include the are						lated using	formula 1	I/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	1 3.2	
Fabric heat los	ss, W/K =	= S (A x	U)				(26)(30) + (32) =				32.62	(33)
Heat capacity	Cm = S((Axk)						((28).	(30) + (32	2) + (32a).	(32e) =	13038.48	(34)
Thermal mass	parame	ter (TMI	= Cm -	: TFA) ir	n kJ/m²K			= (34)	÷ (4) =			220.17	(35)
For design assess				construct	ion are no	t known pi	ecisely the	e indicative	e values of	TMP in Ta	able 1f		
Thermal bridg	es : S (L	x Y) cal	culated	using Ap	pendix l	K						10.34	(36)
if details of therm		are not kr	nown (36) :	= 0.05 x (3	31)								_
Total fabric he									(36) =	·\ :		42.96	(37)
Ventilation hea		r	<u> </u>	<u> </u>	1	1. 1	1	- ` ´	= 0.33 × (<u> </u>	1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		

(20) 40 24	1 10 00	45.00	44.05	14.00	42.00	42.00	42.40	44.07	44.00	45.04	45.42		(38)
(38)m= 16.21		15.82	14.85	14.66	13.68	13.68	13.49	14.07	14.66	15.04	15.43		(30)
Heat transfe		nt, vv/K 58.78	57.81	57.62	56.65	56.65	56.45	57.04	= (37) + (37) 57.62	58.01	58.4		
(66)	00.00	1 000	00.	002	00.00	00.00	00.10			Sum(39) ₁	<u> </u>	57.77	(39)
Heat loss pa	rameter (HLP), W	m²K	1	•	1	1	(40)m	= (39)m ÷	(4)	_		_
(40)m= 1	1	0.99	0.98	0.97	0.96	0.96	0.95	0.96	0.97	0.98	0.99		7(40)
Number of d	ays in mo	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	0.98	(40)
Jan	<u> </u>	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 he	eating ene	rgy requi	irement:								kWh/ye	ar:	
Assumed oc	cupancy.	N								1	.96		(42)
if TFA > 13	3.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		.00		()
if TFA £ 13 Annual avera	•	ater usad	ne in litre	es per da	v Vd.av	erage =	(25 x N)	+ 36		80).74		(43)
Reduce the ann	nual average	hot water	usage by	5% if the a	welling is	designed t			se target o				(1.0)
not more that 12	<u> </u>				_	<u> </u>							
Jan Hot water usage		Mar r day for ea	Apr ach month	May	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m= 88.81	<u> </u>	82.35	79.12	75.89	72.66	72.66	75.89	79.12	82.35	85.58	88.81		
(44)///= 00.01	05.50	02.55	79.12	73.09	72.00	72.00	73.09			m(44) ₁₁₂ =	\vdash	968.86	(44)
Energy content	of hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x E	OTm / 3600			· /	<u> </u>		` ′
(45)m= 131.7	1 115.19	118.87	103.63	99.44	85.81	79.51	91.24	92.33	107.6	117.46	127.55		
If instantaneous	s water heat	ina at noint	of use (no	n hot water	r storaga)	enter () in	hoves (16		Γotal = Su	m(45) ₁₁₂ =	=	1270.32	(45)
(46)m= 19.76		17.83	15.54	14.92	12.87	11.93	13.69	13.85	16.14	17.62	19.13		(46)
Water storage	1	17.03	15.54	14.92	12.07	11.93	13.09	13.63	10.14	17.02	19.13		(40)
Storage volu	ıme (litres) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community	Ū			•			` '						
Otherwise if Water storage		hot wate	er (this in	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
a) If manufa		eclared l	oss facto	or is kno	wn (kWh	n/day):					0		(48)
Temperature	e factor fro	m Table	2b								0		(49)
Energy lost f		_	-				(48) x (49)) =		1	10		(50)
b) If manufa Hot water sto			-										(54)
If community	•			IE Z (KVV	ii/iitie/ua	iy <i>)</i>				0.	02		(51)
Volume facto	_									1.	.03		(52)
Temperature	e factor fro	m Table	2b							0	.6		(53)
Energy lost f		_	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	1.	.03		(54)
Enter (50) o			طممم سما				(/50) /	EE) (44)	_	1.	.03		(55)
Water storag							((56)m = (, , ,					(50)
(56)m= 32.01 If cylinder conta		32.01 ed solar sto	30.98 rage. (57)	32.01 m = (56)m	30.98 x [(50) – (32.01 H11)l ÷ (5	32.01 0), else (5	30.98 7)m = (56)	32.01 m where (30.98 H11) is fro	32.01 m Appendix	κΗ	(56)
		32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
(57)m= 32.01	20.92	32.01	30.96	32.01	30.96	32.01	32.01	30.96	32.01	30.96	32.01		(01)

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 there	mostat)
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 23.2	6 22.51 23.26 (59)
Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m	
(61)m= 0 0 0 0 0 0 0 0 0 0 0	0 0 (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= 186.98 165.12 174.14 157.12 154.71 139.3 134.79 146.52 145.82 162.8	
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contri	
(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 0 (63)
Output from water heater	
(64)m= 186.98 165.12 174.14 157.12 154.71 139.3 134.79 146.52 145.82 162.8	38 170.95 182.83
Output from water he	
Heat gains from water heating, kWh/month 0.25 $^{\prime}$ [0.85 \times (45)m + (61)m] + 0.8 \times [(46)	
(65)m= 88.01 78.24 83.74 77.25 77.28 71.33 70.66 74.56 73.49 80	
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is	s 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 Oc	
(66)m= 97.97 97.97 97.97 97.97 97.97 97.97 97.97 97.97 97.97 97.97	7 97.97 97.97 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	
(67)m= 16.07 14.27 11.6 8.79 6.57 5.54 5.99 7.79 10.45 13.2	7 15.49 16.51 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	
(68)m= 170.98 172.75 168.28 158.76 146.75 135.45 127.91 126.14 130.61 140.	12 152.14 163.43 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	
(69)m= 32.8 32.8 32.8 32.8 32.8 32.8 32.8 32.8	3 32.8 32.8 (69)
Pumps and fans gains (Table 5a)	
(70)m= 0 0 0 0 0 0 0 0 0 0 0	0 0 (70)
Losses e.g. evaporation (negative values) (Table 5)	
(71)m= -78.38 -78.38 -78.38 -78.38 -78.38 -78.38 -78.38 -78.38 -78.38 -78.38 -78.38 -78.38 -78.38 -78.38 -78.38	88 -78.38 -78.38 (71)
Water heating gains (Table 5)	
(72)m= 118.3 116.43 112.56 107.29 103.88 99.06 94.97 100.21 102.08 107.5	53 113.68 116.44 (72)
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (68)m + (69)m	, ,
(73)m= 357.73 355.84 344.84 327.23 309.58 292.45 281.26 286.53 295.53 313.3	
6. Solar gains:	31 333.7 346.76
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the appli	cable orientation
	FF Gains
Orientation: Access Factor Area Flux g_ Table 6d m² Table 6a Table 6b	Table 6c (W)
Northeast 0.9x 0.77 x 9.01 x 11.28 x 0.63 x	
Northeast 0.9x 0.77 x 9.01 x 22.97 x 0.63 x	0.7 = 63.24 (75)

Northeast _{0.9x}	0.77	х	9.0)1	x	4	1.38	X		0.63	x	0.7	=	113.94	(75)
Northeast _{0.9x}	0.77	х	9.0)1	x [6	7.96	x		0.63	x	0.7		187.12	(75)
Northeast _{0.9x}	0.77	х	9.0)1	x [9	1.35	X		0.63	x	0.7		251.53	(75)
Northeast _{0.9x}	0.77	х	9.0)1	x	9	7.38	X		0.63	x	0.7	=	268.16	(75)
Northeast _{0.9x}	0.77	x	9.0)1	x [9	91.1	x		0.63	×	0.7		250.85	(75)
Northeast _{0.9x}	0.77	х	9.0)1	x [7	2.63	X		0.63	x	0.7		199.98	(75)
Northeast 0.9x	0.77	х	9.0)1	x [5	0.42	X		0.63	x	0.7	=	138.84	(75)
Northeast _{0.9x}	0.77	x	9.0)1	x [2	8.07	x		0.63	×	0.7		77.29	(75)
Northeast _{0.9x}	0.77	х	9.0)1	x [1	14.2	X		0.63	x	0.7		39.09	(75)
Northeast 0.9x	0.77	х	9.0)1	x [9	9.21	X		0.63	x	0.7	=	25.37	(75)
_															_
Solar gains in	watts, ca	alculated	d for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m				
(83)m= 31.07	63.24	113.94	187.12	251.53		8.16	250.85	199.		138.84	77.29	39.09	25.37		(83)
Total gains – i	nternal a	and sola	r (84)m =	- (73)m	+ (8	3)m	, watts		!						
(84)m= 388.8	419.08	458.77	514.35	561.11	56	0.61	532.12	486.	.51	434.36	390.6	372.79	374.15		(84)
7. Mean inter	rnal temr	oratura	(heating	easean	1										
Temperature	•		`		<i>'</i>	rea f	rom Tak	مام ۵	Th	1 (°C)				21	(85)
•	•	٠.			•			Jie J,		1 (0)				21	(00)
Utilisation fac					Ė	. 1		١ ٨.	ا ما	Con	Oct	Nov	Dec		
(86)m= Jan 0.99	0.99	Mar 0.98	Apr 0.94	May 0.82	_	Jun .62	Jul 0.46	0.5	- 	Sep 0.8	Oct 0.96	0.99	1		(86)
(80)111= 0.99	0.99	0.90	0.94	0.02		.02	0.40	0.5	,2	0.0	0.90	0.99			(00)
Mean interna	l temper	ature in	living ar	ea T1 (fo	ollov	v ste	ps 3 to 7	7 in T	able	e 9c)		_		•	
(87)m= 19.91	20.03	20.27	20.6	20.86	20).97	21	20.9	99	20.91	20.59	20.21	19.9		(87)
Temperature	during h	neating p	eriods i	n rest of	dwe	elling	from Ta	able 9), Th	n2 (°C)					
(88)m= 20.08	20.09	20.09	20.1	20.11	20).12	20.12	20.1	12	20.11	20.11	20.1	20.09		(88)
Utilisation fac	ctor for a	ains for	rest of d	wellina.	h2.r	n (se	e Table	9a)	-					•	
(89)m= 0.99		0.97		0.77	_	.55	0.37	0.4	3	0.73	0.94	0.99	0.99		(89)
Mean interna	l temper	atura in	the rect	of dwall	ina .	T2 (fa	allow etc	ne 3	to 7	in Tahl	0.00)				
(90)m= 18.64	18.81	19.16	19.64	19.97	┰	0.1	20.12	20.		20.04	19.63	19.07	18.62		(90)
(66)	1 .0.0	1	10.0	10.01								ng area ÷ (0.45	(91)
												·9 ··· · · (-,	0.43	(0.)
Mean interna		· `	1	1	Ť			- `-				1	i	1	(22)
(92)m= 19.21	19.36	19.66	20.07	20.37).49	20.51	20.5		20.43	20.06	19.58	19.2		(92)
Apply adjustr	1				_			·			•	T	T	1	(00)
(93)m= 19.21	19.36	19.66	20.07	20.37	20).49	20.51	20.5	51	20.43	20.06	19.58	19.2		(93)
8. Space hea	·											 >			
Set Ti to the the utilisation					ned	at ste	ep 11 of	Table	e 9b	o, so tha	t Ti,m=	(76)m an	d re-cald	culate	
Jan	Feb	Mar	Apr	May		Jun	Jul	Ι ,,		Sep	Oct	Nov	Dec		
Utilisation fac	l		<u> </u>	Iviay		Juli	Jui	Αι	ug	Sep	Oct	INOV	Dec		
(94)m= 0.99	0.99	0.97	0.92	0.79	Ιο	.58	0.41	0.4	7	0.75	0.94	0.98	0.99]	(94)
Useful gains,	<u> </u>		<u> </u>	l		.50	0.71			0.70	0.04	1 0.00	1 0.00		(- ')
(95)m= 385.39	413.3	445.27	471.67	441.11	32	4.74	220.37	229.	66	327.32	368.13	366.82	371.41		(95)
Monthly aver								L		027.02	550.15	1 000.02	1 57 1.71		(/
(96)m= 4.3	4.9	6.5	8.9	11.7		4.6	16.6	16.	4	14.1	10.6	7.1	4.2		(96)
` ,		<u> </u>	<u> </u>	<u> </u>								<u> </u>	<u> </u>	1	

Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m- (96)m] (97)m= 882.32 853.01 773.55 645.92 499.58 333.94 221.66 232.12 361.26 545.24 724.19 875.67		(97)								
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m		(0.)								
(98)m= 369.71 295.49 244.24 125.45 43.5 0 0 0 131.77 257.3 375.17										
Total per year (kWh/year) = Sum(98) _{15,912} =	1842.63	(98)								
Space heating requirement in kWh/m²/year	31.12	(99)								
9b. Energy requirements – Community heating scheme										
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none	0	(301)								
Fraction of space heat from community system 1 – (301) =	1	(302)								
The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.										
Fraction of heat from Community boilers	1	(303a)								
Fraction of total space heat from Community boilers (302) x (303a) =	1	(304a)								
Factor for control and charging method (Table 4c(3)) for community heating system	1	(305)								
Distribution loss factor (Table 12c) for community heating system	1.05	(306)								
Space heating	kWh/year	1								
Annual space heating requirement	1842.63]								
Space heat from Community boilers (98) x (304a) x (305) x (306) =	1934.76	(307a)								
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0	(308								
Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) =	0	(309)								
Water heating Annual water heating requirement	1921.16]								
If DHW from community scheme:		1								
Water heat from Community boilers (64) x (303a) x (305) x (306) =	2017.22	(310a)								
Electricity used for heat distribution 0.01 × [(307a)(307e) + (310a)(310e)] =	39.52	(313)								
Cooling System Energy Efficiency Ratio	0	(314)								
Space cooling (if there is a fixed cooling system, if not enter 0) = $(107) \div (314) =$	0	(315)								
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside	125.98	(330a)								
warm air heating system fans	0	(330b)								
pump for solar water heating	0	(330g)								
Total electricity for the above, kWh/year =(330a) + (330b) + (330g) =	125.98	(331)								
, , , , , , , , , , , , , , , , , , , ,										
Energy for lighting (calculated in Appendix L)	283.72	(332)								

12b. CO2 Emissions – Community heating scheme

Energy Emission factor Emissions kWh/year kg CO2/kWh kg CO2/year

CO2 from other sources of space and water heat	,		_		_
Efficiency of heat source 1 (%)	there is CHP using two fuels repeat (363) to (3	66) for the secor	nd fuel	96	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.22] = [889.2	(367)
Electrical energy for heat distribution	[(313) x	0.52] = [20.51	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372)		=	909.71	(373)
CO2 associated with space heating (secondary)	(309) x	0] = [0	(374)
CO2 associated with water from immersion heater] = [0	(375)		
Total CO2 associated with space and water heati	ing $(373) + (374) + (375) =$		[909.71	(376)
CO2 associated with electricity for pumps and far	ns within dwelling (331)) x	0.52] = [65.38	(378)
CO2 associated with electricity for lighting	(332))) x	0.52] = [147.25	(379)
Total CO2, kg/year sum of (37	76)(382) =			1122.34	(383)
Dwelling CO2 Emission Rate (383) ÷ (4)) =			18.95	(384)
El rating (section 14)				85.57	(385)

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Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 64.41m²Site Reference:Highgate Road - GREENPlot Reference: 00 - D

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 20.27 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 17.58 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 57.7 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 48.2 kWh/m²

OK
2 Fabric U-values

Flement Average

Element Highest Average External wall 0.18 (max. 0.30) 0.18 (max. 0.70) OK Party wall 0.00 (max. 0.20) OK Floor 0.13 (max. 0.25) 0.13 (max. 0.70) OK Roof 0.13 (max. 0.20) 0.13 (max. 0.35) OK Openings 1.40 (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 3.00 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

71 am ananan Babta		
7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	5.09m²	
Windows facing: South East	6.72m ²	
Ventilation rate:	3.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
•	U VV/III-K	
Community heating, heat from boilers – mains gas		

		l Isar I	Details:							
Assessor Name: Software Name:	Name:Neil InghamStroma Number:STROGName:Stroma FSAP 2012Software Version:Version									
Property Address: 00 - D Address:										
Overall dwelling dime	ensions:									
		Are	a(m²)		Av. He	ight(m)		Volume(m	³)	
Ground floor		(64.41	(1a) x	2	2.65	(2a) =	170.69	(3a)	
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) (64.41	(4)						
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	170.69	(5)	
2. Ventilation rate:										
	main seconda heating heating	ry	other		total			m³ per hou	ır	
Number of chimneys	0 + 0	_ + _	0] = [0	X 4	40 =	0	(6a)	
Number of open flues	0 + 0	+	0	=	0	x 2	20 =	0	(6b)	
Number of intermittent fa	ins				0	x '	10 =	0	(7a)	
Number of passive vents	;			Ē	0	x '	10 =	0	(7b)	
Number of flueless gas fi	ires			F	0	x	40 =	0	(7c)	
				L						
							Air ch	nanges per ho	our	
	ys, flues and fans = $(6a)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6a)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b$			[0		÷ (5) =	0	(8)	
Number of storeys in the	peen carried out or is intended, procee he dwelling (ns)	ed to (17),	otnerwise (continue tr	om (9) to	(16)		0	(9)	
Additional infiltration	no awaming (no)					[(9)	-1]x0.1 =	0	(10)	
Structural infiltration: 0	.25 for steel or timber frame o	r 0.35 fo	r masoni	y constr	ruction			0	(11)	
if both types of wall are p deducting areas of openi	resent, use the value corresponding t	o the grea	ter wall are	a (after			'			
•	floor, enter 0.2 (unsealed) or 0	.1 (seale	ed), else	enter 0				0	(12)	
If no draught lobby, en	,	•	,,					0	(13)	
Percentage of window	s and doors draught stripped							0	(14)	
Window infiltration			0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)	
Infiltration rate			(8) + (10)					0	(16)	
•	q50, expressed in cubic metro	-	•	•	etre of e	envelope	area	3	(17)	
•	lity value, then $(18) = [(17) \div 20] + (18)$ if a pressurisation test has been do				is haina u	sad		0.15	(18)	
Number of sides sheltere		ne or a de	gree an pe	THEADIIITY	is being u	seu		0	(19)	
Shelter factor			(20) = 1 -	[0.0 75 x (1	19)] =			1	(20)	
Infiltration rate incorporate	ting shelter factor		(21) = (18) x (20) =				0.15	(21)	
Infiltration rate modified f	or monthly wind speed									
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Monthly average wind sp	peed from Table 7									
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7			
Wind Factor (22a)m = (2	2)m ÷ 4									
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18]		
		•	•		•	•	•	•		

Adjusted infiltr	ation rate	(allowi	ng for sh	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effec		•	rate for t	he appli	cable ca	se							_
If mechanica				al.) (aa				. (22)	\			0.5	(23a)
If exhaust air h) = (23a)			0.5	(23b)
If balanced with		-	-	_								75.65	(23c)
a) If balance						, 		^ `	<u> </u>		1 ` ´	÷ 100]	(5.4.)
(24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(24a)
b) If balance					1	, , , , , , , , , , , , , , , , , , , 	, ``	í `	r Ó			1	(5.41.)
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole h if (22b)n	n < 0.5 ×			•	•				.5 × (23b)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural if (22b)n	ventilatior n = 1, the								0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	change r	ate - er	iter (24a) or (24k	o) or (24	c) or (24	d) in box	(25)	-		-	•	
(25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25)
3. Heat losse	s and hea	at loss p	oaramet	er:									
ELEMENT	Gross area (Openin m	=	Net Ar A ,r		U-valı W/m2		A X U (W/I	<)	k-value kJ/m²-l		
Doors					2.61	X	1.4	= [3.654				(26)
Windows Type) 1				5.09	x1,	/[1/(1.4)+	0.04] =	6.75				(27)
Windows Type	2				6.72	x1.	/[1/(1.4)+	0.04] =	8.91				(27)
Floor													
					64.41	1 x	0.13	=	8.37330	1	110	7085.10	1 (28)
Walls Type1	45.34	ı	14.4	2	64.41		0.13	= =	8.37330 5.57	1	110	7085.10	(28)
Walls Type1 Walls Type2	45.34		14.4	2		2 x		_		1		- -	╡
• •				2	30.92	2 x	0.18	=	5.57	1	60	1855.2	(29)
Walls Type2	4.69		0	2	30.92 4.69 6.8	2 x x x x	0.18	=	5.57 0.84		60	1855.2	(29)
Walls Type2 Roof Total area of e	4.69		0	2	30.92 4.69 6.8	2 x x x x 4	0.18 0.18 0.13	=	5.57 0.84 0.88		60 60 9	1855.2 281.4 61.2	(29) (29) (30) (31)
Walls Type2 Roof Total area of e	4.69		0	2	30.92 4.69 6.8 121.2 47.16	2 x x x x 4 x x	0.18	=	5.57 0.84		60 60 9 45	1855.2 281.4 61.2	(29) (29) (30) (31) (32)
Walls Type2 Roof Total area of e Party wall Party ceiling	6.8 elements,		0	2	30.92 4.69 6.8 121.2 47.16 57.61	2 x x x x 4 x 1	0.18 0.18 0.13	=	5.57 0.84 0.88		60 60 9 45 30	1855.2 281.4 61.2 2122.2 1728.3	(29) (29) (30) (31) (32) (32b)
Walls Type2 Roof Total area of e Party wall Party ceiling Internal wall ** * for windows and	4.69 6.8 elements,	m² ws, use e	0 0	indow U-va	30.92 4.69 6.8 121.2 47.16 57.61 91.05	2 x x x 4 x 5 x	0.18 0.18 0.13	= = = = = = = = = = = = = = = = = = = =	5.57 0.84 0.88		60 60 9 45 30 9	1855.2 281.4 61.2 2122.2 1728.3 819.45	(29) (29) (30) (31) (32)
Walls Type2 Roof Total area of e Party wall Party ceiling Internal wall ** * for windows and ** include the area	4.69 6.8 elements,	m² ws, use e	0 0	indow U-va	30.92 4.69 6.8 121.2 47.16 57.61 91.05	x x x 4 x 1 5 Salated using	0.18 0.18 0.13	= = = =	5.57 0.84 0.88		60 60 9 45 30 9	1855.2 281.4 61.2 2122.2 1728.3 819.45	(29) (29) (30) (31) (32) (32b) (32c)
Walls Type2 Roof Total area of e Party wall Party ceiling Internal wall ** * for windows and	4.69 6.8 elements, I roof window as on both seeds, W/K =	m² ws, use e ides of in S (A x	0 0	indow U-va	30.92 4.69 6.8 121.2 47.16 57.61 91.05	x x x 4 x 1 5 Salated using	0.18 0.13 0.13	= = = = /[(1/U-value) + (32) =	5.57 0.84 0.88	ns given ir	60 60 9 45 30 9	1855.2 281.4 61.2 2122.2 1728.3 819.45 9 3.2	(29) (29) (30) (31) (32) (32b) (32c)
Walls Type2 Roof Total area of e Party wall Party ceiling Internal wall ** * for windows and ** include the area Fabric heat los Heat capacity	4.69 6.8 elements, I roof window as on both s ss, W/K = Cm = S(A	m² ws, use e	0 0 offective winternal wall	ndow U-va	30.92 4.69 6.8 121.2 47.16 57.61 91.05 alue calculatitions	x x x 4 x x 1 5 x x lated using	0.18 0.13 0.13	= = = = /[(1/U-value) + (32) = ((28).	5.57 0.84 0.88 0	ns given ir	60 60 9 45 30 9	1855.2 281.4 61.2 2122.2 1728.3 819.45 3.2 34.98 13952.85	(29) (29) (30) (31) (32) (32b) (32c) (33) (34)
Walls Type2 Roof Total area of e Party wall Party ceiling Internal wall ** * for windows and ** include the area Fabric heat los	4.69 6.8 elements, A roof window as on both s ss, W/K = Cm = S(A paramete sments whee	ws, use endides of interest S (A x k) er (TMF) re the de	o offective with ternal wall U) $P = Cm + \frac{1}{2}$ tails of the	ndow U-va ls and par	30.92 4.69 6.8 121.2 47.16 57.61 91.05 alue calcul titions	x x x 4 x x 1 5 5 dated using	0.18 0.13 0.13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	= = = = /[(1/U-valu) + (32) = ((28). = (34)	5.57 0.84 0.88 0 0 (30) + (32 ÷ (4) =	as given ir 2) + (32a)	60 9 45 30 9 n paragraph	1855.2 281.4 61.2 2122.2 1728.3 819.45 9 3.2	(29) (29) (30) (31) (32) (32b) (32c)
Walls Type2 Roof Total area of e Party wall Party ceiling Internal wall ** * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess	4.69 6.8 elements, froof window as on both s. as, W/K = Cm = S(A) a paramete sments when ad of a deta	ws, use exides of interest in the decided calculations and the decided calculations.	o offective with ternal wall U) offective with ternal wall u) offective with ternal wall ulation.	ndow U-vals and par - TFA) ir	30.92 4.69 6.8 121.2 47.16 57.61 91.05 alue calcul titions	x x x 4 3 x lated using	0.18 0.13 0.13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	= = = = /[(1/U-valu) + (32) = ((28). = (34)	5.57 0.84 0.88 0 0 (30) + (32 ÷ (4) =	as given ir 2) + (32a)	60 9 45 30 9 n paragraph	1855.2 281.4 61.2 2122.2 1728.3 819.45 3.2 34.98 13952.85	(29) (29) (30) (31) (32) (32b) (32c) (33) (34)
Walls Type2 Roof Total area of e Party wall Party ceiling Internal wall ** * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste	4.69 6.8 elements, I roof window as on both s ss, W/K = Cm = S(A paramete sments whee ad of a deta es : S (L x	ws, use endides of interest of the decided calculations of	o offective winternal wall u) offective winternal wall u) offective winternal wall uniternal wal	ndow U-vals and par TFA) ir construct	30.92 4.69 6.8 121.2 47.16 57.61 91.05 alue calcultitions h kJ/m²K	x x x 4 3 x lated using	0.18 0.13 0.13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	= = = = /[(1/U-valu) + (32) = ((28). = (34)	5.57 0.84 0.88 0 0 (30) + (32 ÷ (4) =	as given ir 2) + (32a)	60 9 45 30 9 n paragraph	1855.2 281.4 61.2 2122.2 1728.3 819.45 3.2 34.98 13952.85 216.63	(29) (29) (30) (31) (32) (32b) (32c) (33) (34) (35)

Ventila	ation hea	at loss ca	alculated	l monthly	y				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	17.63	17.42	17.21	16.15	15.94	14.88	14.88	14.67	15.31	15.94	16.36	16.79		(38)
Heat tr	ansfer c	coefficier	nt, W/K						(39)m	= (37) + (37)	38)m			
(39)m=	64.29	64.08	63.87	62.82	62.6	61.55	61.55	61.34	61.97	62.6	63.03	63.45		
Heat Id	oss para	meter (H	HLP), W/	m²K						Average = = (39)m ÷	Sum(39) _{1.} · (4)	12 /12=	62.76	(39)
(40)m=	1	0.99	0.99	0.98	0.97	0.96	0.96	0.95	0.96	0.97	0.98	0.99		
Numbe	er of day	s in moi	nth (Tab	le 1a)				•	,	Average =	Sum(40) ₁ .	12 /12=	0.97	(40
	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
	ater heat		rgy requi	irement:							2	kWh/ye	ear:	(42
if TF if TF	A > 13.9 A £ 13.9	9, N = 1 9, N = 1	+ 1.76 x		`	,	•	, , -	,	ΓFA -13.				`
Reduce	the annua	al average	ater usag hot water person per	usage by	5% if the a	lwelling is	designed			se target o		.15		(43
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage ii	n litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)			•			
(44)m=	92.57	89.2	85.83	82.47	79.1	75.74	75.74	79.1	82.47	85.83	89.2	92.57		
Energy (content of	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x D	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1009.81	(44
(45)m=	137.27	120.06	123.89	108.01	103.64	89.43	82.87	95.1	96.23	112.15	122.42	132.94		
f instan	taneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =		1324.02	(45
(46)m=	20.59	18.01	18.58	16.2	15.55	13.41	12.43	14.26	14.43	16.82	18.36	19.94		(46
	storage													
If com	munity h	eating a	includin Ind no ta hot wate	ınk in dw	velling, e	nter 110	litres in	(47)				0		(47
	storage													
•			eclared l		or is kno	wn (kWh	n/day):					0		(48
			m Table									0		(49
			storage eclared o	-		or is not		(48) x (49)) =		1	10		(50
		_	factor fr		e 2 (kW	h/litre/da	ıy)				0.	02		(5
	e factor	•		011 1.0							1.	03		(52
			m Table	2b								.6		(53
Energy	lost fro	m water	storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54
	(50) or (_	•								03		(55
				_										
Water	storage	loss cal	culated f	for each	month			((56)m = (55) × (41)	m				

If cylinder contains dedicated solar storage, (57) m = (56) m x $[(50) - (H11)] \div (50)$, else (57) m = (56) m where $(H11)$ is from Appendix H	
(57)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01	(57)
Primary circuit loss (annual) from Table 3	(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= 23.26 21.01 23.26 22.51 23.26 22.51 23.26 22.51 23.26 22.51 23.26 22.51 23.26	(59)
Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m	
(61)m= 0 0 0 0 0 0 0 0 0 0 0 0	(61)
Total heat required for water heating calculated for each month $(62)m = 0.85 \times (45)m + (46)m + (57)m + (59)m + (60)m	1)m
(62)m= 192.55 169.99 179.17 161.5 158.92 142.93 138.15 150.37 149.73 167.43 175.91 188.22	(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	(63)
Output from water heater	
(64)m= 192.55 169.99 179.17 161.5 158.92 142.93 138.15 150.37 149.73 167.43 175.91 188.22	
Output from water heater (annual) ₁₁₂ 1974.86	(64)
Heat gains from water heating, kWh/month 0.25 $'$ [0.85 \times (45)m + (61)m] + 0.8 \times [(46)m + (57)m + (59)m]	
(65)m= 89.86 79.86 85.42 78.71 78.68 72.53 71.78 75.84 74.79 81.51 83.5 88.42	(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= 105.16 105.16 105.16 105.16 105.16 105.16 105.16 105.16 105.16 105.16 105.16 105.16 105.16	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	
(67)m= 16.7 14.83 12.06 9.13 6.83 5.76 6.23 8.09 10.86 13.79 16.1 17.16	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	
(68)m= 183.92 185.83 181.02 170.78 157.85 145.71 137.59 135.68 140.49 150.73 163.65 175.8	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	
(69)m= 33.52 33.52 33.52 33.52 33.52 33.52 33.52 33.52 33.52 33.52 33.52 33.52	(69)
Pumps and fans gains (Table 5a)	
(70)m= 0 0 0 0 0 0 0 0 0 0 0 0	(70)
Losses e.g. evaporation (negative values) (Table 5)	
(71)m= -84.13 -84.13 -84.13 -84.13 -84.13 -84.13 -84.13 -84.13 -84.13 -84.13 -84.13 -84.13 -84.13 -84.13	(71)
Water heating gains (Table 5)	
(72)m= 120.79 118.84 114.81 109.32 105.75 100.74 96.47 101.94 103.88 109.56 115.97 118.85	(72)
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m$	
(73)m= 375.95 374.05 362.43 343.77 324.98 306.75 294.84 300.26 309.78 328.63 350.27 366.36	(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 Area Flux g_ FF Gains Table 6d m² Table 6a Table 6b Table 6c (W)	

Northeast _{0.9x}	0.77	×	5.09		хГ	11.28] _x	0.63	×	0.7		17.55	(75)
Northeast 0.9x	0.77	^ x	5.09		^ L	22.97]	0.63	^ x	0.7	_	35.73	(75)
Northeast _{0.9x}	0.77	^ x	5.09		^ L	41.38]	0.63	= x	0.7	_	64.37	(75)
Northeast _{0.9x}	0.77	d ×	5.09		~ L х [67.96]	0.63	= x	0.7	= =	105.71	(75)
Northeast _{0.9x}	0.77	= x	5.09		x [91.35] x	0.63	×	0.7	= =	142.1	(75)
Northeast _{0.9x}	0.77	×	5.09		x [97.38] x	0.63	×	0.7	= =	151.49	(75)
Northeast 0.9x	0.77	ا ×	5.09		x [91.1]]	0.63	×	0.7	= =	141.71	(75)
Northeast _{0.9x}	0.77	ا ×	5.09		x [72.63]]	0.63	x	0.7	= =	112.98	(75)
Northeast _{0.9x}	0.77	≓ ×	5.09		x	50.42] X	0.63	×	0.7	= =	78.43	(75)
Northeast 0.9x	0.77	×	5.09		x [28.07] x	0.63	X	0.7		43.66	(75)
Northeast _{0.9x}	0.77	×	5.09		x [14.2] x	0.63	x	0.7	=	22.08	(75)
Northeast _{0.9x}	0.77	×	5.09		x	9.21	X	0.63	×	0.7	= =	14.33	(75)
Southeast _{0.9x}	0.77	×	6.72		x	36.79	X	0.63	×	0.7	-	75.56	(77)
Southeast 0.9x	0.77	×	6.72		x [62.67	j×	0.63	x	0.7		128.71	(77)
Southeast 0.9x	0.77	×	6.72		x	85.75	X	0.63	x	0.7	=	176.11	(77)
Southeast 0.9x	0.77	×	6.72		x	106.25	x	0.63	x	0.7		218.21	(77)
Southeast 0.9x	0.77	x	6.72		x	119.01	X	0.63	X	0.7	=	244.41	(77)
Southeast 0.9x	0.77	X	6.72		x	118.15	X	0.63	X	0.7	=	242.65	(77)
Southeast 0.9x	0.77	X	6.72		x	113.91	X	0.63	x	0.7	=	233.94	(77)
Southeast 0.9x	0.77	X	6.72		x	104.39	X	0.63	X	0.7	=	214.39	(77)
Southeast 0.9x	0.77	X	6.72		x	92.85	X	0.63	X	0.7	=	190.69	(77)
Southeast 0.9x	0.77	X	6.72		x	69.27	X	0.63	X	0.7	=	142.26	(77)
Southeast 0.9x	0.77	X	6.72		x	44.07	X	0.63	X	0.7	=	90.51	(77)
Southeast 0.9x	0.77	X	6.72		x	31.49	X	0.63	X	0.7	=	64.67	(77)
Solar gains in w							ì -	n = Sum(74)m	T ·		T	1	(02)
(83)m= 93.12 Total gains – in		40.48 solar		386.51		4.14 375.65	327	269.12	185.9	2 112.59	79]	(83)
		02.91	` 	711.49	·	0.89 670.49	627	.63 578.91	514.5	5 462.87	445.36	1	(84)
` '					_	0.03 070.43	021	.00 070.01	014.0	9 402.07	140.00	J	(0.)
7. Mean intern						una fuana Tal	hia O	Th4 (9C)					7(05)
Temperature of Utilisation factors	ŭ	٠.			•		bie 9	, IIII (C)				21	(85)
Jan	<u>_</u>	Mar	Apr	May	r	lun Jul	ΤΔ	ug Sep	Oct	Nov	Dec	1	
(86)m= 0.99		0.96	0.89	0.74	├	.55 0.4	0.4		0.92		0.99	1	(86)
	<u> </u>		ļ.					İ	ļ			J	, ,
Mean internal (87)m= 19.98		0.41	20.71	20.91		0.98 21	/ IN 1 2		20.7	20.29	19.95	1	(87)
			ļ					!		20.20	10.00	J	(- /
Temperature of (88)m= 20.08		ting pe	20.1	20.11		0.12 20.12	20.		20.11	20.1	20.1	1	(88)
			ļ					12 20.12	20.1	20.1	20.1	J	(00)
Utilisation fact								00 000	0.00	0.00	0.00	1	(00)
(89)m= 0.99		0.95	0.86	0.69		.48 0.32	0.3		0.89	0.98	0.99	J	(89)
Mean internal	temperatu	re in t	he rest of	f dwelli	ing ⁻	T2 (follow ste	eps 3	to 7 in Tab	le 9c)				

(90)m= 18.73 18.98 19.35 19.78 20.02 20.11 20.12	20.12 20.08	19.77	19.19	18.69		(90)
(50)1112 10.75 10.50 15.75 20.02 20.11 20.12		fLA = Living			0.63	(91)
Macon internal temperature (for the whole dwelling) - fl A v T1 v	(4 fl A) TO					` ′
Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (92)m = 19.52 19.72 20.02 20.37 20.58 20.66 20.67$	$\frac{(1-1LA) \times 12}{20.67}$ 20.63	20.35	19.88	19.49		(92)
Apply adjustment to the mean internal temperature from Table 4		opriate				
(93)m= 19.52 19.72 20.02 20.37 20.58 20.66 20.67	20.67 20.63	20.35	19.88	19.49		(93)
8. Space heating requirement						
Set Ti to the mean internal temperature obtained at step 11 of T the utilisation factor for gains using Table 9a	able 9b, so tha	at Ti,m=(7	76)m an	d re-calc	culate	
Jan Feb Mar Apr May Jun Jul	Aug Sep	Oct	Nov	Dec		
Utilisation factor for gains, hm:	- 3				l	
(94)m= 0.99 0.97 0.94 0.87 0.72 0.52 0.37	0.42 0.66	0.9	0.97	0.99		(94)
Useful gains, hmGm , W = (94)m x (84)m	<u> </u>				İ	
(95)m= 462.89 524.62 569.41 578.57 511.99 366.41 249.79	260.5 383.22	462.76	450.79	440.67		(95)
Monthly average external temperature from Table 8 (96)m=	16.4 14.1	10.6	7.1	4.2		(96)
Heat loss rate for mean internal temperature, Lm , W = $[(39)$ m x			7.1	7.2		(55)
	262.12 404.72	610.7	805.69	969.88		(97)
Space heating requirement for each month, kWh/month = 0.024	x [(97)m – (95	5)m] x (41	I)m			
(98)m= 383.44 285.75 218.94 102.18 32.77 0 0	0 0	110.07	255.53	393.73		_
	Total per year	(kWh/year)) = Sum(9	8) _{15,912} =	1782.41	(98)
Space heating requirement in kWh/m²/year					27.67	(99)
9b. Energy requirements – Community heating scheme						
This part is used for space heating, space cooling or water heating. Fraction of space heat from secondary/supplementary heating (T	g provided by	a commi	unity sch	neme		
i raction of space fieat from secondary/supplementary fieating (i	able 11) '0' if n		,		0	(301)
Fraction of space heat from community system 1 – (301) =	able 11) '0' if n		•		0	(301)
	,	one			1	= ' '
Fraction of space heat from community system $1 - (301) =$ The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See	ows for CHP and	one			1 he latter	(302)
Fraction of space heat from community system $1 - (301) =$ The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers	ows for CHP and	one up to four c	other heat	sources; t	1	(302) (303a)
Fraction of space heat from community system $1 - (301) =$ The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See	ows for CHP and	one up to four c		sources; t	1 he latter	(302)
Fraction of space heat from community system $1 - (301) =$ The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers	ows for CHP and the Appendix C.	up to four o	other heat	sources; t	1 he latter	(302) (303a)
Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers Fraction of total space heat from Community boilers	lows for CHP and the Appendix C. ity heating sys	up to four o	other heat	sources; t	1 he latter 1	(302) (303a) (304a)
Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers Fraction of total space heat from Community boilers Factor for control and charging method (Table 4c(3)) for community	lows for CHP and the Appendix C. ity heating sys	up to four o	other heat	sources; t	1 he latter 1 1	(302) (303a) (304a) (305) (306)
Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers Fraction of total space heat from Community boilers Factor for control and charging method (Table 4c(3)) for community boilers Distribution loss factor (Table 12c) for community heating system	lows for CHP and the Appendix C. ity heating sys	up to four o	other heat	sources; t	1	(302) (303a) (304a) (305) (306)
Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. Set Fraction of heat from Community boilers Fraction of total space heat from Community boilers Factor for control and charging method (Table 4c(3)) for community Distribution loss factor (Table 12c) for community heating system. Space heating	ows for CHP and the Appendix C. ity heating sys	up to four o	other heat 02) x (303	sources; ti	1 he latter 1 1 1 1 1.05 kWh/yea	(302) (303a) (304a) (305) (306)
Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. Set Fraction of heat from Community boilers Fraction of total space heat from Community boilers Factor for control and charging method (Table 4c(3)) for community Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement	lows for CHP and the Appendix C. ity heating sys	(30 stem	other heat 02) x (303) 5) x (306) =	sources; ti	1 he latter 1 1 1 1.05 kWh/yea 1782.41	(302) (303a) (304a) (305) (306)
Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers Fraction of total space heat from Community boilers Factor for control and charging method (Table 4c(3)) for community Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement Space heat from Community boilers	ows for CHP and the Appendix C. ity heating sys (98) x (3	(30 stem	5) x (306) = E)	sources; ti	1 he latter 1 1 1 1.05 kWh/yea 1782.41 1871.53	(302) (303a) (304a) (305) (306) Nr
Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers Fraction of total space heat from Community boilers Factor for control and charging method (Table 4c(3)) for community boilers Space heating Annual space heating requirement Space heat from Community boilers Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system) Water heating	ows for CHP and the Appendix C. ity heating sys (98) x (3	(30 stem	5) x (306) = E)	sources; ti	1 1 1 1 1.05 kWh/yea 1782.41 1871.53 0	(302) (303a) (304a) (305) (306) Nr (307a) (308
Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers Fraction of total space heat from Community boilers Factor for control and charging method (Table 4c(3)) for community bistribution loss factor (Table 12c) for community heating system. Space heating Annual space heating requirement Space heat from Community boilers Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system.) Water heating Annual water heating requirement	ows for CHP and the Appendix C. ity heating sys (98) x (3	(30 stem	5) x (306) = E)	sources; ti	1 he latter 1 1 1 1.05 kWh/yea 1782.41 1871.53	(302) (303a) (304a) (305) (306) Nr (307a) (308
Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers Fraction of total space heat from Community boilers Factor for control and charging method (Table 4c(3)) for community boilers Space heating Annual space heating requirement Space heat from Community boilers Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system) Water heating	ows for CHP and the Appendix C. ity heating sys (98) x (3 in Table 4a or A in (98) x (3	(30 stem	5) x (306) = E) - (308) =	sources; ti	1 1 1 1 1.05 kWh/yea 1782.41 1871.53 0	(302) (303a) (304a) (305) (306) Nr (307a) (308
Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure all includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers Fraction of total space heat from Community boilers Factor for control and charging method (Table 4c(3)) for community bistribution loss factor (Table 12c) for community heating system. Space heating Annual space heating requirement Space heat from Community boilers Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system.) Water heating Annual water heating requirement If DHW from community scheme:	ows for CHP and the Appendix C. ity heating sys (98) x (3 in Table 4a or A in (98) x (3	(30 (30 (30 (30 (305) (305) (305) (305) (305) (305) (305)	5) x (306) = E) - (308) =	sources; ti	1 he latter 1 1 1 1.05 kWh/yea 1782.41 1871.53 0 0	(302) (303a) (304a) (305) (306) (307a) (308 (309)

Cooling System Energy Efficiency Ratio)				0	(314)
Space cooling (if there is a fixed cooling	g system, if not enter 0	$= (107) \div (314)$	=		0	(315)
Electricity for pumps and fans within dw mechanical ventilation - balanced, extra	O (m outside		Г	137.02	(330a)
warm air heating system fans					0	(330b)
pump for solar water heating					0] (330g)
Total electricity for the above, kWh/year	r	=(330a) + (330b	o) + (330g) =		137.02	(331)
Energy for lighting (calculated in Appen		, , ,	, , ,		294.9	」 (332)
Total delivered energy for all uses (307)	,	2) + (315) + (331) + (33	(237b) =		4377.05	(338)
12b. CO2 Emissions – Community heat			, , ,			
		Energy kWh/year	Emission fac		missions g CO2/year	
		Killing Gai	ng co_mii		g 002 / y 0a.	
CO2 from other sources of space and v Efficiency of heat source 1 (%)	• •	•	J	•	96	(367a)
•	If there is CHP us	· P)	J	•		(367a) (367)
Efficiency of heat source 1 (%)	If there is CHP us	P) sing two fuels repeat (363) to	(366) for the secon	nd fuel	96	
Efficiency of heat source 1 (%) CO2 associated with heat source 1	If there is CHP us	b) sing two fuels repeat (363) to b)+(310b)] x 100 ÷ (367b) x	0.22 0.52	nd fuel =	96	(367)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution	If there is CHP us [(307b	(363) to b)+(310b)] x 100 ÷ (367b) x	0.22 0.52	ed fuel = =	96 887.66 20.48	(367)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community s	If there is CHP us [(307b systems condary)	(309) x Sing two fuels repeat (363) to (367b) x (363)(366) + (368)(372)	(366) for the secon 0.22 0.52	ed fuel	96 887.66 20.48 908.13	(367) (372) (373)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so	If there is CHP us [(307b systems condary) sion heater or instanta	(309) x Sing two fuels repeat (363) to (367b) x (363)(366) + (368)(372)	(366) for the secon 0.22 0.52 0	= = = =	96 887.66 20.48 908.13	(367) (372) (373) (374)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community s CO2 associated with space heating (se	If there is CHP us [(307b systems condary) sion heater or instantal vater heating	(363)(366) + (368)(372) (309) x (373) + (374) + (375) =	(366) for the secon 0.22 0.52 0	= = = =	96 887.66 20.48 908.13 0	(367) (372) (373) (374) (375)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community s CO2 associated with space heating (se CO2 associated with water from immers Total CO2 associated with space and w	If there is CHP us [(307b) systems condary) sion heater or instantal vater heating ps and fans within dwe	(363)(366) + (368)(372) (309) x (373) + (374) + (375) =	(366) for the secon 0.22 0.52 0 0.22	= = = = =	96 887.66 20.48 908.13 0	(367) (372) (373) (374) (375) (376)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community s CO2 associated with space heating (se CO2 associated with water from immers Total CO2 associated with space and w CO2 associated with electricity for pum	If there is CHP us [(307b) systems condary) sion heater or instantal vater heating ps and fans within dwe	(363)(366) + (368)(372) (309) x (373) + (374) + (375) = (310) x (303) x (309) x (309) x (309) x	(366) for the second 0.22 0.52 0.52 0.52 0.52	= = = = =	96 887.66 20.48 908.13 0 0 908.13 71.11	(367) (372) (373) (374) (375) (376) (378)

El rating (section 14)

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:59:59

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 61.88m²Site Reference:Highgate Road - GREENPlot Reference:00 - E

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 20.45 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 17.55 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 56.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 46.8 kWh/m²

OK

2 Fabric U-values

Element Highest Average External wall 0.16 (max. 0.30) 0.18 (max. 0.70) OK Party wall 0.00 (max. 0.20) OK Floor 0.13 (max. 0.25) 0.13 (max. 0.70) OK Roof 0.13 (max. 0.20) 0.13 (max. 0.35) OK Openings 1.40 (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 3.00 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Law anaray lights		
7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	ок
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: South East	9.14m²	
Ventilation rate:	3.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m ² K	
Community heating, heat from boilers – mains gas		

		Hear	Details:										
A No	Na il la ala ava	USEL		. NI	L		CTDO	040040					
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Stroma Softwa					010943 n: 1.0.5.50					
Contware Hame.	01101110 1 07 11 2012	Property	Address:		31011.		7 01010	11. 1.0.0.00					
Address : 1. Overall dwelling dimensions:													
1. Overall dwelling dime	ensions:												
Ground floor			ea(m²)	(10) v		ight(m)	(2a) =	Volume(m³) (3a)				
	a) . (4 b) . (4 a) . (4 d) . (4 a) .			(1a) x	2	65	(2a) =	163.98	(3a)				
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	(1n)	61.88	(4)		n (5)	<i>(</i> 2)		_				
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	163.98	(5)				
2. Ventilation rate:	main sec	ondary	other		total			m³ per hou	r				
Number of altimospess	heating hea	ating		1			40 =	-	_				
Number of chimneys		<u> </u>	0] = [0			0	(6a)				
Number of open flues	0 +	0 +	0] = [0		20 =	0	(6b)				
Number of intermittent fa				L	0		10 =	0	(7a)				
Number of passive vents				L	0	X '	10 =	0	(7b)				
Number of flueless gas fi	res				0	X 4	40 =	0	(7c)				
							Air ch	anges per ho	ur				
Infiltration due to chimne	vs_flues and fans = (6a)+	·(6b)+(7a)+(7b)+	·(7c) =	Г	0		÷ (5) =	0	(8)				
•	peen carried out or is intended,			ontinue fr			- (3) =	U	(0)				
Number of storeys in the	he dwelling (ns)							0	(9)				
Additional infiltration						[(9)	-1]x0.1 =	0	(10)				
	.25 for steel or timber fra resent, use the value correspon			•	uction			0	(11)				
deducting areas of openii		iding to the grea	iter wan area	a (anter									
If suspended wooden f	floor, enter 0.2 (unsealed	l) or 0.1 (seal	ed), else	enter 0				0	(12)				
If no draught lobby, en								0	(13)				
ŭ	s and doors draught strip	ped						0	(14)				
Window infiltration			0.25 - [0.2		_	. (45)		0	(15)				
Infiltration rate	arron aumanana din aubia		(8) + (10) -	, , ,	, , ,	, ,		0	(16)				
If based on air permeabil	q50, expressed in cubic	•	•	•	etre or e	envelope	area	3	(17)				
•	es if a pressurisation test has be				is being u	sed		0.15	(18)				
Number of sides sheltere			,	,	Ū			0	(19)				
Shelter factor			(20) = 1 - [0.075 x (1	9)] =			1	(20)				
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.15	(21)				
Infiltration rate modified f	or monthly wind speed												
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec						
Monthly average wind sp	eed from Table 7												
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7						
Wind Factor (22a)m = (2	2)m ∸ 4												
		0.95 0.95	0.92	1	1.08	1.12	1.18						
<u> </u>								l					

Adjusted infiltr	ation rat	e (allowi	ing for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effection of the Calculate of		•	iale ioi l	пе аррп	саріе са	ise						0.5	(23
If exhaust air h	eat pump	using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)			0.5	(23
If balanced with	n heat reco	overy: effic	eiency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				75.65	(23
a) If balance	ed mech	anical ve	entilation	with he	at recov	ery (MVI	HR) (24a	a)m = (2)	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(24
b) If balance	ed mech	anical ve	entilation	without	heat red	covery (I	ЛV) (24b	m = (22)	2b)m + (2	23b)		1	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)r		tract ver < (23b), t		•	•				.5 × (23b))			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)r		on or wh en (24d)							0.5]		•	•	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	nter (24a) or (24k	o) or (24	c) or (24	d) in bo	x (25)			•	•	
(25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25
3. Heat losse	s and he	eat loss i	paramet	er:									
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/I	K)	k-value kJ/m²-l		
Doors		` ,			2.61		1.4		3.654	,			(26
Vindows					9.14	x1	/[1/(1.4)+	0.04] =	12.12				(27
Floor					61.88	3 X	0.13	= İ	8.0444		110	6806.8	(28
Walls Type1	21.9	92	11.7	5	10.17	7 X	0.18	=	1.83		60	610.2	(29
Walls Type2	27.9	99	0		27.99) x	0.15	<u> </u>	4.34		60	1679.4	(29
Roof	24.9	98	0		24.98	3 x	0.13	-	3.25		9	224.82	(30
Total area of e	lements	s, m²			136.7	7							(31
Party wall					42.78	3 x	0	=	0		45	1925.1	(32
Party ceiling					36.89	9					30	1106.7	(32
nternal wall **					120.6	8					9	1086.12	2 (32
* for windows and ** include the area						lated using	ı formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	1 3.2	
abric heat los	ss, W/K	= S (A x	U)				(26)(30) + (32) =				33.23	(33
Heat capacity	Cm = S	(A x k)						((28).	(30) + (32	2) + (32a).	(32e) =	13439.14	(34
Thermal mass	parame	eter (TMF	= Cm -	- TFA) ir	n kJ/m²K			= (34)	÷ (4) =			217.18	(35
For design assess can be used inste				construct	ion are no	t known pi	ecisely the	e indicative	e values of	TMP in Ta	able 1f		
Thermal bridg	es : S (L	.xY) cal	culated (using Ap	pendix l	K						11.41	(36
f details of therma		are not kn	own (36) =	= 0.05 x (3	11)			(00)	(26)				-
Fotal fabric he		alculatos	1 manthl	.,					· (36) =	25\m v (F)	١	44.64	(37
entilation hea	r	1	·		lun	11	۸۰۰۰	- ` 	= 0.33 × (<u>, , , , , , , , , , , , , , , , , , , </u>	<u> </u>	1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	J	

							ı						(22)
(38)m= 16.94	16.73	16.53	15.52	15.31	14.3	14.3	14.1	14.71	15.31	15.72	16.13		(38)
Heat transfer								· · · ·	= (37) + (37)				
(39)m= 61.58	61.37	61.17	60.16	59.95	58.94	58.94	58.74	59.35	59.95	60.36	60.77	60.11	(39)
Heat loss para	ameter (I	HLP), W	m²K						= (39)m ÷	Sum(39) _{1.}	12 / 1 Z=	60.11	(39)
(40)m= 1	0.99	0.99	0.97	0.97	0.95	0.95	0.95	0.96	0.97	0.98	0.98		_
Number of da	ys in mo	nth (Tab	le 1a)					/	Average =	Sum(40) _{1.}	12 /12=	0.97	(40)
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 hea	iting ene	rgy requi	rement:								kWh/ye	ar:	
Assumed occ	upancy	N								2	03		(42)
if TFA > 13. if TFA £ 13.	.9, N = 1		[1 - exp	(-0.0003	49 x (TF	A -13.9)2)] + 0.0	0013 x (ΓFA -13.		03		(42)
Annual average	,	ater usaç	ge in litre	s per da	ıy Vd,av	erage =	(25 x N)	+ 36		82	.51		(43)
Reduce the annu	_				-	-	to achieve	a water us	e target o	f			
		· ·			_		Α.	0	0.1	NI.			
Jan Hot water usage	Feb	Mar r day for ea	Apr ach month	May Vd.m = fai	Jun	Jul Fable 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m= 90.77	87.46	84.16	80.86	77.56	74.26	74.26	77.56	80.86	84.16	87.46	90.77		
(44)111= 90.77	07.40	04.10	00.00	11.50	74.20	74.20	77.30			m(44) ₁₁₂ =	L	990.16	(44)
Energy content o	f hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x E	OTm / 3600			· /	L	000.10	(/
(45)m= 134.6	117.72	121.48	105.91	101.62	87.69	81.26	93.25	94.36	109.97	120.04	130.35		
					, ,				Γotal = Su	m(45) ₁₁₂ =	-	1298.26	(45)
If instantaneous	i	· ·	,	hot water	storage),	enter 0 ın	boxes (46)) to (61)					
(46)m= 20.19 Water storage	17.66	18.22	15.89	15.24	13.15	12.19	13.99	14.15	16.5	18.01	19.55		(46)
Storage volun) includir	ig any so	olar or W	/WHRS	storage	within sa	ame vess	sel		0		(47)
If community	` ′	•	0 ,			Ü					<u> </u>		()
Otherwise if n	•			•			` '	ers) ente	er '0' in (47)			
Water storage													
a) If manufac				or is kno	wn (kWr	n/day):					0		(48)
Temperature											0		(49)
Energy lost from b) If manufact		_	-		or ie not		(48) x (49)	=		1	10		(50)
Hot water stor			-							0.	02		(51)
If community	•			,		• /							
Volume factor										1.	03		(52)
Temperature										0	.6		(53)
Energy lost fro		_	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		03		(54)
Enter (50) or							//EC\ /	EE) (44)	_	1.	03		(55)
Water storage							((56)m = (, , ,					(50)
(56)m= 32.01 If cylinder contain	28.92	32.01	30.98	32.01	30.98 × [(50) = (32.01	32.01	30.98 7)m = (56)	32.01	30.98	32.01	v H	(56)
												XII	/ == `
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)

Primary circuit loss (annual) from Table 3	0 (58)
Primary circuit loss calculated for each month (59)m = $(58) \div 365 \times (41)$ m	
(modified by factor from Table H5 if there is solar water heating and a cylinder the	hermostat)
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 22.51 2	23.26 22.51 23.26 (59)
Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m	
(61)m= 0 0 0 0 0 0 0 0 0	0 0 0 (61)
Total heat required for water heating calculated for each month (62)m = $0.85 \times (45)$	5)m + (46)m + (57)m + (59)m + (61)m
	165.25 173.53 185.63 (62)
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar or	
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)	g/
(63)m= 0 0 0 0 0 0 0 0 0	0 0 0 (63)
Output from water heater	
	165.25 173.53 185.63
	er heater (annual) ₁₁₂ 1949.1 (64)
Heat gains from water heating, kWh/month 0.25 $^{\prime}$ [0.85 × (45)m + (61)m] + 0.8 x [(, , ,
	80.79 82.71 87.56 (65)
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water	
	er is nom community nearing
5. Internal gains (see Table 5 and 5a):	
Metabolic gains (Table 5), Watts	Orl No Book
Jan Feb Mar Apr May Jun Jul Aug Sep	Oct Nov Dec
	101.71 101.71 101.71 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	
	13.88 16.19 17.26 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table	
(68)m= 177.66 179.51 174.86 164.97 152.49 140.75 132.91 131.07 135.71	145.6 158.09 169.82 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	;
(69)m= 33.17 33.17 33.17 33.17 33.17 33.17 33.17 33.17 33.17	33.17 33.17 (69)
Pumps and fans gains (Table 5a)	
(70)m= 0 0 0 0 0 0 0 0 0	0 0 0 (70)
Losses e.g. evaporation (negative values) (Table 5)	
(71)m= -81.37 -8	-81.37 -81.37 (71)
Water heating gains (Table 5)	
(72)m= 119.59 117.69 113.73 108.35 104.85 99.93 95.75 101.11 103.01 1	108.58 114.87 117.69 (72)
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (68)m + (69)m + (69)m + (68)m + (69)m + (68)m$	D)m + (71)m + (72)m
(73)m= 367.57 365.63 354.24 336.02 317.72 300 288.44 293.83 303.17 3	321.58 342.67 358.3 (73)
6. Solar gains:	
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the a	applicable orientation.
Orientation: Access Factor Area Flux g_	FF Gains
Table 6d m ² Table 6a Table 6b	Table 6c (W)
Southeast 0.9x 0.77 x 9.14 x 36.79 x 0.63	x 0.7 = 102.78 (77)
Southeast 0.9x 0.77 x 9.14 x 62.67 x 0.63	x 0.7 = 175.07 (77)

Southeast _{0.9x}	0.77	X	9.	14	x	8	5.75	x		0.63	X	0.7	=	239.53	(77)
Southeast _{0.9x}	0.77	X	9.	14	x	10	06.25	x		0.63	x	0.7	=	296.79	(77)
Southeast _{0.9x}	0.77	X	9.	14	x	11	19.01	x		0.63	X	0.7	=	332.43	(77)
Southeast _{0.9x}	0.77	X	9.	14	x	11	18.15	x		0.63	x	0.7	=	330.03	(77)
Southeast _{0.9x}	0.77	X	9.	14	x	11	13.91	X		0.63	x	0.7	=	318.18	(77)
Southeast _{0.9x}	0.77	X	9.	14	x	10	04.39	x		0.63	X	0.7	=	291.59	(77)
Southeast 0.9x	0.77	X	9.	14	x	9:	2.85	x		0.63	x	0.7	=	259.36	(77)
Southeast _{0.9x}	0.77	X	9.	14	x	6	9.27	x		0.63	x	0.7	=	193.49	(77)
Southeast _{0.9x}	0.77	X	9.	14	x	4	4.07	x		0.63	X	0.7	=	123.1	(77)
Southeast 0.9x	0.77	X	9.	14	x	3	1.49	x		0.63	x	0.7	=	87.96	(77)
			•		_										<u></u>
Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m															
(83)m= 102.78	175.07	239.53	296.79	332.43		0.03	318.18	291.	.59	259.36	193.4	123.1	87.96		(83)
Total gains – i	nternal a	and sola	r (84)m =	= (73)m ·	+ (8	3)m ,	watts	•				<u>.</u>	.ī	•	
(84)m= 470.34	540.69	593.77	632.81	650.15	63	0.03	606.63	585.	.43	562.53	515.0	465.77	446.25		(84)
7. Mean inter	nal temr	perature	(heating	season)			•						•	
Temperature			,			rea f	rom Tal	ole 9.	Th1	1 (°C)				21	(85)
Utilisation fac	_				_			,		. (•)					(3.3)
Jan	Feb	Mar	Apr	May	ı 🗀	lun	Jul	Αι	ıa	Sep	Oct	Nov	Dec]	
(86)m= 0.99	0.98	0.95	0.89	0.77	 	.58	0.42	0.4	-	0.68	0.91	0.98	0.99		(86)
` '				L T4 /5					ملطمة	. 0-2)			<u> </u>	J	
Mean interna (87)m= 20.02	20.2	20.44	20.71	20.9		v ster	21	21 21	Т	20.96	20.72	20.33	19.99]	(87)
(87)m= 20.02	20.2	20.44	20.71	20.9	20	7.90	Z1		<u> </u>	20.90	20.72	20.33	19.99		(01)
Temperature						Ť						1	<u> </u>	1	(00)
(88)m= 20.09	20.09	20.09	20.11	20.11	20).12	20.12	20.1	13	20.12	20.11	20.1	20.1		(88)
Utilisation fac		ains for	rest of d	welling,	h2,r	n (se	e Table	9a)							
(89)m= 0.99	0.97	0.94	0.86	0.72	0.	.51	0.34	0.3	7	0.61	0.88	0.97	0.99		(89)
Mean interna	l temper	ature in	the rest	of dwelli	ing ⁻	T2 (fc	ollow ste	ps 3	to 7	in Tabl	e 9c)				
(90)m= 18.79	19.05	19.39	19.78	20.01	20).11	20.12	20.1	12	20.08	19.8	19.25	18.75		(90)
	•	!		!	•			•		f	LA = Liv	ring area ÷ (4) =	0.56	(91)
Mean interna	l temner	ature (fo	or the wh	ole dwe	lling	۱\	Δ ν Τ1	⊥ (1 .	_ fl .	Δ) v T2					
(92)m= 19.47	19.69	19.98	20.3	20.51		0.6	20.61	20.6		20.57	20.32	19.85	19.44]	(92)
Apply adjustr													1		` '
(93)m= 19.47	19.69	19.98	20.3	20.51	1	0.6	20.61	20.6	T	20.57	20.32		19.44]	(93)
8. Space hea													_		. ,
Set Ti to the				re obtair	ned a	at ste	ep 11 of	Table	e 9b	o, so tha	t Ti.m:	₌(76)m an	d re-cal	culate	
the utilisation										,	,	(1 2)111 0111			
Jan	Feb	Mar	Apr	May	J	lun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm	1:											-	
(94)m= 0.98	0.97	0.94	0.87	0.74	0.	.55	0.39	0.4	2	0.65	0.88	0.97	0.99		(94)
Useful gains,	hmGm	, W = (9	4)m x (8	4)m										- •	
(95)m= 462.89	524.04	557.31	549.73	480.93	34	5.68	235.37	245.	.79	365.54	455.5	451.06	440.59		(95)
Monthly aver	age exte	rnal tem	peratur	e from T	able	8						_		1	
(96)m= 4.3	4.9	6.5	8.9	11.7	14	4.6	16.6	16.	4	14.1	10.6	7.1	4.2		(96)

Heat loss rate for mean internal temperature, Lm , W = ((39)m × ((93)m × ((96)m × ((97)m × (93)m × (93)m × (96)m × ((97)m × (93)m ×
Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m
1625.56 198.72 257.86 198.72 97.9 34.98 0 0 0 0 94.61 229.4 361.29 1625.56 (98)
Space heating requirement in kWh/m²/year Space heating requirements — Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community boilers Fraction of total space heat from Community boilers Fraction of total space heat from Community boilers Fraction of total space heat from Community boilers Fraction of total space heat from Community boilers Space heating Annual space heating requirement Space heating requirement Space heat from Community boilers Fraction of total space heating requirement Space heating requirement Space heating requirement Fraction of total space heating requirement Space heating requirement Fraction of total space heating requirement Fraction of total space heating requirement Fraction of total space heating requirement Space heating Fraction of total space heat from Community heating system Space heating Fraction of total space heat from Community heating system Space heating Fraction of total space heat from Community heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system Space heating requirement from secondary/supplementary system Fraction of total space heating requirement Fraction of total space heating requirement Fraction of total space heating requirement Fraction of total space heating system in % (from Table 4a or Appendix E) Space heating Fraction of total space heating requirement Fraction of total space heating requirement Fraction of total space heating requirement Fraction of total space heating requirement Fraction of total space heating requirement Fraction of total space heating
Sb. Energy requirements – Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community boilers The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community boilers The community boilers The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Traction of heat from Community boilers The community boilers The community boilers The community heat from power stations. See Appendix C. The community heat from Community heat from power stations. See Appendix C. The community heat from Community heating system The community heat from Community heating system The community heat from community heating system The community heating system in the form Table 4a or Appendix E) The community heating requirement from secondary/supplementary system The community heating system in the form Table 4a or Appendix E) The community heating requirement from secondary/supplementary system The community heating system in the form Table 4a or Appendix E) The community heating requirement from secondary/supplementary system The community heating system in the form Table 4a or Appendix E) The community heating requirement from secondary/supplementary system The community heating requirement from the form the form the form the form the form the form the form th
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) = The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community boilers Fraction of total space heat from Community boilers Fraction of total space heat from Community boilers Fraction of static space heat from Community heating system Fraction loss factor (Table 12c) for community heating system Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement Space heat from Community boilers Fraction of space heating requirement Fraction of total space heating requirement Fraction of total space heating requirement Space heating Annual space heating requirement from Secondary/supplementary system in % (from Table 4a or Appendix E) Fraction of space heating requirement from secondary/supplementary system Space heating requirement from secondary/supplementary system Fraction of total space heating requirement Fraction of total space heating requirement Fraction of total space heat from Community boilers Fraction of total space heat from Community boilers Fraction of total space heat from Community space heating system in % (from Table 4a or Appendix E) Fraction of total space heating requirement Fraction of total space heating requirement Fraction of total space heat from Community space heating system in % (from Table 4a or Appendix E) Fraction of total space heating system in % (from Table 4a or Appendix E) Fraction of total space heating system in % (from Table 4a or Appendix E) Fraction of total space heating system in % (from Table 4a or Appendix E) Fraction of total space heating system in % (from Tabl
Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none 1
The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community boilers Fraction of total space heat from Community boilers Fractor for control and charging method (Table 4c(3)) for community heating system I (304a) Fractor for control and charging method (Table 4c(3)) for community heating system I (305) Distribution loss factor (Table 12c) for community heating system KWh/year Annual space heating Annual space heating requirement Space heat from Community boilers (98) x (304a) x (305) x (306) = I (706.84) (307a) Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating Annual water heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) = 0 (309) Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community boilers (64) x (303a) x (305) x (306) = 2046.56 (310a) Electricity used for heat distribution 0.01 x [(307a)(307e) + (310a)(310e)] = 37.53 (313) Cooling System Energy Efficiency Ratio
includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community boilers Fraction of total space heat from Community boilers Fraction of total space heat from Community boilers Fraction of total space heat from Community boilers Fractor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system I.05 (306) Space heating Annual space heating requirement Space heat from Community boilers Space heat from Community boilers Space heat from Community boilers Space heat from Community heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community boilers (64) x (303a) x (305) x (306) = 2046.56 (310a) Electricity used for heat distribution 0.01 x [(307a)(307e) + (310a)(310e)] = 37.53 (313) Cooling System Energy Efficiency Ratio
Fraction of total space heat from Community boilers (302) x (303a) = 1 (304a) Factor for control and charging method (Table 4c(3)) for community heating system 1 (305) Distribution loss factor (Table 12c) for community heating system 1.05 (306) Space heating Annual space heating requirement 1625.56 Space heat from Community boilers (98) x (304a) x (305) x (306) = 1706.84 (307a) Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) 0 (308) Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) = 0 (309) Water heating Annual water heating requirement 1949.1 If DHW from community scheme: Water heat from Community boilers (64) x (303a) x (305) x (306) = 2046.56 (310a) Electricity used for heat distribution 0.01 x [(307a)(307e) + (310a)(310e)] = 37.53 (313) Cooling System Energy Efficiency Ratio
Factor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement Space heat from Community boilers Space heat from Community boilers Space heat from Community boilers Space heating requirement in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system Space heating requirement from secondary/supplementary system Space heating requirement from secondary/supplementary system Space heating requirement (98) x (301) x 100 + (308) = 0 (308) Space heating requirement (98) x (301) x 100 + (308) = 0 (309) Water heating Annual water heating requirement Space heating requirement Space heating requirement (98) x (301) x 100 + (308) = 0 (309) Space heating requirement Space heating requirement Space heating requirement Space heating requirement Space heating requirement Space heating requirement Space heating requirement Space heating requirement Space heating requirement Space heating requirement Space heating requirement Space heating requirement Space heating requirement Space heating requirement Space heating requirement Space heating requirement Space heating requirement Space heating requirement Space heating requirement Space he
Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement Space heat from Community boilers Space heat from Community boilers Space heat from Community boilers Space heat from Community boilers Space heating requirement ary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system for some secondary/supplementary system for some secondary/supplementary system for some secondary/supplementary system for some secondary/supplementary system for some secondary/supplementary system for some secondary/supplementary system for some secondary/supplementary system for some secondary/supplementary system for some secondary/supplementary system for some secondary/supplementary system for some secondary system for some secondary system
Space heating Annual space heating requirement Space heat from Community boilers Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) × (304a) × (305) × (306) = 1706.84 (307a) (308) Space heating requirement from secondary/supplementary system (98) × (301) × 100 ÷ (308) = 0 (309) Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community boilers (64) × (303a) × (305) × (306) = 2046.56 (310a) Electricity used for heat distribution 0.01 × [(307a)(307e) + (310a)(310e)] = 37.53 (313) Cooling System Energy Efficiency Ratio
Annual space heating requirement Space heat from Community boilers (98) x (304a) x (305) x (306) = 1706.84 (307a) Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) = 0 (309) Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community boilers (64) x (303a) x (305) x (306) = 2046.56 (310a) Electricity used for heat distribution 0.01 x [(307a)(307e) + (310a)(310e)] = 37.53 (313) Cooling System Energy Efficiency Ratio
Space heat from Community boilers $(98) \times (304a) \times (305) \times (306) = 1706.84$ $(307a)$ Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) 0 (308) Space heating requirement from secondary/supplementary system $(98) \times (301) \times 100 \div (308) = 0$ (309) Water heating Annual water heating requirement $(64) \times (303a) \times (305) \times (306) = 2046.56$ $(310a)$ Electricity used for heat distribution $(64) \times (307a) \dots (307e) + (310a) \dots (310e) = 37.53$ (313) Cooling System Energy Efficiency Ratio
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) = 0 (309) Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community boilers (64) x (303a) x (305) x (306) = 2046.56 (310a) Electricity used for heat distribution 0.01 x [(307a)(307e) + (310a)(310e)] = 37.53 (313) Cooling System Energy Efficiency Ratio
Space heating requirement from secondary/supplementary system $(98) \times (301) \times 100 \div (308) = 0$ (309) Water heating Annual water heating requirement $(64) \times (303a) \times (305) \times (306) = 0$ $(310a)$ Electricity used for heat distribution $(64) \times (307a) \dots (307e) + (310a) \dots (310e) = 0$ (313) Cooling System Energy Efficiency Ratio
Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community boilers (64) x (303a) x (305) x (306) = 2046.56 (310a) Electricity used for heat distribution 0.01 x [(307a)(307e) + (310a)(310e)] = 37.53 (313) Cooling System Energy Efficiency Ratio
Annual water heating requirement 1949.1 If DHW from community scheme: Water heat from Community boilers $(64) \times (303a) \times (305) \times (306) =$ 2046.56 (310a) Electricity used for heat distribution $0.01 \times [(307a)(307e) + (310a)(310e)] =$ 37.53 (313) Cooling System Energy Efficiency Ratio
Water heat from Community boilers $ (64) \times (303a) \times (305) \times (306) = 2046.56 $ (310a) Electricity used for heat distribution $ 0.01 \times [(307a)(307e) + (310a)(310e)] = 37.53 $ (313) Cooling System Energy Efficiency Ratio
Electricity used for heat distribution $0.01 \times [(307a)(307e) + (310a)(310e)] = 37.53$ (313) Cooling System Energy Efficiency Ratio
Cooling System Energy Efficiency Ratio 0 (314)
Space cooling (if there is a fixed cooling system, if not enter 0) = $(107) \div (314) = 0$ (315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside 131.64 (330a)
warm air heating system fans 0 (330b)
pump for solar water heating 0 (330g)
Total electricity for the above, kWh/year $= (330a) + (330b) + (330g) = 131.64 $ (331)
(***) (***)
Energy for lighting (calculated in Appendix L) 296.65 (332)

12b. CO2 Emissions – Community heating scheme

Energy Emission factor Emissions kWh/year kg CO2/kWh kg CO2/year

CO2 from other sources of space and water hefficiency of heat source 1 (%)	heating (not CHP) If there is CHP using two fuels repeat (363) to (3	66) for the seco	nd fuel	96	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.22] = [844.51	(367)
Electrical energy for heat distribution	[(313) x	0.52] = [19.48	(372)
Total CO2 associated with community system	ns (363)(366) + (368)(372)		= [863.99	(373)
CO2 associated with space heating (secondary	ary) (309) x	0] = [0	(374)
CO2 associated with water from immersion h	eater or instantaneous heater (312) x	0.22] = [0	(375)
Total CO2 associated with space and water h	neating (373) + (374) + (375) =		[863.99	(376)
CO2 associated with electricity for pumps and	d fans within dwelling (331)) x	0.52] = [68.32	(378)
CO2 associated with electricity for lighting	(332))) x	0.52] = [153.96	(379)
Total CO2, kg/year	of (376)(382) =			1086.28	(383)
Dwelling CO2 Emission Rate (383)	÷ (4) =			17.55	(384)
El rating (section 14)				86.38	(385)

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Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 48.96m² **Plot Reference:** 01 - A Site Reference : Highgate Road - GREEN

Address:

Client Details:

Name: Address:

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 21.58 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 18.58 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 57.7 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 47.3 kWh/m²

OK 2 Fabric U-values

Element Highest Average

External wall 0.17 (max. 0.30) 0.18 (max. 0.70) OK Party wall 0.00 (max. 0.20) OK OK

Floor 0.13 (max. 0.25) 0.13 (max. 0.70)

Roof (no roof) Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ок
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	5.45m ²	
Windows facing: South East	6.09m ²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		l Jser J	Details:						
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa	are Vei				010943 on: 1.0.5.50	
Address :	F	Property	Address	01 - A					
Overall dwelling dime	nsions:								
		Are	a(m²)		Av. He	ight(m)		Volume(m ³	³)
Ground floor			48.96	(1a) x	2	65	(2a) =	129.74	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	48.96	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	129.74	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	+	0] = [0	x 4	40 =	0	(6a)
Number of open flues	0 + 0	+	0] = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ns			Ī	0	x 1	10 =	0	(7a)
Number of passive vents				Ē	0	x 1	10 =	0	(7b)
Number of flueless gas fi	res				0	x 4	40 =	0	(7c)
				L					
							Air ch	nanges per ho	our
•	ys, flues and fans = $(6a)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6a)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b$				0		÷ (5) =	0	(8)
Number of storeys in the	een carried out or is intended, proced ne dwelling (ns)	ed to (17),	otherwise (ontinue tr	om (9) to	(16)		0	(9)
Additional infiltration	io arrowing (rio)					[(9)-	-1]x0.1 =	0	(10)
Structural infiltration: 0.	.25 for steel or timber frame o	r 0.35 fc	r masoni	y constr	uction			0	(11)
if both types of wall are pri deducting areas of openir	resent, use the value corresponding t	o the grea	ter wall are	a (after					
,	loor, enter 0.2 (unsealed) or ().1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, ent	ter 0.05, else enter 0							0	(13)
Percentage of windows	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	. ,	-			0	(15)
Infiltration rate			(8) + (10)					0	(16)
•	q50, expressed in cubic metro ity value, then $(18) = [(17) \div 20] +$	-	•	•	etre of e	envelope	area	3	(17)
•	s if a pressurisation test has been do				is being u	sed		0.15	(18)
Number of sides sheltere			,	,	J			0	(19)
Shelter factor			(20) = 1 -	0.075 x (1	19)] =			1	(20)
Infiltration rate incorporat	_		(21) = (18	x (20) =				0.15	(21)
Infiltration rate modified for		T	T .	_	T _	T	_	1	
L 1	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp		1 00	1 0.7	4	T 40	1 45	4.7	1	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = $(22a)$ m =	2)m ÷ 4							_	
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltration rate	(allowing	for shelter a	nd wind s	speed) =	(21a) x	(22a)m					
0.19 0.19 Calculate effective air ch	I	0.16 0.16 e for the app	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
If mechanical ventilation	•	o ror are app								0.5	(23
If exhaust air heat pump usi	ng Append	ix N, (23b) = (23b)	Ba) × Fmv (equation (I	N5)) , othe	rwise (23b) = (23a)			0.5	(23
If balanced with heat recove	ery: efficiend	cy in % allowing	for in-use f	actor (fron	n Table 4h) =				75.65	(23
a) If balanced mechan	ical venti	ilation with he	eat recov	ery (MVI	HR) (24a	a)m = (22)	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m= 0.31 0.31	0.31	0.29 0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(24
b) If balanced mechan	ical venti	ilation withou	t heat red	covery (N	ЛV) (24b	m = (22)	2b)m + (23b)		1	
(24b)m= 0 0	0	0 0	0	0	0	0	0	0	0		(24
c) If whole house extra if (22b)m < 0.5 x (•	-				5 × (23b	o)	_	_	
(24c)m= 0 0	0	0 0	0	0	0	0	0	0	0		(24
d) If natural ventilation if (22b)m = 1, then							0.5]				
(24d)m= 0 0	0	0 0	0	0	0	0	0	0	0		(24
Effective air change ra	ite - entei	r (24a) or (24	b) or (24	c) or (24	d) in box	(25)				_	
(25)m= 0.31 0.31	0.31	0.29 0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25
3. Heat losses and hea	t loss par	ameter:									
ELEMENT Gross area (r		penings m²	Net Ar A ,r		U-val W/m2		A X U (W/l		k-value kJ/m²-l		
Windows Type 1			5.45	_x 1	/[1/(1.4)+	0.04] =	7.23	,			(27
Windows Type 2			6.09	x1	/[1/(1.4)+	0.04] =	8.07	Ħ			(27
Floor			48.96	3 X	0.13	─	6.36479	9 [75	3672	(28
Walls Type1 35.3		11.54	23.76	6 X	0.18	-	4.28	T i	60	1425.6	(29)
Walls Type2 35.99	Ħ F	0	35.99) x	0.17	ffi -i	6.04	Ħ i	60	2159.4	(29
Total area of elements, r	<u> </u>	<u>_</u>	120.2	:5							— (31
Party wall			14.89) x	0		0	\neg [45	670.05	(32)
Party ceiling			48.96	5					30	1468.8	(32
Internal wall **			96.46	5				Ī	9	868.14	(32
* for windows and roof window ** include the areas on both sid				lated using	formula 1	/[(1/U-valu	ie)+0.04] a	as given in	paragraph	1 3.2	_
Fabric heat loss, W/K = \$	S (A x U)				(26)(30)	+ (32) =				31.98	(33
Heat capacity Cm = S(A	xk)					((28).	(30) + (32	2) + (32a).	(32e) =	10263.99	(34)
Thermal mass paramete	r (TMP =	Cm ÷ TFA)	in kJ/m²K			= (34)	÷ (4) =			209.64	(35
For design assessments where can be used instead of a detail			ction are no	t known pr	ecisely the	e indicative	e values of	TMP in T	able 1f		
Thermal bridges : S (L x	Y) calcul	lated using A	ppendix l	K						9.02	(36
if details of thermal bridging an Total fabric heat loss	e not knowi	n(36) = 0.05 x ((31)			(33) +	(36) =			41	(37
Ventilation heat loss cald	culated m	onthly		•	•	(38)m	= 0.33 × (25)m x (5))		
Jan Feb	Mar	Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 13.4 13.24	13.08 1	2.28 12.12	11.31	11.31	11.15	11.64	12.12	12.44	12.76		(38
Heat transfer coefficient,	W/K					(39)m	= (37) + (38)m		.	
(39)m= 54.4 54.24	54.08 5	53.28 53.12	52.32	52.32	52.16	52.64	53.12	53.44	53.76		_
Stroma FSAP 2012 Version: 1.	.0.5.50 (SA	P 9.92) - http://v	vww.stroma	a.com			Average =	Sum(39) ₁	12 /12=	53.2 ∮ age 2	J/39

Heat loss parameter (HLP), W/m*K
Number of days in month (Table 1a)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
4. Water heating energy requirement: Assumed occupancy, N
Assumed occupancy, N ### ITFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA - 13.9)2)] + 0.0013 x (TFA - 13.9) ### ITFA £ 13.9, N = 1 ### Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 ### 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) ### Jun
Assumed occupancy, N 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 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= 80.98 78.03 75.09 72.14 69.2 66.25 66.25 69.2 72.14 75.09 78.03 80.98 Total = Sum(44), v = 883.37 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables th, c, td) (45)m= 120.08 105.03 108.38 94.49 90.66 78.23 72.5 83.19 84.18 98.11 107.09 116.29 If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 18.01 15.75 16.26 14.17 13.6 11.74 10.87 12.48 12.63 14.72 16.06 17.44 Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) Ufterwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) If community heating see section 4.3 Volume factor from Table 2 (kWh/litre/day) (52)
Assumed occupancy, N 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 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= 80.98 78.03 75.09 72.14 69.2 66.25 66.25 69.2 72.14 75.09 78.03 80.98 Total = Sum(44), v = 883.37 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, c, d) (45)m= 120.08 105.03 108.38 94.49 90.66 78.23 72.5 83.19 84.18 98.11 107.09 116.29 If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 18.01 15.75 16.26 14.17 13.6 11.74 10.87 12.48 12.63 14.72 16.06 17.44 Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) If community heating see section 4.3 Volume factor from Table 2a (52)
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
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= 80.98 78.03 75.09 72.14 69.2 66.25 66.25 69.2 72.14 75.09 78.03 80.98 Total = Sum(44)1v = 883.37 (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= 120.08 105.03 108.38 94.49 90.66 78.23 72.5 83.19 84.18 98.11 107.09 116.29 If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 18.01 15.75 16.26 14.17 13.6 11.74 10.87 12.48 12.63 14.72 16.06 17.44 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)
(44)m= 80.98 78.03 75.09 72.14 69.2 66.25 66.25 69.2 72.14 75.09 78.03 80.98 Total = Sum(44)_12 =
Total = Sum(44): = 883.37 (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= 120.08 105.03 108.38 94.49 90.66 78.23 72.5 83.19 84.18 98.11 107.09 116.29 Total = Sum(45) ₁₋₁₂ = 1158.23 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 18.01 15.75 16.26 14.17 13.6 11.74 10.87 12.48 12.63 14.72 16.06 17.44 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)
(45)m= 120.08 105.03 108.38 94.49 90.66 78.23 72.5 83.19 84.18 98.11 107.09 116.29 Total = Sum(45):12
If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 18.01 15.75 16.26 14.17 13.6 11.74 10.87 12.48 12.63 14.72 16.06 17.44 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)
(46)m= 18.01 15.75 16.26 14.17 13.6 11.74 10.87 12.48 12.63 14.72 16.06 17.44 Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)
Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) × (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)
Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) × (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)
If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)
Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a 1.03 (48) (48) (49) (49) (48) (49) (50) (51)
Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a 1.03 (48) × (49) = 0 (49) 0 (50) 1.03
a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a 1.03 (48) (48) × (49) = 0 0 (49) 0.00 (50) 1.00 (51)
Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)
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Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)
If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)
Volume factor from Table 2a 1.03 (52)
1 0.0
Energy lost from water storage, kWh/year $(47) \times (51) \times (52) \times (53) = 1.03$ (54)
Enter (50) or (54) in (55) 1.03 (54)
Water storage loss calculated for each month $((56)m = (55) \times (41)m)$
(56)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (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= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (57)
Primary circuit loss (annual) from Table 3 Primary circuit loss calculated for each month (59) m = $(58) \div 365 \times (41)$ m (58)
(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51 23.26 22.51 23.26 22.51 23.26 (59)

Combi loss calc	sulated f	for each	month ((61)m =	(60) ·	365 × (41	/m							
(61)m= 0	0	0	0	0	00) -	0) 0		0	0	T 0	0	1	(61)
Total heat requi													[(50)m + (61)m	(- /
	154.95	163.65	147.98	145.94	131.7		138.	_	137.68	153.38	` 	171.57	(59)III + (61)IIII]	(62)
Solar DHW input ca	Į												I	(- /
(add additional											mon to wat	or modung)		
(63)m= 0	0	0	0	0	0	0	0	_	0	0	0	0]	(63)
Output from wat	ter heat	:er				I					-1			
· -	154.95	163.65	147.98	145.94	131.7	3 127.77	138.	.47	137.68	153.38	160.59	171.57]	
	'						. (Outp	out from wa	ater heat	er (annual)₁	12	1809.07	(64)
Heat gains from	n water l	heating,	kWh/m	onth 0.2	5 ´[0.	85 × (45)m	ı + (6	1)m	n] + 0.8 x	c [(46)m	n + (57)m	+ (59)m]	_
(65)m= 84.15	74.86	80.26	74.21	74.37	68.8	1 68.33	71.8	88	70.79	76.84	78.4	82.89]	(65)
include (57)m	in calc	ulation	of (65)m	only if c	ylinde	r is in the	dwelli	ing	or hot w	ater is	from com	munity h	neating	
5. Internal gai				•	-							•		
Metabolic gains	(Table	5), Wat	ts											
Jan	Feb	Mar	Apr	May	Ju	n Jul	Αι	ug	Sep	Oct	Nov	Dec		
(66)m= 82.98	82.98	82.98	82.98	82.98	82.9	82.98	82.9	98	82.98	82.98	82.98	82.98		(66)
Lighting gains (calculat	ed in Ap	pendix	L, equati	ion L9	or L9a), a	lso s	ee 7	Table 5					
(67)m= 12.89	11.44	9.31	7.05	5.27	4.45	4.8	6.2	:5	8.38	10.64	12.42	13.24		(67)
Appliances gain	ns (calcu	ulated in	Append	dix L, eq	uatior	L13 or L1	3a), a	also	see Tal	ble 5	-	-		
(68)m= 144.53	146.03	142.25	134.21	124.05	114.5	108.13	106.	.63	110.41	118.45	128.61	138.16		(68)
Cooking gains (calculat	ted in Ap	pendix	L, equat	ion L	15 or L15a), also	o se	e Table	5	•		•	
(69)m= 31.3	31.3	31.3	31.3	31.3	31.3	31.3	31.	.3	31.3	31.3	31.3	31.3		(69)
Pumps and fans	s gains	(Table 5	ia)											
(70)m= 0	0	0	0	0	0	0	0		0	0	0	0		(70)
Losses e.g. eva	poratio	n (negat	ive valu	es) (Tab	le 5)							-		
(71)m= -66.38	-66.38	-66.38	-66.38	-66.38	-66.3	8 -66.38	-66.	38	-66.38	-66.38	-66.38	-66.38		(71)
Water heating g	gains (T	able 5)									-	-		
(72)m= 113.1	111.4	107.87	103.07	99.95	95.5	7 91.84	96.6	62	98.31	103.28	108.89	111.41		(72)
Total internal g	gains =					66)m + (67)n	า + (68	3)m +	+ (69)m + ((70)m + (71)m + (72))m		
(73)m= 318.42	316.77	307.33	292.22	277.17	262.4	1 252.66	257.	.38	265	280.27	297.82	310.7		(73)
6. Solar gains:														
Solar gains are ca		ŭ	r flux from	Table 6a		•	tions t	to co	nvert to th	e applica		tion.		
Orientation: Ad	ccess Fa able 6d	actor	Area m²			Flux Fable 6a		т	g_ able 6b	_	FF Fable 6c		Gains	
	able ou				_	able ba	, ,	- 1	able ob	_ ,	able oc		(W)	7
Southeast 0.9x	0.77	X	6.0	9	×	36.79	X		0.63	x [0.7	=	68.48	(77)
Southeast 0.9x	0.77	X	6.0	9	x	62.67	X		0.63	x [0.7	=	116.65	(77)
Southeast 0.9x	0.77	X	6.0	9	X _	85.75	X		0.63	×	0.7	=	159.6	(77)
Southeast 0.9x	0.77	×	6.0	9	X _	106.25	X		0.63	x [0.7	=	197.75	(77)
Southeast 0.9x	0.77	X	6.0	9	x	119.01	X		0.63	X	0.7	=	221.5	(77)

					_		,		_				_
Southeast 0.9x	0.77	X	6.0	9	X	118.15	X	0.63	X	0.7	=	219.9	(77)
Southeast 0.9x	0.77	X	6.0	9	X	113.91	X	0.63	X	0.7	=	212.01	(77)
Southeast 0.9x	0.77	X	6.0	9	X	104.39	X	0.63	X	0.7	=	194.29	(77)
Southeast 0.9x	0.77	X	6.0	9	x	92.85	X	0.63	X	0.7	=	172.81	(77)
Southeast _{0.9x}	0.77	х	6.0	9	x	69.27	X	0.63	X	0.7	=	128.92	(77)
Southeast _{0.9x}	0.77	Х	6.0	9	x	44.07	X	0.63	X	0.7	=	82.02	(77)
Southeast 0.9x	0.77	х	6.0	9	x	31.49	X	0.63	x	0.7	=	58.6	(77)
Southwest _{0.9x}	0.77	x	5.4	5	x	36.79]	0.63	X	0.7	=	61.28	(79)
Southwest _{0.9x}	0.77	х	5.4	5	x	62.67	Ī	0.63	x	0.7		104.39	(79)
Southwest _{0.9x}	0.77	x	5.4	5	x	85.75	Ī	0.63	x	0.7	=	142.83	(79)
Southwest _{0.9x}	0.77	x	5.4	5	x	106.25	Ī	0.63	x	0.7		176.97	(79)
Southwest _{0.9x}	0.77	х	5.4	5	x	119.01	ĺ	0.63	x	0.7	=	198.22	(79)
Southwest _{0.9x}	0.77	x	5.4	5	x	118.15	Ī	0.63	x	0.7	-	196.79	(79)
Southwest _{0.9x}	0.77	х	5.4	5	x	113.91	Ī	0.63	x	0.7	=	189.73	(79)
Southwest _{0.9x}	0.77	х	5.4	5	x	104.39	ĺ	0.63	x	0.7	=	173.87	(79)
Southwest _{0.9x}	0.77	x	5.4	5	x	92.85	ĺ	0.63	x	0.7	=	154.65	(79)
Southwest _{0.9x}	0.77	х	5.4	5	x	69.27	ĺ	0.63	x	0.7	=	115.37	(79)
Southwest _{0.9x}	0.77	х	5.4	5	x	44.07	ĺ	0.63	x	0.7	=	73.4	(79)
Southwest _{0.9x}	0.77	x	5.4	5	x	31.49	ĺ	0.63	x	0.7	=	52.45	(79)
-							_						_
Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m													
(83)m= 129.76		302.43	374.73	419.72	416.6	9 401.73	368	327.47	244.29	155.43	111.05		(83)
Total gains – i	nternal an	nd solar	(84)m =	(73)m	+ (83)	n , watts	•	•	•	•	•		
(84)m= 448.18	537.81	609.76	666.94	696.89	679.	654.39	625	5.54 592.46	524.50	6 453.25	421.75		(84)
7. Mean inter	nal tempe	erature ((heating	season	1)								
Temperature			`		<i>′</i>	a from Ta	ble 9	, Th1 (°C)				21	(85)
Utilisation fac								` '					
Jan	Feb	Mar	Apr	May	Jur		A	ug Sep	Oct	Nov	Dec		
(86)m= 0.98	0.95	0.9	0.81	0.66	0.48	0.35	0.3	38 0.59	0.84	0.96	0.98		(86)
Mean interna	l tempera	ture in l	iving are	ea T1 (fo	ollow s	tens 3 to	7 in T	Table 9c)		!		ı	
(87)m= 19.96	20.2	20.48	20.76	20.92	20.99	i i	2		20.75	20.31	19.91		(87)
	during he	oting p	oriodo ir	root of	dwalli	ag from T	hlo (1	!		l	
Temperature (88)m= 19.99	19.99		20.01	20.01	20.03	-	20.	` 	20.01	20.01	20		(88)
(00)111-	10.00			20.01	20.00	20.00	20.	20.02	20.01	20.01			(00)
		20											
Utilisation fac		ins for r	est of d		1	1	ΤĆ		T	T	T	1	(00)
Utilisation faction (89)m= 0.97	otor for ga	!		welling, 0.6	h2,m (see Table 0.27	9a) 0.	3 0.51	0.8	0.94	0.98		(89)
	0.94	ins for r	est of do	0.6 of dwell	0.41	0.27	0.	!	ļ	0.94	0.98		, ,
(89)m= 0.97	0.94	ins for r	est of d	0.6	0.41	0.27	0.	3 to 7 in Tab	le 9c)	19.15	18.58		(90)
(89)m= 0.97 Mean interna	0.94 ltempera	ins for r 0.88 ture in t	est of do	0.6 of dwell	0.41 ing T2	0.27	0. eps 3	3 to 7 in Tab	le 9c)	-	18.58	0.5	, ,
(89)m= 0.97 Mean interna	0.94 I tempera	ins for r 0.88 ture in t 19.38	est of d 0.77 he rest 19.75	0.6 of dwell 19.94	0.41 ing T2	0.27 (follow stee 2 20.03	0. eps 3	3 to 7 in Tab	19.75 fLA = Liv	19.15	18.58	0.5	(90)
(89)m= 0.97 Mean interna (90)m= 18.64	0.94 I tempera	ins for r 0.88 ture in t 19.38	est of d 0.77 he rest 19.75	0.6 of dwell 19.94	0.41 ing T2	0.27 (follow stop 20.03 = fLA × T1	0. eps 3	3 to 7 in Tab 03 20 - fLA) × T2	19.75 fLA = Liv	19.15	18.58	0.5	(90)
(89)m= 0.97 Mean interna (90)m= 18.64 Mean interna	0.94 ltempera 18.98 ltempera 19.59	ins for r 0.88 ture in t 19.38 ture (fo	est of do 0.77 he rest 19.75 r the wh	0.6 of dwell 19.94 ole dwe 20.43	0.41 ing T2 20.02 elling) =	0.27 (follow storm 2 20.03 = fLA × T1 20.51	0. eps 3 20. + (1	3 to 7 in Tab 03 20 - fLA) × T2 51 20.48	19.75 fLA = Liv	19.15 ring area ÷ (-	18.58	0.5	(90)

	•	•	r	r	1		,			-			
(93)m= 19.29	19.59	19.93	20.25	20.43	20.5	20.51	20.51	20.48	20.25	19.73	19.24		(93)
8. Space hea													
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	l	l	· ·				_ 3						
(94)m= 0.97	0.94	0.88	0.78	0.63	0.45	0.31	0.34	0.55	0.81	0.94	0.97		(94)
Useful gains,	hmGm	, W = (9	4)m x (8	4)m	•								
(95)m= 433.95	504.17	537.92	518.98	436.88	304.14	203.81	213.3	324.61	425.46	426	410.92		(95)
Monthly aver	age exte	rnal tem	perature	from Ta	able 8		,						
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate		i e	 		i	- ,	- ` 	<u> </u>			- 1		(0-)
(97)m= 815.63	796.64	726.12	604.87	463.67	308.55	204.45	214.28	335.66	512.52	674.87	808.69		(97)
Space heatin	g require 196.55	1	1	1	I						205.04		
(98)m= 283.97	196.55	140.02	61.84	19.93	0	0	0	0	64.77	179.18	295.94	4040.04	7(00)
							rota	l per year	(Kvvn/year) = Sum(9	8)15,912 =	1242.21	(98)
Space heatin	g require	ement in	kWh/m²	² /year								25.37	(99)
9b. Energy red	quiremer	nts – Coi	mmunity	heating	scheme	!							
This part is us Fraction of spa										unity sch	neme. I	2	7(201)
·			•		-	_	(Table T	1) 0 11 11	one		[0	(301)
Fraction of space heat from community system 1 – (301) =									1	(302)			
The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the includes heat number another mediant was been from power stations. See Appendix C										he latter			
includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community boilers										1	(303a)		
	Fraction of neat from Community boilers Fraction of total space heat from Community boilers (302) x (303a) =									1	(304a)		
Factor for conf	·			•		r commı	unity hea	iting sys		, ,	′	1	(305)
Distribution los				,	` ''		•	3 - 7 -			l I	1.05	(306)
Space heating		(,		,	3 - 7					ļ	kWh/yea	
Annual space	_	requiren	nent								[1242.21	<u>'</u>
Space heat fro	m Com	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	= [1304.32	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (fro	om Table	4a or A	ppendix	E)	İ	0	(308
Space heating	require	ment fro	m secon	dary/su	oplemen	tary sys	tem	(98) x (30	01) x 100 -	÷ (308) =	ĺ	0	(309)
Water heating	1										•		
Annual water l		equirem	ent									1809.07	
If DHW from c	ommuni	ty schen	ne:								'		<u> </u>
Water heat fro	m Comr	nunity bo	oilers					(64) x (30)3a) x (30	5) x (306) :	=	1899.52	(310a)
Electricity used	d for hea	at distrib	ution				0.01	× [(307a).	(307e) +	(310a)([310e)] =	32.04	(313)
Cooling System	m Energ	y Efficie	ncy Rati	0								0	(314)
Space cooling	(if there	is a fixe	d coolin	g systen	n, if not e	enter 0)		= (107) ÷	(314) =			0	(315)
Electricity for p											ı		7,
mechanical ve	ntilation	- baland	ed, extra	act or po	sitive in	out from	outside					104.15	(330a)

warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330b	b) + (330g) =		104.15	(331)
Energy for lighting (calculated in Appen	dix L)				227.56	(332)
Total delivered energy for all uses (307) + (309) + (310) + (31	2) + (315) + (331) + (33	32)(237b) =		3535.55	(338)
12b. CO2 Emissions – Community hea	ting scheme					
		Energy kWh/year	Emission fac kg CO2/kWh		missions g CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)	O (r) ing two fuels repeat (363) to	(366) for the secon	nd fuel	96	(367a)
CO2 associated with heat source 1	[(307b	y)+(310b)] x 100 ÷ (367b) x	0.22	=	720.86	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	16.63	(372)
Total CO2 associated with community s	systems	(363)(366) + (368)(372	2)	=	737.49	(373)
CO2 associated with space heating (se	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =			737.49	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	=	54.06	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	118.1	(379)
Total CO2, kg/year	sum of (376)(382) =				909.65	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				18.58	(384)

El rating (section 14)

87.03

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 06 December 2021 at 10:59:09*

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 53.46m²

Site Reference: Highgate Road - GREEN

Plot Reference: 01 - B

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 20.26 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 17.51 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 53.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 44.5 kWh/m²

OK
2 Fabric U-values

Element Average Highest

External wall 0.18 (max. 0.30) 0.18 (max. 0.70) OK

Party wall 0.00 (max. 0.20) - OK

Floor 0.13 (max. 0.25) 0.13 (max. 0.70) **OK**

Roof (no roof)

Openings 1.40 (max. 2.00) 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ок
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	ок
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	9.56m²	
Windows facing: North West	3.98m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		Us <u>er [</u>	Details:						
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa					0010943 on: 1.0.5.50	
		Property	Address	: 01 - B					
Address: 1. Overall dwelling dime	oncione:								
1. Overall dwelling dime	211510115.	Δre	a(m²)		Δν Ηρ	eight(m)		Volume(m	3)
Ground floor		_		(1a) x		2.65	(2a) =	141.67	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) =	53.46]](4)			_		
Dwelling volume		′ <u> </u>		J)+(3c)+(3c	d)+(3e)+	(3n) =	141.67	(5)
				(55,7)	,,,(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-, - (, -, -, -, -, -, -, -, -, -, -, -, -,		141.07	(3)
2. Ventilation rate:	main seconda		other		total			m³ per hou	ır
Number of chimneys	heating heating		0	п = г	0	×	40 =	0	(6a)
Number of open flues		╡ᆠ╞	0	」	0	x	20 =	0	(6b)
Number of intermittent fa				J L			10 =		=
				Ļ	0			0	(7a)
Number of passive vents				Ĺ	0		10 =	0	(7b)
Number of flueless gas f	ires				0	X	40 =	0	(7c)
							Air ch	nanges per h	our
Infiltration due to chimne	ys, flues and fans = $(6a)+(6b)+$	(7a)+(7b)+	(7c) =	Г	0		÷ (5) =	0	(8)
	peen carried out or is intended, proce			continue fi	-	(16)	. (0)	U U	(0)
Number of storeys in t	he dwelling (ns)							0	(9)
Additional infiltration	05/	0.05.6				[(9)-1]x0.1 =	0	(10)
	.25 for steel or timber frame or resent, use the value corresponding			•	ruction			0	(11)
deducting areas of openi		io ino grod	tor wan are	a (ano					
·	floor, enter 0.2 (unsealed) or	0.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	2 x (14) ÷ ′	1001 =			0	(14)
Infiltration rate					12) + (13) ·	+ (15) =		0	(16)
	q50, expressed in cubic meti	es per h	our per s	quare m	etre of e	envelop	e area	3	(17)
If based on air permeabi	lity value, then $(18) = [(17) \div 20]$	(8), otherw	vise (18) =	(16)				0.15	(18)
	es if a pressurisation test has been de	one or a de	gree air pe	ermeability	is being u	sed			_
Number of sides shelters Shelter factor	ed		(20) = 1 -	[0.075 x (19)] =			0	(19) (20)
Infiltration rate incorpora	ting shelter factor		(21) = (18	•	-71			0.15	(21)
Infiltration rate modified f	•		. , .					0.10	(=./
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind sp	peed from Table 7	•	•	,	•		•	•	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7]	
Wind Easter (22a) == (2	2)m · 4								
Wind Factor $(22a)m = (2(22a)m = 1.27 1.25)$	2)m ÷ 4 1.23	0.95	0.92	1	1.08	1.12	1.18]	
(220)1117 1.21 1.20	1.20 1.11 1.00 0.30	1 0.00	1 0.02		L	1.12	10]	

- Anilistan inilitration rata rallowing for spatter a	nd wind s	need) –	(21a) v	(22a)m					
Adjusted infiltration rate (allowing for shelter a	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effective air change rate for the app	1 - 1	-							_
If mechanical ventilation:								0.5	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23	Ba) × Fmv (e	equation (N	N5)) , othe	wise (23b) = (23a)			0.5	(23b)
If balanced with heat recovery: efficiency in % allowing	for in-use fa	actor (from	Table 4h) =				75.65	(23c)
a) If balanced mechanical ventilation with he		<u> </u>		<u> </u>	`		- ` ´	÷ 100]	
(24a)m= 0.31 0.31 0.29 0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(24a)
b) If balanced mechanical ventilation withou			- ^ `	<u> </u>				1	,
(24b)m= 0 0 0 0 0	0	0	0	0	0	0	0		(24b)
c) If whole house extract ventilation or positif $(22b)m < 0.5 \times (23b)$, then $(24c) = (23b)$	•				5 × (23b)		_	
(24c)m= 0 0 0 0 0	0	0	0	0	0	0	0		(24c)
d) If natural ventilation or whole house posit if (22b)m = 1, then (24d)m = (22b)m oth					0.5]				
(24d)m= 0 0 0 0 0	0	0	0	0	0	0	0		(24d)
Effective air change rate - enter (24a) or (24	b) or (24d	c) or (24	d) in box	(25)	-	-			
(25)m= 0.31 0.31 0.31 0.29 0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25)
3. Heat losses and heat loss parameter:									
ELEMENT Gross Openings area (m²) m²	Net Are A ,n		U-valı W/m2		A X U (W/I	〈)	k-value kJ/m²-		
Windows Type 1	9.56		/[1/(1.4)+	0.04] =	12.67	,			(27)
Windows Type 2	3.98	x1/	/[1/(1.4)+	0.04] =	5.28	一			(27)
Floor	53.46	x	0.13		6.9498	=	75	4009.5	(28)
Walls Type1 40.04 13.54	26.5	×	0.18	<u> </u>	4.77	F i	60	1590	(29)
						=			J ' '
Walls Type2 12.16 0	12.16	x	0.17	=	2.04		60	729.6	(29)
Walls Type2 12.16 0 Total area of elements, m ²		_	0.17	= [2.04		60	729.6	」 ` ′
	12.16 105.66 27.88	6	0.17	= [2.04		60 45	729.6	(31) (32)
Total area of elements, m ²	105.66	6 x							(31)
Total area of elements, m ² Party wall	105.66 27.88 53.46	6 3 x				 [45	1254.6 1603.8	(31) (32) (32b)
Total area of elements, m ² Party wall Party ceiling	105.66 27.88 53.46 102.03	6 x	0	= [0	[45 30 9	1254.6 1603.8 918.27	(31)
Total area of elements, m ² Party wall Party ceiling Internal wall ** * for windows and roof windows, use effective window U- ** include the areas on both sides of internal walls and page	105.66 27.88 53.46 102.03	6 X	0 formula 1	= [/[(1/U-valu	0	s given in	45 30 9	1254.6 1603.8 918.27	(31) (32) (32b)
Total area of elements, m ² Party wall Party ceiling Internal wall ** * for windows and roof windows, use effective window U- ** include the areas on both sides of internal walls and pa Fabric heat loss, W/K = S (A x U)	105.66 27.88 53.46 102.03	6 X	0	= [/[(1/U-valu	0		45 30 9	1254.6 1603.8 918.27	(31) (32) (32b)
Total area of elements, m ² Party wall Party ceiling Internal wall ** * for windows and roof windows, use effective window U-* ** include the areas on both sides of internal walls and particle the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas of the areas of the areas of the areas of the areas of t	105.66 27.88 53.46 102.03 value calcularitions	6 x 3 ated using	0 formula 1	= [/[(1/U-value) + (32) = ((28)	0 re)+0.04] a		45 30 9 paragraph	1254.6 1603.8 918.27	(31) (32) (32b) (32c)
Total area of elements, m ² Party wall Party ceiling Internal wall ** * for windows and roof windows, use effective window U- ** include the areas on both sides of internal walls and pa Fabric heat loss, W/K = S (A x U) Heat capacity Cm = S(A x k) Thermal mass parameter (TMP = Cm ÷ TFA)	105.66 27.88 53.46 102.03 value calculartitions	6 x 3 3 aated using	0 formula 1. (26)(30)	= [/[(1/U-valu + (32) = ((28) = (34)	0 (30) + (32) ÷ (4) =	2) + (32a)	45 30 9 paragraph (32e) =	1254.6 1603.8 918.27 7 3.2	(31) (32) (32b) (32c)
Total area of elements, m ² Party wall Party ceiling Internal wall ** * for windows and roof windows, use effective window U-* ** include the areas on both sides of internal walls and particle the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas on both sides of internal walls are the areas of the areas of the areas of the areas of the areas of t	105.66 27.88 53.46 102.03 value calculartitions	6 x 3 3 aated using	0 formula 1. (26)(30)	= [/[(1/U-valu + (32) = ((28) = (34)	0 (30) + (32) ÷ (4) =	2) + (32a)	45 30 9 paragraph (32e) =	1254.6 1603.8 918.27 7.3.2 31.71 10105.77	(31) (32) (32b) (32c) (33) (34)
Total area of elements, m ² Party wall Party ceiling Internal wall ** * for windows and roof windows, use effective window U- ** include the areas on both sides of internal walls and pa Fabric heat loss, W/K = S (A x U) Heat capacity Cm = S(A x k) Thermal mass parameter (TMP = Cm ÷ TFA) For design assessments where the details of the construction	105.66 27.88 53.46 102.03 value calcularitions	6 x 3 ated using	0 formula 1. (26)(30)	= [/[(1/U-valu + (32) = ((28) = (34)	0 (30) + (32) ÷ (4) =	2) + (32a)	45 30 9 paragraph (32e) =	1254.6 1603.8 918.27 7.3.2 31.71 10105.77	(31) (32) (32b) (32c) (33) (34)
Total area of elements, m ² Party wall Party ceiling Internal wall ** * for windows and roof windows, use effective window U-* ** include the areas on both sides of internal walls and particle for the entire for the entire for the entire for the entire for design assessments where the details of the construction of the used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using A if details of thermal bridging are not known (36) = 0.05 x (10).	105.66 27.88 53.46 102.03 value calcularitions in kJ/m²K etion are not	6 x 3 ated using	0 formula 1. (26)(30)	= [/[(1/U-valu + (32) = ((28) = (34)	0 $(30) + (32) \div (4) = 4$ $2 \text{ values of } 4$	2) + (32a)	45 30 9 paragraph (32e) =	1254.6 1603.8 918.27 7.3.2 31.71 10105.77 189.03	(31) (32) (32b) (32c) (33) (34) (35)
Total area of elements, m² Party wall Party ceiling Internal wall ** * for windows and roof windows, use effective window U- ** include the areas on both sides of internal walls and pa Fabric heat loss, W/K = S (A x U) Heat capacity Cm = S(A x k) Thermal mass parameter (TMP = Cm ÷ TFA) For design assessments where the details of the construction be used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using A if details of thermal bridging are not known (36) = 0.05 x (1) Total fabric heat loss	105.66 27.88 53.46 102.03 value calcularitions in kJ/m²K etion are not	6 x 3 ated using	0 formula 1. (26)(30)	= [/[(1/U-value) + (32) = ((28) = (34) • indicative	0 $(30) + (32) + (4) = 0$ $(36) = 0$	2) + (32a) TMP in T	45 30 9 paragraph (32e) =	1254.6 1603.8 918.27 7.3.2 31.71 10105.77 189.03	(31) (32) (32b) (32c) (33) (34) (35)
Total area of elements, m² Party wall Party ceiling Internal wall ** * for windows and roof windows, use effective window U- ** include the areas on both sides of internal walls and pa Fabric heat loss, W/K = S (A x U) Heat capacity Cm = S(A x k) Thermal mass parameter (TMP = Cm ÷ TFA) For design assessments where the details of the construction be used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using A if details of thermal bridging are not known (36) = 0.05 x (1) Total fabric heat loss Ventilation heat loss calculated monthly	105.66 27.88 53.46 102.03 value calculartitions in kJ/m²K etion are not ppendix k	6 x 3 3 ated using	o formula 1 (26)(30)	= [/[(1/U-valu + (32) = ((28) = (34) + indicative (33) + (38)m	0 $(30) + (32) \div (4) = 0$ $(36) = 0.33 \times (6)$	2) + (32a) TMP in T 25)m x (5	45 30 9 paragraph (32e) =	1254.6 1603.8 918.27 7.3.2 31.71 10105.77 189.03	(31) (32) (32b) (32c) (33) (34) (35)
Total area of elements, m² Party wall Party ceiling Internal wall ** * for windows and roof windows, use effective window U-* ** include the areas on both sides of internal walls and part Fabric heat loss, W/K = S (A x U) Heat capacity Cm = S(A x k) Thermal mass parameter (TMP = Cm ÷ TFA) For design assessments where the details of the construction be used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using A if details of thermal bridging are not known (36) = 0.05 x (1) Total fabric heat loss Ventilation heat loss calculated monthly Jan Feb Mar Apr May	105.66 27.88 53.46 102.03 Value calcularitions in kJ/m²K etion are not ppendix k	6 x 3 3 ated using	o formula 1. (26)(30)	= [/[(1/U-value) + (32) = ((28) = (34) • indicative (33) + (38)m Sep	0 $(30) + (32) \div (4) = 0$ $(36) = 0.33 \times (0)$ Oct	25)m x (5 Nov	45 30 9 paragraph (32e) = able 1f	1254.6 1603.8 918.27 7.3.2 31.71 10105.77 189.03	(31) (32) (32b) (32c) (32c) (333) (34) (35)
Total area of elements, m² Party wall Party ceiling Internal wall ** * for windows and roof windows, use effective window U- ** include the areas on both sides of internal walls and pa Fabric heat loss, W/K = S (A x U) Heat capacity Cm = S(A x k) Thermal mass parameter (TMP = Cm ÷ TFA) For design assessments where the details of the construction be used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using A if details of thermal bridging are not known (36) = 0.05 x (1) Total fabric heat loss Ventilation heat loss calculated monthly Jan Feb Mar Apr May (38)m= 14.63 14.46 14.28 13.41 13.23	105.66 27.88 53.46 102.03 value calculartitions in kJ/m²K etion are not ppendix k	6 x 3 3 ated using	o formula 1 (26)(30)	= [/[(1/U-valu + (32) = ((28) = (34) e indicative (33) + (38)m Sep 12.7	0 $(30) + (32) \div (4) = 0$ $(36) = 0.33 \times (4)$ Oct $(32) + (33) \div (4) = 0$	25)m x (5 Nov 13.58	45 30 9 paragraph (32e) =	1254.6 1603.8 918.27 7.3.2 31.71 10105.77 189.03	(31) (32) (32b) (32c) (33) (34) (35)
Party wall Party ceiling Internal wall ** * for windows and roof windows, use effective window U- ** include the areas on both sides of internal walls and part Fabric heat loss, W/K = S (A x U) Heat capacity Cm = S(A x k) Thermal mass parameter (TMP = Cm ÷ TFA) For design assessments where the details of the construct can be used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using A if details of thermal bridging are not known (36) = 0.05 x (Total fabric heat loss Ventilation heat loss calculated monthly Jan Feb Mar Apr May (38)m= 14.63 14.46 14.28 13.41 13.23 Heat transfer coefficient, W/K	105.66 27.88 53.46 102.03 Value calculartitions in kJ/m²K ction are not ppendix k 31) Jun 12.35	6 x 3 ated using	o formula 1. (26)(30) ecisely the	= [/[(1/U-valu + (32) = ((28) = (34) + indicative (33) + (38)m Sep 12.7 (39)m	0 (30) + (32 ÷ (4) = • values of (36) = = 0.33 × (Oct 13.23 = (37) + (32)	25)m x (5 Nov 13.58 38)m	45 30 9 paragraph(32e) = able 1f Dec 13.93	1254.6 1603.8 918.27 7.3.2 31.71 10105.77 189.03	(31) (32) (32b) (32c) (32c) (333) (34) (35)
Total area of elements, m² Party wall Party ceiling Internal wall ** * for windows and roof windows, use effective window U- ** include the areas on both sides of internal walls and pa Fabric heat loss, W/K = S (A x U) Heat capacity Cm = S(A x k) Thermal mass parameter (TMP = Cm ÷ TFA) For design assessments where the details of the construction be used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using A if details of thermal bridging are not known (36) = 0.05 x (1) Total fabric heat loss Ventilation heat loss calculated monthly Jan Feb Mar Apr May (38)m= 14.63 14.46 14.28 13.41 13.23	105.66 27.88 53.46 102.03 Value calcularitions in kJ/m²K etion are not ppendix k 31) Jun 12.35	6 x 3 x 3 ated using	o formula 1. (26)(30)	= [/[(1/U-value) + (32) = ((28) = (34) • indicative (33) + (38)m Sep 12.7 (39)m 53.23	0 $(30) + (32) \div (4) = 0$ $(36) = 0.33 \times (4)$ Oct $(32) + (33) \div (4) = 0$	25)m x (5 Nov 13.58 38)m 54.1	45 30 9 paragraph(32e) = able 1f Dec 13.93	1254.6 1603.8 918.27 7.3.2 31.71 10105.77 189.03	(31) (32) (32b) (32c) (32c) (33) (34) (35) (36) (37)

Heat loss para	ameter (I	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 1.03	1.03	1.03	1.01	1.01	0.99	0.99	0.99	1	1.01	1.01	1.02		
							ı		Average =	Sum(40) ₁	12 /12=	1.01	(40)
Number of day	ys in mo	nth (Tab	le 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 hea	iting ene	rgy requi	irement:								kWh/ye	ar:	
Assumed occi if TFA > 13. if TFA £ 13.	.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		79		(42)
Annual average Reduce the annu not more that 125	al average	hot water	usage by	5% if the α	lwelling is	designed t	` ,		se target c		.76		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage	in litres pe	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m= 84.44	81.37	78.3	75.23	72.16	69.09	69.09	72.16	75.23	78.3	81.37	84.44		
_						_				m(44) ₁₁₂ =	L	921.15	(44)
Energy content of	f hot water	used - cal	culated mo	onthly = 4 .	190 x Vd,r	n x nm x C	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 125.22	109.52	113.01	98.53	94.54	81.58	75.6	86.75	87.78	102.3	111.67	121.27		_
If instantaneous v	water heati	na at noint	of use (no	hot water	r storaga)	enter∩in	hoves (46		Total = Su	m(45) ₁₁₂ =	= [1207.78	(45)
	1		·	1	· · ·	·	· · ·	,	45.05	10.75	40.40		(46)
(46)m= 18.78 Water storage	16.43 e loss:	16.95	14.78	14.18	12.24	11.34	13.01	13.17	15.35	16.75	18.19		(46)
Storage volum) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community I	heating a	and no ta	ınk in dw	elling, e	nter 110	litres in	(47)						
Otherwise if n	o stored	hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in ((47)			
Water storage					4.144	/ I \							
a) If manufac				or is kno	wn (kWł	n/day):					0		(48)
Temperature t											0		(49)
Energy lost from b) If manufact		•			or io not		(48) x (49)) =		1	10		(50)
Hot water stor			-								02		(51)
If community I	_			- (77					02		(- /
Volume factor	from Ta	ble 2a								1.	03		(52)
Temperature t	factor fro	m Table	2b							0	.6		(53)
Energy lost fro		_	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter (50) or	(54) in (55)								1.	03		(55)
Water storage	loss cal	culated t	for each	month			((56)m = ((55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendi	хH	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit	t loss (ar	nnual) fro	m Table								0		(58)
Primary circuit	`	,			59)m = ((58) ÷ 36	65 × (41))m					
(modified by				,	•	. ,	, ,		r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi loss c	alculated	for each	month ((61)m =	(60) ÷ 3	365 × (41)m						
(61)m= 0	0	0	0	0	0	0) 0	0	0	Ιο	0	1	(61)
	 auired for	water h	eating ca	Lulated	L I for eac	h month	(62)n	n = 0.85 x	 (45)m +	(46)m +	(57)m +	ו - (59)m + (61)m	
(62)m= 180.5	-	168.29	152.02	149.82	135.07		142.0		157.58	165.17	176.55]	(62)
Solar DHW inpu	it calculated	using App	endix G oı	· Appendix	H (nega	tive quantity	y) (ente	r '0' if no sola	ar contribu	tion to wate	r heating)) T	
(add addition											•		
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(63)
Output from	water hea	ter				•	•	•	•	•	•	•	
(64)m= 180.5	159.45	168.29	152.02	149.82	135.07	130.87	142.0	2 141.28	157.58	165.17	176.55]	
	•			•	•	•		Output from w	ater heate	er (annual)	112	1858.62	(64)
Heat gains fr	om water	heating,	kWh/m	onth 0.2	5 ´ [0.8	5 × (45)m	n + (61)m] + 0.8	x [(46)m	+ (57)m	+ (59)m	ı]	
(65)m= 85.86	76.36	81.8	75.56	75.66	69.92	69.36	73.0	7 71.98	78.24	79.93	84.54]	(65)
include (57	7)m in calc	culation	of (65)m	only if c	ylinder	is in the	dwelli	ng or hot w	ater is f	rom com	munity h	neating	
5. Internal	gains (see	Table 5	and 5a):									
Metabolic ga	ins (Table	5), Wat	ts										
Jan		Mar	Apr	May	Jun	Jul	Au	g Sep	Oct	Nov	Dec]	
(66)m= 89.61	89.61	89.61	89.61	89.61	89.61	89.61	89.6	1 89.61	89.61	89.61	89.61]	(66)
Lighting gain	s (calculat	ted in Ap	pendix	L, equat	ion L9 d	or L9a), a	ilso se	e Table 5				-	
(67)m= 13.93	12.37	10.06	7.62	5.69	4.81	5.19	6.75	9.06	11.5	13.43	14.31]	(67)
Appliances g	ains (calc	ulated ir	Append	dix L, eq	uation l	_13 or L1	3a), a	lso see Ta	ble 5		-	-	
(68)m= 156.2°	1 157.83	153.74	145.05	134.07	123.75	116.86	115.2	24 119.33	128.02	139	149.32]	(68)
Cooking gain	ns (calcula	ted in A	ppendix	L, equat	ion L15	or L15a), also	see Table	e 5		-	_	
(69)m= 31.96	31.96	31.96	31.96	31.96	31.96	31.96	31.9	6 31.96	31.96	31.96	31.96]	(69)
Pumps and fa	ans gains	(Table 5	āa)										
(70)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(70)
Losses e.g. e	evaporatio	n (nega	tive valu	es) (Tab	le 5)							_	
(71)m= -71.68	3 -71.68	-71.68	-71.68	-71.68	-71.68	-71.68	-71.6	8 -71.68	-71.68	-71.68	-71.68]	(71)
Water heatin	g gains (T	able 5)										_	
(72)m= 115.4	113.63	109.94	104.94	101.69	97.11	93.22	98.2	1 99.98	105.16	111.01	113.63]	(72)
Total interna	al gains =				(66	6)m + (67)m	n + (68)	m + (69)m +	(70)m + (7	71)m + (72))m	_	
(73)m= 335.42	2 333.71	323.63	307.48	291.33	275.55	265.16	270.0	08 278.24	294.57	313.32	327.14]	(73)
6. Solar gai													
Solar gains are		ŭ					ations to		ne applica		tion.		
Orientation:	Access F Table 6d	actor	Area m²			ux able 6a		g_ Table 6b	Т	FF able 6c		Gains (W)	
Couthwoots							1 -						7,
Southweston		X	9.5		-	36.79] <u> </u>	0.63	×	0.7	=	107.5	(79)
Southwesters	<u> </u>	X	9.5			62.67	ļ ļ	0.63	×	0.7	=	183.11	」 (79)
Southwesto o	<u> </u>	X	9.5			85.75] 	0.63	×	0.7	=	250.54	」 (79)
Southweston		X	9.5			106.25	ļ ļ	0.63	×	0.7	=	310.43	」 (79)
Southwest _{0.9x}	0.77	X	9.5	56	X	119.01	J L	0.63	Х	0.7	=	347.71	(79)

			_		_		_		_				_
Southwest _{0.9x}	0.77	X	9.5	56	x	118.15	╛	0.63	X	0.7	=	345.19	(79)
Southwest _{0.9x}	0.77	X	9.5	56	x	113.91		0.63	X	0.7	=	332.8	(79)
Southwest _{0.9x}	0.77	X	9.5	56	x	104.39		0.63	X	0.7	=	304.99	(79)
Southwest _{0.9x}	0.77	X	9.5	56	x	92.85		0.63	X	0.7	=	271.28	(79)
Southwest _{0.9x}	0.77	X	9.5	56	x	69.27		0.63	X	0.7	=	202.38	(79)
Southwest _{0.9x}	0.77	X	9.5	56	x	44.07		0.63	X	0.7		128.76	(79)
Southwest _{0.9x}	0.77	x	9.5	56	x	31.49		0.63	x	0.7	=	92	(79)
Northwest 0.9x	0.77	х	3.9	98	x	11.28	x	0.63	х	0.7	=	13.72	(81)
Northwest _{0.9x}	0.77	х	3.9	98	x	22.97	x	0.63	х	0.7	=	27.94	(81)
Northwest 0.9x	0.77	х	3.9	98	x	41.38	x	0.63	х	0.7	=	50.33	(81)
Northwest _{0.9x}	0.77	x	3.9	98	x	67.96	x	0.63	x	0.7	_	82.66	(81)
Northwest _{0.9x}	0.77	x	3.9	98	x	91.35	X	0.63	x	0.7	_	111.11	(81)
Northwest _{0.9x}	0.77	x	3.9	98	x	97.38	X	0.63	x	0.7	=	118.45	(81)
Northwest _{0.9x}	0.77	x	3.9	98	x	91.1	X	0.63	x	0.7		110.81	(81)
Northwest _{0.9x}	0.77	x	3.9	98	x	72.63	×	0.63	x	0.7		88.34	(81)
Northwest 0.9x	0.77	x	3.9	98	x	50.42	T x	0.63	x	0.7	=	61.33	(81)
Northwest 0.9x	0.77	x	3.9	98	x	28.07	T x	0.63	x	0.7	=	34.14	(81)
Northwest _{0.9x}	0.77	х	3.9	98	x	14.2	X	0.63	х	0.7	=	17.27	(81)
Northwest 0.9x	0.77	x	3.9	98	x	9.21	T x	0.63	x	0.7	=	11.21	(81)
Solar gains in (83) m= 121.22 Total gains – i (84) m= 456.64	211.05 3 nternal and	800.87	393.09	458.82	463.	m , watts	(83)m 393 663		236.55 531.08		103.2		(83) (84)
7. Mean inter	nal temper	rature	(heating	season)								
Temperature	•		`		<i>'</i>	ea from Ta	ble 9	. Th1 (°C)				21	(85)
Utilisation fac	J	٠.			•			, , ,					`
Jan	Feb	Mar	Apr	May	Ju		Α	ug Sep	Oct	Nov	Dec		
(86)m= 0.98	0.95	0.9	0.79	0.63	0.4	0.33	0.3	36 0.58	0.84	0.95	0.98		(86)
Mean interna	l temperati	ure in I	iving ar	ea T1 (fo	ollow	steps 3 to	7 in T	able 9c)	•	•	•	•	
(87)m= 19.94	 	20.48	20.77	20.93	20.9	i	2		20.74	20.29	19.9		(87)
Temperature	during had										<u> </u>		
remperature		atina n	ariade ir	n ract at	AII DIVIDII	na from I	ahla (Th2 (°C)					
(88)m= 20.06	,			i	1	<u> </u>	1	9, Th2 (°C)	20.08	20.07	20.07		(88)
(88)m= 20.06	20.06	20.06	20.08	20.08	20.0	9 20.09	20		20.08	20.07	20.07		(88)
Utilisation fac	20.06 2	20.06 ns for r	20.08 est of d	20.08 welling,	20.0 h2,m	9 20.09 (see Table	20 9a)	.1 20.09	!]	, ,
Utilisation faction (89)m= 0.97	20.06 2 ctor for gair 0.94	20.06 ns for r	20.08 est of d	20.08 welling, 0.57	20.0 h2,m 0.39	9 20.09 (see Table 9 0.26	20 e 9a)	.1 20.09	0.8	0.94	0.98		(88)
Utilisation faction (89)m= 0.97 Mean internal	20.06 2 etor for gair 0.94	20.06 ns for r 0.88 ure in t	20.08 est of d 0.75 the rest	20.08 welling, 0.57 of dwell	20.0 h2,m 0.39 ing T2	9 20.09 (see Table 0 0.26 2 (follow st	20 e 9a) 0.2 eps 3	.1 20.09 29 0.51 to 7 in Tab	0.8 le 9c)	0.94	0.98		(89)
Utilisation faction (89)m= 0.97	20.06 2 etor for gair 0.94	20.06 ns for r	20.08 est of d	20.08 welling, 0.57	20.0 h2,m 0.39	9 20.09 (see Table 0 0.26 2 (follow st	20 e 9a)	.1 20.09 29 0.51 to 7 in Tab 09 20.06	0.8 le 9c)	0.94	0.98		(89)
Utilisation faction (89)m= 0.97 Mean internal	20.06 2 etor for gair 0.94	20.06 ns for r 0.88 ure in t	20.08 est of d 0.75 the rest	20.08 welling, 0.57 of dwell	20.0 h2,m 0.39 ing T2	9 20.09 (see Table 0 0.26 2 (follow st	20 e 9a) 0.2 eps 3	.1 20.09 29 0.51 to 7 in Tab 09 20.06	0.8 le 9c)	0.94	0.98	0.45	(89)
Utilisation factors (89)m= 0.97 Mean internation (90)m= 18.66	20.06 z ctor for gair 0.94 I temperate 19.01	20.06 ns for r 0.88 ure in 1 19.42 ure (fo	20.08 rest of d 0.75 the rest 19.82 r the wh	20.08 welling, 0.57 of dwell 20.01	20.0 h2,m 0.39 ing T2 20.0	9 20.09 (see Table 0 0.26 2 (follow stress 2 20.09 = fLA × T1	20 9a) 0.2 eps 3 20.	.1 20.09 29 0.51 20 to 7 in Tab 20 20.06 - fLA) × T2	0.8 le 9c) 19.8 fLA = Liv	0.94 19.19 ving area ÷ (4	0.98 18.61 4) =	0.45	(89) (90) (91)
Utilisation fact (89)m= 0.97 Mean internation fact (90)m= 18.66	20.06 2 etor for gair 0.94 I temperate 19.01 I temperate 19.54	20.06 ns for r 0.88 ure in t 19.42 ure (fo	20.08 rest of d 0.75 the rest 19.82 r the wh 20.25	20.08 welling, 0.57 of dwell 20.01 ole dwe 20.43	20.0 h2,m 0.39 ing T2 20.0 lling) 20.4	9 20.09 (see Table 0 0.26 2 (follow st. 8 20.09 = fLA × T1 9 20.5	20 9a) 0.2 eps 3 20. + (1 20	.1 20.09 29 0.51 to 7 in Tab 09 20.06 - fLA) × T2 .5 20.47	0.8 le 9c) 19.8 ftA = Liv 20.23	0.94 19.19 ving area ÷ (-	0.98	0.45	(89)

(93)m= 19.24 19.54 19.9 20.25 20.43 20.49 20.5 20.5 20.47 20.23 19.69 19.19		(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-calcula the utilisation factor for gains using Table 9a	te	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec		
Utilisation factor for gains, hm:		
(94)m= 0.97 0.93 0.87 0.76 0.59 0.42 0.29 0.32 0.54 0.81 0.94 0.97		(94)
Useful gains, hmGm , W = (94)m x (84)m		
(95)m= 440.75 508.82 546.29 531.19 445.95 307.94 205.7 215.23 327.97 428.45 430.11 418.09		(95)
Monthly average external temperature from Table 8		
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2		(96)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]		(07)
(97)m= 823.91 804.69 734.34 612.19 469.18 311.54 206.24 216.12 338.95 517.41 681.01 816.26		(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 285.07 198.83 139.91 58.32 17.28 0 0 0 0 66.19 180.65 296.24		
	1242.40	(98)
Total per year (kWh/year) = Sum(98) ₁₅₉₁₂ =	1242.49]
Space heating requirement in kWh/m²/year	23.24	(99)
9b. Energy requirements – Community heating scheme		
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none	0	(301)
	0]
Fraction of space heat from community system 1 – (301) =	1	(302)
The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the la	ntter	
includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C. Fraction of heat from Community boilers	1	(303a)
Fraction of total space heat from Community boilers (302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for community heating system	1	(305)
Distribution loss factor (Table 12c) for community heating system	1.05	(306)
Space heating	kWh/year	•
Annual space heating requirement	1242.49	
Space heat from Community boilers (98) x (304a) x (305) x (306) =	1304.62	(307a)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0	(308
Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) =	0	(309)
Water heating		
Annual water heating requirement	1858.62	
If DHW from community scheme: Water heat from Community boilers (64) × (303a) × (305) × (306) =	1951.55	(310a)
Electricity used for heat distribution 0.01 × [(307a)(307e) + (310a)(310e)] =	32.56	(313)
Cooling System Energy Efficiency Ratio	0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0) = (107) ÷ (314) =	0	(315)
	v](0.0)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside	113.73	(330a)
· · · · ·		ı

warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	b) + (330g) =		113.73	(331)
Energy for lighting (calculated in Appen	ndix L)				245.94	(332)
Total delivered energy for all uses (307	(1) + (309) + (310) + (31	2) + (315) + (331) + (33	32)(237b) =		3615.83	(338)
12b. CO2 Emissions - Community hea	ting scheme					
		Energy kWh/year	Emission fac kg CO2/kWh		missions g CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)	O (P) sing two fuels repeat (363) to	(366) for the secon	nd fuel	96	(367a)
CO2 associated with heat source 1	[(307)	o)+(310b)] x 100 ÷ (367b) x	0.22	=	732.64	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	16.9	(372)
Total CO2 associated with community s	systems	(363)(366) + (368)(372	2)	=	749.54	(373)
CO2 associated with space heating (se	econdary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =			749.54	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	=	59.02	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	127.64	(379)
Total CO2, kg/year	sum of (376)(382) =				936.2	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				17.51	(384)

El rating (section 14)

87.26

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:58:43

Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 60.89m² **Plot Reference:** 01 - C Site Reference : Highgate Road - GREEN

Address:

Client Details:

Name: Address:

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

20.63 kg/m² Target Carbon Dioxide Emission Rate (TER)

Dwelling Carbon Dioxide Emission Rate (DER) 18.18 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 59.3 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 50.4 kWh/m²

OK 2 Fabric U-values

Element Average Highest

External wall 0.18 (max. 0.30) 0.18 (max. 0.70) OK Party wall 0.00 (max. 0.20) OK OK

Floor 0.13 (max. 0.25) 0.13 (max. 0.70)

Roof (no roof) 1.40 (max. 2.00) OK 1.40 (max. 3.30)

Openings 2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	12.71m²	
Windows facing: North West	3.46m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		l Iser I	Details:										
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012	a Num are Ve			O010943 on: 1.0.5.50								
	Property Address: 01 - C Address:												
Address: 1. Overall dwelling dime	ensions:												
1. Overall aweiling aime		Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)				
Ground floor				(1a) x		2.65	(2a) =	161.36	(3a)				
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) (60.89	(4)			_						
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	161.36	(5)				
2. Ventilation rate:													
2. Ventuation rate.	main seconda heating heating	ry	other		total			m³ per hou	ır				
Number of chimneys		- + -	0] = [0	x 4	40 =	0	(6a)				
Number of open flues	0 + 0		0	i = F	0	x2	20 =	0	(6b)				
Number of intermittent fa	ns			'	0	x -	10 =	0	(7a)				
Number of passive vents	;			F	0	x ′	10 =	0	(7b)				
Number of flueless gas fi	res			F	0	X	40 =	0	(7c)				
G				L					`				
							Air ch	nanges per ho	our				
	ys, flues and fans = $(6a)+(6b)+(6b)$				0		÷ (5) =	0	(8)				
If a pressurisation test has be Number of storeys in the	peen carried out or is intended, procee the dwelling (ns)	ed to (17),	otherwise of	continue fr	om (9) to	(16)		0	(9)				
Additional infiltration	no awaming (no)					[(9)-	-1]x0.1 =	0	(10)				
Structural infiltration: 0	.25 for steel or timber frame o	r 0.35 fo	r masoni	y constr	ruction			0	(11)				
if both types of wall are p deducting areas of openi	resent, use the value corresponding t	o the grea	ter wall are	a (after									
•	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)				
If no draught lobby, en	ter 0.05, else enter 0							0	(13)				
-	s and doors draught stripped							0	(14)				
Window infiltration			0.25 - [0.2	. ,	-	. (15) -		0	(15)				
Infiltration rate	q50, expressed in cubic metro	se nar h	(8) + (10)				area	0	(16)				
•	lity value, then $(18) = [(17) \div 20] + (18)$	•	•	•	cuc or c	листорс	arca	0.15	(17)				
•	es if a pressurisation test has been do				is being u	sed		3.13	` ′				
Number of sides sheltere	ed		(20) 4	10 07E v (4	10)1			0	(19)				
Shelter factor Infiltration rate incorporate	ting chalter factor		(20) = 1 - (21) = (18)		19)] =			1	(20)				
Infiltration rate modified f	•		(21) = (10	/ X (20) =				0.15	(21)				
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec]					
Monthly average wind sp	1 ' 1 ' 1		<u>, </u>	•	•	1		ı					
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7						
Wind Faster (00s) (0	2)	-	-		-	-		-					
Wind Factor $(22a)m = (2(22a)m = 1.27 1.25)$	2)m ÷ 4 1.23	0.95	0.92	1	1.08	1.12	1.18]					
(ΔΔα)111- 1.20	1.20 1.1 1.00 0.95	1 0.33	1 0.32		1.00	1.12	1.10	J					

Adjusted infiltration rate (allowing for shelte	and wind s	peed) =	(21a) x	(22a)m				_	
0.19 0.19 0.18 0.16 0.1		0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effective air change rate for the a If mechanical ventilation:	oplicable ca	se						0.5	(23
If exhaust air heat pump using Appendix N, (23b) =	(23a) x Fmv (e	equation (I	N5)) . othe	rwise (23b) = (23a)			0.5	—(23
If balanced with heat recovery: efficiency in % allow	. ,	. `	,, .	,	, (200)			0.5	=
a) If balanced mechanical ventilation with	_				2h\m + (23h) ~ [1 _ (23c)	74.8	(23
24a)m= 0.32 0.31 0.31 0.29 0.2		0.27	0.26	0.28	0.29	0.29	0.3	+ 100j	(24
b) If balanced mechanical ventilation with		l	L	<u> </u>			0.0		•
24b)m= 0 0 0 0 0		0	0	0	0	0	0		(24
c) If whole house extract ventilation or po									ν-
if $(22b)m < 0.5 \times (23b)$, then $(24c) = (24c)$	•				5 × (23b	o)			
24c)m= 0 0 0 0 0	- í	0	0	0	0	0	0		(2
d) If natural ventilation or whole house po	sitive input	ventilatio	on from I	oft	Į.	Į.			
if $(22b)m = 1$, then $(24d)m = (22b)m$	•				0.5]			_	
24d)m= 0 0 0 0 0	0	0	0	0	0	0	0		(2
Effective air change rate - enter (24a) or	24b) or (24	c) or (24	d) in bo	(25)					
25)m= 0.32 0.31 0.31 0.29 0.2	9 0.27	0.27	0.26	0.28	0.29	0.29	0.3		(2
3. Heat losses and heat loss parameter:									
ELEMENT Gross Openings	Net Ar	ea	U-val	ue	AXU		k-value	e A2	Χk
area (m²) m²	A ,r		W/m2		(W/I	K)	kJ/m²-l		
Vindows Type 1	12.71	_x 1	/[1/(1.4)+	0.04] =	16.85				(2
Vindows Type 2	3.46	x1	/[1/(1.4)+	0.04] =	4.59				(2
Floor	60.89) X	0.13	=	7.91569	9	75	4566.7	5 (2
Valls Type1 29.71 16.17	13.54	x .	0.18	-	2.44		60	812.4	(2
Valls Type2 13.52 0	13.52	<u>x</u>	0.17	-	2.27	F i	60	811.2	
otal area of elements, m ²	104.1	2							 (3
Party wall	29.71	=	0		0	— [45	1336.9	
Party ceiling	60.89	=				'	30	1826.7	╡
nternal wall **	146.1	=					9	1315.53	=
for windows and roof windows, use effective window			n formula 1	/[(1/U-valı	ie)+0.041 a	L ns aiven in			3 (0
* include the areas on both sides of internal walls and		atou domig	, romaia r	, [(i, o vaic	0,10.01,0	io givoii iii	paragrapi	. 0.2	
Fabric heat loss, W/K = S (A x U)			(26)(30)	+ (32) =				34.06	(3
leat capacity Cm = S(A x k)				((28).	.(30) + (32	2) + (32a).	(32e) =	10669.53	(3
hermal mass parameter (TMP = Cm ÷ TF)	A) in kJ/m²K			= (34)	÷ (4) =			175.23	(3:
For design assessments where the details of the cons an be used instead of a detailed calculation.	ruction are not	t known pi	recisely the	e indicative	values of	TMP in T	able 1f		_
hermal bridges : S (L x Y) calculated using	Appendix I	<						10.47	(3
details of thermal bridging are not known (36) = 0.05	• •							-	`
otal fabric heat loss				(33) +	(36) =			44.53	(3
entilation heat loss calculated monthly				(38)m	= 0.33 × (25)m x (5)		
Jan Feb Mar Apr M	ay Jun	Jul	Aug	Sep	Oct	Nov	Dec		
38)m= 16.89 16.69 16.49 15.5 15	3 14.3	14.3	14.1	14.7	15.3	15.69	16.09		(3
Heat transfer coefficient, W/K				(39)m	= (37) + (37)	38)m			
39)m= 61.42 61.22 61.02 60.02 59.	32 58.82	58.82	58.62	59.22	59.82	60.22	60.62		
50, 5 5 5 50.0 60.0									

Heat loss para	ımeter (I	HLP), W	/m²K					(40)m	= (39)m ÷	÷ (4)			
(40)m= 1.01	1.01	1	0.99	0.98	0.97	0.97	0.96	0.97	0.98	0.99	1		
	!	!	Į.	ļ		ļ	<u> </u>		Average =	Sum(40) ₁	12 /12=	0.98	(40)
Number of day	s in mo	nth (Tab	le 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 heat	ting ene	rgy requi	irement:								kWh/ye	ear:	
Assumed occu if TFA > 13.9 if TFA £ 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		01		(42)
Annual averag Reduce the annua not more that 125	je hot wa al average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		.86		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage is								1 222		1			
(44)m= 90.04	86.77	83.5	80.22	76.95	73.67	73.67	76.95	80.22	83.5	86.77	90.04		
()										I ım(44) ₁₁₂ =	L	982.3	(44)
Energy content of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	n x nm x E	OTm / 3600				L		` ′
(45)m= 133.53	116.79	120.52	105.07	100.82	87	80.62	92.51	93.61	109.1	119.09	129.32		
	<u> </u>			l		l	ı		Total = Su	. <u>I</u> ım(45) ₁₁₂ =	=	1287.96	(45)
If instantaneous w	vater heati	ng at point	of use (no	o hot water	storage),	enter 0 in	boxes (46	to (61)			L		
(46)m= 20.03	17.52	18.08	15.76	15.12	13.05	12.09	13.88	14.04	16.36	17.86	19.4		(46)
Water storage				!		!	!						
Storage volum	ne (litres)) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	-			_			, ,						
Otherwise if no		hot wate	er (this ir	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in ((47)			
Water storage a) If manufact		oclared I	occ foct	or ic kno	wo (k\\/k	n/dov/):							(40)
ŕ				JI IS KIIO	wii (Kvvi	i/day).					0		(48)
Temperature f							(40) (40)				0		(49)
Energy lost fro b) If manufact		•			or is not		(48) x (49)) =		1	10		(50)
Hot water stor			-							0	02		(51)
If community h	-			`		,							()
Volume factor	from Ta	ble 2a								1.	03		(52)
Temperature f	actor fro	m Table	2b							0	.6		(53)
Energy lost fro	m watei	r storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	.03		(54)
Enter (50) or ((54) in (55)								1.	.03		(55)
Water storage	loss cal	culated t	for each	month			((56)m = ((55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contains												x H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit	loss (ar	nual) fro	m Table			•	•	•	•		0		(58)
Primary circuit	`	,			59)m = ((58) ± 36	35 × (41)	ım			~		(/
(modified by				,	•	` '	, ,		r thermo	ostat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
			l	L		L	<u> </u>	L	L	<u> </u>			

Combi loss calculated for each month $(61)m = (60) \div 365 \times (41)m$														
(61)m= 0	0	0	0	0	00) -	0) 0		0	0	0	0	1	(61)
Total heat requir				alculated	l for es	ch month							[.(59)m + (61)m	` '
	166.72	175.79	158.56	156.09	140.49		147.	_	147.11	164.37	172.58	184.6		(62)
Solar DHW input cal		using App	endix G or	Appendix	H (nega	tive quantit) (ente	L er '0'	if no sola	r contribu	tion to wate	L er heating)	1	
(add additional I												0,		
(63)m= 0	0	0	0	0	0	0	0		0	0	0	0	1	(63)
Output from wat	er heat	er				•	•	,			•	!		
(64)m= 188.81	166.72	175.79	158.56	156.09	140.49	135.89	147.	78	147.11	164.37	172.58	184.6]	
						•	(Outp	ut from wa	ater heat	er (annual)	l12	1938.8	(64)
Heat gains from	water l	heating,	kWh/mo	onth 0.2	5 ′ [0.8	5 × (45)m	+ (6°	1)m] + 0.8 x	: [(46)m	ı + (57)m	+ (59)m	ı]	
(65)m= 88.62	78.77	84.29	77.73	77.74	71.72	71.03	74.9	98	73.92	80.5	82.39	87.22		(65)
include (57)m	in calc	ulation o	of (65)m	only if c	ylinde	is in the	dwelli	ng d	or hot w	ater is	from com	munity h	neating	
5. Internal gair	ns (see	Table 5	and 5a):										
Metabolic gains	(Table	5), Wat	ts											
Jan	Feb	Mar	Apr	May	Jun	Jul	Αι	ıg	Sep	Oct	Nov	Dec		
(66)m= 100.33	100.33	100.33	100.33	100.33	100.33	3 100.33	100.	33	100.33	100.33	100.33	100.33		(66)
Lighting gains (d	calculat	ed in Ap	pendix	L, equati	ion L9	or L9a), a	lso se	ee T	able 5					
(67)m= 15.62	13.87	11.28	8.54	6.38	5.39	5.82	7.5	7	10.16	12.9	15.06	16.05		(67)
Appliances gain	s (calcu	ulated in	Append	dix L, eq	uation	L13 or L1	3a), a	also	see Tal	ole 5	-	-		
(68)m= 175.19	177	172.42	162.67	150.36	138.79	131.06	129.	24	133.82	143.58	155.89	167.46		(68)
Cooking gains (calculat	ted in Ap	pendix	L, equat	ion L1	5 or L15a), also	o se	e Table	5	-	-		
(69)m= 33.03	33.03	33.03	33.03	33.03	33.03	33.03	33.0)3	33.03	33.03	33.03	33.03		(69)
Pumps and fans	gains	(Table 5	ia)											
(70)m= 0	0	0	0	0	0	0	0		0	0	0	0		(70)
Losses e.g. eva	poratio	n (negat	ive valu	es) (Tab	le 5)									
(71)m= -80.27	-80.27	-80.27	-80.27	-80.27	-80.27	-80.27	-80.2	27	-80.27	-80.27	-80.27	-80.27		(71)
Water heating g	ains (Ta	able 5)											_	
(72)m= 119.11	117.22	113.3	107.96	104.49	99.61	95.47	100.	78	102.67	108.19	114.43	117.23		(72)
Total internal g	ains =				(6	6)m + (67)m	n + (68))m +	(69)m + (70)m + (71)m + (72))m	_	
(73)m= 363.02	361.2	350.1	332.27	314.34	296.89	285.45	290.	69	299.75	317.77	338.48	353.84		(73)
6. Solar gains:														
Solar gains are cal		Ü					tions t	o cor	nvert to th	e applica		tion.		
Orientation: Ac	cess Fa ble 6d	actor	Area m²			lux able 6a			g_ able 6b	7	FF Fable 6c		Gains (W)	
					_		1 [` '	1,
Northeast 0.9x	0.77	X	12.		X	11.28] X [] [0.63	_	0.7	=	43.83	(75)
Northeast 0.9x	0.77	X	12.		X	22.97	X [0.63	X	0.7	=	89.21	[(75)
Northeast 0.9x	0.77	X	12.		x	41.38	X [0.63	×	0.7	=	160.73	[(75)
Northeast 0.9x	0.77	X	12.		X	67.96] X [] [0.63		0.7	=	263.96	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	91.35	X		0.63	X	0.7	=	354.82	(75)

Nameta					г			1		_		_		—
Northeast _{0.9x}	0.77	X	12.	71	X [9	7.38	X	0.63	X	0.7	=	378.27	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	9	91.1	X	0.63	X	0.7	=	353.87	(75)
Northeast _{0.9x}	0.77	X	12.	71	x	7	2.63	X	0.63	X	0.7	=	282.11	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	5	0.42	X	0.63	X	0.7	=	195.85	(75)
Northeast _{0.9x}	0.77	Х	12.	71	x	2	8.07	X	0.63	X	0.7	=	109.02	(75)
Northeast _{0.9x}	0.77	X	12.	71	x	·	14.2	X	0.63	X	0.7	=	55.15	(75)
Northeast _{0.9x}	0.77	X	12.	71	x	(9.21	X	0.63	X	0.7	=	35.79	(75)
Northwest 0.9x	0.77	X	3.4	16	x	1	1.28	x	0.63	X	0.7	=	11.93	(81)
Northwest 0.9x	0.77	X	3.4	16	x [2	2.97	X	0.63	X	0.7	=	24.29	(81)
Northwest 0.9x	0.77	X	3.4	16	x	4	1.38	x	0.63	X	0.7	=	43.75	(81)
Northwest _{0.9x}	0.77	Х	3.4	16	x	6	7.96	x	0.63	X	0.7	=	71.86	(81)
Northwest _{0.9x}	0.77	X	3.4	16	x	9	1.35	x	0.63	x	0.7		96.59	(81)
Northwest 0.9x	0.77	X	3.4	16	x	9	7.38	x	0.63	x	0.7	=	102.98	(81)
Northwest 0.9x	0.77	X	3.4	16	x	ę	91.1	х	0.63	x	0.7	=	96.33	(81)
Northwest 0.9x	0.77	Х	3.4	16	x	7	2.63	x	0.63	x	0.7	=	76.8	(81)
Northwest 0.9x	0.77	X	3.4	16	x [5	0.42	x	0.63	×	0.7	_ =	53.32	(81)
Northwest _{0.9x}	0.77	X	3.4	16	x	2	8.07	x	0.63	X	0.7	=	29.68	(81)
Northwest 0.9x	0.77	X	3.4	16	x	,	14.2	X	0.63	x	0.7		15.01	(81)
Northwest _{0.9x}	0.77	x	3.4	16	x [(9.21	X	0.63	×	0.7		9.74	(81)
-					•			•						
Solar gains in	watts, ca	lculated	for eacl	h month	1			(83)m	n = Sum(74)m	(82)m				
				454.44						1			1	
(83)m= 55.76	113.5	204.48	335.82	451.41	48	31.25	450.2	358	3.9 249.17	138.7	70.16	45.53		(83)
(83)m= 55.76 Total gains – i								358	3.9 249.17	138.7	70.16	45.53	_	(83)
` '					+ (8			649		456.4	-	45.53 399.37]	(83)
Total gains – i	nternal ai	nd solar 554.59	(84)m = 668.09	= (73)m 765.75	+ (8	33)m	, watts	I		<u> </u>	-			
Total gains – i (84)m= 418.78	nternal ai 474.7	nd solar 554.59 erature ((84)m = 668.09 (heating	765.75 seasor	+ (8 77	33)m 78.14	, watts 735.65	649	9.6 548.92	<u> </u>	-		21	
Total gains – i (84)m= 418.78 7. Mean inter	nternal ar 474.7 mal tempo during he	nd solar 554.59 erature ((84)m = 668.09 (heating eriods in	= (73)m 765.75 seasor	+ (8 77 n)	33)m 78.14 area f	, watts 735.65 from Tab	649	9.6 548.92	<u> </u>	-		21	(84)
Total gains – i (84)m= 418.78 7. Mean inter Temperature	nternal ar 474.7 mal tempo during he	nd solar 554.59 erature ((84)m = 668.09 (heating eriods in	= (73)m 765.75 seasor	+ (8 77 n) ing a	33)m 78.14 area f	, watts 735.65 from Tab	649 ole 9	9.6 548.92	· · · ·	7 408.63		21	(84)
Total gains – i (84)m= 418.78 7. Mean inter Temperature Utilisation fac	nternal ar 474.7 nal tempo during ho	nd solar 554.59 erature (eating positions for li	(84)m = 668.09 (heating eriods in the string are)	765.75 seasor the livi	+ (8 77 n) ing a	33)m 78.14 area f	735.65 rom Tabble 9a)	649 ole 9	9.6 548.92 , Th1 (°C)	456.4	7 408.63	399.37	21	(84)
Total gains – i (84)m= 418.78 7. Mean inter Temperature Utilisation fact Jan (86)m= 0.99	anternal and 474.7 consistency during heater for gas Feb 0.98	erature (eating points for limits of limits) Mar 0.94	(84)m = 668.09 (heating eriods in Apr 0.84	= (73)m 765.75 seasor the living ea, h1,m May 0.66	+ (8 77 n) ing a n (se	33)m 78.14 area f ee Ta Jun	735.65 from Tab ble 9a) Jul 0.35	649 ole 9	9.6 548.92 , Th1 (°C) ug Sep	456.4 Oct	7 408.63 Nov	399.37 Dec	21	(84)
Total gains – i (84)m= 418.78 7. Mean inter Temperature Utilisation face	anternal and 474.7 consistency during heater for gas Feb 0.98	erature (eating points for limits of limits) Mar 0.94	(84)m = 668.09 (heating eriods in Apr 0.84	= (73)m 765.75 seasor the living ea, h1,m May 0.66	+ (8 77 n) ing a n (se	33)m 78.14 area f ee Ta Jun	735.65 from Tab ble 9a) Jul 0.35	649 ole 9	0.6 548.92 , Th1 (°C) ug Sep 11 0.68	456.4 Oct	7 408.63 Nov 0.98	399.37 Dec	21	(84)
Total gains – i (84)m= 418.78 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.99 Mean interna (87)m= 19.72	nternal are 474.7 nal temporal temporal temporal temporal feet of the feet of	erature (eating points for limited Mar 0.94 eature in lagrange)	(84)m = 668.09 (heating eriods ir iving are 0.84 iving are 20.66	= (73)m 765.75 seasor the livi ea, h1,m May 0.66 ea T1 (f	+ (8 777) 777 777 777 777 777 777 77	33)m 78.14 area f ee Ta Jun 0.47 w ste 0.98	735.65 From Take ble 9a) Jul 0.35 ps 3 to 7	649 ole 9 A 0.4 7 in T 20.	0.6 548.92 , Th1 (°C) ug Sep 11 0.68 Table 9c) 99 20.92	456.4 Oct 0.91	7 408.63 Nov 0.98	399.37 Dec 0.99	21	(84)
Total gains – i (84)m= 418.78 7. Mean inter Temperature Utilisation fact Jan (86)m= 0.99 Mean interna (87)m= 19.72 Temperature	nternal are 474.7 considering here to r for gar Feb 0.98 considering here 19.91 considering here to result to the	erature (eating points for limited ature in labeled ature in labeled ature points ature in labeled ature in	(84)m = 668.09 (heating eriods in Apr 0.84 iving are 20.66 eriods in approach to the control of	= (73)m 765.75 seasor the livities, h1,m May 0.66 ea T1 (f 20.9	+ (8 777 777 777 777 777 777 777 777 777	area fee Ta Jun 0.47 w ste 0.98	rom Table 9a) Jul 0.35 ps 3 to 7 21 from Ta	649 DIE 9 A 0.2 7 in T 20.	9.6 548.92 7, Th1 (°C) 10 Sep 11 0.68 1 able 9c) 19 20.92 19, Th2 (°C)	Oct 0.91	7 408.63 Nov 0.98	Dec 0.99	21	(84) (85) (86) (87)
Total gains – i (84)m= 418.78 7. Mean inter Temperature Utilisation fact Jan (86)m= 0.99 Mean internation (87)m= 19.72 Temperature (88)m= 20.08	rnal temporal during he ctor for gas 19.91 during he 20.08	erature (eating points for limited at the control of the control o	(84)m = 668.09 (heating eriods in ving are 20.66 eriods in 20.1	= (73)m 765.75 seasor the livities, h1,m May 0.66 ea T1 (f 20.9 n rest of	+ (8 777) 777 777 777 777 777 777 77	area fee Ta Jun 0.47 w ste 0.98 elling 0.11	735.65 From Table 9a) Jul 0.35 ps 3 to 7 21 from Ta	649 A 0.4 7 in T 20.	9.6 548.92 7, Th1 (°C) 10 Sep 11 0.68 1 able 9c) 19 20.92 19, Th2 (°C)	456.4 Oct 0.91	7 408.63 Nov 0.98	399.37 Dec 0.99	21	(84)
Total gains – i (84)m= 418.78 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.99 Mean interna (87)m= 19.72 Temperature (88)m= 20.08 Utilisation fac	nternal are 474.7 nal temporal temporal temporal temporal temporal feet of the	erature (eating points for limited points for limit	(84)m = 668.09 (heating eriods ir iving are 0.84 iving are 20.66 eriods ir 20.1 est of december 1.00	= (73)m 765.75 seasor the livities, h1,m May 0.66 ea T1 (f 20.9 n rest of 20.1 welling,	+ (8 777) ing a n (see	area fee Ta Jun 0.47 w ste 0.98 elling 0.11 m (se	rom Take, watts 735.65 From Take, watts 735.65 From Take, watts 735.65 From Take, watts	649 ble 9 A 0.4 7 in T 20. able 9 20.	9.6 548.92 y, Th1 (°C) ug Sep 11 0.68 Table 9c) 99 20.92 9, Th2 (°C) 11 20.11	0ct 0.91 20.57	Nov 0.98 20.09	Dec 0.99 19.69 20.09	21	(84) (85) (86) (87) (88)
Total gains – i (84)m= 418.78 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.99 Mean interna (87)m= 19.72 Temperature (88)m= 20.08 Utilisation fac (89)m= 0.98	nternal are 474.7 nal temporal temporal temporal temporal temporal feet of the	erature (eating points for limited points for limit	(84)m = 668.09 (heating eriods ir iving are 0.84 iving are 20.66 eriods ir 20.1 est of do 0.81	= (73)m 765.75 seasor the livities, h1,m May 0.66 ea T1 (f 20.9 n rest of 20.1 welling, 0.61	+ (8 777) 777 777 777 777 777 777 77	33)m 78.14 area f ee Ta Jun 0.47 w ste 0.98 elling 0.11 m (se	rom Take yallow	649 ble 9 A 0.4 7 in T 20. able 9 20. 9a) 0.3	9.6 548.92 y, Th1 (°C) ug Sep 11 0.68 Table 9c) 99 20.92 9, Th2 (°C) 11 20.11	Oct 0.91 20.57 20.1	7 408.63 Nov 0.98	Dec 0.99	21	(84) (85) (86) (87)
Total gains – i (84)m= 418.78 7. Mean inter Temperature Utilisation fac [86)m= 0.99 Mean interna (87)m= 19.72 Temperature (88)m= 20.08 Utilisation fac (89)m= 0.98 Mean interna	nternal are 474.7 considering he ctor for gas 19.91 during he 20.08 ctor for gas 19.91 during he 20.08 ctor for gas 19.97	erature (eating peains for limited at the eating peains for reacting (84)m = 668.09 (heating eriods in ving are 20.66 eriods in 20.1 est of do 0.81 he rest	ea T1 (f 20.9 rest of 20.1 welling, 0.61 of dwell	+ (8 777) ing a following a fo	33)m 78.14 area f ee Ta Jun 0.47 w ste 0.98 elling 0.11 m (se	rom Table 9a) Jul 0.35 ps 3 to 7 21 from Table 20.11 ee Table 0.28 pollow ste	649 A 0.4 7 in T 20. able 9 0.3 pps 3	9.6 548.92 y, Th1 (°C) ug Sep 11 0.68 Table 9c) 99 20.92 9, Th2 (°C) 11 20.11 33 0.61 to 7 in Tab	Oct 0.91 20.57 20.1 0.89 le 9c)	Nov 0.98 20.09 0.97	Dec 0.99 19.69 20.09	21	(84) (85) (86) (87) (88) (89)	
Total gains – i (84)m= 418.78 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.99 Mean interna (87)m= 19.72 Temperature (88)m= 20.08 Utilisation fac (89)m= 0.98	nternal are 474.7 nal temporal temporal temporal temporal temporal feet of the	erature (eating points for limited points for limit	(84)m = 668.09 (heating eriods ir iving are 0.84 iving are 20.66 eriods ir 20.1 est of do 0.81	= (73)m 765.75 seasor the livities, h1,m May 0.66 ea T1 (f 20.9 n rest of 20.1 welling, 0.61	+ (8 777) ing a following a fo	33)m 78.14 area f ee Ta Jun 0.47 w ste 0.98 elling 0.11 m (se	rom Take yallow	649 ble 9 A 0.4 7 in T 20. able 9 20. 9a) 0.3	9.6 548.92 y, Th1 (°C) ug Sep 11 0.68 Table 9c) 99 20.92 9, Th2 (°C) 11 20.11 33 0.61 4 to 7 in Tab 11 20.04	456.4 Oct 0.91 20.57 20.1 0.89 le 9c) 19.6	Nov 0.98 20.09 0.97	399.37 Dec 0.99 19.69 20.09 18.34		(84) (85) (86) (87) (88) (89)
Total gains – i (84)m= 418.78 7. Mean inter Temperature Utilisation fac [86)m= 0.99 Mean interna (87)m= 19.72 Temperature (88)m= 20.08 Utilisation fac (89)m= 0.98 Mean interna	nternal are 474.7 considering he ctor for gas 19.91 during he 20.08 ctor for gas 19.91 during he 20.08 ctor for gas 19.97	erature (eating peains for limited at the eating peains for reacting (84)m = 668.09 (heating eriods in ving are 20.66 eriods in 20.1 est of do 0.81 he rest	ea T1 (f 20.9 rest of 20.1 welling, 0.61 of dwell	+ (8 777) ing a following a fo	33)m 78.14 area f ee Ta Jun 0.47 w ste 0.98 elling 0.11 m (se	rom Table 9a) Jul 0.35 ps 3 to 7 21 from Table 20.11 ee Table 0.28 pollow ste	649 A 0.4 7 in T 20. able 9 0.3 pps 3	9.6 548.92 y, Th1 (°C) ug Sep 11 0.68 Table 9c) 99 20.92 9, Th2 (°C) 11 20.11 33 0.61 4 to 7 in Tab 11 20.04	456.4 Oct 0.91 20.57 20.1 0.89 le 9c) 19.6	Nov 0.98 20.09 0.97	399.37 Dec 0.99 19.69 20.09 18.34	21	(84) (85) (86) (87) (88) (89)	
Total gains – i (84)m= 418.78 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.99 Mean interna (87)m= 19.72 Temperature (88)m= 20.08 Utilisation fac (89)m= 0.98 Mean interna (90)m= 18.37	nternal are 474.7 nal temporal temporal temporal temporal temporal feet 19.91 nal temporal temporal temporal temporal 19.91 nal temporal temporal temporal 18.64	erature (eating points for limited points for limit	(84)m = 668.09 (heating eriods ir iving are 20.66 eriods ir 20.1 est of do 0.81 he rest 19.7	= (73)m 765.75 seasor the livities, h1,m May 0.66 ea T1 (f 20.9 n rest of 20.1 welling, 0.61 of dwell	+ (8 777) ing a collow 20 20 10 10 10 10 10 10 10 10 10 10 10 10 10	33)m 78.14 area f ee Ta Jun 0.47 w ste 0.98 elling 0.11 m (se 0.41 T2 (fc	rom Take ble 9a) Jul 0.35 ps 3 to 7 21 from Take 20.11 ee Table 0.28 bllow steen 20.11	649 A 0.4 7 in T 20. 9a) 0.5 20.	2.6 548.92 2.7 Th1 (°C) 2.8 Sep 3.1 0.68 2.8 Cable 9c) 3.9 20.92 3.7 Th2 (°C) 3.1 20.11 3.3 0.61 3.4 to 7 in Tab 3.1 20.04	456.4 Oct 0.91 20.57 20.1 0.89 19.6 fLA = Liv	Nov 0.98 20.09 0.97	399.37 Dec 0.99 19.69 20.09 18.34		(84) (85) (86) (87) (88) (89)
Total gains – i (84)m= 418.78 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.99 Mean interna (87)m= 19.72 Temperature (88)m= 20.08 Utilisation fac (89)m= 0.98 Mean interna (90)m= 18.37	nternal are 474.7 nal temporal temporal temporal temporal temporal 19.91 nal temporal 19.91 nal temporal 18.64 nal temporal 19.22 nal temporal 19.22	erature (eating positions for limited positions) ature in limited positions for right (eating positions) eating positions for right (eating positions) ature in time (for 19.12)	(84)m = 668.09 (heating eriods ir iving are 20.66 eriods ir 20.1 est of do 0.81 he rest 19.7 r the wh	= (73)m 765.75 seasor the livities, h1,m May 0.66 ea T1 (ff 20.9 n rest of 20.1 welling, 0.61 of dwell 20	+ (8 777) ing a collow 20 20 10 10 10 10 10 10 10 10 10 10 10 10 10	33)m 78.14 area f ee Ta Jun 0.47 w ste 0.98 elling 0.11 T2 (fc 20.1	735.65 From Take ble 9a) Jul 0.35 ps 3 to 7 21 from Take Table 0.28 collow steen 20.11 A × T1 20.52	649 A 0.4 7 in T 20. 9a) 0.3 20. + (1 20.	9.6 548.92 y, Th1 (°C) ug Sep 11 0.68 Table 9c) 99 20.92 9, Th2 (°C) 11 20.11 33 0.61 4 to 7 in Tab 11 20.04 - fLA) × T2 52 20.45	456.4 Oct 0.91 20.57 20.1 0.89 19.6 fLA = Liv	Nov 0.98 20.09 20.09 18.9 ving area ÷ (-	399.37 Dec 0.99 19.69 20.09 18.34		(84) (85) (86) (87) (88) (89)

(93)m= 18.99	19.22	19.64	20.14	20.41	20.5	20.52	20.52	20.45	20.04	19.44	18.96		(93)
8. Space hea													
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9b	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	I												
(94)m= 0.98	0.96	0.92	0.81	0.63	0.44	0.31	0.37	0.64	0.89	0.96	0.98		(94)
Useful gains,	hmGm	, W = (9 ²	4)m x (84	4)m									
(95)m= 409.79	457.75	512.63	544.45	484.7	341.51	229.38	239.25	349.38	404.73	393.8	392.15		(95)
Monthly aver		r	. 		r	·	ı			ī			
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate	1	i				=[(39)m : 230.39	-``	<u>`</u>		740.04	004.70		(07)
(97)m= 902.19 Space heatin	876.84	801.64	674.58	521.27	347.3		241.26	375.79	564.85	743.31	894.73		(97)
(98)m= 366.34	281.63	215.02	93.69	27.2	0	0.02	0	0	119.13	251.65	373.92		
(00)=	201.00	210.02	00.00	21.2				l per year (<u> </u>	└──┤	1728.59	(98)
Casas bootin	a roquir	omant in	I4\A/b/m2	hioor			rota	i poi your i	(ittviii) your) = Odin(o	O)15,912 —		╡``
Space heatin	•			•								28.39	(99)
9b. Energy red			The state of the s	Ĭ									
This part is use Fraction of spa			• .		•		.	•		unity scr	neme.	0	(301)
Fraction of spa			-		-	_		, -			[[1	(302)
·			•	-	,	,	allows for	CUD and	un to form	othor boot		•	(302)
The community so includes boilers, h									ир <i>во тоиг</i> с	other neat	sources, ir	ie ialler	
Fraction of hea	at from C	Commun	ity boiler	S								1	(303a)
Fraction of total	al space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor for conf	trol and	charging	method	(Table	4c(3)) fo	r comm	unity hea	ting syst	tem			1	(305)
Distribution los	ss factor	(Table 1	2c) for c	commun	ity heatii	ng syste	m				ĺ	1.05	(306)
Space heating	a										L	kWh/yea	 r
Annual space	_	requiren	nent									1728.59	
Space heat fro	om Comi	munity b	oilers					(98) x (30)4a) x (30	5) x (306) :	= [1815.02	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)	Ī	0	(308
Space heating	require	ment fro	m secon	dary/sur	plemen	tary syst	tem	(98) x (30	01) x 100 -	÷ (308) =	Ī	0	(309)
Water heating	•										L		
Annual water h	-	equirem	ent									1938.8	
If DHW from c	ommuni	ty schem	ne:								_		_
Water heat from Community boilers (64) x (303a) x (305) x (306) =												2035.74	(310a)
Electricity used for heat distribution $0.01 \times [(307a)(307e) + (310a)(310e)] = \begin{bmatrix} 0.01 \times [(307a)(307e) + (310a)(310e)] \end{bmatrix}$											38.51	(313)	
													_
Cooling System		y Efficie	ncy Ratio	0								0	(314)
•	m Energ	•	•		n, if not e	enter 0)		= (107) ÷	(314) =		[[0	(314)
Cooling System	m Energ (if there	is a fixe	d cooling	g system		,		= (107) ÷	(314) =		[=
Cooling System Space cooling	m Energ (if there oumps a	is a fixe	d cooling	g system	Γable 4f)	:	outside	= (107) ÷	(314) =] [=

warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	b) + (330g) =		148.82	(331)
Energy for lighting (calculated in Appen	dix L)				275.82	(332)
Total delivered energy for all uses (307) + (309) + (310) + (312	2) + (315) + (331) + (33	32)(237b) =		4275.4	(338)
12b. CO2 Emissions - Community hea	ting scheme					
		Energy kWh/year	Emission fac kg CO2/kWh		missions g CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)	• •) ing two fuels repeat (363) to	(366) for the secon	nd fuel	96	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.22] =	866.42	(367)
Electrical energy for heat distribution		[(313) x	0.52] =	19.99	(372)
Total CO2 associated with community s	systems	(363)(366) + (368)(372	2)	=	886.41	(373)
CO2 associated with space heating (se	condary)	(309) x	0] =	0	(374)
CO2 associated with water from immer	sion heater or instantar	neous heater (312) x	0.22] =	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =			886.41	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52] =	77.24	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52] =	143.15	(379)
Total CO2, kg/year	sum of (376)(382) =				1106.79	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				18.18	(384)

El rating (section 14)

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:58:20

Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 61.98m² **Plot Reference:** Site Reference : Highgate Road - GREEN 01 - D

Address:

Client Details:

Name: Address:

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 20.41 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 17.53 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 58.1 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 47.3 kWh/m²

OK 2 Fabric U-values

Element Highest Average

External wall 0.17 (max. 0.30) 0.18 (max. 0.70) OK Party wall 0.00 (max. 0.20) OK

Floor 0.13 (max. 0.25) 0.13 (max. 0.70) Roof (no roof)

1.40 (max. 3.30)

Openings 1.40 (max. 2.00)

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

2a Thermal bridging

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

OK

OK

7 Law anares lights		
7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	ок
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	12.07m²	
Ventilation rate:	4.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		l lser I	Details:						
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012	<u> </u>	Strom Softwa					010943 on: 1.0.5.50	
	F	Property	Address	01 - D					
Address: 1. Overall dwelling dime	anaiona:								
1. Overall dwelling diffie	ensions.	Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Ground floor				(1a) x		2.65	(2a) =	164.25	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	61.98	(4)			J		
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	164,25	(5)
2. Ventilation rate:								104.20	(0)
2. Ventilation rate.	main seconda	ry	other		total			m³ per hou	ır
Number of chimneys	heating heating + 0	- + -	0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	╡╻┝	0]	0	x	20 =	0	(6b)
Number of intermittent fa	ins			J	0	x -	10 =	0	(7a)
Number of passive vents	;			L	0	x ·	10 =	0	(7b)
Number of flueless gas fi				L	0	x 4	40 =	0	(7c)
rambor of hadrood gad h				L	0			0	(70)
							Air ch	nanges per ho	our
Infiltration due to chimne	ys, flues and fans = $(6a)+(6b)+(6b)$	7a)+(7b)+	(7c) =	Г	0		÷ (5) =	0	(8)
	peen carried out or is intended, proceed	ed to (17),	otherwise o	continue fr	rom (9) to	(16)			
Number of storeys in the Additional infiltration	ne aweiling (ns)					[(9).	-1]x0.1 =	0	(9) (10)
	.25 for steel or timber frame o	r 0.35 fo	r masoni	y constr	uction	[(0)	1,10.1 =	0	(11)
if both types of wall are p	resent, use the value corresponding t			•					` `
deducting areas of openii	ngs); if equal user 0.35 floor, enter 0.2 (unsealed) or 0	ı 1 (seal	ed) else	enter ()				0	(12)
If no draught lobby, en	,	(000)	ou), 0.00	ontor o				0	(13)
	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate			(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
•	q50, expressed in cubic metro	•	•	•	etre of e	envelope	area	3	(17)
•	lity value, then $(18) = [(17) \div 20] + (18)$ if a pressurisation test has been do				io hoina u	and		0.15	(18)
Number of sides sheltere		ne or a de	gree air pe	пеаышу	is being u	seu		0	(19)
Shelter factor			(20) = 1 -	[0.0 75 x (1	19)] =			1	(20)
Infiltration rate incorporate	ting shelter factor		(21) = (18	x (20) =				0.15	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7	_	_		-				
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4								
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18]	
· · · · · · · · · · · · · · · · · · ·		•	•		•	•	•	•	

	ation rate	0.18	0.16	0.16	0.14		<u> </u>	<u>` </u>	0.40	0.47	0.40		
0.19 Calculate effe					l -	0.14 se	0.14	0.15	0.16	0.17	0.18		
If mechanic		_										0.5	(23
If exhaust air h	eat pump ι	ısing Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)), othe	rwise (23b) = (23a)			0.5	(23
If balanced with	n heat reco	very: effici	iency in %	allowing f	or in-use fa	actor (from	Table 4h) =				75.65	(23
a) If balance	d mecha	anical ve	ntilation	with hea	at recove	ery (MVI	HR) (24a	m = (22)	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(24
b) If balance	d mecha	anical ve	ntilation	without	heat rec	overy (N	/IV) (24b	m = (22)	2b)m + (2	23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)r	ouse ext n < 0.5 ×			•	•				5 × (23b)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)r	ventilation			•	•				0.51			•	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	iter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)				l	
(25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25
3. Heat losse	e and ha	ot loce r	paramoto	or:									
ELEMENT	Gros	•	Openin		Net Ar	ea	U-valı	IE	AXU		k-value	e AX	k
	area		m		A ,n		W/m2		(W/I	<)	kJ/m²·ł		
Windows					12.07	x1,	/[1/(1.4)+	0.04] =	16				(27
Floor					61.98	X	0.13	= [8.0574		75	4648.5	(28
Walls Type1	30.8	7	12.07	7	18.8	X	0.18	= [3.38		60	1128	(29
Walls Type2	27.4	5	0		27.45	x	0.17	_ = [4.61		60	1647	(29
Total area of e	lements,	, m²			120.3								_ (31
Party wall					31.67	Х	0	=	0		45	1425.15	(32
Party ceiling					61.89						30	1856.7	(32
Internal wall **					95.03					Ī	9	855.27	(32
* for windows and ** include the area						ated using	formula 1	/[(1/U-valu	re)+0.04] a	s given in	paragraph	3.2	_
include the after	ss, W/K =	= S (A x	U)	,			(26)(30)	+ (32) =				32.05	(33
		,	,						(00) - (00	0) + (225)	(32e) =	11560.62] (34
Fabric heat los	Cm = S(Axk)						((28)	.(30) + (32)	1) + (32a).	()		╡
Fabric heat los Heat capacity Thermal mass	•	,	P = Cm ÷	- TFA) ir	n kJ/m²K				$\div (4) =$	L) + (32a).	(0_0)	186.52	(35
Fabric heat los Heat capacity Thermal mass For design asses:	paramet	ter (TMF	tails of the	•			ecisely the	= (34)	÷ (4) =			186.52	<u></u> (35
Fabric heat los Heat capacity	parametes when	ter (TMF ere the det tailed calcu	tails of the ulation.	constructi	ion are not	known pr	ecisely the	= (34)	÷ (4) =			9.43](35](36
Fabric heat lost Heat capacity Thermal mass For design assess can be used instead the trings of thermal bridg	paraments who ad of a detection and of a detection and bridging a	ter (TMF ere the det tailed calcu x Y) calc	tails of the ulation. culated u	constructius	ion are not pendix k	known pr	ecisely the	= (34)	÷ (4) =			9.43](36
Fabric heat lost Heat capacity Thermal mass For design assess can be used inste Thermal bridg if details of thermal Total fabric he	parameters when the sad of a determined by the same of a determined by the same of the sam	ter (TMF ere the dec tailed calcu x Y) calcu are not kn	tails of the ulation. culated u	constructiusing Ap	ion are not pendix k	known pr	ecisely the	= (34) e indicative (33) +	$\div (4) =$ • values of $(36) =$	TMP in T	able 1f](36
Fabric heat lost Heat capacity Thermal mass For design assess can be used inste Thermal bridg if details of thermat Total fabric heat Ventilation heat	paramer sments who ad of a det es: S (L al bridging at loss at loss ca	ter (TMF ere the dec ailed calcu x Y) calcu are not known	tails of the ulation. culated u own (36) =	constructions and constructions and constructions are constructed as the construction of the construction	pendix h	known pr		= (34) = indicative (33) + (38)m	$\div (4) =$ • values of $(36) =$ $= 0.33 \times ($	<i>TMP in T</i> 25)m x (5	able 1f	9.43](36
Fabric heat los Heat capacity Thermal mass For design assess can be used inste	parameters when the sad of a determined by the same of a determined by the same of the sam	ter (TMF ere the dec tailed calcu x Y) calcu are not kn	tails of the ulation. culated u	constructiusing Ap	ion are not pendix k	known pr	Aug	= (34) e indicative (33) +	$\div (4) =$ • values of $(36) =$	TMP in T	able 1f	9.43](36](37
Fabric heat lost Heat capacity Thermal mass For design assess can be used instet Thermal bridg if details of thermal Total fabric heat Ventilation heat (38)m= 16.97	paramer sments whe ad of a det es: S (L al bridging a at loss at loss ca Feb	ter (TMF ere the dec tailed calcu x Y) calcu are not know alculated Mar 16.56	tails of the ulation. culated u own (36) = I monthly	constructions are constructed using Ap = 0.05 x (3)	ppendix h	known pr	Aug	= (34) e indicative (33) + (38)m Sep 14.73	\div (4) = \cdot values of (36) = \cdot = 0.33 × (\cdot Oct 15.34	25)m x (5 Nov 15.75	able 1f	9.43	_
Fabric heat lost Heat capacity Thermal mass For design assess can be used instead for thermal bridge if details of thermatic heat Ventilation heat Language	paramer sments whe ad of a det es: S (L al bridging a at loss at loss ca Feb	ter (TMF ere the dec tailed calcu x Y) calcu are not know alculated Mar 16.56	tails of the ulation. culated u own (36) = I monthly	constructions are constructed using Ap = 0.05 x (3)	ppendix h	known pr	Aug	= (34) e indicative (33) + (38)m Sep 14.73	$\div (4) =$ • values of $(36) =$ $= 0.33 \times ($ Oct	25)m x (5 Nov 15.75	able 1f	9.43](36](37

Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.94	0.94	0.94	0.92	0.92	0.9	0.9	0.9	0.91	0.92	0.92	0.93		
	!								Average =	Sum(40) ₁	12 /12=	0.92	(40)
Number of day	<u> </u>	1 ` ` 	· ·										
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(44)
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ting ene	rgy requ	irement:								kWh/ye	ear:	
Assumed occu if TFA > 13. if TFA £ 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13		04		(42)
Annual average Reduce the annual not more that 125	ge hot wa al average	hot water	usage by	5% if the α	lwelling is	designed i	` ,		se target o		2.58		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i								LOOP		1 1101			
(44)m= 90.84	87.53	84.23	80.93	77.62	74.32	74.32	77.62	80.93	84.23	87.53	90.84		
` ,									I Total = Su	ım(44) ₁₁₂ =	-	990.95	(44)
Energy content of	f hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	n x nm x E	OTm / 3600	0 kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 134.71	117.82	121.58	105.99	101.7	87.76	81.32	93.32	94.44	110.06	120.13	130.46		
									Total = Su	ım(45) ₁₁₂ =	=	1299.3	(45)
If instantaneous v	vater heati	ing at point	of use (no	hot water	storage),	enter 0 in	boxes (46	to (61)	1				
(46)m= 20.21	17.67	18.24	15.9	15.26	13.16	12.2	14	14.17	16.51	18.02	19.57		(46)
Water storage Storage volum) includir	na anv sa	alar or M	/\/\HRS	etorana	within es	ama vas	امء		0		(47)
If community h	` '	•				Ū		anio voo	001		0		(47)
Otherwise if no	-			_			, ,	ers) ente	er '0' in ((47)			
Water storage			`					,	·	,			
a) If manufact	turer's d	eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature f	actor fro	m Table	2b								0		(49)
Energy lost fro		•					(48) x (49)) =		1	10		(50)
b) If manufact			-										(54)
Hot water stor If community h	•			ie Z (KVV	n/litre/da	ly)				0.	02		(51)
Volume factor	•		011 4.5							1	03		(52)
Temperature f			2b							-	.6		(53)
Energy lost fro	m watei	r storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter (50) or		_	,							-	03		(55)
Water storage	loss cal	culated	for each	month			((56)m = ((55) × (41)	m		'		
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain												x H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
	<u> </u>	ļ.		<u>l</u>	L		<u> </u>	L		<u> </u>	<u> </u>		(58)
Primary circuit Primary circuit	,	,			59)m – 1	(58) <u>-</u> 36	S5 v (41)	ım			0		(30)
(modified by				,	•	` '	, ,		r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
		<u> </u>	L	L		<u> </u>	<u> </u>	L	<u> </u>	<u> </u>			*

Combi loss calculated for each month $(61)m = (60) \div 365 \times (41)m$												
		``	00) +	0 7 (41) o	0	0	T 0	0	1	(61)	
Total heat required for water									<u> </u>	[50\m + (61\m	(0.)	
(62)m= 189.99 167.74 176			141.20		148.		165.33	173.63	185.74	(39)III + (81)III]	(62)	
Solar DHW input calculated using			ļ]	(02)	
(add additional lines if FGH							ii continbu	lion to wat	er ricating)			
·) (0	0	0	0	0	0	0	1	(63)	
Output from water heater	I				<u> </u>		<u> </u>		<u> </u>	1		
(64)m= 189.99 167.74 176	5.85 159	49 156.98	141.20	3 136.6	148.	6 147.93	165.33	173.63	185.74	1		
						Output from w	<u> </u>	<u> </u>	<u> </u>	1950.14	(64)	
Heat gains from water hea	tina kWI	/month 0.2	25 ′ [0 8	35 × (45)m						1	_	
(65)m= 89.01 79.12 84.	-		71.98		75.2		80.82	82.74	87.6]	(65)	
include (57)m in calculat	ion of (6	!	cylinde	is in the			ater is f	rom com	ımunity k	J neating		
5. Internal gains (see Tab	· ·	· ·	oy iii idoi	10 111 1110	awo	ig or not w	ator io i	10111 00111	irriariity i	louing		
Metabolic gains (Table 5),		οα).										
	lar A	or May	Jun	Jul	Au	g Sep	Oct	Nov	Dec	1		
(66)m= 101.85 101.85 101	_	 	101.8		101.8		101.85	101.85	101.85		(66)	
Lighting gains (calculated i	n Appen	dix L. equa	tion L9	or L9a). a	also se	e Table 5	1	1	<u> </u>	ı		
(67)m= 16.02 14.23 11.	- i -		5.53	5.97	7.77		13.23	15.45	16.47]	(67)	
Appliances gains (calculate	ed in Apr	endix L. ec	uation	 L13 or L1	т (За), а	 Iso see Ta	ble 5		<u> </u>	ı		
(68)m= 177.91 179.76 175			140.9		131.2		145.81	158.31	170.06	1	(68)	
Cooking gains (calculated	in Apper	dix Legua	tion I 1	 5 or I 15a) also	see Table	· 5			J		
(69)m= 33.19 33.19 33.	- i -		33.19		33.1		33.19	33.19	33.19	1	(69)	
Pumps and fans gains (Tal	 ole 5a)	l								J		
· 		0	0	T 0	0	0	0	0	0	1	(70)	
Losses e.g. evaporation (n	egative v	L alues) (Tal	ole 5)	_!	<u> </u>	!			<u> </u>	J		
(71)m= -81.48 -81.48 -81			-81.48	8 -81.48	-81.4	8 -81.48	-81.48	-81.48	-81.48	1	(71)	
Water heating gains (Table			-							J		
(72)m= 119.64 117.73 113		39 104.89	99.97	95.78	101.1	4 103.05	108.62	114.92	117.74	1	(72)	
Total internal gains =	!		ļ			m + (69)m +		<u> </u>	<u> </u>	1		
(73)m= 367.13 365.28 35	54 335	.9 317.69	300	288.41	293.7	·	321.22	342.23	357.82	1	(73)	
6. Solar gains:									l			
Solar gains are calculated using	solar flux	rom Table 6a	and ass	ociated equa	ations to	convert to th	ne applica	ble orienta	tion.			
Orientation: Access Facto		rea		lux		g_		FF		Gains		
Table 6d		n²	Т	able 6a		Table 6b	Т	able 6c		(W)		
Northeast _{0.9x} 0.77	x	12.07	x	11.28] x [0.63	x	0.7	=	41.62	(75)	
Northeast _{0.9x} 0.77	x	12.07	X	22.97	x	0.63	x	0.7	=	84.72	(75)	
Northeast 0.9x 0.77	x	12.07	x	41.38] × [0.63	x [0.7	=	152.64	(75)	
Northeast 0.9x 0.77	x	12.07	х	67.96	Ī×[0.63	x [0.7	=	250.67	(75)	
Northeast 0.9x 0.77	x	12.07	x	91.35	x	0.63	x [0.7	=	336.95	(75)	

Northeast 0.9x	0.77	X	12.	07	x	97.38	x [0.63	X	0.7	=	359.23	(75)
Northeast 0.9x	0.77	x	12.	07	x	91.1	x_[0.63	x	0.7	=	336.05	(75)
Northeast 0.9x	0.77	х	12.	07	x	72.63	x_[0.63	x	0.7	=	267.9	(75)
Northeast 0.9x	0.77	х	12.	07	x	50.42	x_[0.63	x	0.7	=	185.99	(75)
Northeast 0.9x	0.77	Х	12.	07	x	28.07	x		0.63	x	0.7	=	103.53	(75)
Northeast 0.9x	0.77	x	12.	07	x	14.2	×		0.63	_ x	0.7		52.37	(75)
Northeast 0.9x	0.77	х	12.	07	x	9.21	i x		0.63	x	0.7	=	33.99	(75)
							•							
Solar gains ir	n watts, ca	alculated	I for eac	h month			(83)m	ı = Sı	um(74)m .	(82)m				
(83)m= 41.62	84.72	152.64	250.67	336.95	359.2	3 336.05	267	'.9	185.99	103.53	52.37	33.99		(83)
Total gains –	internal a	and solar	(84)m =	= (73)m	+ (83)	m , watts						•	•	
(84)m= 408.75	449.99	506.64	586.58	654.65	659.2	3 624.46	561.	.62	488.92	424.75	394.6	391.81		(84)
7. Mean inte	ernal temp	perature	(heating	season)									
Temperatur	e during h	neating p	eriods ir	the livi	ng are	a from Ta	ble 9,	Th	1 (°C)				21	(85)
Utilisation fa	ctor for g	ains for I	living are	ea, h1,m	(see	Table 9a)								
Jan	Feb	Mar	Apr	May	Jur	n Jul	Αι	ug	Sep	Oct	Nov	Dec		
(86)m= 0.99	0.98	0.96	0.89	0.73	0.53	0.39	0.4	5	0.72	0.93	0.98	0.99		(86)
Mean intern	al temper	ature in	living an	ea T1 (fo	ollow s	tens 3 to	7 in T	able	9c)			•		
(87)m= 19.86	20.01	20.29	20.66	20.9	20.98	_i	20.9		20.93	20.61	20.18	19.84		(87)
					المديدة		مامام ۵		-2 (00)		!	Į.		
Temperature (88)m= 20.13		20.14	20.15	20.15	20.17	<u> </u>	20.1		20.16	20.15	20.15	20.14		(88)
` /		<u>l</u>				!		''	20.10	20.10	20.10	20.14		(00)
Utilisation fa	 				1	`	T			T	1	T	Ī	(00)
(89)m= 0.99	0.98	0.95	0.86	0.68	0.46	0.32	0.3	37	0.65	0.91	0.98	0.99		(89)
Mean intern	al temper	ature in	the rest	of dwell	ing T2	(follow ste	eps 3	to 7	in Tabl	e 9c)		_	•	
(90)m= 18.61	18.83	19.23	19.75	20.05	20.1	20.17	20.1	17	20.1	19.7	19.09	18.59		(90)
									f	fLA = Livir	ng area ÷ (4) =	0.41	(91)
Mean intern	al temper	ature (fo	r the wh	ole dwe	lling) =	= fLA × T1	+ (1 -	– fL	A) x T2					
(92)m= 19.13	19.32	19.67	20.12	20.4	20.49	20.51	20.5	51	20.44	20.07	19.54	19.1		(92)
Apply adjust	tment to t	he mean	interna	temper	ature	from Table	e 4e, v	whe	re appro	opriate			•	
(93)m= 19.13	19.32	19.67	20.12	20.4	20.49	20.51	20.5	51	20.44	20.07	19.54	19.1		(93)
8. Space he	ating requ	uirement												
Set Ti to the					ned at	step 11 of	Table	e 9b	o, so tha	t Ti,m=	(76)m an	id re-cald	culate	
the utilisatio	Feb	Mar		May	Jur	n Jul	Ι	ا ما	Sep	Oct	Nov	Dec		
Utilisation fa			Apr	iviay	Jui	ı Jui	I A	ug	Sep	Oct	INOV	Dec		
(94)m= 0.98	0.97	0.95	0.86	0.69	0.49	0.35	0.4	4	0.68	0.91	0.97	0.99		(94)
Useful gains								!						
(95)m= 402.16		479.15	504.57	454.72	323.1	5 217.17	226.	.61	331.3	385.86	383.5	386.49		(95)
Monthly ave		rnal tem	perature	from T	able 8	!		!				<u>I</u>		
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2		(96)
Heat loss ra	te for me	an intern	al tempe	erature,	Lm , V	V =[(39)m	x [(93	3)m-	- (96)m]				
(97)m= 866.53	839.72	764.37	640.06	494.25	328.9	6 218.04	228.	.34	356.44	538.18	711.9	859.04		(97)
Space heati	ng require	ement fo	r each n	nonth, k	Wh/mo	onth = 0.02	24 x [(97)	m – (95)m] x (4	1)m		•	
(98)m= 345.5	269.72	212.21	97.55	29.41	0	0	0		0	113.33	236.45	351.58		

т	otal per year (kWh	/year) = Sum(98) _{15,912} =	1655.74	(98)
Space heating requirement in kWh/m²/year			26.71	(99)
9b. Energy requirements – Community heating scheme				
This part is used for space heating, space cooling or water heating pr Fraction of space heat from secondary/supplementary heating (Table		mmunity scheme.	0	(301)
Fraction of space heat from community system 1 – (301) =		Ī	1	(302)
The community scheme may obtain heat from several sources. The procedure allows includes boilers, heat pumps, geothermal and waste heat from power stations. See Approximation of heat from Community boilers		four other heat sources; the	e latter	☐(303a)
Fraction of total space heat from Community boilers		(302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for community h	neating system	Ė	1	(305)
Distribution loss factor (Table 12c) for community heating system		Ī	1.05	(306)
Space heating		-	kWh/year	
Annual space heating requirement		L	1655.74	_
Space heat from Community boilers		(305) x (306) =	1738.52	(307a)
Efficiency of secondary/supplementary heating system in % (from Ta	ble 4a or Apper	ndix E)	0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x ²	100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement		Γ	1950.14	7
If DHW from community scheme: Water heat from Community boilers	(64) x (303a) x	(305) x (306) =	2047.64	(310a)
Electricity used for heat distribution 0	0.01 × [(307a)(307	7e) + (310a)(310e)] =	37.86	(313)
Cooling System Energy Efficiency Ratio		Ī	0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314)) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside	de	Г	131.85	(330a)
warm air heating system fans		Ī	0	(330b)
pump for solar water heating		Ī	0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330	0b) + (330g) =	131.85	(331)
Energy for lighting (calculated in Appendix L)		Ī	282.93	(332)
Total delivered energy for all uses (307) + (309) + (310) + (312) + (31	15) + (331) + (33	32)(237b) =	4200.94	(338)
12b. CO2 Emissions – Community heating scheme				
	Energy xWh/year	Emission factor E kg CO2/kWh k	missions g CO2/year	
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP using two for	uels repeat (363) to	(366) for the second fuel	96	(367a)
CO2 associated with heat source 1 [(307b)+(310b)]] x 100 ÷ (367b) x	0.22 =	851.89	(367)
Electrical energy for heat distribution [(313) 2	x	0.52 =	19.65	(372)

Total CO2 associated with community	systems	(363)(366) + (368)(372)		=	871.54	(373)
CO2 associated with space heating (se	econdary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	rsion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	water heating	(373) + (374) + (375) =			871.54	(376)
CO2 associated with electricity for pur	nps and fans within dwe	elling (331)) x	0.52	=	68.43	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	146.84	(379)
Total CO2, kg/year	sum of (376)(382) =				1086.81	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				17.53	(384)
El rating (section 14)					86.39	(385)

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Project Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 69.44m²

Site Reference: Highgate Road - GREEN

Plot Reference: 01 - E

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.69 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 14.29 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)
41.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 33.7 kWh/m²

OK
2 Fabric U-values

Element Average Highest

External wall 0.18 (max. 0.30) 0.18 (max. 0.70) **OK**Party wall 0.00 (max. 0.20) - **OK**

Floor (no floor) Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	8.97m²	
Windows facing: South West	2.92m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m ² K	
Community heating, heat from boilers – mains gas		

		Heart	Details:						
Access an Name	Nail In ab an	USELL		. Nivera	L		CTDO	040042	
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Stroma Softwa					010943 n: 1.0.5.50	
Continui o Italiio:	0.101110 1 07 11 20 12	Property	Address:		OlOII.		7 0 10 10	111 11010100	
Address :									
1. Overall dwelling dime	ensions:								
Ground floor			ea(m²)	(10) v		ight(m)	(2a) =	Volume(m³) (3a)
	a) . (4 b) . (4 a) . (4 d) . (4 a) .			(1a) x	2	65	(2a) =	184.02	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	(1h)	69.44	(4)) (O.) (O.)	I) (O)	(0.)		_
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	184.02	(5)
2. Ventilation rate:	main sec	ondary	other		total			m³ per hou	r
Number of altimospess	heating hea	ating		1			40 =	-	_
Number of chimneys		<u> </u>	0] = [0			0	(6a)
Number of open flues	0 +	0 +	0] = [0		20 =	0	(6b)
Number of intermittent fa				L	0		10 =	0	(7a)
Number of passive vents				L	0	X '	10 =	0	(7b)
Number of flueless gas fi	res				0	X 4	40 =	0	(7c)
							Air ch	anges per ho	ur
Infiltration due to chimne	vs_flues and fans = (6a)+	·(6b)+(7a)+(7b)+	·(7c) =	Г	0		÷ (5) =	0	(8)
•	peen carried out or is intended,			ontinue fr			- (3) =	U	(0)
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber fra resent, use the value correspon			*	uction			0	(11)
deducting areas of openii		iding to the grea	ilei wali area	i (aitei					
If suspended wooden f	floor, enter 0.2 (unsealed	l) or 0.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
ŭ	s and doors draught strip	ped						0	(14)
Window infiltration			0.25 - [0.2	. ,	_	. (45)		0	(15)
Infiltration rate	arron automorphia		(8) + (10) +		, , ,	, ,		0	(16)
If based on air permeabil	q50, expressed in cubic	•	•	•	etre or e	envelope	area	3	(17)
•	es if a pressurisation test has be				is beina u	sed		0.15	(18)
Number of sides sheltere			3	,	J			0	(19)
Shelter factor			(20) = 1 - [0.075 x (1	9)] =			1	(20)
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.15	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ∸ 4								
		0.95 0.95	0.92	1	1.08	1.12	1.18		
· · · — — — — — — — — — — — — — — — — —					L		ı	l	

Adjusted infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.19 Calculate effe	0.19	0.18	0.16	0.16 he appli	0.14 Cable ca	0.14	0.14	0.15	0.16	0.17	0.18		
If mechanica		•	ato for t	пс арри	oabio oa	00					[0.5	(23
If exhaust air h	eat pump (using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	wise (23b) = (23a)		Ì	0.5	(23
If balanced with	heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =			Ì	74.8	(230
a) If balance	d mech	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	m = (22)	2b)m + (23b) × [1 – (23c)	÷ 100]	_
(24a)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(24
b) If balance	d mech	anical ve	ntilation	without	heat red	covery (N	ЛV) (24b)m = (22	2b)m + (2	23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)r		tract ver (23b), t		•					5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)r		on or wh en (24d)							0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	iter (24a) or (24b	o) or (24	c) or (24	d) in box	(25)	-	-			
(25)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(25
3. Heat losse	s and he	eat loss r	paramete	ėr.									
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/l	K)	k-value kJ/m².k		X k
Windows Type		(111-)	11	_	8.97		۷۷/۱۱۱۷ +(1.4)/[]/		11.89		KJ/III-•I	ι NJ/	(27
Windows Type					2.92	_	/[1/(1.4)+	Ļ		=			(27
Walls Type1			44.0	$\overline{}$		=		— ;	3.87	북 ,			
Walls Type1	41.5		11.89		29.62	_	0.18	=	5.33	륵 ¦	60	1777.2	=
Total area of e	16.7		0		16.73	=	0.17	= [2.81		60	1003.8	
Party wall	icilicilis	, 111-			58.24	=							(31)
					40.43	=	0	=	0		45	1819.35	=
Party floor					69.44					Ĺ	40	2777.6	=
Party ceiling					69.44					Ĺ	30	2083.2	=
Internal wall **					136.2			<i>r</i>		. L	9	1225.89	9 (32
* for windows and ** include the area						ated using	i tormula 1.	/[(1/U-valu	ie)+0.04] a	is given in	paragraph	3.2	
Fabric heat los	s, W/K :	= S (A x	U)	,			(26)(30)	+ (32) =				23.9	(33
Heat capacity		•	,					((28)	.(30) + (32	2) + (32a).	(32e) =	10687.04	(34
Thermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			= (34)	÷ (4) =		[153.9	(35
For design assess can be used inste				construct	ion are no	t known pr	ecisely the	indicative	values of	TMP in Ta	able 1f		
Thermal bridge	es : S (L	x Y) cal	culated ı	using Ap	pendix I	<					[6.99	(36
if details of therma		are not kn	own (36) =	= 0.05 x (3	1)				,·		r		_
Total fabric he		-l-: !-:							(36) =	(E)		30.9	(37
Ventilation hea					1	1, .1	Α		= 0.33 × (.			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(38
(38)m= 19.27	19.04	18.81	17.67	17.44	16.3	16.3	16.08	16.76	17.44	17.9	18.35		(30
Heat transfer o	nofficiar	at \///K						(20)m	= (37) + (37)	38/m			
39)m= 50.16	49.93	49.71	48.57	48.34	47.2	47.2	46.97	47.66	48.34	48.79	49.25		

Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.72	0.72	0.72	0.7	0.7	0.68	0.68	0.68	0.69	0.7	0.7	0.71		
		!	<u>. </u>	<u>. </u>		!	!		Average =	Sum(40) ₁	12 /12=	0.7	(40)
Number of da	`	1 `	· ·						l _				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(44)
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ating ene	rgy requi	irement:								kWh/ye	ear:	
Assumed occ if TFA > 13 if TFA £ 13.	.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13.		23		(42)
Annual average Reduce the annual not more that 125	ial average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		.22		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage								1 - 22		1			
(44)m= 95.94	92.45	88.97	85.48	81.99	78.5	78.5	81.99	85.48	88.97	92.45	95.94		
	!	!	<u> </u>	ļ.		<u> </u>	<u> </u>		Total = Su	m(44) ₁₁₂ =	=	1046.65	(44)
Energy content o	f hot water	used - cal	culated m	onthly = 4.	190 x Vd,r	n x nm x C	Tm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 142.28	124.44	128.41	111.95	107.42	92.7	85.9	98.57	99.74	116.24	126.89	137.79		
If instantaneous			-f /		()		havea (40		Total = Su	m(45) ₁₁₂ =	= [1372.32	(45)
If instantaneous		· ·	·	1	,.		, ,	, , , I		1			
(46)m= 21.34 Water storage	18.67	19.26	16.79	16.11	13.9	12.88	14.78	14.96	17.44	19.03	20.67		(46)
Storage volun) includir	ng anv so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community	` '					_							()
Otherwise if n	_			-			, ,	ers) ente	er '0' in ((47)			
Water storage													
a) If manufac	turer's d	eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature	factor fro	m Table	2b								0		(49)
Energy lost fro		•					(48) x (49)) =		1	10		(50)
b) If manufact Hot water stor			-								02		(51)
If community	•			0 2 (1111)	1,11ti 0, de	•97				0.	02		(01)
Volume factor	•									1.	03		(52)
Temperature	factor fro	m Table	2b							0	.6		(53)
Energy lost from	om watei	r storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter (50) or	(54) in (5	55)								1.	03		(55)
Water storage	e loss cal	culated t	for each	month			((56)m = ((55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendi	хН	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circui	t loss (ar	nnual) fro	m Table	3							0		(58)
Primary circui	,	,			59)m = ((58) ÷ 36	65 × (41)	m					
(modified by				,	•	` '	, ,		r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi loss o	ealculated	for each	month ((61)m –	(60) ÷	365 🗸 (41)m							
(61)m= 0	0	0	0	0 1)111 =	00) +	1 0))	0	0	0	0	1	(61)
													J · (59)m + (61)m	(-)
(62)m= 197.5		183.69	165.44	162.7	146.19		153	_	153.24	171.52	180.38	193.07	(39)III + (01)IIII]	(62)
Solar DHW inpu													J	(/
(add addition										i ooninba	iioii to wat	or ricating)		
(63)m= 0	0	0	0	0	0	0	0	_	0	0	0	0	1	(63)
Output from	uwater hea	ter	<u> </u>							l		<u> </u>	J	
(64)m= 197.5		183.69	165.44	162.7	146.19	141.17	153	.84	153.24	171.52	180.38	193.07	1	
		I	<u> </u>	ļ	<u> </u>	1		Outp	out from wa	ater heate	r (annual)₁	12	2023.16	(64)
Heat gains fr	om water	heating.	kWh/m	onth 0.2	5 ′ [0.8	5 × (45)m	ı + (6	(1)m	1] + 0.8 >	د [(46)m	+ (57)m	+ (59)m	 n]	-
(65)m= 91.53		86.92	80.02	79.94	73.62	72.78	76.	_	75.96	82.87	84.98	90.04]	(65)
include (57	7)m in cal	culation of	of (65)m	only if c	vlinder	is in the	dwell	ing	or hot w	ater is f	rom com	munity h	neating	
5. Internal			. ,		•							,	<u> </u>	
Metabolic ga	·													
Jan	T '	Mar	Apr	May	Jun	Jul	А	ug	Sep	Oct	Nov	Dec]	
(66)m= 111.6	2 111.62	111.62	111.62	111.62	111.62	111.62	111	.62	111.62	111.62	111.62	111.62		(66)
Lighting gain	s (calcula	ted in Ap	pendix	L, equat	ion L9	or L9a), a	lso s	ee -	Table 5				-	
(67)m= 18	15.98	13	9.84	7.36	6.21	6.71	8.7	72	11.71	14.87	17.35	18.5]	(67)
Appliances g	ains (calc	ulated ir	Append	dix L, eq	uation	L13 or L1	3a),	also	see Ta	ble 5		-	_	
(68)m= 195.9	9 198.02	192.9	181.98	168.21	155.27	146.62	144	.59	149.71	160.62	174.4	187.34]	(68)
Cooking gair	ns (calcula	ted in A	ppendix	L, equat	ion L1	or L15a), als	o se	e Table	5			-	
(69)m= 34.16	34.16	34.16	34.16	34.16	34.16	34.16	34.	16	34.16	34.16	34.16	34.16]	(69)
Pumps and f	ans gains	(Table	5а)			•							-	
(70)m= 0	0	0	0	0	0	0	0)	0	0	0	0]	(70)
Losses e.g.	evaporatio	n (nega	tive valu	es) (Tab	le 5)	•				•		•	-	
(71)m= -89.3	-89.3	-89.3	-89.3	-89.3	-89.3	-89.3	-89	0.3	-89.3	-89.3	-89.3	-89.3]	(71)
Water heatin	g gains (T	able 5)	-	-	-					-	-	-	_	
(72)m= 123.0	2 121.01	116.83	111.14	107.44	102.24	97.82	103	.49	105.5	111.39	118.03	121.02]	(72)
Total interna	al gains =				(6	6)m + (67)n	า + (68	3)m +	- (69)m + ((70)m + (7	71)m + (72))m	-	
(73)m= 393.4	9 391.5	379.21	359.45	339.5	320.21	307.64	313	.29	323.41	343.36	366.27	383.34]	(73)
6. Solar gai	ns:													
Solar gains are	e calculated	using sola	r flux from	Table 6a	and asso	ciated equa	ations	to co	nvert to th	e applica		tion.		
Orientation:	Access F Table 6d		Area m²			ux able 6a		_	g_ able 6b	т	FF able 6c		Gains	
						able ba	,	_ '	able ob	_ '	able oc		(W)	,
Northeast 0.9x		X	8.9)7	X	11.28	X		0.63	X	0.7	=	30.93	(75)
Northeast 0.9x		X	8.9	7	X	22.97	X		0.63	×	0.7	=	62.96	(75)
Northeast 0.9x	0	X	8.9	97	X	41.38	X	<u> </u>	0.63	×	0.7	=	113.43	(75)
Northeast 0.9x		X	8.9	7	x	67.96	X	<u> </u>	0.63	×	0.7	=	186.29	(75)
Northeast 0.9x	0.77	X	8.9	7	X	91.35	X		0.63	X	0.7	=	250.41	(75)

		_					,		_				_
Northeast _{0.9x}	0.77	×	8.9)7	X !	97.38	X	0.63	×	0.7	=	266.96	(75)
Northeast _{0.9x}	0.77	X	8.9	97	х	91.1	X	0.63	X	0.7	=	249.74	(75)
Northeast _{0.9x}	0.77	X	8.9	97	х	72.63	X	0.63	X	0.7	=	199.1	(75)
Northeast _{0.9x}	0.77	X	8.9	97	х ,	50.42	X	0.63	X	0.7	=	138.22	(75)
Northeast _{0.9x}	0.77	X	8.9	97	X	28.07	X	0.63	X	0.7	=	76.94	(75)
Northeast _{0.9x}	0.77	X	8.9	97	Х	14.2	X	0.63	X	0.7	=	38.92	(75)
Northeast 0.9x	0.77	X	8.9	97	x	9.21	X	0.63	X	0.7	=	25.26	(75)
Southwest _{0.9x}	0.77	x	2.9	92	x :	36.79]	0.63	X	0.7	=	32.83	(79)
Southwest _{0.9x}	0.77	x	2.9	92	X	62.67		0.63	X	0.7	=	55.93	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x	85.75]	0.63	X	0.7	=	76.52	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x 1	06.25		0.63	x	0.7	=	94.82	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x 1	19.01		0.63	x	0.7	=	106.2	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x 1	18.15]	0.63	x	0.7	=	105.44	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x 1	13.91		0.63	x	0.7	=	101.65	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x 1	04.39		0.63	x	0.7	=	93.16	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x .	92.85]	0.63	×	0.7	=	82.86	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x	69.27	Ī	0.63	×	0.7	_ =	61.81	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x	44.07	1	0.63	x	0.7		39.33	(79)
Southwest _{0.9x}	0.77	×	2.9	92	x =	31.49	Ī	0.63	×	0.7	=	28.1	(79)
Solar gains in						1	`	n = Sum(74)m.		1		7	(00)
(83)m= 63.76		89.96	281.11	356.62	372.4	351.39	292	.25 221.08	138.7	6 78.25	53.36]	(83)
Total gains – i $(84)m = 457.26$		50iai 69.17	640.56	696.12	692.61	659.04	605	.54 544.49	482.1	2 444.51	436.7	1	(84)
` '	LL				<u> </u>	039.04	003	.54 544.49	402.17	2 444.51	430.7]	(04)
7. Mean inter	•		`		/								
Temperature	Ū	٠.			Ū		ble 9	, Th1 (°C)				21	(85)
Utilisation fac					` 					1		7	
Jan	 	Mar	Apr	May	Jun	Jul	 	ug Sep	Oct	+	Dec		(00)
(86)m= 0.98	0.96	0.91	8.0	0.62	0.43	0.31	0.3	36 0.59	0.85	0.96	0.98]	(86)
Mean interna	 	T		· `	1	eps 3 to 7	7 in T	able 9c)				7	
(87)m= 20.14	20.31 2	0.56	20.83	20.96	20.99	21	2	1 20.98	20.8	20.44	20.12]	(87)
Temperature	during hea	ting p	eriods ir	rest of	dwelling	g from Ta	able 9	9, Th2 (°C)		_		_	
(88)m= 20.32	20.32 2	0.33	20.34	20.34	20.36	20.36	20.	36 20.35	20.34	20.34	20.33		(88)
Utilisation fac	tor for gain	s for r	est of d	welling,	h2,m (s	ee Table	9a)						
(89)m= 0.97	0.95	0.9	0.77	0.58	0.39	0.27	0.3	31 0.54	0.83	0.95	0.98		(89)
Mean interna	l temperatu	ıre in t	the rest	of dwelli	ina T2 (1	ollow ste	eps 3	to 7 in Tabl	e 9c)	-	•	_	
(90)m= 19.17		9.77	20.14	20.3	20.35	20.36	20.		20.11	19.61	19.15]	(90)
				!	!	!		1	LA = Liv	ving area ÷ (4) =	0.34	(91)
Mean interna	l temperatu	ıro (fo	r tha wh	ماه طسم	lling) – f	: Δ ∪ T 1	 /1	_ fl ∧\ ∨ T≎					
(92)m= 19.51	 	`				1	`	- i 	00.05	. 1 40 0	10.40	1	(02)
	1 19.77 1 7	().()4	20.38	20.53	20.57	20.58	20	58 20.55	20.35	199	19.48		(92)
Apply adjustr		mean	20.38 interna	20.53 temper	20.57 ature fro	20.58 om Table	20. e 4e.		20.35 opriate		19.48]	(92)

(93)m= 19.51	19.72	20.04	20.38	20.53	20.57	20.58	20.58	20.55	20.35	19.9	19.48		(93)
8. Space hea									/				
Set Ti to the i the utilisation			•		ed at st	ep 11 of	Table 9b	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac			<u> </u>	,	ļ.	Į.		•					
(94)m= 0.97	0.94	0.89	0.77	0.59	0.4	0.28	0.32	0.55	0.83	0.94	0.97		(94)
Useful gains,	hmGm	, W = (94	4)m x (84	4)m									
(95)m= 441.94	482.27	508.95	494.78	412.34	280.41	187.58	195.95	300.31	398.27	418.19	424.3		(95)
Monthly avera		1	·		T T	1	1						(22)
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate (97)m= 762.69	740.05	an intern	557.45	426.72	Lm , VV =	=[(39)m 187.77	x [(93)m-	- (96)m 307.58	471.09	624.48	752.71		(97)
(97)m= 762.69 Space heatin			l			l					752.71		(31)
(98)m= 238.64	173.23	122.02	45.12	10.7	0	0.02	0	0	54.18	148.53	244.34		
(11)		<u> </u>	<u> </u>		<u> </u>		Tota	l per year		r) = Sum(9	<u> </u>	1036.76	(98)
Space heatin	a requir	ament in	k\/\/h/m2	!/vear				7 - 7	()	, (-	[(99)
·	•										l	14.93	(99)
9b. Energy red This part is use			The state of the s	Ĭ			ting prov	ided by	a comm	unity sch	nomo		
Fraction of spa										urilly SCI	ieilie.	0	(301)
Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =					[1	(302)
The community so			•	•	•	•	allows for	CHP and i	up to four	other heat	sources; th	he latter	
includes boilers, h	eat pump	s, geotheri	mal and wa	aste heat f					,		,		_
Fraction of hea	at from (Commun	ity boiler	S								1	(303a)
Fraction of total	al space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor for cont	rol and	charging	method	(Table	4c(3)) fo	r comm	unity hea	iting sys	tem			1	(305)
Distribution los	ss factor	(Table 1	12c) for c	commun	ity heati	ng syste	m					1.05	(306)
Space heating	a										L	kWh/yea	' r
Annual space	_	requiren	nent									1036.76	
Space heat fro	m Com	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	<u> </u>	1088.59	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (fro	om Table	4a or A	ppendix	E)		0	(308)
Space heating	require	ment fro	m secon	dary/su	oplemen	tary sys	tem	(98) x (30	01) x 100 ·	÷ (308) =		0	(309)
Water heating											L		
Annual water h		equirem	ent								[2023.16	7
If DHW from c	ommuni	ty schem	ne:								L		
Water heat fro								(64) x (30	03a) x (30	5) x (306) :	=	2124.32	(310a)
Electricity used	d for hea	at distribu	ution				0.01	× [(307a).	(307e) +	· (310a)([310e)] =	32.13	(313)
Cooling System Energy Efficiency Ratio											0	(314)	
Space cooling (if there is a fixed cooling system, if not enter 0) = $(107) \div (314) =$											0	(315)	
Electricity for p	oumps a	nd fans v	within dv	vellina (1	Γable 4f)	:					L		_
mechanical ve							outside					169.72	(330a)
													_

warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	b) + (330g) =		169.72	(331)
Energy for lighting (calculated in Appen	idix L)				317.84	(332)
Total delivered energy for all uses (307) + (309) + (310) + (31	2) + (315) + (331) + (33	32)(237b) =		3700.47	(338)
12b. CO2 Emissions – Community hea	ting scheme					
		Energy kWh/year	Emission fac kg CO2/kWh		missions g CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)	J \	r) ing two fuels repeat (363) to	(366) for the secon	nd fuel	96	(367a)
CO2 associated with heat source 1	[(307b	y)+(310b)] x 100 ÷ (367b) x	0.22	=	722.91	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	16.68	(372)
Total CO2 associated with community s	systems	(363)(366) + (368)(372	2)	=	739.58	(373)
CO2 associated with space heating (se	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =			739.58	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	=	88.09	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	164.96	(379)
Total CO2, kg/year	sum of (376)(382) =				992.62	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				14.29	(384)

El rating (section 14)

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 06 December 2021 at 10:57:44*

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 69.61m²Site Reference:Highgate Road - GREENPlot Reference:01 - F

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.77 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 14.35 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 41.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 34.0 kWh/m²

OK

2 Fabric U-values

 Element
 Average
 Highest

 External wall
 0.18 (max. 0.30)
 0.18 (max. 0.70)
 OK

 Party wall
 0.00 (max. 0.20)
 OK

Floor (no floor) Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	8.97m²	
Windows facing: South West	2.92m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m ² K	
Community heating, heat from boilers – mains gas		

		Heor	Details:						
Access an Name	Nail In ah am	Osei		- M	L		CTDO	040042	
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Stroma Softwa					010943 n: 1.0.5.50	
Contware Hame.	01101110110111 2012	Property	Address:		31011.		7 01010	11. 1.0.0.00	
Address :									
1. Overall dwelling dime	ensions:								
Ground floor		Are	ea(m²)	(10) v		ight(m)	(2a) =	Volume(m³) (3a)
	a) . (4 b) . (4 a) . (4 d) . (4 a) .	(4 m)		(1a) x	2	65	(2a) =	184.47	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	·(1n)	69.61	(4)) (O.) (O.)	I) (O)	(0.)		_
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	184.47	(5)
2. Ventilation rate:	main sec	ondary	other		total			m³ per hou	r
Number of altimospess	heating hea	ating		1			40 =	-	_
Number of chimneys			0] = [0			0	(6a)
Number of open flues	0 +	0 +	0] = [0		20 =	0	(6b)
Number of intermittent fa				L	0		10 =	0	(7a)
Number of passive vents				L	0	X '	10 =	0	(7b)
Number of flueless gas fi	res				0	X 4	40 =	0	(7c)
							Air ch	anges per ho	ur
Infiltration due to chimne	vs_flues and fans = (6a)+	+(6b)+(7a)+(7b)+	-(7c) =	Г	0		÷ (5) =	0	(8)
•	peen carried out or is intended,			ontinue fr			- (3) =	U	(0)
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber fra resent, use the value correspon		'	•	uction			0	(11)
deducting areas of openii		riding to the grea	ater wall area	a (anter					
If suspended wooden f	floor, enter 0.2 (unsealed	d) or 0.1 (sea	led), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
ŭ	s and doors draught strip	pped						0	(14)
Window infiltration			0.25 - [0.2		_	. (45)		0	(15)
Infiltration rate	aro augustanadia auhia		(8) + (10) -	, , ,	, , ,	, ,		0	(16)
If based on air permeabil	q50, expressed in cubic lity value, then $(18) = [(17)]$	•	•	•	etre or e	envelope	area	3	(17)
•	es if a pressurisation test has be				is beina u	sed		0.15	(18)
Number of sides sheltere			, ,	,	J			0	(19)
Shelter factor			(20) = 1 - [0.075 x (1	9)] =			1	(20)
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.15	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ∸ 4								
	´	0.95 0.95	0.92	1	1.08	1.12	1.18		
· · · — — — — — — — — — — — — — — — — —					L		ı	l	

Adjusted infiltra	ation rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effect		_	rate for t	he appli	cable ca	se	-	-	-	-			
If exhaust air he			endix N (2	3h) = (23a	a) × Fmv (e	equation (N	VS)) othe	rwise (23h) = (23a)			0.5	(23)
If balanced with		0 11		, ,	, ,	. ,	,, .	,) = (20 0)			0.5	= (23
a) If balance		•	•	_					2h\m + (23P) ^ [-	1 _ (23c)	74.8	(23
(24a)m = 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3]	(24
b) If balance					<u> </u>	l	l	<u> </u>	l		0.0		`
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24
c) If whole h					ļ	<u> </u>						J	•
if (22b)n				•					5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24
d) If natural	ventilatio	on or wh	ole hous	e positiv	e input	ventilatio	on from I	oft	I.			ı	
if (22b)n	n = 1, the	en (24d)	m = (221)	o)m othe	rwise (2	4d)m =	0.5 + [(2	2b)m² x	0.5]			1	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	iter (24a) or (24b	o) or (24	c) or (24	d) in box	(25)			•	1	
(25)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(25
3. Heat losse	s and he	eat loss p	paramete	er:									
ELEMENT	Gros	SS	Openin	gs	Net Ar	ea	U-val		AXU		k-value		Χk
	area	(m²)	m	l ²	A ,r		W/m2		(W/I	K)	kJ/m²-l	K kJ	/K
Windows Type	1				8.97	х1.	/[1/(1.4)+	0.04] =	11.89				(27
Windows Type	2				2.92	x1.	/[1/(1.4)+	0.04] =	3.87				(27
Walls Type1	41.5	59	11.89	9	29.7	Х	0.18	=	5.35		60	1782	(29
Walls Type2	18.4	1	0		18.41	X	0.17	=	3.09		60	1104.0	6 (29
Total area of e	lements	, m²			60								(31
Party wall					38.68	3 x	0	=	0		45	1740.0	6 (32
Party floor					69.61						40	2784.4	4 (32
Party ceiling					69.61						30	2088.3	3 (32
Internal wall **					136.2	1				Ī	9	1225.8	9 (32
* for windows and	roof wind	ows, use e	ffective wi	ndow U-va	alue calcul	ated using	formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	1 3.2	
** include the area				ls and part	titions		(00) (00)	(00)					_
Fabric heat los		•	U)				(26)(30)		(22)	-) (0.5.)	(22.)	24.2	(33
Heat capacity	^	,						(()	(30) + (32	2) + (32a).	(32e) =	10725.79	(34
Thermal mass	•	•		•				` '	÷ (4) =	TAID to T		154.08	(35
For design assess can be used inste				constructi	ion are noi	t known pr	ecisely the	e inaicative	values of	TIMP IN T	able 11		
Thermal bridge	es : S (L	x Y) cal	culated i	using Ap	pendix I	<						6.99	(36
if details of therma													 `
Total fabric he	at loss							(33) +	(36) =			31.19	(37
Ventilation hea	at loss ca	alculated	monthly	/	•	•		(38)m	= 0.33 × (25)m x (5)	1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 19.31	19.08	18.86	17.71	17.49	16.34	16.34	16.12	16.8	17.49	17.94	18.4		(38
Heat transfer o	coefficier	nt, W/K						(39)m	= (37) + (3	38)m		_	
(39)m= 50.5	50.28	50.05	48.91	48.68	47.54	47.54	47.31	47.99	48.68	49.13	49.59		
			0.4.0.00	I. 11 11	ww.stroma				Average =	Sum(39)	12 /12=	48.8 5 age	130

Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	· (4)			
(40)m= 0.73	0.72	0.72	0.7	0.7	0.68	0.68	0.68	0.69	0.7	0.71	0.71		
	1			ı		ı	ı		Average =	Sum(40) ₁ .	12 /12=	0.7	(40)
Number of da	ys in mo	nth (Tab	le 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 hea	ating ene	rgy requi	rement:								kWh/ye	ear:	
Assumed occ if TFA > 13. if TFA £ 13.	.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13		24		(42)
Annual average Reduce the annual not more that 125	ial average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		.32		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage								- 1					
(44)m= 96.05	92.56	89.07	85.57	82.08	78.59	78.59	82.08	85.57	89.07	92.56	96.05		
									Total = Su	m(44) ₁₁₂ =		1047.84	(44)
Energy content o	f hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x C	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 142.44	124.58	128.56	112.08	107.54	92.8	85.99	98.68	99.86	116.37	127.03	137.95		
If instantaneous	water beeti	ing at naint	of upo (no	hot woto	· otorogol	ontor O in	havas (16		Total = Su	m(45) ₁₁₂ =	• [1373.88	(45)
If instantaneous		· ·	,	ı	, , , , , , , , , , , , , , , , , , ,		, ,	, , , I	1	1			(40)
(46)m= 21.37 Water storage	18.69	19.28	16.81	16.13	13.92	12.9	14.8	14.98	17.46	19.05	20.69		(46)
Storage volun) includir	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community	` '					_							` '
Otherwise if n	_			_			, ,	ers) ente	er '0' in (47)			
Water storage													
a) If manufac				or is kno	wn (kWł	n/day):					0		(48)
Temperature											0		(49)
Energy lost from		•			!4		(48) x (49)) =		1	10		(50)
b) If manufact Hot water stor			-								02		(51)
If community	•			_ (., 0, 0.0	-97				0.	02		(0.)
Volume factor	r from Ta	ble 2a								1.	03		(52)
Temperature	factor fro	m Table	2b							0	.6		(53)
Energy lost from	om watei	r storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter (50) or	(54) in (55)								1.	03		(55)
Water storage	e loss cal	culated f	or each	month			((56)m = ((55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendi	хН	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circui	t loss (ar	nnual) fro	m Table	- 							0		(58)
Primary circui	,	,			59)m = ((58) ÷ 36	65 × (41)	m					
(modified by	y factor f	rom Tab	le H5 if t	here is s	olar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi loss o	ealculated	for each	month ((61)m –	(60) ± 3	65 v (41	۱m							
(61)m= 0	0	0	0	0	00) - 0	00 x (+1)) 0		0	0	0	0	1	(61)
		<u> </u>		alculated	for eac	h month							J · (59)m + (61)m	` ,
(62)m= 197.7		183.83	165.57	162.82	146.29	141.27	153.	_	153.35	171.65	180.52	193.22]	(62)
Solar DHW inpu		using App	<u> </u>	Appendix	H (negat	ive quantity	/) (ent	er '0'	if no sola	r contribu	tion to wate	r heating)	1	
(add addition												0,		
(63)m= 0	0	0	0	0	0	0	0		0	0	0	0]	(63)
Output from	water hea	ter					•					•	•	
(64)m= 197.7	2 174.51	183.83	165.57	162.82	146.29	141.27	153.	96	153.35	171.65	180.52	193.22]	
	•							Outp	ut from wa	ater heate	er (annual) ₁	12	2024.72	(64)
Heat gains fi	om water	heating,	kWh/m	onth 0.2	5 ´ [0.85	5 × (45)m	+ (6	1)m	1] + 0.8 x	([(46)m	+ (57)m	+ (59)m	n]	
(65)m= 91.58	81.36	86.97	80.06	79.98	73.65	72.81	77.0)3	76	82.92	85.03	90.09]	(65)
include (5	7)m in cald	culation	of (65)m	only if c	ylinder	is in the	dwelli	ing	or hot w	ater is f	rom com	munity h	neating	
5. Internal	gains (see	Table 5	and 5a):										
Metabolic ga	ins (Table	e 5), Wat	ts											
Jan	Feb	Mar	Apr	May	Jun	Jul	Αι	лg	Sep	Oct	Nov	Dec]	
(66)m= 111.8	3 111.83	111.83	111.83	111.83	111.83	111.83	111.	83	111.83	111.83	111.83	111.83		(66)
Lighting gain	s (calcula	ted in Ap	pendix	L, equat	ion L9 c	r L9a), a	lso s	ee T	Table 5				_	
(67)m= 18.0 ²	16.02	13.03	9.87	7.37	6.23	6.73	8.7	4	11.74	14.9	17.39	18.54]	(67)
Appliances of	ains (calc	ulated ir	Append	dix L, eq	uation L	.13 or L1	3a), a	also	see Ta	ble 5		_	-	
(68)m= 196.3	9 198.42	193.29	182.36	168.55	155.58	146.92	144.	88	150.02	160.95	174.75	187.72]	(68)
Cooking gair	ns (calcula	ited in A	ppendix	L, equat	ion L15	or L15a), also	o se	e Table	5	-	-		
(69)m= 34.18	34.18	34.18	34.18	34.18	34.18	34.18	34.′	18	34.18	34.18	34.18	34.18]	(69)
Pumps and f	ans gains	(Table 5	5a)											
(70)m= 0	0	0	0	0	0	0	0		0	0	0	0]	(70)
Losses e.g.	evaporatio	n (nega	tive valu	es) (Tab	le 5)									
(71)m= -89.4	6 -89.46	-89.46	-89.46	-89.46	-89.46	-89.46	-89.	46	-89.46	-89.46	-89.46	-89.46]	(71)
Water heatin	g gains (T	able 5)											_	
(72)m= 123.1	121.08	116.89	111.2	107.5	102.29	97.87	103.	54	105.55	111.45	118.1	121.09]	(72)
Total intern	al gains =				(66	s)m + (67)m	ı + (68)m +	- (69)m +	(70)m + (7	71)m + (72))m	_	
(73)m= 394.0	7 392.08	379.76	359.97	339.98	320.65	308.06	313.	71	323.86	343.85	366.79	383.9		(73)
6. Solar gai	ns:													
Solar gains are		•				·	itions t	0 CO		e applica		tion.		
Orientation:	Access F Table 6d		Area m²		Flu Ta	ıx ıble 6a		Т	g_ able 6b	т	FF able 6c		Gains (W)	
North coat a c				1			1 1						. ,	1,
Northeast 0.9		X	8.9		_	11.28	X [0.63	_ ×	0.7	=	30.93	(75)
Northeast 0.9		X	8.9			22.97	X		0.63	×	0.7	=	62.96	(75)
Northeast 0.9		X	8.9			41.38	X		0.63	×	0.7	=	113.43	[(75)
Northeast 0.9		X	8.9		-	67.96	X		0.63	_ ×	0.7	=	186.29	(75)
Northeast 0.9	0.77	X	8.9	7	X	91.35	X		0.63	X	0.7	=	250.41	(75)

		_			_		,		_				_
Northeast _{0.9x}	0.77	X	8.9	7	X	97.38	X	0.63	X	0.7	=	266.96	(75)
Northeast _{0.9x}	0.77	X	8.9)7	X	91.1	X	0.63	X	0.7	=	249.74	(75)
Northeast _{0.9x}	0.77	X	8.9)7	X	72.63	X	0.63	X	0.7	=	199.1	(75)
Northeast _{0.9x}	0.77	X	8.9)7	x	50.42	X	0.63	X	0.7	=	138.22	(75)
Northeast _{0.9x}	0.77	X	8.9)7	X	28.07	X	0.63	X	0.7	=	76.94	(75)
Northeast _{0.9x}	0.77	X	8.9)7	x	14.2	X	0.63	X	0.7	=	38.92	(75)
Northeast _{0.9x}	0.77	X	8.9)7	x	9.21	X	0.63	X	0.7	=	25.26	(75)
Southwest _{0.9x}	0.77	X	2.9)2	x	36.79		0.63	X	0.7	=	32.83	(79)
Southwest _{0.9x}	0.77	X	2.9)2	x	62.67		0.63	X	0.7	=	55.93	(79)
Southwest _{0.9x}	0.77	X	2.9)2	x	85.75		0.63	X	0.7	=	76.52	(79)
Southwest _{0.9x}	0.77	x	2.9)2	X	106.25	1	0.63	x	0.7		94.82	(79)
Southwest _{0.9x}	0.77	x	2.9)2	X	119.01	1	0.63	x	0.7		106.2	(79)
Southwest _{0.9x}	0.77	x	2.9)2	X	118.15	Ī	0.63	x	0.7	<u> </u>	105.44	(79)
Southwest _{0.9x}	0.77	x	2.9)2	X	113.91	Ī	0.63	x	0.7		101.65	(79)
Southwest _{0.9x}	0.77	x	2.9)2	X	104.39	Ī	0.63	x	0.7	=	93.16	(79)
Southwest _{0.9x}	0.77	x	2.9)2	x	92.85	Ī	0.63	x	0.7	=	82.86	(79)
Southwest _{0.9x}	0.77	x	2.9)2	x	69.27	Ī	0.63	x	0.7	=	61.81	(79)
Southwest _{0.9x}	0.77	x	2.9)2	x	44.07	j	0.63	x	0.7	=	39.33	(79)
Southwest _{0.9x}	0.77	x	2.9)2	x	31.49	j	0.63	×	0.7		28.1	(79)
•							-						
Solar gains in	watts, calc	culated	for eacl	h month			(83)m	n = Sum(74)m .	(82)m				
(83)m= 63.76	118.89 1	189.96	281.11	356.62	372.4	351.39	292	.25 221.08	138.70	6 78.25	53.36		(83)
Total gains – i	nternal and	d solar	(84)m =	= (73)m ·	+ (83)m	, watts		-			-	-	
(84)m= 457.84	540.00											_	
(84)m= 457.84 510.96 569.72 641.07 696.59 693.05 659.46 605.97 544.94 482.6 445.04 437.26 7. Mean internal temperature (heating season)]	(84)
` '		569.72 rature (641.07 (heating	696.59 season	693.05	659.46	605	.97 544.94	482.6	445.04	437.26		(84)
` '	nal tempe	rature	(heating	season)				482.6	445.04	437.26	21	(84)
7. Mean inter	nal temper during hea	rature (ating p	(heating eriods ir	season the livi) ng area	from Tal			482.6	445.04	437.26	21	_
7. Mean inter	nal temper during hea	rature (ating p	(heating eriods ir	season the livi) ng area	from Tal	ble 9		482.6 Oct		437.26 Dec	21	_
7. Mean inter Temperature Utilisation fac	nal tempe during hea ctor for gain	rature (ating p	(heating eriods ir iving are	season the livil ea, h1,m) ng area (see T	from Tal	ble 9	, Th1 (°C)				21	_
7. Mean inter Temperature Utilisation fac Jan (86)m= 0.98	nal tempel during hea ctor for gain Feb	rature (ating points for li Mar 0.92	(heating eriods ir iving are Apr 0.8	season the living ea, h1,m May) ng area (see T Jun 0.44	from Tal able 9a) Jul 0.32	ble 9	, Th1 (°C) ug Sep 6 0.59	Oct	Nov	Dec	21	(85)
7. Mean inter Temperature Utilisation fac	nal tempe during hea etor for gain Feb 0.96	rature (ating points for li Mar 0.92	(heating eriods ir iving are Apr 0.8	season the living ea, h1,m May) ng area (see T Jun 0.44	from Tal able 9a) Jul 0.32	ble 9	Th1 (°C) Sep 0.59 Table 9c)	Oct	Nov 0.96	Dec	21	(85)
7. Mean intercontrol Temperature Utilisation factor Jan (86)m= 0.98 Mean internation (87)m= 20.14	rnal temper during heater for gain Feb 0.96 ltemperat 20.3	rature of ating points for line of the control of t	(heating eriods ir iving are 0.8 iving are 20.83	season the livings, h1,m May 0.62 ea T1 (for 20.96	ng area (see T Jun 0.44 ollow ste 20.99	from Tal able 9a) Jul 0.32 eps 3 to 7	ble 9 A 0.3 7 in T	Th1 (°C) Sep 0.59 Table 9c) 1 20.98	Oct 0.85	Nov 0.96	Dec 0.98	21	(85)
7. Mean inter Temperature Utilisation fac Jan (86)m= 0.98 Mean interna (87)m= 20.14 Temperature	nal temper during heater for gain Feb 0.96 lt temperat 20.3 during heater	rature (ating points for li Mar 0.92 ure in l 20.55 ating points	(heating eriods ir iving are 0.8 iving are 20.83 eriods ir	season the livin ea, h1,m May 0.62 ea T1 (for 20.96	ng area (see T Jun 0.44 bllow ste 20.99 dwellin	from Tal able 9a) Jul 0.32 eps 3 to 7 21 g from Ta	ble 9 A 0.3 7 in T	Th1 (°C) ug Sep 66 0.59 Table 9c) 1 20.98 9, Th2 (°C)	Oct 0.85	Nov 0.96	Dec 0.98	21	(85)
7. Mean inter Temperature Utilisation fac Jan (86)m= 0.98 Mean interna (87)m= 20.14 Temperature (88)m= 20.32	rnal temper during hea etor for gain Feb 0.96 Il temperat 20.3 during hea 20.32	rature (ating points for li Mar 0.92 ure in li 20.55 ating points ating points ating points at li 20.32	(heating eriods ir iving are 20.83) eriods ir 20.34	season the living the) ng area (see T Jun 0.44 ollow sto 20.99 dwellin 20.36	from Tal able 9a) Jul 0.32 eps 3 to 7 21 g from Ta 20.36	ble 9 A 0.3 7 in T 2 able 9	Sep 36 0.59 Table 9c) 1 20.98 9, Th2 (°C)	Oct 0.85	Nov 0.96	Dec 0.98	21	(85) (86) (87)
7. Mean intercent Temperature Utilisation factors Jan (86)m= 0.98 Mean internations (87)m= 20.14 Temperature (88)m= 20.32 Utilisation factors	rnal temper during heater for gain Feb 0.96 ltemperat 20.3 during heater for gain extern for gain	rature of ating points for line of the control of t	(heating eriods ir iving are 0.8 iving are 20.83 eriods ir 20.34 est of decided and the control of the control	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34 welling,	ng area (see T Jun 0.44 ollow ste 20.99 dwellin 20.36 h2,m (s	from Tal able 9a) Jul 0.32 eps 3 to 7 21 g from Ta 20.36	ble 9 A 0.3 7 in T 2 able 9 20.	Th1 (°C) Sep 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35	Oct 0.85 20.79 20.34	Nov 0.96 20.44	Dec 0.98 20.12 20.33	21	(85) (86) (87) (88)
7. Mean intercent Temperature Utilisation factors Jan (86)m= 0.98 Mean internations (87)m= 20.14 Temperature (88)m= 20.32 Utilisation factors (89)m= 0.97	rnal temper during heater for gain Feb 0.96 lt temperat 20.3 during heater for gain 0.95	rature of ating points for line of the control of t	(heating eriods ir iving are 0.8 iving are 20.83 eriods ir 20.34 est of do 0.77	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34 welling, 0.58) ng area (see T	from Tal able 9a) Jul 0.32 eps 3 to 7 21 g from Tal 20.36 eee Table 0.27	ble 9 A 0.3 7 in T 2 able 9 20. 9a) 0.3	Sep 36 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35	Oct 0.85 20.79 20.34 0.83	Nov 0.96	Dec 0.98	21	(85) (86) (87)
7. Mean intercent Temperature Utilisation fact [86]m= 0.98 Mean internation (87)m= 20.14 Temperature (88)m= 20.32 Utilisation fact (89)m= 0.97 Mean internation fact (89)m= 0.97	rnal temper during heat temperat 20.3 during heat 20.32 etor for gail 0.95	rature of ating points for in 1 20.55 ating points for rough on 1 20.9 at the second of the second o	criods ir Apr 0.8 iving are 20.83 eriods ir 20.34 est of do 0.77 the rest	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 rest of 20.34 welling, 0.58 of dwelling) ng area (see T	from Tal able 9a) Jul 0.32 eps 3 to 7 21 g from Ta 20.36 eee Table 0.27 follow ste	ble 9 A 0.3 7 in T 2 able 9 20. 99a) 0.3	Sep 66 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35 1 0.54 to 7 in Table	Oct 0.85 20.79 20.34 0.83 e 9c)	Nov 0.96 20.44 20.34	Dec 0.98 20.12 20.33	21	(85) (86) (87) (88) (89)
7. Mean intercontrol of the control	rnal temper during heat temperat 20.3 during heat 20.32 etor for gail 0.95	rature of ating points for line of the control of t	(heating eriods ir iving are 0.8 iving are 20.83 eriods ir 20.34 est of do 0.77	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34 welling, 0.58) ng area (see T	from Tal able 9a) Jul 0.32 eps 3 to 7 21 g from Tal 20.36 eee Table 0.27	ble 9 A 0.3 7 in T 2 able 9 20. 9a) 0.3	Th1 (°C) ug Sep 66 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35 to 7 in Tabl 36 20.33	Oct 0.85 20.79 20.34 0.83 e 9c) 20.1	Nov 0.96 20.44 20.34 0.95	Dec 0.98 20.12 20.33 0.98		(85) (86) (87) (88) (89)
7. Mean intercent Temperature Utilisation fact [86]m= 0.98 Mean internation (87)m= 20.14 Temperature (88)m= 20.32 Utilisation fact (89)m= 0.97 Mean internation fact (89)m= 0.97	rnal temper during heat temperat 20.3 during heat 20.32 etor for gail 0.95	rature of ating points for in 1 20.55 ating points for rough on 1 20.9 at the second of the second o	criods ir Apr 0.8 iving are 20.83 eriods ir 20.34 est of do 0.77 the rest	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 rest of 20.34 welling, 0.58 of dwelling) ng area (see T	from Tal able 9a) Jul 0.32 eps 3 to 7 21 g from Ta 20.36 eee Table 0.27 follow ste	ble 9 A 0.3 7 in T 2 able 9 20. 99a) 0.3	Th1 (°C) ug Sep 66 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35 to 7 in Tabl 36 20.33	Oct 0.85 20.79 20.34 0.83 e 9c) 20.1	Nov 0.96 20.44 20.34	Dec 0.98 20.12 20.33 0.98	0.38	(85) (86) (87) (88) (89)
7. Mean intercent Temperature Utilisation fact Jan (86)m= 0.98 Mean internation (87)m= 20.14 Temperature (88)m= 20.32 Utilisation fact (89)m= 0.97 Mean internation (90)m= 19.16 Mean internation (90)m= 19.16	during heat temperat 20.3 during heat 20.32 ctor for gain 0.95 ltemperat 19.4 dtemperat 19.4	rature of ating points for in the second sec	criving are 20.83 eriods in 20.34 est of do 0.77 che rest 20.13	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34 welling, 0.58 of dwelling 20.3	mg area (see T Jun 0.44 bllow str 20.99 dwellin 20.36 h2,m (s 0.39 mg T2 (20.35	from Tal able 9a) Jul 0.32 eps 3 to 7 21 g from Ta 20.36 eee Table 0.27 follow ste 20.36	ble 9 A 0.3 7 in T 2 able 9 20. 9a) 0.3 eps 3 20.	Th1 (°C) ug Sep 66 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35 4 to 7 in Table 36 20.33 f fLA) x T2	Oct 0.85 20.79 20.34 0.83 e 9c) 20.1 LA = Liv	Nov 0.96 20.44 20.34 0.95	Dec 0.98 20.12 20.33 0.98 19.14 4) =		(85) (86) (87) (88) (89) (90) (91)
7. Mean intercent Temperature Utilisation factors Jan (86)m= 0.98 Mean internations (87)m= 20.14 Temperature (88)m= 20.32 Utilisation factors (89)m= 0.97 Mean internations (90)m= 19.16	rnal temper during heater for gain sector for	rature ating points for line at the control of the	cheating eriods ir iving are 20.83 eriods ir 20.34 est of do 0.77 the rest 20.13 er the who 20.4	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 to rest of 20.34 welling, 0.58 of dwelling 20.3) ng area (see T	from Tal able 9a) Jul 0.32 eps 3 to 7 21 g from Tal 20.36 eee Table 0.27 follow ste 20.36 fLA × T1 20.6	ble 9 A 0.3 7 in T 2 able 9 20. 9a) 0.3 2pps 3 20. + (1 20	Th1 (°C) Sep 66 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35 10.54 10.54 10.54 10.54 10.54 10.54 10.54 10.54 10.54 10.54 10.54 10.54	Oct 0.85 20.79 20.34 0.83 e 9c) 20.1 LA = Liv	Nov 0.96 20.44 20.34 0.95 19.6 ving area ÷ (-	Dec 0.98 20.12 20.33 0.98		(85) (86) (87) (88) (89)

	•									•	•		
(93)m= 19.53	19.74	20.06	20.4	20.55	20.6	20.6	20.6	20.58	20.37	19.92	19.51		(93)
8. Space hea													
Set Ti to the i the utilisation			•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	l						5						
(94)m= 0.97	0.95	0.9	0.78	0.6	0.41	0.29	0.33	0.56	0.83	0.94	0.97		(94)
Useful gains,	hmGm	, W = (94	4)m x (8	4)m	•								
(95)m= 442.81	483.37	510.56	497.42	415.67	283.37	189.97	198.39	303.11	400.16	419.22	425.1		(95)
	Monthly average external temperature from Table 8												
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2												(96)	
Heat loss rate	·	i			i	- ,	· · ·	<u> </u>				ı	(0-)
(97)m= 769.26	746.33	678.64	562.34	430.79	285.07	190.19	198.8	310.81	475.38	629.94	759.24		(97)
Space heatin (98)m= 242.87	g require 176.71	125.05	r each n	11.25	I		24 x [(97])m – (95 0)m] x (4 55.96	1)m 151.71	040.6		
(98)m= 242.87	176.71	125.05	46.74	11.25	0	0				<u> </u>	248.6	4050.0	7(00)
							rota	l per year	(kvvn/year) = Sum(9	8)15,912 =	1058.9	(98)
Space heatin	g requir	ement in	kWh/m²	/year								15.21	(99)
9b. Energy red	quiremer	nts – Cor	nmunity	heating	scheme								
This part is use										unity sch	neme.		7(201)
Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none									0	(301)			
Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The community so									up to four	other heat	sources; t	he latter	
includes boilers, he Fraction of hea		-			rom powei	stations.	See Appei	naix C.				1	(303a)
Fraction of total			•		oilers				(3	02) x (303	a) =	1	(304a)
Factor for cont	•			•		r commı	unity hea	iting sys		, ,	,	1	(305)
Distribution los				,	` ''		•	3 - 7 -				1.05	(306)
Space heating		(,		,	3 - 7						kWh/yea	
Annual space	_	requiren	nent									1058.9	<u>'</u>
Space heat fro	m Com	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	=	1111.84	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308
Space heating	require	ment fro	m secon	dary/su _l	oplemen	tary syst	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water heating	•										•		
Annual water h		equirem	ent									2024.72	7
If DHW from c	ommuni	ty schem	ne:										_
Water heat fro	m Comr	nunity bo	oilers					(64) x (30	03a) x (30	5) x (306) :	=	2125.95	(310a)
Electricity used	d for hea	at distribu	ution				0.01	× [(307a).	(307e) +	32.38	(313)		
Cooling Syster	m Energ	y Efficie	ncy Rati	0								0	(314)
Space cooling	(if there	is a fixe	d coolin	g systen	n, if not e	enter 0)		= (107) ÷	(314) =			0	(315)
Electricity for p											İ		7,,,,,
mechanical ve	ntılation	- balanc	ed, extra	act or po	sitive in	out from	outside					170.14	(330a)

warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	b) + (330g) =		170.14	(331)
Energy for lighting (calculated in Apper		318.62	(332)			
Total delivered energy for all uses (307	Ī	3726.56	(338)			
12b. CO2 Emissions – Community hea	ting scheme					
		Energy kWh/year	Emission factor kg CO2/kWh	_	missions g CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)		e) oing two fuels repeat (363) to	(366) for the second f	uel	96	(367a)
CO2 associated with heat source 1	[(307b	y)+(310b)] x 100 ÷ (367b) x	0.22	=	728.5	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	16.8	(372)
Total CO2 associated with community :	systems	(363)(366) + (368)(372	2)	=	745.31	(373)
CO2 associated with space heating (se	econdary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =			745.31	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	=	88.3	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	165.36	(379)
Total CO2, kg/year	sum of (376)(382) =				998.97	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =			Ī	14.35	(384)

El rating (section 14)

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:57:25

Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 50.62m2 Plot Reference: 01 - G Site Reference : Highgate Road - GREEN

Address:

Client Details:

Name: Address:

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

19.64 kg/m² Target Carbon Dioxide Emission Rate (TER)

Dwelling Carbon Dioxide Emission Rate (DER) 16.45 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 48.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 38.7 kWh/m²

OK 2 Fabric U-values

Element Average

Highest 0.18 (max. 0.70) External wall 0.17 (max. 0.30) OK Party wall 0.00 (max. 0.20) **OK**

Floor (no floor) Roof (no roof)

Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	8.97m²	
Ventilation rate:	4.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

Sasessor Name: Neil Ingham Stroma Number: Stroma Number: Stroma FSAP 2012 Software Version: Version: 1.0.5.50			User_[Details:						
Academis Control Con		•								
Area(m²)			Property	Address	: 01 - G					
A		oncione:								
Common C	1. Overall dwelling dime	ensions.	Δre	a(m²)		Δν Ηρ	iaht(m)		Volume/m ³	3)
Dwelling volume	Ground floor				(1a) x			_	·	<u>^</u>
Dwelling volume	Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	50.62	l [(4)			_		
2. Ventilation rate: main heating heati			.,		J)+(3c)+(3c	d)+(3e)+	(3n) =	10444	7(5)
Number of chimneys					(00)1(00	71(00)1(00	a)	(011) =	134.14	(5)
Number of chimneys	2. Ventilation rate:	main seconda	ıry	other		total			m³ per hou	ır
Number of open flues	Number of chimneys	heating heating			л <u>-</u> г		x	40 =	-	_
Number of intermittent fans 0	•		ᆜ =		╛╘					╡``
Number of passive vents	·			0	」	0			0	╡``
Number of flueless gas fires	Number of intermittent fa	ins				0	x	10 =	0	(7a)
Air changes per hour	Number of passive vents	3				0	Х	10 =	0	(7b)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	Number of flueless gas f	ires				0	X	40 =	0	(7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =								Air ch	anges per he	SUP.
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)	Indituation due to alcient	fl and fame (Co) (Ch)	(7a) . (7b) .	(70)	_					_
Number of storeys in the dwelling (ns) Additional infiltration (g)-1)x0.1 = 0 (10) (10)		•			continue fi	-		÷ (5) =	0	(8)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 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			ou to (),	ou.o.moo		0 (0) 10 ((1.5)		0	(9)
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 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - [0.2 × (14) ÷ 100] = 0 Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 × (19)] = 0 (19) 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= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4	Additional infiltration						[(9))-1]x0.1 =	0	(10)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 0 (12)					•	ruction			0	(11)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped 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 If based on air permeability value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 x (19)] = 0 (19) Infiltration rate incorporating shelter factor (21) = (18) x (20) = 0.15 Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4			to the grea	iter wall are	ea (after					
Percentage of windows and doors draught stripped Window infiltration $0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times$	=).1 (seal	ed), else	enter 0				0	(12)
Window infiltration $0.25 - [0.2 \times (14) + 100] = 0.015$ Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) = 0.016$ Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 3.017 If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ 0.15	If no draught lobby, en	ter 0.05, else enter 0							0	(13)
Infiltration rate Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] = $ $(20) = 1 - [0.075 \times (19)] = $ $(21) = (18) \times (20) = $ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = $ Monthly average wind speed from Table 7 $(22) m = 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7$ Wind Factor $(22a)m = (22)m \div 4$	•	s and doors draught stripped							0	(14)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 × (19)] = 1 (20) Infiltration rate incorporating shelter factor (21) = (18) × (20) = 0.15 (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= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4							>		0	≓ ` `
If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] =$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ 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 $(22)m = 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7$ Wind Factor $(22a)m = (22)m \div 4$, , , ,	, , , ,	, , ,				= ' '
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] = 1 (20)$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = 1 \cdot (20) = 1 \cdot (20)$ 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 $(22)m = 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7$ Wind Factor $(22a)m = (22)m \div 4$	•	• • •	•	•	•	etre of e	envelope	e area		=
Number of sides sheltered $ (20) = 1 - [0.075 \times (19)] = $ $ (20) = 1 - [0.075 \times (19)] = $ $ (20) = 1 - [0.075 \times (19)] = $ $ (21) = (18) \times (20) = $ $ (22) = (18) \times (20) = $ $ (22) = (18) \times (20) = $ $ (22) = (18) \times (20) = $ $ (22) = (18) \times (20) = $ $ (22) = (18) \times (20) = $ $ (23) = (18) \times (20) = $ $ (24) = (18) \times (20) = $ $ (25) = (20) \times (20) = $ $ (25) = (20) \times (20) = $ $ (25) = (20) \times (20) = $ $ (25) = (20) \times (20) = $ $ (25) = (20) \times (20) = $ $ (25) = (20) \times (20) = $ $ (25) = (20) \times (20) = $ $ (25) = (20) \times (20) = $	•	•				is being u	sed		0.15	(10)
Infiltration rate incorporating shelter factor									0	(19)
Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Shelter factor			(20) = 1 -	[0.075 x (19)] =			1	(20)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4	·	•		(21) = (18	s) x (20) =				0.15	(21)
Monthly average wind speed from Table 7 (22)m= $\begin{bmatrix} 5.1 & 5 & 4.9 & 4.4 & 4.3 & 3.8 & 3.8 & 3.7 & 4 & 4.3 & 4.5 & 4.7 \end{bmatrix}$ Wind Factor (22a)m = (22)m \div 4			1	1 .	T _	T _	1	Ι_	1	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			Jul	Aug	Sep	Oct	Nov	Dec		
Wind Factor (22a)m = (22)m ÷ 4	 	 	1	T	1 .	1	1	T	1	
	(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	<u> </u>	4.3	4.5	4.7		
(22a)m= 1.27 1.25 1.23 1.1 1.08 0.95 0.95 0.92 1 1.08 1.12 1.18	Wind Factor (22a)m = (2	2)m ÷ 4								
	(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effe	ctive air	change i	rate for t	he appli	cable ca	se	<u> </u>		ļ		<u>!</u>		
If mechanica												0.5	(2:
If exhaust air h		0		, ,	,	. ,	,, .	`) = (23a)			0.5	(2
If balanced with	n heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				75.65	(2
a) If balance						- ` 	- 	<u> </u>	2b)m + (23b) × [- ` ` `	÷ 100]	
24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(2
b) If balance	d mech	anical ve	ntilation	without	heat red	overy (N	ЛV) (24b	m = (22)	2b)m + (23b)		Ī	
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
c) If whole h				•	•				_				
<u> </u>	n < 0.5 ×	<u> </u>	· ·	<u> </u>	ŕ	· ` `	É `		`	ŕ	1	1	(0
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
d) If natural	ventilation								0.51				
24d)m= 0	0	0	0	0	0	0	0.5 + [(2	0	0.5]	0	0		(2
Effective air			,			<u> </u>							(_
25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3]	(2
0.31	0.31	0.51	0.29	0.20	0.26	0.20	0.26	0.27	0.20	0.29	0.3		(2
3. Heat losse	s and he	eat loss p	paramete	er:									
LEMENT	Gros	_	Openin		Net Ar		U-val		AXU		k-value		Χk
Caralanna	area	(m²)	m	l ²	A ,r		W/m2		(W/	K)	kJ/m²-l	K kJ	
/indows					8.97	x1	/[1/(1.4)+	0.04] = [11.89	ᆗ,			(2 —
/alls Type1	31.4	4	8.97		22.43	3 X	0.18	= [4.04	!	60	1345.8	3 (2
Valls Type2	22.9	92	0		22.92	2 x	0.17	=	3.85		60	1375.2	2 (2
otal area of e	lements	, m²			54.32	2							(3
arty wall					30.08	3 X	0	=	0		45	1353.6	3 (3
arty floor					50.62	2				[40	2024.8	3 (3
arty ceiling					50.62	2					30	1518.6	3 (3
nternal wall **	:				83.2						9	748.8	(3
for windows and	roof wind	ows, use e	ffective wi	ndow U-va	alue calcul	ated using	formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	n paragraph	n 3.2	
* include the area				ls and par	titions								
abric heat los	3s, W/K :	= S (A x	U)				(26)(30)	+ (32) =				19.78	(3
eat capacity	Cm = S((Axk)						((28)	(30) + (32	2) + (32a)	(32e) =	8366.8	(3
hermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			= (34)	÷ (4) =			165.29	(3
or design asses: an be used inste				construct	ion are no	t known pr	ecisely the	indicative	e values of	TMP in T	able 1f		
an be usea inste hermal bridge				ıcina Δr	nandiy l	<i>(</i>						5.00	$\neg_{\prime 2}$
details of therma	•	,			-	`						5.92	(3
otal fabric he		are not kir	OWII (30) =	- 0.00 X (3	'')			(33) +	(36) =			25.7	<u></u> (3
	at loss ca	alculated	l monthly	/				(38)m	= 0.33 × ((25)m x (5)		
	ı	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
entilation hea	l Feb							-	-	 	+		
entilation hea	Feb 13.69	13.52	12.69	12.53	11.7	11.7	11.53	12.03	12.53	12.86	13.19		(3
Jan 8)m= 13.86	13.69	13.52	12.69	12.53	11.7	11.7	11.53		<u> </u>	<u> </u>	13.19		(3
entilation hea	13.69	13.52	12.69	12.53	37.39	37.39	37.23		12.53 = (37) + (38.22	<u> </u>	38.89	1	(3)

Heat loss par	ameter (I	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.78	0.78	0.77	0.76	0.76	0.74	0.74	0.74	0.75	0.76	0.76	0.77		
						l	l		Average =	: Sum(40) ₁	12 /12=	0.76	(40)
Number of da	-	nth (Tab	le 1a)		ı			1	1				
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 hea	ating ene	rgy requi	irement:								kWh/ye	ar:	
Assumed occ if TFA > 13 if TFA £ 13	.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		71		(42)
Annual avera Reduce the annu not more that 12:	ial average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		.77		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage		1											
(44)m= 82.25	79.26	76.27	73.28	70.29	67.3	67.3	70.29	73.28	76.27	79.26	82.25		
	•								Total = Su	ım(44) ₁₁₂ =	-	897.28	(44)
Energy content of	of hot water	used - cal	culated m	onthly = 4 .	190 x Vd,r	n x nm x C	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 121.98	106.68	110.09	95.97	92.09	79.47	73.64	84.5	85.51	99.65	108.78	118.13		_
If instantaneous	water heat	ing at naint	of upo (no	hot woto	r otorogol	ontor O in	havas (16		Total = Su	ım(45) ₁₁₂ =	= [1176.48	(45)
If instantaneous	1	· ·	·	i	, , , , , , , , , , , , , , , , , , ,		, ,	, , , ,	1		· ·		(40)
(46)m= 18.3 Water storage	16 2 loss:	16.51	14.4	13.81	11.92	11.05	12.68	12.83	14.95	16.32	17.72		(46)
Storage volur) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community	heating a	and no ta	ınk in dw	elling, e	nter 110	litres in	(47)						
Otherwise if n	o stored	hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in ((47)			
Water storage													
a) If manufac				or is kno	wn (kWł	n/day):					0		(48)
Temperature											0		(49)
Energy lost fr		•			or io not		(48) x (49)) =		1	10		(50)
b) If manufactHot water sto			-							0	02		(51)
If community	•			_ (,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-77				0.	.02		(= -)
Volume facto	r from Ta	ble 2a								1.	.03		(52)
Temperature	factor fro	m Table	2b							0	.6		(53)
Energy lost fr		•	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter (50) or	(54) in (55)								1.	03		(55)
Water storage	e loss cal	culated f	for each	month			((56)m = ((55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where ((H11) is fro	m Appendi	хH	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit	it loss (ar	nnual) fro	m Table	 e 3							0		(58)
Primary circuit	•	,			59)m = ((58) ÷ 36	65 × (41)	m					
(modified b	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi loss ca	lculated f	or each	month (61)m =	(60) ÷ 3	65 × (41))m							
(61)m= 0	0	0	0	0	0	0) 0	П	0	0	0	0	1	(61)
	uired for	water he	eating ca	alculated	L for eac	h month	(62)r	—— m =	0 85 x (′45)m +	(46)m +	(57)m +	ı · (59)m + (61)m	
(62)m= 177.25	156.61	165.36	149.47	147.37	132.96	128.91	139.	_	139	154.93	162.27	173.4]	(62)
Solar DHW input	calculated ι	ısing App	endix G or	Appendix	H (negati	ve quantity	/) (ent	er '0'	if no sola	r contribu	tion to wate	r heating)		
(add additiona												•		
(63)m= 0	0	0	0	0	0	0	0		0	0	0	0]	(63)
Output from w	ater heat	er				•		•			•	•	•	
(64)m= 177.25	156.61	165.36	149.47	147.37	132.96	128.91	139.	.78	139	154.93	162.27	173.4]	
	•					•		Outp	ut from wa	ater heate	er (annual)	12	1827.32	(64)
Heat gains fro	m water l	neating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (6	1)m] + 0.8 x	c [(46)m	+ (57)m	+ (59)m	١]	
(65)m= 84.78	75.41	80.82	74.71	74.84	69.22	68.71	72.3	32	71.23	77.36	78.96	83.5]	(65)
include (57)	m in calc	ulation o	of (65)m	only if c	ylinder i	s in the o	dwelli	ing o	or hot w	ater is f	rom com	munity h	neating	
5. Internal ga	ains (see	Table 5	and 5a):										
Metabolic gair	ns (Table	5), Wat	ts											
Jan	Feb	Mar	Apr	May	Jun	Jul	Αι	Jg	Sep	Oct	Nov	Dec]	
(66)m= 85.42	85.42	85.42	85.42	85.42	85.42	85.42	85.4	42	85.42	85.42	85.42	85.42]	(66)
Lighting gains	(calculat	ed in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso s	ee T	Table 5				-	
(67)m= 13.59	12.07	9.81	7.43	5.55	4.69	5.07	6.5	9	8.84	11.22	13.1	13.97]	(67)
Appliances ga	ins (calcu	ılated in	Append	dix L, eq	uation L	13 or L1	3a), a	also	see Tal	ble 5		_	-	
(68)m= 148.84	150.39	146.5	138.21	127.75	117.92	111.35	109.	.81	113.7	121.99	132.45	142.28]	(68)
Cooking gains	(calculat	ed in A	opendix	L, equat	ion L15	or L15a)), also	o se	e Table	5	-	-	-	
(69)m= 31.54	31.54	31.54	31.54	31.54	31.54	31.54	31.5	54	31.54	31.54	31.54	31.54]	(69)
Pumps and fa	ns gains	(Table 5	āa)										-	
(70)m= 0	0	0	0	0	0	0	0		0	0	0	0]	(70)
Losses e.g. ev	/aporation	n (nega	ive valu	es) (Tab	le 5)								-	
(71)m= -68.33	-68.33	-68.33	-68.33	-68.33	-68.33	-68.33	-68.	33	-68.33	-68.33	-68.33	-68.33]	(71)
Water heating	gains (Ta	able 5)											_	
(72)m= 113.95	112.22	108.64	103.76	100.59	96.14	92.35	97.	2	98.93	103.97	109.67	112.23]	(72)
Total internal	gains =				(66)m + (67)m	ı + (68)m +	(69)m + ((70)m + (7	71)m + (72))m	_	
(73)m= 325.01	323.3	313.57	298.03	282.52	267.37	257.39	262.	.22	270.09	285.81	303.84	317.1]	(73)
6. Solar gain	s:													
Solar gains are		ŭ					itions t	o cor	nvert to th	e applica		tion.		
Orientation:	Access Fa Table 6d	actor	Area m²		Flu Ta	ıx ble 6a		Τź	g_ able 6b	т	FF able 6c		Gains (W)	
_							1 1	- 1 0						1
Northeast 0.9x	0.77	×	8.9		-	11.28	X		0.63	_ ×	0.7	=	30.93	(75)
Northeast 0.9x	0.77	×	8.9			22.97	X		0.63	╛ [×] ╘	0.7	_ =	62.96	(75)
Northeast 0.9x	0.77	×	8.9			41.38	X		0.63	_ ×	0.7	=	113.43	(75)
Northeast 0.9x	0.77	X	8.9	_	-	67.96	X		0.63	_ ×	0.7	=	186.29	(75)
Northeast _{0.9x}	0.77	X	8.9	7	x (91.35	X		0.63	X	0.7	=	250.41	(75)

Northeast _{0.9x}	0.77	X	8.9	97	X S	97.38	x [0.63	x	0.7	=	266.96	(75)
Northeast _{0.9x}	0.77	x	8.9	97	х	91.1	x	0.63	x	0.7	=	249.74	(75)
Northeast _{0.9x}	0.77	Х	8.9)7	х	72.63	x [0.63	x	0.7	=	199.1	(75)
Northeast _{0.9x}	0.77	Х	8.9)7	x t	50.42] x [0.63	х	0.7	=	138.22	(75)
Northeast _{0.9x}	0.77	x	8.9	97	x 2	28.07	x	0.63	x	0.7	=	76.94	(75)
Northeast _{0.9x}	0.77	x	8.9	97	х	14.2	х	0.63	_ x [0.7	=	38.92	(75)
Northeast 0.9x	0.77	X	8.9)7	х	9.21	x	0.63	_ x [0.7	=	25.26	(75)
•		<u> </u>											
Solar gains in	watts, ca	alculated	I for eacl	h month			(83)m =	Sum(74)m .	(82)m				
(83)m= 30.93	62.96	113.43	186.29	250.41	266.96	249.74	199.1	138.22	76.94	38.92	25.26		(83)
Total gains –	internal a	nd solar	(84)m =	= (73)m	+ (83)m	, watts						•	
(84)m= 355.94	386.26	427.01	484.32	532.94	534.34	507.13	461.32	408.31	362.75	342.76	342.36		(84)
7. Mean inte	rnal temp	erature	(heating	season)								
Temperature	during h	eating p	eriods ir	n the livi	ng area	from Tal	ole 9, 1	h1 (°C)				21	(85)
Utilisation fa	ctor for g	ains for I	living are	ea, h1,m	(see Ta	able 9a)							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m= 0.98	0.96	0.93	0.82	0.64	0.44	0.32	0.37	0.61	0.87	0.96	0.98		(86)
Mean interna	al temper	ature in	living are	ea T1 (fo	ollow ste	eps 3 to 7	7 in Ta	ole 9c)		-	•	•	
(87)m= 20.13	20.27	20.52	20.81	20.95	20.99	21	21	20.97	20.77	20.42	20.11		(87)
Temperature	during b	eating n	oriode ir	rost of	dwelling	from To	hla a	Th2 (°C)	<u> </u>	!	!		
(88)m= 20.27	20.27	20.28	20.29	20.29	20.31	20.31	20.31		20.29	20.29	20.28		(88)
` '	ļ			<u> </u>	<u> </u>	<u> </u>							, ,
Utilisation fa					T	1	T	1 0.50	0.04	T 0.05	0.00		(89)
(89)m= 0.97	0.96	0.91	0.79	0.59	0.4	0.27	0.31	0.56	0.84	0.95	0.98		(03)
Mean interna	al temper	ature in	the rest	of dwell	ing T2 (f	ollow ste	eps 3 to	7 in Tabl	e 9c)		T	Ī	
(90)m= 19.1	19.31	19.66	20.06	20.24	20.3	20.31	20.31		20.03	19.54	19.09		(90)
								1	LA = Livir	ng area ÷ (4) =	0.49	(91)
Mean_interna	al temper	ature (fo	r the wh	ole dwe	lling) = f	LA × T1	+ (1 –	fLA) × T2					
(92)m= 19.61	19.78	20.08	20.43	20.59	20.64	20.65	20.65	20.62	20.39	19.97	19.59		(92)
Apply adjust	ment to the	ne mean	interna	temper	ature fro	m Table	4e, w	here appro	opriate			•	
(93)m= 19.61	19.78	20.08	20.43	20.59	20.64	20.65	20.65	20.62	20.39	19.97	19.59		(93)
8. Space hea	·												
Set Ti to the the utilisation					ned at st	ep 11 of	Table	9b, so tha	t Ti,m=(76)m an	d re-calc	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fa			•	iviay	<u> </u>	<u> </u>	7.05	,	000	1407	_ <u></u>		
(94)m= 0.97	0.95	0.91	0.79	0.61	0.42	0.3	0.34	0.58	0.85	0.95	0.97		(94)
Useful gains	, hmGm ,	W = (94	4)m x (84	 4)m	<u>!</u>	!	!		<u>I</u>	<u>!</u>	<u>!</u>		
(95)m= 344.68	367.88	388.24	384.81	326.31	224.34	151.08	157.68	3 238.18	307.45	324.2	332.97		(95)
Monthly ave	rage exte	rnal tem	perature	from T	able 8			•					
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rat	_				Lm , W	=[(39)m	x [(93)	m- (96)m]			•	
(97)m= 605.37		532.59	442.53	339.89	225.9	151.29	158.09		374.26	496.17	598.46		(97)
Space heatir	ng require	ement fo	r each n	nonth, k	Wh/mon	th = 0.02	24 x [(9	7)m – (95)m] x (4	1)m		•	
(98)m= 193.95	146.61	107.39	41.56	10.1	0	1 0	l 0	l 0	49.71	123.82	197.53		

	Total per year (kWh	/year) = Sum(98) _{15,912} =	870.67	(98)
Space heating requirement in kWh/m²/year			17.2	(99)
9b. Energy requirements – Community heating scheme				
This part is used for space heating, space cooling or water heating Fraction of space heat from secondary/supplementary heating (Tab		mmunity scheme.	0	(301)
Fraction of space heat from community system 1 – (301) =	, , ,		1] (302)
The community scheme may obtain heat from several sources. The procedure allow	s for CHP and up to	L four other heat sources; the	e latter	`` ′
includes boilers, heat pumps, geothermal and waste heat from power stations. See A Fraction of heat from Community boilers	Appendix C.	Г		(303a)
Fraction of total space heat from Community boilers		(302) x (303a) =	1	$\int_{(304a)}^{(304a)}$
·	hooting eyetom	(302) X (303a) =		╣
Factor for control and charging method (Table 4c(3)) for community Distribution loss factor (Table 12c) for community heating system	nealing system	L	1 05	(305)
Space heating		L	1.05 kWh/year	」 ``
Annual space heating requirement		Γ	870.67	٦
Space heat from Community boilers	(98) x (304a) x	(305) x (306) =	914.2	(307a)
Efficiency of secondary/supplementary heating system in % (from T	able 4a or Appe	ndix E)	0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x	100 ÷ (308) =	0	(309)
Water heating		_		_
Annual water heating requirement			1827.32	
If DHW from community scheme: Water heat from Community boilers	(64) x (303a)	x (305) x (306) =	1918.69	(310a)
Electricity used for heat distribution	0.01 × [(307a)(30	7e) + (310a)(310e)] =	28.33	(313)
Cooling System Energy Efficiency Ratio			0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314	·) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outs	side	Γ	107.68	(330a)
warm air heating system fans		Ī	0	(330b)
pump for solar water heating		Ī	0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330	0b) + (330g) =	107.68	(331)
Energy for lighting (calculated in Appendix L)		Ī	239.96	(332)
Total delivered energy for all uses (307) + (309) + (310) + (312) + (312)	315) + (331) + (3	32)(237b) =	3180.53	(338)
12b. CO2 Emissions – Community heating scheme				
	Energy kWh/year	Emission factor E	missions g CO2/year	
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP using two	·	o (366) for the second fuel	96	(367a)
	b)] x 100 ÷ (367b) x	0.22 =	637.4	
Electrical energy for heat distribution [(313		0.22		
[[313	'/ ^	0.52	14.7	(312)

Total CO2 associated with community s	systems	(363)(366) + (368)(372)		=	652.1	(373)
CO2 associated with space heating (se	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immers	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and w	ater heating	(373) + (374) + (375) =			652.1	(376)
CO2 associated with electricity for pum	ps and fans within dw	elling (331)) x	0.52	=	55.89	(378)
CO2 associated with electricity for lighti	ng	(332))) x	0.52	=	124.54	(379)
Total CO2, kg/year	sum of (376)(382) =				832.53	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				16.45	(384)
El rating (section 14)					88.33	(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:57:09

Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:**

Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 63.92m² Site Reference :

Plot Reference: 01 - H Highgate Road - GREEN

Address:

Client Details:

Name: Address:

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 17.67 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 15.46 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 45.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 38.8 kWh/m²

OK

2 Fabric U-values

Element Average Highest 0.18 (max. 0.70) External wall 0.18 (max. 0.30) OK Party wall 0.00 (max. 0.20) **OK**

Floor (no floor) Roof (no roof)

Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	ОК
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	9.56m²	
Windows facing: South East	8.76m²	
Ventilation rate:	6.00	
10 Key features		
	2.0 m ³ /m ² h	
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		l lser I	Details:						
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa	are Ve				010943 on: 1.0.5.50	
Address :	F	Property	Address	01 - H					
1. Overall dwelling dime	ensions:								
3		Are	a(m²)		Av. He	ight(m)		Volume(m ³	³)
Ground floor			63.92	(1a) x	2	2.65	(2a) =	169.39	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	63.92	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	169.39	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	+	0	=	0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	<u> </u>	0	Ī - Ē	0	x 2	20 =	0	(6b)
Number of intermittent fa	ns				0	x '	10 =	0	(7a)
Number of passive vents	;			Ē	0	x -	10 =	0	(7b)
Number of flueless gas fi	res			F	0	X 4	40 =	0	(7c)
				L					
							Air ch	nanges per ho	our
	ys, flues and fans = (6a)+(6b)+(ontinus fr	0		÷ (5) =	0	(8)
Number of storeys in the	neen carried out or is intended, procee he dwelling (ns)	ea 10 (17),	otrierwise (onunue ir	om (9) to	(10)		0	(9)
Additional infiltration	3 \					[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o			•	ruction			0	(11)
if both types of wall are padeducting areas of openia	resent, use the value corresponding t nas): if equal user 0.35	o the grea	ter wall are	a (after					
,	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0							0	(13)
-	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	. ,	-	. (45)		0	(15)
Infiltration rate	q50, expressed in cubic metro	oc por b	(8) + (10)				oroo	0	(16)
•	lity value, then $(18) = [(17) \div 20] + (18)$	•	•	•	elle ol e	rivelope	alea	0.15	(17)
•	es if a pressurisation test has been do				is being u	sed		0.10	(10)
Number of sides sheltere	ed		(00) 4	10.07E (4	10)1			0	(19)
Shelter factor	ling abolton footon		(20) = 1 -		19)] =			1	(20)
Infiltration rate incorporate Infiltration rate modified f	•		(21) = (18) X (20) =				0.15	(21)
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind sp	1 ' 1 ' 1	1 00.	1 7.09	Сор	1 000	1 1101		l	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7]	
	2)	1	1	•	1	1	1	ı	
Wind Factor (22a)m = (2.23) m = (2.23)		0.05	T 0.00	4	1.00	4 40	1 10	1	
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effective of the control o		•	rate for t	пе арріі	саріе са	se						0.5	(238
If exhaust air h			endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	wise (23b) = (23a)			0.5	(231
If balanced with	n heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (from	n Table 4h) =				75.65	(23)
a) If balance	ed mecha	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	ı)m = (22	2b)m + (23b) × [ا (23c) – 1		`
(24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3	-	(24
b) If balance	d mech	anical ve	ntilation	without	heat red	covery (N	лV) (24b)m = (22	2b)m + (23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h				•					- (00)	`			
	i	(23b), t	· ` `	ŕ		· ` `	ŕ	<u> </u>	· ` `			İ	(0.4
(24c)m= 0	0	0		0	0	0	0	0	0	0	0		(24
d) If natural if (22b)r		on or wh en (24d)							0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	iter (24a) or (24k	o) or (24	c) or (24	d) in box	(25)					
(25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25
3. Heat losse	c and he	nat loce r	paramete	or:							•		
S. Fleat losse ELEMENT	S and the Gros		Openin		Net Ar	ea	U-valı	16	AXU		k-value	e A X	X k
	area		m		A ,r		W/m2		(W/I	K)	kJ/m²-ł		
Windows Type	e 1				9.56	x1,	/[1/(1.4)+	0.04] =	12.67				(27
Windows Type	2				8.76	x1,	/[1/(1.4)+	0.04] =	11.61				(27
Walls Type1	61.0)9	18.3	2	42.77	, X	0.18	=	7.7	$\overline{}$ [60	2566.2	(29
Nalls Type2	3.80	6	0		3.86	x	0.17	=	0.65	$\overline{}$	60	231.6	(29
Total area of e	lements	, m²			64.95	5							— (31
Party wall					37.5	x	0		0	\neg [45	1687.5	(32
Party floor					63.92	2					40	2556.8	(32
Party ceiling					63.92	2				Ī	30	1917.6	(32
nternal wall **					113.4	7				Ī	9	1021.23	3 (32
* for windows and					alue calcul		formula 1	/[(1/U-valu	re)+0.04] a	L as given in	paragraph		 `
** include the area				ls and pari	titions		(26)(30)	(22) _			ı		٦,,,,
Fabric heat los		•	U)				(20)(30)		(20) + (2)	2) + (225)	(220) -	32.63	(33)
Heat capacity		,	0 – Cm	TEA) in	\ \ \ \/m2\			***	.(30) + (32) $\div (4) =$	2) + (32a).	(32e) =	9980.93	(34)
Thermal mass For design assess	•	•		,			acisaly the	` '	. ,	TMD in T	ahle 1f	156.15	(35
can be used inste				CONSTRUCT	on are no	. Kirowir pr	colocity tire	maioanvo	values of	77011 117 11	abio II		
Thermal bridge	es : S (L	x Y) cal	culated (using Ap	pendix l	<						7.91	(36
if details of therma		are not kn	own (36) =	= 0.05 x (3	1)								_
Total fabric he									(36) =			40.54	(37
entilation hea	i								= 0.33 × (.	1	1	
Jan 17.5	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(20
(38)m= 17.5	17.29	17.08	16.03	15.82	14.77	14.77	14.56	15.19	15.82	16.24	16.66	l	(38
Heat transfer (39)m= 58.04	57.83	nt, W/K 57.62	56.57	56.36	55.32	55.32	55.11	(39)m 55.73	= (37) + (37)	38)m 56.78	57.2	ı	

Heat loss pa	arameter (HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.9	1 0.9	0.9	0.89	0.88	0.87	0.87	0.86	0.87	0.88	0.89	0.89		
									Average =	Sum(40) ₁ .	12 /12=	0.88	(40)
Number of o	- i	<u> </u>	<u> </u>							·			
Ja	-	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(44)
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water h	eating ene	rgy requi	irement:								kWh/ye	ar:	
	ccupancy, I3.9, N = 1 I3.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (¯	TFA -13.		09		(42)
Annual ave Reduce the ar	nual average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		.84		(43)
Ja	n Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usag		r day for ea				Table 1c x	_	<u>'</u>	<u> </u>	!			
(44)m= 92.2	22 88.87	85.51	82.16	78.81	75.45	75.45	78.81	82.16	85.51	88.87	92.22		
_						_				m(44) ₁₁₂ =	L	1006.06	(44)
Energy conten					190 x Vd,r								
(45)m= 136.	76 119.61	123.43	107.61	103.25	89.1	82.56	94.74	95.88	111.73	121.97	132.45		— ,,,,
If instantaneou	ıs water heat	ing at point	of use (no	o hot water	· storage).	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	- L	1319.1	(45)
(46)m= 20.5		18.51	16.14	15.49	13.37	12.38	14.21	14.38	16.76	18.29	19.87		(46)
Water stora		1 10.01	10.11	10.10	10.01	12.00		1 1.00	10.70	10.20	10.01		(- /
Storage vol	ume (litres) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If communit	y heating a	and no ta	ınk in dw	velling, e	nter 110	litres in	(47)						
Otherwise in		hot wate	er (this in	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water stora a) If manuf	_	oclared I	oss fact	or ie kna	wn (k\//k	v/dav/).							(40)
Temperatur				JI 15 KI10	wii (Kvvi	i/uay).					0		(48)
Energy lost				aar			(48) x (49)	١ _			0		(49)
b) If manuf		•	•		or is not		(40) X (40)	, –		1	10		(50)
Hot water s	torage loss	factor fr	om Tabl	le 2 (kW	h/litre/da	ıy)				0.	02		(51)
If communit			on 4.3										
Volume factoring Temperatur			2h							-	03		(52) (53)
Energy lost				oor			(47) v (51)) x (52) x (52) _		.6		. ,
Enter (50)		•	, KVVII/yt	zai			(47) X (31)) X (JZ) X (33) –		03		(54) (55)
Water stora	` , ` `	,	for each	month			((56)m = ((55) × (41)	m		00		()
(56)m= 32.0		32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder cont												×Н	(30)
(57)m= 32.0	01 28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
		ļ		<u>l</u>	<u> </u>	<u> </u>	<u> </u>	L			0		(58)
Primary circ	`	,			59)m = ((58) <u>–</u> 36	35 x (41)	ım			o .		(00)
-	by factor f			,	•	. ,	, ,		r thermo	stat)			
(modilied	e, idolo.	ioiii iab								,			

Combi loss ca	lculated	for each	month ((61)m –	(60) ± 3	65 v (41	١m						
(61)m= 0	0	0	0	0 0	00) + 3	03 × (41)) 0	0	Ιο	0	0	1	(61)
												J · (59)m + (61)m	(- /
(62)m= 192.04	169.54	178.71	161.1	158.53	142.59	137.84	150.0		167.01	175.46	187.72	1	(62)
Solar DHW input	L											1	()
(add additiona									ar continoc	morrio wan	or ricating)		
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(63)
Output from w	ater hea	ter					!		1	ļ	<u> </u>	ı	
(64)m= 192.04	169.54	178.71	161.1	158.53	142.59	137.84	150.0	2 149.37	167.01	175.46	187.72]	
L	1	<u> </u>		ļ		ļ		utput from w	ater heat	_ I er (annual)₁	112	1969.94	(64)
Heat gains fro	m water	heating,	kWh/me	onth 0.2	5 ′ [0.85	5 × (45)m	+ (61)m] + 0.8	x [(46)m	n + (57)m	+ (59)m	 .]	-
(65)m= 89.69	79.71	85.26	78.58	78.55	72.42	71.67	75.7		81.37	83.35	88.26	1	(65)
include (57)	m in calc	culation of	of (65)m	only if c	vlinder	is in the	dwellir	ng or hot v	vater is t	from com	munity h	ı neating	
5. Internal ga					,			<u> </u>			,	,	
Metabolic gair	Ì												
Jan	Feb	Mar	Apr	May	Jun	Jul	Au	g Sep	Oct	Nov	Dec]	
(66)m= 104.5	104.5	104.5	104.5	104.5	104.5	104.5	104.	5 104.5	104.5	104.5	104.5		(66)
Lighting gains	(calcula	ted in Ap	pendix	L, equat	on L9 c	r L9a), a	lso se	e Table 5			-	•	
(67)m= 16.29	14.47	11.77	8.91	6.66	5.62	6.07	7.9	10.6	13.46	15.7	16.74]	(67)
Appliances ga	ins (calc	ulated in	Append	dix L, eq	uation L	.13 or L1	3a), a	lso see Ta	ble 5	-	•	•	
(68)m= 182.71	184.61	179.83	169.66	156.82	144.75	136.69	134.	3 139.57	149.75	162.58	174.65		(68)
Cooking gains	(calcula	ted in A	ppendix	L, equat	ion L15	or L15a), also	see Table	÷ 5	•	-	•	
(69)m= 33.45	33.45	33.45	33.45	33.45	33.45	33.45	33.4	5 33.45	33.45	33.45	33.45		(69)
Pumps and fa	ns gains	(Table 5	ōa)					•				•	
(70)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(70)
Losses e.g. ev	/aporatio	n (nega	tive valu	es) (Tab	le 5)			•		•	•	•	
(71)m= -83.6	-83.6	-83.6	-83.6	-83.6	-83.6	-83.6	-83.6	-83.6	-83.6	-83.6	-83.6		(71)
Water heating	gains (T	able 5)		-		-				-	-	•	
(72)m= 120.56	118.62	114.6	109.13	105.58	100.58	96.34	101.7	8 103.71	109.37	115.76	118.63		(72)
Total internal	gains =				(66)m + (67)m	ı + (68)	m + (69)m +	(70)m + (71)m + (72))m	•	
(73)m= 373.91	372.05	360.55	342.05	323.41	305.31	293.45	298.8	308.23	326.92	348.4	364.37		(73)
6. Solar gain	s:												
Solar gains are	calculated	using sola	r flux from	Table 6a	and assoc	ciated equa	itions to	convert to the	he applica	ble orienta	tion.		
Orientation:			Area		Flu			g_ Table 6b	-	FF		Gains	
_	Table 6d		m²			ble 6a		Table 6b		Table 6c		(W)	,
Northeast _{0.9x}	0.77	Х	9.5	56	x	11.28	x	0.63	x [0.7	=	32.96	(75)
Northeast _{0.9x}	0.77	X	9.5	56	X	22.97	X	0.63	×	0.7	=	67.1	(75)
Northeast 0.9x	0.77	X	9.5	56	х	41.38	X	0.63	x [0.7	=	120.89	(75)
Northeast 0.9x	0.77	Х	9.5	56	x	67.96	X	0.63	x	0.7	=	198.54	(75)
Northeast _{0.9x}	0.77	X	9.5	56	X	91.35	X	0.63	X	0.7	=	266.88	(75)

NIdi							1		_				—
Northeast _{0.9x}	0.77	X	9.5	56	× L	97.38	X	0.63	×	0.7	=	284.52	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x L	91.1	X	0.63	X	0.7	=	266.17	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x	72.63	X	0.63	X	0.7	=	212.19	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x L	50.42	X	0.63	X	0.7	=	147.31	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x	28.07	X	0.63	X	0.7	=	82	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x	14.2	X	0.63	X	0.7		41.48	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x	9.21	X	0.63	X	0.7	=	26.92	(75)
Southeast _{0.9x}	0.77	X	8.7	76	x	36.79	X	0.63	X	0.7	=	98.5	(77)
Southeast 0.9x	0.77	X	8.7	7 6	x	62.67	X	0.63	X	0.7	=	167.79	(77)
Southeast 0.9x	0.77	X	8.7	7 6	x	85.75	X	0.63	X	0.7	=	229.57	(77)
Southeast _{0.9x}	0.77	Х	8.7	' 6	x	106.25	x	0.63	х	0.7	=	284.45	(77)
Southeast _{0.9x}	0.77	X	8.7	76	x	119.01	X	0.63	x	0.7	=	318.61	(77)
Southeast _{0.9x}	0.77	X	8.7	76	x	118.15	x	0.63	x	0.7		316.31	(77)
Southeast _{0.9x}	0.77	X	8.7	76	х	113.91	x	0.63	x	0.7	=	304.95	(77)
Southeast _{0.9x}	0.77	X	8.7	76	x $\overline{\ }$	104.39	x	0.63	x	0.7		279.47	(77)
Southeast _{0.9x}	0.77	x	8.7	76	x	92.85	x	0.63	x	0.7	=	248.58	(77)
Southeast _{0.9x}	0.77	X	8.7	' 6	x	69.27	x	0.63	x	0.7		185.44	(77)
Southeast _{0.9x}	0.77	X	8.7	76	x	44.07	x	0.63	x	0.7	_	117.98	(77)
Southeast 0.9x	0.77	x	8.7	76	x	31.49	x	0.63	X	0.7	= =	84.3	(77)
_													_
Solar gains in	watts, ca	lculated	for eacl	h month			(83)m	n = Sum(74)m .	(82)m				
1				585.49			<u> </u>						(0.0)
(83)m= 131.47	234.89	350.47	483	365.49	600.	.83 571.12	491	.66 395.89	267.44	159.46	111.22		(83)
(83)m= 131.47 Total gains – i							491	.66 395.89	267.44	1 159.46	111.22		(83)
` ')m , watts	790		594.37	<u> </u>	475.59		(83)
Total gains – i	nternal a 606.94	nd solar 711.02	(84)m = 825.05	908.91	+ (83 906.)m , watts			<u> </u>				, ,
Total gains – i (84)m= 505.38	nternal at 606.94	nd solar 711.02 erature	(84)m = 825.05 (heating	908.91 season	+ (83 906.)m , watts .14 864.57	790	.48 704.13	<u> </u>			21	, ,
Total gains – i (84)m= 505.38 7. Mean inter	nternal ar 606.94 mal temp during he	nd solar 711.02 erature eating p	(84)m = 825.05 (heating eriods in	908.91 season	906.	e)m , watts 14 864.57	790	.48 704.13	<u> </u>			21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature	nternal ar 606.94 mal temp during he	nd solar 711.02 erature eating p	(84)m = 825.05 (heating eriods in	908.91 season	906.	ea from Table Table 9a)	790 ole 9	.48 704.13	<u> </u>	7 507.86		21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac	nternal and 606.94 mal temporal during heater for gar	nd solar 711.02 erature eating p ains for l	(84)m = 825.05 (heating eriods ir iving are	908.91 season the living	+ (83 906.) ng ar	ea from Tale Table 9a) un Jul	790 ole 9	.48 704.13 , Th1 (°C)	594.37	7 507.86	475.59	21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fact Jan (86)m= 0.97	nternal are 606.94 character for gas Feb 0.94	rature eating pains for I	(84)m = 825.05 (heating eriods in iving are Apr 0.73	908.91 season the living ea, h1,m May 0.55	+ (83 906.) ng ard (see Ju	ea from Talle Table 9a) un Jul	790 ole 9 A 0.3	.48 704.13 , Th1 (°C) ug Sep 32 0.53	594.37 Oct	7 507.86 Nov	475.59 Dec	21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac	nternal are 606.94 character for gas Feb 0.94	rature eating pains for I	(84)m = 825.05 (heating eriods in iving are Apr 0.73	908.91 season the living ea, h1,m May 0.55	+ (83 906.) ng ard (see Ju	ea from Table Pa) un Jul 9 0.28 steps 3 to 7	790 ole 9 A 0.3	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c)	594.37 Oct	7 507.86 Nov 0.94	475.59 Dec	21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fact Jan (86)m= 0.97 Mean interna (87)m= 19.93	nternal are 606.94 nal temp during heter for gare Feb 0.94 l tempera 20.19	erature eating pains for I Mar 0.87 ature in I	(84)m = 825.05 (heating eriods ir iving are 0.73 iving are 20.81	908.91 season the livit ea, h1,m May 0.55 ea T1 (for 20.95	+ (83 906.) ng ard (see 0.3 ollow 20.9	ea from Table Pa) un Jul 9 0.28 steps 3 to 7	790 ole 9 A 0.3 7 in T	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97	594.37 Oct 0.8	7 507.86 Nov 0.94	475.59 Dec 0.97	21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fact Jan (86)m= 0.97 Mean interna (87)m= 19.93 Temperature	nternal are 606.94 cornal temp during he ctor for gare Feb 0.94 l tempera 20.19 during he	erature eating pains for I Mar 0.87 ature in I 20.51 eating p	(84)m = 825.05 (heating eriods in iving are 0.73 iving are 20.81 eriods in iving are 20.81	908.91 season the living a, h1,m May 0.55 ea T1 (for 20.95) rest of	+ (83 906.) ng ard (see 0.3 Ollow 20.9	ea from Table 9a) un Jul 9 0.28 steps 3 to 7	790 ole 9	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C)	Oct 0.8	Nov 0.94	Dec 0.97	21	(84) (85) (86) (87)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16	nternal are 606.94 considering he ctor for gas Feb 0.94 considering he 20.19 considering he 20.16	erature eating pains for I Mar 0.87 eature in I 20.51 eating p	(84)m = 825.05 (heating eriods in iving are 20.81 eriods in 20.18	908.91 season the living a, h1,m May 0.55 ea T1 (for 20.95) rest of 20.18	+ (83 906.) ng ard (see 0.3 ollow 20.9 dwell 20.	ea from Table 9a) un Jul 9 0.28 steps 3 to 7 99 21 ling from Ta 2 20.2	790 Dole 9 A 0.3 7 in T 2 Able 9	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C)	594.37 Oct 0.8	Nov 0.94	475.59 Dec 0.97	21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac	nternal are 606.94 nal temp during he ctor for gare 20.19 during he 20.16 ctor for gare ctor for gar	erature eating p ains for I Mar 0.87 ature in I 20.51 eating p 20.17	(84)m = 825.05 (heating eriods ir iving are 20.81 eriods ir 20.18	908.91 season the livit ea, h1,m May 0.55 ea T1 (for 20.95 n rest of 20.18 welling,	+ (83 906.) ng ard (see 0.3 ollow 20.9 dwell 20.	ea from Table 9a) un Jul 9 0.28 steps 3 to 7 99 21 ling from Table 2 20.2 (see Table	790 A 0.3 7 in T 2 Able 9 9a)	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C) .2 20.19	Oct 0.8 20.76	Nov 0.94 20.3	Dec 0.97 19.89 20.17	21	(84) (85) (86) (87) (88)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac (89)m= 0.96	nternal ar 606.94 nal temp during he ctor for ga Feb 0.94 I tempera 20.19 during he 20.16 ctor for ga	erature eating pains for I Mar 0.87 eature in I 20.51 eating p 20.17 ains for r 0.85	(84)m = 825.05 (heating eriods ir iving are 0.73 iving are 20.81 eriods ir 20.18 eest of de 0.69	908.91 season the livities, h1,m May 0.55 ea T1 (for 20.95 n rest of 20.18 welling, 0.51	+ (83 906.) ng ard (see 0.3 ollow 20.9 dwell 20. h2,m 0.3	ea from Table 9a) un Jul 9 0.28 steps 3 to 7 99 21 ling from Ta 2 20.2 (see Table	790 A 0.3 7 in T 2 Able 9 9a) 0.2	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C) .2 20.19	Oct 0.8 20.76 20.18	Nov 0.94	Dec 0.97	21	(84) (85) (86) (87)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac [86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac (89)m= 0.96 Mean interna	nternal are 606.94 considering heater for garage 20.19 considering heater for garage 20.19 considering heater for garage 20.16 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.19 considering	erature eating pains for I Mar 0.87 eature in I 20.51 eating p 20.17 ains for r 0.85 eature in t	(84)m = 825.05 (heating eriods in iving are 20.81 eriods in 20.18 eriods in 20.18 eriods in 20.18 eriods in 20.18 eriods in 20.18	908.91 season the living a, h1,m May 0.55 ea T1 (for 20.95 n rest of 20.18 welling, 0.51 of dwelling	+ (83 906.) ng ard (see Ju 0.3 ollow 20.9 dwell 20. h2,m 0.3	ea from Tale Table 9a) un Jul 9 0.28 steps 3 to 7 99 21 ling from Ta 2 20.2 (see Table 9a) 2 (follow ste	790 A 0.3 7 in T 2 Able 9 9a) 0.2 pps 3	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C) .2 20.19 26 0.47 3 to 7 in Table	Oct 0.8 20.76 20.18 0.77 e 9c)	7 507.86 Nov 0.94 20.3 20.18	Dec 0.97 19.89 20.17	21	(84) (85) (86) (87) (88) (89)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac (89)m= 0.96	nternal ar 606.94 nal temp during he ctor for ga Feb 0.94 I tempera 20.19 during he 20.16 ctor for ga	erature eating pains for I Mar 0.87 eature in I 20.51 eating p 20.17 ains for r 0.85	(84)m = 825.05 (heating eriods ir iving are 0.73 iving are 20.81 eriods ir 20.18 eest of de 0.69	908.91 season the livities, h1,m May 0.55 ea T1 (for 20.95 n rest of 20.18 welling, 0.51	+ (83 906.) ng ard (see 0.3 ollow 20.9 dwell 20. h2,m 0.3	ea from Tale Table 9a) un Jul 9 0.28 steps 3 to 7 99 21 ling from Ta 2 20.2 (see Table 9a) 2 (follow ste	790 A 0.3 7 in T 2 Able 9 9a) 0.2	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C) .2 20.19 26 0.47 3 to 7 in Table .2 20.17	Oct 0.8 20.76 20.18 0.77 le 9c) 19.91	Nov 0.94 20.3 20.18 0.93	Dec 0.97 19.89 20.17 0.97		(84) (85) (86) (87) (88) (89)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac [86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac (89)m= 0.96 Mean interna	nternal are 606.94 considering heater for garage 20.19 considering heater for garage 20.19 considering heater for garage 20.16 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.92 considering heater for garage 20.19 considering	erature eating pains for I Mar 0.87 eature in I 20.51 eating p 20.17 ains for r 0.85 eature in t	(84)m = 825.05 (heating eriods in iving are 20.81 eriods in 20.18 eriods in 20.18 eriods in 20.18 eriods in 20.18 eriods in 20.18	908.91 season the living a, h1,m May 0.55 ea T1 (for 20.95 n rest of 20.18 welling, 0.51 of dwelling	+ (83 906.) ng ard (see Ju 0.3 ollow 20.9 dwell 20. h2,m 0.3	ea from Tale Table 9a) un Jul 9 0.28 steps 3 to 7 99 21 ling from Ta 2 20.2 (see Table 9a) 2 (follow ste	790 A 0.3 7 in T 2 Able 9 9a) 0.2 pps 3	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C) .2 20.19 26 0.47 3 to 7 in Table .2 20.17	Oct 0.8 20.76 20.18 0.77 le 9c) 19.91	7 507.86 Nov 0.94 20.3 20.18	Dec 0.97 19.89 20.17 0.97	0.38	(84) (85) (86) (87) (88) (89)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac [86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac (89)m= 0.96 Mean interna	nternal ar 606.94 nal temp during he ctor for ga Feb 0.94 I tempera 20.19 during he 20.16 ctor for ga 19.11	erature eating pains for I Mar 0.87 eature in I 20.51 eating p 20.17 eating p 1.0.85 eature in I 1.0.85 eature in I 1.0.85	(84)m = 825.05 (heating eriods ir iving are 0.73 iving are 20.81 eriods ir 20.18 eest of do 0.69 the rest 19.97	908.91 season the livin ea, h1,m May 0.55 ea T1 (for 20.95 rest of 20.18 welling, 0.51 of dwelling	+ (83 906.) ng ard (see 0.3 ollow 20.9 dwell 20. h2,m 0.3 ing T2	ea from Tale Table 9a) In Jul 9 0.28 steps 3 to 7 99 21 ling from Tale 2 20.2 (see Table 4 0.23 2 (follow steps 19 20.2	790 A 0.3 7 in T 2 9a) 0.2 9a) 20	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C) .2 20.19 26 0.47 4 to 7 in Table .2 20.17	Oct 0.8 20.76 20.18 0.77 e 9c) 19.91 fLA = Liv	Nov 0.94 20.3 20.18 0.93	Dec 0.97 19.89 20.17 0.97		(84) (85) (86) (87) (88) (89)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac (89)m= 0.96 Mean interna (90)m= 18.74	nternal ar 606.94 nal temp during heter for ga Feb 0.94 I tempera 20.19 during heter for ga 20.16 ctor for ga 19.11 I tempera 19.52	erature eating p ains for I Mar 0.87 eature in I 20.51 eating p 20.17 eating p 10.85 eature in t 19.56 eature (fo	(84)m = 825.05 (heating eriods ir iving are 20.81 eriods ir 20.18 eriods ir 20.18 eriods ir 20.18 rest of dr 0.69 the rest 19.97 r the wh 20.29	908.91 season the livin ea, h1,m May 0.55 ea T1 (for 20.95 n rest of 20.18 welling, 0.51 of dwelling 20.13	+ (83 906.)	ea from Table 9a) In Jul 9 0.28 steps 3 to 7 99 21 ling from Table 2 20.2 (see Table 4 0.23 2 (follow steps 19 20.2 = fLA × T1 5 20.5	790 A 0.3 7 in T 2 9a) 0.2 + (1 20	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C) .2 20.19 26 0.47 3 to 7 in Table .2 20.17 - fLA) × T2 .5 20.47	Oct 0.8 20.76 20.18 0.77 e 9c) 19.91 fLA = Liv	7 507.86 Nov 0.94 20.3 20.18 0.93 19.29 ring area ÷ (Dec 0.97 19.89 20.17 0.97		(84) (85) (86) (87) (88) (89)

	•		•	•		•					•	•	
(93)m= 19.19	19.52	19.92	20.29	20.44	20.5	20.5	20.5	20.47	20.23	19.67	19.14		(93)
8. Space hea													
Set Ti to the return the utilisation			•		ed at st	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	l	l	· ·	1	<u> </u>								
(94)m= 0.95	0.91	0.84	0.7	0.52	0.36	0.25	0.29	0.49	0.77	0.92	0.96		(94)
Useful gains,	hmGm	, W = (9	4)m x (8	4)m	•								
(95)m= 481.7	555.07	597.49	576.76	475.72	323.61	215.39	225.34	345.69	458.98	466.53	457.07		(95)
Monthly average		rnal tem	perature	from Ta	able 8	·						ı	
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate		i e			i	-``	· · ·	<u> </u>				Ī	(o=)
(97)m= 864.4	845.57	773.35	644.22	492.83	326.09	215.79	226.04	355.11	542.96	713.83	854.77		(97)
Space heatin (98)m= 284.73	g require 195.21	130.84	r each n 48.57	12.73	/vn/mon	$\ln = 0.02$	24 x [(97])m – (95 0)m] x (4 62.48	1)M 178.05	295.89		
(98)m= 284.73	195.21	130.64	46.57	12.73	0	U					<u> </u>	1200 F	(98)
							rota	l per year	(kvvn/year) = Sum(9	8)15,912 =	1208.5	=
Space heatin	g require	ement in	kWh/m²	² /year								18.91	(99)
9b. Energy red	quiremer	nts – Coi	mmunity	heating	scheme								
This part is use Fraction of spa										unity sch	neme.		7(201)
•			•		•	_	(Table T	1) 0 11 11	one			0	(301)
Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The community so									up to four	other heat	sources; t	he latter	
includes boilers, h Fraction of hea		-			rom powe	stations.	See Appei	naix C.				1	(303a)
Fraction of total			•		oilers				(3	02) x (303	a) =	1	(304a)
Factor for cont	·			•		r commı	unity hea	iting sys	tem			1	(305)
Distribution los				,	` ''		•	0 ,				1.05	(306)
Space heating		`	,		,	0 ,						kWh/yea	
Annual space	_	requiren	nent									1208.5	<u>.</u>
Space heat fro	m Com	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	=	1268.93	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308
Space heating	require	ment fro	m secon	dary/su	oplemen	tary syst	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water heating	1												
Annual water h		equirem	ent									1969.94	
If DHW from co	ommuni	ty schen	ne:										-
Water heat fro	m Comr	nunity bo	oilers					(64) x (30	03a) x (30	5) x (306) :	=	2068.44	(310a)
Electricity used for heat distribution $0.01 \times [(307a)(307e) + (310a)(310e)] = $										33.37	(313)		
Cooling Syster	m Energ	y Efficie	ncy Rati	0								0	(314)
Space cooling	(if there	is a fixe	d coolin	g systen	n, if not e	enter 0)		= (107) ÷	(314) =			0	(315)
Electricity for p											ĺ		7,000
mechanical ve	ntilation	- baland	ed, extr	act or po	sitive in	put from	outside					135.98	(330a)

warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	b) + (330g) =		135.98	(331)
Energy for lighting (calculated in Appen	idix L)				287.67	(332)
Total delivered energy for all uses (307) + (309) + (310) + (31	2) + (315) + (331) + (33	32)(237b) =		3761.01	(338)
12b. CO2 Emissions – Community hea	ting scheme					
		Energy kWh/year	Emission factors kg CO2/kWh		missions g CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)	• •	P) sing two fuels repeat (363) to	(366) for the secon	nd fuel	96	(367a)
CO2 associated with heat source 1	[(307b	b)+(310b)] x 100 ÷ (367b) x	0.22	=	750.91	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	17.32	(372)
Total CO2 associated with community s	systems	(363)(366) + (368)(372	2)	=	768.23	(373)
CO2 associated with space heating (se	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =			768.23	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	=	70.57	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	149.3	(379)
Total CO2, kg/year	sum of (376)(382) =				988.1	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				15.46	(384)

El rating (section 14)

87.84

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 06 December 2021 at 10:56:51*

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 60.34m²Site Reference:Highgate Road - GREENPlot Reference: 01 - I

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 18.05 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 15.55 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 45.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 37.8 kWh/m²

OK

2 Fabric U-values

 Element
 Average
 Highest

 External wall
 0.18 (max. 0.30)
 0.18 (max. 0.70)
 OK

 Party wall
 0.00 (max. 0.20)
 OK

Floor (no floor) Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ок
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	ок
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	4.7m²	
Windows facing: South East	6.09m ²	
Windows facing: North West	2.92m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		l lear l	Details:						
Access an Name	Nail In ab an	USELL		- M	L		CTDO	010010	
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Stroma Softwa					010943 on: 1.0.5.50	
Contware Hame.	01101110 T 0711 2012	Property	Address:		31011.		7 01010	7.0.0.00	
Address :									
1. Overall dwelling dime	ensions:								
Ground floor			ea(m²)	(10) v		ight(m)	(2a) =	Volume(m³	(3a)
	-) . (4 -) . (4 -) . (4 -) . (4 -) .			(1a) x	2	65	(2a) =	159.9	(Sa)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	(1n)	60.34	(4)) (O.) (O.)	I) (O)	(0.)		_
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	159.9	(5)
2. Ventilation rate:	main sec	ondary	other		total			m³ per hou	r
Number of altimospess	heating hea	ating		1			40 =		_
Number of chimneys		<u> </u>	0] = [0			0	(6a)
Number of open flues	0 +	0 +	0] = [0		20 =	0	(6b)
Number of intermittent fa				Ĺ	0		10 =	0	(7a)
Number of passive vents				L	0	X '	10 =	0	(7b)
Number of flueless gas fi	res				0	X 4	40 =	0	(7c)
							Air ch	nanges per ho	our
Infiltration due to chimne	vs_flues and fans = (6a)+	·(6b)+(7a)+(7b)+	·(7c) =	Г	0		÷ (5) =	0	(8)
•	peen carried out or is intended,			ontinue fr			. (0) =	0	
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber fra resent, use the value correspon			•	uction			0	(11)
deducting areas of openii		iding to the grea	ilei wali ared	a (anter					
If suspended wooden f	floor, enter 0.2 (unsealed	l) or 0.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
ŭ	s and doors draught strip	ped						0	(14)
Window infiltration			0.25 - [0.2		_	. (45)		0	(15)
Infiltration rate	arron automorphia		(8) + (10) -	, , ,	, , ,	, ,		0	(16)
If based on air permeabil	q50, expressed in cubic	-	•	•	etre or e	envelope	area	3	(17)
•	es if a pressurisation test has be				is beina u	sed		0.15	(18)
Number of sides sheltere			3	,	J			0	(19)
Shelter factor			(20) = 1 - [0.075 x (1	9)] =			1	(20)
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.15	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ∸ 4								
		0.95 0.95	0.92	1	1.08	1.12	1.18		
· · · — — — — — — — — — — — — — — — — —					L		<u> </u>	J	

Adjusted infiltr	ation rat	e (allowi	ing for sh	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effe		•	rate for t	пе арріі	cable ca	ise					ĺ	0.5	(23
If exhaust air h	eat pump	using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)			0.5	(23
If balanced with	h heat reco	overy: effic	ciency in %	allowing f	for in-use f	actor (fron	n Table 4h) =				75.65	(23
a) If balance	ed mech	anical ve	entilation	with he	at recov	ery (MVI	HR) (24a	a)m = (22)	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(24
b) If balance	ed mech	anical ve	entilation	without	heat red	covery (I	MV) (24b	m = (22)	2b)m + (2	23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)r		tract ver < (23b), t		•					.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)r		on or wh en (24d)		•					0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	nter (24a) or (24l	o) or (24	c) or (24	d) in bo	x (25)					
(25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25
3. Heat losse	s and he	eat loss	paramet	er:									
LEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/I	K)	k-value kJ/m²-ł		
Windows Type	∋ 1				4.7	x1	/[1/(1.4)+	0.04] =	6.23				(27
Windows Type	e 2				6.09	x1	/[1/(1.4)+	0.04] =	8.07				(27
Windows Type	e 3				2.92	x1	/[1/(1.4)+	0.04] =	3.87				(27
Walls Type1	52.	8	13.7	1	39.09) x	0.18	=	7.04		60	2345.4	(29
Walls Type2	27.3	31	0		27.3′	ı x	0.17	=	4.59		60	1638.6	(29
otal area of e	elements	s, m²			80.11	I							(31
Party wall					16.88	3 x	0	=	0		45	759.6	(32
Party floor					60.34	1					40	2413.6	(32
Party ceiling					60.34	1					30	1810.2	(32
nternal wall **	•				107.9	1				[9	971.190	1 (32
for windows and it include the are						lated using	g formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	3.2	
Fabric heat lo				is anu par	แนงกร		(26)(30) + (32) =			1	29.8	(33
Heat capacity		•	0,						(30) + (32	2) + (32a).	(32e) =	9938.59	(34
Thermal mass		` '	⊃ = Cm ÷	- TFA) ir	n kJ/m²K				÷ (4) =	, , ,	` ′	164.71	(35
or design asses an be used inste	sments wh	nere the de	tails of the	•			recisely the	e indicative	e values of	TMP in Ta	able 1f		`
Thermal bridg	es : S (L	.xY) cal	culated (using Ap	pendix l	K						7.62	(36
f details of therm		are not kn	nown (36) =	= 0.05 x (3	31)						-		_
Total fabric he								(33) +	(36) =			37.42	(37
entilation hea	at loss ca	alculated	d monthly	/			•		= 0.33 × (25)m x (5)) 	ı	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		

(38)m= 16.52	16.32	16.12	15.13	14.93	13.94	13.94	13.75	14.34	14.93	15.33	15.72		(38)
` ′		L	13.13	14.93	13.94	13.94	13.73			l	15.72		(30)
Heat transfe		53.54	52.55	52.35	51.36	51.36	51.16	51.76	= (37) + (3 52.35	52.75	53.14		
(00)111=	00.71	00.01	02.00	02.00	01.00	01.00	01.10			Sum(39) ₁	<u> </u>	52.5	(39)
Heat loss pa	rameter (I	HLP), W	m²K						= (39)m ÷				_
(40)m= 0.89	0.89	0.89	0.87	0.87	0.85	0.85	0.85	0.86	0.87	0.87	0.88		_
Number of d	avs in mo	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	0.87	(40)
Jan	i	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 he	ating ene	rgy requ	irement:								kWh/ye	ear:	
Assumed so	ou no nov	NI											(40)
Assumed oc if TFA > 1	3.9, N = 1		[1 - exp	(-0.0003	349 x (TF	A -13.9)2)] + 0.0	0013 x (ΓFA -13.		99		(42)
if TFA £ 1: Annual avera	,	ater usad	ae in litre	es per da	ıv Vd.av	erage =	(25 x N)	+ 36		81	.49		(43)
Reduce the ann	ual average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		.70		(10)
not more that 1.						<u> </u>							
Jan Hot water usag		Mar r day for ea	Apr	May	Jun	Jul Table 1c x	Aug	Sep	Oct	Nov	Dec		
	'	83.12	79.86	76.6	73.34	73.34	76.6	79.86	83.12	86.38	89.64		
(44)m= 89.64	00.30	03.12	79.00	76.6	73.34	73.34	70.0			m(44) ₁₁₂ =	L	977.9	(44)
Energy content	of hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x E	OTm / 3600			. ,	L	077.0	(```
(45)m= 132.9	3 116.27	119.98	104.6	100.36	86.61	80.25	92.09	93.19	108.61	118.55	128.74		
If in atomton a cur	water beet	na ot noint	of upo (no	hot water	· otorogo)	antar O in	havea (16		Γotal = Su	m(45) ₁₁₂ =	=	1282.18	(45)
If instantaneous			·			1		` '	40.00	17.70	1004		(46)
(46)m= 19.94 Water storage		18	15.69	15.05	12.99	12.04	13.81	13.98	16.29	17.78	19.31		(46)
Storage volu) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community	heating a	and no ta	ınk in dw	velling, e	nter 110	litres in	(47)						
Otherwise if		hot wate	er (this in	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storag		eclared I	oss facto	or is kno	wn (kWh	n/day).					0		(48)
Temperature				01 10 1410	("uay).					0		(49)
Energy lost f				ear			(48) x (49)) =			10		(50)
b) If manufa	cturer's d	eclared o	cylinder l	loss fact									, ,
Hot water sto	•			le 2 (kW	h/litre/da	ıy)				0.	02		(51)
If community Volume factor	_		011 4.3							1	.03		(52)
Temperature			2b							—	.6		(53)
Energy lost f	rom wate	r storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	1.	.03		(54)
Enter (50) o	r (54) in (55)								1.	03		(55)
Water storag	je loss cal	culated	for each	month			((56)m = (55) × (41)ı	m				
(56)m= 32.01		32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder conta	ins dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	хН	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)

Primary circuit loss (annual) from	om Table 3			0		(58)
Primary circuit loss calculated		(58) ÷ 365 × (41)m			
(modified by factor from Tab	ole H5 if there is solar wa	ater heating and	a cylinder thermo	stat)		
(59)m= 23.26 21.01 23.26	22.51 23.26 22.51	23.26 23.26	22.51 23.26	22.51 2	23.26	(59)
Combi loss calculated for each	n month (61)m = (60) ÷ 3	365 × (41)m				
(61)m= 0 0 0	0 0 0	0 0	0 0	0	0	(61)
Total heat required for water h	neating calculated for ea	ch month (62)m :	= 0.85 × (45)m +	(46)m + (5	 7)m + (59)m + (61)m	
(62)m= 188.21 166.19 175.25	158.09 155.64 140.1	135.53 147.37	146.69 163.88	ì í	184.02	(62)
Solar DHW input calculated using App			I L O' if no solar contribut	ļļ_	l neating)	
(add additional lines if FGHRS	· · · · · ·					
(63)m = 0 0 0	0 0 0	0 0	0 0	0	0	(63)
Output from water heater		<u> </u>	1	ļl		
(64)m= 188.21 166.19 175.25	158.09 155.64 140.1	135.53 147.37	146.69 163.88	172.05 1	184.02	
(0.7)	1	-	put from water heate			(64)
Heat gains from water heating	. kWh/month 0.25 ′ [0.8], ,
(65)m= 88.42 78.6 84.11	77.57 77.59 71.59	70.91 74.84	73.78 80.33		87.03	(65)
` '	 			<u> </u>		(00)
include (57)m in calculation	. ,	is in the aweiling	or not water is if	om commu	unity neating	
5. Internal gains (see Table !	,					
Metabolic gains (Table 5), Wa		1 1 .				
Jan Feb Mar	Apr May Jun	Jul Aug	Sep Oct	Nov	Dec	(0.0)
(66)m= 99.56 99.56 99.56	99.56 99.56 99.56	99.56 99.56	99.56 99.56	99.56	99.56	(66)
Lighting gains (calculated in A	```	or L9a), also see	Table 5			
(67)m= 15.49 13.76 11.19	8.47 6.33 5.35	5.78 7.51	10.08 12.8	14.94 1	15.93	(67)
Appliances gains (calculated in	n Appendix L, equation I	L13 or L13a), als	o see Table 5			
(68)m= 173.8 175.61 171.06	161.39 149.17 137.69	130.03 128.22	132.77 142.44	154.66 1	166.13	(68)
Cooking gains (calculated in A	ppendix L, equation L15	5 or L15a), also s	ee Table 5			
(69)m= 32.96 32.96 32.96	32.96 32.96 32.96	32.96 32.96	32.96 32.96	32.96	32.96	(69)
Pumps and fans gains (Table	5a)	•		-		
(70)m = 0 0 0	0 0 0	0 0	0 0	0	0	(70)
Losses e.g. evaporation (nega	ative values) (Table 5)	•	•	•		
(71)m= -79.65 -79.65 -79.65	-79.65 -79.65 -79.65	-79.65 -79.65	-79.65 -79.65	-79.65	79.65	(71)
Water heating gains (Table 5)	.1 1		ļ l	I		
(72)m= 118.85 116.96 113.06	107.74 104.29 99.43	95.3 100.59	102.47 107.97	114.19 1	116.97	(72)
Total internal gains =	 	<u> </u>	+ (69)m + (70)m + (7	<u> </u>		
(73)m= 361.01 359.2 348.18	, , , , , , , , , , , , , , , , , , , 	, , , , , , , , , , , , , , , , , , , 	298.19 316.08	<u> </u>	351.9	(73)
6. Solar gains:	9:210: 200:0	200.00	200.10	000.00	50.1.0	
Solar gains are calculated using sola	ar flux from Table 6a and asso	ciated equations to c	onvert to the applicat	ole orientation	1.	
Orientation: Access Factor		ux	g_	FF	Gains	
Table 6d				able 6c	(W)	
Southeast 0.9x 0.77 x	6.09 ×	36.79 ×	0.63 ×	0.7	= 68.48	(77)
Southeast 0.9x 0.77 x		62.67 X	0.63 x	0.7	= 116.65](77)
0.11 ×		<u></u> "		0.7		1, ,

Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest0.9x 0.77 x 4.0 S	ch month 473.96 4 = (73)m + (8 786.63 7 g season) in the living	(83)m , watts 771.86 740.9	409.05 698.24	Sum(74)m 5 351.18 4 649.37		157.99	112.06 463.96	21	(83) (84)
Southeast 0.9x	ch month 473.96 4 = (73)m + (8 786.63 7	(83)m , watts 771.86 740.9	83)m = 409.05	Sum(74)m 5 351.18 4 649.37	.(82)m 253.46	157.99			(84)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest0.9x 0.77 x 4.0 S	ch month 473.96 4 = (73)m + (8	476.51 456.92 (83)m , watts	83)m = 409.05	Sum(74)m 5 351.18	.(82)m 253.46	157.99			
Southeast 0.9x	ch month 473.96 4	476.51 456.92	83)m =	Sum(74)m	.(82)m		112.06		(83)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest0.9x 0.77 x 4.0 S	.92 x	(8	83)m =	Sum(74)m	.(82)m		112.06		(83)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0	92 x		_			0.7			
Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 2.9		9.21	× L	0.03	J ^ L	0.1			
Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 2.9				0.63	X	0.7	=	8.22	(81)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0 Southwest 0.9x 0.77 x 2.3	no I v		X	0.63]	0.7	=	12.67	(81)
Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southwest 0.9x 0.77 x 6.6 Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 2.5 <td< td=""><td>.92 ×</td><td></td><td>X</td><td>0.63</td><td>]</td><td>0.7</td><td>_ = </td><td>25.05</td><td>(81)</td></td<>	.92 ×		X	0.63]	0.7	_ =	25.05	(81)
Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southwest 0.9x 0.77 x 6.6 Southwest 0.9x 0.77 x 6.6 Southwest 0.9x 0.77 x 6.6 Southwest 0.9x 0.77 x 4.6 Southwest 0.9x 0.77 x 4.7	.92 ×		X	0.63] x [0.7	=	44.99	(81)
Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southwest 0.9x 0.77 x 4.6 Southwest 0.9x 0.77 x 4. Northwest 0.9x 0.77 x 2.9 <td< td=""><td>.92 ×</td><td></td><td>X</td><td>0.63</td><td>] x [</td><td>0.7</td><td>=</td><td>64.81</td><td>(81)</td></td<>	.92 ×		X	0.63] x [0.7	=	64.81	(81)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0	.92 ×		X	0.63]	0.7	=	81.3	(81)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0	.92 ×	97.38	Х	0.63	_ x _	0.7	=	86.9	(81)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0	.92 ×	91.35	x	0.63] × [0.7	=	81.52	(81)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0	.92 x	67.96	X	0.63	_ x _	0.7	=	60.64	(81)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0	.92 x	41.38	X	0.63] x [0.7	=	36.93	(81)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0	.92 ×	22.97	X	0.63	_ x _	0.7	=	20.5	(81)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 4.0 Southwest0.9x 0.77 x 4.0	2.92 ×	11.28	X	0.63	_ x _	0.7	=	10.07	(81)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest0.9x 0.77 x 4.0	4.7 ×	31.49		0.63	_ x _	0.7	=	45.23	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest0.9x 0.77 x 4.0	4.7 ×	44.07		0.63	_ x _	0.7	=	63.3	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest0.9x 0.77 x 4.	4.7 ×	69.27		0.63	x	0.7	=	99.49	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest0.9x 0.77 x 4.0	4.7 ×	92.85		0.63	x	0.7	=	133.37	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest0.9x 0.77 x 4.	4.7 ×	104.39		0.63	x	0.7	=	149.94	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest0.9x 0.77 x 4.	4.7 ×	113.91		0.63	_ x [0.7	=	163.62	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0	4.7 ×	118.15		0.63] x [0.7	=	169.71	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.	4.7 ×	119.01	Ē	0.63] × [0.7	=	170.94	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4.	4.7 ×	106.25	Ē	0.63	x	0.7	=	152.62	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0	4.7 ×	85.75	F	0.63] × [0.7		123.17	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0	4.7 ×		F	0.63]	0.7	=	90.02	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0	4.7 ×		F	0.63]	0.7	= =	52.85	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0	3.09 X		x	0.63	」^L 1 _× 「	0.7		58.6	(77)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0	i.09 x		x	0.63	」^L 1 _× 「	0.7		82.02	(77)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0	3.09 ×		x F	0.63	」^L 1 _× 「	0.7		128.92	= (//) (77)
Southeast 0.9x			^ _ x	0.63	」^L 1 × 「	0.7		172.81	(77)
Southeast 0.9x 0.77 x 6.0			х <u>Г</u>	0.63	」 ^	0.7	=	194.29	(77)
Ozvitle z z z 4			^ <u>Г</u>	0.63	」^L 1 × 「	0.7	= -	219.9	(77)
	i.09 ×		^ _	0.63	」×L Tx「	0.7		221.5	(77)
Courth a cost a c	i.09 ×		x L	0.63	Ϳ × L ͻ ͺͺ	0.7	= 	197.75	(77)
Occusto a cost	5.09 X		x	0.63	」 ×	0.7	╡ -	159.6	(77)

(86)m= 0.9	97 0.93	0.87	0.75	0.59	0.42	0.3	0.34	0.53	0.8	0.94	0.97		(86)
Mean inte	ernal tempe	rature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	' in Table	e 9c)					
(87)m= 20	.03 20.28	20.56	20.82	20.95	20.99	21	21	20.97	20.8	20.38	19.99		(87)
Temperat	ure during h	neating p	eriods ir	rest of	dwelling	from Ta	ble 9, Ti	h2 (°C)					
(88)m= 20	.17 20.18	20.18	20.19	20.2	20.21	20.21	20.21	20.2	20.2	20.19	20.18		(88)
Utilisation	factor for g	ains for	rest of d	welling,	h2,m (se	e Table	9a)						
(89)m= 0.9	96 0.92	0.85	0.72	0.55	0.37	0.25	0.28	0.48	0.76	0.92	0.97		(89)
Mean_inte	ernal tempe	rature in	the rest	of dwelli	ng T2 (f	ollow ste	ps 3 to 7	7 in Tabl	e 9c)				
(90)m= 18	19.24	19.63	19.99	20.14	20.2	20.21	20.21	20.18	19.97	19.41	18.84		(90)
								1	LA = Livin	g area ÷ (4	4) =	0.44	(91)
Mean inte	ernal tempe	rature (fo	r the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	A) × T2					
(92)m= 19		20.04	20.35	20.5	20.55	20.56	20.56	20.53	20.34	19.84	19.35		(92)
· · · · · - · ·	ustment to t	1	r		r				·				(00)
(93)m= 19	heating req	20.04	20.35	20.5	20.55	20.56	20.56	20.53	20.34	19.84	19.35		(93)
	the mean in			re obtain	ed at ste	en 11 of	Table 9	so tha	t Ti m=(76)m an	d re-calc	ulate	
	tion factor f						1 4510 01	5, 00 tria					
	an Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	factor for g	r	r		I				<u> </u>	I	ı		(0.4)
(94)m= 0.9		0.85	0.72	0.56	0.39	0.27	0.3	0.5	0.77	0.92	0.96		(94)
(95)m= 469	ins, hmGm 0.79 536.92	, vv = (94 566.33	537.01	442.7	303.05	202.92	212.18	325.06	438.84	454.12	446.31		(95)
` '	verage exte	l .	l					020.00	100.01		1.0.01		()
(96)m= 4.		6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss	rate for me	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]		,		
(97)m= 814		725.02	601.93	460.68	305.71	203.32	212.81	333	509.67	672	805.28		(97)
Space he (98)m= 256	ating requir	ement fo			i)m – (95 0			267.00		
(98)III= 256	0.41 173.67	116.07	46.74	13.38	0	0	0 Tota		52.7	156.87 r) = Sum(9	267.08	1084.92	(98)
Casas ha	oting roquir	omant in	Id M/b/pp3	2hroor			Tota	i per year	(KVVII/yeai) = Sum(9	0)15,912 =		╡
·	ating requir											17.98	<u>(99)</u>
•	requireme		· ·	Ĭ			ina prov	idad by	a aamm	unitu ook	2000		
	s used for sp space heat									unity Scr	ieme.	0	(301)
Fraction of	space heat	from co	mmunity	system	1 – (30	1) =						1	(302)
	ity scheme ma		•	•	,	,	allows for	CHP and i	up to four (other heat	sources; ti	he latter	
includes boile	ers, heat pump	s, geotherr	mal and wa	aste heat f					•		, I		_
Fraction of	heat from (Commun	ity boiler	S								1	(303a)
Fraction of	total space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor for	control and	charging	method	(Table	4c(3)) fo	r commu	ınity hea	iting sys	tem			1	(305)
Distribution	n loss factor	(Table 1	12c) for o	commun	ity heatii	ng syste	m					1.05	(306)
Space hea	ating										!	kWh/year	_
Annual spa	ace heating	requiren	nent									1084.92	

Space heat from Community boilers		(98) x (304a) x	(305) x (306) =	1139.16	(307a)
Efficiency of secondary/supplementary	heating system in %	(from Table 4a or Apper	ndix E)	0	(308)
Space heating requirement from secon	dary/supplementary s	ystem (98) x (301) x 1	100 ÷ (308) =	0	(309)
Water heating					_
Annual water heating requirement				1933.02	
If DHW from community scheme: Water heat from Community boilers		(64) x (303a) x	(305) x (306) =	2029.67	(310a)
Electricity used for heat distribution		0.01 × [(307a)(307	7e) + (310a)(310e)] =	31.69	(313)
Cooling System Energy Efficiency Ration	0			0	(314)
Space cooling (if there is a fixed cooling	g system, if not enter	$= (107) \div (314)$) =	0	(315)
Electricity for pumps and fans within dv mechanical ventilation - balanced, extra		om outside		128.36	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	0b) + (330g) =	128.36	(331)
Energy for lighting (calculated in Apper	ndix L)			273.64	(332)
Total delivered energy for all uses (307	') + (309) + (310) + (3	12) + (315) + (331) + (33	32)(237b) =	3570.84	(338)
12b. CO2 Emissions – Community hea	ting scheme				
12b. CO2 Emissions – Community hea	ting scheme	Energy kWh/year	Emission factor	Emissions kg CO2/year	
CO2 from other sources of space and vertice of heat source 1 (%)	water heating (not CH	kWh/year	kg CO2/kWh	kg CO2/year	(367a)
CO2 from other sources of space and v	water heating (not CH	kWh/year P)	kg CO2/kWh	kg CO2/year	(367a) (367)
CO2 from other sources of space and vertice Efficiency of heat source 1 (%)	water heating (not CH	kWh/year P) using two fuels repeat (363) to	kg CO2/kWh (366) for the second fu	kg CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%) CO2 associated with heat source 1	water heating (not CH If there is CHP u	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52	kg CO2/year el 96 = 712.99	(367)
CO2 from other sources of space and vertical energy for heat distribution	water heating (not CH If there is CHP to [(307	kWh/year P) using two fuels repeat (363) to (367b) x (313) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52	kg CO2/year el 96 = 712.99 = 16.45	(367)
CO2 from other sources of space and vertical energy for heat distribution Total CO2 associated with community seems of space and vertical energy for heat distribution	water heating (not CH If there is CHP to [(307) systems econdary)	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(376) (309) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52	kg CO2/year el 96 = 712.99 = 16.45 = 729.43	(367) (372) (373)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so	water heating (not CH If there is CHP to [(307) systems econdary) rsion heater or instanta	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(376) (309) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52	kg CO2/year el 96 = 712.99 = 16.45 = 729.43 = 0	(367) (372) (373) (374)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community and CO2 associated with space heating (see CO2 associated with water from immerse)	water heating (not CH If there is CHP to [(307) systems econdary) rsion heater or instanta water heating	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(373) (309) x aneous heater (312) x (373) + (374) + (375) =	kg CO2/kWh 0 (366) for the second fu 0.22 0.52 0 0.22	kg CO2/year el 96 = 712.99 = 16.45 = 729.43 = 0 = 0	(367) (372) (373) (374) (375)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community and CO2 associated with space heating (see CO2 associated with water from immeratoral CO2 associated with space and verifications.	water heating (not CH If there is CHP to [(307) systems econdary) rsion heater or instanta water heating ups and fans within dw	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(373) (309) x aneous heater (312) x (373) + (374) + (375) =	kg CO2/kWh 0 (366) for the second fu 0.22 0.52 0 0.22	kg CO2/year el 96 = 712.99 = 16.45 = 729.43 = 0 = 0	(367) (372) (373) (374) (375) (376)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community of the commun	water heating (not CH If there is CHP to [(307) systems econdary) rsion heater or instanta water heating ups and fans within dw ing sum of (376)(382) =	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(37) (309) x aneous heater (312) x (373) + (374) + (375) = relling (331)) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52 0 0.22	kg CO2/year el 96 = 712.99 = 16.45 = 729.43 = 0 = 0 729.43 = 66.62	(367) (372) (373) (374) (375) (376) (378)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community of the commun	water heating (not CH If there is CHP to [(307) systems econdary) rsion heater or instanta vater heating ups and fans within dw ing	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(37) (309) x aneous heater (312) x (373) + (374) + (375) = relling (331)) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52 0 0.22	kg CO2/year el 96 = 712.99 = 16.45 = 729.43 = 0	(367) (372) (373) (374) (375) (376) (378) (379)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 06 December 2021 at 10:56:35*

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 48.96m²

Site Reference: Highgate Road - GREEN

Plot Reference: 02 - A

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 19.27 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 16.43 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 45.7 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 37.5 kWh/m²

OK

2 Fabric U-values

 Element
 Average
 Highest

 External wall
 0.17 (max. 0.30)
 0.18 (max. 0.70)
 OK

 Party wall
 0.00 (max. 0.20)
 OK

Floor (no floor) Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ок
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	5.45m ²	
Windows facing: South East	6.09m ²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		Lleo	r Details:						
Access an Name	No: Unabore	USE		- M	L		CTDO	010010	
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Stroma Softwa					010943 on: 1.0.5.50	
Contware Hame.	Ottoma 1		ty Address:		31011.		7 01010	7.0.0.00	
Address :		·							
1. Overall dwelling dime	ensions:								
Ground floor		A	rea(m²)	(10) v		ight(m)	(2a) =	Volume(m³	(3a)
	-) . (41-) . (4 -) . (4 -1) . (4 -)	. (4.5)		(1a) x	2	65	(2a) =	129.74	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	+(1h)	48.96	(4)	\	I) (O)	(0.)		_
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	129.74	(5)
2. Ventilation rate:	main sec	condary	other		total			m³ per hou	r
Number of altimospess	heating he	ating		,			40 =	-	_
Number of chimneys			0] = [0			0	(6a)
Number of open flues	0 +	0 +	0] = [0		20 =	0	(6b)
Number of intermittent fa				Ĺ	0		10 =	0	(7a)
Number of passive vents	i			L	0	X '	10 =	0	(7b)
Number of flueless gas fi	ires				0	X 4	40 =	0	(7c)
							Air ch	nanges per ho	our
Infiltration due to chimne	ovs flues and fans = (6a)	+(6b)+(7a)+(7b)+(7c) =	Г	0		÷ (5) =	0	(8)
•	peen carried out or is intended,			ontinue fr			- (3) =	0	(0)
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	0.25 for steel or timber fra present, use the value correspo			•	ruction			0	(11)
deducting areas of openii		maing to the gr	ealer wan are	a (anter					
If suspended wooden f	floor, enter 0.2 (unsealed	d) or 0.1 (se	aled), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
ŭ	s and doors draught strip	pped						0	(14)
Window infiltration			0.25 - [0.2		_	. (45)		0	(15)
Infiltration rate	aro avaraged in subject		(8) + (10)	, , ,	, , ,	, ,		0	(16)
If based on air permeabil	q50, expressed in cubic	•	•	•	etre or e	envelope	area	3	(17)
•	es if a pressurisation test has b				is beina u	sed		0.15	(18)
Number of sides sheltere				,	3			0	(19)
Shelter factor			(20) = 1 -	0.075 x (1	19)] =			1	(20)
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.15	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May	Jun Ju	l Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4								
	1.23 1.1 1.08	0.95 0.95	5 0.92	1	1.08	1.12	1.18		
								I	

Adjusted infiltr	ation rat	e (allowi	na for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18]	
Calculate effec	l				_						1	l 	
If mechanica	al ventila	ition:										0.5	(23a)
If exhaust air h	eat pump	using Appe	endix N, (2	3b) = (23a	ı) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			0.5	(23b)
If balanced with	heat reco	overy: effici	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				75.65	(23c)
a) If balance	d mech	anical ve	ntilation	with hea	at recove	ery (MVI	HR) (24a	a)m = (22)	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(24a)
b) If balance	d mech	anical ve	ntilation	without	heat red	covery (N	ЛV) (24b	m = (22)	2b)m + (23b)		1	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole h if (22b)n		tract ven (23b), t		•	-				.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural if (22b)n		on or when (24d)			•				0.5]	-			
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	change	rate - er	iter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)	-	-	-		
(25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25)
3. Heat losse	s and he	eat loss r	paramete	ėr.									
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/		k-value kJ/m²-l		X k J/K
Windows Type		()			5.45		/[1/(1.4)+		7.23				(27)
Windows Type					6.09	ऱ .	/[1/(1.4)+	0.04] =	8.07	=			(27)
Walls Type1	35.	3	11.54	4	23.76		0.18		4.28	╡ ┌	60	1425.	` <i>`</i>
Walls Type2	35.9		0		35.99	=	0.17	=	6.04	륵 ¦	60	2159.	=
Total area of e					71.29	=	0.17		0.04		- 00	2139.	(31)
Party wall		,			14.89	=	0	—	0		45	670.0	`
Party floor						=	0		0	L	40	= ==	=
Party ceiling					48.96	=				L		1958.	=
Internal wall **					48.96	_				Ĺ	30	1468.	=
* for windows and		014/0 1/00 0	ffootivo wi	ndow II ve	96.46		formula 1	/F/1/II val	(0) (0 (0.41)	l So givon in	9 norograph	868.1	4 (32c)
** include the area						ateu using	i ioiiiiuia i	/[(1/ U- vait	1 0)+0.04] a	is giveri iii	parayrapi	1 3.2	
Fabric heat los	ss, W/K :	= S (A x	U)				(26)(30)) + (32) =				25.62	(33)
Heat capacity	Cm = S((Axk)						((28).	(30) + (32	2) + (32a).	(32e) =	8550.39	(34)
Thermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	ı kJ/m²K			= (34)	÷ (4) =			174.64	(35)
For design assess can be used inste				constructi	ion are noi	t known pr	ecisely the	e indicative	e values of	TMP in Ta	able 1f		
Thermal bridge	es : S (L	x Y) cal	culated ı	using Ap	pendix l	<						6.09	(36)
if details of therma Total fabric he		are not kn	own (36) =	= 0.05 x (3	1)			(33) +	(36) =			31.71	(37)
Ventilation hea	at loss ca	alculated	l monthly	/				(38)m	= 0.33 × ((25)m x (5))		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 13.4	13.24	13.08	12.28	12.12	11.31	11.31	11.15	11.64	12.12	12.44	12.76		(38)
Heat transfer of	coefficie	nt, W/K						(39)m	= (37) + (38)m			
(39)m= 45.11	44.95	44.79	43.99	43.83	43.03	43.03	42.87	43.35	43.83	44.15	44.47		
Stroma FSAP 201	2 Version	: 1.0.5.50 (SAP 9.92)	- http://wv	ww.stroma	.com			Average =	Sum(39) ₁	12 /12=	43.9 ⊳ age	2 0 (3/ 9)

Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.92	0.92	0.91	0.9	0.9	0.88	0.88	0.88	0.89	0.9	0.9	0.91		
						•	•	•	Average =	: Sum(40) ₁	12 /12=	0.9	(40)
Number of day	<u> </u>		· ·		l .	Ι			Ι	T			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct 31	Nov	Dec		(41)
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ting ene	rgy requ	rement:								kWh/ye	ear:	
Assumed occurring TFA > 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		.66		(42)
Annual average Reduce the annual not more that 125	al average	hot water	usage by	5% if the c	lwelling is	designed			se target o		3.61		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i								1 7 -		1	30		
(44)m= 80.98	78.03	75.09	72.14	69.2	66.25	66.25	69.2	72.14	75.09	78.03	80.98		
										im(44) ₁₁₂ =		883.37	(44)
Energy content of							OTm / 3600			1			
(45)m= 120.08	105.03	108.38	94.49	90.66	78.23	72.5	83.19	84.18	98.11	107.09	116.29		
If instantaneous v	vater heati	ng at point	of use (no	o hot water	r storage),	enter 0 in	boxes (46		Total = Su	ım(45) ₁₁₂ =	=	1158.23	(45)
(46)m= 18.01	15.75	16.26	14.17	13.6	11.74	10.87	12.48	12.63	14.72	16.06	17.44		(46)
Water storage	1		<u> </u>	<u> </u>	<u> </u>		<u> </u>		<u> </u>		<u> </u>		, ,
Storage volum	ne (litres)) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	-			-			, ,		(01.1	(4 -)			
Otherwise if no Water storage		hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er 'O' in ((47)			
a) If manufact		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature f					`	• ,					0		(49)
Energy lost fro	om watei	r storage	, kWh/ye	ear			(48) x (49)) =		1	10		(50)
b) If manufact			-										
Hot water stor If community h	-			le 2 (kW	h/litre/da	ay)				0.	.02		(51)
Volume factor	•		011 4.5							1.	.03		(52)
Temperature f			2b							-	.6		(53)
Energy lost fro	om watei	r storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	.03		(54)
Enter (50) or	(54) in (5	55)								1.	.03		(55)
Water storage	loss cal	culated	for each	month			((56)m = ((55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where ((H11) is fro	m Append	x H	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit	t loss (ar	nnual) fro	m Table	= 3							0		(58)
Primary circuit	`	,			59)m = ((58) ÷ 36	65 × (41)	m					
(modified by	/ factor f	rom Tab	le H5 if t	here is s	solar wat	ter heati	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi loss calc	sulated f	for each	month ((61)m =	(60) ·	365 × (41)m							
(61)m= 0	0	0	0	0	00) -	0) 0		0	0	T 0	0	1	(61)
Total heat requi													[(50)m + (61)m	(- /
	154.95	163.65	147.98	145.94	131.7		138.	_	137.68	153.38	` 	171.57	(59)III + (61)IIII]	(62)
Solar DHW input ca	Į						<u> </u>						I	(- /
(add additional											mon to wat	or modung)		
(63)m= 0	0	0	0	0	0	0	0	_	0	0	0	0]	(63)
Output from wat	ter heat	:er				I					-1			
· -	154.95	163.65	147.98	145.94	131.7	3 127.77	138.	.47	137.68	153.38	160.59	171.57		
	'							Outp	out from wa	ater heat	er (annual)₁	12	1809.07	(64)
Heat gains from	water l	heating,	kWh/m	onth 0.2	5 ´[0.	85 × (45)m	n + (6	1)m	n] + 0.8 x	c [(46)m	n + (57)m	+ (59)m]	_
(65)m= 84.15	74.86	80.26	74.21	74.37	68.8	1 68.33	71.8	88	70.79	76.84	78.4	82.89]	(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), Wat	ts											
Jan	Feb	Mar	Apr	May	Ju	n Jul	Αι	ug	Sep	Oct	Nov	Dec		
(66)m= 82.98	82.98	82.98	82.98	82.98	82.9	8 82.98	82.9	98	82.98	82.98	82.98	82.98		(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
(67)m= 12.89	11.44	9.31	7.05	5.27	4.45	4.8	6.2	:5	8.38	10.64	12.42	13.24		(67)
Appliances gain	ıs (calcı	ulated in	Append	dix L, eq	uatior	L13 or L1	3a), a	also	see Tal	ble 5	-	-		
(68)m= 144.53	146.03	142.25	134.21	124.05	114.5	108.13	106.	.63	110.41	118.45	128.61	138.16		(68)
Cooking gains (calculat	ted in Ap	pendix	L, equat	ion L	15 or L15a), als	o se	e Table	5	•		•	
(69)m= 31.3	31.3	31.3	31.3	31.3	31.3	31.3	31.	.3	31.3	31.3	31.3	31.3		(69)
Pumps and fans	s gains	(Table 5	ia)											
(70)m= 0	0	0	0	0	0	0	0		0	0	0	0		(70)
Losses e.g. eva	poratio	n (negat	ive valu	es) (Tab	le 5)							-		
(71)m= -66.38	-66.38	-66.38	-66.38	-66.38	-66.3	8 -66.38	-66.	38	-66.38	-66.38	-66.38	-66.38		(71)
Water heating g	ains (T	able 5)									-	-		
(72)m= 113.1	111.4	107.87	103.07	99.95	95.5	7 91.84	96.6	62	98.31	103.28	108.89	111.41		(72)
Total internal g	gains =					66)m + (67)n	n + (68	3)m +	+ (69)m + ((70)m + (71)m + (72))m		
(73)m= 318.42	316.77	307.33	292.22	277.17	262.4	1 252.66	257.	.38	265	280.27	297.82	310.7		(73)
6. Solar gains:														
Solar gains are ca		ŭ	r flux from	Table 6a		·	ations t	to co	nvert to th	e applica		tion.		
Orientation: Ad	ccess Fa able 6d	actor	Area m²			Flux Fable 6a		т	g_ able 6b	_	FF Fable 6c		Gains	
	able ou				_	able ba	, ,	- 1	able ob	_ ,	able oc		(W)	7
Southeast 0.9x	0.77	X	6.0	9	×	36.79	X		0.63	x [0.7	=	68.48	(77)
Southeast 0.9x	0.77	X	6.0	9	X _	62.67	X		0.63	x [0.7	=	116.65	(77)
Southeast 0.9x	0.77	X	6.0	9	X	85.75	X		0.63	×	0.7	=	159.6	(77)
Southeast _{0.9x}	0.77	x	6.0	9	X	106.25	X		0.63	×	0.7	=	197.75	(77)
Southeast 0.9x	0.77	X	6.0	9	x	119.01	X		0.63	X	0.7	=	221.5	(77)

		_					, ,		_				_
Southeast 0.9x	0.77	X	6.0)9	X 1	18.15	X	0.63	X	0.7	=	219.9	(77)
Southeast 0.9x	0.77	X	6.0)9	x 1	13.91	X	0.63	X	0.7	=	212.01	(77)
Southeast 0.9x	0.77	X	6.0)9	X 1	04.39	X	0.63	X	0.7	=	194.29	(77)
Southeast 0.9x	0.77	X	6.0)9	X (92.85	X	0.63	X	0.7	=	172.81	(77)
Southeast 0.9x	0.77	x	6.0)9	X (69.27	x	0.63	X	0.7	=	128.92	(77)
Southeast 0.9x	0.77	x	6.0)9	X	44.07	x	0.63	x	0.7	=	82.02	(77)
Southeast 0.9x	0.77	x	6.0)9	x (31.49	x	0.63	х	0.7	=	58.6	(77)
Southwest _{0.9x}	0.77	x	5.4	15	x :	36.79		0.63	х	0.7	=	61.28	(79)
Southwest _{0.9x}	0.77	x	5.4	15	x (62.67		0.63	х	0.7	=	104.39	(79)
Southwest _{0.9x}	0.77	x	5.4	15	x 8	85.75		0.63	х	0.7	=	142.83	(79)
Southwest _{0.9x}	0.77	x	5.4	15	x 1	06.25		0.63	x	0.7	=	176.97	(79)
Southwest _{0.9x}	0.77	x	5.4	15	x 1	19.01		0.63	x	0.7	=	198.22	(79)
Southwest _{0.9x}	0.77	x	5.4	15	x 1	18.15		0.63	x	0.7	=	196.79	(79)
Southwest _{0.9x}	0.77	x	5.4	15	x 1	13.91]	0.63	x	0.7	_ =	189.73	(79)
Southwest _{0.9x}	0.77	x	5.4	15	x 1	04.39		0.63	x	0.7	=	173.87	(79)
Southwest _{0.9x}	0.77	×	5.4	15	x .	92.85	֓֞֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֡֓֓֓֓֡	0.63	x	0.7	=	154.65	(79)
Southwest _{0.9x}	0.77	×	5.4	ļ5	x (69.27	j	0.63	x	0.7	=	115.37	(79)
Southwest _{0.9x}	0.77	×	5.4	15	x Z	44.07	j	0.63	x	0.7	=	73.4	(79)
Southwest _{0.9x}	0.77	×	5.4	ļ5	x :	31.49	֓֞֞֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֡֓֓֓֓֓֓֡֓֡֓֡	0.63	x	0.7	=	52.45	(79)
Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m (83)m = 129.76 221.04 302.43 374.73 419.72 416.69 401.73 368.16 327.47 244.29 155.43 111.05 (83) Total gains – internal and solar (84)m = (73)m + (83)m, watts (84)m = 448.18 537.81 609.76 666.94 696.89 679.1 654.39 625.54 592.46 524.56 453.25 421.75 (84)													
7. Mean inter	nal temper	ature	(heating	season)								
Temperature	during hea	ting p	eriods ir	n the livii	ng area	from Tal	ble 9,	Th1 (°C)				21	(85)
Utilisation fac				ea, h1,m	(see Ta	able 9a)						7	
Jan		Mar	Apr	May	Jun	Jul	 	ug Sep	Oct		Dec	1	
(86)m= 0.96	0.92	0.84	0.72	0.56	0.4	0.29	0.3	0.49	0.76	0.92	0.97]	(86)
Mean interna	l temperatu	ıre in I	iving are	ea T1 (fo	ollow ste	ps 3 to 7	7 in T	able 9c)				-	
(87)m= 20.14	20.38 2	0.64	20.86	20.96	20.99	21	2	1 20.98	20.85	20.47	20.09		(87)
Temperature	during hea	ting p	eriods ir	n rest of	dwelling	g from Ta	able 9	9, Th2 (°C)					
(88)m= 20.15	20.15 2	0.15	20.17	20.17	20.19	20.19	20.	19 20.18	20.17	20.17	20.16		(88)
Utilisation fac	tor for gain	s for r	est of d	wellina.	h2.m (se	ee Table	9a)			-	•	_	
(89)m= 0.95		0.82	0.68	0.52	0.35	0.24	0.2	0.44	0.72	0.9	0.96]	(89)
Mean interna	l temperati	ıre in 1	the rest	of dwelli	ing T2 (f	follow ste	ne 3	to 7 in Tahl	L a_9c)			J	
(90)m= 19.02		9.72	20.01	20.13	20.18	20.19	20.		20.01	19.51	18.97	1	(90)
. ,	<u> </u>				<u> </u>					/ing area ÷ (ļ	0.5	(91)
Maara la terr	l tower seed			ا- مام	II:\ ′	1 A	. /4	41 A) . TO		`			 ` ′
Mean interna (92)m= 19.58	 	`				ì	Ť		00.40	1 10 00	10.50	1	(02)
134111= 1 19.08							100						
Apply adjustr		0.18 mean	20.43	20.54	20.58	20.59	20.		20.42		19.53]	(92)

												•	
(93)m= 19.58	19.87	20.18	20.43	20.54	20.58	20.59	20.59	20.57	20.42	19.99	19.53		(93)
8. Space hea													
Set Ti to the return the utilisation			•		ned at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac		l	<u> </u>				5						
(94)m= 0.94	0.9	0.82	0.69	0.54	0.38	0.26	0.29	0.47	0.73	0.9	0.95		(94)
Useful gains,	hmGm	, W = (9	4)m x (8	4)m									
(95)m= 423.35	482.65	500.76	463.26	375.66	255.76	171.39	179.24	275.91	384.24	408.09	402.4		(95)
Monthly average	_	T T	-	from T	able 8							ı	
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m– (96)m]											Ī	(07)	
(97)m= 689.14	673.12	612.61	507.26	387.6	257.47	171.63	179.6	280.53	430.55	569.04	681.54		(97)
Space heatin (98)m= 197.75	g require 127.99	83.22	31.68	8.88	vvn/mon	n = 0.02	24 X [(97))m – (95 0)MJ X (4 34.46	1) m 115.88	207.69		
(96)111= 197.73	127.99	03.22	31.00	0.00		U		l per year			l	807.54	(98)
			1.14/1./	.,			TUld	i per year	(KVVII/yeai) = Sum(9	O)15,912 =		╡``
Space heatin	g require	ement in	kvvh/m²	/year								16.49	(99)
9b. Energy red	•		· ·	Ĭ									
This part is use										unity sch	neme.	0	(301)
•	Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none									0	╡`		
Fraction of space heat from community system 1 – (301) =										1	(302)		
The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.													
Fraction of hea		-			rom power	stations.	see Appei	iuix C.				1	(303a)
Fraction of total			-		oilers				(3	02) x (303	a) =	1	(304a)
Factor for cont	rol and	charging	method	(Table	4c(3)) fo	r commu	unity hea	iting syst	tem			1	(305)
Distribution los	s factor	(Table 1	12c) for d	commun	ity heatii	ng syste	m					1.05	(306)
Space heating	a										!	kWh/yea	 r
Annual space	_	requiren	nent									807.54	
Space heat fro	m Comi	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	=	847.92	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (frc	m Table	4a or A	ppendix	E)		0	(308
Space heating	require	ment fro	m secon	dary/suլ	oplemen	tary syst	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water heating	ı												
Annual water h		equirem	ent									1809.07	
If DHW from co													_
Water heat fro		•)3a) x (30		1899.52	(310a)	
Electricity used							0.01	× [(307a).	(307e) +	(310a)((310e)] =	27.47	(313)
Cooling Syster	_	•	•									0	(314)
Space cooling	,					•		= (107) ÷	(314) =			0	(315)
Electricity for p							outoida				İ	404.45	(2202)
mechanical ve	rilliallOff	- paiaii(eu, exilî	act or po	onuve Ifi	out 110111	outside					104.15	(330a)

warm air heating system fans					0	(330b)					
pump for solar water heating					0	(330g)					
Total electricity for the above, kWh/year		=(330a) + (330	b) + (330g) =		104.15	(331)					
Energy for lighting (calculated in Appen		227.56	(332)								
Total delivered energy for all uses $(307) + (309) + (310) + (312) + (315) + (331) + (332)(237b) = 30$											
12b. CO2 Emissions – Community heating scheme											
		Energy kWh/year	Emission factors kg CO2/kWh		missions g CO2/year						
CO2 from other sources of space and v Efficiency of heat source 1 (%)	o (P) sing two fuels repeat (363) to	(366) for the second	d fuel	96	(367a)					
CO2 associated with heat source 1	[(307b	y)+(310b)] x 100 ÷ (367b) x	0.22	=	618.18	(367)					
Electrical energy for heat distribution		[(313) x	0.52	=	14.26	(372)					
Total CO2 associated with community s	systems	(363)(366) + (368)(372	2)	=	632.43	(373)					
CO2 associated with space heating (se	condary)	(309) x	0	=	0	(374)					
CO2 associated with water from immers	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)					
Total CO2 associated with space and w	ater heating	(373) + (374) + (375) =			632.43	(376)					
CO2 associated with electricity for pum	os and fans within dwe	elling (331)) x	0.52	=	54.06	(378)					
CO2 associated with electricity for lighti	ng	(332))) x	0.52	=	118.1	(379)					
Total CO2, kg/year	sum of (376)(382) =				804.59	(383)					
Dwelling CO2 Emission Rate	(383) ÷ (4) =				16.43	(384)					

El rating (section 14)

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:56:21

Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:**

Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 53.46m² Site Reference :

Plot Reference: Highgate Road - GREEN 02 - B

Address:

Client Details:

Name: Address:

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

18.07 kg/m² Target Carbon Dioxide Emission Rate (TER)

Dwelling Carbon Dioxide Emission Rate (DER) 15.38 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 42.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 35.0 kWh/m²

OK

OK

OK

2 Fabric U-values

Element Average Highest 0.18 (max. 0.70) External wall 0.18 (max. 0.30)

Party wall 0.00 (max. 0.20)

Floor (no floor) Roof (no roof)

Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ок
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	ОК
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	ок
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	9.56m²	
Windows facing: North West	3.98m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		l lser I	Details:									
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa	are Ve				010943 on: 1.0.5.50				
Property Address: 02 - B Address:												
Overall dwelling dime	nsions:											
		Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)			
Ground floor			53.46	(1a) x	2	2.65	(2a) =	141.67	(3a)			
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	n) [53.46	(4)								
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	141.67	(5)			
2. Ventilation rate:												
	main seconda heating heating	ry	other		total			m³ per hou	ır			
Number of chimneys	0 + 0	+	0] = [0	X 4	40 =	0	(6a)			
Number of open flues	0 + 0	+	0] = [0	x 2	20 =	0	(6b)			
Number of intermittent fa	ns	_		Ī	0	x 1	10 =	0	(7a)			
Number of passive vents				Ī	0	x 1	10 =	0	(7b)			
Number of flueless gas fi	res			Ē	0	x 4	40 =	0	(7c)			
				L								
				_			Air ch	anges per ho	our —			
•	ys, flues and fans = (6a)+(6b)+(een carried out or is intended, proced			ontinuo fr	0		÷ (5) =	0	(8)			
Number of storeys in the		eu 10 (17),	otrierwise (onunue n	om (9) to	(10)		0	(9)			
Additional infiltration	3 ()					[(9)-	-1]x0.1 =	0	(10)			
	.25 for steel or timber frame o			•	ruction			0	(11)			
if both types of wall are prideducting areas of openir	resent, use the value corresponding t pas): if equal user 0.35	o the grea	ter wall are	a (after								
,	floor, enter 0.2 (unsealed) or ().1 (seal	ed), else	enter 0				0	(12)			
If no draught lobby, en	ter 0.05, else enter 0							0	(13)			
-	s and doors draught stripped							0	(14)			
Window infiltration			0.25 - [0.2	. ,	-	(- - \		0	(15)			
Infiltration rate	250 amaza dia adia adia		(8) + (10)					0	(16)			
•	q50, expressed in cubic metrity value, then $(18) = [(17) \div 20] +$		•	•	etre or e	envelope	area	3	(17)			
•	s if a pressurisation test has been do				is being u	sed		0.15	(10)			
Number of sides sheltere	ed							0	(19)			
Shelter factor			(20) = 1 -		19)] =			1	(20)			
Infiltration rate incorporat	•		(21) = (18) x (20) =				0.15	(21)			
Infiltration rate modified for	 		1 .					1				
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec					
Monthly average wind sp (22)m= 5.1 5	eed from Table 7 4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7	1				
(22)m= 5.1 5	4.3 4.4 4.3 3.8	3.6	3.1	4	4.3	J 4.0	4.1					
Wind Factor (22a)m = (22	2)m ÷ 4							•				
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18					

djusted infiltr	ation rat	e (allowi	ing for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
<i>alculate effe</i> If mechanic		•	rate for t	he appli	cable ca	se	-		-				—
If exhaust air h			endix N (2	3h) = (23a	a) × Fmv (e	equation (N	NS)) other	wise (23h) = (23a)			0.5	=
If balanced with		0		, ,	,	. `	,, .	`) = (20a)			0.5	=
		-	•	_					2h\ma . /	00h) [4 (22-)	75.65	(2
a) If balance 4a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	230) × [0.29	0.3	÷ 100]]	(2
,	<u> </u>	<u> </u>			<u> </u>		<u> </u>				0.3	İ	(2
b) If balance	ea mech	anicai ve	entilation 0	without	neat red	overy (i	0 (24b	0 = (22)	2b)m + (. 0	23b) ₀	0	1	(2
	<u> </u>	<u> </u>							0	0	0	İ	(2
c) If whole h			then (24	•	•				.5 × (23b	o)		_	
4c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
d) If natural if (22b)r			ole hous m = (22		•				0.5]				
4d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
Effective air	change	rate - er	nter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)				I	
5)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(:
									1	1		ı	
3. Heat losse LEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/		k-value kJ/m²-l		X k /K
indows Type		` ,			9.56	x1.	/[1/(1.4)+	0.04] =	12.67	<u></u>			(
indows Type	2				3.98	x ₁ ,	/[1/(1.4)+	0.04] =	5.28	一			(
/alls Type1	40.0	14	13.54	1	26.5	x	0.18		4.77	=	60	1590) (:
/alls Type2	12.1		0		12.16	=	0.17	-	2.04	북 ¦	60	729.6	=
otal area of e					52.2	' ^	0.17		2.04	[729.0	`\ (
arty wall	, ioi i ioi i io	,				=							`
-					27.88		0	=	0		45	1254.6	=
arty floor					53.46	_				Ĺ	70	3742.2	=
arty ceiling					53.46					Į	30	1603.8	3(
ternal wall **					102.0					Ĺ	9	918.27	7(
or windows and include the area						ated using	formula 1	/[(1/U-valu	ıe)+0.04] á	as given in	paragraph	1 3.2	
bric heat los				o ana pan			(26)(30)	+ (32) =				24.76	
eat capacity		•	-,					((28)	(30) + (3	2) + (32a).	(32e) =	9838.47	\exists
nermal mass		,	⊃ = Cm ÷	- TFA) ir	n kJ/m²K			** *	÷ (4) =	, (,	(= = 7	184.03	\exists
r design asses n be used inste	sments wh	ere the de	tails of the	•			ecisely the	` '		TMP in Ta	able 1f	104.03	
ermal bridg				usina An	pendix k	<						6.09	
details of therma					-							0.00	`
otal fabric he			, ,	·	,			(33) +	(36) =			30.85	
entilation hea	at loss ca	alculated	d monthly	/				(38)m	= 0.33 × ((25)m x (5))		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
3)m= 14.63	14.46	14.28	13.41	13.23	12.35	12.35	12.18	12.7	13.23	13.58	13.93		(
eat transfer o	coefficie	nt, W/K						(39)m	= (37) + (38)m			
		-											
9)m= 45.49	45.31	45.14	44.26	44.08	43.21	43.21	43.03	43.56	44.08	44.43	44.78		

Author	Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
Number of days in month (Table 1a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	(40)m= 0.85	0.85	0.84	0.83	0.82	0.81	0.81	0.8	0.81	0.82	0.83	0.84		
A.		!	!							Average =	Sum(40) ₁	12 /12=	0.83	(40)
4. Water heating energy requirement. **RWh/year:** Assumed occupancy, N if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) Annual average not value use transported by for each month Vd,m = factor from Table 2 to x (43) (44)me		<u> </u>							-			T _ 1		
### Assumed occupancy, N 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 had water usage in litres per day Vd.average = (25 x N) + 36 ### Reduce the annual varage had value 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, hor and cold) ### Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ### Hot water usage in litres per day for each month Vol.m = factor from Table 1c x (43) ### Hot water usage in litres per day for each month Vol.m = factor from Table 1c x (43) ### Hot water usage in litres per day for each month Vol.m = factor from Table 1c x (44) ### Hot water usage in litres per day for each month Vol.m = factor from Table 1c x (43) ### Hot water usage in litres per day for each month Vol.m = factor from Table 1c x (43) ### Hot water usage in litres per day for each month Vol.m = factor from Table 1c x (43) ### Hot water usage in litres per day for each month Vol.m = factor from Table 1c x (43) ### Hot water usage in litres per day for each month Vol.m = factor from Table 2b ### Hot water usage in litres per day for each month Vol.m = factor from Table 2b ### Hot water usage in litres per day for each month Vol.m = factor from Table 2b ### Hot water usage in litres per day for each month Vol.m = factor from Table 2b ### Hot water usage in litres per day for each month Vol.m = factor from Table 2b ### Hot water storage loss: ### Hot water usage in litres per day for each month Vol.m = factor from Table 2b ### Hot water storage loss calculated for each month ### Hot water storage loss calculated for each month ### Hot water storage loss calculated for each month ### Hot water storage loss calculated for each month ### Hot water storage loss calculated for each month ### Hot water storage loss calculated for each month ### Hot water storage loss calculated for each month ### Hot water storage loss calc		-	_	<u> </u>	– –		-	Ť		-	 	\vdash		
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Assumed occupancy, N 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 E 13.9, N = 1														
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 Reduce the annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day Vd, average a contained to a chieve a water use target or not more that 125 litres per persons per day (if water us, hot and colors) Jan	4. Water hea	ting ene	rgy requi	rement:								kWh/ye	ar:	
Annual average hot water usage in litres per day Vd,average = (25 x N) + 36	if TFA > 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (¯	TFA -13		79		(42)
Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43) (44)m = 84.44 81.37 78.3 75.23 72.16 69.09 69.09 72.16 75.23 78.3 81.37 84.44 Total = Sum(44), vo = 921.15 (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) (46)m = 125.22 109.52 113.01 88.63 94.54 81.58 75.6 86.75 87.78 102.3 111.67 121.27 Total = Sum(45), vo = 120.778 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m = 18.78 16.43 16.95 14.78 14.18 12.24 11.34 13.01 13.17 15.35 16.75 18.19 (46)m = 18.78 16.43 16.95 14.78 14.18 12.24 11.34 13.01 13.17 15.35 16.75 18.19 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Chemisse if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2b Energy lost from water storage, kWh/year (48) x (49) = 110 (50) (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) (51) If community heating see section 4.3 Volume factor from Table 2b (52) 1.03 (52) Temperature factor from Table 2b (53) 1.03 (52) Temperature factor from Table 2b (54) 1.03 (52) Temperature factor from Table 2b (55) (41)m (56)m = (55) x (41)m (56)m = (32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 10.98 32.01 (57) Primary circuit loss (annual) from Table 3 Primary circuit loss calculated for each month (59)m = (58) + 365 x (41)m (modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)	Annual averag	ge hot wa al average	hot water	usage by	5% if the α	lwelling is	designed i	` ,		se target o		5.76		(43)
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(45)me	` '		l .				l .	<u> </u>		I Total = Su	ım(44) ₁₁₂ =	=	921.15	(44)
Total = Sum(45) 1	Energy content of	f hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
## instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ## (46)me	(45)m= 125.22	109.52	113.01	98.53	94.54	81.58	75.6	86.75	87.78	102.3	111.67	121.27		
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Storage volume (litres) including any solar or WWHRS storage within same vessel	` '		16.95	14.78	14.18	12.24	11.34	13.01	13.17	15.35	16.75	18.19		(46)
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b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year Enter (50) or (54) in (55) Water storage loss calculated for each month $((56)m = 32.01 28.92 32.01 30.98 32.01 30.9$	Temperature f	actor fro	m Table	2b								0		(49)
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If cylinder contains dedicated solar storage, $(57)m = (56)m \times [(50) - (H11)] \div (50)$, else $(57)m = (56)m$ where $(H11)$ is from Appendix H $(57)m = 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (57)$ Primary circuit loss (annual) from Table 3 Primary circuit loss calculated for each month $(59)m = (58) \div 365 \times (41)m$ (modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)	(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
Primary circuit loss (annual) from Table 3 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)	` '												хН	. ,
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)	(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
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)		loce (c	nual\ fra	m Toble	. 2		ı	ı		ı		<u> </u>		(58)
(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)	•	,	,			59)m = 4	(58) ± 36	35 × (41)	ım			·		(50)
	-				,	•	` '	, ,		r thermo	stat)			
(**/	(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi loss c	alculated	for each	month ((61)m =	(60) ÷ 3	365 × (41)m						
(61)m= 0	0	0	0	0	0	0	0	0	0	То	0	1	(61)
	 auired for	water h	eating ca	Lulated	L I for eac	h month	(62)n	n = 0.85 x	 (45)m +	(46)m +	(57)m +	ו - (59)m + (61)m	
(62)m= 180.5	-	168.29	152.02	149.82	135.07		142.0		157.58	165.17	176.55]	(62)
Solar DHW inpu	it calculated	using App	endix G oı	· Appendix	H (nega	tive quantity	y) (ente	r '0' if no sola	ar contribu	tion to wate	r heating)) T	
(add addition											•		
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(63)
Output from	water hea	ter				•	•	•	•	•	•	•	
(64)m= 180.5	159.45	168.29	152.02	149.82	135.07	130.87	142.0	2 141.28	157.58	165.17	176.55]	
				•	•	•		Output from w	ater heate	er (annual)	l12	1858.62	(64)
Heat gains fr	om water	heating,	kWh/m	onth 0.2	5 ´ [0.8	5 × (45)m	ı + (61)m] + 0.8	x [(46)m	+ (57)m	+ (59)m	ı]	
(65)m= 85.86	76.36	81.8	75.56	75.66	69.92	69.36	73.0	7 71.98	78.24	79.93	84.54]	(65)
include (57	7)m in calc	culation	of (65)m	only if c	ylinder	is in the	dwelli	ng or hot w	ater is f	rom com	munity h	neating	
5. Internal	gains (see	Table 5	and 5a):									
Metabolic ga	ins (Table	5), Wat	ts										
Jan		Mar	Apr	May	Jun	Jul	Au	g Sep	Oct	Nov	Dec]	
(66)m= 89.61	89.61	89.61	89.61	89.61	89.61	89.61	89.6	1 89.61	89.61	89.61	89.61]	(66)
Lighting gain	s (calculat	ted in Ap	pendix	L, equat	ion L9 d	or L9a), a	ılso se	e Table 5				-	
(67)m= 13.93	12.37	10.06	7.62	5.69	4.81	5.19	6.75	9.06	11.5	13.43	14.31]	(67)
Appliances g	ains (calc	ulated ir	Append	dix L, eq	uation l	_13 or L1	3a), a	lso see Ta	ble 5		-	-	
(68)m= 156.2°	1 157.83	153.74	145.05	134.07	123.75	116.86	115.2	24 119.33	128.02	139	149.32]	(68)
Cooking gain	ns (calcula	ted in A	ppendix	L, equat	ion L15	or L15a), also	see Table	e 5		-	_	
(69)m= 31.96	31.96	31.96	31.96	31.96	31.96	31.96	31.9	6 31.96	31.96	31.96	31.96]	(69)
Pumps and fa	ans gains	(Table 5	āa)										
(70)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(70)
Losses e.g. e	evaporatio	n (nega	tive valu	es) (Tab	le 5)							_	
(71)m= -71.68	3 -71.68	-71.68	-71.68	-71.68	-71.68	-71.68	-71.6	8 -71.68	-71.68	-71.68	-71.68]	(71)
Water heatin	g gains (T	able 5)										_	
(72)m= 115.4	113.63	109.94	104.94	101.69	97.11	93.22	98.2	1 99.98	105.16	111.01	113.63]	(72)
Total interna	al gains =				(66	6)m + (67)m	n + (68)	m + (69)m +	(70)m + (7	71)m + (72))m	_	
(73)m= 335.42	2 333.71	323.63	307.48	291.33	275.55	265.16	270.0	08 278.24	294.57	313.32	327.14]	(73)
6. Solar gai													
Solar gains are		ŭ					ations to		ne applica		tion.		
Orientation:	Access F Table 6d	actor	Area m²			ux able 6a		g_ Table 6b	Т	FF able 6c		Gains (W)	
Couthwoots							1 -					. ,	7,
Southweston		X	9.5		-	36.79] <u> </u>	0.63	×	0.7	=	107.5	(79)
Southwesters	<u> </u>	X	9.5			62.67	ļ ļ	0.63	×	0.7	=	183.11](79)
Southwesto o	<u> </u>	X	9.5			85.75]	0.63	×	0.7	=	250.54	_ (79) _ (70)
Southweston		X	9.5	_		106.25] <u> </u>	0.63	×	0.7	=	310.43	(79)
Southwest _{0.9x}	0.77	X	9.5	56	X	119.01	J L	0.63	Х	0.7	=	347.71	(79)

								_		_				
Southwest _{0.9x}	0.77	X	9.5	66	X	1	18.15	_	0.63	X	0.7	=	345.19	(79)
Southwest _{0.9x}	0.77	X	9.5	56	X	1	13.91]	0.63	X	0.7	=	332.8	(79)
Southwest _{0.9x}	0.77	X	9.5	56	X	1	04.39		0.63	X	0.7	=	304.99	(79)
Southwest _{0.9x}	0.77	X	9.5	56	X	9	92.85]	0.63	Х	0.7	=	271.28	(79)
Southwest _{0.9x}	0.77	X	9.5	56	X	6	9.27]	0.63	X	0.7	=	202.38	(79)
Southwest _{0.9x}	0.77	X	9.5	56	X	4	14.07]	0.63	X	0.7	=	128.76	(79)
Southwest _{0.9x}	0.77	X	9.5	56	X	3	31.49]	0.63	X	0.7	=	92	(79)
Northwest 0.9x	0.77	X	3.9	8	X	1	1.28	X	0.63	х	0.7	=	13.72	(81)
Northwest 0.9x	0.77	X	3.9	8	X	2	22.97	X	0.63	х	0.7	=	27.94	(81)
Northwest 0.9x	0.77	X	3.9	8	X	4	11.38	X	0.63	х	0.7	=	50.33	(81)
Northwest 0.9x	0.77	X	3.9	98	X	ε	67.96	X	0.63	х	0.7	=	82.66	(81)
Northwest 0.9x	0.77	X	3.9	98	X	9	91.35	X	0.63	х	0.7	=	111.11	(81)
Northwest 0.9x	0.77	X	3.9	8	x	9	97.38	X	0.63	x	0.7	=	118.45	(81)
Northwest _{0.9x}	0.77	X	3.9	98	x		91.1	X	0.63	x	0.7	=	110.81	(81)
Northwest 0.9x	0.77	X	3.9	8	x	7	72.63	X	0.63	x	0.7		88.34	(81)
Northwest _{0.9x}	0.77	X	3.9	8	X	5	50.42	x	0.63	x	0.7	=	61.33	(81)
Northwest _{0.9x}	0.77	X	3.9	98	X	2	28.07	x	0.63	x	0.7		34.14	(81)
Northwest 0.9x	0.77	X	3.9	98	x		14.2	X	0.63	x	0.7	=	17.27	(81)
Northwest _{0.9x}	0.77	X	3.9	8	X	,	9.21	x	0.63	x	0.7	=	11.21	(81)
Solar gains in								Ϋ́	n = Sum(74)m	 			1	(00)
(83)m= 121.22	211.05	300.87	393.09	458.82		63.65	443.61	393	.33 332.61	236.5	2 146.03	103.2]	(83)
Total gains – i					`			1 000	44 040.05	T 504.0	0 450 04	100.05	1	(0.4)
(84)m= 456.64	544.75	624.5	700.57	750.15	<u>L</u>	'39.2	708.77	663	.41 610.85	531.0	8 459.34	430.35	J	(84)
7. Mean inte	rnal tempe	erature	(heating	seasor	า)									_
Temperature	during he	eating p	eriods ir	the liv	ing	area	from Tal	ble 9	, Th1 (°C)				21	(85)
Utilisation fac	 				n (s	ee Ta	ible 9a)						1	
Jan	Feb	Mar	Apr	May	_	Jun	Jul	 	ug Sep	Oc	+	Dec	_	
(86)m= 0.97	0.93	0.85	0.71	0.54		0.37	0.27	0.	3 0.49	0.77	0.93	0.97]	(86)
Mean interna	al tempera	ture in I	iving are	ea T1 (f	ollo	w ste	ps 3 to 7	7 in T	able 9c)				-	
(87)m= 20.24	20.47	20.71	20.91	20.98		21	21	2	1 20.99	20.88	20.55	20.2		(87)
Temperature	during he	eating p	eriods ir	rest of	dw	elling	from Ta	able 9	9, Th2 (°C)					
(88)m= 20.21	20.21	20.22	20.23	20.23	2	20.25	20.25	20.	25 20.24	20.23	3 20.23	20.22		(88)
Utilisation fac	ctor for ga	ins for r	est of d	welling,	h2	,m (se	ee Table	9a)						
(89)m= 0.96	0.92	0.83	0.67	0.49		0.33	0.22	0.2	25 0.43	0.73	0.92	0.97		(89)
Mean interna	al tempera	ature in t	the rest	of dwel	ling	T2 (f	ollow ste	eps 3	to 7 in Tab	ole 9c)			_	
(90)m= 19.21	19.53	19.86	20.13	20.21	Ť	20.24	20.25	20.	T T	20.1	19.66	19.17]	(90)
					•				<u>.</u>	fLA = Li	ving area ÷ (4) =	0.45	(91)
Mean interna	al temnera	nture (fo	r the wh	റില പ്യം	ماالد	a) – f	I Δ ∨ Τ1	+ (1	_ fl Δ\ ∨ Τα)				
(92)m= 19.68	19.95	20.25	20.48	20.56	$\overline{}$	9) – 1 20.58	20.59	20.	- 1	20.46	20.06	19.63	1	(92)
Apply adjusti								l					J	. ,
117 22,000		··		F				-,						

(00) = 40.00	10.05	00.05	00.40	00.50	00.50	00.50	00.50	00.57	00.40	00.00	40.00	Ī	(93)
(93)m= 19.68 8. Space hea	19.95	20.25	20.48	20.56	20.58	20.59	20.59	20.57	20.46	20.06	19.63		(93)
Set Ti to the				re obtair	ned at ste	ep 11 of	Table 9	o, so tha	t Ti.m=(76)m an	d re-calc	culate	
the utilisation			•						, (•	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac		i	i			i	i			i	i	ı	
(94)m= 0.96	0.91	0.83	0.68	0.51	0.35	0.24	0.27	0.46	0.74	0.91	0.96		(94)
Useful gains	1	· `	r `	·	057.00	470.44	400.05	070.04	004.00	100.10	44.4.70	1	(OE)
(95)m= 436.32	496.94	519.33	479.81	383.83	257.86	172.14	180.05	279.24	394.63	420.13	414.76		(95)
Monthly aver (96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rat	l									1	7.2		(00)
(97)m= 699.49	682.13	620.42	512.39	390.52	258.56	172.22	180.19	282.03	434.44	575.85	691.24		(97)
Space heating	ıa require	l	r each n		l	th = 0.02	L 24 x [(97]	L)m – (95	l)m] x (4	1)m			
(98)m= 195.8	124.45	75.21	23.46	4.97	0	0	0	0	29.62	112.12	205.7		
		!	!			Į.	Tota	l per year	(kWh/yea	·) = Sum(9	8) _{15,912} =	771.33	(98)
Space heating	g require	ement in	kWh/m²	/year								14.43	(99)
9b. Energy re	quiremer	nts – Coi	mmunity	heating	scheme								
This part is us	ed for sp	ace hea	iting, spa	ace cool	ing or wa	ater heat				unity sch	neme.		_
Fraction of spa	ace heat	from se	condary,	/supplen	nentary l	neating (Table 1	1) '0' if n	one			0	(301)
Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The community s									up to four	other heat	sources; t	he latter	
includes boilers, I Fraction of he		-			rom powei	r stations.	See Appei	ndix C.				1	(303a)
Fraction of tot	al space	heat fro	m Comn	nunity be	oilers				(3	02) x (303	a) =	1	(304a)
Factor for con	trol and	charging	method	(Table	4c(3)) fo	r commu	unity hea	iting sys	tem			1	(305)
Distribution lo	ss factor	(Table 1	12c) for o	commun	ity heatii	ng syste	m					1.05	(306)
Space heatin	g										'	kWh/yea	 r
Annual space	_	requiren	nent									771.33	
Space heat fro	om Comi	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	=	809.9	(307a)
Efficiency of s	econdar	y/supple	mentary	heating	system	in % (frc	m Table	4a or A	ppendix	E)		0	(308
Space heating	require	ment fro	m secon	dary/su _l	oplemen	tary syst	tem	(98) x (30	01) x 100 ·	÷ (308) =		0	(309)
Water heating	a												
Annual water	-	equirem	ent									1858.62	
If DHW from o		•											
Water heat fro		•						(64) x (30	03a) x (30	5) x (306) :	=	1951.55	(310a)
Electricity use	d for hea	at distribu	ution				0.01	× [(307a).	(307e) +	· (310a)([310e)] =	27.61	(313)
Cooling Syste	m Energ	y Efficie	ncy Rati	0								0	(314)
Space cooling	(if there	is a fixe	d coolin	g systen	n, if not e	enter 0)		= (107) ÷	(314) =			0	(315)
Electricity for p											ĺ		7,000
mechanical ve	enulation	- palanc	eu, extr	act or po	silive in	put from	outside					113.73	(330a)

warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	b) + (330g) =		113.73	(331)
Energy for lighting (calculated in Apper	ndix L)				245.94	(332)
Total delivered energy for all uses (307	7) + (309) + (310) + (31	2) + (315) + (331) + (33	32)(237b) =	Ī	3121.11	(338)
12b. CO2 Emissions – Community hea	ting scheme					
		Energy kWh/year	Emission factor kg CO2/kWh		missions g CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)		P) sing two fuels repeat (363) to	(366) for the second	fuel	96	(367a)
CO2 associated with heat source 1	[(307b	o)+(310b)] x 100 ÷ (367b) x	0.22	=	621.32	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	14.33	(372)
Total CO2 associated with community	systems	(363)(366) + (368)(372	2)	=	635.66	(373)
CO2 associated with space heating (se	econdary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =			635.66	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	=	59.02	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	127.64	(379)
Total CO2, kg/year	sum of (376)(382) =				822.32	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				15.38	(384)

El rating (section 14)

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:56:09

Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 72.62m2 Plot Reference: 02 - C Site Reference : Highgate Road - GREEN

Address:

Client Details:

Name: Address:

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

18.46 kg/m² Target Carbon Dioxide Emission Rate (TER)

Dwelling Carbon Dioxide Emission Rate (DER) 15.74 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 52.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 42.5 kWh/m²

OK 2 Fabric U-values

Element Average

Highest 0.18 (max. 0.70) External wall 0.18 (max. 0.30) OK Party wall 0.00 (max. 0.20) **OK**

Floor (no floor) Roof (no roof)

Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	12.71m²	
Windows facing: North West	3.46m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		l Jser I	Details:						
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa	are Vei				010943 on: 1.0.5.50	
Address :	F	Property	Address	02 - C					
Overall dwelling dime	nsions:								
		Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Ground floor			72.62	(1a) x	2	.65	(2a) =	192.44	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	72.62	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	192.44	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	_ + [0] = [0	x 4	10 =	0	(6a)
Number of open flues	0 + 0	+ [0] = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ns			Ī	0	x 1	10 =	0	(7a)
Number of passive vents				Ī	0	x 1	10 =	0	(7b)
Number of flueless gas fi	res			Ī	0	x 4	10 =	0	(7c)
				_					
						<u>_</u>	Air ch	nanges per ho	our —
•	ys, flues and fans = (6a)+(6b)+(een carried out or is intended, procee			ontinuo fr	0		÷ (5) =	0	(8)
Number of storeys in the		eu 10 (17),	otrierwise t	onunue n	om (9) to	(10)		0	(9)
Additional infiltration	3 ()					[(9)-	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o			•	uction			0	(11)
if both types of wall are pr deducting areas of openir	resent, use the value corresponding t gas): if equal user 0.35	o the grea	ter wall are	a (after					
,	loor, enter 0.2 (unsealed) or 0).1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, ent	ter 0.05, else enter 0							0	(13)
-	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	. ,	-	(- N		0	(15)
Infiltration rate	250 amaza dia adia adia arata		(8) + (10)					0	(16)
•	q50, expressed in cubic metro ity value, then $(18) = [(17) \div 20] +$	•	•	•	etre or e	envelope	area	3	(17)
•	s if a pressurisation test has been do				is being u	sed		0.15	(10)
Number of sides sheltere	d							0	(19)
Shelter factor			(20) = 1 -		19)] =			1	(20)
Infiltration rate incorporat	_		(21) = (18	x (20) =				0.15	(21)
Infiltration rate modified for			1 ,		<u> </u>	<u> </u>		1	
L 1	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp (22)m= 5.1 5	eed from Table 7 4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7	1	
(22)m= 5.1 5	4.3 4.4 4.3 3.8	3.6	3.1	4	4.3	4.5	4.1		
Wind Factor (22a)m = (22	2)m ÷ 4							1	
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltr	ation rat	e (allowi	ng for sh	elter an	d wind s	peed) =	(21a) x	(22a)m	_	_			
0.19 Calculate effe	0.19	0.18	0.16	0.16 he appli	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
If mechanica		•	ale for t	пе арри	cable ca	30						0.5	(23
If exhaust air h	eat pump	using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	wise (23b) = (23a)			0.5	(23
If balanced with	n heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				74.8	(23)
a) If balance	ed mech	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	m = (22)	2b)m + (23b) × [1 – (23c)	÷ 100]	_
(24a)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(24
b) If balance	ed mech	anical ve	ntilation	without	heat red	covery (N	ЛV) (24b)m = (22	2b)m + (23b)		_	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)r		tract ver (23b), t		-					.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)r		on or wh en (24d)							0.5]			1	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	iter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)		•		•	
(25)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(25
3. Heat losse	s and he	eat loss r	paramete	er:									
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/		k-value kJ/m²-l		
Windows Type		(111)		l	12.71				16.85		NO/III I	(10)	(27
Windows Type					3.46	_	/[1/(1.4)+	Ļ	4.59	\dashv			(27
Walls Type1	72.6	2	16.1	7	56.45	=	0.18	= [10.16	╡┌	60	3387	(29)
Walls Type1	17.7		0			=			2.99	륵 ¦		1066.8	= '
Total area of e					17.78	3 ×	0.17	[2.99		60		(31)
Party wall	, ioi i ioi i io	,			90.4						AF	1264.4	_ `
Party floor					30.32	=	0	[0	L	45	1364.4	=
Party ceiling					72.62	=				Ĺ	40	2904.8	=
Internal wall **					72.62	=				Ĺ	30	2178.6	= `
internal wall * for windows and		014/0 1100 0	effootivo wi	ndow II v	146.1		formula 1	/[/1/ L.volu	(0) (0 (04] (l So givon in	9 norograph	1315.53	3 (32
** include the area						ateu using	i ioiiiiuia i	/[(1/ O- valu	1 0)+0.04] a	is giveri iii	i parayrapri	1 3.2	
Fabric heat los	ss, W/K :	= S (A x	U)				(26)(30)	+ (32) =				34.58	(33
Heat capacity	Cm = S	(Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	12217.13	(34)
Thermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			= (34)	÷ (4) =			168.23	(35)
For design assess can be used inste				construct	ion are no	t known pr	ecisely the	indicative	values of	TMP in Ta	able 1f		_
Thermal bridge	es : S (L	x Y) cal	culated ı	using Ap	pendix I	<						7.11	(36
if details of therma		are not kn	own (36) =	= 0.05 x (3	1)			(22)	(20)				¬,
Total fabric he		alouloto -	l manthi	,					(36) =	(25)m + (F)	\	41.69	(37
Ventilation hea	Feb				lun	Jul	۸۰۰۰		= 0.33 × (l	1	1	
(38)m= 20.15	19.91	Mar 19.67	Apr 18.48	May 18.24	Jun 17.05	Jui 17.05	Aug 16.81	Sep 17.53	Oct 18.24	Nov 18.72	Dec 19.19		(38
(VV) - LULIO	1 .5.91	10.07	10.40	10.24	17.00	. 7.00	10.01	17.00	10.24	10.72	13.13	1	,50
								/ 	(6-)	0.0)			
Heat transfer (39)m= 61.84	coefficier	nt, W/K 61.36	60.17	59.93	58.74	58.74	58.51	(39)m 59.22	= (37) + (38)m 60.41	60.89	1	

eat loss pa	rameter (HLP), W	m²K			1	1	(40)m	= (39)m ÷	· (4)			
0.85 O.85	0.85	0.84	0.83	0.83	0.81	0.81	0.81	0.82	0.83	0.83	0.84		_
umber of d	ave in mo	onth (Tah	le 1a)						Average =	Sum(40) ₁	12 /12=	0.83	(4
Jar	<u> </u>	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
)m= 31	28	31	30	31	30	31	31	30	31	30	31		(4
<u> </u>													
. Water he	ating ene	rgy requi	irement:								kWh/yea	ar:	
sumed oc	cupancy	N									04		()
if TFA > 1	3.9, N = 1		[1 - exp	(-0.0003	349 x (TF	A -13.9)2)] + 0.0	0013 x (TFA -13		31		(4
if TFA £ 13 inual aver	•	ator usar	na in litra	s nar da	v Vd av	orano –	(25 v NI)	± 36					(4
duce the anı	nual average	hot water	usage by	5% if the a	welling is	designed t			se target o		0.02		(-
t more that 1.	25 litres per	person per	day (all w	ater use, l	not and co	ld)			,				
Jar		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
t water usag						1	· <i>'</i>						
)m= 97.92	94.36	90.8	87.24	83.67	80.11	80.11	83.67	87.24	90.8	94.36	97.92		— ,
ergy content	of hot water	r used - cal	culated mo	onthly = 4 .	190 x Vd,r	n x nm x D)Tm / 3600			m(44) ₁₁₂		1068.18	(4
)m= 145.2		131.05	114.25	109.63	94.6	87.66	100.59	101.8	118.63	129.5	140.63		
, 1.0.2	. 1	101.00	111.20	100.00	0 1.0	07.00	100.00		<u> </u>	m(45) ₁₁₂ =	<u> </u>	1400.56	(4
nstantaneous	s water heat	ing at point	of use (no	hot water	storage),	enter 0 in	boxes (46			(10)112	L		`
)m= 21.78	19.05	19.66	17.14	16.44	14.19	13.15	15.09	15.27	17.8	19.42	21.09		(4
ater storaç													
orage volu	•	•	•			_		ame ves	sel		0		(4
community herwise if	•			-			' '	ora) ant	or 'O' in <i>(</i>	17 \			
ater storaç		not wate	וו פוווט) ול	iciuues i	IIStaiitai	ieous co	ווטט וטוווי	ers) erik	ei U iii (47)			
If manufa		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(4
mperature	factor fro	om Table	2b								0		(4
ergy lost f	rom wate	r storage	, kWh/ye	ear			(48) x (49)) =		1	10		(5
If manufa			-										
ot water st	•			e 2 (kW	h/litre/da	ıy)				0.	02		(5
community Jume facto	_		011 4.3							1	03		(!
mperature			2b								.6		(!
ergy lost f	rom wate	r storage	. kWh/ve	ear			(47) x (51)) x (52) x ((53) =		.03		(!
nter (50) o		_	,								.03		(5
ater storaç	ge loss ca	lculated t	for each	month			((56)m = ((55) × (41)	m				
)m= 32.0°	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(5
ylinder conta		ed solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendix	Н	
7)m= 32.0°	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(5
mary circ	uit loss (a	nnual) fro	m Table	. 3				•	•		0		(!
mary circ	•	•			59)m = ((58) ÷ 36	65 × (41)	ım					,
modified				,		. ,	, ,		r thermo	stat)			

Combi loss calculate	d for each	month (′61)m =	(60) ÷ 3	65 × (41)m							
(61)m= 0 0	0	0	0	0	0	0		0	0	0	0	1	(61)
Total heat required for	r water he	eating ca	L	L I for eac	h month	(62)r	—— n =	0.85 × (45)m +	. (46)m +	(57)m +	ı · (59)m + (61)m	
(62)m= 200.48 176.93		167.75	164.91	148.1	142.94	155.	_	155.29	173.91	182.99	195.9]	(62)
Solar DHW input calculate	d using App	endix G oı	· Appendix	: H (negati	ve quantity	/) (ente	er '0'	if no sola	r contribu	tion to wate	er heating)		
(add additional lines											-		
(63)m= 0 0	0	0	0	0	0	0		0	0	0	0]	(63)
Output from water he	ater				•	•				•	•	•	
(64)m= 200.48 176.93	186.33	167.75	164.91	148.1	142.94	155.	.87	155.29	173.91	182.99	195.9	1	
			•	•	•		Outp	ut from wa	ater heate	er (annual)	112	2051.4	(64)
Heat gains from water	r heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (6	1)m	ı] + 0.8 x	(46)m	n + (57)m	+ (59)m	١]	
(65)m= 92.5 82.17	87.8	80.78	80.67	74.25	73.37	77.6	67	76.64	83.67	85.85	90.98]	(65)
include (57)m in ca	lculation	of (65)m	only if c	ylinder i	s in the	dwelli	ing (or hot w	ater is f	from com	munity h	neating	
5. Internal gains (se	e Table 5	and 5a):										
Metabolic gains (Tab	le 5), Wat	ts											
Jan Feb		Apr	May	Jun	Jul	Αι	Jg	Sep	Oct	Nov	Dec]	
(66)m= 115.4 115.4	115.4	115.4	115.4	115.4	115.4	115	.4	115.4	115.4	115.4	115.4	1	(66)
Lighting gains (calcul	ated in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso s	ee 7	Table 5			-	-	
(67)m= 18.13 16.1	13.09	9.91	7.41	6.26	6.76	8.7	9	11.79	14.97	17.48	18.63]	(67)
Appliances gains (ca	culated in	Append	dix L, eq	uation L	13 or L1	3a), a	also	see Tal	ole 5	-	•	•	
(68)m= 203.33 205.44	200.13	188.81	174.52	161.09	152.12	150.	.01	155.32	166.64	180.93	194.36]	(68)
Cooking gains (calcu	ated in A	opendix	L, equat	ion L15	or L15a), also	o se	e Table	5	•	•	•	
(69)m= 34.54 34.54	34.54	34.54	34.54	34.54	34.54	34.5	54	34.54	34.54	34.54	34.54]	(69)
Pumps and fans gair	s (Table 5	āa)			•	•	•			•	•	•	
(70)m= 0 0	0	0	0	0	0	0		0	0	0	0]	(70)
Losses e.g. evaporat	ion (negat	ive valu	es) (Tab	le 5)	-					-	-	-	
(71)m= -92.32 -92.32	-92.32	-92.32	-92.32	-92.32	-92.32	-92.	32	-92.32	-92.32	-92.32	-92.32]	(71)
Water heating gains	Table 5)				•		•			•		•	
(72)m= 124.33 122.28	118.01	112.2	108.43	103.13	98.61	104.	.39	106.45	112.46	119.24	122.28]	(72)
Total internal gains	=			(66))m + (67)m	ı + (68)m +	- (69)m + (70)m + (71)m + (72))m	•	
(73)m= 403.41 401.44	388.85	368.54	347.98	328.09	315.11	320.	.81	331.19	351.69	375.27	392.9]	(73)
6. Solar gains:													
Solar gains are calculate	•	r flux from	Table 6a		•	itions t	0 CO	nvert to th	e applica		tion.		
Orientation: Access Table 6		Area m²		Flu	ıx ble 6a		т.	g_ able 6b	-	FF Table 6c		Gains (W)	
						1 1	1 (_ '				1
Northeast 0.9x 0.7	7 ×	12.	71	X	11.28	X		0.63	_ ×	0.7	=	43.83	(75)
Northeast 0.9x 0.7		12.			22.97	X		0.63	x	0.7	=	89.21	(75)
Northeast 0.9x 0.7		12.		-	41.38	X		0.63	x	0.7	=	160.73	(75)
Northeast 0.9x 0.7		12.	71	-	67.96	X		0.63	x [0.7	=	263.96	(75)
Northeast 0.9x 0.7	7 ×	12.	71	x (91.35	x		0.63	X	0.7	=	354.82	(75)

Naw46		_						1		_				– ,,
Northeast _{0.9x}	0.77	×	12.	71	X	9	7.38	X	0.63	×	0.7	=	378.27	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	(91.1	X	0.63	X	0.7	_ =	353.87	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	7	2.63	X	0.63	X	0.7	=	282.11	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	5	0.42	X	0.63	X	0.7	=	195.85	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	2	8.07	X	0.63	X	0.7	=	109.02	(75)
Northeast _{0.9x}	0.77	X	12.	71	X		14.2	X	0.63	X	0.7	_	55.15	(75)
Northeast 0.9x	0.77	X	12.	71	X	(9.21	X	0.63	X	0.7	=	35.79	(75)
Northwest _{0.9x}	0.77	X	3.4	16	X	1	1.28	X	0.63	X	0.7	=	11.93	(81)
Northwest _{0.9x}	0.77	X	3.4	16	X	2	2.97	X	0.63	X	0.7	=	24.29	(81)
Northwest 0.9x	0.77	X	3.4	16	x	4	1.38	x	0.63	x	0.7		43.75	(81)
Northwest _{0.9x}	0.77	X	3.4	16	x	6	7.96	x	0.63	х	0.7	=	71.86	(81)
Northwest _{0.9x}	0.77	x	3.4	16	x	9	1.35	x	0.63	x	0.7	_	96.59	(81)
Northwest _{0.9x}	0.77	x	3.4	16	x	9	7.38	х	0.63	x	0.7		102.98	(81)
Northwest _{0.9x}	0.77	x	3.4	16	x	Ç	91.1	х	0.63	x	0.7		96.33	(81)
Northwest _{0.9x}	0.77	x	3.4	16	x	7	2.63	х	0.63	x	0.7	_	76.8	(81)
Northwest _{0.9x}	0.77	×	3.4	16	x	5	0.42	x	0.63	×	0.7		53.32	(81)
Northwest 0.9x	0.77	×	3.4	16	X	2	8.07	X	0.63	×	0.7	=	29.68	(81)
Northwest 0.9x	0.77	×	3.4	16	X		14.2	X	0.63	×	0.7		15.01	(81)
Northwest 0.9x	0.77	×	3.4	16	x	(9.21	X	0.63	×	0.7		9.74	(81)
_								,						
Solar gains in	watts, calc	ulated	for eacl	h month	1			(83)m	n = Sum(74)m .	(82)m				
(83)m= 55.76		04.48	335.82	451.41	_	31.25	450.2	358		138.7	70.16	45.53		(83)
Total gains – i	nternal and	solar	(84)m =	= (73)m	+ (8	33)m	, watts				!	Į.	ı	
(84)m= 459.17	514.94 5	93.33	704.36	799.39	80	9.34	765.31	679	.71 580.35	490.4	445.43	438.43		(84)
7. Mean inter	nal temper	ature (heating	seasor	n)									
Temperature						area 1	from Tal	ole 9.	Th1 (°C)				21	(85)
Utilisation fac	•	• .			_				, ,					``
Jan	Feb	Mar	Apr	May	Ť	Jun	Jul	Α	ug Sep	Oct	Nov	Dec		
(86)m= 0.99		0.94	0.84	0.65	+	0.46	0.34	0.3		0.91	0.98	0.99		(86)
Mean interna	l tomporati	ıro in l	ivina or	00 T1 /f	مااه	w cto	nc 2 to 7	Tin T	able (le)	<u>!</u>	-1	<u> </u>		
(87)m= 19.91	r - r	20.38	20.74	20.93	1	0.99	21	2		20.66	20.23	19.89		(87)
` '		0.00	20.1	<u> </u>					20.00	20.00	20.20	10.00		(=: /
Tomporofuro														
· -		 			_		1	1	9, Th2 (°C)		T 00 00	00.00	1	(00)
(88)m= 20.21		ting po 20.21	eriods ir 20.23	20.23	_	elling 0.25	from Ta	20.		20.23	20.23	20.22		(88)
· -	20.21 2	20.21	20.23	20.23	2	0.25	20.25	20.		20.23	20.23	20.22		(88)
(88)m= 20.21	20.21 2	20.21	20.23	20.23	h2,	0.25	20.25	20.	25 20.24	20.23	20.23	0.99]]	(88)
(88)m= 20.21 Utilisation fac	20.21 2 etor for gain	20.21 ns for r	20.23 est of d	20.23 welling, 0.61	h2,	0.25 m (se	20.25 ee Table 0.28	20. 9a)	25 20.24	0.89				
(88)m= 20.21 Utilisation fac (89)m= 0.98	20.21 2 etor for gain 0.97 (20.21 ns for r	20.23 est of d	20.23 welling, 0.61	h2,	0.25 m (se	20.25 ee Table 0.28	20. 9a)	25 20.24 33 0.6 to 7 in Tabl	0.89	0.97			
Utilisation factors (89)m= 0.98 Mean internal	20.21 2 etor for gain 0.97 (20.21 ns for r 0.93 ure in t	20.23 est of double 0.81 he rest	20.23 welling, 0.61 of dwel	h2,	0.25 m (se).41 T2 (fe	20.25 ee Table 0.28 ollow ste	9a) 0.3	25 20.24 33 0.6 to 7 in Table 25 20.2	0.89 le 9c)	0.97	0.99	0.38	(89)
(88)m= 20.21 Utilisation factors (89)m= 0.98 Mean internation (90)m= 18.74	20.21 2 etor for gain 0.97 0 I temperatu 18.99 1	20.21 as for r 0.93 ure in t	20.23 est of do 0.81 he rest 19.93	20.23 welling, 0.61 of dwel 20.17	1 2 h2, ding 2	0.25 m (se).41 T2 (fo 0.24	20.25 ee Table 0.28 ollow ste 20.24	9a) 0.3 eps 3 20.	25 20.24 33 0.6 to 7 in Tabl 25 20.2	0.89 le 9c) 19.84 fLA = Liv	0.97	0.99	0.38	(89)
Utilisation factors (89)m= 0.98 Mean internation (90)m= 18.74	20.21 2 ctor for gain 0.97 0 I temperatu 18.99 1	20.21 as for r 0.93 ure in t	20.23 est of do 0.81 he rest 19.93	20.23 welling, 0.61 of dwel 20.17	h2, ling 2	0.25 m (se).41 T2 (fo 0.24	20.25 ee Table 0.28 ollow ste 20.24	9a) 0.3 eps 3 20.	25 20.24 33 0.6 to 7 in Table 25 20.2 - fLA) × T2	0.89 le 9c) 19.84 fLA = Liv	0.97 19.23 ving area ÷ (4	0.99	0.38	(89)
(88)m= 20.21 Utilisation factors (89)m= 0.98 Mean internation (90)m= 18.74	20.21 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	20.21 ns for r 0.93 ure in t 19.42 ure (for	20.23 est of do 0.81 he rest 19.93 r the wh 20.24	20.23 welling, 0.61 of dwel 20.17 ole dwe 20.46	h2, ling 2	0.25 m (see).41 T2 (fe 0.24 g) = fl 0.53	20.25 ee Table 0.28 collow ste 20.24 _A × T1 20.53	20. 9a) 0.3 eps 3 20. + (1	25 20.24 33 0.6 to 7 in Table 25 20.2 	0.89 le 9c) 19.84 fLA = Liv 20.15	0.97 19.23 ving area ÷ (-	0.99 18.72 4) =	0.38	(89) (90) (91)

			1			1							
(93)m= 19.19	19.41	19.79	20.24	20.46	20.53	20.53	20.54	20.49	20.15	19.61	19.17		(93)
8. Space hea						44 4	Table O	41	4 T: /	70)	-ll-		
Set Ti to the return the utilisation			•		ied at ste	ер 11 от	rable 9	o, so tna	t 11,m=(76)m an	a re-caic	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm):										
(94)m= 0.98	0.97	0.93	0.81	0.62	0.43	0.3	0.35	0.62	0.88	0.96	0.98		(94)
Useful gains,	hmGm	, W = (9	4)m x (8	4)m									
(95)m= 449.99	497.58	549.78	572.64	498.55	344.88	230.65	240.9	360.02	433.61	429.81	431.1		(95)
Monthly average	_	T T		from T									
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate		1			i	-``	· · ·	``					(07)
(97)m= 920.89	893.8	815.46	682.31	525.12	348.22	231.14	241.92	378.27	572.65	755.98	911.39		(97)
Space heatin (98)m= 350.35	g require 266.26	197.66	r each n 78.97	19.77	/Vh/moni	I	24 x [(97])m – (95 0)m] x (4 103.45	1)m 234.84	357.33		
(98)m= 350.35	200.20	197.00	76.97	19.77		0					<u> </u>	4000.00	7(00)
							rota	ı per year	(Kvvn/yeai	r) = Sum(9	8)15,912 =	1608.62	(98)
Space heatin	g requir	ement in	kWh/m²	/year								22.15	(99)
9b. Energy red	•		The state of the s	Ĭ									
This part is use Fraction of spa										unity sch	neme.	0	(301)
Fraction of spa			•		-	_	(Table T	1) 0 11 11	OHO		[[1	(302)
•			•	•	,	,	allows for	CUD and	un to forus	other boot			(302)
The community so includes boilers, h		-							up to rour	otner neat	sources; tr	іе ιαπег	
Fraction of hea		-										1	(303a)
Fraction of total	al space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor for cont	rol and	charging	method	(Table	4c(3)) fo	r commu	unity hea	ating sys	tem		Ī	1	(305)
Distribution los	s factor	(Table 1	2c) for c	commun	ity heatii	ng syste	m				ĺ	1.05	(306)
Space heating	a										L	kWh/yea	' r
Annual space	-	requiren	nent									1608.62	
Space heat fro	m Com	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	= [1689.05	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308
Space heating	require	ment fro	m secon	dary/su _l	oplemen	tary syst	tem	(98) x (30	01) x 100 ·	÷ (308) =		0	(309)
Water heating											L		_
Annual water h		requirem	ent									2051.4	
If DHW from co											<u>.</u>		_
Water heat from Community boilers $(64) \times (303a) \times (305) \times (306) =$										=	2153.97	(310a)	
Electricity used	d for hea	at distrib	ution				0.01	× [(307a).	(307e) +	· (310a)([310e)] =	38.43	(313)
Cooling Syster	m Energ	y Efficie	ncy Rati	0								0	(314)
Space cooling	(if there	is a fixe	d coolin	g systen	n, if not e	enter 0)		= (107) ÷	(314) =			0	(315)
Electricity for p													_
mechanical ve	ntilation	- balanc	ed, extra	act or po	sitive in	put from	outside					177.49	(330a)
mechanical ventilation - balanced, extract or positive input from outside													

						_
warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330	b) + (330g) =		177.49	(331)
Energy for lighting (calculated in Appen	dix L)				320.14	(332)
Total delivered energy for all uses (307)	+ (309) + (310) + (313	2) + (315) + (331) + (33	32)(237b) =		4340.66	(338)
12b. CO2 Emissions – Community heat	ing scheme					
		Energy kWh/year	Emission fac		missions g CO2/year	
CO2 from other sources of space and w Efficiency of heat source 1 (%)	•) ing two fuels repeat (363) to	(366) for the secon	d fuel	96	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.22	=	864.68	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	19.95	(372)
Total CO2 associated with community s	ystems	(363)(366) + (368)(372	2)	=	884.62	(373)
CO2 associated with space heating (see	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immers	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and w	ater heating	(373) + (374) + (375) =			884.62	(376)
CO2 associated with electricity for pump	os and fans within dwe	elling (331)) x	0.52	=	92.12	(378)
CO2 associated with electricity for lighti	ng	(332))) x	0.52	=	166.15	(379)
Total CO2, kg/year	sum of (376)(382) =				1142.9	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				15.74	(384)

El rating (section 14)

(385)

86.98

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 06 December 2021 at 10:55:54*

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 53.96m²Site Reference:Highgate Road - GREENPlot Reference:02 - D

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 19.25 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 16.23 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 48.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 39.2 kWh/m²

OK
2 Fabric U-values

Element Average Highest

External wall 0.17 (max. 0.30) 0.18 (max. 0.70) **OK**Party wall 0.00 (max. 0.20) - **OK**

Floor (no floor) Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
	400.00/	
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	ОК
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	ОК
Based on:	Wedidiff	OK
	Avorago or unknown	
Overshading:	Average or unknown 12.07m²	
Windows facing: North East	· - · • · · ·	
Ventilation rate:	4.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		User D	Details:						
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa	are Ve				010943 on: 1.0.5.50	
Address :	F	Property	Address	: 02 - D					
1. Overall dwelling dime	ensions:								
		Are	a(m²)	-	Av. He	ight(m)	_	Volume(m ³	3)
Ground floor			53.96	(1a) x	2	2.65	(2a) =	142.99	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) [53.96	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	142.99	(5)
2. Ventilation rate:									
	main seconda heating heating	ry 	other	_	total			m³ per hou	ır
Number of chimneys	0 + 0	+	0	=	0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	+	0] = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ins				0	X ·	10 =	0	(7a)
Number of passive vents	3				0	X '	10 =	0	(7b)
Number of flueless gas fi	ires			Γ	0	x 4	40 =	0	(7c)
							A in a k	ongoo nor ba	
lafituation due to altique	fl and fare (Co) (Ch) (70) . (7 b) . ((70)	_				nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(been carried out or is intended, procee			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in the		(),			(3)	(-7		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o resent, use the value corresponding t			•	ruction			0	(11)
deducting areas of openi		o ine great	ier wan are	a (anter					
·	floor, enter 0.2 (unsealed) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	2 x (14) ÷ 1	1001 =			0	(14)
Infiltration rate			(8) + (10)		_	+ (15) =		0	(15)
	q50, expressed in cubic metre	es per ho	our per s	quare m	etre of e	envelope	area	3	(17)
If based on air permeabil	lity value, then $(18) = [(17) \div 20] + (18)$	(8), otherw	rise (18) = ((16)				0.15	(18)
	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			_
Number of sides sheltere Shelter factor	ed		(20) = 1 -	[0.075 x (²	19)] =			0	(19)
Infiltration rate incorporate	ting shelter factor		(21) = (18					0.15	(21)
Infiltration rate modified f								00	` /
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2.	2)m ÷ 4								
<u> </u>	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18]	
` '	1 1 2 2 3 3 3 3	L		L	L		<u> </u>	J	

Adjusted infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m				-	
0.19 Calculate effect	0.19 Ctive air	0.18 Change i	0.16 ate for t	0.16 he appli	0.14 cable ca	0.14 SE	0.14	0.15	0.16	0.17	0.18]	
If mechanica		_										0.5	(23a
If exhaust air h	eat pump ı	using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			0.5	(23k
If balanced with	n heat reco	overy: effic	ency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				75.65	(230
a) If balance	ed mecha	anical ve	ntilation	with he	at recove	ery (MVI	HR) (24a	m = (22)	2b)m + (23b) × [1 – (23c)) ÷ 100]	
(24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(248
b) If balance	ed mecha	anical ve	ntilation	without	heat red	covery (N	ЛV) (24b	m = (22)	2b)m + (23b)	ī	,	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)n	ouse ex n < 0.5 ×			•					5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24
d) If natural if (22b)n	ventilation			•	•				0.5]			•	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24
Effective air	change	rate - er	iter (24a) or (24b	o) or (24	c) or (24	d) in box	(25)		-	-	_	
(25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3]	(25)
3. Heat losse	s and he	eat loss r	paramete	er:									
ELEMENT	Gros	·	Openin		Net Ar	ea	U-valı	re	AXU		k-value	e A	λΧk
	area	(m^2)	' m		A ,r	m²	W/m2	K	(W/I	K)	kJ/m²•	K k	J/K
Windows					12.07	x1.	/[1/(1.4)+	0.04] =	16				(27)
Walls Type1	27.6	66	12.0	7	15.59	X	0.18	= [2.81		60	935	.4 (29)
Walls Type2	24.2	24	0		24.24	, x	0.17	= [4.07		60	1454	4.4 (29)
Total area of e	elements	, m²			51.9								(31)
Party wall					31.67	, X	0	= [0		45	1425	i.15 (32)
Party floor					53.96	5					40	2158	3.4 (32
Party ceiling					53.96	5					30	1618	3.8 (32)
Internal wall **	ŧ				95.03	3					9	855.	27 (32
* for windows and						ated using	formula 1	/[(1/U-valu	e)+0.04] a	as given in	paragrapi	h 3.2	
** include the area				ls and par	titions		(00) (00)	(20)				_	
Fabric heat los		•	U)				(26)(30)		(00) - (0)	0) - (00-)	(00-)	22.88	(33)
Heat capacity	,	,		TEA) :				***	.(30) + (32)	2) + (32a).	(32e) =	8447.42	(34)
Thermal mass For design assess	•	•		•			ooisoly the	` '	\div (4) =	TMD in T	ahla 1f	156.55	(35)
can be used inste				CONSTRUCT	ion are noi	known pi	ecisely lile	illulcative	values of	TIVIT III I	able II		
Thermal bridge	es : S (L	x Y) cal	culated ı	using Ap	pendix l	<						6.04	(36)
if details of therma		are not kn	own (36) =	= 0.05 x (3	1)								
Total fabric he								(33) +	(36) =			28.91	(37)
Ventilation hea	at loss ca	alculated	monthly	/					= 0.33 × ((25)m x (5) T	1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	4	4=
(38)m= 14.77	14.59	14.42	13.53	13.35	12.47	12.47	12.29	12.82	13.35	13.71	14.06]	(38)
Heat transfer of		nt, W/K			·	·			= (37) + (38)m		1	
(39)m= 43.68	43.51	43.33	42.45	42.27	41.38	41.38	41.21	41.74	42.27	42.62	42.98		
									Average =	Sum(39) ₁	12 /12=	42.4	(39)

Heat loss	s parar	meter (H	HLP), W/	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	0.81	0.81	0.8	0.79	0.78	0.77	0.77	0.76	0.77	0.78	0.79	0.8		
										Average =	Sum(40) ₁	12 /12=	0.79	(40)
Number	of day		nth (Tab	le 1a)			·	ı						
_	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. Wate	r heati	ng ene	rgy requi	rement:								kWh/ye	ear:	
Assumed if TFA if TFA	> 13.9	, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		81		(42)
Annual a Reduce the not more th	e annuai	l average	hot water	usage by	5% if the a	lwelling is	designed t	` ,		se target o		.11		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water u		litres per	day for ea		,		Table 1c x	_	· ·		!			
(44)m=	84.82	81.74	78.65	75.57	72.49	69.4	69.4	72.49	75.57	78.65	81.74	84.82		
										Total = Su	m(44) ₁₁₂ =		925.35	(44)
Energy cor	ntent of I	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x D	Tm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 1	25.79	110.02	113.53	98.98	94.97	81.95	75.94	87.14	88.18	102.77	112.18	121.82		
If in atomton		ator booti	na ot noint	of upo (no	, hat water	, ataragal	antar O in	haves (46		Total = Su	m(45) ₁₁₂ =	- [1213.27	(45)
If instantan				,		, , , , , , , , , , , , , , , , , , ,	·	` '	,	ı	ı	1		(10)
(46)m= Mater sto	18.87 Orage	16.5	17.03	14.85	14.25	12.29	11.39	13.07	13.23	15.42	16.83	18.27		(46)
Storage	_		includin	a anv so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If commu		` '					_					<u> </u>		(/
Otherwis	-	_			-			' '	ers) ente	er '0' in ((47)			
Water sto	•													
a) If mar	nufactu	ırer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempera	ature fa	ctor fro	m Table	2b								0		(49)
Energy lo			•					(48) x (49)) =		1	10		(50)
b) If marHot wate				-								02		(51)
If commu		-			C 2 (KVV)	ii/iiti C/GC	·y /				0.	02		(31)
Volume f		_									1.	03		(52)
Tempera	ature fa	actor fro	m Table	2b							0	.6		(53)
Energy lo	ost fror	m water	storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter (5	0) or (54) in (5	55)								1.	03		(55)
Water sto	orage l	loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder of	contains	dedicate	d solar sto	rage, (57)ı	n = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendi	ix H	
(57)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary o	circuit	loss (ar	nual) fro	m Table	3							0		(58)
Primary		`	,			59)m = ((58) ÷ 36	65 × (41)	m			-		• /
•					,	•	. ,	, ,	cylinde	r thermo	stat)			
(59)m= 2	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi loss calculated for each month $(61)m = (60) \div 365 \times (41)m$													
(61)m= 0	0	0	0	0 0	00) + 0	0 7 (41) o	0	0	0	0	1	(61)
		-	-									J · (59)m + (61)m	(- /
(62)m= 181.07	159.94	168.8	152.47	150.25	135.45		142.4	_	158.05	165.67	177.1	1	(62)
Solar DHW input c									ļ]	(-)
(add additional										morrio wan	or riodiirig)		
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(63)
Output from wa	ater heat	ter				1	·	I	!	1	!	1	
(64)m= 181.07	159.94	168.8	152.47	150.25	135.45	131.22	142.4	12 141.68	158.05	165.67	177.1	1	
	'						C	Output from w	ater heat	er (annual)	112	1864.11	(64)
Heat gains fror	n water	heating,	kWh/mo	onth 0.2	5 ´ [0.8	5 × (45)m	ı + (61)m] + 0.8	x [(46)m	n + (57)m	+ (59)m		-
(65)m= 86.05	76.52	81.97	75.7	75.8	70.04	69.47	73.2	72.12	78.39	80.1	84.73]	(65)
include (57)r	n in calc	culation of	of (65)m	only if c	ylinder	is in the	dwellir	ng or hot w	ater is f	from com	munity h	neating	
5. Internal ga			. ,		•						•		
Metabolic gains	s (Table	5), Wat	ts										
Jan	Feb	Mar	Apr	May	Jun	Jul	Au	g Sep	Oct	Nov	Dec		
(66)m= 90.34	90.34	90.34	90.34	90.34	90.34	90.34	90.3	4 90.34	90.34	90.34	90.34		(66)
Lighting gains	(calculat	ted in Ap	pendix	L, equat	ion L9	or L9a), a	lso se	e Table 5	-		-	•	
(67)m= 14.04	12.47	10.14	7.68	5.74	4.85	5.24	6.81	9.13	11.6	13.54	14.43]	(67)
Appliances gai	ns (calc	ulated in	Append	dix L, eq	uation I	_13 or L1	3a), a	lso see Ta	ble 5	-	_	•	
(68)m= 157.5	159.14	155.02	146.25	135.18	124.78	117.83	116.	2 120.31	129.08	140.15	150.55		(68)
Cooking gains	(calcula	ted in A	opendix	L, equat	ion L15	or L15a), also	see Table	5	•	-	•	
(69)m= 32.03	32.03	32.03	32.03	32.03	32.03	32.03	32.0	3 32.03	32.03	32.03	32.03		(69)
Pumps and far	ns gains	(Table 5	āa)					•				•	
(70)m= 0	0	0	0	0	0	0	0	0	0	0	0		(70)
Losses e.g. ev	aporatio	n (negat	ive valu	es) (Tab	le 5)	-		-	-	-	-	•	
(71)m= -72.27	-72.27	-72.27	-72.27	-72.27	-72.27	-72.27	-72.2	7 -72.27	-72.27	-72.27	-72.27		(71)
Water heating	gains (T	able 5)		-		-		-	-	-	-	•	
(72)m= 115.65	113.87	110.17	105.15	101.88	97.28	93.38	98.3	8 100.16	105.37	111.24	113.88		(72)
Total internal	gains =				(60	6)m + (67)m	n + (68)	m + (69)m +	(70)m + (71)m + (72))m	•	
(73)m= 337.3	335.58	325.44	309.18	292.9	277.01	266.54	271.4	9 279.71	296.15	315.03	328.97		(73)
6. Solar gains):												
Solar gains are c	alculated ı	using sola	r flux from	Table 6a	and asso	ciated equa	ations to	convert to the	ne applica	ble orienta	tion.		
Orientation: A		actor	Area			UX		g_ Table 6b	-	FF		Gains	
_	able 6d		m²		- 18	able 6a		Table 6b	_ '	Table 6c		(W)	_
Northeast _{0.9x}	0.77	X	12.	07	x	11.28	X	0.63	x	0.7	=	41.62	(75)
Northeast _{0.9x}	0.77	x	12.	07	х	22.97	X	0.63	x	0.7	=	84.72	(75)
Northeast _{0.9x}	0.77	X	12.	07	x	41.38	X	0.63	x	0.7	=	152.64	(75)
Northeast _{0.9x}	0.77	Х	12.	07	X	67.96	X	0.63	x	0.7	=	250.67	(75)
Northeast _{0.9x}	0.77	X	12.	07	X	91.35	X	0.63	x	0.7	=	336.95	(75)

Northeast _{0.9x}	0.77	X	12.	07	x	97.38	X		0.63	X	0.7	=	359.23	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	91.1	X		0.63	x	0.7	=	336.05	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	72.63	X		0.63	x	0.7	=	267.9	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	50.42	X		0.63	x	0.7	=	185.99	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	28.07	X		0.63	x	0.7	=	103.53	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	14.2	X		0.63	X	0.7	=	52.37	(75)
Northeast 0.9x	0.77	Х	12.	07	x	9.21	X		0.63	x	0.7	=	33.99	(75)
Solar gains in	watts, ca	alculated	for eac	h month	_		(83)m	n = Si	um(74)m .	(82)m	_			
(83)m= 41.62	84.72	152.64	250.67	336.95	359.2	3 336.05	267	7.9	185.99	103.53	52.37	33.99		(83)
Total gains –	internal a	and solar	(84)m =	= (73)m	+ (83)	m , watts						•	•	
(84)m= 378.92	420.3	478.07	559.85	629.86	636.2	4 602.59	539	.39	465.7	399.68	367.4	362.95		(84)
7. Mean inte	rnal temp	perature	(heating	season)									
Temperature	during h	neating p	eriods ir	n the livi	ng are	a from Ta	ble 9	, Th	1 (°C)				21	(85)
Utilisation fa	ctor for g	ains for I	living are	ea, h1,m	(see	Table 9a)								
Jan	Feb	Mar	Apr	May	Jui	n Jul	Α	ug	Sep	Oct	Nov	Dec		
(86)m= 0.98	0.96	0.91	0.79	0.6	0.41	0.3	0.3	35	0.59	0.86	0.96	0.98		(86)
Mean interna	al temner	ature in	living an		llow s	tens 3 to	7 in T	 Table	2 9c)					
(87)m= 20.03	20.19	20.48	20.8	20.95	20.9	_i	2		20.97	20.74	20.34	20		(87)
, ,					-l 113		-1-1- (-0 (00)		1			
Temperature (88)m= 20.25	20.25	20.25	20.26	20.27	20.2	<u> </u>	20.		12 (°C) 20.28	20.27	20.26	20.26		(88)
. ,	ļ			<u> </u>	<u> </u>	!	<u> </u>	20	20.20	20.27	20.20	20.26		(00)
Utilisation fa	 					`	T			1	1	1	1	(2.2)
(89)m= 0.97	0.95	0.9	0.76	0.56	0.37	0.25	0.3	3	0.54	0.83	0.95	0.98		(89)
Mean interna	al temper	ature in	the rest	of dwell	ng T2	(follow ste	eps 3	to 7	7 in Tabl	e 9c)	_			
(90)m= 18.94	19.19	19.59	20.03	20.22	20.2	3 20.28	20.	28	20.25	19.97	19.41	18.92		(90)
									f	LA = Livir	ng area ÷ (4) =	0.47	(91)
Mean interna	al temper	ature (fo	r the wh	ole dwe	lling) :	= fLA × T1	+ (1	– fL	A) × T2					
(92)m= 19.45	19.66	20.01	20.4	20.57	20.6	2 20.62	20.	62	20.59	20.33	19.85	19.43		(92)
Apply adjust	ment to t	he mean	interna	l temper	ature	from Table	e 4e,	whe	re appro	opriate				
(93)m= 19.45	19.66	20.01	20.4	20.57	20.6	2 20.62	20.	62	20.59	20.33	19.85	19.43		(93)
8. Space hea	ating requ	uirement												
Set Ti to the					ned at	step 11 of	Tabl	le 9b	o, so tha	t Ti,m=	(76)m an	d re-calc	culate	
the utilisation	1			i			Ι,		0	0.1	NI.			
Jan Utilisation fo	Feb	Mar	Apr	May	Jui	n Jul	A	ug	Sep	Oct	Nov	Dec		
Utilisation fa	0.95	0.89	0.76	0.57	0.39	0.28	0.3	32	0.56	0.84	0.94	0.97		(94)
Useful gains				<u> </u>	0.50	0.20	0.0	,,,	0.50	0.04	0.54	0.57		(0.)
(95)m= 365.75	`	427.33	427.25	360.81	247.2	2 166.11	173	.41	261.73	334.22	345.95	352.08		(95)
Monthly ave				<u> </u>		1					1		1	, ,
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16	.4	14.1	10.6	7.1	4.2		(96)
Heat loss rat				l .	Lm , \	V =[(39)m]	1	I	I	
(97)m= 661.94		585.42	487.92	374.76	248.9		173		270.77	411.33	543.52	654.55		(97)
Space heatir	ng require	ement fo	r each n	nonth, k	Nh/m	$\frac{1}{\text{onth}} = 0.02$	24 x [[(97)	m – (95)m] x (4	1)m		•	
(98)m= 220.37	164.48	117.62	43.69	10.37	0	0	0)	0	57.37	142.25	225.03		
	-				-	•	•			-	•	-	•	

т	otal per year (kWh/	/year) = Sum(98) _{15,912} =	981.18	(98)
Space heating requirement in kWh/m²/year			18.18	(99)
9b. Energy requirements – Community heating scheme				
This part is used for space heating, space cooling or water heating properties of space heat from secondary/supplementary heating (Table	•	mmunity scheme.	0	(301)
Fraction of space heat from community system 1 – (301) =	,	F	1	(302)
The community scheme may obtain heat from several sources. The procedure allows	for CHP and up to t	ـــ four other heat sources; the	e latter	_
includes boilers, heat pumps, geothermal and waste heat from power stations. See Approximation of heat from Community boilers	ppendix C.	Г	1	(303a)
Fraction of total space heat from Community boilers		(302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for community h	neating system		1] (305)
Distribution loss factor (Table 12c) for community heating system	3 - 7		1.05	」 (306)
Space heating		L	kWh/year	_
Annual space heating requirement			981.18	
Space heat from Community boilers	(98) x (304a) x	(305) x (306) =	1030.24	(307a)
Efficiency of secondary/supplementary heating system in % (from Ta	ble 4a or Apper	ndix E)	0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x 1	100 ÷ (308) =	0	(309)
Water heating		_		_
Annual water heating requirement		L	1864.11	
If DHW from community scheme: Water heat from Community boilers	(64) x (303a) x	(305) x (306) =	1957.32	(310a)
Electricity used for heat distribution	0.01 × [(307a)(307	7e) + (310a)(310e)] =	29.88	(313)
Cooling System Energy Efficiency Ratio			0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314)) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside	de	Γ	114.79	(330a)
warm air heating system fans		Ī	0	(330b)
pump for solar water heating		Ī	0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330	0b) + (330g) =	114.79	(331)
Energy for lighting (calculated in Appendix L)			247.96	(332)
Total delivered energy for all uses (307) + (309) + (310) + (312) + (31	15) + (331) + (33	32)(237b) =	3350.31	(338)
12b. CO2 Emissions – Community heating scheme				
	Energy kWh/year	Emission factor E kg CO2/kWh k	missions g CO2/year	
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP using two forms	uels repeat (363) to	(366) for the second fuel	96	(367a)
CO2 associated with heat source 1 [(307b)+(310b)] x 100 ÷ (367b) x	0.22 =	672.2	(367)
Electrical energy for heat distribution [(313)	x	0.52	15.51	(372)

Total CO2 associated with community	systems	(363)(366) + (368)(372)		=	687.71	(373)
CO2 associated with space heating (se	econdary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =			687.71	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	=	59.58	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	128.69	(379)
Total CO2, kg/year	sum of (376)(382) =				875.97	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				16.23	(384)
El rating (section 14)					88.14	(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 06 December 2021 at 10:55:42*

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 69.44m²Site Reference:Highgate Road - GREENPlot Reference:02 - E

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

16.69 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 14.29 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)
41.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 33.7 kWh/m²

OK

2 Fabric U-values

 Element
 Average
 Highest

 External wall
 0.18 (max. 0.30)
 0.18 (max. 0.70)
 OK

 Party wall
 0.00 (max. 0.20)
 OK

Floor (no floor) Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	8.97m²	
Windows facing: South West	2.92m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m ² K	
Community heating, heat from boilers – mains gas		

		Heor	Details:						
A a a a a a a a a a Maria a a	Noil look on	Osei		- M	L		CTDO	040040	
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Stroma Softwa					010943 on: 1.0.5.50	
Continui o Humo.	5.101.101.107.11 2012		y Address:		0.011.		7 0 10 10	711 11010100	
Address :		·							
1. Overall dwelling dime	ensions:								
Ground floor		Ar	ea(m²)	(10) v		ight(m)	(2a) =	Volume(m³	(3a)
	-) . (4 -) . (4 -) . (4 -) . (4 -)	. (4.5)		(1a) x	2	65	(2a) =	184.02	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	F(1II)	69.44	(4)	\	I) (O)	(0.)		_
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	184.02	(5)
2. Ventilation rate:	main sec	condary	other		total			m³ per hou	r
Number of allipsychia	heating he	ating		,			40 =		_
Number of chimneys		<u> </u>	0] = [0			0	(6a)
Number of open flues	0 +	0 +	0] = [0		20 =	0	(6b)
Number of intermittent fa				Ĺ	0		10 =	0	(7a)
Number of passive vents	;			L	0	X '	10 =	0	(7b)
Number of flueless gas fi	ires				0	X 4	40 =	0	(7c)
							Air ch	nanges per ho	our
Infiltration due to chimne	vs_flues and fans = (6a)	+(6b)+(7a)+(7b)	+(7c) =	Г	0		÷ (5) =	0	(8)
'	peen carried out or is intended,			ontinue fr			- (3) =	0	(0)
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber fra resent, use the value correspo			•	ruction			0	(11)
deducting areas of openii		maing to the gre	aler wall are	a (anter					
If suspended wooden f	floor, enter 0.2 (unsealed	d) or 0.1 (sea	aled), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
ŭ	s and doors draught strip	pped						0	(14)
Window infiltration			0.25 - [0.2		_	. (45)		0	(15)
Infiltration rate	arron avance and in authin		(8) + (10)	, , ,	, , ,	, ,		0	(16)
If based on air permeabil	q50, expressed in cubic $(18) = (17)$	•	•	•	etre or e	envelope	area	3	$= \begin{pmatrix} (17) \\ (48) \end{pmatrix}$
	es if a pressurisation test has b				is being u	sed	ļ	0.15	(18)
Number of sides sheltere			0 ,	,	Ü			0	(19)
Shelter factor			(20) = 1 -	0.075 x (1	19)] =			1	(20)
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.15	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4								
	1.23 1.1 1.08	0.95 0.95	0.92	1	1.08	1.12	1.18		
								•	

Adjusted infiltr	ation rat	e (allowi	ng for sh	elter an	d wind s	peed) =	(21a) x	(22a)m				1	
0.19 Calculate effe	0.19	0.18	0.16	0.16 he appli	0.14 Cable ca	0.14	0.14	0.15	0.16	0.17	0.18		
If mechanica		-	uto 101 t	по арри	ouble ou							0.5	(23
If exhaust air h	eat pump	using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	wise (23b) = (23a)		Ī	0.5	(23
If balanced with	n heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				74.8	(23
a) If balance	d mech	anical ve	ntilation	with he	at recove	ery (MVI	HR) (24a	m = (22)	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(24
b) If balance	d mech	anical ve	ntilation	without	heat red	covery (N	ЛV) (24b)m = (22	2b)m + (23b)		•	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)r				-					.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)r									0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	iter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)					
(25)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(25
3. Heat losse	s and he	eat loss r	paramete	er:									
ELEMENT	Gros area	SS	Openin	gs	Net Ar A ,r		U-valı W/m2		A X U (W/		k-value kJ/m².ł		X k /K
Windows Type		(111)			8.97				11.89		10/111 1	110/	(27
Windows Type					2.92	_	- ` / /[1/(1.4)+	Ļ	3.87	\dashv			(27
Walls Type1	41.5	:1	11.89		29.62	=	0.18		5.33	╡┌	60	1777.2	_
Walls Type2	16.7		0		16.73	_	0.17		2.81	륵 ¦	60	1003.8	= ' '
Total area of e					58.24	=	0.17		2.01			1003.0	(31)
Party wall		,			40.43	=	0		0		45	1819.35	`
Party floor					69.44	=				L	40	2777.6	=
Party ceiling						=				L T		2083.2	=
Internal wall **					69.44	=				L	30		=
* for windows and		owe use s	effective wi	ndow H-vs	136.2		ı formula 1	/[/1/ L.valu	ا ۱۸۵ مراهر	es aiven in	9 naragranh	1225.89	9 (32
** include the area						atou uomg	normala 1	n no vara	10) 10.04] 0	io givori iii	paragrapii	0.2	
Fabric heat los	ss, W/K :	= S (A x	U)				(26)(30)	+ (32) =				23.9	(33
Heat capacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	10687.04	(34
Thermal mass	parame	ter (TMF	P = Cm -	- TFA) ir	n kJ/m²K			= (34)	÷ (4) =			153.9	(35
For design assess can be used inste				construct	ion are no	t known pr	ecisely the	indicative	e values of	TMP in T	able 1f		
Thermal bridge	es : S (L	x Y) cal	culated ı	using Ap	pendix I	<					[6.99	(36
if details of therma		are not kn	own (36) =	= 0.05 x (3	1)			(22)	(20)		ı		¬,,,_
Total fabric he		aloudoto -	l manthi	,					(36) =	(25)m + (F)	\	30.9	(37
Ventilation hea	Feb	Mar			lun	1,,1	۸۰۰۰		= 0.33 × (l	1		
(38)m= Jan (38)m= 19.27	19.04	18.81	Apr 17.67	May 17.44	Jun 16.3	Jul 16.3	Aug 16.08	Sep 16.76	Oct 17.44	17.9	Dec 18.35		(38
19.27		<u> </u>	17.07		10.5	10.0	1 10.00		<u> </u>	<u> </u>	10.00		,00
11													
Heat transfer (39)m= 50.16	49.93	1t, VV/K 49.71	48.57	48.34	47.2	47.2	46.97	(39)m 47.66	= (37) + (37) 48.34	38)m 48.79	49.25		

Heat loss par	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.72	0.72	0.72	0.7	0.7	0.68	0.68	0.68	0.69	0.7	0.7	0.71		
	•	!	<u>. </u>	<u>. </u>		!	!		Average =	Sum(40) ₁ .	12 /12=	0.7	(40)
Number of da	-	1 `	<u> </u>						l _				
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 hea	ating ene	rgy requi	irement:								kWh/ye	ar:	
Assumed occ if TFA > 13 if TFA £ 13	3.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13.		23		(42)
Annual avera Reduce the annu not more that 12	ual average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		.22		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage								1 - 22		L			
(44)m= 95.94	92.45	88.97	85.48	81.99	78.5	78.5	81.99	85.48	88.97	92.45	95.94		
	1	!	<u> </u>	ļ.		<u> </u>	<u> </u>		Total = Su	m(44) ₁₁₂ =	=	1046.65	(44)
Energy content of	of hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x C	Tm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 142.28	124.44	128.41	111.95	107.42	92.7	85.9	98.57	99.74	116.24	126.89	137.79		
K in a tamba mana a sa			-f (()		havea (40		Total = Su	m(45) ₁₁₂ =	= [1372.32	(45)
If instantaneous		· ·	·	1	,.		, ,	, , , I					
(46)m= 21.34 Water storage	1	19.26	16.79	16.11	13.9	12.88	14.78	14.96	17.44	19.03	20.67		(46)
Storage volur) includir	ng anv so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community	` '					_							()
Otherwise if r	•			_			, ,	ers) ente	er '0' in (47)			
Water storage													
a) If manufac	cturer's d	eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature	factor fro	m Table	2b								0		(49)
Energy lost fr		•	•				(48) x (49)) =		1	10		(50)
b) If manufactHot water sto			-								02		(51)
If community	_			0 2 (1111)	1,11ti 0, de	•97				<u> </u>	02		(01)
Volume facto	_									1.	03		(52)
Temperature	factor fro	m Table	2b							0	.6		(53)
Energy lost fr	om wate	r storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter (50) or	(54) in (5	55)								1.	03		(55)
Water storage	e loss cal	culated t	for each	month			((56)m = ((55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contai	ns dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendi	хН	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circu	it loss (ar	nual) fro	m Table								0		(58)
Primary circu	`	,			59)m = ((58) ÷ 36	65 × (41)	m					
(modified b				,	•	` '	, ,		r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi loss o	ealculated	for each	month ((61)m –	(60) ÷	365 🗸 (41)m							
(61)m= 0	0	0	0	01)111 =	00) +	1 0))	0	0	0	0	1	(61)
													J · (59)m + (61)m	(-)
(62)m= 197.5		183.69	165.44	162.7	146.19		153	_	153.24	171.52	180.38	193.07	(39)III + (01)IIII]	(62)
Solar DHW inpu				<u> </u>									J	(/
(add addition										i ooniinba	iion to wat	or ricating)		
(63)m= 0	0	0	0	0	0	0	0	_	0	0	0	0	1	(63)
Output from	uwater hea	ter	<u> </u>	<u> </u>						l		<u> </u>	J	
(64)m= 197.5		183.69	165.44	162.7	146.19	141.17	153	.84	153.24	171.52	180.38	193.07	1	
		l	l .	l		-1		Outp	out from wa	ater heate	r (annual)₁	12	2023.16	(64)
Heat gains fr	om water	heating,	kWh/m	onth 0.2	5 ′ [0.8	5 × (45)m	ı + (6	1)m	1] + 0.8 >	د [(46)m	+ (57)m	+ (59)m]	-
(65)m= 91.53		86.92	80.02	79.94	73.62	72.78	76.	_	75.96	82.87	84.98	90.04]	(65)
include (57	7)m in cal	culation of	of (65)m	only if c	vlinder	is in the	dwell	ing	or hot w	ater is f	rom com	munity h	neating	
5. Internal			. ,		•							,	<u> </u>	
Metabolic ga	·			,										
Jan	T '	Mar	Apr	May	Jun	Jul	А	ug	Sep	Oct	Nov	Dec]	
(66)m= 111.6	2 111.62	111.62	111.62	111.62	111.62	111.62	111	.62	111.62	111.62	111.62	111.62		(66)
Lighting gain	s (calcula	ted in Ap	pendix	L, equat	ion L9	or L9a), a	lso s	ee -	Table 5				-	
(67)m= 18	15.98	13	9.84	7.36	6.21	6.71	8.7	72	11.71	14.87	17.35	18.5]	(67)
Appliances g	ains (calc	ulated ir	Append	dix L, eq	uation	L13 or L1	3a),	also	see Ta	ble 5		-	_	
(68)m= 195.9	9 198.02	192.9	181.98	168.21	155.27	146.62	144	.59	149.71	160.62	174.4	187.34]	(68)
Cooking gair	ns (calcula	ted in A	ppendix	L, equat	ion L1	or L15a), als	o se	e Table	5			-	
(69)m= 34.16	34.16	34.16	34.16	34.16	34.16	34.16	34.	16	34.16	34.16	34.16	34.16]	(69)
Pumps and f	ans gains	(Table	5а)			•							-	
(70)m= 0	0	0	0	0	0	0	0)	0	0	0	0]	(70)
Losses e.g.	evaporatio	n (nega	tive valu	es) (Tab	le 5)	•				•		•	-	
(71)m= -89.3	-89.3	-89.3	-89.3	-89.3	-89.3	-89.3	-89	0.3	-89.3	-89.3	-89.3	-89.3]	(71)
Water heatin	g gains (T	able 5)	-	-	-					-	-	-	-	
(72)m= 123.0	2 121.01	116.83	111.14	107.44	102.24	97.82	103	.49	105.5	111.39	118.03	121.02]	(72)
Total interna	al gains =				(6	6)m + (67)n	า + (68	3)m +	- (69)m + ((70)m + (7	71)m + (72))m	-	
(73)m= 393.4	9 391.5	379.21	359.45	339.5	320.21	307.64	313	.29	323.41	343.36	366.27	383.34]	(73)
6. Solar gai	ns:													
Solar gains are	e calculated	using sola	r flux from	Table 6a	and asso	ciated equa	ations	to co	nvert to th	e applica		tion.		
Orientation:	Access F Table 6d		Area m²			ux able 6a		_	g_ able 6b	т	FF able 6c		Gains	
						able ba	,	_ '	able ob	_ '	able oc		(W)	,
Northeast 0.9x		X	8.9	97	X	11.28	X		0.63	X	0.7	=	30.93	(75)
Northeast 0.9x		X	8.9	97	X	22.97	X		0.63	×	0.7	=	62.96	(75)
Northeast 0.9x	0	X	8.9	97	X	41.38	X	<u> </u>	0.63	×	0.7	=	113.43	(75)
Northeast 0.9x		X	8.9	97	x	67.96	X	<u> </u>	0.63	×	0.7	=	186.29	(75)
Northeast 0.9x	0.77	X	8.9	97	X	91.35	X		0.63	X	0.7	=	250.41	(75)

					_		1		_				_
Northeast _{0.9x}	0.77	X	8.9	97	x	97.38	X	0.63	X	0.7	=	266.96	(75)
Northeast _{0.9x}	0.77	X	8.9	97	x	91.1	X	0.63	X	0.7	=	249.74	(75)
Northeast _{0.9x}	0.77	X	8.9	97	x	72.63	X	0.63	X	0.7	=	199.1	(75)
Northeast _{0.9x}	0.77	X	8.9	97	x	50.42	X	0.63	X	0.7	=	138.22	(75)
Northeast _{0.9x}	0.77	X	8.9	97	x	28.07	X	0.63	X	0.7	=	76.94	(75)
Northeast _{0.9x}	0.77	Х	8.9	97	х	14.2	X	0.63	X	0.7	=	38.92	(75)
Northeast 0.9x	0.77	X	8.9	97	x	9.21	X	0.63	x	0.7	=	25.26	(75)
Southwest _{0.9x}	0.77	X	2.9	92	x	36.79]	0.63	x	0.7	=	32.83	(79)
Southwest _{0.9x}	0.77	X	2.9	92	x	62.67]	0.63	x	0.7	=	55.93	(79)
Southwest _{0.9x}	0.77	X	2.9	92	x	85.75]	0.63	x	0.7	=	76.52	(79)
Southwest _{0.9x}	0.77	Х	2.9	92	x	106.25]	0.63	х	0.7	=	94.82	(79)
Southwest _{0.9x}	0.77	х	2.9	92	х	119.01]	0.63	х	0.7	=	106.2	(79)
Southwest _{0.9x}	0.77	х	2.9	92	х	118.15]	0.63	x	0.7	=	105.44	(79)
Southwest _{0.9x}	0.77	Х	2.9	92	х	113.91]	0.63	х	0.7	=	101.65	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x	104.39	j	0.63	x	0.7	=	93.16	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x	92.85	Ī	0.63	x	0.7	=	82.86	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x	69.27	Ī	0.63	x	0.7	_ =	61.81	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x	44.07	Ī	0.63	x	0.7		39.33	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x	31.49	Ī	0.63	x	0.7	=	28.1	(79)
							_						
Solar gains in	watts, cal	culated	for eac	h month			(83)m	n = Sum(74)m .	(82)m				
(83)m= 63.76	118.89	189.96	281.11	356.62	372.4	351.39	292	.25 221.08	138.7	6 78.25	53.36		(83)
]	· /
Total gains –		nd solar	` '	<u> </u>	`					- 1		J 1	
Total gains – i (84)m= 457.26		nd solar 569.17	(84)m = 640.56	= (73)m - 696.12	+ (83)m 692.61		605		482.12		436.7]	(84)
	510.39	569.17	640.56	696.12	692.61		<u> </u>		!		!]	
(84)m= 457.26	510.39	569.17 erature (640.56 (heating	696.12 season	692.61	659.04	605	.54 544.49	!		!	21	
(84)m= 457.26 7. Mean inter	510.39 rnal tempe during he	569.17 erature (eating p	640.56 (heating	696.12 season	692.61) ng area	659.04	605	.54 544.49	!		!	21	(84)
(84)m= 457.26 7. Mean intermediate Temperature	510.39 rnal tempe during he	569.17 erature (eating p	640.56 (heating	696.12 season	692.61) ng area	659.04	605 ble 9	.54 544.49	!	2 444.51	!	21	(84)
(84)m= 457.26 7. Mean intermediation factors Utilisation factors	510.39 rnal tempe during he	erature (eating points for li	640.56 (heating eriods in iving are	season the livinga, h1,m	692.61) ng area (see T	659.04 a from Tal	605 ble 9	.54 544.49 , Th1 (°C) ug Sep	482.12	2 444.51	436.7	21	(84)
(84)m= 457.26 7. Mean intermediate Temperature Utilisation factors and the second sec	510.39 rnal temper during he ctor for gain Feb 0.96	erature (eating poins for limar 0.91	640.56 (heating eriods in iving are Apr	season the livings, h1,m May	692.61) ng area (see T Jun 0.43	a from Tal able 9a) Jul 0.31	605 ble 9	.54 544.49 , Th1 (°C) ug Sep 36 0.59	482.11 Oct	2 444.51 Nov	436.7 Dec	21	(84)
(84)m= 457.26 7. Mean intermediate Temperature Utilisation factors Jan (86)m= 0.98	510.39 rnal temper during he ctor for gain Feb 0.96	erature (eating poins for limar 0.91	640.56 (heating eriods in iving are Apr	season the livings, h1,m May	692.61) ng area (see T Jun 0.43	a from Tal able 9a) Jul 0.31	605 ble 9	.54 544.49 , Th1 (°C) ug Sep 36 0.59 Table 9c)	482.11 Oct	2 444.51 Nov	436.7 Dec	21	(84)
(84)m= 457.26 7. Mean interpretation factors Utilisation factors Jan (86)m= 0.98 Mean internations (87)m= 20.14	rnal temper during he ctor for gain Feb 0.96 al temperar 20.31	erature eating perins for lims	640.56 (heating eriods ir iving are 0.8 iving are 20.83	season the livings, h1,m May 0.62 ea T1 (for 20.96	692.61) ng area (see T Jun 0.43 bllow st 20.99	659.04 a from Tal able 9a) Jul 0.31 eps 3 to 7	605 ble 9 A 0.3 7 in T	.54 544.49 , Th1 (°C) ug Sep 36 0.59 Table 9c) 1 20.98	482.1: Oct 0.85	2 444.51 Nov 0.96	436.7 Dec 0.98	21	(84)
7. Mean internation (84)m= 457.26 7. Mean internation factor (86)m= 0.98 Mean internation	rnal temper during he ctor for gain Feb 0.96 al temperar 20.31	erature eating perins for lims	640.56 (heating eriods ir iving are 0.8 iving are 20.83	season the livings, h1,m May 0.62 ea T1 (for 20.96	692.61) ng area (see T Jun 0.43 bllow st 20.99	659.04 a from Tal able 9a) Jul 0.31 eps 3 to 7	605 ble 9 A 0.3 7 in T	.54 544.49 , Th1 (°C) ug Sep 36 0.59 Table 9c) 1 20.98 9, Th2 (°C)	482.1: Oct 0.85	2 444.51 Nov 0.96	436.7 Dec 0.98	21	(84)
(84)m= 457.26 7. Mean interpretation factors and the second seco	stor for gainer feb 0.96 lt temperar 20.31 during he 20.32	erature (eating prins for limited in land) ture in land) 20.56 eating prins for limited in land)	640.56 (heating eriods in iving are 20.83 eriods ir 20.34	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34	692.61) ng area (see T Jun 0.43 bllow st 20.99 dwellin 20.36	659.04 a from Tal able 9a) Jul 0.31 eps 3 to 7 21 g from Tal 20.36	605 ble 9 A 0.3 7 in T 2 able 9	.54 544.49 , Th1 (°C) ug Sep 36 0.59 Table 9c) 1 20.98 9, Th2 (°C)	Oct 0.85	2 444.51 Nov 0.96	Dec 0.98	21	(84) (85) (86) (87)
(84)m= 457.26 7. Mean interpretation factors (86)m= 0.98 Mean internation (87)m= 20.14 Temperature (88)m= 20.32 Utilisation factors (84)m= 20.32	stor for gaing during her constant temperate temperate 20.31 during her constant temperate 20.32 during her constant temperate	erature eating poins for line Mar 0.91 ture in la 20.56 eating poins for r	640.56 (heating eriods ir iving are 0.8 iving are 20.83 eriods ir 20.34 est of decrease in the control of the c	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 rest of 20.34 welling,	692.61) ng area (see T Jun 0.43 bllow st 20.99 dwellin 20.36 h2,m (s	659.04 a from Tal able 9a) Jul 0.31 eps 3 to 7 21 g from Tal 20.36	605 ble 9 A 0.3 7 in 1 2 able 9 20.	.54 544.49 , Th1 (°C) ug Sep 36 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35	Oct 0.85	2 444.51 Nov 0.96 20.44	Dec 0.98 20.12 20.33	21	(84) (85) (86) (87)
(84)m= 457.26 7. Mean interpretation factors (86)m= 0.98 Mean internation (87)m= 20.14 Temperature (88)m= 20.32 Utilisation factors (89)m= 0.97	stor for gain and temperate to the store of	erature eating poins for line 1 20.56 eating poins for reading poi	640.56 (heating eriods ir iving are 20.83 eriods ir 20.34 est of do 0.77	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 rest of 20.34 welling, 0.58	692.61) ng area (see T Jun 0.43 bllow st 20.99 dwellin 20.36 h2,m (s	a from Tal Table 9a) Jul 0.31 eps 3 to 7 21 g from Ta 20.36 see Table 0.27	605 ble 9 A 0.3 7 in T 2 able 9 20. 99a) 0.3	.54 544.49 , Th1 (°C) ug Sep 36 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35	Oct 0.85 20.8 20.34	2 444.51 Nov 0.96	Dec 0.98	21	(84) (85) (86) (87) (88)
(84)m= 457.26 7. Mean intermediate Temperature Utilisation factors Jan	stor for gail 20.31 ctor for gail 20.32 ctor for gail 0.95 ctor for gail 1 temperal 20.32 ctor for gail 1 temperal 20.95 ctor for gail 1 temperal 20.95 ctor for gail 1 temperal 20.95 ctor for gail 1 temperal 20.39 ctor for gail 1 temperal 20.30 ctor for gail 1 temperal 20.30 ctor for gail 1 temperal 20.30 ctor for gail 1 temperal 20.30 ctor for gail 1 temperal 20.30 cto	erature (eating prins for line) Mar 0.91 ture in line) 20.56 eating prince 20.33 ins for rine) 0.9	640.56 (heating eriods ir iving are 20.83 eriods ir 20.34 est of do 0.77 the rest	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34 welling, 0.58 of dwelling	692.61) ng area (see T Jun 0.43 bllow st 20.99 dwellin 20.36 h2,m (s 0.39 ng T2 (a from Tal Table 9a) Jul 0.31 eps 3 to 7 21 g from Tal 20.36 see Table 0.27 (follow ste	605 ble 9 A 0.3 7 in T 2 able 9 20. 99a) 0.3	.54 544.49 , Th1 (°C) ug Sep 36 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35 31 0.54 4 to 7 in Table	Oct 0.85 20.8 20.34 0.83 e 9c)	2 444.51 Nov 0.96 20.44 20.34	Dec 0.98 20.12 20.33	21	(84) (85) (86) (87) (88) (89)
(84)m= 457.26 7. Mean interpretation factors (86)m= 0.98 Mean internation (87)m= 20.14 Temperature (88)m= 20.32 Utilisation factors (89)m= 0.97	stor for gain and temperate to the store of	erature eating poins for line 1 20.56 eating poins for reading poi	640.56 (heating eriods ir iving are 20.83 eriods ir 20.34 est of do 0.77	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 rest of 20.34 welling, 0.58	692.61) ng area (see T Jun 0.43 bllow st 20.99 dwellin 20.36 h2,m (s	a from Tal Table 9a) Jul 0.31 eps 3 to 7 21 g from Ta 20.36 see Table 0.27	605 ble 9 A 0.3 7 in T 2 able 9 20. 99a) 0.3	.54 544.49 , Th1 (°C) ug Sep 36 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35 31 0.54 36 20.33	Oct 0.85 20.8 20.34 0.83 e 9c) 20.11	2 444.51 Nov 0.96 20.44 20.34 0.95	20.12 20.33 0.98		(84) (85) (86) (87) (88) (89)
(84)m= 457.26 7. Mean intermediate Temperature Utilisation factors (86)m= 0.98 Mean internations (87)m= 20.14 Temperature (88)m= 20.32 Utilisation factors (89)m= 0.97 Mean internations (90)m= 19.17	stor for gail 20.32 ctor for gail 19.41	erature eating prins for line 20.56 eating prins for rough ture in the 19.77	640.56 (heating eriods ir iving are 20.83 eriods ir 20.34 est of do 0.77 the rest 20.14	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34 welling, 0.58 of dwelling	692.61) ng area (see T Jun 0.43 bllow st 20.99 dwellin 20.36 h2,m (s 0.39 ing T2 (20.35)	659.04 a from Tal rable 9a) Jul 0.31 eps 3 to 7 21 g from Tal 20.36 see Table 0.27 (follow stell 20.36	605 ble 9 A 0.3 7 in 1 2 able 9 20. 9a) 0.3 eps 3	.54 544.49 , Th1 (°C) ug Sep 36 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35 31 0.54 36 20.33	Oct 0.85 20.8 20.34 0.83 e 9c) 20.11	2 444.51 Nov 0.96 20.44 20.34	20.12 20.33 0.98	21	(84) (85) (86) (87) (88) (89)
(84)m= 457.26 7. Mean intercontrol Temperature Utilisation fact Jan (86)m= 0.98 Mean internation (87)m= 20.14 Temperature (88)m= 20.32 Utilisation fact (89)m= 0.97 Mean internation (90)m= 19.17	stor for gail 20.31 ctor for gail 0.95 ctor for gail 19.41 ctor fo	erature eating prins for line (form) Mar 0.91 ture in line (form) ture in time (form)	640.56 (heating eriods in iving are 20.83 eriods in 20.34 est of do 0.77 the rest 20.14	season the livin ea, h1,m May 0.62 ea T1 (fc 20.96 rest of 20.34 welling, 0.58 of dwelli 20.3	692.61) ng area (see T Jun 0.43 bllow st 20.99 dwellin 20.36 h2,m (s 0.39 ng T2 (20.35)	659.04 a from Tal able 9a) Jul 0.31 eps 3 to 7 21 g from Ta 20.36 see Table 0.27 (follow ste 20.36	605 ble 9 A 0.3 7 in T 2 able 9 20. 99a)	.54 544.49 , Th1 (°C) ug Sep 36 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35 31 0.54 36 20.33 - fLA) × T2	Oct 0.85 20.8 20.34 0.83 le 9c) 20.11 FLA = Liv	2 444.51 Nov 0.96 20.44 20.34 0.95 19.61 ving area ÷ (-	Dec 0.98 20.12 20.33 0.98 19.15 4) =		(84) (85) (86) (87) (88) (89) (90) (91)
(84)m= 457.26 7. Mean intermediate Temperature Utilisation factors (86)m= 0.98 Mean internations (87)m= 20.14 Temperature (88)m= 20.32 Utilisation factors (89)m= 0.97 Mean internations (90)m= 19.17	stor for gail 20.32 ctor for gail 19.41 self temperare 19.72	erature eating prins for line 20.56 eating prins for rough ture in the 19.77 e	cheating eriods ir iving are 20.83 eriods ir 20.34 est of dr 0.77 the rest 20.14 er the wh	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34 welling, 0.58 of dwelling 20.3	692.61) ng area (see T Jun 0.43 bllow st 20.99 dwellin 20.36 h2,m (s 0.39 ing T2 (20.35	659.04 a from Tal able 9a) Jul 0.31 eps 3 to 7 21 g from Tal 20.36 see Table 0.27 (follow stern 20.36) fLA × T1 20.58	605 ble 9 A 0.3 7 in 1 2 able 9 0.3 9a) 0.3 eps 3 20. + (1 20.	.54 544.49 , Th1 (°C) ug Sep 36 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35 31 0.54 36 20.33 - fLA) × T2 58 20.55	Oct 0.85 20.8 20.34 0.83 e 9c) 20.11 fLA = Liv	2 444.51 Nov 0.96 20.44 20.34 0.95 19.61 ving area ÷ (20.12 20.33 0.98		(84) (85) (86) (87) (88) (89)

(93)m= 19.51	19.72	20.04	20.38	20.53	20.57	20.58	20.58	20.55	20.35	19.9	19.48		(93)
8. Space heat									. —				
Set Ti to the new the utilisation			•		ed at ste	ep 11 of	Table 9b	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fact			<u> </u>	,									
(94)m= 0.97	0.94	0.89	0.77	0.59	0.4	0.28	0.32	0.55	0.83	0.94	0.97		(94)
Useful gains,	hmGm	, W = (94	4)m x (84	4)m									
(95)m= 441.94													(95)
Monthly average external temperature from Table 8												(0.0)	
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate (97)m= 762.69	740.05	an intern	557.45	426.72	Lm , VV = 281.99	=[(39)m : 187.77	x [(93)m- 196.33	- (96)m 307.58	471.09	624.48	752.71		(97)
(97)m= 762.69 Space heating						<u> </u>					752.71		(97)
(98)m= 238.64	173.23	122.02	45.12	10.7	0	0.02	0	0	54.18	148.53	244.34		
(66)		1	.0		Ů) = Sum(9	<u> </u>	1036.76	(98)
Space heating	a roquir	omont in	k\\/\b/m2	2/voor				. po. you.	(,) ca.	<i>,</i> • • • • • • • • • • • • • • • • • • •	() 1		╡```
,	,										l	14.93	(99)
9b. Energy req			The state of the s	Ĭ			ting prov	idad by	o oomm	unity ook	omo		
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none									0	(301)			
Fraction of spa	ce heat	from co	mmunity	svstem	1 – (301	1) =					[1	(302)
The community sc			•	•	,	,	allows for	CHP and i	ın to four	other heat	sources: th	he latter	`
includes boilers, he									ap to rour	ouror riout	-	io iattor	_
Fraction of hea	t from C	Commun	ity boiler	s								1	(303a)
Fraction of tota	ıl space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor for cont	rol and	charging	method	(Table	4c(3)) fo	r commu	unity hea	ting sys	tem		Ī	1	(305)
Distribution los	s factor	(Table 1	2c) for c	commun	ity heatir	ng syste	m					1.05	(306)
Space heating	ı										L	kWh/yeaı	- ·
Annual space h		requiren	nent									1036.76	
Space heat fro	m Comi	munity b	oilers					(98) x (30	04a) x (30	5) x (306) =	<u> </u>	1088.59	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (frc	m Table	4a or A	ppendix	E)	[0	(308
Space heating			•	_	•	,			· · 01) x 100 -	,		0	<u> </u>
	•			7 ,		, ,					L		
Water heating Annual water h		eauirem	ent								[2023.16	7
If DHW from co	_	•									l	2020.10	_
Water heat from								(64) x (30	03a) x (30	5) x (306) =	=	2124.32	(310a)
Electricity used	d for hea	at distribu	ution				0.01	× [(307a).	(307e) +	32.13	(313)		
Cooling System	n Energ	y Efficie	ncy Ratio	0							[0	(314)
Space cooling	(if there	is a fixe	d cooling	g systen	n, if not e	enter 0)		= (107) ÷	(314) =		[0	(315)
Electricity for p	`					,					L	<u> </u>	_
mechanical ver							outside				[169.72	(330a)
											L		_

warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	b) + (330g) =		169.72	(331)
Energy for lighting (calculated in Appen	idix L)				317.84	(332)
Total delivered energy for all uses (307) + (309) + (310) + (31	2) + (315) + (331) + (33	32)(237b) =		3700.47	(338)
12b. CO2 Emissions – Community hea	ting scheme					
		Energy kWh/year	Emission factors kg CO2/kWh		missions g CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)	•	P) sing two fuels repeat (363) to	(366) for the secon	nd fuel	96	(367a)
CO2 associated with heat source 1	[(307b	o)+(310b)] x 100 ÷ (367b) x	0.22	=	722.91	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	16.68	(372)
Total CO2 associated with community s	systems	(363)(366) + (368)(372	2)	=	739.58	(373)
CO2 associated with space heating (se	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =			739.58	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	=	88.09	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	164.96	(379)
Total CO2, kg/year	sum of (376)(382) =				992.62	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				14.29	(384)

El rating (section 14)

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 06 December 2021 at 10:55:32*

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 69.61m²Site Reference:Highgate Road - GREENPlot Reference:02 - F

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 16.77 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

14.35 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 41.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 34.0 kWh/m²

OK

2 Fabric U-values

 Element
 Average
 Highest

 External wall
 0.18 (max. 0.30)
 0.18 (max. 0.70)
 OK

 Party wall
 0.00 (max. 0.20)
 OK

Floor (no floor) Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	8.97m²	
Windows facing: South West	2.92m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers - mains gas		

		Lleo	Details:						
Access an Name	Nailleabare	0361		- M	L		CTDO	010010	
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Stroma Softwa			010943 on: 1.0.5.50			
Continui o Italiio:	5.101.101.107.11 2012		ty Address:		0.011.		7 0 10 10	11010100	
Address :		·	•						
1. Overall dwelling dime	ensions:								
Ground floor		A	rea(m²)	(10) v		ight(m)	(2a) =	Volume(m³	(3a)
	-) . (4 -) . (4 -) . (4 -) . (4 -)	. (4.5)		(1a) x	2	65	(2a) =	184.47	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)-	+(1n)	69.61	(4)	\	I) (O)	(0.)		_
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	184.47	(5)
2. Ventilation rate:	main sec	condary	other		total			m³ per hou	r
Number of altimospess	heating he	ating		,			40 =		_
Number of chimneys			0] = [0			0	(6a)
Number of open flues	0 +	0 +	0] = [0		20 =	0	(6b)
Number of intermittent fa				Ĺ	0		10 =	0	(7a)
Number of passive vents				L	0	X '	10 =	0	(7b)
Number of flueless gas fi	res				0	X 4	40 =	0	(7c)
							Air ch	nanges per ho	our
Infiltration due to chimne	vs_flues and fans = (6a)	+(6b)+(7a)+(7b)+(7c) =	Г	0		÷ (5) =	0	(8)
•	peen carried out or is intended			ontinue fr			- (3) =	0	(0)
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber fra resent, use the value correspo			•	ruction			0	(11)
deducting areas of openii		maing to the gr	eater wan are	a (anter					
If suspended wooden f	floor, enter 0.2 (unseale	d) or 0.1 (sea	aled), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
ŭ	s and doors draught stri	pped						0	(14)
Window infiltration			0.25 - [0.2		_	. (45)		0	(15)
Infiltration rate	aro avaraged in subject		(8) + (10)	, , ,	, , ,	, ,		0	(16)
If based on air permeabil	q50, expressed in cubic $(18) = (17)$	•	•	•	etre or e	envelope	area	3	$= \begin{pmatrix} (17) \\ (48) \end{pmatrix}$
•	es if a pressurisation test has b				is beina u	sed		0.15	(18)
Number of sides sheltere			3 ,	,	3			0	(19)
Shelter factor			(20) = 1 -	0.075 x (1	19)] =			1	(20)
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.15	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ∸ 4								
	1.23 1.1 1.08	0.95 0.95	0.92	1	1.08	1.12	1.18		
		<u>.</u>						I	

Adjusted infiltra	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effect		-	rate for t	he appli	cable ca	se	-		-	-		· 	
If exhaust air he			endix N (2	3h) <i>– (</i> 23a	a) × Fmv (e	equation (N	VS)) other	wise (23h) = (23a)			0.5	(23:
If balanced with		0 11		, ,	, ,	. ,	,, .	,) = (20 0)			0.5	= (23
a) If balance		•	•	_					2h\m + (23P) ^ [∙	1 _ (23c)	74.8	(23
(24a)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3	- 100] 	(24
b) If balance					<u> </u>	l	l				0.0		`
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h					ļ	<u> </u>							•
if (22b)n				•					.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural	ventilatio	on or wh	ole hous	e positiv	/e input	ventilatio	on from I	oft	ļ	!	ļ.		
if (22b)n				•	•				0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	iter (24a) or (24b	o) or (24	c) or (24	d) in box	(25)				-	
(25)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(25
3. Heat losse	s and he	eat loss r	paramete	er:									
ELEMENT	Gros	·	Openin		Net Ar	ea	U-valı	ıe	ΑXU		k-value	e A	Χk
	area	(m²)	m	Ž	A ,r	n²	W/m2	Κ.	(W/	K)	kJ/m²·l	K kJ	/K
Windows Type	1				8.97	x1.	/[1/(1.4)+	0.04] =	11.89				(27
Windows Type	2				2.92	х1.	/[1/(1.4)+	0.04] =	3.87				(27
Walls Type1	41.5	59	11.89	9	29.7	Х	0.18	=	5.35		60	1782	(29
Walls Type2	18.4	1	0		18.41	X	0.17	= [3.09	\Box [60	1104.0	6 (29
Total area of e	lements	, m²			60								(31
Party wall					38.68	3 x	0	=	0		45	1740.0	6 (32
Party floor					69.61						40	2784.4	4 (32
Party ceiling					69.61					Ī	30	2088.3	3 (32
Internal wall **					136.2	1				Ī	9	1225.8	9 (32
* for windows and	roof wind	ows, use e	ffective wi	ndow U-va	alue calcul	ated using	formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	n 3.2	
** include the area				ls and part	titions								
Fabric heat los		•	U)				(26)(30)	+ (32) =				24.2	(33
Heat capacity	^	,						***	(30) + (32	2) + (32a).	(32e) =	10725.79	(34
Thermal mass	•	•		•				` '	÷ (4) =			154.08	(35
For design assess can be used inste				constructi	ion are no	t known pr	ecisely the	indicative	e values of	TMP in T	able 1f		
Thermal bridge				usina Ap	pendix ł	<						6.99	(36
if details of therma													`
Total fabric he	at loss							(33) +	(36) =			31.19	(37
Ventilation hea	at loss ca	alculated	l monthly	/				(38)m	= 0.33 × ((25)m x (5))		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
38)m= 19.31	19.08	18.86	17.71	17.49	16.34	16.34	16.12	16.8	17.49	17.94	18.4		(38
Heat transfer of	coefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m= 50.5	50.28	50.05	48.91	48.68	47.54	47.54	47.31	47.99	48.68	49.13	49.59		
										-	-	i	_

Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.73	0.72	0.72	0.7	0.7	0.68	0.68	0.68	0.69	0.7	0.71	0.71		
	•			ı		ı	ı		Average =	: Sum(40) ₁	12 /12=	0.7	(40)
Number of day	ys in mo	nth (Tab	le 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 hea	ting ene	rgy requi	rement:								kWh/ye	ear:	
Assumed occi if TFA > 13. if TFA £ 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13		24		(42)
Annual average Reduce the annual not more that 125	al average	hot water	usage by	5% if the a	lwelling is	designed t			se target c		7.32		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage								- 1					
(44)m= 96.05	92.56	89.07	85.57	82.08	78.59	78.59	82.08	85.57	89.07	92.56	96.05		
	•								Total = Su	ım(44) ₁₁₂ =		1047.84	(44)
Energy content of	f hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x C	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 142.44	124.58	128.56	112.08	107.54	92.8	85.99	98.68	99.86	116.37	127.03	137.95		
If instantaneous	vator hooti	na ot noint	of upo (no	hot woto	· otorogol	ontor O in	hayaa (16		Total = Su	ım(45) ₁₁₂ =	• [1373.88	(45)
If instantaneous v			,	ı	, , , , , , , , , , , , , , , , , , ,		, ,	, , , I	1				(40)
(46)m= 21.37 Water storage	18.69	19.28	16.81	16.13	13.92	12.9	14.8	14.98	17.46	19.05	20.69		(46)
Storage volum) includir	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	neating a	and no ta	nk in dw	elling, e	nter 110	litres in	(47)						
Otherwise if n	o stored	hot wate	er (this in	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in ((47)			
Water storage													
a) If manufac				or is kno	wn (kWł	n/day):					0		(48)
Temperature f											0		(49)
Energy lost fro		•			orio not		(48) x (49)) =		1	10		(50)
b) If manufact Hot water stor			-							0	02		(51)
If community h	-			(,,,,,,	-77				0.	<u> </u>		()
Volume factor	from Ta	ble 2a								1.	03		(52)
Temperature f	factor fro	m Table	2b							0	.6		(53)
Energy lost fro		_	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter (50) or	(54) in (55)								1.	03		(55)
Water storage	loss cal	culated t	or each	month			((56)m = ((55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where ((H11) is fro	m Appendi	хH	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit	t loss (ar	nnual) fro	m Table	e 3		<u> </u>	<u> </u>	<u> </u>			0		(58)
Primary circuit	`	,			59)m = ((58) ÷ 36	65 × (41)	m					
(modified by	/ factor f	rom Tab	le H5 if t	here is s	olar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m														
(61)m= 0	0	0	0	0	00) - 0	00 x (+1) 0		0	0	T 0	0	1	(61)
	<u>l</u>			alculated	for eac	h month							J · (59)m + (61)m	` ,
(62)m= 197.7		183.83	165.57	162.82	146.29	141.27	153	_	153.35	171.65	180.52	193.22	1	(62)
Solar DHW inpu			<u> </u>						if no sola		1		1	` ,
(add addition												· · · · · · · · · · · · · · · · · ·		
(63)m= 0	0	0	0	0	0	0	0		0	0	0	0	1	(63)
Output from	water hea	ter	ı										•	
(64)m= 197.7		183.83	165.57	162.82	146.29	141.27	153	.96	153.35	171.65	180.52	193.22	1	
			ı			1		Outp	out from wa	ater heate	er (annual) ₁	112	2024.72	(64)
Heat gains fi	rom water	heating,	kWh/m	onth 0.2	5 ´ [0.85	5 × (45)m	ı + (6	1)m	n] + 0.8 x	د [(46)m	+ (57)m	+ (59)m	n]	_
(65)m= 91.58	81.36	86.97	80.06	79.98	73.65	72.81	77.0	03	76	82.92	85.03	90.09]	(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	e Table 5	and 5a):										
5. Internal gains (see Table 5 and 5a):Metabolic gains (Table 5), Watts														
Jan		Mar	Apr	May	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec]	
(66)m= 111.8	3 111.83	111.83	111.83	111.83	111.83	111.83	111.	.83	111.83	111.83	111.83	111.83]	(66)
Lighting gair	ns (calcula	ted in Ap	pendix	L, equat	ion L9 d	r L9a), a	lso s	ee ¯	Table 5				_	
(67)m= 18.0 ²	16.02	13.03	9.87	7.37	6.23	6.73	8.7	4	11.74	14.9	17.39	18.54]	(67)
Appliances of	gains (calc	ulated ir	Append	dix L, eq	uation L	.13 or L1	3a), a	also	see Ta	ble 5		-	_	
(68)m= 196.3	9 198.42	193.29	182.36	168.55	155.58	146.92	144.	.88	150.02	160.95	174.75	187.72]	(68)
Cooking gair	ns (calcula	ted in A	ppendix	L, equat	ion L15	or L15a), als	o se	e Table	5	-	-	-	
(69)m= 34.18	34.18	34.18	34.18	34.18	34.18	34.18	34.	18	34.18	34.18	34.18	34.18]	(69)
Pumps and t	ans gains	(Table 5	5a)										_	
(70)m= 0	0	0	0	0	0	0	0		0	0	0	0]	(70)
Losses e.g.	evaporatio	on (nega	tive valu	es) (Tab	le 5)									
(71)m= -89.4	6 -89.46	-89.46	-89.46	-89.46	-89.46	-89.46	-89.	46	-89.46	-89.46	-89.46	-89.46]	(71)
Water heating	ng gains (T	able 5)											_	
(72)m= 123.1	121.08	116.89	111.2	107.5	102.29	97.87	103	.54	105.55	111.45	118.1	121.09]	(72)
Total intern	al gains =				(66	i)m + (67)m	า + (68	3)m +	- (69)m + ((70)m + (7	71)m + (72))m	_	
(73)m= 394.0	7 392.08	379.76	359.97	339.98	320.65	308.06	313	.71	323.86	343.85	366.79	383.9		(73)
6. Solar gai														
Solar gains ar		•				•	tions 1	to co		e applica		tion.		
Orientation:	Access F Table 6d		Area m²		Fli Ta	ıx ıble 6a		Т	g_ able 6b	Т	FF able 6c		Gains (W)	
Northoast o o							1 1					_	. ,	1,75
Northeast 0.93		X				11.28	X]		0.63	×	0.7	=	30.93	(75)
	<u> </u>	X				22.97	X]		0.63	_	0.7	_ =	62.96	(75)
Northeast 0.9	<u> </u>	X	8.9			41.38	X]		0.63	×	0.7	=	113.43	[(75)
Northeast 0.9		X	8.9		<u> </u>	67.96	X		0.63	×	0.7	=	186.29](75)] ₍₇₅₎
Northeast 0.9	0.77	X	8.9	97	X	91.35	X		0.63	X	0.7	=	250.41	(75)

					_		٦.		_				_
Northeast _{0.9x}	0.77	X	8.9)7	x	97.38	X	0.63	X	0.7	=	266.96	(75)
Northeast _{0.9x}	0.77	X	8.9)7	x	91.1	X	0.63	X	0.7	=	249.74	(75)
Northeast _{0.9x}	0.77	X	8.9	7	х	72.63	X	0.63	X	0.7	=	199.1	(75)
Northeast _{0.9x}	0.77	X	8.9	7	x	50.42	X	0.63	X	0.7	=	138.22	(75)
Northeast _{0.9x}	0.77	X	8.9	97	x	28.07	X	0.63	X	0.7	=	76.94	(75)
Northeast _{0.9x}	0.77	X	8.9)7	x	14.2	X	0.63	X	0.7	=	38.92	(75)
Northeast 0.9x	0.77	X	8.9	97	x	9.21	X	0.63	X	0.7	=	25.26	(75)
Southwest _{0.9x}	0.77	X	2.9)2	x	36.79]	0.63	X	0.7	=	32.83	(79)
Southwest _{0.9x}	0.77	X	2.9)2	x	62.67		0.63	X	0.7	=	55.93	(79)
Southwest _{0.9x}	0.77	X	2.9)2	x	85.75]	0.63	X	0.7	=	76.52	(79)
Southwest _{0.9x}	0.77	X	2.9)2	x	106.25		0.63	X	0.7	=	94.82	(79)
Southwest _{0.9x}	0.77	X	2.9)2	x	119.01]	0.63	x	0.7	=	106.2	(79)
Southwest _{0.9x}	0.77	x	2.9)2	x	118.15]	0.63	x	0.7	=	105.44	(79)
Southwest _{0.9x}	0.77	X	2.9)2	x	113.91		0.63	x	0.7	=	101.65	(79)
Southwest _{0.9x}	0.77	x	2.9)2	x	104.39]	0.63	x	0.7	=	93.16	(79)
Southwest _{0.9x}	0.77	x	2.9)2	x	92.85]	0.63	x	0.7	=	82.86	(79)
Southwest _{0.9x}	0.77	x	2.9)2	x	69.27	Ī	0.63	x	0.7		61.81	(79)
Southwest _{0.9x}	0.77	X	2.9)2	x	44.07	1	0.63	x	0.7		39.33	(79)
Southwest _{0.9x}	0.77	x	2.9)2	x	31.49	Ī	0.63	x	0.7	=	28.1	(79)
							_						
Solar gains in	watts, cal	culated	for eac	h month			(83)m	n = Sum(74)m.	(82)m				
(83)m= 63.76	118.89	189.96	281.11	356.62	372.4	351.39	292	.25 221.08	138.7	6 78.25	53.36		(83)
												1	
Total gains – i			` '		<u>`</u>					1		1	
Total gains – i (84)m= 457.84		nd solar 569.72	(84)m = 641.07	= (73)m - 696.59	+ (83)r 693.0		605	.97 544.94	482.6	445.04	437.26]	(84)
	510.96	569.72	641.07	696.59	693.0		605	.97 544.94	482.6	445.04	437.26]	(84)
(84)m= 457.84	510.96 rnal tempe	569.72 erature (641.07 (heating	696.59 season	693.05	659.46			482.6	445.04	437.26	21	(84)
(84)m= 457.84 7. Mean inter	510.96 rnal tempe during he	569.72 erature (eating p	641.07 (heating	696.59 season	693.06) ng area	659.46 a from Tal			482.6	445.04	437.26	21	
(84)m= 457.84 7. Mean intermediate Temperature	510.96 rnal tempe during he	569.72 erature (eating p	641.07 (heating	696.59 season	693.06) ng area	659.46 a from Tal able 9a)	ble 9		482.6		437.26 Dec	21	
(84)m= 457.84 7. Mean intermediate Temperature Utilisation factors	510.96 rnal tempe during he	erature (eating points for li	641.07 (heating eriods in iving are	season the livinga, h1,m	693.05) ng area (see	659.46 a from Tal able 9a)	ble 9	, Th1 (°C)				21	
(84)m= 457.84 7. Mean interpreture Temperature Utilisation factors Jan	510.96 rnal temper during he ctor for gain Feb 0.96	erature (eating poins for limated) Mar 0.92	641.07 (heating eriods in iving are Apr 0.8	season the living the May	693.08 ng area (see] Jun 0.44	a from Tal Table 9a) Jul 0.32	ble 9	, Th1 (°C) ug Sep 36 0.59	Oct	Nov	Dec	21	(85)
(84)m= 457.84 7. Mean intermediate Temperature Utilisation factors Jan (86)m= 0.98	510.96 rnal temper during he ctor for gain Feb 0.96	erature (eating poins for limated) Mar 0.92	641.07 (heating eriods in iving are Apr 0.8	season the living the May	693.08 ng area (see] Jun 0.44	a from Tal Table 9a) Jul 0.32	ble 9	Th1 (°C) Sep 0.59 Table 9c)	Oct	Nov 0.96	Dec	21	(85)
7. Mean internation (84)m= 457.84 7. Mean internation factor (86)m= 0.98 Mean internation	rnal temper during head to for gain and temperature and temper	erature eating poins for lims	641.07 (heating eriods ir iving are 0.8 iving are 20.83	season the living the living the sea, h1,m May 0.62 the sea T1 (for 20.96)	693.08) ing area (see 7 Jun 0.44 bllow s 20.99	a from Tal Table 9a) Jul 0.32 teps 3 to 7	ble 9 A 0.3 7 in T	Th1 (°C) Sep 0.59 able 9c) 20.98	Oct 0.85	Nov 0.96	Dec 0.98	21	(85)
(84)m= 457.84 7. Mean interconduction factors Utilisation factors Jan (86)m= 0.98 Mean internation (87)m= 20.14	rnal temper during head to for gain and temperature and temper	erature eating poins for lims	641.07 (heating eriods ir iving are 0.8 iving are 20.83	season the living the living the sea, h1,m May 0.62 the sea T1 (for 20.96)	693.08) ing area (see 7 Jun 0.44 bllow s 20.99	a from Tal a from Tal able 9a) Jul 0.32 teps 3 to 7 21	ble 9 A 0.3 7 in T	Th1 (°C) ug Sep 0.59 able 9c) 1 20.98 9, Th2 (°C)	Oct 0.85	Nov 0.96	Dec 0.98	21	(85)
(84)m= 457.84 7. Mean interpretation factors and the second seco	510.96 rnal temper during here tor for gain Feb 0.96 al tempera 20.3 during here 20.32	erature (eating prins for line) Mar 0.92 Ature in line) 20.55 eating prins for line)	641.07 (heating eriods in iving are 20.83 eriods ir 20.34	season the livin ea, h1,m May 0.62 ea T1 (fc 20.96 n rest of 20.34	693.09 ng area (see 7 Jun 0.44 bllow s 20.99 dwellir 20.36	a from Tal a from Tal a le 9a) Jul 0.32 teps 3 to 7 21 ng from Tal 20.36	ble 9 A 0.3 7 in T 2 able 9	Th1 (°C) ug Sep 0.59 Table 9c) 1 20.98 9, Th2 (°C)	Oct 0.85	Nov 0.96	Dec 0.98	21	(85) (86) (87)
(84)m= 457.84 7. Mean interpretation factors (86)m= 0.98 Mean internation (87)m= 20.14 Temperature (88)m= 20.32 Utilisation factors (84)m= 20.32	stor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.3	erature of eating points for line of the eating points and eating points for response of the eating points f	641.07 (heating eriods ir iving are 0.8 iving are 20.83 eriods ir 20.34 est of decrease of	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34 welling,	693.08) ing area (see 7 Jun 0.44 pllow si 20.99 dwellir 20.36 h2,m (see 7)	a from Tal a from Tal a le 9a) Jul 0.32 teps 3 to 7 21 ng from Tal 20.36	ble 9 A 0.3 7 in T 2 able 9 20.	Th1 (°C) ug Sep 6 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35	Oct 0.85 20.79 20.34	Nov 0.96 20.44	Dec 0.98 20.12 20.33	21	(85) (86) (87)
(84)m= 457.84 7. Mean interpretation factors (86)m= 0.98 Mean internation (87)m= 20.14 Temperature (88)m= 20.32 Utilisation factors (89)m= 0.97	stor for gales at tempera 20.3 during he 20.32 etor for gales 20.95	erature of eating points for in 20.55 eating points for in 20.32 eating points for in 20.9	641.07 (heating eriods ir iving are 20.83 eriods ir 20.34 est of do 0.77	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34 welling, 0.58	693.08 ng area (see 7 Jun 0.44 bllow s 20.99 dwellir 20.36 h2,m (see 7)	a from Tal Table 9a) Jul 0.32 teps 3 to 7 21 ng from Ta 20.36 see Table 0.27	ble 9 A 0.3 7 in 1 2 20. 9a) 0.3	Th1 (°C) ug Sep 66 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35	Oct 0.85 20.79 20.34 0.83	Nov 0.96	Dec 0.98	21	(85) (86) (87) (88)
(84)m= 457.84 7. Mean intermediate Temperature Utilisation factors	stor for gales and tempera sector for gales and tempera sector for gales and tempera sector for gales and tempera sector for gales and tempera sector for gales and tempera sector for gales sector for gales and tempera s	erature (eating prins for line) Mar 0.92 Atture in line) 20.32 Atture in rine) ins for rine) 0.9	641.07 (heating eriods ir iving are 20.83 eriods ir 20.34 est of do 0.77 the rest	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34 welling, 0.58 of dwelling	693.09 ng area (see 7 Jun 0.44 bllow s 20.99 dwellir 20.36 h2,m (see 7) 0.39 ng T2	a from Tal a from Tal a from Tal a Jul 0.32 teps 3 to 7 21 ag from Ta 20.36 see Table 0.27 (follow ste	A 0.37 in 1 2 20.4 9a) 0.3 eps 3	Th1 (°C) ug Sep 6 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35 1 0.54 to 7 in Table	Oct 0.85 20.79 20.34 0.83 e 9c)	Nov 0.96 20.44 20.34	Dec 0.98 20.12 20.33	21	(85) (86) (87) (88) (89)
(84)m= 457.84 7. Mean interpretation factors (86)m= 0.98 Mean internation (87)m= 20.14 Temperature (88)m= 20.32 Utilisation factors (89)m= 0.97	stor for gales at tempera 20.3 during he 20.32 etor for gales 20.95	erature of eating poins for in 20.55 eating poins for in 20.32 ins for in 0.9	641.07 (heating eriods ir iving are 20.83 eriods ir 20.34 est of do 0.77	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34 welling, 0.58	693.08 ng area (see 7 Jun 0.44 bllow s 20.99 dwellir 20.36 h2,m (see 7)	a from Tal a from Tal a from Tal a Jul 0.32 teps 3 to 7 21 ag from Ta 20.36 see Table 0.27 (follow ste	ble 9 A 0.3 7 in 1 2 20. 9a) 0.3	Th1 (°C) ug Sep 66 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35 1 0.54 to 7 in Tabl 36 20.33	Oct 0.85 20.79 20.34 0.83 e 9c) 20.1	Nov 0.96 20.44 20.34 0.95	Dec 0.98 20.12 20.33 0.98		(85) (86) (87) (88) (89) (90)
(84)m= 457.84 7. Mean intermediate Temperature Utilisation factors (86)m= 0.98 Mean internations (87)m= 20.14 Temperature (88)m= 20.32 Utilisation factors (89)m= 0.97 Mean internations (90)m= 19.16	510.96 rnal temper during he ctor for gain se	erature eating poins for line at line point in line at line point in line at l	641.07 (heating eriods ir iving are 20.83 eriods ir 20.34 est of do 0.77 che rest 20.13	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34 welling, 0.58 of dwelling	693.08 ng area (see 7 Jun 0.44 ollow s 20.99 dwellir 20.36 h2,m (see 7) 0.39 ng T2 20.35	a from Tal Table 9a) Jul 0.32 teps 3 to 7 21 ng from Tal 20.36 see Table 0.27 (follow ste	ble 9 A 0.3 7 in 1 2 20. 9a) 0.3 20.	Th1 (°C) ug Sep 6 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35 1 0.54 to 7 in Tabl 36 20.33	Oct 0.85 20.79 20.34 0.83 e 9c) 20.1	Nov 0.96 20.44 20.34	Dec 0.98 20.12 20.33 0.98	21	(85) (86) (87) (88) (89)
(84)m= 457.84 7. Mean intermediate Temperature Utilisation factors Jan (86)m= 0.98 Mean internation (87)m= 20.14 Temperature (88)m= 20.32 Utilisation factors (89)m= 0.97 Mean internation (90)m= 19.16	510.96 rnal temper during he ctor for gain representation for gain representa	erature eating prins for line at line in terms of the line in terms of t	641.07 (heating eriods in iving are 20.83 eriods in 20.34 est of do 0.77 the rest 20.13	season the livin ea, h1,m May 0.62 ea T1 (fc 20.96 n rest of 20.34 welling, 0.58 of dwelli 20.3	693.09 ng area (see 7 Jun 0.44 bllow s 20.99 dwellir 20.36 h2,m (see 7) 0.39 ng T2 20.35	a from Tal a from Tal a from Tal a Jul 0.32 teps 3 to 7 21 ag from Ta 20.36 see Table 0.27 (follow ste 20.36	bble 9 A 0.3 7 in T 2 abble 9 20. 99a) 0.3 + (1	Th1 (°C) ug Sep 6 0.59 Table 9c) 1 20.98 2, Th2 (°C) 36 20.35 4 to 7 in Table 36 20.33 f - fLA) × T2	Oct 0.85 20.79 20.34 0.83 e 9c) 20.1 LA = Liv	Nov 0.96 20.44 20.34 0.95 19.6 ving area ÷ (-	Dec 0.98 20.12 20.33 0.98 19.14 4) =		(85) (86) (87) (88) (89) (90) (91)
(84)m= 457.84 7. Mean intermediate Temperature Utilisation factors (86)m= 0.98 Mean internations (87)m= 20.14 Temperature (88)m= 20.32 Utilisation factors (89)m= 0.97 Mean internations (90)m= 19.16	stor for gales at tempera 20.3 ctor for gales 20.32 ctor for gales 20.32 ctor for gales 20.32 ctor for gales 20.34 ctor for gales 20.35	erature eating prins for line in the seating print	cheating eriods ir iving are 20.83 eriods ir 20.34 est of do 0.77 the rest 20.13 er the who 20.4	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34 welling, 0.58 of dwelling 20.3	693.08 Ing area (see 7 Jun 0.44 ollow s 20.99 dwellir 20.36 h2,m (see 7) 0.39 Ing T2 20.35	a from Tal Table 9a) Jul 0.32 teps 3 to 7 21 ag from Tal 20.36 see Table 0.27 (follow ster 20.36 fLA × T1 20.6	bble 9 A 0.3 7 in 1 2 20. 9a) 0.3 + (1 20	Th1 (°C) ug Sep 6 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35 1 0.54 1 to 7 in Tabl 36 20.33 f - fLA) × T2 6 20.58	Oct 0.85 20.79 20.34 0.83 e 9c) 20.1 LA = Liv	Nov 0.96 20.44 20.34 0.95 19.6 ving area ÷ (-	Dec 0.98 20.12 20.33 0.98		(85) (86) (87) (88) (89) (90)

										•	•		
(93)m= 19.53	19.74	20.06	20.4	20.55	20.6	20.6	20.6	20.58	20.37	19.92	19.51		(93)
8. Space hea													
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	l				<u> </u>								
(94)m= 0.97	0.95	0.9	0.78	0.6	0.41	0.29	0.33	0.56	0.83	0.94	0.97		(94)
Useful gains,	hmGm	, W = (94	1)m x (8	4)m	•								
(95)m= 442.81	483.37	510.56	497.42	415.67	283.37	189.97	198.39	303.11	400.16	419.22	425.1		(95)
Monthly aver		1		from T	T T					·		ı	
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate	i	i	<u> </u>		i	- ,	· · ·	<u> </u>				ı	(0-)
(97)m= 769.26	746.33	678.64	562.34	430.79	285.07	190.19	198.8	310.81	475.38	629.94	759.24		(97)
Space heatin	r i	1	r each n 46.74		I					r -	040.6		
(98)m= 242.87	176.71	125.05	46.74	11.25	0	0	0 	0	55.96	151.71	248.6	4050.0	7(00)
							rota	l per year	(Kvvn/yeai	') = Sum(9	8)15,912 =	1058.9	(98)
Space heatin	g requir	ement in	kWh/m²	/year								15.21	(99)
9b. Energy red	quiremer	nts – Cor	nmunity	heating	scheme								
This part is us										unity sch	neme.		7(204)
Fraction of spa			•		-	_	(Table T	1) 0 11 11	one			0	(301)
Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The community so									up to four	other heat	sources; t	he latter	
includes boilers, here		-			rom powei	stations.	See Appei	naix C.				1	(303a)
Fraction of total			•		nilere				(3	02) x (303	a) =	1	(304a)
Factor for conf	•			•		r commi	ınity has	itina eve		02) X (000	u) –	1	(305)
				,	` ''		•	iling sys	CIII				╡`
Distribution los		(Table 1	2c) for (commun	ity neatii	ng syste	m					1.05	(306)
Space heating	_		4									kWh/yea	r ¬
Annual space	_	·										1058.9	╛
Space heat fro	m Com	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	=	1111.84	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308
Space heating	require	ment fro	m secon	dary/su	oplemen	tary syst	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water heating	3												
Annual water	neating i	equirem	ent									2024.72	
If DHW from c								(0.4) (0.6)	20-) (00)	=) (000)			
Water heat from Community boilers $ (64) \times (303a) \times (305) \times (306) = $ Electricity used for heat distribution $ 0.01 \times [(307a)(307e) + (310a)(307e) + $												2125.95	(310a)
•							0.01	× [(307a).	(307e) +	· (310a)([310e)] =	32.38	(313)
Cooling System Energy Efficiency Ratio												0	(314)
Space cooling	,					•		= (107) ÷	(314) =			0	(315)
Electricity for p							outoide				ĺ	470.44	7(2202)
mechanical ve	ะแแลแอก	- palanc	eu, extr	act of po	silive in	out Irom	outside					170.14	(330a)

warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	b) + (330g) =		170.14	(331)
Energy for lighting (calculated in Apper	ndix L)				318.62	(332)
Total delivered energy for all uses (307	(309) + (310) + (31	2) + (315) + (331) + (33	32)(237b) =	Ī	3726.56	(338)
12b. CO2 Emissions – Community hea	ting scheme					
		Energy kWh/year	Emission factor kg CO2/kWh	_	missions g CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)) sing two fuels repeat (363) to	(366) for the second f	uel	96	(367a)
CO2 associated with heat source 1	[(307b	o)+(310b)] x 100 ÷ (367b) x	0.22	=	728.5	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	16.8	(372)
Total CO2 associated with community :	systems	(363)(366) + (368)(372	2)	=	745.31	(373)
CO2 associated with space heating (se	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =			745.31	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	=	88.3	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	165.36	(379)
Total CO2, kg/year	sum of (376)(382) =				998.97	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =			Ī	14.35	(384)

El rating (section 14)

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 06 December 2021 at 10:55:20*

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 50.62m²Site Reference:Highgate Road - GREENPlot Reference: 02 - G

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 19.64 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 16.45 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 48.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 38.7 kWh/m²

OK
2 Fabric U-values

Element Average Highest

External wall 0.17 (max. 0.30) 0.18 (max. 0.70) **OK**Party wall 0.00 (max. 0.20) - **OK**

Floor (no floor) Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	8.97m²	
Ventilation rate:	4.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		User_[Details:						
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa					0010943 on: 1.0.5.50	
		Property	Address	02 - G					
Address: 1. Overall dwelling dime	oncione:								
1. Overall dwelling diffle	ensions.	Δre	a(m²)		Δν Ηρ	ight(m)		Volume(m ³	3)
Ground floor				(1a) x		.65	(2a) =	134.14	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	50.62	(4)			_		
Dwelling volume		′)+(3c)+(3c	d)+(3e)+	(3n) =	134.14	(5)
				(00) (00	, , (00) , (00	., . (00)	(0)	134.14	(5)
2. Ventilation rate:	main seconda		other		total			m³ per hou	ır
Number of chimneys	heating heating		0	л ₌ г	0	x	40 =	0	(6a)
Number of open flues		╡╻╞]			20 =		╡``
·			0		0		10 =	0	(6b)
Number of intermittent fa				Ļ	0			0	(7a)
Number of passive vents					0		10 =	0	(7b)
Number of flueless gas f	ires				0	X	40 =	0	(7c)
							Air ch	nanges per ho	our
Infiltration due to chimne	ys, flues and fans = (6a)+(6b)+	(7a)+(7b)+	(7c) =	Г	0		÷ (5) =	0	(8)
	peen carried out or is intended, proce			continue fr	-		. (0) –		
Number of storeys in t	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber frame or resent, use the value corresponding			•	ruction			0	(11)
deducting areas of openi		io ine grea	ter wan are	a (anter					
·	floor, enter 0.2 (unsealed) or (0.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
Percentage of window Window infiltration	s and doors draught stripped		0.25 - [0.2	x (14) ± 1	1001 -			0	(14)
Infiltration rate			(8) + (10)			+ (15) =		0	(15)
	q50, expressed in cubic metr	es per h	, , , ,	, , ,	, , ,		area	3	(17)
	lity value, then $(18) = [(17) \div 20] +$	•	•	•		•		0.15	(18)
	es if a pressurisation test has been do	one or a de	gree air pe	rmeability	is being u	sed			<u></u>
Number of sides shelters Shelter factor	ed		(20) = 1 -	in n75 x (*	19)1 –			0	(19)
Infiltration rate incorpora	ting shelter factor		(20) = 1 (21) = (18)	`				1 0.45	(20)
Infiltration rate modified f	•		(= 1)	(==)				0.15	(21)
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind sp		1				1	1	ı	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7]	
Wind Factor (OC.)	0)		•		•	•	•	•	
Wind Factor $(22a)m = (2(22a)m = 1.27 1.25)$	2)m ÷ 4 1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18	1	
(22a)m= 1.27 1.25	1.20 1.1 1.00 0.95	0.95	1 0.92	'	1.00	1.12	1.10	J	

0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effe	ctive air	change i	rate for t	he appli	cable ca	se	<u> </u>		ļ		<u>!</u>		
If mechanica												0.5	(2:
If exhaust air h		0		, ,	,	. ,	,, .	`) = (23a)			0.5	(2
If balanced with	n heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				75.65	(2
a) If balance						- `	- 	<u> </u>	2b)m + (23b) × [- ` ` `	÷ 100]	
24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(2
b) If balance	d mech	anical ve	ntilation	without	heat red	overy (N	ЛV) (24b	m = (22)	2b)m + (23b)		Ī	
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
c) If whole h				•	•				_				
<u> </u>	n < 0.5 ×	<u> </u>	· ·	<u> </u>	ŕ	· ` `	É `		`	ŕ	1	1	(0
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
d) If natural	ventilation								0.51				
24d)m= 0	0	0	0	0	0	0	0.5 + [(2	0	0.5]	0	0		(2
Effective air			,			<u> </u>							(_
25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3]	(2
0.31	0.31	0.51	0.29	0.20	0.26	0.20	0.26	0.27	0.20	0.29	0.3		(2
3. Heat losse	s and he	eat loss p	paramete	er:									
LEMENT	Gros	_	Openin		Net Ar		U-val		AXU		k-value		Χk
Caralanna	area	(m²)	m	l ²	A ,r		W/m2		(W/	K)	kJ/m²-l	K kJ	
/indows					8.97	x1	/[1/(1.4)+	0.04] = [11.89	ᆗ,			(2 —
/alls Type1	31.4	4	8.97		22.43	3 X	0.18	= [4.04	!	60	1345.8	3 (2
Valls Type2	22.9	92	0		22.92	2 x	0.17	=	3.85		60	1375.2	2 (2
otal area of e	lements	, m²			54.32	2							(3
arty wall					30.08	3 X	0	=	0		45	1353.6	3 (3
arty floor					50.62	2				[40	2024.8	3 (3
arty ceiling					50.62	2					30	1518.6	3 (3
nternal wall **	:				83.2						9	748.8	<u> </u>
for windows and	roof wind	ows, use e	ffective wi	ndow U-va	alue calcul	ated using	formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	n paragraph	n 3.2	
* include the area				ls and par	titions								
abric heat los	3s, W/K :	= S (A x	U)				(26)(30)	+ (32) =				19.78	(3
eat capacity	Cm = S((Axk)						((28)	(30) + (32	2) + (32a)	(32e) =	8366.8	(3
hermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			= (34)	÷ (4) =			165.29	(3
or design asses: an be used inste				construct	ion are no	t known pr	ecisely the	indicative	e values of	TMP in T	able 1f		
an be usea inste hermal bridge				ıcina Δr	nandiy l	<i>(</i>						5.00	$\neg_{\prime 2}$
details of therma	•	,			-	`						5.92	(3
otal fabric he		are not kir	OWII (30) =	- 0.00 X (3	'')			(33) +	(36) =			25.7	<u></u> (3
	at loss ca	alculated	l monthly	/				(38)m	= 0.33 × ((25)m x (5)		
	ı	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
entilation hea	l Feb							-	-	 	+		
entilation hea	Feb 13.69	13.52	12.69	12.53	11.7	11.7	11.53	12.03	12.53	12.86	13.19		(3
Jan 8)m= 13.86	13.69	13.52	12.69	12.53	11.7	11.7	11.53		<u> </u>	<u> </u>	13.19		(3
entilation hea	13.69	13.52	12.69	12.53	37.39	37.39	37.23		12.53 = (37) + (38.22	<u> </u>	38.89	1	(3)

Heat loss par	ameter (I	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.78	0.78	0.77	0.76	0.76	0.74	0.74	0.74	0.75	0.76	0.76	0.77		
						l	l		Average =	: Sum(40) ₁	12 /12=	0.76	(40)
Number of da	-	nth (Tab	le 1a)		ı			1	1				
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 hea	ating ene	rgy requi	irement:								kWh/ye	ar:	
Assumed occ if TFA > 13 if TFA £ 13	.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		71		(42)
Annual avera Reduce the annu not more that 12:	ial average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		.77		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage		1											
(44)m= 82.25	79.26	76.27	73.28	70.29	67.3	67.3	70.29	73.28	76.27	79.26	82.25		
	•								Total = Su	ım(44) ₁₁₂ =	-	897.28	(44)
Energy content of	of hot water	used - cal	culated m	onthly = 4 .	190 x Vd,r	n x nm x C	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 121.98	106.68	110.09	95.97	92.09	79.47	73.64	84.5	85.51	99.65	108.78	118.13		_
If instantaneous	water heat	ing at naint	of upo (no	hot woto	r otorogol	ontor O in	havas (16		Total = Su	ım(45) ₁₁₂ =	= [1176.48	(45)
If instantaneous	1	· ·	·	i	, , , , , , , , , , , , , , , , , , ,		, ,	, , , ,	1		· ·		(40)
(46)m= 18.3 Water storage	16 2 loss:	16.51	14.4	13.81	11.92	11.05	12.68	12.83	14.95	16.32	17.72		(46)
Storage volur) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community	heating a	and no ta	ınk in dw	elling, e	nter 110	litres in	(47)						
Otherwise if n	o stored	hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in ((47)			
Water storage													
a) If manufac				or is kno	wn (kWł	n/day):					0		(48)
Temperature											0		(49)
Energy lost fr		•			or io not		(48) x (49)) =		1	10		(50)
b) If manufactHot water sto			-							0	02		(51)
If community	•			_ (,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-77				0.	.02		(= -)
Volume facto	r from Ta	ble 2a								1.	.03		(52)
Temperature	factor fro	m Table	2b							0	.6		(53)
Energy lost fr		•	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter (50) or	(54) in (55)								1.	03		(55)
Water storage	e loss cal	culated f	for each	month			((56)m = ((55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where ((H11) is fro	m Appendi	хH	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit	it loss (ar	nnual) fro	m Table	 e 3							0		(58)
Primary circuit	•	,			59)m = ((58) ÷ 36	65 × (41)	m					
(modified b	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi loss calculated for each month (61)m = (60) ÷ 365 x (41)m														
(61)m= 0	0	0	0	0	0	0) 0	П	0	0	0	0	1	(61)
	uired for	water he	eating ca	alculated	L for eac	h month	(62)r	—— m =	0 85 x (′45)m +	(46)m +	(57)m +	ı · (59)m + (61)m	
(62)m= 177.25	156.61	165.36	149.47	147.37	132.96	128.91	139.	_	139	154.93	162.27	173.4]	(62)
Solar DHW input	calculated ι	ısing App	endix G or	Appendix	H (negati	ve quantity	/) (ent	er '0'	if no sola	r contribu	tion to wate	r heating)		
(add additiona												•		
(63)m= 0	0	0	0	0	0	0	0		0	0	0	0]	(63)
Output from w	ater heat	er				•		•			•	•	•	
(64)m= 177.25	156.61	165.36	149.47	147.37	132.96	128.91	139.	.78	139	154.93	162.27	173.4]	
	•					•		Outp	ut from wa	ater heate	er (annual)	12	1827.32	(64)
Heat gains fro	m water l	neating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (6	1)m] + 0.8 x	c [(46)m	+ (57)m	+ (59)m	١]	
(65)m= 84.78	75.41	80.82	74.71	74.84	69.22	68.71	72.3	32	71.23	77.36	78.96	83.5]	(65)
include (57)	m in calc	ulation o	of (65)m	only if c	ylinder i	s in the o	dwelli	ing o	or hot w	ater is f	rom com	munity h	neating	
5. Internal ga	ains (see	Table 5	and 5a):										
5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts														
Jan	Feb	Mar	Apr	May	Jun	Jul	Αι	Jg	Sep	Oct	Nov	Dec]	
(66)m= 85.42	85.42	85.42	85.42	85.42	85.42	85.42	85.4	42	85.42	85.42	85.42	85.42]	(66)
Lighting gains	(calculat	ed in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso s	ee T	Table 5				-	
(67)m= 13.59	12.07	9.81	7.43	5.55	4.69	5.07	6.5	9	8.84	11.22	13.1	13.97]	(67)
Appliances ga	ins (calcu	ılated in	Append	dix L, eq	uation L	13 or L1	3a), a	also	see Tal	ble 5		_	-	
(68)m= 148.84	150.39	146.5	138.21	127.75	117.92	111.35	109.	.81	113.7	121.99	132.45	142.28]	(68)
Cooking gains	(calculat	ed in A	opendix	L, equat	ion L15	or L15a)), also	o se	e Table	5	-	-	-	
(69)m= 31.54	31.54	31.54	31.54	31.54	31.54	31.54	31.5	54	31.54	31.54	31.54	31.54]	(69)
Pumps and fa	ns gains	(Table 5	āa)										-	
(70)m= 0	0	0	0	0	0	0	0		0	0	0	0]	(70)
Losses e.g. ev	/aporation	n (nega	ive valu	es) (Tab	le 5)								-	
(71)m= -68.33	-68.33	-68.33	-68.33	-68.33	-68.33	-68.33	-68.	33	-68.33	-68.33	-68.33	-68.33]	(71)
Water heating	gains (Ta	able 5)											_	
(72)m= 113.95	112.22	108.64	103.76	100.59	96.14	92.35	97.	2	98.93	103.97	109.67	112.23]	(72)
Total internal	gains =				(66)m + (67)m	ı + (68)m +	(69)m + ((70)m + (7	71)m + (72))m	_	
(73)m= 325.01	323.3	313.57	298.03	282.52	267.37	257.39	262.	.22	270.09	285.81	303.84	317.1]	(73)
6. Solar gain	s:													
Solar gains are		ŭ					itions t	o cor	nvert to th	e applica		tion.		
Orientation:	Access Fa Table 6d	actor	Area m²		Flu Ta	ıx ble 6a		Τź	g_ able 6b	т	FF able 6c		Gains (W)	
_							1 1	- 10						1
Northeast 0.9x	0.77	×	8.9		-	11.28	X		0.63	_ ×	0.7	=	30.93	(75)
Northeast 0.9x	0.77	×	8.9			22.97	X		0.63	╛ [×] ╘	0.7	_ =	62.96	(75)
Northeast 0.9x	0.77	×	8.9		-	41.38	X		0.63	_ ×	0.7	=	113.43	(75)
Northeast 0.9x	0.77	X	8.9	_	-	67.96	X		0.63	_ ×	0.7	=	186.29	(75)
Northeast _{0.9x}	0.77	X	8.9	7	X (91.35	X		0.63	X	0.7	=	250.41	(75)

Northeast _{0.9x}	0.77	X	8.9	97	X S	97.38	x [0.63	x	0.7	=	266.96	(75)
Northeast _{0.9x}	0.77	x	8.9	97	х	91.1	x	0.63	x	0.7	=	249.74	(75)
Northeast _{0.9x}	0.77	Х	8.9)7	х	72.63	x [0.63	x	0.7	=	199.1	(75)
Northeast _{0.9x}	0.77	Х	8.9)7	x t	50.42] x [0.63	х	0.7	=	138.22	(75)
Northeast _{0.9x}	0.77	x	8.9	97	x 2	28.07	x	0.63	x	0.7	=	76.94	(75)
Northeast _{0.9x}	0.77	x	8.9	97	х	14.2	х	0.63	_ x [0.7	=	38.92	(75)
Northeast 0.9x	0.77	X	8.9)7	х	9.21	x	0.63	x	0.7	=	25.26	(75)
•		<u> </u>											
Solar gains in	watts, ca	alculated	I for eacl	h month			(83)m =	Sum(74)m .	(82)m				
(83)m= 30.93	62.96	113.43	186.29	250.41	266.96	249.74	199.1	138.22	76.94	38.92	25.26		(83)
Total gains –	internal a	nd solar	(84)m =	= (73)m	+ (83)m	, watts						•	
(84)m= 355.94	386.26	427.01	484.32	532.94	534.34	507.13	461.32	408.31	362.75	342.76	342.36		(84)
7. Mean inte	rnal temp	erature	(heating	season)								
Temperature	during h	eating p	eriods ir	n the livi	ng area	from Tal	ole 9, 1	h1 (°C)				21	(85)
Utilisation fa	ctor for g	ains for I	living are	ea, h1,m	(see Ta	able 9a)							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m= 0.98	0.96	0.93	0.82	0.64	0.44	0.32	0.37	0.61	0.87	0.96	0.98		(86)
Mean interna	al temper	ature in	living are	ea T1 (fo	ollow ste	eps 3 to 7	7 in Ta	ole 9c)		-	•	•	
(87)m= 20.13	20.27	20.52	20.81	20.95	20.99	21	21	20.97	20.77	20.42	20.11		(87)
Temperature	during b	eating n	oriode ir	rost of	dwelling	from To	hla a	Th2 (°C)	<u> </u>	!	!		
(88)m= 20.27	20.27	20.28	20.29	20.29	20.31	20.31	20.31		20.29	20.29	20.28		(88)
` '	ļ			<u> </u>	<u> </u>	<u> </u>							, ,
Utilisation fa					T	1	T	1 0.50	0.04	T 0.05	0.00		(89)
(89)m= 0.97	0.96	0.91	0.79	0.59	0.4	0.27	0.31	0.56	0.84	0.95	0.98		(03)
Mean interna	al temper	ature in	the rest	of dwell	ing T2 (f	ollow ste	eps 3 to	7 in Tabl	e 9c)		T	Ī	
(90)m= 19.1	19.31	19.66	20.06	20.24	20.3	20.31	20.31		20.03	19.54	19.09		(90)
								1	LA = Livir	ng area ÷ (4) =	0.49	(91)
Mean_interna	al temper	ature (fo	r the wh	ole dwe	lling) = f	LA × T1	+ (1 –	fLA) × T2					
(92)m= 19.61	19.78	20.08	20.43	20.59	20.64	20.65	20.65	20.62	20.39	19.97	19.59		(92)
Apply adjust	ment to the	ne mean	interna	temper	ature fro	m Table	4e, w	here appro	opriate			•	
(93)m= 19.61	19.78	20.08	20.43	20.59	20.64	20.65	20.65	20.62	20.39	19.97	19.59		(93)
8. Space hea	·												
Set Ti to the the utilisation					ned at st	ep 11 of	Table	9b, so tha	t Ti,m=(76)m an	d re-calc	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fa			•	iviay	<u> </u>	<u> </u>	7.05	,	000	1407	_ <u></u>		
(94)m= 0.97	0.95	0.91	0.79	0.61	0.42	0.3	0.34	0.58	0.85	0.95	0.97		(94)
Useful gains	, hmGm ,	W = (94	4)m x (84	 4)m	<u>!</u>	!	!		<u>I</u>	<u>!</u>	<u>!</u>		
(95)m= 344.68	367.88	388.24	384.81	326.31	224.34	151.08	157.68	3 238.18	307.45	324.2	332.97		(95)
Monthly ave	rage exte	rnal tem	perature	from T	able 8			•					
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rat	_				Lm , W	=[(39)m	x [(93)	m- (96)m]			•	
(97)m= 605.37		532.59	442.53	339.89	225.9	151.29	158.09		374.26	496.17	598.46		(97)
Space heatir	ng require	ement fo	r each n	nonth, k	Wh/mon	th = 0.02	24 x [(9	7)m – (95)m] x (4	1)m		•	
(98)m= 193.95	146.61	107.39	41.56	10.1	0	1 0	l 0	l 0	49.71	123.82	197.53		

	Total per year (kWh	/year) = Sum(98) _{15,912} =	870.67	(98)
Space heating requirement in kWh/m²/year			17.2	(99)
9b. Energy requirements – Community heating scheme				
This part is used for space heating, space cooling or water heating Fraction of space heat from secondary/supplementary heating (Tab		mmunity scheme.	0	(301)
Fraction of space heat from community system 1 – (301) =	, , ,		1] (302)
The community scheme may obtain heat from several sources. The procedure allow	s for CHP and up to	L four other heat sources; the	e latter	`` ′
includes boilers, heat pumps, geothermal and waste heat from power stations. See A Fraction of heat from Community boilers	Appendix C.	Г		(303a)
Fraction of total space heat from Community boilers		(302) x (303a) =	1	$\int_{(304a)}^{(304a)}$
·	hooting eyetom	(302) X (303a) =		╣
Factor for control and charging method (Table 4c(3)) for community Distribution loss factor (Table 12c) for community heating system	nealing system	L	1 05	(305)
Space heating		L	1.05 kWh/year	」 ``
Annual space heating requirement		Γ	870.67	٦
Space heat from Community boilers	(98) x (304a) x	(305) x (306) =	914.2	(307a)
Efficiency of secondary/supplementary heating system in % (from T	able 4a or Appe	ndix E)	0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x	100 ÷ (308) =	0	(309)
Water heating		_		_
Annual water heating requirement			1827.32	
If DHW from community scheme: Water heat from Community boilers	(64) x (303a)	x (305) x (306) =	1918.69	(310a)
Electricity used for heat distribution	0.01 × [(307a)(30	7e) + (310a)(310e)] =	28.33	(313)
Cooling System Energy Efficiency Ratio			0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314	·) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outs	side	Γ	107.68	(330a)
warm air heating system fans		Ī	0	(330b)
pump for solar water heating		Ī	0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330	0b) + (330g) =	107.68	(331)
Energy for lighting (calculated in Appendix L)		Ī	239.96	(332)
Total delivered energy for all uses (307) + (309) + (310) + (312) + (312)	315) + (331) + (3	32)(237b) =	3180.53	(338)
12b. CO2 Emissions – Community heating scheme				
	Energy kWh/year	Emission factor E	missions g CO2/year	
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP using two	·	o (366) for the second fuel	96	(367a)
	b)] x 100 ÷ (367b) x	0.22 =	637.4	
Electrical energy for heat distribution [(313		0.22		
[[313	'/ ^	0.52	14.7	(312)

Total CO2 associated with community s	systems	(363)(366) + (368)(372)		=	652.1	(373)
CO2 associated with space heating (se	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immers	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and w	ater heating	(373) + (374) + (375) =			652.1	(376)
CO2 associated with electricity for pum	ps and fans within dw	elling (331)) x	0.52	=	55.89	(378)
CO2 associated with electricity for lighti	ng	(332))) x	0.52	=	124.54	(379)
Total CO2, kg/year	sum of (376)(382) =				832.53	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				16.45	(384)
El rating (section 14)					88.33	(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:55:10

Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:**

Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 63.92m² Plot Reference: 02 - H Site Reference : Highgate Road - GREEN

Address:

Client Details:

Name: Address:

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 17.67 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 15.46 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 45.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 38.8 kWh/m²

OK

2 Fabric U-values

Element Average Highest 0.18 (max. 0.70) External wall 0.18 (max. 0.30) OK Party wall 0.00 (max. 0.20) **OK**

Floor (no floor) Roof (no roof)

Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	ОК
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	9.56m²	
Windows facing: South East	8.76m²	
Ventilation rate:	6.00	
10 Key features		
	2.0 m ³ /m ² h	
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		Hear	Details:						
A No	Noil look on	USEI		- M	L		CTDO	040040	
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Stroma Softwa					010943 on: 1.0.5.50	
Contware Hame.	0.10111a 1 0711 2012		y Address:		31011.		7 01010	71. 110.0.00	
Address :		·	-						
1. Overall dwelling dime	ensions:								
Ground floor		Aı	rea(m²)	(10) ×		ight(m)	(2a) =	Volume(m³	(3a)
	-) . (4 -) . (4 -) . (4 -) . (4 -)	. (4.5)		(1a) x	2	65	(2a) =	169.39	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)-	F(1n)	63.92	(4)	\	I) (O)	(0.)		_
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	169.39	(5)
2. Ventilation rate:	main sec	condary	other		total			m³ per hou	r
Number of altimospess	heating he	ating		,			40 =		_
Number of chimneys			0] = [0			0	(6a)
Number of open flues	0 +	0 +	0] = [0		20 =	0	(6b)
Number of intermittent fa				L	0		10 =	0	(7a)
Number of passive vents					0	X '	10 =	0	(7b)
Number of flueless gas fi	res				0	X 4	40 =	0	(7c)
							Air ch	nanges per ho	our
Infiltration due to chimne	vs_flues and fans = (6a)	+(6b)+(7a)+(7b)+(7c) =	Г	0		÷ (5) =	0	(8)
•	peen carried out or is intended			continue fr			- (3) =	0	(0)
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber fra resent, use the value correspo			•	ruction			0	(11)
deducting areas of openii		maing to the gre	ealer wan are	a (anter					
If suspended wooden f	floor, enter 0.2 (unseale	d) or 0.1 (sea	aled), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
ŭ	s and doors draught stri	pped						0	(14)
Window infiltration			0.25 - [0.2		_	. (45)		0	(15)
Infiltration rate	aEO avaraged in pubic	motroe nor	(8) + (10)	, , ,	, , ,	, ,	oroo	0	(16)
If based on air permeabil	q50, expressed in cubic $(18) = (17)$	•	•	•	etre or e	envelope	area	3	(17)
•	es if a pressurisation test has b				is being u	sed	ļ	0.15	(18)
Number of sides sheltere			,	,	Ü			0	(19)
Shelter factor			(20) = 1 -	0.075 x (1	19)] =			1	(20)
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.15	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ∸ 4								
	1.23 1.1 1.08	0.95 0.95	0.92	1	1.08	1.12	1.18]	
		<u>l</u>			<u> </u>			J	

Adjusted infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effective of the control o		•	rate for t	пе арріі	саріе са	se						0.5	(238
If exhaust air h			endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	wise (23b) = (23a)			0.5	(231
If balanced with	n heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (from	n Table 4h) =				75.65	(23)
a) If balance	ed mecha	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	ı)m = (22	2b)m + (23b) × [ا (23c) – 1		`
(24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3	-	(24
b) If balance	d mech	anical ve	ntilation	without	heat red	covery (N	лV) (24b)m = (22	2b)m + (23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h				•					- (00)	`			
	i	(23b), t	· ` `	ŕ		· ` `	ŕ	<u> </u>	· ` `			İ	(0.4
(24c)m= 0	0	0		0	0	0	0	0	0	0	0		(24
d) If natural if (22b)r		on or wh en (24d)							0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	iter (24a) or (24k	o) or (24	c) or (24	d) in box	(25)					
(25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25
3. Heat losse	c and he	nat loce r	aramata	or:							•		
S. Fleat losse ELEMENT	S and the Gros		Openin		Net Ar	ea	U-valı	16	AXU		k-value	e A X	X k
	area		m		A ,r		W/m2		(W/I	K)	kJ/m²-ł		
Windows Type	e 1				9.56	x1,	/[1/(1.4)+	0.04] =	12.67				(27
Windows Type	2				8.76	x1,	/[1/(1.4)+	0.04] =	11.61				(27
Walls Type1	61.0)9	18.3	2	42.77	, X	0.18	=	7.7	$\overline{}$ [60	2566.2	(29
Nalls Type2	3.80	6	0		3.86	x	0.17	=	0.65	$\overline{}$	60	231.6	(29
Total area of e	lements	, m²			64.95	5							— (31
Party wall					37.5	x	0		0	\neg [45	1687.5	(32
Party floor					63.92	2					40	2556.8	(32
Party ceiling					63.92	2				Ī	30	1917.6	(32
nternal wall **					113.4	7				Ī	9	1021.23	3 (32
* for windows and					alue calcul		formula 1	/[(1/U-valu	re)+0.04] a	L as given in	paragraph		 `
** include the area				ls and pari	titions		(26)(30)	(22) _			ı		٦,,,,
Fabric heat los		•	U)				(20)(30)		(20) + (2)	2) + (225)	(220) -	32.63	(33)
Heat capacity		,	0 – Cm	TEA) in	\ \ \ \/m2\			***	.(30) + (32) $\div (4) =$	2) + (32a).	(32e) =	9980.93	(34)
Thermal mass For design assess	•	•		•			acisaly the	` '	. ,	TMD in T	ahle 1f	156.15	(35
can be used inste				CONSTRUCT	on are no	. Kirowir pr	colocity tire	maioanvo	values of	77011 117 11	abio II		
Thermal bridge	es : S (L	x Y) cal	culated (using Ap	pendix l	<						7.91	(36
if details of therma		are not kn	own (36) =	= 0.05 x (3	1)								_
Total fabric he									(36) =			40.54	(37
entilation hea	i								= 0.33 × (.	1	1	
Jan 17.5	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(20
(38)m= 17.5	17.29	17.08	16.03	15.82	14.77	14.77	14.56	15.19	15.82	16.24	16.66	l	(38
Heat transfer (39)m= 58.04	57.83	nt, W/K 57.62	56.57	56.36	55.32	55.32	55.11	(39)m 55.73	= (37) + (37)	38)m 56.78	57.2	ı	

Heat loss pa	arameter (HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.9	1 0.9	0.9	0.89	0.88	0.87	0.87	0.86	0.87	0.88	0.89	0.89		
									Average =	Sum(40) ₁ .	12 /12=	0.88	(40)
Number of o	- i	<u> </u>	<u> </u>							·			
Ja	-	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(44)
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water h	eating ene	rgy requi	irement:								kWh/ye	ar:	
	ccupancy, I3.9, N = 1 I3.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (¯	TFA -13.		09		(42)
Annual ave Reduce the ar	nual average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		.84		(43)
Ja	n Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usag		r day for ea				Table 1c x	_	<u>'</u>	<u> </u>	!			
(44)m= 92.2	22 88.87	85.51	82.16	78.81	75.45	75.45	78.81	82.16	85.51	88.87	92.22		
_						_				m(44) ₁₁₂ =	L	1006.06	(44)
Energy conten					190 x Vd,r								
(45)m= 136.	76 119.61	123.43	107.61	103.25	89.1	82.56	94.74	95.88	111.73	121.97	132.45		— ,,,,
If instantaneou	ıs water heat	ing at point	of use (no	o hot water	· storage).	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	- L	1319.1	(45)
(46)m= 20.5		18.51	16.14	15.49	13.37	12.38	14.21	14.38	16.76	18.29	19.87		(46)
Water stora		1 10.01	10.11	10.10	10.01	12.00		1 1.00	10.70	10.20	10.01		(- /
Storage vol	ume (litres) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If communit	y heating a	and no ta	ınk in dw	velling, e	nter 110	litres in	(47)						
Otherwise in		hot wate	er (this in	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water stora a) If manuf	_	oclared l	oss fact	or ie kna	wn (k\//k	v/dav/).							(40)
Temperatur				JI 15 KI10	wii (Kvvi	i/uay).					0		(48)
Energy lost				aar			(48) x (49)	١ _			0		(49)
b) If manuf		•	•		or is not		(40) X (40)	, –		1	10		(50)
Hot water s	torage loss	factor fr	om Tabl	le 2 (kW	h/litre/da	ıy)				0.	02		(51)
If communit			on 4.3										
Volume factoring Temperatur			2h							-	03		(52) (53)
Energy lost				oor			(47) v (51)) x (52) x (52) _		.6		. ,
Enter (50)		•	, KVVII/yt	zai			(47) X (31)) X (JZ) X (33) –		03		(54) (55)
Water stora	` , ` `	,	for each	month			((56)m = ((55) × (41)	m		00		()
(56)m= 32.0		32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder cont												×Н	(30)
(57)m= 32.0	01 28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
		ļ		<u>l</u>	<u> </u>	<u> </u>	<u> </u>	L			0		(58)
Primary circ	`	,			59)m = ((58) <u>–</u> 36	35 x (41)	ım			o .		(00)
-	by factor f			,	•	. ,	, ,		r thermo	stat)			
(modilied	e, idolo.	ioiii iab								,			

Combi loss ca	lculated	for each	month ((61)m –	(60) ± 3	65 v (41	١m						
(61)m= 0	0	0	0	0 0	00) + 3	03 × (41)) 0	0	Ιο	0	0	1	(61)
												J · (59)m + (61)m	(- /
(62)m= 192.04	169.54	178.71	161.1	158.53	142.59	137.84	150.0		167.01	175.46	187.72	1	(62)
Solar DHW input	L											1	()
(add additiona									ar continoc	morrio wan	or ricating)		
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(63)
Output from w	ater hea	ter					!		1	Į.	<u> </u>	ı	
(64)m= 192.04	169.54	178.71	161.1	158.53	142.59	137.84	150.0	2 149.37	167.01	175.46	187.72]	
L	1	<u> </u>		ļ		ļ		utput from w	ater heat	_ I er (annual)₁	112	1969.94	(64)
Heat gains fro	m water	heating,	kWh/me	onth 0.2	5 ′ [0.85	5 × (45)m	+ (61)m] + 0.8	x [(46)m	n + (57)m	+ (59)m	 .]	-
(65)m= 89.69	79.71	85.26	78.58	78.55	72.42	71.67	75.7		81.37	83.35	88.26	1	(65)
include (57)	m in calc	culation of	of (65)m	only if c	vlinder	is in the	dwellir	ng or hot v	vater is t	from com	munity h	ı neating	
5. Internal ga					,			<u> </u>			,	,	
Metabolic gair	Ì												
Jan	Feb	Mar	Apr	May	Jun	Jul	Au	g Sep	Oct	Nov	Dec]	
(66)m= 104.5	104.5	104.5	104.5	104.5	104.5	104.5	104.	5 104.5	104.5	104.5	104.5		(66)
Lighting gains	(calcula	ted in Ap	pendix	L, equat	on L9 c	r L9a), a	lso se	e Table 5			-	•	
(67)m= 16.29	14.47	11.77	8.91	6.66	5.62	6.07	7.9	10.6	13.46	15.7	16.74]	(67)
Appliances ga	ins (calc	ulated in	Append	dix L, eq	uation L	.13 or L1	3a), a	lso see Ta	ble 5	-	•	•	
(68)m= 182.71	184.61	179.83	169.66	156.82	144.75	136.69	134.	3 139.57	149.75	162.58	174.65		(68)
Cooking gains	(calcula	ted in A	ppendix	L, equat	ion L15	or L15a), also	see Table	÷ 5	•	-	•	
(69)m= 33.45	33.45	33.45	33.45	33.45	33.45	33.45	33.4	5 33.45	33.45	33.45	33.45		(69)
Pumps and fa	ns gains	(Table 5	ōa)					•				•	
(70)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(70)
Losses e.g. ev	/aporatio	n (nega	tive valu	es) (Tab	le 5)			•		•	•	•	
(71)m= -83.6	-83.6	-83.6	-83.6	-83.6	-83.6	-83.6	-83.6	-83.6	-83.6	-83.6	-83.6		(71)
Water heating	gains (T	able 5)		-		-				-	-	•	
(72)m= 120.56	118.62	114.6	109.13	105.58	100.58	96.34	101.7	8 103.71	109.37	115.76	118.63		(72)
Total internal	gains =				(66)m + (67)m	ı + (68)	m + (69)m +	(70)m + (71)m + (72))m	•	
(73)m= 373.91	372.05	360.55	342.05	323.41	305.31	293.45	298.8	308.23	326.92	348.4	364.37		(73)
6. Solar gain	s:												
Solar gains are	calculated	using sola	r flux from	Table 6a	and assoc	ciated equa	itions to	convert to the	he applica	ble orienta	tion.		
Orientation:			Area		Flu			g_ Table 6b	-	FF		Gains	
_	Table 6d		m²			ble 6a		Table 6b		Table 6c		(W)	,
Northeast _{0.9x}	0.77	Х	9.5	56	x	11.28	x	0.63	x [0.7	=	32.96	(75)
Northeast _{0.9x}	0.77	X	9.5	56	X	22.97	X	0.63	×	0.7	=	67.1	(75)
Northeast 0.9x	0.77	X	9.5	56	х	41.38	X	0.63	x [0.7	=	120.89	(75)
Northeast 0.9x	0.77	Х	9.5	56	х	67.96	X	0.63	x	0.7	=	198.54	(75)
Northeast _{0.9x}	0.77	X	9.5	56	X	91.35	X	0.63	X	0.7	=	266.88	(75)

NIdi							1		_				—
Northeast _{0.9x}	0.77	X	9.5	56	× L	97.38	X	0.63	×	0.7	=	284.52	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x L	91.1	X	0.63	X	0.7	=	266.17	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x	72.63	X	0.63	X	0.7	=	212.19	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x	50.42	X	0.63	X	0.7	=	147.31	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x	28.07	X	0.63	X	0.7	=	82	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x	14.2	X	0.63	X	0.7		41.48	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x	9.21	X	0.63	X	0.7	=	26.92	(75)
Southeast _{0.9x}	0.77	X	8.7	76	x	36.79	X	0.63	X	0.7	=	98.5	(77)
Southeast 0.9x	0.77	X	8.7	7 6	x	62.67	X	0.63	X	0.7	=	167.79	(77)
Southeast 0.9x	0.77	X	8.7	7 6	x	85.75	X	0.63	X	0.7	=	229.57	(77)
Southeast _{0.9x}	0.77	Х	8.7	' 6	x	106.25	x	0.63	х	0.7	=	284.45	(77)
Southeast _{0.9x}	0.77	X	8.7	76	x	119.01	X	0.63	x	0.7	=	318.61	(77)
Southeast _{0.9x}	0.77	X	8.7	76	x	118.15	x	0.63	x	0.7		316.31	(77)
Southeast _{0.9x}	0.77	X	8.7	76	х	113.91	x	0.63	x	0.7	=	304.95	(77)
Southeast _{0.9x}	0.77	X	8.7	76	x $\overline{\ }$	104.39	x	0.63	x	0.7		279.47	(77)
Southeast _{0.9x}	0.77	x	8.7	76	x	92.85	x	0.63	x	0.7	=	248.58	(77)
Southeast _{0.9x}	0.77	X	8.7	' 6	x	69.27	x	0.63	x	0.7		185.44	(77)
Southeast _{0.9x}	0.77	X	8.7	76	x	44.07	x	0.63	x	0.7	_	117.98	(77)
Southeast 0.9x	0.77	x	8.7	76	x	31.49	x	0.63	X	0.7	= =	84.3	(77)
_													_
Solar gains in	watts, ca	lculated	for eacl	h month			(83)m	n = Sum(74)m .	(82)m				
1				585.49			<u> </u>						(0.0)
(83)m= 131.47	234.89	350.47	483	365.49	600.	.83 571.12	491	.66 395.89	267.44	159.46	111.22		(83)
(83)m= 131.47 Total gains – i							491	.66 395.89	267.44	1 159.46	111.22		(83)
` ')m , watts	790		594.37	<u> </u>	475.59		(83)
Total gains – i	nternal a 606.94	nd solar 711.02	(84)m = 825.05	908.91	+ (83 906.)m , watts			<u> </u>	-			, ,
Total gains – i (84)m= 505.38	nternal at 606.94	nd solar 711.02 erature	(84)m = 825.05 (heating	908.91 season	+ (83 906.)m , watts .14 864.57	790	.48 704.13	<u> </u>	-		21	, ,
Total gains – i (84)m= 505.38 7. Mean inter	nternal ar 606.94 mal temp during he	nd solar 711.02 erature eating p	(84)m = 825.05 (heating eriods in	908.91 season	906.	e)m , watts 14 864.57	790	.48 704.13	<u> </u>	-		21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature	nternal ar 606.94 mal temp during he	nd solar 711.02 erature eating p	(84)m = 825.05 (heating eriods in	908.91 season	906.	ea from Table Table 9a)	790 ole 9	.48 704.13	<u> </u>	7 507.86		21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac	nternal and 606.94 mal temporal during heater for gar	nd solar 711.02 erature eating p ains for l	(84)m = 825.05 (heating eriods ir iving are	908.91 season the living	+ (83 906.) ng ar	ea from Tale Table 9a) un Jul	790 ole 9	.48 704.13 , Th1 (°C)	594.37	7 507.86	475.59	21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fact Jan (86)m= 0.97	nternal are 606.94 character for garacter fo	rature eating pains for I	(84)m = 825.05 (heating eriods in iving are Apr 0.73	908.91 season the living ea, h1,m May 0.55	+ (83 906.) ng ard (see Ju	ea from Talle Table 9a) un Jul	790 ole 9 A 0.3	.48 704.13 , Th1 (°C) ug Sep 32 0.53	594.37 Oct	7 507.86 Nov	475.59 Dec	21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac	nternal are 606.94 character for garacter fo	rature eating pains for I	(84)m = 825.05 (heating eriods in iving are Apr 0.73	908.91 season the living ea, h1,m May 0.55	+ (83 906.) ng ard (see Ju	ea from Table Pa) un Jul 9 0.28 steps 3 to 7	790 ole 9 A 0.3	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c)	594.37 Oct	7 507.86 Nov 0.94	475.59 Dec	21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fact Jan (86)m= 0.97 Mean interna (87)m= 19.93	nternal are 606.94 nal temp during he ctor for gare 7.94 l temperare 20.19	erature eating pains for I Mar 0.87 ature in I	(84)m = 825.05 (heating eriods ir iving are 0.73 iving are 20.81	908.91 season the livit ea, h1,m May 0.55 ea T1 (for 20.95	+ (83 906.) ng ard (see 0.3 ollow 20.9	ea from Table Pa) un Jul 9 0.28 steps 3 to 7	790 ole 9 A 0.3 7 in T	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97	594.37 Oct 0.8	7 507.86 Nov 0.94	475.59 Dec 0.97	21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fact Jan (86)m= 0.97 Mean interna (87)m= 19.93 Temperature	nternal are 606.94 cornal temp during he ctor for gare Feb 0.94 l tempera 20.19 during he	erature eating pains for I Mar 0.87 ature in I 20.51 eating p	(84)m = 825.05 (heating eriods in iving are 0.73 iving are 20.81 eriods in iving are 20.81	908.91 season the living a, h1,m May 0.55 ea T1 (for 20.95) rest of	+ (83 906.) ng ard (see 0.3 Ollow 20.9	ea from Table 9a) un Jul 9 0.28 steps 3 to 7	790 ole 9	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C)	Oct 0.8	Nov 0.94	Dec 0.97	21	(84) (85) (86) (87)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16	nternal are 606.94 considering he ctor for gas Feb 0.94 considering he 20.19 considering he 20.16	erature eating pains for I Mar 0.87 eature in I 20.51 eating p	(84)m = 825.05 (heating eriods in iving are 20.81 eriods in 20.18	908.91 season the living a, h1,m May 0.55 ea T1 (for 20.95) rest of 20.18	+ (83 906.) ng ard (see 0.3 ollow 20.9 dwell 20.	ea from Table 9a) un Jul 9 0.28 steps 3 to 7 99 21 ling from Ta 2 20.2	790 Dole 9 A 0.3 7 in T 2 Able 9	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C)	594.37 Oct 0.8	Nov 0.94	475.59 Dec 0.97	21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac	nternal are 606.94 nal temp during he ctor for gare 20.19 during he 20.16 ctor for gare ctor for gar	erature eating p ains for I Mar 0.87 ature in I 20.51 eating p 20.17	(84)m = 825.05 (heating eriods ir iving are 20.81 eriods ir 20.18	908.91 season the livit ea, h1,m May 0.55 ea T1 (for 20.95 n rest of 20.18 welling,	+ (83 906.) ng ard (see 0.3 ollow 20.9 dwell 20.	ea from Table 9a) un Jul 9 0.28 steps 3 to 7 99 21 ling from Table 2 20.2 (see Table	790 A 0.3 7 in T 2 Able 9 9a)	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C) .2 20.19	Oct 0.8 20.76	Nov 0.94 20.3	Dec 0.97 19.89 20.17	21	(84) (85) (86) (87) (88)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac (89)m= 0.96	nternal ar 606.94 nal temp during he ctor for ga Feb 0.94 I tempera 20.19 during he 20.16 ctor for ga	erature eating pains for I Mar 0.87 eature in I 20.51 eating p 20.17 ains for r 0.85	(84)m = 825.05 (heating eriods ir iving are 0.73 iving are 20.81 eriods ir 20.18 eest of de 0.69	908.91 season the livities, h1,m May 0.55 ea T1 (for 20.95 n rest of 20.18 welling, 0.51	+ (83 906.) ng ard (see 0.3 ollow 20.9 dwell 20. h2,m 0.3	ea from Table 9a) un Jul 9 0.28 steps 3 to 7 99 21 ling from Ta 2 20.2 (see Table	790 A 0.3 7 in T 2 Able 9 9a) 0.2	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C) .2 20.19	Oct 0.8 20.76 20.18	Nov 0.94	Dec 0.97	21	(84) (85) (86) (87)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac [86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac (89)m= 0.96 Mean interna	nternal are 606.94 cornal temperaturing here 20.19 during here 20.16 corner garage are 10.92 l temperature are 10.92 l temperature are 10.92 l temperature are 10.92 l temperature are 10.94 l temperature are 10.92 l temperature are 10.94 l tempera	erature eating pains for I Mar 0.87 eature in I 20.51 eating p 20.17 ains for r 0.85 eature in t	(84)m = 825.05 (heating eriods in iving are 20.81 eriods in 20.18 eriods in 20.18 eriods in 20.18 eriods in 20.18 eriods in 20.18	908.91 season the livings, h1,m May 0.55 ea T1 (for 20.95 n rest of 20.18 welling, 0.51 of dwelling	+ (83 906.) ng ard (see Ju 0.3 ollow 20.9 dwell 20. h2,m 0.3	ea from Tale Table 9a) un Jul 9 0.28 steps 3 to 7 99 21 ling from Ta 2 20.2 (see Table 9a) 2 (follow ste	790 A 0.3 7 in T 2 Able 9 9a) 0.2	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C) .2 20.19 26 0.47 3 to 7 in Table	Oct 0.8 20.76 20.18 0.77 e 9c)	Nov 0.94 20.3 20.18	Dec 0.97 19.89 20.17	21	(84) (85) (86) (87) (88) (89)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac (89)m= 0.96	nternal ar 606.94 nal temp during he ctor for ga Feb 0.94 I tempera 20.19 during he 20.16 ctor for ga	erature eating pains for I Mar 0.87 eature in I 20.51 eating p 20.17 ains for r 0.85	(84)m = 825.05 (heating eriods ir iving are 0.73 iving are 20.81 eriods ir 20.18 eest of de 0.69	908.91 season the livities, h1,m May 0.55 ea T1 (for 20.95 n rest of 20.18 welling, 0.51	+ (83 906.) ng ard (see 0.3 ollow 20.9 dwell 20. h2,m 0.3	ea from Tale Table 9a) un Jul 9 0.28 steps 3 to 7 99 21 ling from Ta 2 20.2 (see Table 9a) 2 (follow ste	790 A 0.3 7 in T 2 Able 9 9a) 0.2	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C) .2 20.19 26 0.47 3 to 7 in Table .2 20.17	Oct 0.8 20.76 20.18 0.77 le 9c) 19.91	Nov 0.94 20.3 20.18 19.29	Dec 0.97 19.89 20.17 0.97		(84) (85) (86) (87) (88) (89)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac [86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac (89)m= 0.96 Mean interna	nternal are 606.94 cornal temperaturing here 20.19 during here 20.16 corner garage are 10.92 l temperature are 10.92 l temperature are 10.92 l temperature are 10.92 l temperature are 10.94 l temperature are 10.92 l temperature are 10.94 l tempera	erature eating pains for I Mar 0.87 eature in I 20.51 eating p 20.17 ains for r 0.85 eature in t	(84)m = 825.05 (heating eriods in iving are 20.81 eriods in 20.18 eriods in 20.18 eriods in 20.18 eriods in 20.18 eriods in 20.18	908.91 season the livings, h1,m May 0.55 ea T1 (for 20.95 n rest of 20.18 welling, 0.51 of dwelling	+ (83 906.) ng ard (see Ju 0.3 ollow 20.9 dwell 20. h2,m 0.3	ea from Tale Table 9a) un Jul 9 0.28 steps 3 to 7 99 21 ling from Ta 2 20.2 (see Table 9a) 2 (follow ste	790 A 0.3 7 in T 2 Able 9 9a) 0.2	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C) .2 20.19 26 0.47 3 to 7 in Table .2 20.17	Oct 0.8 20.76 20.18 0.77 le 9c) 19.91	Nov 0.94 20.3 20.18	Dec 0.97 19.89 20.17 0.97	0.38	(84) (85) (86) (87) (88) (89)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac [86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac (89)m= 0.96 Mean interna	nternal ar 606.94 nal temp during he ctor for ga Feb 0.94 I tempera 20.19 during he 20.16 ctor for ga 19.11	erature eating pains for I Mar 0.87 eature in I 20.51 eating p 20.17 eating p 1.0.85 eature in I 1.0.85 eature in I 1.0.85	(84)m = 825.05 (heating eriods ir iving are 0.73 iving are 20.81 eriods ir 20.18 eest of do 0.69 the rest 19.97	908.91 season the livin ea, h1,m May 0.55 ea T1 (for 20.95 rest of 20.18 welling, 0.51 of dwelling	+ (83 906.) ng ard (see 0.3 ollow 20.9 dwell 20. h2,m 0.3 ing T2	ea from Tale Table 9a) In Jul 9 0.28 steps 3 to 7 99 21 ling from Tale 2 20.2 (see Table 4 0.23 2 (follow steps 19 20.2	790 A 0.3 7 in T 2 9a) 0.2 9a) 20	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C) .2 20.19 26 0.47 4 to 7 in Table .2 20.17	Oct 0.8 20.76 20.18 0.77 e 9c) 19.91 fLA = Liv	Nov 0.94 20.3 20.18 19.29	Dec 0.97 19.89 20.17 0.97		(84) (85) (86) (87) (88) (89)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac (89)m= 0.96 Mean interna (90)m= 18.74	nternal ar 606.94 nal temp during heter for ga Feb 0.94 I tempera 20.19 during heter for ga 20.16 ctor for ga 19.11 I tempera 19.52	erature eating p ains for I Mar 0.87 eature in I 20.51 eating p 20.17 eating p 10.85 eature in t 19.56 eature (fo	(84)m = 825.05 (heating eriods ir iving are 20.81 eriods ir 20.18 eriods ir 20.18 eriods ir 20.18 rest of dr 0.69 the rest 19.97 r the wh 20.29	908.91 season the livin ea, h1,m May 0.55 ea T1 (for 20.95 n rest of 20.18 welling, 0.51 of dwelling 20.13	+ (83 906.)	ea from Table 9a) In Jul 9 0.28 steps 3 to 7 99 21 ling from Table 2 20.2 (see Table 4 0.23 2 (follow steps 19 20.2 = fLA × T1 5 20.5	790 A 0.3 7 in T 2 9a) 0.2 + (1 20	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C) .2 20.19 26 0.47 3 to 7 in Table .2 20.17 - fLA) × T2 .5 20.47	Oct 0.8 20.76 20.18 0.77 e 9c) 19.91 fLA = Liv	7 507.86 Nov 0.94 20.3 20.18 0.93 19.29 ring area ÷ (Dec 0.97 19.89 20.17 0.97		(84) (85) (86) (87) (88) (89)

	•		•	•		•					•	•	
(93)m= 19.19	19.52	19.92	20.29	20.44	20.5	20.5	20.5	20.47	20.23	19.67	19.14		(93)
8. Space hea													
Set Ti to the return the utilisation			•		ed at st	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	l	l	· ·	1	<u> </u>								
(94)m= 0.95	0.91	0.84	0.7	0.52	0.36	0.25	0.29	0.49	0.77	0.92	0.96		(94)
Useful gains,	hmGm	, W = (9	4)m x (8	4)m	•								
(95)m= 481.7	555.07	597.49	576.76	475.72	323.61	215.39	225.34	345.69	458.98	466.53	457.07		(95)
Monthly average		rnal tem	perature	from Ta	able 8	·						ı	
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate		i e			i	-``	· · ·	<u> </u>				Ī	(o=)
(97)m= 864.4	845.57	773.35	644.22	492.83	326.09	215.79	226.04	355.11	542.96	713.83	854.77		(97)
Space heatin (98)m= 284.73	g require 195.21	130.84	r each n 48.57	12.73	/vn/mon	$\ln = 0.02$	24 x [(97])m – (95 0)m] x (4 62.48	1)M 178.05	295.89		
(98)m= 284.73	195.21	130.64	46.57	12.73	0	U					<u> </u>	1200 F	(98)
							rota	l per year	(kvvn/year) = Sum(9	8)15,912 =	1208.5	=
Space heatin	g require	ement in	kWh/m²	² /year								18.91	(99)
9b. Energy red	quiremer	nts – Coi	mmunity	heating	scheme								
This part is use Fraction of spa										unity sch	neme.		7(201)
•			•		•	_	(Table T	1) 0 11 11	one			0	(301)
Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The community so									up to four	other heat	sources; t	he latter	
includes boilers, h Fraction of hea		-			rom powe	stations.	See Appei	naix C.				1	(303a)
Fraction of total			•		oilers				(3	02) x (303	a) =	1	(304a)
Factor for cont	·			•		r commı	unity hea	iting sys	tem			1	(305)
Distribution los				,	` ''		•	0 ,				1.05	(306)
Space heating		`	,		,	0 ,						kWh/yea	
Annual space	_	requiren	nent									1208.5	<u>.</u>
Space heat fro	m Com	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	=	1268.93	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308
Space heating	require	ment fro	m secon	dary/su	oplemen	tary syst	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water heating	1												
Annual water h		equirem	ent									1969.94	
If DHW from co	ommuni	ty schen	ne:										-
Water heat fro	m Comr	nunity bo	oilers					(64) x (30	03a) x (30	5) x (306) :	=	2068.44	(310a)
Electricity used	d for hea	at distribi	ution				0.01	× [(307a).	(307e) +	(310a)([310e)] =	33.37	(313)
Cooling Syster	m Energ	y Efficie	ncy Rati	0								0	(314)
Space cooling	(if there	is a fixe	d coolin	g systen	n, if not e	enter 0)		= (107) ÷	(314) =			0	(315)
Electricity for p											ĺ		7,000
mechanical ve	ntilation	- baland	ed, extr	act or po	sitive in	put from	outside					135.98	(330a)

warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	b) + (330g) =		135.98	(331)
Energy for lighting (calculated in Appen	idix L)				287.67	(332)
Total delivered energy for all uses (307) + (309) + (310) + (31	2) + (315) + (331) + (33	32)(237b) =		3761.01	(338)
12b. CO2 Emissions – Community hea	ting scheme					
		Energy kWh/year	Emission factors kg CO2/kWh		missions g CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)	•	P) sing two fuels repeat (363) to	(366) for the secon	nd fuel	96	(367a)
CO2 associated with heat source 1	[(307b	b)+(310b)] x 100 ÷ (367b) x	0.22	=	750.91	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	17.32	(372)
Total CO2 associated with community s	systems	(363)(366) + (368)(372	2)	=	768.23	(373)
CO2 associated with space heating (se	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =			768.23	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	=	70.57	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	149.3	(379)
Total CO2, kg/year	sum of (376)(382) =				988.1	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				15.46	(384)

El rating (section 14)

87.84

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:55:00

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 60.34m²Site Reference:Highgate Road - GREENPlot Reference: 02 - I

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

18.05 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 15.55 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)
45.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 37.8 kWh/m²

OK

2 Fabric U-values

 Element
 Average
 Highest

 External wall
 0.18 (max. 0.30)
 0.18 (max. 0.70)
 OK

 Party wall
 0.00 (max. 0.20)
 OK

Floor (no floor) Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ок
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	ок
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	4.7m ²	
Windows facing: South East	6.09m ²	
Windows facing: North West	2.92m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		l Iser I	Details:						
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa	are Ve				0010943 on: 1.0.5.50	
Address :	F	Property	Address	: 02 - I					
1. Overall dwelling dime	ensions:								
3		Are	a(m²)		Av. He	ight(m)		Volume(m	³)
Ground floor			60.34	(1a) x	2	65	(2a) =	159.9	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	60.34	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	159.9	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	+	0	=	0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	<u> </u>	0	<u> </u>	0	x 2	20 =	0	(6b)
Number of intermittent fa	ns				0	x ²	10 =	0	(7a)
Number of passive vents				Ē	0	x ′	10 =	0	(7b)
Number of flueless gas fi	res			F	0	X 4	40 =	0	(7c)
				L					
				_			Air ch	nanges per ho	our
•	ys, flues and fans = (6a)+(6b)+(aantinua fi	0		÷ (5) =	0	(8)
Number of storeys in the	een carried out or is intended, proced ne dwelling (ns)	ea 10 (17),	otrierwise (conunue ii	om (9) to ((10)		0	(9)
Additional infiltration	3 \					[(9)-	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o			•	ruction			0	(11)
if both types of wall are pu deducting areas of openir	resent, use the value corresponding t nas): if equal user 0.35	o the grea	ter wall are	ea (after					
,	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0							0	(13)
-	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	. ,	-	()		0	(15)
Infiltration rate	250 amaza dia adia adia ada		(8) + (10)					0	(16)
•	q50, expressed in cubic metro ity value, then $(18) = [(17) \div 20] +$		•	•	etre or e	envelope	area	3	(17)
•	es if a pressurisation test has been do				is being u	sed		0.15	(10)
Number of sides sheltere	ed							0	(19)
Shelter factor			(20) = 1 -		19)] =			1	(20)
Infiltration rate incorporat	•		(21) = (18	s) x (20) =				0.15	(21)
Infiltration rate modified for	- 1 	1	Δ	0	0-4	Nan	Data	1	
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec	J	
Monthly average wind sp (22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7	1	
(<u></u> /	5.0	1	1	<u> </u>	I	I	l	J	
Wind Factor (22a)m = (22	' 							1	
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltr	ation rat	e (allowi	ing for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effe		•	rate ior t	пе арріі	саріе са	se						0.5	(23
If exhaust air h	eat pump	using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)			0.5	(23
If balanced with	h heat reco	overy: effic	eiency in %	allowing f	or in-use f	actor (fron	n Table 4h	ı) =				75.65	(23
a) If balance	ed mech	anical ve	entilation	with he	at recov	ery (MVI	HR) (24a	a)m = (2	2b)m + (23b) × [′	1 – (23c)	÷ 100]	
(24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(24
b) If balance	ed mech	anical ve	entilation	without	heat red	covery (I	ЛV) (24b	o)m = (22	2b)m + (2	23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)r		tract ver < (23b), t		•					.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)r		on or wh en (24d)		•					0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in bo	x (25)					
(25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25
3. Heat losse	es and he	eat loss	paramet	er:									
LEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/I	〈)	k-value kJ/m²-l		
Windows Type	e 1				4.7	x1	/[1/(1.4)+	0.04] =	6.23				(27
Windows Type	e 2				6.09	x1	/[1/(1.4)+	0.04] =	8.07				(27
Windows Type	e 3				2.92	x1	/[1/(1.4)+	0.04] =	3.87				(27
Walls Type1	52.	8	13.7	1	39.09) x	0.18	=	7.04		60	2345.4	(29
Walls Type2	27.3	31	0		27.3	X	0.17	=	4.59		60	1638.6	(29
Total area of e	elements	s, m²			80.11								(31
Party wall					16.88	3 x	0	=	0		45	759.6	(32
Party floor					60.34	1					40	2413.6	(32
Party ceiling					60.34	1					30	1810.2	(32
nternal wall **	ŧ				107.9	1					9	971.190	1 (32
for windows and						ated using	formula 1	1/[(1/U-valu	ıe)+0.04] a	is given in	paragraph	3.2	
* include the are abric heat lo				is and par	uuons		(26)(30) + (32) =				29.8	(33
Heat capacity		•	0,					, , ,	(30) + (32	2) + (32a).	(32e) =	9938.59](34
Thermal mass		` '	⊃ = Cm ÷	- TFA) ir	n kJ/m²K				÷ (4) =	, , ,	` ,	164.71	(35
or design asses an be used inste	sments wh	nere the de	tails of the	,			ecisely the	e indicative	e values of	TMP in Ta	able 1f		`
Thermal bridg	es : S (L	.xY) cal	culated (using Ap	pendix l	<						7.62	(36
f details of therm		are not kn	own (36) =	= 0.05 x (3	11)								
Total fabric he									(36) =			37.42	(37
entilation hea	1	1	·						= 0.33 × () 	l	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		

(38)m= 16.52	16.32	16.12	15.13	14.93	13.94	13.94	13.75	14.34	14.93	15.33	15.72		(38)
` ′		<u> </u>	13.13	14.93	13.94	13.94	13.73			l	15.72		(30)
Heat transfer		53.54	52.55	52.35	51.36	51.36	51.16	51.76	= (37) + (3 52.35	52.75	53.14		
(00)111= 00.00	1 00 1	00.01	02.00	02.00	01.00	01.00	01.10			Sum(39) ₁		52.5	(39)
Heat loss pa	ameter (I	HLP), W	m²K						= (39)m ÷		,		_
(40)m= 0.89	0.89	0.89	0.87	0.87	0.85	0.85	0.85	0.86	0.87	0.87	0.88		_
Number of da	avs in mo	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	0.87	(40)
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 he	ating ene	rgy requ	irement:								kWh/ye	ear:	
Assumed so	NIDODOV	NI											(40)
Assumed occi if TFA > 13	3.9, N = 1		[1 - exp	(-0.0003	349 x (TF	A -13.9)2)] + 0.0	0013 x (ΓFA -13.		.99		(42)
if TFA £ 13 Annual avera	•	ater usad	ae in litre	es per da	ıv Vd.av	erage =	(25 x N)	+ 36		81	.49		(43)
Reduce the ann	ual average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		.40		(10)
not more that 12	- 	· ·				<u> </u>							
Jan Hot water usage	Feb	Mar r day for ea	Apr	May	Jun	Jul Table 1c x	Aug	Sep	Oct	Nov	Dec		
(44)m= 89.64	-	83.12	79.86	76.6	73.34	73.34	76.6	79.86	83.12	86.38	89.64		
(44)111= 09.04	00.38	03.12	79.00	70.0	73.34	73.34	70.0			m(44) ₁₁₂ =	L	977.9	(44)
Energy content	of hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,n	n x nm x E	OTm / 3600			. ,			(```
(45)m= 132.93	116.27	119.98	104.6	100.36	86.61	80.25	92.09	93.19	108.61	118.55	128.74		
If instantaneous	water heati	ng of point	of upo (no	hot water	: otorogo)	ontor O in	hayaa (16		Γotal = Su	m(45) ₁₁₂ =	=	1282.18	(45)
If instantaneous			·			1		` '	40.00	17.70	1001		(46)
(46)m= 19.94 Water storage		18	15.69	15.05	12.99	12.04	13.81	13.98	16.29	17.78	19.31		(46)
Storage volu) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community	heating a	and no ta	ınk in dw	velling, e	nter 110	litres in	(47)						
Otherwise if		hot wate	er (this in	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storag a) If manufa		eclared I	oss facto	or is kno	wn (kWh	n/day).					0		(48)
Temperature				01 10 1410	("uay).					0		(49)
Energy lost f				ear			(48) x (49)) =			10		(50)
b) If manufa	cturer's d	eclared o	cylinder l	loss fact									,
Hot water sto	•			le 2 (kW	h/litre/da	ıy)				0.	.02		(51)
If community Volume factor	•		011 4.3							1	.03		(52)
Temperature			2b							—	1.6		(53)
Energy lost f	om wate	r storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	1.	.03		(54)
Enter (50) o	(54) in (5	55)								1.	.03		(55)
Water storag	e loss cal	culated	for each	month			((56)m = (55) × (41)ı	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	хН	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)

Primary circuit loss (annual) fr	om Table 3			0		(58)
Primary circuit loss calculated		(58) ÷ 365 × (41)m			
(modified by factor from Tab	ole H5 if there is solar wa	ater heating and	a cylinder thermo	stat)		
(59)m= 23.26 21.01 23.26	22.51 23.26 22.51	23.26 23.26	22.51 23.26	22.51 2	23.26	(59)
Combi loss calculated for each	n month (61)m = (60) ÷ 3	365 × (41)m				
(61)m= 0 0 0	0 0 0	0 0	0 0	0	0	(61)
Total heat required for water h	neating calculated for ea	ch month (62)m :	= 0.85 × (45)m +	(46)m + (5	 7)m + (59)m + (61)m	
(62)m= 188.21 166.19 175.25	158.09 155.64 140.1	135.53 147.37	146.69 163.88	ì í	184.02	(62)
Solar DHW input calculated using App			I I D' if no solar contribut	ļļ_	l neating)	
(add additional lines if FGHRS	· · · · · ·					
(63)m = 0 0 0	0 0 0	0 0	0 0	0	0	(63)
Output from water heater		<u> </u>	1	ļl		
(64)m= 188.21 166.19 175.25	158.09 155.64 140.1	135.53 147.37	146.69 163.88	172.05 1	184.02	
(6.7)	1	-	put from water heate			(64)
Heat gains from water heating	ı kWh/month 0 25 ´ [0 8], ,
(65)m= 88.42 78.6 84.11	77.57 77.59 71.59	70.91 74.84	73.78 80.33		87.03	(65)
` '	! ! !			<u> </u>		(00)
include (57)m in calculation	. ,	is in the aweiling	or not water is if	om commu	unity neating	
5. Internal gains (see Table	,					
Metabolic gains (Table 5), Wa		1 1 .				
Jan Feb Mar	Apr May Jun	Jul Aug	Sep Oct	Nov	Dec	(0.0)
(66)m= 99.56 99.56 99.56	99.56 99.56 99.56	99.56 99.56	99.56 99.56	99.56	99.56	(66)
Lighting gains (calculated in A	`` 	or L9a), also see	Table 5			
(67)m= 15.49 13.76 11.19	8.47 6.33 5.35	5.78 7.51	10.08 12.8	14.94 1	15.93	(67)
Appliances gains (calculated in	n Appendix L, equation I	L13 or L13a), als	o see Table 5			
(68)m= 173.8 175.61 171.06	161.39 149.17 137.69	130.03 128.22	132.77 142.44	154.66 1	166.13	(68)
Cooking gains (calculated in A	ppendix L, equation L15	5 or L15a), also s	ee Table 5			
(69)m= 32.96 32.96 32.96	32.96 32.96 32.96	32.96 32.96	32.96 32.96	32.96	32.96	(69)
Pumps and fans gains (Table	5a)	•				
(70)m= 0 0 0	0 0 0	0 0	0 0	0	0	(70)
Losses e.g. evaporation (nega	ative values) (Table 5)	•	•	•		
(71)m= -79.65 -79.65 -79.65	-79.65 -79.65 -79.65	-79.65 -79.65	-79.65 -79.65	-79.65	-79.65	(71)
Water heating gains (Table 5)	.1 1		! !	<u> </u>		
(72)m= 118.85 116.96 113.06	107.74 104.29 99.43	95.3 100.59	102.47 107.97	114.19 1	116.97	(72)
Total internal gains =	 	<u> </u>	+ (69)m + (70)m + (7	<u> </u>		
(73)m= 361.01 359.2 348.18	, , , , , , , , , , , , , , , , , , , 	, , , , , , , , , , , , , , , , , , , 	298.19 316.08	<u> </u>	351.9	(73)
6. Solar gains:	9:210: 200:0	200.00	200.10	000.00	50.10	
Solar gains are calculated using sola	ar flux from Table 6a and asso	ciated equations to c	onvert to the applicat	ole orientation	1.	
Orientation: Access Factor		ux	g_	FF	Gains	
Table 6d				able 6c	(W)	
Southeast 0.9x 0.77 x	6.09 ×	36.79 ×	0.63 ×	0.7	= 68.48	(77)
Southeast 0.9x 0.77 x		62.67 X	0.63 x	0.7	= 116.65](77)
0.11		<u></u> "		0.7		7, ,

Southeast 0.9x	Utilisation fac	() (() ()-					· uviv vul							
Southeast 0, 30	, , , , , , , , , , , , , , , , , , ,												21	(85)
Southeast 0.9x				,			, –		TI 4 (2.5)					7,
Southeast 0.9x	(84)m= 492.41	586.37	667.88	741.48	786.63	771.8	740.9	698	.24 649.3	569.	55 494.64	463.96		(84)
Southeast 0.9x		nternal a	nd solai	(84)m =	(73)m -	+ (83)	m , watts						-	
Southeast 0.9x	T	1				476.	456.92	409	.05 351.1	8 253.	46 157.99	112.06]	(83)
Southeast 0.9x	Solar gains in v	watts, ca	lculated	for each	month			(83)m	n = Sum(74)	m(82)r	n			
Southeast 0.9x	INORTHWEST 0.9x	0.77	X	2.92	2	x	9.21	x	0.63	X	0.7	=	8.22	(81)
Southeast 0.9x			_			늗		╡		_		=		(81)
Southeast 0.9x	<u>_</u>		=			\ <u></u>		╡		_		=		(81)
Southeast 0.9x	<u>_</u>		_			 -		╡		=		=		(81)
Southeast 0.9x	<u>_</u>		=			-		╡		=		=		(81)
Southeast 0.9x	<u>_</u>		_			x		╡		X		=		(81)
Southeast 0.9x	<u> </u>	0.77	x	2.92	2	x	97.38	X	0.63	X	0.7	=	86.9	(81)
Southeast 0.9x	<u> </u>	0.77	X	2.92	2	x	91.35	X	0.63	X	0.7	=	81.52	(81)
Southeast 0.9x	<u> </u>	0.77	X	2.92	2	X	67.96	x	0.63	X	0.7	=	60.64	(81)
Southeast 0.9x	<u> </u>	0.77	X	2.92	2	x	41.38	X	0.63	Х	0.7	=	36.93	(81)
Southeast 0.9x	<u> </u>	0.77	X	2.92	2	x	22.97	X	0.63	Х	0.7	=	20.5	(81)
Southeast 0.9x	<u> </u>	0.77	х	2.92	2	x	11.28	x	0.63	х	0.7	=	10.07	(81)
Southeast 0.9x	<u> </u>	0.77	х	4.7		x	31.49]	0.63	х	0.7	=	45.23	(79)
Southeast 0.9x	Southwest _{0.9x}	0.77	X	4.7		x	44.07]	0.63	X	0.7	=	63.3	(79)
Southeast 0.9x	Southwest _{0.9x}	0.77	X	4.7		X	69.27]	0.63	X	0.7	=	99.49	(79)
Southeast 0.9x	<u> </u>	0.77	X	4.7		X	92.85]	0.63	X	0.7	=	133.37	(79)
Southeast 0.9x 0.77 x 6.09 x 119.01 x 0.63 x 0.7 = 221.5 (77 Southeast 0.9x 0.77 x 6.09 x 118.15 x 0.63 x 0.7 = 219.9 (77 Southeast 0.9x 0.77 x 6.09 x 113.91 x 0.63 x 0.7 = 212.01 (77 Southeast 0.9x 0.77 x 6.09 x 104.39 x 0.63 x 0.7 = 212.01 (77 Southeast 0.9x 0.77 x 6.09 x 92.85 x 0.63 x 0.7 = 194.29 (77 Southeast 0.9x 0.77 x 6.09 x 69.27 x 0.63 x 0.7 = 128.92 (77 Southeast 0.9x 0.77 x 6.09 x 31.49 x 0.63 x 0.7 <	Southwest _{0.9x}	0.77	X	4.7		x	104.39]	0.63	X	0.7	=	149.94	(79)
Southeast 0.9x 0.77 x 6.09 x 119.01 x 0.63 x 0.7 = 221.5 (77 Southeast 0.9x 0.77 x 6.09 x 118.15 x 0.63 x 0.7 = 219.9 (77 Southeast 0.9x 0.77 x 6.09 x 113.91 x 0.63 x 0.7 = 212.01 (77 Southeast 0.9x 0.77 x 6.09 x 104.39 x 0.63 x 0.7 = 212.01 (77 Southeast 0.9x 0.77 x 6.09 x 92.85 x 0.63 x 0.7 = 194.29 (77 Southeast 0.9x 0.77 x 6.09 x 69.27 x 0.63 x 0.7 = 128.92 (77 Southeast 0.9x 0.77 x 6.09 x 31.49 x 0.63 x 0.7 <	Southwest _{0.9x}	0.77	X	4.7		x	113.91]	0.63	X	0.7	=	163.62	(79)
Southeast 0.9x 0.77 x 6.09 x 119.01 x 0.63 x 0.7 = 221.5 (77 Southeast 0.9x 0.77 x 6.09 x 118.15 x 0.63 x 0.7 = 219.9 (77 Southeast 0.9x 0.77 x 6.09 x 113.91 x 0.63 x 0.7 = 212.01 (77 Southeast 0.9x 0.77 x 6.09 x 104.39 x 0.63 x 0.7 = 194.29 (77 Southeast 0.9x 0.77 x 6.09 x 92.85 x 0.63 x 0.7 = 172.81 (77 Southeast 0.9x 0.77 x 6.09 x 69.27 x 0.63 x 0.7 = 128.92 (77 Southeast 0.9x 0.77 x 6.09 x 31.49 x 0.63 x 0.7 = 58.6 (77 Southwest 0.9x 0.77 x 4.7 x <td>Southwest_{0.9x}</td> <td>0.77</td> <td>X</td> <td>4.7</td> <td></td> <td>x</td> <td>118.15</td> <td>ĺ</td> <td>0.63</td> <td>×</td> <td>0.7</td> <td>=</td> <td>169.71</td> <td>(79)</td>	Southwest _{0.9x}	0.77	X	4.7		x	118.15	ĺ	0.63	×	0.7	=	169.71	(79)
Southeast 0.9x 0.77 x 6.09 x 119.01 x 0.63 x 0.7 = 221.5 (77 Southeast 0.9x 0.77 x 6.09 x 118.15 x 0.63 x 0.7 = 219.9 (77 Southeast 0.9x 0.77 x 6.09 x 113.91 x 0.63 x 0.7 = 212.01 (77 Southeast 0.9x 0.77 x 6.09 x 104.39 x 0.63 x 0.7 = 194.29 (77 Southeast 0.9x 0.77 x 6.09 x 92.85 x 0.63 x 0.7 = 172.81 (77 Southeast 0.9x 0.77 x 6.09 x 44.07 x 0.63 x 0.7 = 128.92 (77 Southeast 0.9x 0.77 x 6.09 x 44.07 x 0.63 x 0.7 = 58.6 (77 Southwest 0.9x 0.77 x 4.7 x <td>Southwest_{0.9x}</td> <td>0.77</td> <td>X</td> <td>4.7</td> <td></td> <td>x $$</td> <td>119.01</td> <td>j</td> <td>0.63</td> <td>x</td> <td>0.7</td> <td></td> <td>170.94</td> <td>(79)</td>	Southwest _{0.9x}	0.77	X	4.7		x $$	119.01	j	0.63	x	0.7		170.94	(79)
Southeast 0.9x 0.77 x 6.09 x 119.01 x 0.63 x 0.7 = 221.5 (77 Southeast 0.9x 0.77 x 6.09 x 118.15 x 0.63 x 0.7 = 219.9 (77 Southeast 0.9x 0.77 x 6.09 x 104.39 x 0.63 x 0.7 = 212.01 (77 Southeast 0.9x 0.77 x 6.09 x 104.39 x 0.63 x 0.7 = 194.29 (77 Southeast 0.9x 0.77 x 6.09 x 92.85 x 0.63 x 0.7 = 172.81 (77 Southeast 0.9x 0.77 x 6.09 x 44.07 x 0.63 x 0.7 = 128.92 (77 Southeast 0.9x 0.77 x 6.09 x 44.07 x 0.63 x 0.7 = 82.02 (77 Southwest 0.9x 0.77 x 4.7 x </td <td>Southwest_{0.9x}</td> <td>0.77</td> <td>x</td> <td>4.7</td> <td></td> <td>х</td> <td>106.25</td> <td>Ī</td> <td>0.63</td> <td>×</td> <td>0.7</td> <td></td> <td>152.62</td> <td>(79)</td>	Southwest _{0.9x}	0.77	x	4.7		х	106.25	Ī	0.63	×	0.7		152.62	(79)
Southeast 0.9x 0.77 x 6.09 x 119.01 x 0.63 x 0.7 = 221.5 (77 Southeast 0.9x 0.77 x 6.09 x 118.15 x 0.63 x 0.7 = 219.9 (77 Southeast 0.9x 0.77 x 6.09 x 113.91 x 0.63 x 0.7 = 212.01 (77 Southeast 0.9x 0.77 x 6.09 x 104.39 x 0.63 x 0.7 = 194.29 (77 Southeast 0.9x 0.77 x 6.09 x 92.85 x 0.63 x 0.7 = 172.81 (77 Southeast 0.9x 0.77 x 6.09 x 44.07 x 0.63 x 0.7 = 128.92 (77 Southeast 0.9x 0.77 x 6.09 x 31.49 x 0.63 x 0.7 = 58.6 (77 Southwest 0.9x 0.77 x 4.7 x <td>Southwest_{0.9x}</td> <td>0.77</td> <td>×</td> <td></td> <td></td> <td>x \vdash</td> <td>85.75</td> <td>ĺ</td> <td>0.63</td> <td>×</td> <td>0.7</td> <td>-</td> <td>123.17</td> <td>(79)</td>	Southwest _{0.9x}	0.77	×			x \vdash	85.75	ĺ	0.63	×	0.7	-	123.17	(79)
Southeast 0.9x 0.77 x 6.09 x 119.01 x 0.63 x 0.7 = 221.5 (77 Southeast 0.9x 0.77 x 6.09 x 118.15 x 0.63 x 0.7 = 219.9 (77 Southeast 0.9x 0.77 x 6.09 x 113.91 x 0.63 x 0.7 = 212.01 (77 Southeast 0.9x 0.77 x 6.09 x 104.39 x 0.63 x 0.7 = 194.29 (77 Southeast 0.9x 0.77 x 6.09 x 69.27 x 0.63 x 0.7 = 172.81 (77 Southeast 0.9x 0.77 x 6.09 x 44.07 x 0.63 x 0.7 = 82.02 (77 Southeast 0.9x 0.77 x 6.09 x 31.49 x 0.63 x 0.7 = 58.6 (77	<u> </u>		_		$\overline{}$	-		ĺ		_				(79)
Southeast 0.9x 0.77 x 6.09 x 119.01 x 0.63 x 0.7 = 221.5 (77 Southeast 0.9x 0.77 x 6.09 x 118.15 x 0.63 x 0.7 = 219.9 (77 Southeast 0.9x 0.77 x 6.09 x 113.91 x 0.63 x 0.7 = 212.01 (77 Southeast 0.9x 0.77 x 6.09 x 104.39 x 0.63 x 0.7 = 194.29 (77 Southeast 0.9x 0.77 x 6.09 x 69.27 x 0.63 x 0.7 = 172.81 (77 Southeast 0.9x 0.77 x 6.09 x 69.27 x 0.63 x 0.7 = 128.92 (77 Southeast 0.9x 0.77 x 6.09 x 44.07 x 0.63 x 0.7 = 82.02 (77	<u> </u>		_			-		ĺ		_		 		(79)
Southeast 0.9x 0.77 x 6.09 x 119.01 x 0.63 x 0.7 = 221.5 (77 Southeast 0.9x 0.77 x 6.09 x 118.15 x 0.63 x 0.7 = 219.9 (77 Southeast 0.9x 0.77 x 6.09 x 113.91 x 0.63 x 0.7 = 212.01 (77 Southeast 0.9x 0.77 x 6.09 x 104.39 x 0.63 x 0.7 = 194.29 (77 Southeast 0.9x 0.77 x 6.09 x 92.85 x 0.63 x 0.7 = 172.81 (77 Southeast 0.9x 0.77 x 6.09 x 69.27 x 0.63 x 0.7 = 128.92 (77	<u>_</u>		_			⊢		╡		_		=		(77)
Southeast 0.9x 0.77 x 6.09 x 119.01 x 0.63 x 0.7 = 221.5 (77 Southeast 0.9x 0.77 x 6.09 x 118.15 x 0.63 x 0.7 = 219.9 (77 Southeast 0.9x 0.77 x 6.09 x 113.91 x 0.63 x 0.7 = 212.01 (77 Southeast 0.9x 0.77 x 6.09 x 104.39 x 0.63 x 0.7 = 194.29 (77 Southeast 0.9x 0.77 x 6.09 x 92.85 x 0.63 x 0.7 = 172.81 (77	<u> </u>					-		╡		_		=		(77)
Southeast 0.9x 0.77 x 6.09 x 119.01 x 0.63 x 0.7 = 221.5 (77 Southeast 0.9x 0.77 x 6.09 x 118.15 x 0.63 x 0.7 = 219.9 (77 Southeast 0.9x 0.77 x 6.09 x 113.91 x 0.63 x 0.7 = 212.01 (77 Southeast 0.9x 0.77 x 6.09 x 104.39 x 0.63 x 0.7 = 194.29 (77	<u> </u>		=			-		╡		_		 		(77)
Southeast 0.9x 0.77 x 6.09 x 119.01 x 0.63 x 0.7 = 221.5 (77 Southeast 0.9x 0.77 x 6.09 x 118.15 x 0.63 x 0.7 = 219.9 (77 Southeast 0.9x 0.77 x 6.09 x 113.91 x 0.63 x 0.7 = 212.01 (77	<u> </u>		_			H		╣		=		=		(77)
Southeast 0.9x 0.77 x 6.09 x 119.01 x 0.63 x 0.7 = 221.5 (77 Southeast 0.9x 0.77 x 6.09 x 118.15 x 0.63 x 0.7 = 219.9 (77	<u> </u>		_			-		╡		_		=		(77)
Southeast 0.9x 0.77 x 6.09 x 119.01 x 0.63 x 0.7 = 221.5 (77	<u> </u>		_			 		╡		_		=		(77)
Cauthaasta a	<u>_</u>		_			H		╡		_		=		(77)
Southeast 0.9x 0.77 x 6.00 x 1.06.25 x 0.63 x 0.7 - 1.07.75 (77.	<u> </u>					H		╡		_		=		= ``
	<u> </u>		=			 -		╡		_		=		(77)

(86)m=	0.97	0.93	0.87	0.75	0.59	0.42	0.3	0.34	0.53	0.8	0.94	0.97		(86)
Mean ii	nternal	temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	' in Table	e 9c)					
(87)m=	20.03	20.28	20.56	20.82	20.95	20.99	21	21	20.97	20.8	20.38	19.99		(87)
Tempe	rature	during h	eating p	eriods ir	rest of	dwelling	from Ta	ble 9, Ti	h2 (°C)					
(88)m=	20.17	20.18	20.18	20.19	20.2	20.21	20.21	20.21	20.2	20.2	20.19	20.18		(88)
Utilisati	ion fac	tor for g	ains for i	rest of d	welling,	h2,m (se	e Table	9a)						
(89)m=	0.96	0.92	0.85	0.72	0.55	0.37	0.25	0.28	0.48	0.76	0.92	0.97		(89)
Mean_ii	nternal	temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	ps 3 to 7	7 in Tabl	le 9c)				
(90)m=	18.9	19.24	19.63	19.99	20.14	20.2	20.21	20.21	20.18	19.97	19.41	18.84		(90)
									1	fLA = Livin	g area ÷ (4	4) =	0.44	(91)
Mean_iı	nternal	temper	ature (fo	r the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	A) × T2					
` ′ ∟	19.4	19.7	20.04	20.35	20.5	20.55	20.56	20.56	20.53	20.34	19.84	19.35		(92)
· · · · · _						r	m Table			r i				(00)
(93)m=	19.4	19.7	20.04 uirement	20.35	20.5	20.55	20.56	20.56	20.53	20.34	19.84	19.35		(93)
•					re obtain	ed at ste	en 11 of	Table 9	n so tha	ıt Ti m=(76)m an	d re-calc	ulate	
			or gains					1 4510 01					diato	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
			ains, hm			I			<u> </u>	I	<u> </u>			(0.4)
(94)m=	0.95	0.92	0.85	0.72	0.56	0.39	0.27	0.3	0.5	0.77	0.92	0.96		(94)
	469.79	536.92	W = (94)	537.01	442.7	303.05	202.92	212.18	325.06	438.84	454.12	446.31		(95)
` ′			rnal tem						020.00					()
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat lo	ss rate	for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
` ′	814.42	795.35	725.02	601.93	460.68	305.71	203.32	212.81	333	509.67	672	805.28		(97)
· –	heating 256.41					i	th = 0.02		``	í - `		207.00		
(98)m= 2	256.41	173.67	118.07	46.74	13.38	0	0	0 Tota	0	52.7	156.87	267.08	1084.92	(98)
Casas	h a atia.			1.\ \	2/			TOla	прегуеат	(kWh/year) = Sum(9	O)15,912 =		╡
·	· ·	•	ement in										17.98	(99)
9b. Ener				· ·	Ĭ				برجا لمحامات					
This par Fraction											unity Scr	ieme.	0	(301)
Fraction	of spa	ce heat	from co	mmunity	svstem	1 – (30	1) =		,				1	(302)
	-			•	•	,	,	allows for	CHP and i	up to four (other heat	sources; tl	he latter	``
includes b	ooilers, h	eat pumps	s, geothern	nal and wa	aste heat f					-,-				_
Fraction	of hea	t from C	Commun	ity boile	S								1	(303a)
Fraction	of tota	l space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor fo	or cont	rol and o	charging	method	(Table	4c(3)) fo	r commu	unity hea	ating sys	tem			1	(305)
Distribut	tion los	s factor	(Table 1	2c) for d	commun	ity heatii	ng syste	m				j	1.05	(306)
Space h	neating	I											kWh/year	- ,
Annual s			requirem	nent									1084.92	
												•		_

Space heat from Community boilers		(98) x (304a) x	(98) x (304a) x (305) x (306) =					
Efficiency of secondary/supplementary	heating system in %	(from Table 4a or Apper	ndix E)	0	(308)			
Space heating requirement from secon	dary/supplementary s	ystem (98) x (301) x 1	100 ÷ (308) =	0	(309)			
Water heating					_			
Annual water heating requirement				1933.02]			
If DHW from community scheme: Water heat from Community boilers		(64) x (303a) x	(305) x (306) =	2029.67	(310a)			
Electricity used for heat distribution		0.01 × [(307a)(307	7e) + (310a)(310e)] =	31.69	(313)			
Cooling System Energy Efficiency Ration	0			0	(314)			
Space cooling (if there is a fixed cooling	g system, if not enter	$= (107) \div (314)$) =	0	(315)			
Electricity for pumps and fans within dv mechanical ventilation - balanced, extra		om outside		128.36	(330a)			
warm air heating system fans				0	(330b)			
pump for solar water heating	0	(330g)						
Total electricity for the above, kWh/yea	128.36	(331)						
Energy for lighting (calculated in Apper	273.64	(332)						
Total delivered energy for all uses (307	') + (309) + (310) + (3	12) + (315) + (331) + (33	32)(237b) =	3570.84	(338)			
12b. CO2 Emissions – Community hea	ting scheme							
12b. CO2 Emissions – Community hea	ting scheme	Energy kWh/year	Emission factor	Emissions kg CO2/year				
CO2 from other sources of space and vertice of heat source 1 (%)	water heating (not CH	kWh/year	kg CO2/kWh	kg CO2/year	(367a)			
CO2 from other sources of space and v	water heating (not CH	kWh/year P)	kg CO2/kWh	kg CO2/year	(367a) (367)			
CO2 from other sources of space and vertice Efficiency of heat source 1 (%)	water heating (not CH	kWh/year P) using two fuels repeat (363) to	kg CO2/kWh (366) for the second fu	kg CO2/year	⊒ ` ¬			
CO2 from other sources of space and v Efficiency of heat source 1 (%) CO2 associated with heat source 1	water heating (not CH If there is CHP t	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52	kg CO2/year el 96 = 712.99	(367)			
CO2 from other sources of space and vertical energy for heat distribution	water heating (not CH If there is CHP to [(307	kWh/year P) using two fuels repeat (363) to (367b) x (313) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52	kg CO2/year el 96 = 712.99 = 16.45	(367)			
CO2 from other sources of space and vertical energy for heat distribution Total CO2 associated with community seems of space and vertical energy for heat distribution	water heating (not CH If there is CHP to [(307) systems econdary)	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(376) (309) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52	kg CO2/year el 96 = 712.99 = 16.45 = 729.43	(367) (372) (373)			
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so	water heating (not CH If there is CHP to [(307) systems econdary) rsion heater or instanta	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(376) (309) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52	kg CO2/year el 96 = 712.99 = 16.45 = 729.43 = 0	(367) (372) (373) (374)			
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community and CO2 associated with space heating (see CO2 associated with water from immerse	water heating (not CH If there is CHP to [(307) systems econdary) rsion heater or instanta water heating	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(373) (309) x aneous heater (312) x (373) + (374) + (375) =	kg CO2/kWh 0 (366) for the second fu 0.22 0.52 0 0.22	kg CO2/year el 96 = 712.99 = 16.45 = 729.43 = 0 = 0	(367) (372) (373) (374) (375)			
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community and CO2 associated with space heating (see CO2 associated with water from immeratoral CO2 associated with space and verifications.	water heating (not CH If there is CHP to [(307) systems econdary) rsion heater or instanta water heating ups and fans within dw	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(373) (309) x aneous heater (312) x (373) + (374) + (375) =	kg CO2/kWh 0 (366) for the second fu 0.22 0.52 0 0.22	kg CO2/year el 96 = 712.99 = 16.45 = 729.43 = 0 = 0	(367) (372) (373) (374) (375) (376)			
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community of the commun	water heating (not CH If there is CHP to [(307) systems econdary) rsion heater or instanta water heating ups and fans within dw ing sum of (376)(382) =	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(37) (309) x aneous heater (312) x (373) + (374) + (375) = relling (331)) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52 0 0.22	kg CO2/year el 96 = 712.99 = 16.45 = 729.43 = 0 = 0 729.43 = 66.62	(367) (372) (373) (374) (375) (376) (378)			
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community of the community of the community of the community of the control	water heating (not CH If there is CHP to [(307) systems econdary) rsion heater or instanta vater heating ups and fans within dw ing	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(37) (309) x aneous heater (312) x (373) + (374) + (375) = relling (331)) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52 0 0.22	kg CO2/year el 96 = 712.99 = 16.45 = 729.43 = 0	(367) (372) (373) (374) (375) (376) (378) (379)			

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 06 December 2021 at 10:54:51*

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 48.96m²

Site Reference: Highgate Road - GREEN

Plot Reference: 03 - A

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.27 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 16.43 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 45.7 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 37.5 kWh/m²

OK

2 Fabric U-values

 Element
 Average
 Highest

 External wall
 0.17 (max. 0.30)
 0.18 (max. 0.70)
 OK

 Party wall
 0.00 (max. 0.20)
 OK

Floor (no floor) Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ок
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	5.45m ²	
Windows facing: South East	6.09m ²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		Hear	Details:								
Access on Names	Noil lo alo an	User		- M	L		CTDO	010010			
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Stroma Softwa			010943 on: 1.0.5.50					
Contware reame.	01101110111	Property	/ Address:		31011.		7 01010	7.0.0.00			
Address:											
1. Overall dwelling dime	ensions:										
Ground floor		Ar	ea(m²)	(10) ×		ight(m)	(2a) =	Volume(m³) (3a)		
	-\ . (4 l-\ . (4 -\ . (4 -\ .)	(4.5)		(1a) x	2	65	(2a) =	129.74	(Sa)		
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	(1II)	48.96	(4)	\	I) (O)	(0.)		_		
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	129.74	(5)		
2. Ventilation rate:	main sec	ondary	other		total			m³ per hou	r		
Number of allipsychia	heating hea	ating		,			40 =		_		
Number of chimneys			0] = [0			0	(6a)		
Number of open flues	0 +	0 +	0] = [0		20 =	0	(6b)		
Number of intermittent fa				L	0		10 =	0	(7a)		
Number of passive vents	;				0	X '	10 =	0	(7b)		
Number of flueless gas fi	ires				0	X 4	40 =	0	(7c)		
							Air ch	nanges per ho	our		
Infiltration due to chimne	vs_flues and fans = (6a)-	+(6b)+(7a)+(7b)-	+(7c) =	Г	0		÷ (5) =	0	(8)		
'	peen carried out or is intended,			ontinue fr			. (0) =	0			
Number of storeys in the	he dwelling (ns)							0	(9)		
Additional infiltration						[(9)	-1]x0.1 =	0	(10)		
	.25 for steel or timber fra resent, use the value correspo			•	ruction			0	(11)		
deducting areas of openii		riding to the gre	aler wall are	a (anter							
If suspended wooden f	floor, enter 0.2 (unsealed	d) or 0.1 (sea	led), else	enter 0				0	(12)		
If no draught lobby, en								0	(13)		
ŭ	s and doors draught strip	oped						0	(14)		
Window infiltration			0.25 - [0.2		_	. (45)		0	(15)		
Infiltration rate	arron avanced in auhia		(8) + (10)	, , ,	, , ,	, ,		0	(16)		
If based on air permeabil	q50, expressed in cubic	-	•	•	etre or e	envelope	area	3	(17)		
	es if a pressurisation test has b				is being u	sed	ļ	0.15	(18)		
Number of sides sheltere			,	•	· ·			0	(19)		
Shelter factor			(20) = 1 -	0.075 x (1	19)] =			1	(20)		
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.15	(21)		
Infiltration rate modified f	or monthly wind speed							-			
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec				
Monthly average wind sp	eed from Table 7										
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7				
Wind Factor (22a)m = (2	2)m ÷ 4										
	1.23 1.1 1.08	0.95 0.95	0.92	1	1.08	1.12	1.18				
			-					ı			

Adjusted infiltr	ation rat	e (allowi	na for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18]	
Calculate effec					l -						1	<u> </u>	
If mechanica	al ventila	ition:										0.5	(23a)
If exhaust air h	eat pump	using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			0.5	(23b)
If balanced with	n heat reco	overy: effici	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				75.65	(23c)
a) If balance	ed mech	anical ve	ntilation	with he	at recove	ery (MVI	HR) (24a	a)m = (22)	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3]	(24a)
b) If balance	ed mech	anical ve	ntilation	without	heat red	covery (N	ЛV) (24b	m = (22)	2b)m + (23b)		1	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole h if (22b)n		tract ven (23b), t		•					.5 × (23b	o)		_	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural if (22b)n		on or when (24d)							0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	change	rate - er	iter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)	-	-			
(25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25)
3. Heat losse	s and he	eat loss r	paramete	ėr.									
ELEMENT	Gros		Openin		Net Ar	ea	U-valı	ue	ΑXU		k-value	e A	Χk
	area	(m²)	· m	2	A ,r	m²	W/m2	!K	(W/	K)	kJ/m²-l	K k.	J/K
Windows Type	2 1				5.45	х1.	/[1/(1.4)+	0.04] =	7.23				(27)
Windows Type	2				6.09	х1.	/[1/(1.4)+	0.04] =	8.07				(27)
Walls Type1	35.	3	11.54	4	23.76	x	0.18	=	4.28		60	1425.	6 (29)
Walls Type2	35.9	9	0		35.99) X	0.17	=	6.04	\Box [60	2159.	4 (29)
Total area of e	elements	, m²			71.29)							(31)
Party wall					14.89) x	0	=	0		45	670.0	5 (32)
Party floor					48.96	3				[40	1958.	4 (32a)
Party ceiling					48.96	3				Ī	30	1468.	8 (32b)
Internal wall **	•				96.46	3				Ī	9	868.1	4 (32c)
* for windows and ** include the area						ated using	ı formula 1	/[(1/U-valu	ıe)+0.04] á	as given in	paragraph	1 3.2	<u></u>
Fabric heat los	ss, W/K	= S (A x	U)				(26)(30)	+ (32) =				25.62	(33)
Heat capacity	Cm = S	(Axk)						((28).	(30) + (32	2) + (32a).	(32e) =	8550.39	(34)
Thermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			= (34)	÷ (4) =			174.64	(35)
For design assess can be used inste				construct	ion are no	t known pr	ecisely the	e indicative	e values of	TMP in T	able 1f		
Thermal bridge	es : S (L	x Y) cal	culated ı	using Ap	pendix l	<						6.09	(36)
if details of therma Total fabric he		are not kn	own (36) =	= 0.05 x (3	1)			(33) +	(36) =			31.71	(37)
Ventilation hea	at loss ca	alculated	monthly	/				(38)m	= 0.33 × ((25)m x (5))		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 13.4	13.24	13.08	12.28	12.12	11.31	11.31	11.15	11.64	12.12	12.44	12.76]	(38)
Heat transfer of	coefficie	nt, W/K						(39)m	= (37) + (38)m			
(39)m= 45.11	44.95	44.79	43.99	43.83	43.03	43.03	42.87	43.35	43.83	44.15	44.47		
Stroma FSAP 201	2 Version	1.0.5.50 (SAP 9.92)	- http://w	ww.stroma	.com			Average =	Sum(39) ₁	12 /12=	43.9 5 age	2 0 (349)

	ı ÷ (4)			
(40)m= 0.92 0.92 0.91 0.9 0.9 0.88 0.88 0.88 0.89 0.9	0.9	0.91		
•	= Sum(40)	112 /12=	0.9	(40)
Number of days in month (Table 1a)	—			
Jan Feb Mar Apr May Jun Jul Aug Sep Oct (41)m= 31 28 31 30 31 30 31 30 31	+	Dec		(41)
(41)m= 31 28 31 30 31 30 31 30 31	30	31		(41)
4. Water heating energy requirement:		kWh/ye	ar:	
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - $exp(-0.000349 \text{ x (TFA -}13.9)2)] + 0.0013 \text{ x (TFA -}1 \text{ if TFA £ 13.9, N = 1}$.66		(42)
Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use targe not more that 125 litres per person per day (all water use, hot and cold)		3.61		(43)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct	Nov	Dec		
Hot water usage in litres per day for each month $Vd,m = factor from Table 1c \times (43)$	1			
(44)m= 80.98 78.03 75.09 72.14 69.2 66.25 66.25 69.2 72.14 75.09	78.03	80.98		
	Sum(44) ₁₁₂	L	883.37	(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= 120.08 105.03 108.38 94.49 90.66 78.23 72.5 83.19 84.18 98.11		116.29		— ,
Total = 5 If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)	Sum(45) ₁₁₂	= [1158.23	(45)
(46)m= 18.01 15.75 16.26 14.17 13.6 11.74 10.87 12.48 12.63 14.72	16.06	17.44		(46)
Water storage loss:	10.00	17.44		(10)
Storage volume (litres) including any solar or WWHRS storage within same vessel		0		(47)
If community heating and no tank in dwelling, enter 110 litres in (47)	·			
Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in	n (47)			
Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day):		0		(48)
Temperature factor from Table 2b		0		(49)
Energy lost from water storage, kWh/year (48) × (49) =		110		(50)
b) If manufacturer's declared cylinder loss factor is not known:		110		(30)
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	0.02		(51)
If community heating see section 4.3				(==)
Volume factor from Table 2a Temperature factor from Table 2b	-	0.6		(52) (53)
Energy lost from water storage, kWh/year $(47) \times (51) \times (52) \times (53) =$. ,
Enter (50) or (54) in (55)		.03		(54) (55)
Water storage loss calculated for each month $((56)m = (55) \times (41)m)$				` ,
(56)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 32.01 30.98 32.01	30.98	32.01		(56)
If cylinder contains dedicated solar storage, (57) m = (56) m x $[(50)$ – $(H11)]$ ÷ (50) , else (57) m = (56) m when			хН	()
(57)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01	30.98	32.01		(57)
				(58)
Primary circuit loss (annual) from Table 3 Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m	L	0		(50)
(modified by factor from Table H5 if there is solar water heating and a cylinder thern	nostat)			
	22.51	23.26		(59)

Combi loss calculated for each month $(61)m = (60) \div 365 \times (41)m$														
(61)m= 0	0	0	0	0	00) -	0) 0		0	0	T 0	0	1	(61)
Total heat requi													[(50)m + (61)m	(- /
	154.95	163.65	147.98	145.94	131.7		138.	_	137.68	153.38	` 	171.57	(59)III + (61)IIII]	(62)
Solar DHW input ca	Į												I	(- /
(add additional											mon to wat	or modung)		
(63)m= 0	0	0	0	0	0	0	0	_	0	0	0	0]	(63)
Output from wat	ter heat	:er				I					-1			
· -	154.95	163.65	147.98	145.94	131.7	3 127.77	138.	.47	137.68	153.38	160.59	171.57]	
	'						. (Outp	out from wa	ater heat	er (annual)₁	12	1809.07	(64)
Heat gains from	n water l	heating,	kWh/m	onth 0.2	5 ´[0.	85 × (45)m	ı + (6	1)m	n] + 0.8 x	c [(46)m	n + (57)m	+ (59)m]	_
(65)m= 84.15	74.86	80.26	74.21	74.37	68.8	1 68.33	71.8	88	70.79	76.84	78.4	82.89]	(65)
include (57)m	in calc	ulation	of (65)m	only if c	ylinde	r is in the	dwelli	ing (or hot w	ater is	from com	munity h	neating	
5. Internal gai				•	-							•		
Metabolic gains	(Table	5), Wat	ts											
Jan	Feb	Mar	Apr	May	Ju	n Jul	Αι	ug	Sep	Oct	Nov	Dec		
(66)m= 82.98	82.98	82.98	82.98	82.98	82.9	82.98	82.9	98	82.98	82.98	82.98	82.98		(66)
Lighting gains (calculat	ed in Ap	pendix	L, equati	ion L9	or L9a), a	lso s	ee 7	Table 5					
(67)m= 12.89	11.44	9.31	7.05	5.27	4.45	4.8	6.2	:5	8.38	10.64	12.42	13.24		(67)
Appliances gain	ns (calcu	ulated in	Append	dix L, eq	uatior	L13 or L1	3a), a	also	see Tal	ble 5	-	-		
(68)m= 144.53	146.03	142.25	134.21	124.05	114.5	108.13	106.	.63	110.41	118.45	128.61	138.16		(68)
Cooking gains (calculat	ted in Ap	pendix	L, equat	ion L	15 or L15a), also	o se	e Table	5	•		•	
(69)m= 31.3	31.3	31.3	31.3	31.3	31.3	31.3	31.	.3	31.3	31.3	31.3	31.3		(69)
Pumps and fans	s gains	(Table 5	ia)											
(70)m= 0	0	0	0	0	0	0	0		0	0	0	0		(70)
Losses e.g. eva	poratio	n (negat	ive valu	es) (Tab	le 5)							-		
(71)m= -66.38	-66.38	-66.38	-66.38	-66.38	-66.3	8 -66.38	-66.	38	-66.38	-66.38	-66.38	-66.38		(71)
Water heating g	gains (T	able 5)									-	-		
(72)m= 113.1	111.4	107.87	103.07	99.95	95.5	7 91.84	96.6	62	98.31	103.28	108.89	111.41		(72)
Total internal g	gains =					66)m + (67)n	า + (68	3)m +	+ (69)m + ((70)m + (71)m + (72))m		
(73)m= 318.42	316.77	307.33	292.22	277.17	262.4	1 252.66	257.	.38	265	280.27	297.82	310.7		(73)
6. Solar gains:														
Solar gains are ca		ŭ	r flux from	Table 6a		•	tions t	to co	nvert to th	e applica		tion.		
Orientation: Access Factor Area Flux g_ FF Gains Table 6d m ² Table 6a Table 6b Table 6c (W)														
	able ou		m ²		_	able ba	, ,	- 1	able ob	_ ,	Table 6c		(W)	7
Southeast 0.9x	0.77	X	6.0	9	×	36.79	X		0.63	x [0.7	=	68.48	(77)
Southeast 0.9x	0.77	X	6.0	9	x	62.67	X		0.63	x [0.7	=	116.65	(77)
Southeast 0.9x	0.77	X	6.0	9	X _	85.75	X		0.63	×	0.7	=	159.6	(77)
Southeast 0.9x	0.77	×	6.0	9	X _	106.25	X		0.63	x [0.7	=	197.75	(77)
Southeast 0.9x	0.77	X	6.0	9	x	119.01	X		0.63	X	0.7	=	221.5	(77)

		_					, ,		_				_
Southeast 0.9x	0.77	X	6.0)9	X 1	18.15	X	0.63	X	0.7	=	219.9	(77)
Southeast 0.9x	0.77	X	6.0)9	x 1	13.91	X	0.63	X	0.7	=	212.01	(77)
Southeast 0.9x	0.77	X	6.0)9	X 1	04.39	X	0.63	X	0.7	=	194.29	(77)
Southeast 0.9x	0.77	X	6.0)9	x g	92.85	X	0.63	X	0.7	=	172.81	(77)
Southeast 0.9x	0.77	x	6.0)9	X (69.27	x	0.63	X	0.7	=	128.92	(77)
Southeast 0.9x	0.77	x	6.0)9	X	44.07	x	0.63	x	0.7	=	82.02	(77)
Southeast 0.9x	0.77	x	6.0)9	x :	31.49	x	0.63	х	0.7	=	58.6	(77)
Southwest _{0.9x}	0.77	x	5.4	15	x :	36.79		0.63	х	0.7	=	61.28	(79)
Southwest _{0.9x}	0.77	x	5.4	15	x (62.67		0.63	х	0.7	=	104.39	(79)
Southwest _{0.9x}	0.77	x	5.4	15	x 8	85.75		0.63	x	0.7	=	142.83	(79)
Southwest _{0.9x}	0.77	x	5.4	15	x 1	06.25		0.63	x	0.7	=	176.97	(79)
Southwest _{0.9x}	0.77	x	5.4	15	x 1	19.01		0.63	x	0.7	=	198.22	(79)
Southwest _{0.9x}	0.77	x	5.4	15	x 1	18.15		0.63	x	0.7	=	196.79	(79)
Southwest _{0.9x}	0.77	x	5.4	15	x 1	13.91]	0.63	x	0.7	_ =	189.73	(79)
Southwest _{0.9x}	0.77	x	5.4	15	x 1	04.39		0.63	x	0.7	=	173.87	(79)
Southwest _{0.9x}	0.77	×	5.4	15	x .	92.85	֓֞֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֡֓֓֓֓֓֡֓֓֡	0.63	x	0.7	=	154.65	(79)
Southwest _{0.9x}	0.77	×	5.4	ļ5	x (69.27	j	0.63	x	0.7	=	115.37	(79)
Southwest _{0.9x}	0.77	×	5.4	15	x Z	44.07	j	0.63	x	0.7	=	73.4	(79)
Southwest _{0.9x}	0.77	×	5.4	ļ5	x :	31.49	֓֞֞֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֡֓֓֓֓֓֡֓֓֡	0.63	x	0.7	=	52.45	(79)
Solar gains in (83)m= 129.76 Total gains – i (84)m= 448.18	221.04 30 nternal and	02.43	374.73	419.72	416.69	401.73 , watts 654.39	(83)m 368 625		244.29 524.50	9 155.43	111.05 421.75]	(83) (84)
7. Mean inter	nal temper	ature	(heating	season)								
Temperature	during hea	ting p	eriods ir	n the livii	ng area	from Tal	ble 9,	Th1 (°C)				21	(85)
Utilisation fac				ea, h1,m	(see Ta	able 9a)						7	
Jan		Mar	Apr	May	Jun	Jul	 	ug Sep	Oct		Dec	1	
(86)m= 0.96	0.92	0.84	0.72	0.56	0.4	0.29	0.3	0.49	0.76	0.92	0.97]	(86)
Mean interna	l temperatu	ıre in I	iving are	ea T1 (fo	ollow ste	ps 3 to 7	7 in T	able 9c)				-	
(87)m= 20.14	20.38 2	0.64	20.86	20.96	20.99	21	2	1 20.98	20.85	20.47	20.09		(87)
Temperature	during hea	ting p	eriods ir	n rest of	dwelling	g from Ta	able 9	9, Th2 (°C)					
(88)m= 20.15	20.15 2	0.15	20.17	20.17	20.19	20.19	20.	19 20.18	20.17	20.17	20.16]	(88)
Utilisation fac	tor for gain	s for r	est of d	wellina.	h2.m (se	ee Table	9a)			-	•	_	
(89)m= 0.95		0.82	0.68	0.52	0.35	0.24	0.2	0.44	0.72	0.9	0.96]	(89)
Mean interna	l temperati	ıre in 1	the rest	of dwelli	ing T2 (f	follow ste	ne 3	to 7 in Tahl	L a_9c)			J	
(90)m= 19.02		9.72	20.01	20.13	20.18	20.19	20.		20.01	19.51	18.97	1	(90)
. ,	<u> </u>				<u> </u>					/ing area ÷ (ļ	0.5	(91)
Maara la terr	l tower seed			ا- مام	II:\ ′	1 A	. /4	41 A) . TO		`			 ` ′
Mean interna (92)m= 19.58	 	`				ì	Ť		00.40	1 10 00	10.50	1	(02)
134111= 1 19.08							100						
Apply adjustr		0.18 mean	20.43	20.54	20.58	20.59	20.		20.42		19.53]	(92)

												•	
(93)m= 19.58	19.87	20.18	20.43	20.54	20.58	20.59	20.59	20.57	20.42	19.99	19.53		(93)
8. Space hea													
Set Ti to the i the utilisation			•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	l						_ 3						
(94)m= 0.94	0.9	0.82	0.69	0.54	0.38	0.26	0.29	0.47	0.73	0.9	0.95		(94)
Useful gains,	hmGm	, W = (9	4)m x (8	4)m	•								
(95)m= 423.35	482.65	500.76	463.26	375.66	255.76	171.39	179.24	275.91	384.24	408.09	402.4		(95)
Monthly average		1	i 	from T	able 8	·				·		ı	
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate	i	i	· ·	i	i	-``	· · ·	<u> </u>				Ī	(07)
(97)m= 689.14	673.12	612.61	507.26	387.6	257.47	171.63	179.6	280.53	430.55	569.04	681.54		(97)
Space heatin (98)m= 197.75	g require	83.22	31.68	8.88	/vn/mon	$\ln = 0.02$	24 X [(97))m – (95 0)MJ X (4 34.46	1) m 115.88	207.69		
(96)111= 197.75	127.99	03.22	31.00	0.00		0		l per year		<u> </u>	l	807.54	(98)
				.,			TUld	i per year	(KVVII/yeai) = Sum(9	O)15,912 =		╡``
Space heatin	g requir	ement in	kVVh/m²	² /year								16.49	(99)
9b. Energy red	•		· ·	Ĭ									
This part is use Fraction of spa										unity sch	neme.	0	(301)
·			•		-	_	(Table T	1) 0 11 11	one			0	╡`
Fraction of spa	ace heat	from co	mmunity	system /	1 – (30	1) =						1	(302)
The community so									up to four	other heat	sources; ti	he latter	
includes boilers, he Fraction of hea		-			rom power	stations.	see Appei	iuix C.				1	(303a)
Fraction of total			•		oilers				(3	02) x (303	a) =	1	(304a)
Factor for cont	trol and	charging	method	l (Table	4c(3)) fo	r commi	unity hea	iting syst	tem			1	(305)
Distribution los	ss factor	(Table 1	12c) for (commun	ity heatii	ng syste	m					1.05	(306)
Space heating	a										!	kWh/yea	 r
Annual space	_	requiren	nent									807.54	
Space heat fro	m Com	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	=	847.92	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308
Space heating	require	ment fro	m secon	ıdary/su	oplemen	tary sys	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water heating	3												
Annual water h		equirem	ent									1809.07	
If DHW from c													_
Water heat fro		•								5) x (306) :		1899.52	(310a)
Electricity used							0.01	× [(307a).	(307e) +	· (310a)((310e)] =	27.47	(313)
Cooling System	_	•	•			>						0	(314)
Space cooling	,					,		= (107) ÷	(314) =			0	(315)
Electricity for p							outoide				ĺ	404.45	(2202)
mechanical ve	ะแแลแดก	- palanc	eu, extr	act of po	silive in	put Irom	outside					104.15	(330a)

warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330	b) + (330g) =		104.15	(331)
Energy for lighting (calculated in Appen	dix L)				227.56	(332)
Total delivered energy for all uses (307) + (309) + (310) + (31	2) + (315) + (331) + (33	32)(237b) =		3079.16	(338)
12b. CO2 Emissions – Community heat	ing scheme					
		Energy kWh/year	Emission factors kg CO2/kWh		missions g CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)	o (e) ring two fuels repeat (363) to	(366) for the second	d fuel	96	(367a)
CO2 associated with heat source 1	[(307b	y)+(310b)] x 100 ÷ (367b) x	0.22	=	618.18	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	14.26	(372)
Total CO2 associated with community s	systems	(363)(366) + (368)(372	2)	=	632.43	(373)
CO2 associated with space heating (se	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immers	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and w	ater heating	(373) + (374) + (375) =			632.43	(376)
CO2 associated with electricity for pum	os and fans within dwe	elling (331)) x	0.52	=	54.06	(378)
CO2 associated with electricity for lighti	ng	(332))) x	0.52	=	118.1	(379)
Total CO2, kg/year	sum of (376)(382) =				804.59	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				16.43	(384)

El rating (section 14)

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:54:42

Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 53.46m² Site Reference :

Plot Reference: Highgate Road - GREEN 03 - B

Address:

Client Details:

Name: Address:

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

18.07 kg/m² Target Carbon Dioxide Emission Rate (TER)

Dwelling Carbon Dioxide Emission Rate (DER) 15.38 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 42.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 35.0 kWh/m²

OK

2 Fabric U-values

Element Average Highest 0.18 (max. 0.70) External wall 0.18 (max. 0.30) OK Party wall 0.00 (max. 0.20) **OK**

Floor (no floor) Roof (no roof)

Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ок
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	ок
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	9.56m²	
Windows facing: North West	3.98m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		l lser-l	Details:						
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa	are Ve				010943 on: 1.0.5.50	
Address :	· ·	Property	Address	: 03 - B					
Overall dwelling dime	ensions:								
		Are	a(m²)		Av. He	ight(m)		Volume(m	3)
Ground floor			53.46	(1a) x	2	2.65	(2a) =	141.67	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	53.46	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	141.67	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0] + [0	= [0	x 4	10 =	0	(6a)
Number of open flues	0 + 0	+ [0	=	0	x 2	20 =	0	(6b)
Number of intermittent fa	ins				0	x 1	10 =	0	(7a)
Number of passive vents	3			Ē	0	x 1	10 =	0	(7b)
Number of flueless gas fi	ires			F	0	x 4	10 =	0	(7c)
				L					
							Air ch	anges per ho	our
	ys, flues and fans = $(6a)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6a)+(6b)+(6b)+(6a)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b$				0		÷ (5) =	0	(8)
Number of storeys in the	peen carried out or is intended, proced he dwelling (ns)	ed to (17),	otherwise (continue ti	rom (9) to	(16)		0	(9)
Additional infiltration	ine arraining (ine)					[(9)-	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame o	r 0.35 fc	r masoni	ry consti	ruction			0	(11)
if both types of wall are p deducting areas of openi	resent, use the value corresponding t	o the grea	ter wall are	ea (after					
•	floor, enter 0.2 (unsealed) or ().1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	,	`	,,					0	(13)
Percentage of windows	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	2 x (14) ÷ 1	100] =			0	(15)
Infiltration rate			(8) + (10)					0	(16)
•	q50, expressed in cubic metro		•	•	etre of e	envelope	area	3	(17)
•	lity value, then $(18) = [(17) \div 20] +$ es if a pressurisation test has been do				is boing u	sod		0.15	(18)
Number of sides sheltere		ne or a de	gree air pe	ппеаышу	is being u	seu		0	(19)
Shelter factor			(20) = 1 -	[0.075 x (19)] =			1	(20)
Infiltration rate incorporate	ting shelter factor		(21) = (18) x (20) =				0.15	(21)
Infiltration rate modified f	for monthly wind speed								<u> </u>
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2.	2)m ÷ 4								
<u> </u>	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
								ı	

djusted infiltr	ation rat	e (allowi	ing for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
<i>alculate effe</i> If mechanic		•	rate for t	he appli	cable ca	se	-		-				—
If exhaust air h			endix N (2	3h) = (23a	a) × Fmv (e	equation (N	NS)) other	wise (23h) = (23a)			0.5	=
If balanced with		0		, ,	,	. `	,, .	`) = (20a)			0.5	=
		-	•	_					2h\ma . /	00h) [4 (22-)	75.65	(2
a) If balance 4a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	230) × [0.29	0.3	÷ 100]]	(2
,	<u> </u>	<u> </u>			<u> </u>		<u> </u>				0.3	İ	(2
b) If balance	ea mech	anicai ve	entilation 0	without	neat red	overy (i	0 (24b	0 = (22)	2b)m + (. 0	23b) ₀	0	1	(2
	<u> </u>	<u> </u>							0	0	0	İ	(2
c) If whole h			then (24	•	•				.5 × (23b	o)		_	
4c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
d) If natural if (22b)r			ole hous m = (22		•				0.5]				
4d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
Effective air	change	rate - er	nter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)				I	
5)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(:
									1	1		ı	
3. Heat losse LEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/		k-value kJ/m²-l		X k /K
indows Type		` ,			9.56	x1.	/[1/(1.4)+	0.04] =	12.67	<u></u>			(
indows Type	2				3.98	x ₁ ,	/[1/(1.4)+	0.04] =	5.28	一			(
/alls Type1	40.0	14	13.54	1	26.5	x	0.18		4.77	=	60	1590) (:
/alls Type2	12.1		0		12.16	=	0.17	-	2.04	북 ¦	60	729.6	=
otal area of e					52.2	' ^	0.17		2.04	[729.0	`\ (
arty wall	, ioi i ioi i io	,				=							`
-					27.88		0	= [0		45	1254.6	=
arty floor					53.46	_				Ĺ	70	3742.2	=
arty ceiling					53.46					Į	30	1603.8	3(
ternal wall **					102.0					Ĺ	9	918.27	7(
or windows and include the area						ated using	formula 1	/[(1/U-valu	ıe)+0.04] á	as given in	paragraph	1 3.2	
bric heat lo				o ana pan			(26)(30)	+ (32) =				24.76	
eat capacity		•	-,					((28)	(30) + (32	2) + (32a).	(32e) =	9838.47	\exists
nermal mass		,	⊃ = Cm ÷	- TFA) ir	n kJ/m²K			** *	÷ (4) =	, (,	(= = 7	184.03	\exists
r design asses n be used inste	sments wh	ere the de	tails of the	•			ecisely the	` '		TMP in Ta	able 1f	104.03	
ermal bridg				usina An	pendix k	<						6.09	
details of therma					-							0.00	`
otal fabric he			, ,	·	,			(33) +	(36) =			30.85	
entilation hea	at loss ca	alculated	d monthly	/				(38)m	= 0.33 × ((25)m x (5))		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
3)m= 14.63	14.46	14.28	13.41	13.23	12.35	12.35	12.18	12.7	13.23	13.58	13.93		(
eat transfer o	coefficie	nt, W/K						(39)m	= (37) + (38)m			
		-											
9)m= 45.49	45.31	45.14	44.26	44.08	43.21	43.21	43.03	43.56	44.08	44.43	44.78		

Author	Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
Number of days in month (Table 1a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	(40)m= 0.85	0.85	0.84	0.83	0.82	0.81	0.81	0.8	0.81	0.82	0.83	0.84		
A.		!	!							Average =	Sum(40) ₁	12 /12=	0.83	(40)
4. Water heating energy requirement. **RWh/year:** Assumed occupancy, N if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA a 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) Annual average not value use transported by for each month Vd,m = factor from Table 2 to x (43) (44)me		<u> </u>							-			T _ 1		
### Assumed occupancy, N 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 had water usage in litres per day Vd.average = (25 x N) + 36 ### Reduce the annual varage had value 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, hor and cold) ### Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ### Hot water usage in litres per day for each month Vol.m = factor from Table 1c x (43) ### Hot water usage in litres per day for each month Vol.m = factor from Table 1c x (43) ### Hot water usage in litres per day for each month Vol.m = factor from Table 1c x (44) ### Hot water usage in litres per day for each month Vol.m = factor from Table 1c x (43) ### Hot water usage in litres per day for each month Vol.m = factor from Table 1c x (43) ### Hot water usage in litres per day for each month Vol.m = factor from Table 1c x (43) ### Hot water usage in litres per day for each month Vol.m = factor from Table 1c x (43) ### Hot water usage in litres per day for each month Vol.m = factor from Table 2b ### Hot water usage in litres per day for each month Vol.m = factor from Table 2b ### Hot water usage in litres per day for each month Vol.m = factor from Table 2b ### Hot water usage in litres per day for each month Vol.m = factor from Table 2b ### Hot water usage in litres per day for each month Vol.m = factor from Table 2b ### Hot water storage loss: ### Hot water usage in litres per day for each month Vol.m = factor from Table 2b ### Hot water storage loss calculated for each month ### Hot water storage loss calculated for each month ### Hot water storage loss calculated for each month ### Hot water storage loss calculated for each month ### Hot water storage loss calculated for each month ### Hot water storage loss calculated for each month ### Hot water storage loss calculated for each month ### Hot water storage loss calc		-	_	<u> </u>	<u></u>		-	Ť		-	 	\vdash		
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Assumed occupancy, N 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 E 13.9, N = 1														
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 Reduce the annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day Vd, average a contained to a chieve a water use target or not more that 125 litres per persons per day (if water us, hot and colors) Jan	4. Water hea	ting ene	rgy requi	rement:								kWh/ye	ar:	
Annual average hot water usage in litres per day Vd,average = (25 x N) + 36	if TFA > 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (¯	TFA -13		79		(42)
Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43) (44)m = 84.44 81.37 78.3 75.23 72.16 69.09 69.09 72.16 75.23 78.3 81.37 84.44 Total = Sum(44), vo = 921.15 (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) (46)m = 125.22 109.52 113.01 88.63 94.54 81.58 75.6 86.75 87.78 102.3 111.67 121.27 Total = Sum(45), vo = 120.778 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m = 18.78 16.43 16.95 14.78 14.18 12.24 11.34 13.01 13.17 15.35 16.75 18.19 (46)m = 18.78 16.43 16.95 14.78 14.18 12.24 11.34 13.01 13.17 15.35 16.75 18.19 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Chemisse if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2b Energy lost from water storage, kWh/year (48) x (49) = 110 (50) (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) (51) If community heating see section 4.3 Volume factor from Table 2b (52) 1.03 (52) Temperature factor from Table 2b (53) 1.03 (52) Temperature factor from Table 2b (54) 1.03 (52) Temperature factor from Table 2b (55) (41)m (56)m = (55) x (41)m (56)m = (32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 10.98 32.01 (57) Primary circuit loss (annual) from Table 3 Primary circuit loss calculated for each month (59)m = (58) + 365 x (41)m (modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)	Annual averag	ge hot wa al average	hot water	usage by	5% if the α	lwelling is	designed i	,		se target o		5.76		(43)
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Total = Sum(44)									1 - 22		L			
Energy content of hor water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) 45 m= 125.22 109.52 113.01 98.53 94.54 81.58 75.6 86.75 87.78 102.3 111.67 121.27 Total = Sum(45) _{1.12} = 1207.78 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) 46 m= 18.78 16.43 16.95 14.78 14.18 12.24 11.34 13.01 13.17 15.35 16.75 18.19 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known:	(44)m= 84.44	81.37	78.3	75.23	72.16	69.09	69.09	72.16	75.23	78.3	81.37	84.44		
(45)me	` '		l .				l .	<u> </u>		I Total = Su	ım(44) ₁₁₂ =	=	921.15	(44)
Total = Sum(45) 1	Energy content of	f hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
## instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ## (46)me	(45)m= 125.22	109.52	113.01	98.53	94.54	81.58	75.6	86.75	87.78	102.3	111.67	121.27		
(46)m= 18.78 16.43 16.95 14.78 14.18 12.24 11.34 13.01 13.17 15.35 16.75 18.19 Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52) Temperature factor from Table 2b 0.6 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54) Energy lost										Total = Su	ım(45) ₁₁₂ =	=	1207.78	(45)
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Storage volume (litres) including any solar or WWHRS storage within same vessel	` '		16.95	14.78	14.18	12.24	11.34	13.01	13.17	15.35	16.75	18.19		(46)
If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) × (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 1.03 Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 1.03 Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m= 32.01 28.92 32.01 30.98	_) includir	na anv so	olar or W	/WHRS	storane	within sa	ame ves	ല		0		(47)
Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = (52) Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = (54) Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m = (55) × (41)m) (56)m = (32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (56) If cylinder contains dedicated solar storage, (57)m = (56)m × ((50) - (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H (57)m = (32.01 28.92 32.01 30.98 32.01	-	` .					•		a	001		<u> </u>		(47)
Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) × (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 1.03 (54) Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 If cylinder contains dedicated solar storage, (57)m = (56)m × [(50) - (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H (57)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 Primary circuit loss (annual) from Table 3 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)	-	-			-			, ,	ers) ente	er '0' in ((47)			
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b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year Enter (50) or (54) in (55) Water storage loss calculated for each month $((56)m = 32.01 28.92 32.01 30.98 32.01 30.9$	Temperature f	actor fro	m Table	2b								0		(49)
Hot water storage loss factor from Table 2 (kWh/litre/day) $0.02 \qquad (51)$ If community heating see section 4.3 $ \text{Volume factor from Table 2a} \qquad \qquad 1.03 \qquad (52) $ Temperature factor from Table 2b $0.6 \qquad (53)$ Energy lost from water storage, kWh/year $(47) \times (51) \times (52) \times (53) = \qquad 1.03 \qquad (54)$ Enter (50) or (54) in (55) $ \qquad \qquad (103) \qquad (55) $ Water storage loss calculated for each month $ ((56)m = (55) \times (41)m) $ (56) $ \qquad \qquad (56)m = 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 $ (56) $ \qquad \qquad (56)m = 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 $ (56) $ \qquad \qquad (57)m = 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 $ (57) $ \qquad \qquad (57)m = 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 $ (57) $ \qquad \qquad (57)m = 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 $ (58) $ \qquad \qquad (57)m = 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 $ (58) $ \qquad \qquad (58)m = 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 $ (58) $ \qquad \qquad (57)m = 32.01 30.98 3$	0,		•					(48) x (49)) =		1	10		(50)
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	•		_	,							-			
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If cylinder contains dedicated solar storage, $(57)m = (56)m \times [(50) - (H11)] \div (50)$, else $(57)m = (56)m$ where $(H11)$ is from Appendix H $(57)m = 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (57)$ Primary circuit loss (annual) from Table 3 Primary circuit loss calculated for each month $(59)m = (58) \div 365 \times (41)m$ (modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)	(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
Primary circuit loss (annual) from Table 3 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)	` '												хН	. ,
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)	(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
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)		loce (c	nual\ fra	m Toble	. 2		ı	ı		ı		<u> </u>		(58)
(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)	•	,	,			59)m = 4	(58) ± 36	35 × (41)	ım			·		(50)
	-				,	•	` '	, ,		r thermo	stat)			
(**/	(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi loss calculated for each month (61)m = (60) \div 365 × (41)m													
(61)m= 0	0	0	0	0	0	0	0	0	0	То	0	1	(61)
	 auired for	water h	eating ca	Lulated	L I for eac	.h month	(62)n	n = 0.85 x	 (45)m +	(46)m +	(57)m +	ו - (59)m + (61)m	
(62)m= 180.5	-	168.29	152.02	149.82	135.07		142.0		157.58	165.17	176.55]	(62)
Solar DHW inpu	it calculated	using App	endix G oı	· Appendix	H (nega	tive quantity	y) (ente	r '0' if no sola	ar contribu	tion to wate	r heating)) T	
(add addition											•		
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(63)
Output from	water hea	ter				•	•	•	•	•	•	•	
(64)m= 180.5	159.45	168.29	152.02	149.82	135.07	130.87	142.0	2 141.28	157.58	165.17	176.55]	
				•	•	•		Output from w	ater heate	er (annual)	l12	1858.62	(64)
Heat gains fr	om water	heating,	kWh/m	onth 0.2	5 ´ [0.8	5 × (45)m	ı + (61)m] + 0.8	x [(46)m	+ (57)m	+ (59)m	ı]	
(65)m= 85.86	76.36	81.8	75.56	75.66	69.92	69.36	73.0	7 71.98	78.24	79.93	84.54]	(65)
include (57	7)m in calc	culation	of (65)m	only if c	ylinder	is in the	dwelli	ng or hot w	ater is f	rom com	munity h	neating	
5. Internal	gains (see	Table 5	and 5a):									
Metabolic ga	ins (Table	5), Wat	ts										
Jan		Mar	Apr	May	Jun	Jul	Au	g Sep	Oct	Nov	Dec]	
(66)m= 89.61	89.61	89.61	89.61	89.61	89.61	89.61	89.6	1 89.61	89.61	89.61	89.61]	(66)
Lighting gain	s (calculat	ted in Ap	pendix	L, equat	ion L9 d	or L9a), a	ılso se	e Table 5				-	
(67)m= 13.93	12.37	10.06	7.62	5.69	4.81	5.19	6.75	9.06	11.5	13.43	14.31]	(67)
Appliances g	ains (calc	ulated ir	Append	dix L, eq	uation l	_13 or L1	3a), a	lso see Ta	ble 5		-	-	
(68)m= 156.2°	1 157.83	153.74	145.05	134.07	123.75	116.86	115.2	24 119.33	128.02	139	149.32]	(68)
Cooking gain	ns (calcula	ted in A	ppendix	L, equat	ion L15	or L15a), also	see Table	e 5		-	_	
(69)m= 31.96	31.96	31.96	31.96	31.96	31.96	31.96	31.9	6 31.96	31.96	31.96	31.96]	(69)
Pumps and fa	ans gains	(Table 5	āa)										
(70)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(70)
Losses e.g. e	evaporatio	n (nega	tive valu	es) (Tab	le 5)							_	
(71)m= -71.68	3 -71.68	-71.68	-71.68	-71.68	-71.68	-71.68	-71.6	8 -71.68	-71.68	-71.68	-71.68]	(71)
Water heatin	g gains (T	able 5)										_	
(72)m= 115.4	113.63	109.94	104.94	101.69	97.11	93.22	98.2	1 99.98	105.16	111.01	113.63]	(72)
Total interna	al gains =				(66	6)m + (67)m	n + (68)	m + (69)m +	(70)m + (7	71)m + (72))m	_	
(73)m= 335.42	2 333.71	323.63	307.48	291.33	275.55	265.16	270.0	08 278.24	294.57	313.32	327.14]	(73)
6. Solar gai													
Solar gains are		ŭ					ations to		ne applica		tion.		
Orientation: Access Factor Area Flux g_ FF Gains Table 6d m² Table 6a Table 6b Table 6c (W)													
Couthwoots							1 -					. ,	7,
Southweston		X	9.5		-	36.79] <u> </u>	0.63	×	0.7	=	107.5	(79)
Southwesters	<u> </u>	X	9.5			62.67	ļ ļ	0.63	×	0.7	=	183.11](79)
Southwesto o	<u> </u>	X	9.5			85.75]	0.63	×	0.7	=	250.54	」 (79)
Southweston		X	9.5	_		106.25] <u> </u>	0.63	×	0.7	_ =	310.43	」 (79)
Southwest _{0.9x}	0.77	X	9.5	56	X	119.01	J L	0.63	Х	0.7	=	347.71	(79)

								_		_				
Southwest _{0.9x}	0.77	X	9.5	66	X	1	18.15	_	0.63	X	0.7	=	345.19	(79)
Southwest _{0.9x}	0.77	X	9.5	56	X	1	13.91]	0.63	X	0.7	=	332.8	(79)
Southwest _{0.9x}	0.77	X	9.5	56	X	1	04.39		0.63	X	0.7	=	304.99	(79)
Southwest _{0.9x}	0.77	X	9.5	56	X	9	92.85]	0.63	Х	0.7	=	271.28	(79)
Southwest _{0.9x}	0.77	X	9.5	56	X	6	9.27]	0.63	X	0.7	=	202.38	(79)
Southwest _{0.9x}	0.77	X	9.5	56	X	4	14.07]	0.63	X	0.7	=	128.76	(79)
Southwest _{0.9x}	0.77	X	9.5	56	X	3	31.49]	0.63	X	0.7	=	92	(79)
Northwest 0.9x	0.77	X	3.9	8	X	1	1.28	X	0.63	х	0.7	=	13.72	(81)
Northwest 0.9x	0.77	X	3.9	8	X	2	22.97	X	0.63	х	0.7	=	27.94	(81)
Northwest 0.9x	0.77	X	3.9	8	X	4	11.38	X	0.63	х	0.7	=	50.33	(81)
Northwest 0.9x	0.77	X	3.9	98	X	ε	67.96	X	0.63	х	0.7	=	82.66	(81)
Northwest 0.9x	0.77	X	3.9	98	X	9	91.35	X	0.63	х	0.7	=	111.11	(81)
Northwest 0.9x	0.77	X	3.9	8	x	9	97.38	X	0.63	x	0.7	=	118.45	(81)
Northwest 0.9x	0.77	X	3.9	98	x		91.1	X	0.63	x	0.7	=	110.81	(81)
Northwest 0.9x	0.77	X	3.9	8	x	7	72.63	X	0.63	x	0.7		88.34	(81)
Northwest _{0.9x}	0.77	X	3.9	8	X	5	50.42	x	0.63	x	0.7	=	61.33	(81)
Northwest _{0.9x}	0.77	X	3.9	98	X	2	28.07	x	0.63	x	0.7		34.14	(81)
Northwest 0.9x	0.77	X	3.9	98	x		14.2	X	0.63	x	0.7	=	17.27	(81)
Northwest _{0.9x}	0.77	X	3.9	8	X	,	9.21	x	0.63	x	0.7	=	11.21	(81)
Solar gains in								Ϋ́	n = Sum(74)m	 			1	(00)
(83)m= 121.22	211.05	300.87	393.09	458.82		63.65	443.61	393	.33 332.61	236.5	2 146.03	103.2]	(83)
Total gains – i					`			1 000	44 040.05	T 504.0	0 450 04	100.05	1	(0.4)
(84)m= 456.64	544.75	624.5	700.57	750.15	<u>L</u>	'39.2	708.77	663	.41 610.85	531.0	8 459.34	430.35	J	(84)
7. Mean inte	rnal tempe	erature	(heating	seasor	า)									_
Temperature	during he	eating p	eriods ir	the liv	ing	area	from Tal	ble 9	, Th1 (°C)				21	(85)
Utilisation fac	 				n (s	ee Ta	ible 9a)						1	
Jan	Feb	Mar	Apr	May	_	Jun	Jul	 	ug Sep	Oc	+	Dec	_	
(86)m= 0.97	0.93	0.85	0.71	0.54		0.37	0.27	0.	3 0.49	0.77	0.93	0.97]	(86)
Mean interna	al tempera	ture in I	iving are	ea T1 (f	ollo	w ste	ps 3 to 7	7 in T	able 9c)				-	
(87)m= 20.24	20.47	20.71	20.91	20.98		21	21	2	1 20.99	20.88	20.55	20.2		(87)
Temperature	during he	eating p	eriods ir	rest of	dw	elling	from Ta	able 9	9, Th2 (°C)					
(88)m= 20.21	20.21	20.22	20.23	20.23	2	20.25	20.25	20.	25 20.24	20.23	3 20.23	20.22		(88)
Utilisation fac	ctor for ga	ins for r	est of d	welling,	h2	,m (se	ee Table	9a)						
(89)m= 0.96	0.92	0.83	0.67	0.49		0.33	0.22	0.2	25 0.43	0.73	0.92	0.97		(89)
Mean interna	al tempera	ature in t	the rest	of dwel	ling	T2 (f	ollow ste	eps 3	to 7 in Tab	ole 9c)			_	
(90)m= 19.21	19.53	19.86	20.13	20.21	Ť	20.24	20.25	20.	T T	20.1	19.66	19.17]	(90)
					-				<u>.</u>	fLA = Li	ving area ÷ (4) =	0.45	(91)
Mean interna	al temnera	nture (fo	r the wh	റില പ്യം	ماالد	a) – f	I Δ ∨ Τ1	+ (1	_ fl Δ\ ∨ Τα)				
(92)m= 19.68	19.95	20.25	20.48	20.56	$\overline{}$	9) – 1 20.58	20.59	20.	- 1	20.46	20.06	19.63	1	(92)
Apply adjusti								l					J	. ,
117 22,000		··		F				-,						

(00) = 40.00	10.05	00.05	00.40	00.50	00.50	00.50	00.50	00.57	00.40	00.00	40.00	Ī	(93)
(93)m= 19.68 8. Space hea	19.95	20.25	20.48	20.56	20.58	20.59	20.59	20.57	20.46	20.06	19.63		(93)
Set Ti to the				re obtair	ned at ste	ep 11 of	Table 9	o, so tha	t Ti.m=(76)m an	d re-calc	culate	
the utilisation			•						, (•	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac		i e	i			i	i			i	i	ı	
(94)m= 0.96	0.91	0.83	0.68	0.51	0.35	0.24	0.27	0.46	0.74	0.91	0.96		(94)
Useful gains	1	· `	r `	·	057.00	470.44	400.05	070.04	004.00	400.40	44.4.70	1	(OE)
(95)m= 436.32	496.94	519.33	479.81	383.83	257.86	172.14	180.05	279.24	394.63	420.13	414.76		(95)
Monthly aver (96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rat	l									1	7.2		(00)
(97)m= 699.49	682.13	620.42	512.39	390.52	258.56	172.22	180.19	282.03	434.44	575.85	691.24		(97)
Space heating	ıa require	l	r each n		l	th = 0.02	24 x [(97	L)m – (95	l)m] x (4	1)m			
(98)m= 195.8	124.45	75.21	23.46	4.97	0	0	0	0	29.62	112.12	205.7		
		!	!			Į.	Tota	l per year	(kWh/yea	·) = Sum(9	8) _{15,912} =	771.33	(98)
Space heating	g require	ement in	kWh/m²	/year								14.43	(99)
9b. Energy re	quiremer	nts – Coi	mmunity	heating	scheme								
This part is us	ed for sp	ace hea	iting, spa	ace cool	ing or wa	ater heat				unity sch	neme.		_
Fraction of spa	ace heat	from se	condary,	/supplen	nentary l	neating (Table 1	1) '0' if n	one			0	(301)
Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The community s									up to four	other heat	sources; t	he latter	
includes boilers, I Fraction of he		-			rom powei	r stations.	See Appei	ndix C.				1	(303a)
Fraction of tot	al space	heat fro	m Comn	nunity be	oilers				(3	02) x (303	a) =	1	(304a)
Factor for con	trol and	charging	method	(Table	4c(3)) fo	r commu	unity hea	iting sys	tem			1	(305)
Distribution lo	ss factor	(Table 1	12c) for o	commun	ity heatii	ng syste	m					1.05	(306)
Space heatin	g										'	kWh/yea	 r
Annual space	_	requiren	nent									771.33	
Space heat fro	om Comi	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	=	809.9	(307a)
Efficiency of s	econdar	y/supple	mentary	heating	system	in % (frc	m Table	4a or A	ppendix	E)		0	(308
Space heating	require	ment fro	m secon	dary/su _l	oplemen	tary syst	tem	(98) x (30	01) x 100 ·	÷ (308) =		0	(309)
Water heating	a												
Annual water	-	equirem	ent									1858.62	
If DHW from o		•											
Water heat fro		•						(64) x (30	03a) x (30	5) x (306) :	=	1951.55	(310a)
Electricity use	d for hea	at distribu	ution				0.01	× [(307a).	(307e) +	· (310a)([310e)] =	27.61	(313)
Cooling Syste	m Energ	y Efficie	ncy Rati	0								0	(314)
Space cooling	(if there	is a fixe	d coolin	g systen	n, if not e	enter 0)		= (107) ÷	(314) =			0	(315)
Electricity for p											ĺ		7,000
mechanical ve	enulation	- palanc	eu, extr	act or po	silive in	put from	outside					113.73	(330a)

warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	b) + (330g) =		113.73	(331)
Energy for lighting (calculated in Apper	ndix L)				245.94	(332)
Total delivered energy for all uses (307	7) + (309) + (310) + (31	2) + (315) + (331) + (33	32)(237b) =	Ī	3121.11	(338)
12b. CO2 Emissions – Community hea	ting scheme					
		Energy kWh/year	Emission factor kg CO2/kWh		missions g CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)		P) sing two fuels repeat (363) to	(366) for the second	fuel	96	(367a)
CO2 associated with heat source 1	[(307b	o)+(310b)] x 100 ÷ (367b) x	0.22	=	621.32	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	14.33	(372)
Total CO2 associated with community	systems	(363)(366) + (368)(372	2)	=	635.66	(373)
CO2 associated with space heating (se	econdary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =			635.66	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	=	59.02	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	127.64	(379)
Total CO2, kg/year	sum of (376)(382) =				822.32	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				15.38	(384)

El rating (section 14)

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 06 December 2021 at 10:54:35*

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 72.62m²Site Reference:Highgate Road - GREENPlot Reference:03 - C

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 18.46 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 15.74 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 52.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 42.5 kWh/m²

OK
2 Fabric U-values

Element Average Highest

External wall 0.18 (max. 0.30) 0.18 (max. 0.70) **OK**Party wall 0.00 (max. 0.20) - **OK**

Floor (no floor) Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	12.71m²	
Windows facing: North West	3.46m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		User_[Details:						
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa					0010943 on: 1.0.5.50	
		Property	Address	: 03 - C					
Address: 1. Overall dwelling dime	ancione:								
1. Overall dwelling dime	511310113.	Are	a(m²)		Av. He	ight(m))	Volume(m ³	3)
Ground floor				(1a) x		2.65	(2a) =	192.44	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	72.62] [(4)			_		
Dwelling volume		´ L		J)+(3c)+(3c	d)+(3e)+	(3n) =	192.44	(5)
								192.44	
2. Ventilation rate:	main seconda		other		total			m³ per hou	ır
Number of chimneys	heating heating	- + F	0	7 = [0	x	40 =	0	(6a)
Number of open flues		╣ + ├	0	」	0	$=\mid$,	20 =	0	(6b)
Number of intermittent fa				J			10 =		= ``
				Ļ	0		10 =	0	(7a)
Number of passive vents				Ļ	0			0	(7b)
Number of flueless gas f	ires			L	0	×	40 =	0	(7c)
							Air ch	nanges per ho	our
Infiltration due to chimne	ys, flues and fans = $(6a)+(6b)+$	(7a)+(7b)+	(7c) =	Г	0		÷ (5) =	0	(8)
	peen carried out or is intended, proce			continue fi	-	(16)	- (-)		(-/
Number of storeys in t	he dwelling (ns)							0	(9)
Additional infiltration	05 (20 24 24 24 24 24 24 24 24 24 24 24 24 24	. 0.05 (-				[(9))-1]x0.1 =	0	(10)
	.25 for steel or timber frame or resent, use the value corresponding			•	ruction			0	(11)
deducting areas of openi	ngs); if equal user 0.35								
•	floor, enter 0.2 (unsealed) or	0.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	2 x (14) ÷ 1	100] =			0	(14)
Infiltration rate					- 12) + (13) ·	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cubic metr	es per h	our per s	quare m	etre of e	envelop	e area	3	(17)
If based on air permeabi	lity value, then $(18) = [(17) \div 20] +$	(8), otherw	vise (18) =	(16)				0.15	(18)
	es if a pressurisation test has been do	one or a de	gree air pe	ermeability	is being u	sed			
Number of sides shelters Shelter factor	ed		(20) = 1 -	[0.075 x (19)] =			0	(19) (20)
Infiltration rate incorpora	ting shelter factor		(21) = (18	3) x (20) =	<i>,</i> -			0.15	(21)
Infiltration rate modified f	•							0.10	` ′
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind sp	peed from Table 7						•	•	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7]	
Wind Factor (22a) == (2	2)m · 4								
Wind Factor $(22a)m = (2(22a)m = 1.27 1.25)$	2)m ÷ 4 1.23	0.95	0.92	1	1.08	1.12	1.18]	
(220)1117 1.21 1.20	1.20 1.11 1.00 0.90	1 0.00	1 0.02	<u> </u>	1	1.12	10	J	

Adjusted infiltr	ation rat	e (allowi	ng for sh	elter an	d wind s	peed) =	(21a) x	(22a)m	_	_			
0.19 Calculate effe	0.19	0.18	0.16	0.16 he appli	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
If mechanica		•	ale for t	пе арри	cable ca	30						0.5	(23
If exhaust air h	eat pump	using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	wise (23b) = (23a)			0.5	(23
If balanced with	n heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				74.8	(23)
a) If balance	ed mech	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	m = (22)	2b)m + (23b) × [1 – (23c)	÷ 100]	_
(24a)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(24
b) If balance	ed mech	anical ve	ntilation	without	heat red	covery (N	ЛV) (24b)m = (22	2b)m + (23b)		_	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)r		tract ver (23b), t		-					.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)r		on or wh en (24d)							0.5]			1	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	iter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)		•		•	
(25)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(25
3. Heat losse	s and he	eat loss r	paramete	er:									
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/		k-value kJ/m²-l		
Windows Type		(111)		l	12.71				16.85		NO/III I	(10)	(27
Windows Type					3.46	_	/[1/(1.4)+	Ļ	4.59	\dashv			(27
Walls Type1	72.6	2	16.1	7	56.45	=	0.18	= [10.16	╡┌	60	3387	(29)
Walls Type1	17.7		0			=			2.99	륵 ¦		1066.8	= '
Total area of e					17.78	3 ×	0.17	[2.99	[60		(31)
Party wall	, ioi i ioi i io	,			90.4						AF	1264.4	`
Party floor					30.32	=	0	[0	L	45	1364.4	=
Party ceiling					72.62	=				L	40	2904.8	=
Internal wall **					72.62	=				Ĺ	30	2178.6	= `
internal wall * for windows and		014/0 1100 0	effootivo wi	ndow II v	146.1		formula 1	/[/1/ L.volu	(0) (0 (04) (l So givon in	9 norograph	1315.53	3 (32
** include the area						ateu using	i ioiiiiuia i	/[(1/ O- valu	1 0)+0.04] a	is giveri iii	i parayrapri	1 3.2	
Fabric heat los	ss, W/K :	= S (A x	U)				(26)(30)	+ (32) =				34.58	(33
Heat capacity	Cm = S	(Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	12217.13	(34)
Thermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			= (34)	÷ (4) =			168.23	(35)
For design assess can be used inste				construct	ion are no	t known pr	ecisely the	indicative	values of	TMP in T	able 1f		_
Thermal bridge	es : S (L	x Y) cal	culated ı	using Ap	pendix I	<						7.11	(36
if details of therma		are not kn	own (36) =	= 0.05 x (3	1)			(22)	(20)				¬,
Total fabric he		alouloto -	l manthi	,					(36) =	(25)m + (F)	\	41.69	(37
Ventilation hea	Feb				lun	Jul	۸۰۰۰		= 0.33 × (l	1	1	
(38)m= 20.15	19.91	Mar 19.67	Apr 18.48	May 18.24	Jun 17.05	Jui 17.05	Aug 16.81	Sep 17.53	Oct 18.24	Nov 18.72	Dec 19.19		(38
(VV) - LULIO	1 .5.91	10.07	10.40	10.24	17.00	. 7.00	10.01	17.00	10.24	10.72	13.13	1	,50
								/ 	(6-)	0.0)			
Heat transfer (39)m= 61.84	coefficier	nt, W/K 61.36	60.17	59.93	58.74	58.74	58.51	(39)m 59.22	= (37) + (38)m 60.41	60.89	1	

eat loss pa	rameter (HLP), W	m²K			1	1	(40)m	= (39)m ÷	· (4)			
0.85 O.85	0.85	0.84	0.83	0.83	0.81	0.81	0.81	0.82	0.83	0.83	0.84		_
umber of d	ave in mo	onth (Tah	le 1a)						Average =	Sum(40) ₁	12 /12=	0.83	(4
Jar	<u> </u>	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
)m= 31	28	31	30	31	30	31	31	30	31	30	31		(4
<u> </u>		1											
. Water he	ating ene	rgy requi	irement:								kWh/yea	ar:	
sumed oc	cupancy	N									04		()
if TFA > 1	3.9, N = 1		[1 - exp	(-0.0003	349 x (TF	A -13.9)2)] + 0.0	0013 x (TFA -13		31		(4
if TFA £ 13 inual aver	•	ator usar	na in litra	s nar da	v Vd av	orano –	(25 v NI)	± 36			.00		(4
duce the anı	nual average	hot water	usage by	5% if the a	welling is	designed t			se target o		0.02		(-
t more that 1.	25 litres per	person per	day (all w	ater use, l	not and co	ld)			,				
Jar		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
t water usag						1	· <i>'</i>			•			
)m= 97.92	94.36	90.8	87.24	83.67	80.11	80.11	83.67	87.24	90.8	94.36	97.92		— ,
ergy content	of hot water	r used - cal	culated mo	onthly = 4 .	190 x Vd,r	n x nm x D)Tm / 3600			m(44) ₁₁₂		1068.18	(4
)m= 145.2		131.05	114.25	109.63	94.6	87.66	100.59	101.8	118.63	129.5	140.63		
, 1.0.2	. 1	101.00	111.20	100.00	0 1.0	07.00	100.00		<u> </u>	m(45) ₁₁₂ =	<u> </u>	1400.56	(4
nstantaneous	s water heat	ing at point	of use (no	hot water	storage),	enter 0 in	boxes (46			(10)112	L		`
)m= 21.78	19.05	19.66	17.14	16.44	14.19	13.15	15.09	15.27	17.8	19.42	21.09		(4
ater storaç													
orage volu	•	•	•			_		ame ves	sel		0		(4
community herwise if	•			-			' '	ora) ant	or 'O' in <i>(</i>	17 \			
ater storaç		not wate	וו פוווט) ול	iciuues i	IIStaiitai	ieous co	ווטט וטוווי	ers) erik	ei U iii (47)			
If manufa		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(4
mperature	factor fro	om Table	2b								0		(4
ergy lost f	rom wate	r storage	, kWh/ye	ear			(48) x (49)) =		1	10		(5
If manufa			-										
ot water st	•			e 2 (kW	h/litre/da	ıy)				0.	02		(5
community Jume facto	_		011 4.3							1	03		(!
mperature			2b								.6		(!
ergy lost f	rom wate	r storage	. kWh/ve	ear			(47) x (51)) x (52) x ((53) =		.03		(!
nter (50) o		_	,								.03		(5
ater storaç	ge loss ca	lculated t	for each	month			((56)m = ((55) × (41)	m				
)m= 32.0°	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(5
ylinder conta		ed solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendix	Н	
7)m= 32.0°	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(5
mary circ	uit loss (a	nnual) fro	m Table	. 3				•	•		0		(!
mary circ	•	•			59)m = ((58) ÷ 36	65 × (41)	ım					,
modified				,		. ,	, ,		r thermo	stat)			

Combi loss calculate	d for each	month (′61)m =	(60) ÷ 3	65 × (41)m							
(61)m= 0 0	0	0	0	0	0	0		0	0	0	0	1	(61)
Total heat required for	r water he	eating ca	L	L I for eac	h month	(62)r	—— n =	0.85 × (45)m +	. (46)m +	(57)m +	ı · (59)m + (61)m	
(62)m= 200.48 176.93		167.75	164.91	148.1	142.94	155.	_	155.29	173.91	182.99	195.9]	(62)
Solar DHW input calculate	d using App	endix G oı	· Appendix	: H (negati	ve quantity	/) (ente	er '0'	if no sola	r contribu	tion to wate	er heating)		
(add additional lines											-		
(63)m= 0 0	0	0	0	0	0	0		0	0	0	0]	(63)
Output from water he	ater				•	•				•	•	•	
(64)m= 200.48 176.93	186.33	167.75	164.91	148.1	142.94	155.	.87	155.29	173.91	182.99	195.9	1	
			•	•	•		Outp	ut from wa	ater heate	er (annual)	112	2051.4	(64)
Heat gains from water	r heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (6	1)m	ı] + 0.8 x	(46)m	n + (57)m	+ (59)m	١]	
(65)m= 92.5 82.17	87.8	80.78	80.67	74.25	73.37	77.6	67	76.64	83.67	85.85	90.98]	(65)
include (57)m in ca	lculation	of (65)m	only if c	ylinder i	s in the	dwelli	ing (or hot w	ater is f	from com	munity h	neating	
5. Internal gains (se	e Table 5	and 5a):										
Metabolic gains (Tab	le 5), Wat	ts											
Jan Feb		Apr	May	Jun	Jul	Αι	Jg	Sep	Oct	Nov	Dec]	
(66)m= 115.4 115.4	115.4	115.4	115.4	115.4	115.4	115	.4	115.4	115.4	115.4	115.4	1	(66)
Lighting gains (calcul	ated in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso s	ee 7	Table 5			-	-	
(67)m= 18.13 16.1	13.09	9.91	7.41	6.26	6.76	8.7	9	11.79	14.97	17.48	18.63]	(67)
Appliances gains (ca	culated in	Append	dix L, eq	uation L	13 or L1	3a), a	also	see Tal	ole 5	-	•	•	
(68)m= 203.33 205.44	200.13	188.81	174.52	161.09	152.12	150.	.01	155.32	166.64	180.93	194.36]	(68)
Cooking gains (calcu	ated in A	opendix	L, equat	ion L15	or L15a), also	o se	e Table	5	•	•	•	
(69)m= 34.54 34.54	34.54	34.54	34.54	34.54	34.54	34.5	54	34.54	34.54	34.54	34.54]	(69)
Pumps and fans gair	s (Table 5	āa)			•	•	•			•	•	•	
(70)m= 0 0	0	0	0	0	0	0		0	0	0	0]	(70)
Losses e.g. evaporat	ion (negat	ive valu	es) (Tab	le 5)	-					-	-	-	
(71)m= -92.32 -92.32	-92.32	-92.32	-92.32	-92.32	-92.32	-92.	32	-92.32	-92.32	-92.32	-92.32]	(71)
Water heating gains	Table 5)				•		•			•		•	
(72)m= 124.33 122.28	118.01	112.2	108.43	103.13	98.61	104.	.39	106.45	112.46	119.24	122.28]	(72)
Total internal gains	=			(66))m + (67)m	ı + (68)m +	- (69)m + (70)m + (71)m + (72))m	•	
(73)m= 403.41 401.44	388.85	368.54	347.98	328.09	315.11	320.	.81	331.19	351.69	375.27	392.9]	(73)
6. Solar gains:													
Solar gains are calculate	•	r flux from	Table 6a		•	itions t	0 CO	nvert to th	e applica		tion.		
Orientation: Access Table 6		Area m²		Flu	ıx ble 6a		т.	g_ able 6b	-	FF Table 6c		Gains (W)	
						1 1	1 (_ '				1
Northeast 0.9x 0.7	7 ×	12.	71	X	11.28	X		0.63	_ ×	0.7	=	43.83	(75)
Northeast 0.9x 0.7		12.			22.97	X		0.63	x	0.7	=	89.21	(75)
Northeast 0.9x 0.7		12.		-	41.38	X		0.63	x	0.7	=	160.73	(75)
Northeast 0.9x 0.7		12.	71	-	67.96	X		0.63	x [0.7	=	263.96	(75)
Northeast 0.9x 0.7	7 ×	12.	71	x (91.35	x		0.63	X	0.7	=	354.82	(75)

Naw46		_						1		_				– ,,
Northeast _{0.9x}	0.77	×	12.	71	X	9	7.38	X	0.63	×	0.7	=	378.27	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	(91.1	X	0.63	X	0.7	_ =	353.87	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	7	2.63	X	0.63	X	0.7	=	282.11	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	5	0.42	X	0.63	X	0.7	=	195.85	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	2	8.07	X	0.63	X	0.7	=	109.02	(75)
Northeast _{0.9x}	0.77	X	12.	71	X		14.2	X	0.63	X	0.7	_	55.15	(75)
Northeast 0.9x	0.77	X	12.	71	X	(9.21	X	0.63	X	0.7	=	35.79	(75)
Northwest _{0.9x}	0.77	X	3.4	16	X	1	1.28	X	0.63	X	0.7	=	11.93	(81)
Northwest _{0.9x}	0.77	X	3.4	16	X	2	2.97	X	0.63	X	0.7	=	24.29	(81)
Northwest 0.9x	0.77	X	3.4	16	x	4	1.38	x	0.63	x	0.7		43.75	(81)
Northwest _{0.9x}	0.77	X	3.4	16	x	6	7.96	x	0.63	х	0.7	=	71.86	(81)
Northwest _{0.9x}	0.77	x	3.4	16	x	9	1.35	x	0.63	x	0.7	_	96.59	(81)
Northwest _{0.9x}	0.77	x	3.4	16	x	9	7.38	х	0.63	x	0.7		102.98	(81)
Northwest _{0.9x}	0.77	x	3.4	16	x	Ç	91.1	х	0.63	x	0.7		96.33	(81)
Northwest _{0.9x}	0.77	x	3.4	16	x	7	2.63	х	0.63	x	0.7	_	76.8	(81)
Northwest _{0.9x}	0.77	×	3.4	16	x	5	0.42	x	0.63	×	0.7		53.32	(81)
Northwest 0.9x	0.77	×	3.4	16	X	2	8.07	X	0.63	×	0.7	=	29.68	(81)
Northwest 0.9x	0.77	×	3.4	16	X		14.2	X	0.63	×	0.7		15.01	(81)
Northwest 0.9x	0.77	×	3.4	16	x	(9.21	X	0.63	×	0.7		9.74	(81)
_								,						
Solar gains in	watts, calc	ulated	for eacl	h month	1			(83)m	n = Sum(74)m .	(82)m				
(83)m= 55.76		04.48	335.82	451.41	_	31.25	450.2	358		138.7	70.16	45.53		(83)
Total gains – i	nternal and	solar	(84)m =	= (73)m	+ (8	33)m	, watts				!	Į.	ı	
(84)m= 459.17	514.94 5	93.33	704.36	799.39	80	9.34	765.31	679	.71 580.35	490.4	445.43	438.43		(84)
7. Mean inter	nal temper	ature (heating	seasor	n)									
Temperature						area 1	from Tal	ole 9.	Th1 (°C)				21	(85)
Utilisation fac	•	• .			_				, ,					``
Jan	Feb	Mar	Apr	May	Ť	Jun	Jul	Α	ug Sep	Oct	Nov	Dec		
(86)m= 0.99		0.94	0.84	0.65	+	0.46	0.34	0.3		0.91	0.98	0.99		(86)
Mean interna	l tomporati	ıro in l	ivina or	00 T1 /f	مااه	w cto	nc 2 to 7	Tin T	able (le)	<u>!</u>	-1	<u> </u>		
(87)m= 19.91	r - r	20.38	20.74	20.93	1	0.99	21	2		20.66	20.23	19.89		(87)
` '		0.00	20.1	<u> </u>					20.00	20.00	20.20	10.00		(=: /
Tomporofuro														
· -		 			_		1	1	9, Th2 (°C)		T 00 00	00.00	1	(00)
(88)m= 20.21		ting po 20.21	eriods ir 20.23	20.23	_	elling 0.25	from Ta	20.		20.23	20.23	20.22		(88)
· -	20.21 2	20.21	20.23	20.23	2	0.25	20.25	20.		20.23	20.23	20.22		(88)
(88)m= 20.21	20.21 2	20.21	20.23	20.23	h2,	0.25	20.25	20.	25 20.24	20.23	20.23	0.99]]	(88)
(88)m= 20.21 Utilisation fac	20.21 2 etor for gain	20.21 ns for r	20.23 est of d	20.23 welling, 0.61	h2,	0.25 m (se	20.25 ee Table 0.28	20. 9a)	25 20.24	0.89				
(88)m= 20.21 Utilisation fac (89)m= 0.98	20.21 2 etor for gain 0.97 (20.21 ns for r	20.23 est of d	20.23 welling, 0.61	h2,	0.25 m (se	20.25 ee Table 0.28	20. 9a)	25 20.24 33 0.6 to 7 in Tabl	0.89	0.97			
Utilisation factors (89)m= 0.98 Mean internal	20.21 2 etor for gain 0.97 (20.21 ns for r 0.93 ure in t	20.23 est of double 0.81 he rest	20.23 welling, 0.61 of dwel	h2,	0.25 m (se).41 T2 (fe	20.25 ee Table 0.28 ollow ste	9a) 0.3	25 20.24 33 0.6 to 7 in Table 25 20.2	0.89 le 9c)	0.97	0.99	0.38	(89)
(88)m= 20.21 Utilisation factors (89)m= 0.98 Mean internation (90)m= 18.74	20.21 2 etor for gain 0.97 0 I temperatu 18.99 1	20.21 as for r 0.93 ure in t	20.23 est of do 0.81 he rest 19.93	20.23 welling, 0.61 of dwel 20.17	1 2 h2, ding 2	0.25 m (se).41 T2 (fo 0.24	20.25 ee Table 0.28 ollow ste 20.24	9a) 0.3 eps 3 20.	25 20.24 33 0.6 to 7 in Tabl 25 20.2	0.89 le 9c) 19.84 fLA = Liv	0.97	0.99	0.38	(89)
Utilisation factors (89)m= 0.98 Mean internation (90)m= 18.74	20.21 2 ctor for gain 0.97 0 I temperatu 18.99 1	20.21 as for r 0.93 ure in t	20.23 est of do 0.81 he rest 19.93	20.23 welling, 0.61 of dwel 20.17	h2, ling 2	0.25 m (se).41 T2 (fo 0.24	20.25 ee Table 0.28 ollow ste 20.24	9a) 0.3 eps 3 20.	25 20.24 33 0.6 to 7 in Table 25 20.2 - fLA) × T2	0.89 le 9c) 19.84 fLA = Liv	0.97 19.23 ving area ÷ (4	0.99	0.38	(89)
(88)m= 20.21 Utilisation factors (89)m= 0.98 Mean internation (90)m= 18.74	20.21 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	20.21 ns for r 0.93 ure in t 19.42 ure (for	20.23 est of do 0.81 he rest 19.93 r the wh 20.24	20.23 welling, 0.61 of dwel 20.17 ole dwe 20.46	h2, ling 2 elling 2	0.25 m (see).41 T2 (fe 0.24 g) = fl 0.53	20.25 ee Table 0.28 collow ste 20.24 _A × T1 20.53	20. 9a) 0.3 eps 3 20. + (1	25 20.24 33 0.6 to 7 in Table 25 20.2 	0.89 le 9c) 19.84 fLA = Liv 20.15	0.97 19.23 ving area ÷ (-	0.99 18.72 4) =	0.38	(89) (90) (91)

			1			1							
(93)m= 19.19	19.41	19.79	20.24	20.46	20.53	20.53	20.54	20.49	20.15	19.61	19.17		(93)
8. Space hea						44 4	Table O	41	4 T: /	70)	-ll-		
Set Ti to the return the utilisation			•		ied at ste	ер 11 от	i abie 9i	o, so tna	t 11,m=(76)m an	a re-caic	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm):										
(94)m= 0.98	0.97	0.93	0.81	0.62	0.43	0.3	0.35	0.62	0.88	0.96	0.98		(94)
Useful gains,	hmGm	, W = (9	4)m x (8	4)m									
(95)m= 449.99	497.58	549.78	572.64	498.55	344.88	230.65	240.9	360.02	433.61	429.81	431.1		(95)
Monthly average	_	T T		from T									
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate		1			i	-``	· · ·	``					(07)
(97)m= 920.89	893.8	815.46	682.31	525.12	348.22	231.14	241.92	378.27	572.65	755.98	911.39		(97)
Space heatin (98)m= 350.35	g require 266.26	197.66	r each n 78.97	19.77	/Vh/moni	I	24 x [(97])m – (95 0)m] x (4 103.45	1)m 234.84	357.33		
(98)m= 350.35	200.20	197.00	76.97	19.77		0					<u> </u>	4000.00	7(00)
							rota	ı per year	(Kvvn/yeai	r) = Sum(9	8)15,912 =	1608.62	(98)
Space heatin	g requir	ement in	kWh/m²	/year								22.15	(99)
9b. Energy red	•		The state of the s	Ĭ									
This part is use Fraction of spa										unity sch	neme.	0	(301)
Fraction of spa			•		-	_	(Table T	1) 0 11 11	OHO		[[1	(302)
·			•	•	,	,	allows for	CUD and	un to forus	other boot			(302)
The community so includes boilers, h		-							up to rour	otner neat	sources; tr	іе ιαπег	
Fraction of hea		-										1	(303a)
Fraction of total	al space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor for cont	rol and	charging	method	(Table	4c(3)) fo	r commu	unity hea	ating sys	tem		Ī	1	(305)
Distribution los	s factor	(Table 1	2c) for c	commun	ity heatii	ng syste	m				ĺ	1.05	(306)
Space heating	a										L	kWh/yea	' r
Annual space	-	requiren	nent									1608.62	
Space heat fro	m Com	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	= [1689.05	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308
Space heating	require	ment fro	m secon	dary/su _l	oplemen	tary syst	tem	(98) x (30	01) x 100 ·	÷ (308) =		0	(309)
Water heating											L		_
Annual water h		requirem	ent									2051.4	
If DHW from co											<u>.</u>		_
Water heat fro	m Comr	nunity bo	oilers					(64) x (30	03a) x (30	5) x (306) :	=	2153.97	(310a)
Electricity used	d for hea	at distrib	ution				0.01	× [(307a).	(307e) +	· (310a)([310e)] =	38.43	(313)
Cooling Syster	m Energ	y Efficie	ncy Rati	0								0	(314)
Space cooling	(if there	is a fixe	d coolin	g systen	n, if not e	enter 0)		= (107) ÷	(314) =			0	(315)
Electricity for p													_
mechanical ve	ntilation	- balanc	ed, extra	act or po	sitive in	put from	outside					177.49	(330a)

						_
warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330	b) + (330g) =		177.49	(331)
Energy for lighting (calculated in Appen	dix L)				320.14	(332)
Total delivered energy for all uses (307)	+ (309) + (310) + (313	2) + (315) + (331) + (33	32)(237b) =		4340.66	(338)
12b. CO2 Emissions – Community heat	ing scheme					
		Energy kWh/year	Emission fac		missions g CO2/year	
CO2 from other sources of space and w Efficiency of heat source 1 (%)	•) ing two fuels repeat (363) to	(366) for the secon	d fuel	96	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.22	=	864.68	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	19.95	(372)
Total CO2 associated with community s	ystems	(363)(366) + (368)(372	2)	=	884.62	(373)
CO2 associated with space heating (see	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immers	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and w	ater heating	(373) + (374) + (375) =			884.62	(376)
CO2 associated with electricity for pump	os and fans within dwe	elling (331)) x	0.52	=	92.12	(378)
CO2 associated with electricity for lighti	ng	(332))) x	0.52	=	166.15	(379)
Total CO2, kg/year	sum of (376)(382) =				1142.9	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				15.74	(384)

El rating (section 14)

(385)

86.98

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Project Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 53.96m²Site Reference:Highgate Road - GREENPlot Reference: 03 - D

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER)

19.25 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 16.23 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 48.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 39.2 kWh/m²

OK
2 Fabric U-values

Element Average Highest

External wall 0.17 (max. 0.30) 0.18 (max. 0.70) OK
Party wall 0.00 (max. 0.20) - OK

Floor (no floor) Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
	400.00/	
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	ОК
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	ОК
Based on:	Wedidiff	OK
	Avorago or unknown	
Overshading:	Average or unknown 12.07m²	
Windows facing: North East	· <u>-</u> ·•··	
Ventilation rate:	4.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		User D	Details:						
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa	are Ve				010943 on: 1.0.5.50	
Address :	F	Property	Address	03 - D					
Overall dwelling dime	ensions:								
		Are	a(m²)		Av. He	ight(m)	_	Volume(m ³	3)
Ground floor			53.96	(1a) x	2	.65	(2a) =	142.99	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	n) [53.96	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	142.99	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	+	0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	+ [0] = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ns			Ī	0	x	10 =	0	(7a)
Number of passive vents	;			Ī	0	x -	10 =	0	(7b)
Number of flueless gas fi	res			Ė	0	x 4	40 =	0	(7c)
				_					
							Air ch	nanges per ho	our
•	ys, flues and fans = $(6a)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6a)+(6b)+(6b)+(6a)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b$			[0		÷ (5) =	0	(8)
Number of storeys in the	een carried out or is intended, procee he dwelling (ns)	ea to (17),	otnerwise (continue tr	om (9) to	(16)		0	(9)
Additional infiltration	a					[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame o	r 0.35 fo	r masoni	y constr	uction			0	(11)
if both types of wall are po deducting areas of openir	resent, use the value corresponding t	o the grea	ter wall are	a (after					
•	floor, enter 0.2 (unsealed) or 0).1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0							0	(13)
Percentage of windows	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	. ,	_			0	(15)
Infiltration rate	50		(8) + (10)					0	(16)
•	q50, expressed in cubic metro lity value, then $(18) = [(17) \div 20] + (18)$	•		•	etre of e	envelope	area	3	(17)
· ·	es if a pressurisation test has been do				is being u	sed		0.15	(18)
Number of sides sheltere	ed							0	(19)
Shelter factor			(20) = 1 -		19)] =			1	(20)
Infiltration rate incorporat	•		(21) = (18) x (20) =				0.15	(21)
Infiltration rate modified for	- 1 	1	Ι,		<u> </u>	<u> </u>		1	
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp (22)m= 5.1 5	peed from Table 7 4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7	1	
(22)m= 5.1 5	7.0 4.7 4.3 3.0	1 3.0	J 3.1	4	4.3	<u> </u>	L 4./	J	
Wind Factor (22a)m = (22	2)m ÷ 4								
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Aujusteu IIIIIII	ation rate	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.19 Calculate effect	0.19 Ctive air	0.18 Change i	0.16 rate for t	0.16 he appli	0.14 cable ca	0.14 SE	0.14	0.15	0.16	0.17	0.18		
If mechanica		_										0.5	(23a
If exhaust air he	eat pump (using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			0.5	(23k
If balanced with	heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				75.65	(230
a) If balance	d mecha	anical ve	ntilation	with he	at recove	ery (MVI	HR) (24a	m = (22)	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(248
b) If balance	d mecha	anical ve	ntilation	without	heat red	covery (N	ЛV) (24b	m = (22)	2b)m + (23b)	r	1	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)n				•					5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24
d) If natural if (22b)n					•				0.5]			•	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	iter (24a) or (24b	o) or (24	c) or (24	d) in box	(25)	-	-	-		
(25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25)
3. Heat losse	s and he	eat loss r	paramete	er:									
ELEMENT	Gros	·	Openin		Net Ar	ea	U-valı	re	AXU		k-value	e Al	Χk
	area	(m²)	m		A ,r		W/m2		(W/I		kJ/m²•		
Windows					12.07	χ1,	/[1/(1.4)+	0.04] =	16				(27)
Walls Type1	27.6	66	12.0	7	15.59) X	0.18	= [2.81		60	935.4	(29)
Walls Type2	24.2	24	0		24.24	, x	0.17	= [4.07		60	1454.4	(29)
Total area of e	lements	, m²			51.9								(31)
Party wall					31.67	, X	0	= [0		45	1425.1	5 (32)
Party floor					53.96	5					40	2158.4	(32
Party ceiling					53.96	5				Ī	30	1618.8	3 (32)
Internal wall **					95.03	3					9	855.27	(32)
* for windows and						ated using	ı formula 1	/[(1/U-valu	ie)+0.04] a	as given in	paragrapl	1 3.2	_
** include the area				ls and pari	titions		(26)(30)	ı ± (32) =					7(22)
Fabric heat los Heat capacity		•	U)				(20)(30)		.(30) + (32	2) + (225)	(220) -	22.88	(33)
Thermal mass	•	,) – Cm ·	TEA) ir	k I/m2k			***	$\div (4) =$	z) + (32a).	(326) =	8447.42	(34)
For design assess	•	•		•			ecisely the	` '	. ,	TMP in T	able 1f	156.55	(35)
can be used instead				constract	017 470 770	. rarowr pr	oolooly till	marodavo	values of		abio 11		
Thermal bridge	es : S (L	x Y) cal	culated (using Ap	pendix l	<						6.04	(36)
if details of therma		are not kn	own (36) =	= 0.05 x (3	1)			(0.0)	(2.5)				_
	at loss								(36) =			28.91	(37)
								(38)m	$= 0.33 \times ($	(25)m x (5)		
Ventilation hea									<u> </u>	N.I		1	
Ventilation hea	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(20)
(38)m= 14.77	Feb 14.59	Mar 14.42			Jun 12.47	Jul 12.47	Aug 12.29	Sep 12.82	13.35	13.71	Dec 14.06		(38)
Ventilation hea	Feb 14.59	Mar 14.42	Apr	May			Ť	Sep 12.82		13.71	 		(38)

Heat loss	s parar	meter (H	HLP), W/	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	0.81	0.81	0.8	0.79	0.78	0.77	0.77	0.76	0.77	0.78	0.79	0.8		
_										Average =	Sum(40) ₁	12 /12=	0.79	(40)
Number	of day		nth (Tab	le 1a)			·	ı	1					
	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. Wate	r heati	ng ene	gy requi	rement:								kWh/ye	ear:	
Assumed if TFA if TFA	> 13.9	, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		81		(42)
Annual a Reduce the not more th	e annua	l average	hot water	usage by	5% if the a	lwelling is	designed t	` ,		se target o		.11		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water ι					,			_	'	!				
(44)m= 8	84.82	81.74	78.65	75.57	72.49	69.4	69.4	72.49	75.57	78.65	81.74	84.82		
										Total = Su	m(44) ₁₁₂ =	=	925.35	(44)
Energy cor	ntent of I	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x D	Tm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 1	25.79	110.02	113.53	98.98	94.97	81.95	75.94	87.14	88.18	102.77	112.18	121.82		
If in atomton		ator booti	na ot noint	of upo (no	, hat water	, ataragal	antar O in	haves (46		Total = Su	m(45) ₁₁₂ =	-	1213.27	(45)
If instantan			· ·	,		, , , , , , , , , , , , , , , , , , ,	·	` '	. , ,	ı	ı	1		(10)
(46)m= 1 Water sto	18.87 Orage	16.5	17.03	14.85	14.25	12.29	11.39	13.07	13.23	15.42	16.83	18.27		(46)
Storage	_		includin	a anv so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If commu		` '					_							(/
Otherwis	-	_			-			' '	ers) ente	er '0' in ((47)			
Water sto	•													
a) If mar	nufactu	ırer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempera	iture fa	actor fro	m Table	2b								0		(49)
Energy lo			•					(48) x (49)) =		1	10		(50)
b) If marHot wate				-								02		(51)
If commu		-			C 2 (KVV)	ii/iiti C/GC	·y /				0.	02		(31)
Volume f	-	_									1.	03		(52)
Tempera	ture fa	actor fro	m Table	2b							0	.6		(53)
Energy lo	ost fror	m water	storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter (5	0) or (54) in (5	55)								1.	03		(55)
Water sto	orage l	loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m= 3	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder of	contains	dedicate	d solar sto	rage, (57)ı	n = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendi	хН	
(57)m= 3	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary o	circuit	loss (ar	nual) fro	m Table	. 3							0		(58)
Primary		`	,			59)m = ((58) ÷ 36	65 × (41)	m					` '
-					,		. ,	, ,	cylinde	r thermo	stat)			
(59)m= 2	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi loss calculated for each month $(61)m = (60) \div 365 \times (41)m$													
(61)m= 0	0	0	0	0 0	00) + 0	0 7 (41) o	0	0	0	0	1	(61)
		-										J · (59)m + (61)m	(- /
(62)m= 181.07	159.94	168.8	152.47	150.25	135.45		142.4		158.05	165.67	177.1	1	(62)
Solar DHW input c									ļ]	(- /
(add additional										morrio wan	or riodiirig)		
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(63)
Output from wa	ater heat	ter				1	·	I	!	-1	!	1	
(64)m= 181.07 159.94 168.8 152.47 150.25 135.45 131.22 142.42 141.68 158.05 165.67 177.1													
	'						C	Output from w	ater heat	er (annual)	112	1864.11	(64)
Heat gains fror	n water	heating,	kWh/m	onth 0.2	5 ´ [0.8	5 × (45)m	ı + (61)m] + 0.8	x [(46)m	n + (57)m	+ (59)m]	-
(65)m= 86.05	76.52	81.97	75.7	75.8	70.04	69.47	73.2	72.12	78.39	80.1	84.73]	(65)
include (57)r	n in calc	culation of	of (65)m	only if c	ylinder	is in the	dwellir	ng or hot w	ater is f	from com	munity h	neating	
5. Internal ga					•						•		
Metabolic gains	s (Table	5), Wat	ts										
Jan	Feb	Mar	Apr	May	Jun	Jul	Au	g Sep	Oct	Nov	Dec]	
(66)m= 90.34	90.34	90.34	90.34	90.34	90.34	90.34	90.3	4 90.34	90.34	90.34	90.34		(66)
Lighting gains	(calculat	ted in Ap	pendix	L, equat	ion L9	or L9a), a	lso se	e Table 5	-		-	•	
(67)m= 14.04	12.47	10.14	7.68	5.74	4.85	5.24	6.81	9.13	11.6	13.54	14.43]	(67)
Appliances gai	ns (calc	ulated in	Append	dix L, eq	uation I	_13 or L1	3a), a	lso see Ta	ble 5	-	_	•	
(68)m= 157.5	159.14	155.02	146.25	135.18	124.78	117.83	116.	2 120.31	129.08	140.15	150.55		(68)
Cooking gains	(calcula	ted in A	opendix	L, equat	ion L15	or L15a), also	see Table	5	•	-	•	
(69)m= 32.03	32.03	32.03	32.03	32.03	32.03	32.03	32.0	3 32.03	32.03	32.03	32.03		(69)
Pumps and far	ns gains	(Table 5	āa)					•				•	
(70)m= 0	0	0	0	0	0	0	0	0	0	0	0		(70)
Losses e.g. ev	aporatio	n (negat	ive valu	es) (Tab	le 5)	-		-	-	-	-	•	
(71)m= -72.27	-72.27	-72.27	-72.27	-72.27	-72.27	-72.27	-72.2	7 -72.27	-72.27	-72.27	-72.27		(71)
Water heating	gains (T	able 5)		-		-			-	-	-	•	
(72)m= 115.65	113.87	110.17	105.15	101.88	97.28	93.38	98.3	8 100.16	105.37	111.24	113.88		(72)
Total internal	gains =				(60	6)m + (67)m	n + (68)	m + (69)m +	(70)m + (71)m + (72))m	•	
(73)m= 337.3	335.58	325.44	309.18	292.9	277.01	266.54	271.4	9 279.71	296.15	315.03	328.97		(73)
6. Solar gains):												
Solar gains are c	alculated ı	using sola	r flux from	Table 6a	and asso	ciated equa	ations to	convert to the	ne applica	ble orienta	tion.		
Orientation: A		actor	Area			UX		g_ Table 6b	-	FF		Gains	
_	able 6d		m²		- 18	able 6a		Table 6b	_ '	Table 6c		(W)	_
Northeast _{0.9x}	0.77	X	12.	07	x	11.28	X	0.63	x	0.7	=	41.62	(75)
Northeast _{0.9x}	0.77	x	12.	07	х	22.97	X	0.63	x	0.7	=	84.72	(75)
Northeast _{0.9x}	0.77	X	12.	07	x	41.38	X	0.63	x	0.7	=	152.64	(75)
Northeast _{0.9x}	0.77	Х	12.	07	X	67.96	X	0.63	x	0.7	=	250.67	(75)
Northeast _{0.9x}	0.77	X	12.	07	X	91.35	X	0.63	x	0.7	=	336.95	(75)

Northeast _{0.9x}	0.77	X	12.	07	x	97.38	X		0.63	x	0.7	=	359.23	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	91.1	x		0.63	x	0.7	=	336.05	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	72.63	X		0.63	х	0.7	=	267.9	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	50.42	x		0.63	х	0.7	=	185.99	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	28.07	x		0.63	x	0.7	=	103.53	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	14.2	x		0.63	x	0.7		52.37	(75)
Northeast 0.9x	0.77	х	12.	07	x	9.21	x		0.63	x	0.7	=	33.99	(75)
•							_							
Solar gains in	watts, ca	alculated	I for eac	h month			(83)m	ı = Sı	um(74)m .	(82)m				
(83)m= 41.62	84.72	152.64	250.67	336.95	359.2	3 336.05	267	7.9	185.99	103.53	52.37	33.99		(83)
Total gains –	internal a	and solar	(84)m =	= (73)m	+ (83)	m , watts							•	
(84)m= 378.92	420.3	478.07	559.85	629.86	636.2	4 602.59	539	.39	465.7	399.68	367.4	362.95		(84)
7. Mean inte	rnal temp	perature	(heating	season)									
Temperature	during h	neating p	eriods ir	n the livi	ng are	a from Ta	ble 9,	, Th	1 (°C)				21	(85)
Utilisation fa	ctor for g	ains for I	living are	ea, h1,m	(see	Table 9a)								
Jan	Feb	Mar	Apr	May	Jui	n Jul	Aı	ug	Sep	Oct	Nov	Dec		
(86)m= 0.98	0.96	0.91	0.79	0.6	0.41	0.3	0.3	35	0.59	0.86	0.96	0.98		(86)
Mean interna	el temper	ature in	livina ar	22 T1 (f	llow s	tone 3 to	7 in T	-ahla	2 9c)					
(87)m= 20.03	20.19	20.48	20.8	20.95	20.9	_i	2		20.97	20.74	20.34	20		(87)
	ļ			<u> </u>	<u> </u>	_!								, ,
Temperature (88)m= 20.25	20.25	eating p		ı	20.2	<u> </u>	Т		` ,	20.27	20.26	20.26	Ī	(88)
(88)m= 20.25	20.25	20.25	20.26	20.27	20.2	3 20.28	20.2	20	20.28	20.27	20.26	20.26		(00)
Utilisation fa	 	ains for i		welling,	h2,m	see Table	9a)						Ī	
(89)m= 0.97	0.95	0.9	0.76	0.56	0.37	0.25	0.0	3	0.54	0.83	0.95	0.98		(89)
Mean_interna	al temper	ature in	the rest	of dwell	ng T2	(follow ste	eps 3	to 7	in Tabl	e 9c)				
(90)m= 18.94	19.19	19.59	20.03	20.22	20.2	3 20.28	20.2	28	20.25	19.97	19.41	18.92		(90)
									f	LA = Livir	ng area ÷ (4) =	0.47	(91)
Mean interna	al temper	ature (fo	r the wh	ole dwe	lling) =	= fLA × T1	+ (1	– fL	A) × T2					
(92)m= 19.45	19.66	20.01	20.4	20.57	20.6	2 20.62	20.0	62	20.59	20.33	19.85	19.43		(92)
Apply adjust	ment to t	he mean	interna	l temper	ature	from Table	e 4e,	whe	re appro	priate		•		
(93)m= 19.45	19.66	20.01	20.4	20.57	20.6	2 20.62	20.0	62	20.59	20.33	19.85	19.43		(93)
8. Space hea	ating requ	uirement												
Set Ti to the					ed at	step 11 of	Tabl	le 9b	o, so tha	t Ti,m=(76)m an	d re-cald	culate	
the utilisation	1			i	г.		Ι.					-	l	
Jan	Feb	Mar	Apr	May	Ju	n Jul	A	ug	Sep	Oct	Nov	Dec		
Utilisation factors (94)m= 0.97	0.95	0.89	0.76	0.57	0.39	0.28	0.3	22	0.56	0.84	0.94	0.97		(94)
Useful gains				<u> </u>	0.38	0.20	0.5)2	0.50	0.04	0.94	0.97		(04)
(95)m= 365.75	`	427.33	427.25	360.81	247.2	2 166.11	173.	41	261.73	334.22	345.95	352.08		(95)
Monthly ave				l		_ 100.11	1 .,,		_51.70	331.22	1 5 10.00	1 332.00	1	(-5)
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2		(96)
Heat loss rat				l .							<u> </u>	<u> </u>		
(97)m= 661.94		585.42	487.92	374.76	248.9		173	_	270.77	411.33	543.52	654.55		(97)
Space heatir	ng require	ement fo	r each n	nonth, k	Wh/m	onth = 0.02	24 x [[(97)	m – (95)m] x (4	1)m		1	
(98)m= 220.37	Ť	117.62	43.69	10.37	0	0	0	Ó	0	57.37	142.25	225.03		
						•	•						•	

Total per year (kWh/y	rear) = Sum(98) _{15,912} =	981.18	(98)					
Space heating requirement in kWh/m²/year		18.18	(99)					
9b. Energy requirements – Community heating scheme								
This part is used for space heating, space cooling or water heating provided by a compression of space heat from secondary/supplementary heating (Table 11) '0' if none	nmunity scheme.	0	(301)					
Fraction of space heat from community system 1 – (301) =	<u> </u>	1] (302)					
The community scheme may obtain heat from several sources. The procedure allows for CHP and up to for	L our other heat sources; the	e latter						
includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.	Г	1	(303a)					
Fraction of heat from Community boilers								
Fraction of total space heat from Community boilers	<u> </u>							
Factor for control and charging method (Table 4c(3)) for community heating system	Ĺ	1	(305)					
Distribution loss factor (Table 12c) for community heating system	L	1.05	(306)					
Space heating Annual space heating requirement	Г	kWh/year						
Space heat from Community boilers (98) x (304a) x ((305) x (306) =	1030.24	(307a)					
Efficiency of secondary/supplementary heating system in % (from Table 4a or Append	L	0						
Space heating requirement from secondary/supplementary system (98) x (301) x 10	, L	0	」(309)					
Water heating Annual water heating requirement		1864.11]					
If DHW from community scheme: Water heat from Community boilers (64) x (303a) x (64)	(305) x (306) =	1957.32	(310a)					
Electricity used for heat distribution 0.01 × [(307a)(307e	e) + (310a)(310e)] =	29.88	(313)					
Cooling System Energy Efficiency Ratio		0	(314)					
Space cooling (if there is a fixed cooling system, if not enter 0) = $(107) \div (314)$	=	0	(315)					
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside	Γ	114.79	(330a)					
warm air heating system fans	Ī	0	(330b)					
pump for solar water heating	Ī	0	(330g)					
Total electricity for the above, kWh/year =(330a) + (330b)	o) + (330g) =	114.79	(331)					
Energy for lighting (calculated in Appendix L)	Ī	247.96	(332)					
Total delivered energy for all uses (307) + (309) + (310) + (312) + (315) + (331) + (33	2)(237b) =	3350.31	(338)					
12b. CO2 Emissions – Community heating scheme	_							
Energy kWh/year	Emission factor Ekg CO2/kWh kg	Emissions ag CO2/year						
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP using two fuels repeat (363) to ((366) for the second fuel	96	(367a)					
CO2 associated with heat source 1 [(307b)+(310b)] x 100 ÷ (367b) x	0.22	672.2	(367)					
Electrical energy for heat distribution [(313) x	0.52 =	15.51	(372)					

Total CO2 associated with community	systems	(363)(366) + (368)(372)	=	687.71	(373)	
CO2 associated with space heating (se	econdary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =			687.71	(376)
CO2 associated with electricity for pum	elling (331)) x	0.52	=	59.58	(378)	
CO2 associated with electricity for light	ing	(332))) x	0.52	=	128.69	(379)
Total CO2, kg/year	sum of (376)(382) =				875.97	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				16.23	(384)
El rating (section 14)					88.14	(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 06 December 2021 at 10:54:20*

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 69.44m²Site Reference:Highgate Road - GREENPlot Reference: 03 - E

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 16.69 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

14.29 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 41.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 33.7 kWh/m²

OK
2 Fabric U-values

 Element
 Average
 Highest

 External wall
 0.18 (max. 0.30)
 0.18 (max. 0.70)
 OK

 Party wall
 0.00 (max. 0.20)
 OK

Party wall 0.00 (max. 0.20)
Floor (no floor)

Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	8.97m²	
Windows facing: South West	2.92m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers - mains gas		

		l lser I	Details:								
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa	are Ve				010943 on: 1.0.5.50			
Property Address: 03 - E Address:											
1. Overall dwelling dime	ensions:										
		Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)		
Ground floor			69.44	(1a) x	2	.65	(2a) =	184.02	(3a)		
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	69.44	(4)							
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	184.02	(5)		
2. Ventilation rate:											
	main seconda heating heating	ry	other		total			m³ per hou	ır		
Number of chimneys	0 + 0	+	0	_ = [0	X 4	40 =	0	(6a)		
Number of open flues	0 + 0	+	0] = [0	x 2	20 =	0	(6b)		
Number of intermittent fa	ns			Ī	0	x 1	10 =	0	(7a)		
Number of passive vents	;			Ī	0	x 1	10 =	0	(7b)		
Number of flueless gas fi	res			Ē	0	x 4	40 =	0	(7c)		
				_				_			
				_			Air ch	nanges per ho	our —		
•	ys, flues and fans = $(6a)+(6b)+(6b)+(6b)$ een carried out or is intended, proceed			oontinuo fi	0		÷ (5) =	0	(8)		
Number of storeys in the		eu 10 (17),	ourer wise t	conunue n	om (9) to	(10)		0	(9)		
Additional infiltration	3 \					[(9)-	-1]x0.1 =	0	(10)		
	.25 for steel or timber frame o			•	ruction			0	(11)		
if both types of wall are pudeducting areas of openia	resent, use the value corresponding t nas): if equal user 0.35	o the grea	ter wall are	ea (after							
,	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)		
If no draught lobby, en	ter 0.05, else enter 0							0	(13)		
-	s and doors draught stripped							0	(14)		
Window infiltration			0.25 - [0.2	. ,	-	()		0	(15)		
Infiltration rate	arron annotation and in an abis an atm		(8) + (10)					0	(16)		
•	q50, expressed in cubic metro lity value, then $(18) = [(17) \div 20] +$		•	•	ietre oi e	envelope	area	3	(17)		
· ·	es if a pressurisation test has been do				is being u	sed		0.15	(10)		
Number of sides sheltere	ed							0	(19)		
Shelter factor			(20) = 1 -		19)] =			1	(20)		
Infiltration rate incorporat	•		(21) = (18	s) x (20) =				0.15	(21)		
Infiltration rate modified f	- 1 	1	Δ	0	0-4	Nan	Data	1			
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Monthly average wind sp (22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7]			
()	1 4.0 0.0	<u> </u>	1	<u> </u>	I	1 7.0	1 7.7	I			
Wind Factor (22a)m = (22								1			
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18				

Adjusted infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.19 Calculate effe	0.19	0.18	0.16	0.16 he appli	0.14 Cable ca	0.14	0.14	0.15	0.16	0.17	0.18		
If mechanica		•	ato for t	пс арри	oabio oa	00					[0.5	(23
If exhaust air h	eat pump (using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	wise (23b) = (23a)		Ì	0.5	(23
If balanced with	heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =			Ì	74.8	(230
a) If balance	d mech	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	m = (22)	2b)m + (23b) × [1 – (23c)	÷ 100]	_
(24a)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(24
b) If balance	d mech	anical ve	ntilation	without	heat red	covery (N	ЛV) (24b)m = (22	2b)m + (2	23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)r		tract ver (23b), t		•					5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)r		on or wh en (24d)							0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	iter (24a) or (24b	o) or (24	c) or (24	d) in box	(25)	-	-			
(25)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(25
3. Heat losse	s and he	eat loss r	paramete	ėr.									
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/l	K)	k-value kJ/m².k		X k
Windows Type		(111-)	11	_	8.97		۷۷/۱۱۱۷ +(1.4)/[]/		11.89		KJ/III-•I	KU/	(27
Windows Type					2.92	_	/[1/(1.4)+	Ļ		=			(27
Walls Type1			44.0	$\overline{}$		=		— ;	3.87	북 ,			
Walls Type1	41.5		11.89		29.62	_	0.18	=	5.33	륵 ¦	60	1777.2	=
Total area of e	16.7		0		16.73	=	0.17	= [2.81		60	1003.8	
Party wall	iemenis	, 111-			58.24	=							(31)
					40.43	=	0	=	0		45	1819.35	=
Party floor					69.44					[40	2777.6	=
Party ceiling					69.44					Ĺ	30	2083.2	=
Internal wall **					136.2			<i>r</i>		. L	9	1225.89	9 (32
* for windows and ** include the area						ated using	i tormula 1.	/[(1/U-valu	ie)+0.04] a	is given in	paragraph	3.2	
Fabric heat los	s, W/K :	= S (A x	U)	,			(26)(30)	+ (32) =				23.9	(33
Heat capacity		•	,					((28)	.(30) + (32	2) + (32a).	(32e) =	10687.04	(34
Thermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			= (34)	÷ (4) =		[153.9	(35
For design assess can be used inste				construct	ion are no	t known pr	ecisely the	indicative	values of	TMP in Ta	able 1f		
Thermal bridge	es : S (L	x Y) cal	culated ı	using Ap	pendix I	<					[6.99	(36
if details of therma		are not kn	own (36) =	= 0.05 x (3	1)				<i>,</i> ,		r		_
Total fabric he		-l-: !-:							(36) =	(E)		30.9	(37
Ventilation hea					1	1, .1	Α		= 0.33 × (.			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(38
(38)m= 19.27	19.04	18.81	17.67	17.44	16.3	16.3	16.08	16.76	17.44	17.9	18.35		(30
Heat transfer o	nofficiar	at \///K						(20)m	= (37) + (37)	38/m			
39)m= 50.16	49.93	49.71	48.57	48.34	47.2	47.2	46.97	47.66	48.34	48.79	49.25		

Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.72	0.72	0.72	0.7	0.7	0.68	0.68	0.68	0.69	0.7	0.7	0.71		
		!	<u>. </u>	<u>. </u>		!	!		Average =	Sum(40) ₁	12 /12=	0.7	(40)
Number of da	`	1 `	· ·						l _				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(44)
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ating ene	rgy requi	irement:								kWh/ye	ear:	
Assumed occ if TFA > 13 if TFA £ 13.	.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13.		23		(42)
Annual average Reduce the annual not more that 125	ial average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		.22		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage								1 - 22		1			
(44)m= 95.94	92.45	88.97	85.48	81.99	78.5	78.5	81.99	85.48	88.97	92.45	95.94		
	!	!	<u> </u>	ļ.		<u> </u>	<u> </u>		Total = Su	m(44) ₁₁₂ =	=	1046.65	(44)
Energy content o	f hot water	used - cal	culated m	onthly = 4.	190 x Vd,r	n x nm x C	Tm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 142.28	124.44	128.41	111.95	107.42	92.7	85.9	98.57	99.74	116.24	126.89	137.79		
If instantaneous			-f /		()		havea (40		Total = Su	m(45) ₁₁₂ =	= [1372.32	(45)
If instantaneous		· ·	·	1	,.		, ,	, , , I		1			
(46)m= 21.34 Water storage	18.67	19.26	16.79	16.11	13.9	12.88	14.78	14.96	17.44	19.03	20.67		(46)
Storage volun) includir	ng anv so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community	` '					_							()
Otherwise if n	_			-			, ,	ers) ente	er '0' in ((47)			
Water storage													
a) If manufac	turer's d	eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature	factor fro	m Table	2b								0		(49)
Energy lost fro		•					(48) x (49)) =		1	10		(50)
b) If manufact Hot water stor			-								02		(51)
If community	•			0 2 (1111)	1,11ti 0, de	•97				0.	02		(01)
Volume factor	•									1.	03		(52)
Temperature	factor fro	m Table	2b							0	.6		(53)
Energy lost from	om watei	r storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter (50) or	(54) in (5	55)								1.	03		(55)
Water storage	e loss cal	culated t	for each	month			((56)m = ((55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendi	хН	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circui	t loss (ar	nnual) fro	m Table	3							0		(58)
Primary circui	,	,			59)m = ((58) ÷ 36	65 × (41)	m					
(modified by				,		` '	, ,		r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi loss o	·alculated	for each	month ((61)m –	(60) ÷	365 🗸 (41)m							
(61)m= 0	0	0	0	0 1)111 =	00) +	1 0))	0	0	0	0	1	(61)
													J · (59)m + (61)m	(-)
(62)m= 197.5		183.69	165.44	162.7	146.19		153	_	153.24	171.52	180.38	193.07	(39)III + (01)IIII]	(62)
Solar DHW inpu													J	(/
(add addition										i ooniinba	iioii to wat	or ricating)		
(63)m= 0	0	0	0	0	0	0	0	_	0	0	0	0	1	(63)
Output from	uwater hea	ter	<u> </u>			-				l		<u> </u>	J	
(64)m= 197.5		183.69	165.44	162.7	146.19	141.17	153	.84	153.24	171.52	180.38	193.07	1	
		I	<u> </u>	ļ	<u> </u>	1		Outp	out from wa	ater heate	r (annual)₁	12	2023.16	(64)
Heat gains fr	om water	heating.	kWh/m	onth 0.2	5 ′ [0.8	5 × (45)m	ı + (6	(1)m	1] + 0.8 >	د [(46)m	+ (57)m	+ (59)m	 n]	-
(65)m= 91.53		86.92	80.02	79.94	73.62	72.78	76.	_	75.96	82.87	84.98	90.04]	(65)
include (57	7)m in cal	culation of	of (65)m	only if c	vlinder	is in the	dwell	ing	or hot w	ater is f	rom com	munity h	neating	
5. Internal			. ,		•							,	<u> </u>	
Metabolic ga	·													
Jan	T '	Mar	Apr	May	Jun	Jul	А	ug	Sep	Oct	Nov	Dec]	
(66)m= 111.6	2 111.62	111.62	111.62	111.62	111.62	111.62	111	.62	111.62	111.62	111.62	111.62		(66)
Lighting gain	s (calcula	ted in Ap	pendix	L, equat	ion L9	or L9a), a	lso s	ee -	Table 5				-	
(67)m= 18	15.98	13	9.84	7.36	6.21	6.71	8.7	72	11.71	14.87	17.35	18.5]	(67)
Appliances g	ains (calc	ulated ir	Append	dix L, eq	uation	L13 or L1	3a),	also	see Ta	ble 5		-	_	
(68)m= 195.9	9 198.02	192.9	181.98	168.21	155.27	146.62	144	.59	149.71	160.62	174.4	187.34]	(68)
Cooking gair	ns (calcula	ted in A	ppendix	L, equat	ion L1	or L15a), als	o se	e Table	5			-	
(69)m= 34.16	34.16	34.16	34.16	34.16	34.16	34.16	34.	16	34.16	34.16	34.16	34.16]	(69)
Pumps and f	ans gains	(Table	5а)			•							-	
(70)m= 0	0	0	0	0	0	0	0)	0	0	0	0]	(70)
Losses e.g.	evaporatio	n (nega	tive valu	es) (Tab	le 5)	•				•		•	-	
(71)m= -89.3	-89.3	-89.3	-89.3	-89.3	-89.3	-89.3	-89	0.3	-89.3	-89.3	-89.3	-89.3]	(71)
Water heatin	g gains (T	able 5)	-	-	-					-	-	-	_	
(72)m= 123.0	2 121.01	116.83	111.14	107.44	102.24	97.82	103	.49	105.5	111.39	118.03	121.02]	(72)
Total interna	al gains =				(6	6)m + (67)n	า + (68	3)m +	- (69)m + ((70)m + (7	71)m + (72))m	-	
(73)m= 393.4	9 391.5	379.21	359.45	339.5	320.21	307.64	313	.29	323.41	343.36	366.27	383.34]	(73)
6. Solar gai	ns:													
Solar gains are	e calculated	using sola	r flux from	Table 6a	and asso	ciated equa	ations	to co	nvert to th	e applica		tion.		
Orientation:	Access F Table 6d		Area m²			ux able 6a		_	g_ able 6b	т	FF able 6c		Gains	
						able ba	,	_ '	able ob	_ '	able oc		(W)	,
Northeast 0.9x		X	8.9)7	X	11.28	X		0.63	X	0.7	=	30.93	(75)
Northeast 0.9x		X	8.9	7	X	22.97	X		0.63	×	0.7	=	62.96	(75)
Northeast 0.9x	0	X	8.9	97	X	41.38	X	<u> </u>	0.63	×	0.7	=	113.43	(75)
Northeast 0.9x		X	8.9	7	x	67.96	X	<u> </u>	0.63	×	0.7	=	186.29	(75)
Northeast 0.9x	0.77	X	8.9	7	X	91.35	X		0.63	X	0.7	=	250.41	(75)

		_					,		_				_
Northeast _{0.9x}	0.77	×	8.9)7	X !	97.38	X	0.63	×	0.7	=	266.96	(75)
Northeast _{0.9x}	0.77	X	8.9	97	х	91.1	X	0.63	X	0.7	=	249.74	(75)
Northeast _{0.9x}	0.77	X	8.9	97	х	72.63	X	0.63	X	0.7	=	199.1	(75)
Northeast _{0.9x}	0.77	X	8.9	97	х ,	50.42	X	0.63	X	0.7	=	138.22	(75)
Northeast _{0.9x}	0.77	X	8.9	97	X	28.07	X	0.63	X	0.7	=	76.94	(75)
Northeast _{0.9x}	0.77	X	8.9	97	Х	14.2	X	0.63	X	0.7	=	38.92	(75)
Northeast 0.9x	0.77	X	8.9	97	x	9.21	X	0.63	X	0.7	=	25.26	(75)
Southwest _{0.9x}	0.77	x	2.9	92	x :	36.79]	0.63	X	0.7	=	32.83	(79)
Southwest _{0.9x}	0.77	x	2.9	92	X	62.67		0.63	X	0.7	=	55.93	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x	85.75]	0.63	X	0.7	=	76.52	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x 1	06.25		0.63	x	0.7	=	94.82	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x 1	19.01		0.63	x	0.7	=	106.2	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x 1	18.15]	0.63	x	0.7	=	105.44	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x 1	13.91		0.63	x	0.7	=	101.65	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x 1	04.39		0.63	x	0.7	=	93.16	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x .	92.85]	0.63	×	0.7	=	82.86	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x	69.27	Ī	0.63	×	0.7	_ =	61.81	(79)
Southwest _{0.9x}	0.77	x	2.9	92	x	44.07	1	0.63	x	0.7		39.33	(79)
Southwest _{0.9x}	0.77	×	2.9	92	x =	31.49	Ī	0.63	×	0.7	=	28.1	(79)
Solar gains in						1	`	n = Sum(74)m.		1		7	(00)
(83)m= 63.76		89.96	281.11	356.62	372.4	351.39	292	.25 221.08	138.7	6 78.25	53.36]	(83)
Total gains – i $(84)m = 457.26$		50iai 69.17	640.56	696.12	692.61	659.04	605	.54 544.49	482.1	2 444.51	436.7	1	(84)
` '	LL				<u> </u>	039.04	003	.54 544.49	402.17	2 444.51	430.7]	(04)
7. Mean inter	•		`		/								
Temperature	Ū	٠.			Ū		ble 9	, Th1 (°C)				21	(85)
Utilisation fac					` 					1		7	
Jan	 	Mar	Apr	May	Jun	Jul	 	ug Sep	Oct	+	Dec		(00)
(86)m= 0.98	0.96	0.91	8.0	0.62	0.43	0.31	0.3	36 0.59	0.85	0.96	0.98]	(86)
Mean interna	 	T		· `	1	eps 3 to 7	7 in T	able 9c)				7	
(87)m= 20.14	20.31 2	0.56	20.83	20.96	20.99	21	2	1 20.98	20.8	20.44	20.12]	(87)
Temperature	during hea	ting p	eriods ir	rest of	dwelling	g from Ta	able 9	9, Th2 (°C)		_		_	
(88)m= 20.32	20.32 2	0.33	20.34	20.34	20.36	20.36	20.	36 20.35	20.34	20.34	20.33		(88)
Utilisation fac	tor for gain	s for r	est of d	welling,	h2,m (s	ee Table	9a)						
(89)m= 0.97	0.95	0.9	0.77	0.58	0.39	0.27	0.3	31 0.54	0.83	0.95	0.98		(89)
Mean interna	l temperatu	ıre in t	the rest	of dwelli	ina T2 (1	ollow ste	eps 3	to 7 in Tabl	e 9c)	-	•	_	
(90)m= 19.17		9.77	20.14	20.3	20.35	20.36	20.		20.11	19.61	19.15]	(90)
				!	!	!		1	LA = Liv	ving area ÷ (4) =	0.34	(91)
Mean interna	l temperatu	ıro (fo	r tha wh	ماه طسم	lling) – f	: Δ ∪ T 1	 /1	_ fl ∧\ ∨ T≎					
(92)m= 19.51	 	`				1	`	- i 	00.05	. 1 40 0	10.40	1	(02)
	1 19.77 1 7	().()4	20.38	20.53	20.57	20.58	20	58 20.55	20.35	199	19.48		(92)
Apply adjustr		mean	20.38 interna	20.53 temper	20.57 ature fro	20.58 om Table	20. e 4e.		20.35 opriate		19.48]	(92)

(93)m= 19.51	19.72	20.04	20.38	20.53	20.57	20.58	20.58	20.55	20.35	19.9	19.48		(93)
8. Space hea									,				
Set Ti to the i the utilisation			•		ed at st	ep 11 of	Table 9b	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac			<u> </u>	,	ļ.	Į.		•					
(94)m= 0.97	0.94	0.89	0.77	0.59	0.4	0.28	0.32	0.55	0.83	0.94	0.97		(94)
Useful gains,	hmGm	, W = (94	4)m x (84	4)m									
(95)m= 441.94	482.27	508.95	494.78	412.34	280.41	187.58	195.95	300.31	398.27	418.19	424.3		(95)
Monthly avera		1	·		T T	1	1						(22)
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate (97)m= 762.69	740.05	an intern	557.45	426.72	Lm , VV =	=[(39)m 187.77	x [(93)m-	- (96)m 307.58	471.09	624.48	752.71		(97)
(97)m= 762.69 Space heatin			l			l					752.71		(31)
(98)m= 238.64	173.23	122.02	45.12	10.7	0	0.02	0	0	54.18	148.53	244.34		
(11)		<u> </u>	<u> </u>		<u> </u>		Tota	l per year		r) = Sum(9	<u> </u>	1036.76	(98)
Space heatin	a requir	ament in	k\/\/h/m2	!/vear				7 - 7	()	, (-	[(99)
·	•										l	14.93	(99)
9b. Energy red This part is use			The state of the s	Ĭ			ting prov	ided by	a comm	unity sch	nomo		
Fraction of spa										urilly SCI	ieilie.	0	(301)
Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =					[1	(302)
The community so			•	•	•	•	allows for	CHP and i	up to four	other heat	sources; th	he latter	
includes boilers, h	eat pump	s, geotheri	mal and wa	aste heat f					,		,		_
Fraction of hea	at from (Commun	ity boiler	S								1	(303a)
Fraction of total	al space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor for cont	rol and	charging	method	(Table	4c(3)) fo	r comm	unity hea	iting sys	tem			1	(305)
Distribution los	ss factor	(Table 1	12c) for c	commun	ity heati	ng syste	m					1.05	(306)
Space heating	a										L	kWh/yea	' r
Annual space	_	requiren	nent									1036.76	
Space heat fro	m Com	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	<u> </u>	1088.59	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (fro	om Table	4a or A	ppendix	E)		0	(308)
Space heating	require	ment fro	m secon	dary/su	oplemen	tary sys	tem	(98) x (30	01) x 100 ·	÷ (308) =		0	(309)
Water heating											L		
Annual water h		equirem	ent								[2023.16	7
If DHW from c	ommuni	ty schem	ne:								L		
Water heat fro								(64) x (30	03a) x (30	5) x (306) :	=	2124.32	(310a)
Electricity used	d for hea	at distribu	ution				0.01	× [(307a).	(307e) +	· (310a)([310e)] =	32.13	(313)
Cooling Syster	m Energ	y Efficie	ncy Ratio	0							j	0	(314)
Space cooling	(if there	is a fixe	d cooling	g systen	n, if not e	enter 0)		= (107) ÷	(314) =		ļ	0	(315)
Electricity for p	oumps a	nd fans v	within dv	vellina (1	Γable 4f)	:					L		_
mechanical ve							outside					169.72	(330a)
													_

warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	b) + (330g) =		169.72	(331)
Energy for lighting (calculated in Appen	dix L)				317.84	(332)
Total delivered energy for all uses (307) + (309) + (310) + (31	2) + (315) + (331) + (33	32)(237b) =		3700.47	(338)
12b. CO2 Emissions – Community hea	ting scheme					
		Energy kWh/year	Emission fac kg CO2/kWh		missions g CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)	J \	r) ing two fuels repeat (363) to	(366) for the secon	nd fuel	96	(367a)
CO2 associated with heat source 1	[(307b	y)+(310b)] x 100 ÷ (367b) x	0.22	=	722.91	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	16.68	(372)
Total CO2 associated with community s	systems	(363)(366) + (368)(372	2)	=	739.58	(373)
CO2 associated with space heating (se	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =			739.58	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	=	88.09	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	164.96	(379)
Total CO2, kg/year	sum of (376)(382) =				992.62	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				14.29	(384)

El rating (section 14)

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 06 December 2021 at 10:54:13*

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 69.61m²Site Reference :Highgate Road - GREENPlot Reference: 03 - F

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 16.77 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

14.35 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 41.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 34.0 kWh/m²

ОК

2 Fabric U-values

 Element
 Average
 Highest

 External wall
 0.18 (max. 0.30)
 0.18 (max. 0.70)
 OK

 Party wall
 0.00 (max. 0.20)
 OK

Floor (no floor) Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	8.97m²	
Windows facing: South West	2.92m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m ² K	
Community heating, heat from boilers – mains gas		

		Llcor	Details:						
Access an Name	No: Unaboro	USEI		- M	L		CTDO	040042	
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa					010943 on: 1.0.5.50	
Continuito Humo.			y Address		0.011.		7 01010	11010100	
Address :		·	-						
1. Overall dwelling dime	ensions:								
Ground floor		Aı	rea(m²)	(10) v		ight(m)	(2a) =	Volume(m³	(3a)
	-) . (41-) . (4 -) . (4 -) . (4 -)	. (4.5)		(1a) x	2	2.65	(2a) =	184.47	(Sa)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	F(1n)	69.61	(4)	\	I) (O)	(0.)		_
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	(3n) =	184.47	(5)
2. Ventilation rate:	main sec	condary	other		total			m³ per hou	r
Number of altimospess	heating he	ating		,			40 =		_
Number of chimneys		<u> </u>	0] = [0			0	(6a)
Number of open flues	0 +	0 +	0] = [0		20 =	0	(6b)
Number of intermittent fa				Ĺ	0		10 =	0	(7a)
Number of passive vents	i			L	0	X '	10 =	0	(7b)
Number of flueless gas fi	ires				0	X 4	40 =	0	(7c)
							Air ch	anges per ho	our
Infiltration due to chimne	ovs flues and fans = (6a)	+(6b)+(7a)+(7b))+(7c) =	Г	0		÷ (5) =	0	(8)
•	peen carried out or is intended,			ontinue fr			÷ (3) =	U	(0)
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	0.25 for steel or timber fra present, use the value correspo			•	ruction			0	(11)
deducting areas of openii		maing to the gre	ealer wan are	a (anter					
If suspended wooden f	floor, enter 0.2 (unsealed	d) or 0.1 (sea	aled), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
ŭ	s and doors draught strip	pped						0	(14)
Window infiltration			0.25 - [0.2		_	. (45)		0	(15)
Infiltration rate	aFO avaraged in subje		(8) + (10)	, , ,	, , ,	, ,		0	(16)
If based on air permeabil	q50, expressed in cubic	•	•	•	etre or e	envelope	area	3	$= \begin{pmatrix} (17) \\ (49) \end{pmatrix}$
•	es if a pressurisation test has b				is beina u	sed		0.15	(18)
Number of sides sheltere			,	,	3			0	(19)
Shelter factor			(20) = 1 -	0.075 x (1	19)] =			1	(20)
Infiltration rate incorporat	ting shelter factor		(21) = (18	x (20) =				0.15	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4								
	1.23 1.1 1.08	0.95 0.95	0.92	1	1.08	1.12	1.18		
								I	

Adjusted infiltra	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effect		_	rate for t	he appli	cable ca	se	-		-	-		· 	
If exhaust air he			endix N (2	3h) <i>– (</i> 23a	a) × Fmv (e	equation (N	VS)) other	wise (23h) = (23a)			0.5	(23:
If balanced with		0 11		, ,	, ,	. ,	,, .	,) = (20 0)			0.5	= (23
a) If balance		•	•	_					2h\m + (23P) ^ [∙	1 _ (23c)	74.8	(23
(24a)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3	- 100] 	(24
b) If balance					<u> </u>	l	l				0.0		`
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h					ļ	<u> </u>							•
if (22b)n				•					.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural	ventilatio	on or wh	ole hous	e positiv	/e input	ventilatio	on from I	oft	ļ	!	ļ.		
if (22b)n				•	•				0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	iter (24a) or (24b	o) or (24	c) or (24	d) in box	(25)				-	
(25)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(25
3. Heat losse	s and he	eat loss r	paramete	er:									
ELEMENT	Gros	·	Openin		Net Ar	ea	U-valı	ıe	ΑXU		k-value	e A	Χk
	area	(m²)	m	Ž	A ,r	n²	W/m2	Κ.	(W/	K)	kJ/m²·l	K kJ	/K
Windows Type	1				8.97	x1.	/[1/(1.4)+	0.04] =	11.89				(27
Windows Type	2				2.92	x1.	/[1/(1.4)+	0.04] =	3.87				(27
Walls Type1	41.5	59	11.89	9	29.7	Х	0.18	=	5.35		60	1782	(29
Walls Type2	18.4	1	0		18.41	X	0.17	= [3.09	\Box [60	1104.0	6 (29
Total area of e	lements	, m²			60								(31
Party wall					38.68	3 x	0	=	0		45	1740.0	6 (32
Party floor					69.61						40	2784.4	4 (32
Party ceiling					69.61					Ī	30	2088.3	3 (32
Internal wall **					136.2	1				Ī	9	1225.8	9 (32
* for windows and	roof wind	ows, use e	ffective wi	ndow U-va	alue calcul	ated using	formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	n 3.2	
** include the area				ls and part	titions								
Fabric heat los		•	U)				(26)(30)	+ (32) =				24.2	(33
Heat capacity	^	,						***	(30) + (32	2) + (32a).	(32e) =	10725.79	(34
Thermal mass	•	•		•				` '	÷ (4) =			154.08	(35
For design assess can be used inste				constructi	ion are no	t known pr	ecisely the	indicative	e values of	TMP in T	able 1f		
Thermal bridge				usina Ap	pendix ł	<						6.99	(36
if details of therma													`
Total fabric he	at loss							(33) +	(36) =			31.19	(37
Ventilation hea	at loss ca	alculated	l monthly	/				(38)m	= 0.33 × ((25)m x (5))		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
38)m= 19.31	19.08	18.86	17.71	17.49	16.34	16.34	16.12	16.8	17.49	17.94	18.4		(38
Heat transfer of	coefficier	nt, W/K						(39)m	= (37) + (38)m			
(39)m= 50.5	50.28	50.05	48.91	48.68	47.54	47.54	47.31	47.99	48.68	49.13	49.59		
										-	-	i	_

Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.73	0.72	0.72	0.7	0.7	0.68	0.68	0.68	0.69	0.7	0.71	0.71		
	•			ı		ı	ı		Average =	: Sum(40) ₁	12 /12=	0.7	(40)
Number of day	ys in mo	nth (Tab	le 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 hea	ting ene	rgy requi	rement:								kWh/ye	ear:	
Assumed occi if TFA > 13. if TFA £ 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13		24		(42)
Annual average Reduce the annual not more that 125	al average	hot water	usage by	5% if the a	lwelling is	designed t			se target c		7.32		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage								- 1					
(44)m= 96.05	92.56	89.07	85.57	82.08	78.59	78.59	82.08	85.57	89.07	92.56	96.05		
	•								Total = Su	ım(44) ₁₁₂ =		1047.84	(44)
Energy content of	f hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x C	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 142.44	124.58	128.56	112.08	107.54	92.8	85.99	98.68	99.86	116.37	127.03	137.95		
If instantaneous	vator hooti	na ot noint	of upo (no	hot woto	· otorogol	ontor O in	havas (16		Total = Su	ım(45) ₁₁₂ =	• [1373.88	(45)
If instantaneous v			,	ı	, , , , , , , , , , , , , , , , , , ,		, ,	, , , I	1				(40)
(46)m= 21.37 Water storage	18.69	19.28	16.81	16.13	13.92	12.9	14.8	14.98	17.46	19.05	20.69		(46)
Storage volum) includir	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	neating a	and no ta	nk in dw	elling, e	nter 110	litres in	(47)						
Otherwise if n	o stored	hot wate	er (this in	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in ((47)			
Water storage													
a) If manufac				or is kno	wn (kWł	n/day):					0		(48)
Temperature f											0		(49)
Energy lost fro		•			orio not		(48) x (49)) =		1	10		(50)
b) If manufact Hot water stor			-							0	02		(51)
If community h	-			(,,,,,,	-77				0.	<u> </u>		()
Volume factor	from Ta	ble 2a								1.	03		(52)
Temperature f	factor fro	m Table	2b							0	.6		(53)
Energy lost fro		_	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter (50) or	(54) in (55)								1.	03		(55)
Water storage	loss cal	culated t	or each	month			((56)m = ((55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where ((H11) is fro	m Appendi	хH	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit	t loss (ar	nnual) fro	m Table	e 3		<u> </u>	<u> </u>	<u> </u>			0		(58)
Primary circuit	`	,			59)m = ((58) ÷ 36	65 × (41)	m					
(modified by	/ factor f	rom Tab	le H5 if t	here is s	olar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi loss o	ralculated	for each	month ((61)m –	(60) ± 3	65 v (41)m							
(61)m= 0	0	0	0	0	00) - 0	00 x (+1) 0		0	0	T 0	0	1	(61)
	<u>l</u>			alculated	for eac	h month							J · (59)m + (61)m	` ,
(62)m= 197.7		183.83	165.57	162.82	146.29	141.27	153	_	153.35	171.65	180.52	193.22	1	(62)
Solar DHW inpu			<u> </u>						if no sola		1		1	` ,
(add addition												· · · · · · · · · · · · · · · · · ·		
(63)m= 0	0	0	0	0	0	0	0		0	0	0	0	1	(63)
Output from	water hea	ter	ı										•	
(64)m= 197.7		183.83	165.57	162.82	146.29	141.27	153	.96	153.35	171.65	180.52	193.22	1	
			ı			1		Outp	out from wa	ater heate	er (annual) ₁	112	2024.72	(64)
Heat gains fi	rom water	heating,	kWh/m	onth 0.2	5 ´ [0.85	5 × (45)m	ı + (6	1)m	n] + 0.8 x	κ [(46)m	+ (57)m	+ (59)m	n]	_
(65)m= 91.58	81.36	86.97	80.06	79.98	73.65	72.81	77.0	03	76	82.92	85.03	90.09]	(65)
include (5	7)m in cald	culation	of (65)m	only if c	ylinder	is in the	dwell	ing	or hot w	ater is f	rom com	munity h	neating	
5. Internal	gains (see	e Table 5	and 5a):										
Metabolic ga	ins (Table	e 5), Wat	ts											
Jan		Mar	Apr	May	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec]	
(66)m= 111.8	3 111.83	111.83	111.83	111.83	111.83	111.83	111.	.83	111.83	111.83	111.83	111.83]	(66)
Lighting gair	ns (calcula	ted in Ap	pendix	L, equat	ion L9 d	r L9a), a	lso s	ee ¯	Table 5				_	
(67)m= 18.0 ²	16.02	13.03	9.87	7.37	6.23	6.73	8.7	4	11.74	14.9	17.39	18.54]	(67)
Appliances of	gains (calc	ulated ir	Append	dix L, eq	uation L	.13 or L1	3a), a	also	see Ta	ble 5		-	_	
(68)m= 196.3	9 198.42	193.29	182.36	168.55	155.58	146.92	144.	.88	150.02	160.95	174.75	187.72]	(68)
Cooking gair	ns (calcula	ted in A	ppendix	L, equat	ion L15	or L15a), als	o se	e Table	5	-	-	_	
(69)m= 34.18	34.18	34.18	34.18	34.18	34.18	34.18	34.	18	34.18	34.18	34.18	34.18]	(69)
Pumps and t	ans gains	(Table 5	5a)										_	
(70)m= 0	0	0	0	0	0	0	0		0	0	0	0]	(70)
Losses e.g.	evaporatio	on (nega	tive valu	es) (Tab	le 5)									
(71)m= -89.4	6 -89.46	-89.46	-89.46	-89.46	-89.46	-89.46	-89.	46	-89.46	-89.46	-89.46	-89.46]	(71)
Water heating	ng gains (T	able 5)											_	
(72)m= 123.1	121.08	116.89	111.2	107.5	102.29	97.87	103	.54	105.55	111.45	118.1	121.09]	(72)
Total intern	al gains =				(66	i)m + (67)m	า + (68	3)m +	- (69)m + ((70)m + (7	71)m + (72))m	_	
(73)m= 394.0	7 392.08	379.76	359.97	339.98	320.65	308.06	313	.71	323.86	343.85	366.79	383.9		(73)
6. Solar gai														
Solar gains ar		•				•	tions 1	to co		e applica		tion.		
Orientation:	Access F Table 6d		Area m²		Fli Ta	ıx ıble 6a		Т	g_ able 6b	Т	FF able 6c		Gains (W)	
Northoast o o							1 1					_	. ,	1,75
Northeast 0.93		X				11.28	X]		0.63	_	0.7	=	30.93	(75)
	<u> </u>	X				22.97	X]		0.63	_	0.7	_ =	62.96	(75)
Northeast 0.9	<u> </u>	X	8.9			41.38	X]		0.63	×	0.7	=	113.43	[(75)
Northeast 0.9		X	8.9		<u> </u>	67.96	X		0.63	×	0.7	=	186.29](75)] ₍₇₅₎
Northeast 0.9	0.77	X	8.9	97	X	91.35	X		0.63	X	0.7	=	250.41	(75)

					_		٦.		_				_
Northeast _{0.9x}	0.77	X	8.9)7	x	97.38	X	0.63	X	0.7	=	266.96	(75)
Northeast _{0.9x}	0.77	X	8.9)7	x	91.1	X	0.63	X	0.7	=	249.74	(75)
Northeast _{0.9x}	0.77	X	8.9	7	х	72.63	X	0.63	X	0.7	=	199.1	(75)
Northeast _{0.9x}	0.77	X	8.9	7	x	50.42	X	0.63	X	0.7	=	138.22	(75)
Northeast _{0.9x}	0.77	X	8.9	97	x	28.07	X	0.63	X	0.7	=	76.94	(75)
Northeast _{0.9x}	0.77	X	8.9)7	x	14.2	X	0.63	X	0.7	=	38.92	(75)
Northeast 0.9x	0.77	X	8.9	97	x	9.21	X	0.63	X	0.7	=	25.26	(75)
Southwest _{0.9x}	0.77	X	2.9)2	x	36.79]	0.63	X	0.7	=	32.83	(79)
Southwest _{0.9x}	0.77	X	2.9)2	x	62.67		0.63	X	0.7	=	55.93	(79)
Southwest _{0.9x}	0.77	X	2.9)2	x	85.75]	0.63	X	0.7	=	76.52	(79)
Southwest _{0.9x}	0.77	X	2.9)2	x	106.25		0.63	X	0.7	=	94.82	(79)
Southwest _{0.9x}	0.77	X	2.9)2	x	119.01]	0.63	x	0.7	=	106.2	(79)
Southwest _{0.9x}	0.77	x	2.9)2	x	118.15]	0.63	x	0.7	=	105.44	(79)
Southwest _{0.9x}	0.77	X	2.9)2	x	113.91		0.63	x	0.7	=	101.65	(79)
Southwest _{0.9x}	0.77	x	2.9)2	x	104.39]	0.63	x	0.7	=	93.16	(79)
Southwest _{0.9x}	0.77	x	2.9)2	x	92.85]	0.63	x	0.7	=	82.86	(79)
Southwest _{0.9x}	0.77	x	2.9)2	x	69.27	Ī	0.63	x	0.7		61.81	(79)
Southwest _{0.9x}	0.77	X	2.9)2	x	44.07	1	0.63	x	0.7		39.33	(79)
Southwest _{0.9x}	0.77	x	2.9)2	x	31.49	Ī	0.63	×	0.7	=	28.1	(79)
							_						
Solar gains in	watts, cal	culated	for eac	h month			(83)m	n = Sum(74)m.	(82)m				
(83)m= 63.76	118.89	189.96	281.11	356.62	372.4	351.39	292	.25 221.08	138.7	6 78.25	53.36		(83)
												1	
Total gains – i			` '		<u>`</u>					1		1	
Total gains – i (84)m= 457.84		nd solar 569.72	(84)m = 641.07	= (73)m - 696.59	+ (83)r 693.0		605	.97 544.94	482.6	445.04	437.26]	(84)
	510.96	569.72	641.07	696.59	693.0		605	.97 544.94	482.6	445.04	437.26]	(84)
(84)m= 457.84	510.96 rnal tempe	569.72 erature (641.07 (heating	696.59 season	693.05	659.46			482.6	445.04	437.26	21	(84)
(84)m= 457.84 7. Mean inter	510.96 rnal tempe during he	569.72 erature (eating p	641.07 (heating	696.59 season	693.06) ng area	659.46 a from Tal			482.6	445.04	437.26	21	
(84)m= 457.84 7. Mean intermediate Temperature	510.96 rnal tempe during he	569.72 erature (eating p	641.07 (heating	696.59 season	693.06) ng area	659.46 a from Tal able 9a)	ble 9		482.6		437.26 Dec	21	
(84)m= 457.84 7. Mean intermediate Temperature Utilisation factors	510.96 rnal tempe during he	erature (eating points for li	641.07 (heating eriods in iving are	season the livinga, h1,m	693.05) ng area (see	659.46 a from Tal able 9a)	ble 9	, Th1 (°C)				21	
(84)m= 457.84 7. Mean intermediate Temperature Utilisation factors Jan	510.96 rnal temper during he ctor for gain Feb 0.96	erature (eating poins for limated) Mar 0.92	641.07 (heating eriods in iving are Apr 0.8	season the living the May	693.08 ng area (see] Jun 0.44	a from Tal Table 9a) Jul 0.32	ble 9	, Th1 (°C) ug Sep 36 0.59	Oct	Nov	Dec	21	(85)
(84)m= 457.84 7. Mean intermediate Temperature Utilisation factors Jan (86)m= 0.98	510.96 rnal temper during he ctor for gain Feb 0.96	erature (eating poins for limar 0.92	641.07 (heating eriods in iving are Apr 0.8	season the living the May	693.08 ng area (see] Jun 0.44	a from Tal Table 9a) Jul 0.32	ble 9	Th1 (°C) Sep 0.59 Table 9c)	Oct	Nov 0.96	Dec	21	(85)
7. Mean internation (84)m= 457.84 7. Mean internation factor (86)m= 0.98 Mean internation	rnal temper during head to for gain and temperature and temper	erature eating poins for lims	641.07 (heating eriods ir iving are 0.8 iving are 20.83	season the living ea, h1,m May 0.62 ea T1 (for 20.96	693.08) ing area (see 7 Jun 0.44 bllow s 20.99	a from Tal Table 9a) Jul 0.32 teps 3 to 7	ble 9 A 0.3 7 in T	Th1 (°C) Sep 6 0.59 Table 9c) 1 20.98	Oct 0.85	Nov 0.96	Dec 0.98	21	(85)
(84)m= 457.84 7. Mean interconduction factors Utilisation factors Jan (86)m= 0.98 Mean internation (87)m= 20.14	rnal temper during head to for gain and temperature and temper	erature eating poins for lims	641.07 (heating eriods ir iving are 0.8 iving are 20.83	season the living ea, h1,m May 0.62 ea T1 (for 20.96	693.08) ing area (see 7 Jun 0.44 bllow s 20.99	a from Tal a from Tal able 9a) Jul 0.32 teps 3 to 7 21	ble 9 A 0.3 7 in T	Th1 (°C) ug Sep 0.59 able 9c) 1 20.98 9, Th2 (°C)	Oct 0.85	Nov 0.96	Dec 0.98	21	(85)
(84)m= 457.84 7. Mean interpretation factors and the second seco	510.96 rnal temper during here tor for gain Feb 0.96 al tempera 20.3 during here 20.32	erature (eating prins for line) Mar 0.92 Ature in line) 20.55 eating prins for line)	641.07 (heating eriods in iving are 20.83 eriods ir 20.34	season the livin ea, h1,m May 0.62 ea T1 (fc 20.96 n rest of 20.34	693.09 ng area (see 7 Jun 0.44 bllow s 20.99 dwellir 20.36	a from Tal a from Tal a le 9a) Jul 0.32 teps 3 to 7 21 ng from Tal 20.36	ble 9 A 0.3 7 in T 2 able 9	Th1 (°C) ug Sep 0.59 Table 9c) 1 20.98 9, Th2 (°C)	Oct 0.85	Nov 0.96	Dec 0.98	21	(85) (86) (87)
(84)m= 457.84 7. Mean interpretation factors (86)m= 0.98 Mean internation (87)m= 20.14 Temperature (88)m= 20.32 Utilisation factors (84)m= 20.32	stor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.32 etor for gales at tempera 20.3 during he 20.3	erature of eating points for line of the eating points and eating points for response of the eating points f	641.07 (heating eriods ir iving are 0.8 iving are 20.83 eriods ir 20.34 est of decrease of	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34 welling,	693.08) ing area (see 7 Jun 0.44 pllow si 20.99 dwellir 20.36 h2,m (see 7)	a from Tal a from Tal a le 9a) Jul 0.32 teps 3 to 7 21 ng from Tal 20.36	ble 9 A 0.3 7 in T 2 able 9 20.	Th1 (°C) ug Sep 6 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35	Oct 0.85 20.79 20.34	Nov 0.96 20.44	Dec 0.98 20.12 20.33	21	(85) (86) (87)
(84)m= 457.84 7. Mean interpretation factors (86)m= 0.98 Mean internation (87)m= 20.14 Temperature (88)m= 20.32 Utilisation factors (89)m= 0.97	stor for gales at tempera 20.3 during he 20.32 etor for gales 20.95	erature of eating poins for in 20.55 eating poins for in 20.32 ins for in 0.9	641.07 (heating eriods ir iving are 20.83 eriods ir 20.34 est of do 0.77	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34 welling, 0.58	693.08 ng area (see 7 Jun 0.44 bllow s 20.99 dwellir 20.36 h2,m (see 7)	a from Tal Table 9a) Jul 0.32 teps 3 to 7 21 ng from Ta 20.36 see Table 0.27	ble 9 A 0.3 7 in 1 2 20. 9a) 0.3	Th1 (°C) ug Sep 66 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35	Oct 0.85 20.79 20.34	Nov 0.96	Dec 0.98	21	(85) (86) (87) (88)
(84)m= 457.84 7. Mean intermediate Temperature Utilisation factors	stor for gales and sector for gales are sector for	erature (eating prins for line) Mar 0.92 Atture in line) 20.55 eating prins for ring	641.07 (heating eriods ir iving are 20.83 eriods ir 20.34 est of do 0.77 the rest	season the livin ea, h1,m May 0.62 ea T1 (fo 20.96 n rest of 20.34 welling, 0.58 of dwelli	693.09 ng area (see 7 Jun 0.44 bllow s 20.99 dwellir 20.36 h2,m (see 7) 0.39 ng T2	a from Tal a from Tal a from Tal a Jul 0.32 teps 3 to 7 21 ag from Ta 20.36 see Table 0.27 (follow ste	A 0.37 in 1 2 20.4 9a) 0.3 eps 3	Th1 (°C) ug Sep 6 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35 1 0.54 to 7 in Table	Oct 0.85 20.79 20.34 0.83 e 9c)	Nov 0.96 20.44 20.34	Dec 0.98 20.12 20.33	21	(85) (86) (87) (88) (89)
(84)m= 457.84 7. Mean interpretation factors (86)m= 0.98 Mean internation (87)m= 20.14 Temperature (88)m= 20.32 Utilisation factors (89)m= 0.97	stor for gales at tempera 20.3 during he 20.32 etor for gales 20.95	erature of eating poins for in 20.55 eating poins for in 20.32 ins for in 0.9	641.07 (heating eriods ir iving are 20.83 eriods ir 20.34 est of do 0.77	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34 welling, 0.58	693.08 ng area (see 7 Jun 0.44 bllow s 20.99 dwellir 20.36 h2,m (see 7)	a from Tal a from Tal a from Tal a Jul 0.32 teps 3 to 7 21 ag from Ta 20.36 see Table 0.27 (follow ste	ble 9 A 0.3 7 in 1 2 20. 9a) 0.3	Th1 (°C) ug Sep 66 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35 1 0.54 to 7 in Tabl 36 20.33	Oct 0.85 20.79 20.34 0.83 e 9c) 20.1	Nov 0.96 20.44 20.34 0.95	Dec 0.98 20.12 20.33 0.98		(85) (86) (87) (88) (89) (90)
(84)m= 457.84 7. Mean intermediate Temperature Utilisation face [86)m= 0.98 Mean internation (87)m= 20.14 Temperature (88)m= 20.32 Utilisation face (89)m= 0.97 Mean internation (90)m= 19.16	510.96 rnal temper during he ctor for gain se	erature eating poins for line at line point in line at line point in line at l	641.07 (heating eriods ir iving are 20.83 eriods ir 20.34 est of do 0.77 che rest 20.13	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34 welling, 0.58 of dwelling	693.08 ng area (see 7 Jun 0.44 ollow s 20.99 dwellir 20.36 h2,m (see 7) 0.39 ng T2 20.35	a from Tal Table 9a) Jul 0.32 teps 3 to 7 21 ng from Tal 20.36 see Table 0.27 (follow ste	ble 9 A 0.3 7 in 1 2 20. 9a) 0.3 20.	Th1 (°C) ug Sep 6 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35 1 0.54 to 7 in Tabl 36 20.33	Oct 0.85 20.79 20.34 0.83 e 9c) 20.1	Nov 0.96 20.44 20.34	Dec 0.98 20.12 20.33 0.98	21	(85) (86) (87) (88) (89)
(84)m= 457.84 7. Mean intermediate Temperature Utilisation factors Jan (86)m= 0.98 Mean internation (87)m= 20.14 Temperature (88)m= 20.32 Utilisation factors (89)m= 0.97 Mean internation (90)m= 19.16	510.96 rnal temper during he ctor for gain	erature eating prins for line at line prins for line at line prins for response to the line at	641.07 (heating eriods in iving are 20.83 eriods in 20.34 est of do 0.77 the rest 20.13	season the livin ea, h1,m May 0.62 ea T1 (fc 20.96 n rest of 20.34 welling, 0.58 of dwelli 20.3	693.09 ng area (see 7 Jun 0.44 bllow s 20.99 dwellir 20.36 h2,m (see 7) 0.39 ng T2 20.35	a from Tal a from Tal a from Tal a Jul 0.32 teps 3 to 7 21 ag from Ta 20.36 see Table 0.27 (follow ste 20.36	bble 9 A 0.3 7 in T 2 abble 9 20. 99a) 0.3 eps 3 20.	Th1 (°C) ug Sep 6 0.59 Table 9c) 1 20.98 2, Th2 (°C) 36 20.35 4 to 7 in Table 36 20.33 f - fLA) × T2	Oct 0.85 20.79 20.34 0.83 e 9c) 20.1 LA = Liv	Nov 0.96 20.44 20.34 0.95 19.6 ving area ÷ (-	Dec 0.98 20.12 20.33 0.98 19.14 4) =		(85) (86) (87) (88) (89) (90) (91)
(84)m= 457.84 7. Mean intermediate Temperature Utilisation face [86)m= 0.98 Mean internation (87)m= 20.14 Temperature (88)m= 20.32 Utilisation face (89)m= 0.97 Mean internation (90)m= 19.16	stor for gales at tempera 20.3 ctor for gales 20.32 ctor for gales 20.32 ctor for gales 20.32 ctor for gales 20.34 ctor for gales 20.35	erature eating prins for line in the seating print	cheating eriods ir iving are 20.83 eriods ir 20.34 est of do 0.77 the rest 20.13 er the who 20.4	season the livin ea, h1,m May 0.62 ea T1 (for 20.96 n rest of 20.34 welling, 0.58 of dwelling 20.3	693.08 ng area (see 7 Jun 0.44 bllow s 20.99 dwellir 20.36 h2,m (see 7) 20.35 lling) = 20.6	a from Tal Table 9a) Jul 0.32 teps 3 to 7 21 ag from Tal 20.36 see Table 0.27 (follow ster 20.36 fLA × T1 20.6	bble 9 A 0.3 7 in 1 2 20. 9a) 0.3 + (1 20	Th1 (°C) ug Sep 6 0.59 Table 9c) 1 20.98 9, Th2 (°C) 36 20.35 1 0.54 1 to 7 in Tabl 36 20.33 f - fLA) × T2 6 20.58	Oct 0.85 20.79 20.34 0.83 e 9c) 20.1 LA = Liv	Nov 0.96 20.44 20.34 0.95 19.6 ving area ÷ (-	Dec 0.98 20.12 20.33 0.98		(85) (86) (87) (88) (89) (90)

										•	•		
(93)m= 19.53	19.74	20.06	20.4	20.55	20.6	20.6	20.6	20.58	20.37	19.92	19.51		(93)
8. Space hea													
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	l		-		<u> </u>								
(94)m= 0.97	0.95	0.9	0.78	0.6	0.41	0.29	0.33	0.56	0.83	0.94	0.97		(94)
Useful gains,	hmGm	, W = (94	1)m x (8	4)m	•								
(95)m= 442.81	483.37	510.56	497.42	415.67	283.37	189.97	198.39	303.11	400.16	419.22	425.1		(95)
Monthly aver		1		from T	r e					·		ı	
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate	i	i	<u> </u>		i	- ,	· · ·	·				ı	(0-)
(97)m= 769.26	746.33	678.64	562.34	430.79	285.07	190.19	198.8	310.81	475.38	629.94	759.24		(97)
Space heatin	r i	1	r each n 46.74		I					r -	040.6		
(98)m= 242.87	176.71	125.05	46.74	11.25	0	0	0 	0	55.96	151.71	248.6	4050.0	7(00)
							rota	l per year	(Kvvn/yeai	') = Sum(9	8)15,912 =	1058.9	(98)
Space heatin	g requir	ement in	kWh/m²	/year								15.21	(99)
9b. Energy red	quiremer	nts – Cor	nmunity	heating	scheme								
This part is us										unity sch	neme.		7(204)
Fraction of spa			•		-	_	(Table T	1) 0 11 11	one			0	(301)
Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The community so									up to four	other heat	sources; t	he latter	
includes boilers, here		-			rom powei	stations.	See Appei	naix C.				1	(303a)
Fraction of total			•		nilere				(3	02) x (303	a) =	1	(304a)
Factor for conf	•			•		r commi	ınity has	itina eve		02) X (000	u) – 	1	(305)
				,	` ''		•	iling sys	CIII				╡`
Distribution los		(Table 1	2c) for (commun	ity neatii	ng syste	m					1.05	(306)
Space heating	_		4									kWh/yea	r ¬
Annual space	_	·										1058.9	╛
Space heat fro	m Com	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	=	1111.84	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308
Space heating	require	ment fro	m secon	dary/su	oplemen	tary syst	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water heating	3												
Annual water	neating i	equirem	ent									2024.72	
If DHW from c								(0.4) (0.6)	20-) (00)	=) (000)			
Water heat fro		•					0.04			5) x (306) :		2125.95	(310a)
Electricity used							0.01	× [(307a).	(307e) +	· (310a)([310e)] =	32.38	(313)
Cooling System	_	•	·									0	(314)
Space cooling	,					•		= (107) ÷	(314) =			0	(315)
Electricity for p							outoide				ĺ	470.44	7(2202)
mechanical ve	ะแแลแดก	- palanc	eu, extr	act of po	silive in	out Irom	outside					170.14	(330a)

warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	b) + (330g) =		170.14	(331)
Energy for lighting (calculated in Apper	ndix L)				318.62	(332)
Total delivered energy for all uses (307	(309) + (310) + (31	2) + (315) + (331) + (33	32)(237b) =	Ī	3726.56	(338)
12b. CO2 Emissions – Community hea	ting scheme					
		Energy kWh/year	Emission factor kg CO2/kWh	_	missions g CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)) sing two fuels repeat (363) to	(366) for the second f	uel	96	(367a)
CO2 associated with heat source 1	[(307b	o)+(310b)] x 100 ÷ (367b) x	0.22	=	728.5	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	16.8	(372)
Total CO2 associated with community	systems	(363)(366) + (368)(37	2)	=	745.31	(373)
CO2 associated with space heating (se	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =			745.31	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	=	88.3	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	165.36	(379)
Total CO2, kg/year	sum of (376)(382) =				998.97	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =			Ī	14.35	(384)

El rating (section 14)

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 06 December 2021 at 10:54:08*

Project Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 50.62m²Site Reference:Highgate Road - GREENPlot Reference: 03 - G

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 19.64 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 16.45 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 48.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 38.7 kWh/m²

OK
2 Fabric U-values

Element Average Highest

External wall 0.17 (max. 0.30) 0.18 (max. 0.70) **OK**Party wall 0.00 (max. 0.20) - **OK**

Floor (no floor)
Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	8.97m²	
Ventilation rate:	4.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		<u>U</u>	lser De	etails: _						
Assessor Name:	Neil Ingham			Stroma	Num	her:		STRO	010943	
Software Name:	Stroma FSAP 201	2		Softwa					n: 1.0.5.50	
		Prop	perty A	ddress:	03 - G					
Address :										
1. Overall dwelling dime	ensions:		Area	(m²)		Δv He	ight(m)		Volume(m³	\
Ground floor		[<u> </u>	(1a) x		.65	(2a) =	134.14	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e	ı (1n)+(50).62	(4)			1		_
Dwelling volume		´ ` ` [)+(3c)+(3c	d)+(3e)+	.(3n) =	134.14	(5)
2. Ventilation rate:										
2. Ventuation rate.		econdary leating	C	other		total			m³ per hou	r
Number of chimneys	heating h		+	0	=	0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	+	0] = [0	x	20 =	0	(6b)
Number of intermittent fa	ıns				, 	0	x .	10 =	0	(7a)
Number of passive vents	i				F	0	x -	10 =	0	(7b)
Number of flueless gas fi	res				F	0	X 4	40 =	0	(7c)
					_					_
								Air ch	anges per ho	ur
Infiltration due to chimne	•				ontinuo fr	0		÷ (5) =	0	(8)
Number of storeys in the		ей, ргосеей то) (17), Ol	iriei wise c	onunue m	om (9) to ((10)		0	(9)
Additional infiltration	- , ,						[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0					•	uction			0	(11)
if both types of wall are pa deducting areas of openia	resent, use the value corres ngs); if equal user 0.35	ponding to the	e greate	r wall area	a (after					
If suspended wooden f		ed) or 0.1 ((sealed	d), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0								0	(13)
Percentage of windows	s and doors draught st	ripped							0	(14)
Window infiltration				0.25 - [0.2			. (45)		0	(15)
Infiltration rate	aEO evereged in out	io motros n				2) + (13) -		oroo	0	(16)
Air permeability value, If based on air permeabil	•	•		•	•	elle ol e	rivelope	alea	3	(17)
Air permeability value applie	-					is being u	sed		0.15	(10)
Number of sides sheltere	ed								0	(19)
Shelter factor				20) = 1 - [9)] =			1	(20)
Infiltration rate incorporat	_		(:	21) = (18)	x (20) =				0.15	(21)
Infiltration rate modified f			1		_			_	1	
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp			20 1	27 1	4	4.0	1.5	4 -7	1	
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (22	2)m ÷ 4									
(22a)m= 1.27 1.25	1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		

0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effe	ctive air	change i	rate for t	he appli	cable ca	se	<u> </u>		ļ		<u>!</u>		
If mechanica												0.5	(2:
If exhaust air h		0		, ,	,	. ,	,, .	`) = (23a)			0.5	(2
If balanced with	n heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				75.65	(2
a) If balance						- `	- 	<u> </u>	2b)m + (23b) × [- ` ` `	÷ 100]	
24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(2
b) If balance	d mech	anical ve	ntilation	without	heat red	overy (N	ЛV) (24b	m = (22)	2b)m + (23b)		Ī	
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
c) If whole h				•	•				_				
<u> </u>	n < 0.5 ×	<u> </u>	· ·	<u> </u>	ŕ	· ` `	É `		`	ŕ	1	1	(0
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
d) If natural	ventilation								0.51				
24d)m= 0	0	0	0	0	0	0	0.5 + [(2	0	0.5]	0	0		(2
Effective air			,			<u> </u>							(_
25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3]	(2
0.31	0.31	0.51	0.29	0.20	0.26	0.20	0.26	0.27	0.20	0.29	0.3		(2
3. Heat losse	s and he	eat loss p	paramete	er:									
LEMENT	Gros	_	Openin		Net Ar		U-val		AXU		k-value		Χk
Caralanna	area	(m²)	m	l ²	A ,r		W/m2		(W/	K)	kJ/m²-l	K kJ	
/indows					8.97	x1	/[1/(1.4)+	0.04] = [11.89	ᆗ,			(2 —
/alls Type1	31.4	4	8.97		22.43	3 X	0.18	= [4.04	!	60	1345.8	3 (2
Valls Type2	22.9	92	0		22.92	2 x	0.17	=	3.85		60	1375.2	2 (2
otal area of e	lements	, m²			54.32	2							(3
arty wall					30.08	3 X	0	=	0		45	1353.6	3 (3
arty floor					50.62	2				[40	2024.8	3 (3
arty ceiling					50.62	2					30	1518.6	3 (3
nternal wall **	:				83.2						9	748.8	<u> </u>
for windows and	roof wind	ows, use e	ffective wi	ndow U-va	alue calcul	ated using	formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	n paragraph	n 3.2	
* include the area				ls and par	titions								
abric heat los	3s, W/K :	= S (A x	U)				(26)(30)	+ (32) =				19.78	(3
eat capacity	Cm = S((Axk)						((28)	(30) + (32	2) + (32a)	(32e) =	8366.8	(3
hermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			= (34)	÷ (4) =			165.29	(3
or design asses: an be used inste				construct	ion are no	t known pr	ecisely the	indicative	e values of	TMP in T	able 1f		
an be usea inste hermal bridge				ıcina Δr	nandiy l	<i>(</i>						5.00	$\neg_{\prime 2}$
details of therma	•	,			-	`						5.92	(3
otal fabric he		are not kir	OWII (30) =	- 0.00 X (3	'')			(33) +	(36) =			25.7	<u></u> (3
	at loss ca	alculated	l monthly	/				(38)m	= 0.33 × ((25)m x (5)		
	ı	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
entilation hea	l Feb							-	-	 	+		
entilation hea	Feb 13.69	13.52	12.69	12.53	11.7	11.7	11.53	12.03	12.53	12.86	13.19		(3
Jan 8)m= 13.86	13.69	13.52	12.69	12.53	11.7	11.7	11.53		<u> </u>	<u> </u>	13.19		(3
entilation hea	13.69	13.52	12.69	12.53	37.39	37.39	37.23		12.53 = (37) + (38.22	<u> </u>	38.89	1	(3)

Heat loss par	ameter (I	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.78	0.78	0.77	0.76	0.76	0.74	0.74	0.74	0.75	0.76	0.76	0.77		
						l	l		Average =	: Sum(40) ₁	12 /12=	0.76	(40)
Number of da	-	nth (Tab	le 1a)		ı			1	1				
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 hea	ating ene	rgy requi	irement:								kWh/ye	ar:	
Assumed occ if TFA > 13 if TFA £ 13	.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		71		(42)
Annual avera Reduce the annu not more that 12:	ial average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		.77		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage		1											
(44)m= 82.25	79.26	76.27	73.28	70.29	67.3	67.3	70.29	73.28	76.27	79.26	82.25		
	•								Total = Su	ım(44) ₁₁₂ =	-	897.28	(44)
Energy content of	of hot water	used - cal	culated m	onthly = 4 .	190 x Vd,r	n x nm x C	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 121.98	106.68	110.09	95.97	92.09	79.47	73.64	84.5	85.51	99.65	108.78	118.13		_
If instantaneous	water heat	ing at naint	of upo (no	hot woto	r otorogol	ontor O in	hayaa (16		Total = Su	ım(45) ₁₁₂ =	= [1176.48	(45)
If instantaneous	1	· ·	·	i	, , , , , , , , , , , , , , , , , , ,		, ,	, , , ,	1		· ·		(40)
(46)m= 18.3 Water storage	16 2 loss:	16.51	14.4	13.81	11.92	11.05	12.68	12.83	14.95	16.32	17.72		(46)
Storage volur) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community	heating a	and no ta	ınk in dw	elling, e	nter 110	litres in	(47)						
Otherwise if n	o stored	hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in ((47)			
Water storage													
a) If manufac				or is kno	wn (kWł	n/day):					0		(48)
Temperature											0		(49)
Energy lost fr		•			or io not		(48) x (49)) =		1	10		(50)
b) If manufactHot water sto			-							0	02		(51)
If community	•			_ (,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-77				0.	.02		(= -)
Volume facto	r from Ta	ble 2a								1.	.03		(52)
Temperature	factor fro	m Table	2b							0	.6		(53)
Energy lost fr		•	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter (50) or	(54) in (55)								1.	03		(55)
Water storage	e loss cal	culated f	for each	month			((56)m = ((55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where ((H11) is fro	m Appendi	хH	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit	it loss (ar	nnual) fro	m Table	 e 3							0		(58)
Primary circuit	•	,			59)m = ((58) ÷ 36	65 × (41)	m					
(modified b	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi loss ca	lculated f	or each	month (61)m =	(60) ÷ 3	65 × (41))m							
(61)m= 0	0	0	0	0	0	0) 0	П	0	0	0	0	1	(61)
	uired for	water he	eating ca	alculated	L for eac	h month	(62)r	—— m =	0 85 x (′45)m +	(46)m +	(57)m +	ı · (59)m + (61)m	
(62)m= 177.25	156.61	165.36	149.47	147.37	132.96	128.91	139.	_	139	154.93	162.27	173.4]	(62)
Solar DHW input	calculated ι	ısing App	endix G or	Appendix	H (negati	ve quantity	/) (ent	er '0'	if no sola	r contribu	tion to wate	r heating)		
(add additiona												•		
(63)m= 0	0	0	0	0	0	0	0		0	0	0	0]	(63)
Output from w	ater heat	er				•		•			•	•	•	
(64)m= 177.25	156.61	165.36	149.47	147.37	132.96	128.91	139.	.78	139	154.93	162.27	173.4]	
	•					•		Outp	ut from wa	ater heate	er (annual)	12	1827.32	(64)
Heat gains fro	m water l	neating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (6	1)m] + 0.8 x	c [(46)m	+ (57)m	+ (59)m	١]	
(65)m= 84.78	75.41	80.82	74.71	74.84	69.22	68.71	72.3	32	71.23	77.36	78.96	83.5]	(65)
include (57)	m in calc	ulation o	of (65)m	only if c	ylinder i	s in the o	dwelli	ing o	or hot w	ater is f	rom com	munity h	neating	
5. Internal ga	ains (see	Table 5	and 5a):										
Metabolic gair	ns (Table	5), Wat	ts											
Jan	Feb	Mar	Apr	May	Jun	Jul	Αι	Jg	Sep	Oct	Nov	Dec]	
(66)m= 85.42	85.42	85.42	85.42	85.42	85.42	85.42	85.4	42	85.42	85.42	85.42	85.42]	(66)
Lighting gains	(calculat	ed in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso s	ee T	Table 5				-	
(67)m= 13.59	12.07	9.81	7.43	5.55	4.69	5.07	6.5	9	8.84	11.22	13.1	13.97]	(67)
Appliances ga	ins (calcu	ılated in	Append	dix L, eq	uation L	13 or L1	3a), a	also	see Tal	ble 5		-	-	
(68)m= 148.84	150.39	146.5	138.21	127.75	117.92	111.35	109.	.81	113.7	121.99	132.45	142.28]	(68)
Cooking gains	(calculat	ed in A	opendix	L, equat	ion L15	or L15a)), also	o se	e Table	5	-	-	-	
(69)m= 31.54	31.54	31.54	31.54	31.54	31.54	31.54	31.5	54	31.54	31.54	31.54	31.54]	(69)
Pumps and fa	ns gains	(Table 5	āa)										-	
(70)m= 0	0	0	0	0	0	0	0		0	0	0	0]	(70)
Losses e.g. ev	/aporation	n (nega	ive valu	es) (Tab	le 5)								-	
(71)m= -68.33	-68.33	-68.33	-68.33	-68.33	-68.33	-68.33	-68.	33	-68.33	-68.33	-68.33	-68.33]	(71)
Water heating	gains (Ta	able 5)											_	
(72)m= 113.95	112.22	108.64	103.76	100.59	96.14	92.35	97.	2	98.93	103.97	109.67	112.23]	(72)
Total internal	gains =				(66)m + (67)m	ı + (68)m +	(69)m + ((70)m + (7	71)m + (72))m	_	
(73)m= 325.01	323.3	313.57	298.03	282.52	267.37	257.39	262.	.22	270.09	285.81	303.84	317.1]	(73)
6. Solar gain	s:													
Solar gains are		ŭ					itions t	o cor	nvert to th	e applica		tion.		
Orientation:	Access Fa Table 6d	actor	Area m²		Flu Ta	ıx ble 6a		Τź	g_ able 6b	т	FF able 6c		Gains (W)	
_							1 1	- 10						1
Northeast 0.9x	0.77	×	8.9		-	11.28	X		0.63	_ ×	0.7	=	30.93	(75)
Northeast 0.9x	0.77	×	8.9			22.97	X		0.63	╛ [×] ╘	0.7	_ =	62.96	(75)
Northeast 0.9x	0.77	×	8.9			41.38	X		0.63	_ ×	0.7	=	113.43	(75)
Northeast 0.9x	0.77	X	8.9	_	-	67.96	X		0.63	_ ×	0.7	=	186.29	(75)
Northeast _{0.9x}	0.77	X	8.9	7	x (91.35	X		0.63	X	0.7	=	250.41	(75)

Northeast _{0.9x}	0.77	X	8.9	97	x g	97.38	x [0.63	x	0.7	=	266.96	(75)
Northeast _{0.9x}	0.77	x	8.9	97	х	91.1	x	0.63	x	0.7	=	249.74	(75)
Northeast _{0.9x}	0.77	Х	8.9)7	х	72.63	x [0.63	x	0.7	=	199.1	(75)
Northeast _{0.9x}	0.77	Х	8.9)7	x t	50.42] x [0.63	х	0.7	=	138.22	(75)
Northeast _{0.9x}	0.77	x	8.9	97	x 2	28.07	x	0.63	x	0.7	=	76.94	(75)
Northeast _{0.9x}	0.77	x	8.9	97	х	14.2	х	0.63	_ x [0.7	=	38.92	(75)
Northeast 0.9x	0.77	X	8.9)7	х	9.21	x	0.63	x	0.7	=	25.26	(75)
•		<u> </u>											
Solar gains in	watts, ca	alculated	I for eacl	h month			(83)m =	Sum(74)m .	(82)m				
(83)m= 30.93	62.96	113.43	186.29	250.41	266.96	249.74	199.1	138.22	76.94	38.92	25.26		(83)
Total gains –	internal a	nd solar	(84)m =	= (73)m	+ (83)m	, watts						•	
(84)m= 355.94	386.26	427.01	484.32	532.94	534.34	507.13	461.32	408.31	362.75	342.76	342.36		(84)
7. Mean inte	rnal temp	erature	(heating	season)								
Temperature	during h	eating p	eriods ir	n the livi	ng area	from Tal	ole 9, 1	h1 (°C)				21	(85)
Utilisation fa	ctor for g	ains for I	living are	ea, h1,m	(see Ta	able 9a)							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m= 0.98	0.96	0.93	0.82	0.64	0.44	0.32	0.37	0.61	0.87	0.96	0.98		(86)
Mean interna	al temper	ature in	living are	ea T1 (fo	ollow ste	eps 3 to 7	7 in Ta	ole 9c)		-	•	•	
(87)m= 20.13	20.27	20.52	20.81	20.95	20.99	21	21	20.97	20.77	20.42	20.11		(87)
Temperature	during b	eating n	oriode ir	rost of	dwelling	from To	hla a	Th2 (°C)	<u> </u>	!	!		
(88)m= 20.27	20.27	20.28	20.29	20.29	20.31	20.31	20.31		20.29	20.29	20.28		(88)
` '	ļ			<u> </u>	<u> </u>	<u> </u>							, ,
Utilisation fa					T	1	T	1 0.50	0.04	T 0.05	0.00		(89)
(89)m= 0.97	0.96	0.91	0.79	0.59	0.4	0.27	0.31	0.56	0.84	0.95	0.98		(03)
Mean interna	al temper	ature in	the rest	of dwell	ing T2 (f	ollow ste	eps 3 to	7 in Tabl	e 9c)		T	Ī	
(90)m= 19.1	19.31	19.66	20.06	20.24	20.3	20.31	20.31		20.03	19.54	19.09		(90)
								1	LA = Livir	ng area ÷ (4) =	0.49	(91)
Mean_interna	al temper	ature (fo	r the wh	ole dwe	lling) = f	LA × T1	+ (1 –	fLA) × T2					
(92)m= 19.61	19.78	20.08	20.43	20.59	20.64	20.65	20.65	20.62	20.39	19.97	19.59		(92)
Apply adjust	ment to the	ne mean	interna	temper	ature fro	m Table	4e, w	here appro	opriate			•	
(93)m= 19.61	19.78	20.08	20.43	20.59	20.64	20.65	20.65	20.62	20.39	19.97	19.59		(93)
8. Space hea	·												
Set Ti to the the utilisation					ned at st	ep 11 of	Table	9b, so tha	t Ti,m=(76)m an	d re-calc	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fa			•	iviay	<u> </u>	<u> </u>	7105	,	000	1407	_ <u></u>		
(94)m= 0.97	0.95	0.91	0.79	0.61	0.42	0.3	0.34	0.58	0.85	0.95	0.97		(94)
Useful gains	, hmGm ,	W = (94	4)m x (84	 4)m	<u>!</u>	!	!		<u>I</u>	<u>!</u>	<u>!</u>		
(95)m= 344.68	367.88	388.24	384.81	326.31	224.34	151.08	157.68	3 238.18	307.45	324.2	332.97		(95)
Monthly ave	rage exte	rnal tem	perature	from T	able 8			•					
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rat	_				Lm , W	=[(39)m	x [(93)	m- (96)m]			•	
(97)m= 605.37		532.59	442.53	339.89	225.9	151.29	158.09		374.26	496.17	598.46		(97)
Space heatir	ng require	ement fo	r each n	nonth, k	Wh/mon	th = 0.02	24 x [(9	7)m – (95)m] x (4	1)m		•	
(98)m= 193.95	146.61	107.39	41.56	10.1	0	1 0	l 0	l 0	49.71	123.82	197.53		

	Total per year (kWh	/year) = Sum(98) _{15,912} =	870.67	(98)
Space heating requirement in kWh/m²/year			17.2	(99)
9b. Energy requirements – Community heating scheme				
This part is used for space heating, space cooling or water heating Fraction of space heat from secondary/supplementary heating (Tab		mmunity scheme.	0	(301)
Fraction of space heat from community system 1 – (301) =	, , ,		1] (302)
The community scheme may obtain heat from several sources. The procedure allow	s for CHP and up to	L four other heat sources; the	e latter	`` ′
includes boilers, heat pumps, geothermal and waste heat from power stations. See A Fraction of heat from Community boilers	Appendix C.	Г		(303a)
Fraction of total space heat from Community boilers		(302) x (303a) =	1	$\int_{(304a)}^{(304a)}$
·	hooting eyetom	(302) X (303a) =		╣
Factor for control and charging method (Table 4c(3)) for community Distribution loss factor (Table 12c) for community heating system	nealing system	L	1 05	(305)
Space heating		L	1.05 kWh/year	」 ``
Annual space heating requirement		Γ	870.67	٦
Space heat from Community boilers	(98) x (304a) x	(305) x (306) =	914.2	(307a)
Efficiency of secondary/supplementary heating system in % (from T	able 4a or Appe	ndix E)	0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x	100 ÷ (308) =	0	(309)
Water heating		_		_
Annual water heating requirement			1827.32	
If DHW from community scheme: Water heat from Community boilers	(64) x (303a)	x (305) x (306) =	1918.69	(310a)
Electricity used for heat distribution	0.01 × [(307a)(30	7e) + (310a)(310e)] =	28.33	(313)
Cooling System Energy Efficiency Ratio			0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314	·) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outs	side	Γ	107.68	(330a)
warm air heating system fans		Ī	0	(330b)
pump for solar water heating		Ī	0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330	0b) + (330g) =	107.68	(331)
Energy for lighting (calculated in Appendix L)		Ī	239.96	(332)
Total delivered energy for all uses (307) + (309) + (310) + (312) + (312)	315) + (331) + (3	32)(237b) =	3180.53	(338)
12b. CO2 Emissions – Community heating scheme				
	Energy kWh/year	Emission factor E	missions g CO2/year	
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP using two	·	o (366) for the second fuel	96	(367a)
	b)] x 100 ÷ (367b) x	0.22 =	637.4	
Electrical energy for heat distribution [(313		0.22		
[[313	'/ ^	0.52	14.7	(312)

Total CO2 associated with community s	systems	(363)(366) + (368)(372)		=	652.1	(373)
CO2 associated with space heating (se	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immers	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and w	ater heating	(373) + (374) + (375) =			652.1	(376)
CO2 associated with electricity for pum	ps and fans within dw	elling (331)) x	0.52	=	55.89	(378)
CO2 associated with electricity for lighti	ng	(332))) x	0.52	=	124.54	(379)
Total CO2, kg/year	sum of (376)(382) =				832.53	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				16.45	(384)
El rating (section 14)					88.33	(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:54:02

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 63.92m²Site Reference:Highgate Road - GREENPlot Reference:03 - H

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 17.67 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 15.46 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 45.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 38.8 kWh/m²

OK
2 Fabric U-values

Element Average Highest

External wall 0.18 (max. 0.30) 0.18 (max. 0.70) OK
Party wall 0.00 (max. 0.20) - OK

Floor (no floor) Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	ОК
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	9.56m²	
Windows facing: South East	8.76m²	
Ventilation rate:	6.00	
10 Key features		
	2.0 m ³ /m ² h	
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

			Jser D	etails: _						
Assessor Name:	Neil Ingham			Stroma	Num	her:		STRO	010943	
Software Name:	Stroma FSAP 2012	2		Softwa					n: 1.0.5.50	
		Pro	perty A	Address:	03 - H					
Address :										
1. Overall dwelling dime	nsions:		Δrea	a(m²)		Δv He	ight(m)		Volume(m³)	\
Ground floor				<u>` </u>	(1a) x		.65	(2a) =	169.39	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e))+(1n)	6:	3.92	(4)			.		
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	169.39	(5)
2. Ventilation rate:										
		condary eating		other		total			m³ per hou	r
Number of chimneys	0 +	0	+	0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	+	0	j = F	0	x 2	20 =	0	(6b)
Number of intermittent fa	ns				Ī	0	x -	10 =	0	(7a)
Number of passive vents					Ē	0	x ·	10 =	0	(7b)
Number of flueless gas fi	res				Ė	0	x 4	40 =	0	(7c)
									_	_
					_			Air ch	nanges per ho	ur —
Infiltration due to chimne	· ·				ontinue fr	0 om (9) to (÷ (5) =	0	(8)
Number of storeys in the		u, proceed to	0 (11), 0	ni ici wise e	onunae m	om (5) to ((10)		0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0					•	uction			0	(11)
if both types of wall are pi deducting areas of openir	resent, use the value corresp ngs); if equal user 0.35	onding to th	ne greate	er wall area	a (after					
If suspended wooden f	loor, enter 0.2 (unseale	ed) or 0.1	(seale	d), else	enter 0				0	(12)
If no draught lobby, en									0	(13)
Percentage of windows	s and doors draught str	ripped			(4.4)	001			0	(14)
Window infiltration				0.25 - [0.2 (8) + (10) -			ı (15) —		0	(15)
Infiltration rate Air permeability value,	a50 everessed in cubi	c metres						area	0	(16)
If based on air permeabil	•		•	•	•	cue oi e	invelope	aica	0.15	(18)
Air permeability value applie						is being u	sed		0.10	()
Number of sides sheltere	d								0	(19)
Shelter factor				(20) = 1 - [9)] =			1	(20)
Infiltration rate incorporat	-			(21) = (18)	x (20) =				0.15	(21)
Infiltration rate modified for		li i i	11	A 1	0	0-4	Nan	D.,	1	
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp (22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7]	
(/	7.0	0	0.0	5	•	L	I		I	
Wind Factor (22a)m = (22	'	Г							1	
(22a)m= 1.27 1.25	1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effe		-	rate for t	пе арріі	саріе са	se						0.5	(238
If exhaust air h			endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	wise (23b) = (23a)			0.5	(23)
If balanced with	n heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				75.65	(23)
a) If balance	ed mecha	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	ı)m = (22	2b)m + (23b) × [ı (23c) – 1		┛`
(24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3	_	(24
b) If balance	d mech	anical ve	ntilation	without	heat red	overy (N	ЛV) (24b)m = (22	2b)m + (2	23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h				•					5 (00)	`			
	i	(23b), t	· ` `	ŕ		· ` `	ŕ	<u> </u>	· ` `			1	(24
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
d) If natural if (22b)r		on or wn en (24d)							0.51				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	iter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)					
(25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25
2 Hoot losses	e and he	ot loce r	ooromot	or:					ı	1	•		
3. Heat losse ELEMENT	S and he Gros		Openin		Net Ar	ea	U-valı	IE	AXU		k-value	e A >	X k
LLLIVILINI	area		m		A ,r		W/m2		(W/I	〈)	kJ/m²·ł		
Windows Type	e 1				9.56	x1.	/[1/(1.4)+	0.04] =	12.67				(27
Windows Type	2				8.76	x1.	/[1/(1.4)+	0.04] =	11.61				(27
Walls Type1	61.0	9	18.3	2	42.77	, X	0.18	=	7.7	$\overline{}$ [60	2566.2	(29
Walls Type2	3.80	6	0		3.86	x	0.17	=	0.65	$\overline{}$	60	231.6	(29
Total area of e	lements	, m²			64.95	5							— (31
Party wall					37.5	x	0	=	0		45	1687.5	(32
Party floor					63.92	2					40	2556.8	(32
Party ceiling					63.92	<u> </u>				Ī	30	1917.6	(32
Internal wall **					113.4	7				Ī	9	1021.23	3 (32
* for windows and						ated using	formula 1	/[(1/U-valu	ie)+0.04] a	ns given in	paragraph		_
** include the area				is and pari	titions		(26)(30)	± (32) =			Ī		٦,,,,
Fabric heat los		•	U)				(20)(30)		.(30) + (32	2) + (225)	(320) -	32.63	(33
Heat capacity Thermal mass		,	2 – Cm	TEA) ir	k I/m²k⁄			***	$\div (4) =$	2) + (32a).	(32e) =	9980.93	(34
For design asses	•	•		,			ecisely the	` '	. ,	TMP in T	able 1f	156.15	(35
can be used inste				constract	017 470 770	. rarowr pr	colocity the	maioanvo	values of		ubio 11		
Thermal bridg	es : S (L	x Y) cal	culated (using Ap	pendix l	<						7.91	(36
if details of therm		are not kn	own (36) =	= 0.05 x (3	1)								_
Total fabric he									(36) =			40.54	(37
Ventilation hea	i	i							= 0.33 × (T	1	1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		/00
(38)m= 17.5	17.29	17.08	16.03	15.82	14.77	14.77	14.56	15.19	15.82	16.24	16.66	I	(38
1		+ 101/1/											
Heat transfer (39)m= 58.04	57.83	57.62	56.57	56.36	55.32	55.32	55.11	(39)m 55.73	= (37) + (3 56.36	38)m 56.78	57.2	ı	

Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.91	0.9	0.9	0.89	0.88	0.87	0.87	0.86	0.87	0.88	0.89	0.89		
				!		!			Average =	Sum(40) ₁	12 /12=	0.88	(40)
Number of day	<u> </u>			·	i .				<u> </u>				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(44)
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water heat	ting ene	rgy requi	rement:								kWh/ye	ear:	
Assumed occu if TFA > 13.9 if TFA £ 13.9	9, N = 1		[1 - exp	0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		09		(42)
Annual average Reduce the annual not more that 125	al average	hot water	usage by	5% if the a	lwelling is	designed			se target c		3.84		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage is								1 1	1	1			
(44)m= 92.22	88.87	85.51	82.16	78.81	75.45	75.45	78.81	82.16	85.51	88.87	92.22		
										ım(44) ₁₁₂ =	L	1006.06	(44)
Energy content of	f hot water	used - cal	culated mo	onthly = 4 .	190 x Vd,ı	n x nm x E	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 136.76	119.61	123.43	107.61	103.25	89.1	82.56	94.74	95.88	111.73	121.97	132.45		
If instantaneous w	vator hoati	na at noint	of use (no	n hot water	r storaga)	enter () in	hoves (46		Total = Su	ım(45) ₁₁₂ =	= [1319.1	(45)
			,		· · ·		· · ·	, , , ,	10.70	10.00	40.07		(46)
(46)m= 20.51 Water storage	17.94 loss:	18.51	16.14	15.49	13.37	12.38	14.21	14.38	16.76	18.29	19.87		(46)
Storage volum) includir	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	neating a	and no ta	nk in dw	velling, e	nter 110) litres in	(47)				'		
Otherwise if no	o stored	hot wate	er (this in	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in ((47)			
Water storage					(1.14.11								
a) If manufact				or is kno	wn (kVVI	n/day):					0		(48)
Temperature f											0		(49)
Energy lost from b) If manufact		•			or ic not		(48) x (49)) =		1	10		(50)
Hot water stor			-							0.	02		(51)
If community h	•			•		• ,							` '
Volume factor										1.	.03		(52)
Temperature f	actor fro	m Table	2b							0	.6		(53)
Energy lost fro		_	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter (50) or (` , ` `	,								1.	.03		(55)
Water storage	loss cal	culated 1	or each	month	•		((56)m = ((55) × (41)	m •				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contains	s dedicate	d solar sto	rage, (57)ı	m = (56)m •	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where ((H11) is fro	m Appendi	хН	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit	loss (ar	nnual) fro	m Table	e 3							0		(58)
Primary circuit				,	•		, ,						
(modified by					ı —			<u> </u>	1	- 			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi loss ca	lculated	for each	month ((61)m –	(60) ± 3	65 v (41	١m						
(61)m= 0	0	0	0	0 0	00) + 3	03 × (41)) 0		T 0	0	0	1	(61)
												J (59)m + (61)m	(-)
(62)m= 192.04	169.54	178.71	161.1	158.53	142.59	137.84	150.0		` 	` 	187.72]	(62)
Solar DHW input	<u> </u>											J	(/
(add additiona									ar contino	mon to wat	or ricating)		
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(63)
Output from w	ater hea	ter					!	ļ.			<u> </u>	J	
(64)m= 192.04	169.54	178.71	161.1	158.53	142.59	137.84	150.0)2 149.37	167.01	175.46	187.72	1	
	1	<u> </u>	<u> </u>	ļ.		Į	C	Output from v	vater heat	_ I er (annual)₁	112	1969.94	(64)
Heat gains fro	m water	heating,	kWh/me	onth 0.2	5 ′ [0.85	5 × (45)m	+ (61)m] + 0.8	x [(46)n	n + (57)m	+ (59)m	1]	-
(65)m= 89.69	79.71	85.26	78.58	78.55	72.42	71.67	75.7	` 	81.37	83.35	88.26]	(65)
include (57)	m in cald	culation of	of (65)m	only if c	vlinder	is in the	dwellir	ng or hot v	vater is	from com	munity h	ı neating	
5. Internal ga					,			<u> </u>			,	<u> </u>	
Metabolic gair	Ì												
Jan	Feb	Mar	Apr	May	Jun	Jul	Au	g Sep	Oct	Nov	Dec]	
(66)m= 104.5	104.5	104.5	104.5	104.5	104.5	104.5	104.	5 104.5	104.5	104.5	104.5		(66)
Lighting gains	(calcula	ted in Ap	pendix	L, equat	ion L9 c	r L9a), a	lso se	e Table 5		-	-	-	
(67)m= 16.29	14.47	11.77	8.91	6.66	5.62	6.07	7.9	10.6	13.46	15.7	16.74]	(67)
Appliances ga	ins (calc	ulated in	Append	dix L, eq	uation L	.13 or L1	3a), a	lso see Ta	able 5	•	•	•	
(68)m= 182.71	184.61	179.83	169.66	156.82	144.75	136.69	134.	8 139.57	149.75	162.58	174.65]	(68)
Cooking gains	(calcula	ted in A	ppendix	L, equat	ion L15	or L15a), also	see Table	e 5	•	-	-	
(69)m= 33.45	33.45	33.45	33.45	33.45	33.45	33.45	33.4	5 33.45	33.45	33.45	33.45]	(69)
Pumps and fa	ns gains	(Table 5	ōa)					•	•			•	
(70)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(70)
Losses e.g. ev	/aporatio	n (nega	tive valu	es) (Tab	le 5)			•	•	•	•	•	
(71)m= -83.6	-83.6	-83.6	-83.6	-83.6	-83.6	-83.6	-83.6	6 -83.6	-83.6	-83.6	-83.6]	(71)
Water heating	gains (T	able 5)		-		-		-	-	-	-	-	
(72)m= 120.56	118.62	114.6	109.13	105.58	100.58	96.34	101.7	78 103.71	109.37	115.76	118.63]	(72)
Total internal	gains =				(66)m + (67)m	ı + (68)	m + (69)m +	(70)m + (71)m + (72))m	-	
(73)m= 373.91	372.05	360.55	342.05	323.41	305.31	293.45	298.8	32 308.23	326.92	348.4	364.37]	(73)
6. Solar gain	s:												
Solar gains are	calculated	using sola	r flux from	Table 6a	and assoc	ciated equa	itions to	convert to t	he applica	able orienta	tion.		
Orientation:			Area		Flu			g_ Table 6b	_	FF		Gains	
_	Table 6d		m²			ble 6a		Table 60) — -	Table 6c		(W)	-
Northeast _{0.9x}	0.77	Х	9.5	56	x	11.28	x	0.63	x	0.7	=	32.96	(75)
Northeast _{0.9x}	0.77	X	9.5	56	X	22.97	X	0.63	x	0.7	=	67.1	(75)
Northeast 0.9x	0.77	X	9.5	56	X	41.38	X	0.63	x	0.7	=	120.89	(75)
Northeast 0.9x	0.77	Х	9.5	56	x	67.96	X	0.63	x	0.7	=	198.54	(75)
Northeast _{0.9x}	0.77	X	9.5	56	X	91.35	X	0.63	Х	0.7	=	266.88	(75)

N 1 41 4							1		_				– 1
Northeast _{0.9x}	0.77	X	9.5	56	x	97.38	X	0.63	×	0.7	=	284.52	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x	91.1	X	0.63	X	0.7	=	266.17	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x	72.63	X	0.63	X	0.7	=	212.19	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x	50.42	X	0.63	X	0.7	=	147.31	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x	28.07	X	0.63	X	0.7	=	82	(75)
Northeast _{0.9x}	0.77	X	9.5	56	X	14.2	X	0.63	X	0.7	=	41.48	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x	9.21	X	0.63	X	0.7	=	26.92	(75)
Southeast 0.9x	0.77	X	8.7	76	X	36.79	X	0.63	X	0.7	=	98.5	(77)
Southeast 0.9x	0.77	X	8.7	7 6	X	62.67	X	0.63	X	0.7	=	167.79	(77)
Southeast 0.9x	0.77	X	8.7	7 6	x	85.75	X	0.63	X	0.7	=	229.57	(77)
Southeast _{0.9x}	0.77	Х	8.7	' 6	x	106.25	x	0.63	х	0.7	=	284.45	(77)
Southeast _{0.9x}	0.77	X	8.7	76	x	119.01	X	0.63	x	0.7	=	318.61	(77)
Southeast _{0.9x}	0.77	X	8.7	76	x	118.15	X	0.63	X	0.7		316.31	(77)
Southeast _{0.9x}	0.77	X	8.7	76	x	113.91	x	0.63	x	0.7		304.95	(77)
Southeast _{0.9x}	0.77	X	8.7	76	x	104.39	X	0.63	x	0.7	-	279.47	(77)
Southeast _{0.9x}	0.77	X	8.7	76	x	92.85	x	0.63	x	0.7	=	248.58	(77)
Southeast _{0.9x}	0.77	X	8.7	' 6	x	69.27	j x	0.63	x	0.7		185.44	(77)
Southeast _{0.9x}	0.77	X	8.7	76	x	44.07	j×	0.63	x	0.7		117.98	(77)
Southeast _{0.9x}	0.77	x	8.7	7 6	x	31.49	X	0.63	×	0.7	╡ -	84.3	(77)
Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m													
(83)m= 131.47	234.89	350.47	483	585.49	600.83	571.12	491	.66 395.89	267.44	1 159.46	111.22]	(83)
(00)111= 101.47	-000	330.47	.00	1	000.00	,	1	.00 393.09	207.44	133.40	111.22		(00)
Total gains – i				= (73)m ·			101	.00 393.09	207.42	139.40	111.22		(03)
. ,				= (73)m · 908.91		n , watts	790		594.37	- 	475.59		(84)
Total gains – i	nternal ar	nd solar 711.02	(84)m = 825.05	908.91	+ (83)n 906.14	n , watts				-			
Total gains – i (84)m= 505.38	nternal ar 606.94	nd solar 711.02 erature	(84)m = 825.05 (heating	908.91 season	+ (83)n 906.14	n , watts 4 864.57	790	.48 704.13		-		21	
Total gains – i (84)m= 505.38 7. Mean inter	nternal ar 606.94 mal tempo during he	nd solar 711.02 erature (eating po	(84)m = 825.05 (heating eriods in	908.91 season	906.14) ng area	watts 864.57 a from Tal	790	.48 704.13		-		21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature	nternal ar 606.94 mal tempo during he	nd solar 711.02 erature (eating po	(84)m = 825.05 (heating eriods in	908.91 season	906.14) ng area	n , watts 4 864.57 a from Tal able 9a)	790 ble 9	.48 704.13		7 507.86		21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac	nternal ar 606.94 mal tempo during he	nd solar 711.02 erature (eating points for li	(84)m = 825.05 (heating eriods ir iving are	908.91 season the livinga, h1,m	+ (83)n 906.14) ng area (see T	n , watts 4 864.57 a from Tal able 9a)	790 ble 9	.48 704.13 , Th1 (°C)	594.37	507.86	475.59	21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fact Jan (86)m= 0.97	nternal ar 606.94 rnal tempe during he ctor for ga Feb 0.94	erature (eating pains for limits of limits) Mar 0.87	(84)m = 825.05 (heating eriods in iving are Apr 0.73	908.91 season the livin ea, h1,m May 0.55	906.14) ng area (see] Jun 0.39	a from Tal Jul 0.28	790 ble 9,	.48 704.13 , Th1 (°C) ug Sep 32 0.53	594.37 Oct	7 507.86 Nov	475.59 Dec	21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac	nternal ar 606.94 rnal tempe during he ctor for ga Feb 0.94	erature (eating pains for limits of limits) Mar 0.87	(84)m = 825.05 (heating eriods in iving are Apr 0.73	908.91 season the livin ea, h1,m May 0.55	906.14) ng area (see] Jun 0.39	a from Tal able 9a) Jul 0.28	790 ble 9,	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c)	594.37 Oct	7 507.86 Nov 0.94	475.59 Dec	21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.97 Mean interna (87)m= 19.93	nternal ar 606.94 nal temporal temporal temporal temporal temporal temporal temporal temporal temporal temporal temporal 20.19	erature eating pains for limits for limits at	(84)m = 825.05 (heating eriods ir iving are 0.73 iving are 20.81	908.91 season the livin ea, h1,m May 0.55 ea T1 (for 20.95	+ (83)n 906.14) ng area (see] Jun 0.39 bllow si 20.99	a from Tal able 9a) Jul 0.28 teps 3 to 2	790 ble 9 Al 0.3 7 in T	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97	594.37 Oct 0.8	7 507.86 Nov 0.94	475.59 Dec 0.97	21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fact Jan (86)m= 0.97 Mean interna (87)m= 19.93 Temperature	nternal ar 606.94 rnal temporal during he ctor for gar Feb 0.94 I temperal 20.19 during he control of the co	erature (eating points for limits for limits at limits a	(84)m = 825.05 (heating eriods in Apr 0.73 iving are 20.81 eriods in a control of the control of	908.91 season the livin ea, h1,m May 0.55 ea T1 (for 20.95	+ (83)n 906.1 ²) ng area (see 1 Jun 0.39 bllow st 20.99	a from Tal Table 9a) Jul 0.28 teps 3 to 7	790 ble 9, 0.3 7 in T 2	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C)	Oct 0.8	Nov 0.94	Dec 0.97	21	(84)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fact Jan (86)m= 0.97 Mean internation (87)m= 19.93 Temperature (88)m= 20.16	nternal ar 606.94 rnal temporal during he ctor for ga Feb 0.94 I temperal 20.19 during he 20.16	erature (eating points for limited at the control of the control o	(84)m = 825.05 (heating eriods in iving are 20.81 eriods in 20.18	908.91 season the livin ea, h1,m May 0.55 ea T1 (for 20.95 rest of 20.18	+ (83)n 906.14) ng area (see 1 Jun 0.39 bllow st 20.99 dwellir 20.2	a from Tal Table 9a) Jul 0.28 teps 3 to 7 21 ng from Ta	790 ble 9, 0.3 7 in T 2 able 9	.48 704.13 , Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C)	594.37 Oct 0.8	Nov 0.94	475.59 Dec 0.97	21	(84) (85) (86) (87)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac	nternal ar 606.94 nal temporal during he tor for ga Feb 0.94 ltempera 20.19 during he 20.16 ctor for ga	erature eating pains for limits at the eating pains at the eating pains at the eating pains at the eating pains for real eating pain	(84)m = 825.05 (heating eriods ir iving are 0.73 iving are 20.81 eriods ir 20.18 est of decrease in the second in the second ir iving are 20.18	908.91 season the livin ea, h1,m May 0.55 ea T1 (for 20.95 rest of 20.18 welling,	+ (83)n 906.14) ng area (see] Jun 0.39 bllow si 20.99 dwellir 20.2	a from Tal Table 9a) Jul 0.28 teps 3 to 2 21 ng from Ta 20.2 see Table	790 ble 9 0.3 7 in T 2 able 9 20 99a)	.48 704.13 Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C) .2 20.19	Oct 0.8 20.76	Nov 0.94 20.3	Dec 0.97 19.89 20.17	21	(84) (85) (86) (87) (88)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac (89)m= 0.96	nternal ar 606.94 nal temporal during he ctor for ga Peb 0.94 ltemperal 20.19 during he 20.16 ctor for ga	erature eating pains for limited at limited	(84)m = 825.05 (heating eriods ir iving are 0.73 iving are 20.81 eriods ir 20.18 est of do 0.69	908.91 season the livin ea, h1,m May 0.55 ea T1 (for 20.95 rest of 20.18 welling, 0.51	+ (83)n 906.14) ng area (see T Jun 0.39 bllow si 20.99 dwellir 20.2 h2,m (s	a from Tal Table 9a) Jul 0.28 teps 3 to 7 21 g from Ta 20.2 see Table 0.23	790 ble 9 0.3 7 in T 2 able 9 20 9a) 0.2	A8 704.13 Th1 (°C) ug Sep B2 0.53 Table 9c) 1 20.97 9, Th2 (°C) 2 20.19	Oct 0.8 20.76 20.18	Nov 0.94	Dec 0.97	21	(84) (85) (86) (87)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac [86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac (89)m= 0.96 Mean interna	nternal ar 606.94 mal temporal during he ctor for ga Feb 0.94 Il temperal 20.19 during he control of the con	erature eating positions for limited at the eating positions for limited at the eating positions for respectively. The eating positions for respectively.	(84)m = 825.05 (heating eriods in iving are 20.81 eriods in 20.18 est of do 0.69 the rest	908.91 season the livin ea, h1,m May 0.55 ea T1 (for 20.95 n rest of 20.18 welling, 0.51 of dwelling	+ (83)n 906.14) ng area (see T Jun 0.39 bllow si 20.99 dwellir 20.2 h2,m (see T)	a from Tal Table 9a) Jul 0.28 teps 3 to 2 21 ng from Ta 20.2 see Table 0.23 (follow ste	790 ble 9, 0.3 7 in T 2 able 9 9a) 0.2 eps 3	.48 704.13 Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C) 2 20.19 1 0.47 1 to 7 in Table	Oct 0.8 20.76 20.18 0.77 e 9c)	Nov 0.94 20.3 20.18	Dec 0.97 19.89 20.17	21	(84) (85) (86) (87) (88) (89)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac (89)m= 0.96	nternal ar 606.94 nal temporal during he ctor for ga Peb 0.94 ltemperal 20.19 during he 20.16 ctor for ga	erature eating pains for limited at limited	(84)m = 825.05 (heating eriods ir iving are 0.73 iving are 20.81 eriods ir 20.18 est of do 0.69	908.91 season the livin ea, h1,m May 0.55 ea T1 (for 20.95 rest of 20.18 welling, 0.51	+ (83)n 906.14) ng area (see T Jun 0.39 bllow si 20.99 dwellir 20.2 h2,m (s	a from Tal Table 9a) Jul 0.28 teps 3 to 2 21 ng from Ta 20.2 see Table 0.23 (follow ste	790 ble 9 0.3 7 in T 2 able 9 20 9a) 0.2	A8 704.13 Th1 (°C) ug Sep B2 0.53 Table 9c) 1 20.97 9, Th2 (°C) 2 20.19 to 7 in Table 2 20.17	Oct 0.8 20.76 20.18 0.77 e 9c) 19.91	Nov 0.94 20.3 20.18 0.93	Dec 0.97 19.89 20.17 0.97		(84) (85) (86) (87) (88) (89)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac [86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac (89)m= 0.96 Mean interna	nternal ar 606.94 mal temporal during he ctor for ga Feb 0.94 Il temperal 20.19 during he control of the con	erature eating positions for limited at the eating positions for limited at the eating positions for respectively. The eating positions for respectively.	(84)m = 825.05 (heating eriods in iving are 20.81 eriods in 20.18 est of do 0.69 the rest	908.91 season the livin ea, h1,m May 0.55 ea T1 (for 20.95 n rest of 20.18 welling, 0.51 of dwelling	+ (83)n 906.14) ng area (see T Jun 0.39 bllow si 20.99 dwellir 20.2 h2,m (see T)	a from Tal Table 9a) Jul 0.28 teps 3 to 2 21 ng from Ta 20.2 see Table 0.23 (follow ste	790 ble 9, 0.3 7 in T 2 able 9 9a) 0.2 eps 3	A8 704.13 Th1 (°C) ug Sep B2 0.53 Table 9c) 1 20.97 9, Th2 (°C) 2 20.19 to 7 in Table 2 20.17	Oct 0.8 20.76 20.18 0.77 e 9c) 19.91	Nov 0.94 20.3 20.18	Dec 0.97 19.89 20.17 0.97	0.38	(84) (85) (86) (87) (88) (89)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac [86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac (89)m= 0.96 Mean interna	nternal ar 606.94 nal temporal during he tor for ga 20.19 during he 20.16 ctor for ga 0.92 l tempera 19.11	erature eating pains for li Mar 0.87 eating pains for li 20.51 eating pains for r 0.85 eating pains for r 0.85 eating pains for r 0.85	(84)m = 825.05 (heating eriods ir iving are 0.73 iving are 20.81 eriods ir 20.18 est of do 0.69 the rest 19.97	908.91 season the livin ea, h1,m May 0.55 ea T1 (for 20.95 n rest of 20.18 welling, 0.51 of dwelling	+ (83)n 906.14) ng area (see T Jun 0.39 bllow si 20.99 dwellir 20.2 h2,m (s 0.34 ng T2 20.19	a from Tal Table 9a) Jul 0.28 teps 3 to 7 21 ag from Ta 20.2 see Table 0.23 (follow ste	790 ble 9	.48 704.13 Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C) .2 20.19 to 7 in Table 2 20.17	Oct 0.8 20.76 20.18 0.77 e 9c) 19.91	Nov 0.94 20.3 20.18 0.93	Dec 0.97 19.89 20.17 0.97		(84) (85) (86) (87) (88) (89)
Total gains – i (84)m= 505.38 7. Mean inter Temperature Utilisation fac Jan (86)m= 0.97 Mean interna (87)m= 19.93 Temperature (88)m= 20.16 Utilisation fac (89)m= 0.96 Mean interna (90)m= 18.74	nternal ar 606.94 nal temporal during he ctor for gar 20.19 during he 20.16 ctor for gar 19.11 ltemperar 19.52	erature eating peains for li Mar 0.87 ature in l 20.51 eating pe 20.17 ains for r 0.85 ature in t 19.56 ature (fo	(84)m = 825.05 (heating eriods ir iving are 20.81 eriods ir 20.18 est of do 0.69 the rest 19.97 r the wh	908.91 season the livin ea, h1,m May 0.55 ea T1 (for 20.95 n rest of 20.18 welling, 0.51 of dwelling 20.13	+ (83)n 906.14) ng area (see T Jun 0.39 bllow si 20.99 dwellir 20.2 h2,m (s 0.34 ng T2 20.19	m , watts 4 864.57 a from Tal Table 9a) Jul 0.28 teps 3 to 7 21 ng from Ta 20.2 see Table 0.23 (follow ste 20.2	790 ble 9	.48 704.13 Th1 (°C) ug Sep 32 0.53 Table 9c) 1 20.97 9, Th2 (°C) .2 20.19 to 7 in Table 2 20.17 f fLA) × T2 .5 20.47	Oct 0.8 20.76 20.18 0.77 e 9c) 19.91 LA = Liv	7 507.86 Nov 0.94 20.3 20.18 0.93 19.29 ring area ÷ (4)	Dec 0.97 19.89 20.17 0.97		(84) (85) (86) (87) (88) (89)

					•			•		•	1	•	
(93)m= 19.19	19.52	19.92	20.29	20.44	20.5	20.5	20.5	20.47	20.23	19.67	19.14		(93)
8. Space hea													
Set Ti to the return the utilisation			•		ed at st	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac			<u> </u>					1					
(94)m= 0.95	0.91	0.84	0.7	0.52	0.36	0.25	0.29	0.49	0.77	0.92	0.96		(94)
Useful gains,	hmGm	, W = (9	4)m x (8	4)m									
(95)m= 481.7	555.07	597.49	576.76	475.72	323.61	215.39	225.34	345.69	458.98	466.53	457.07		(95)
	Monthly average external temperature from Table 8												
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate		i	 			-``	· · ·	``				Ī	(o=)
(97)m= 864.4	845.57	773.35	644.22	492.83	326.09	215.79	226.04	355.11	542.96	713.83	854.77		(97)
Space heatin (98)m= 284.73	g require 195.21	130.84	48.57	12.73	/vn/mon	th = 0.02	24 x [(97])m – (95 0)m] x (4 62.48	1)m 178.05	295.89		
(98)m= 284.73	193.21	130.04	40.37	12.73	0					l .		1200 F	(98)
							rota	l per year	(kvvn/year) = Sum(9	8)15,912 =	1208.5	=
Space heatin	g require	ement in	kWh/m²	² /year								18.91	(99)
9b. Energy red	quiremer	nts – Coi	mmunity	heating	scheme)							
This part is use										unity sch	neme.		7(201)
Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none									0	(301)			
Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The community so									up to four	other heat	sources; t	he latter	
includes boilers, h Fraction of hea		-			rom powe	r stations.	See Appei	naix C.				1	(303a)
Fraction of total			-		oilers				(3	02) x (303	a) =	1	(304a)
Factor for cont	·			•		r commu	unity hea	ating sys	tem			1	(305)
Distribution los				,	` ''		•	0 ,				1.05	(306)
Space heating		`	,		,	0 ,						kWh/yea	
Annual space	-	requiren	nent									1208.5	<u>.</u>
Space heat fro	m Comi	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	=	1268.93	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308
Space heating	require	ment fro	m secon	dary/suլ	oplemen	tary syst	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water heating	1												
Annual water h		equirem	ent									1969.94	
If DHW from c	ommuni	ty schen	ne:										-
Water heat fro	m Comr	nunity bo	oilers					(64) x (30	03a) x (30	=	2068.44	(310a)	
Electricity used	d for hea	at distribi	ution				0.01	× [(307a).	(307e) +	· (310a)((310e)] =	33.37	(313)
Cooling Syster	m Energ	y Efficie	ncy Rati	0								0	(314)
Space cooling	(if there	is a fixe	d coolin	g systen	n, if not e	enter 0)		= (107) ÷	(314) =			0	(315)
Electricity for p													7,000
mechanical ve	ntilation	- paland	ea, extr	act or po	sitive in	put from	outside					135.98	(330a)

warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330b	b) + (330g) =		135.98	(331)
Energy for lighting (calculated in Appen		287.67	(332)			
Total delivered energy for all uses (307	(1) + (309) + (310) + (31	2) + (315) + (331) + (33	32)(237b) =		3761.01	(338)
12b. CO2 Emissions – Community hea	ting scheme					
		Energy kWh/year	Emission factors kg CO2/kWh		missions g CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)	Ŭ \	P) sing two fuels repeat (363) to	(366) for the secon	nd fuel	96	(367a)
CO2 associated with heat source 1	[(307b	b)+(310b)] x 100 ÷ (367b) x	0.22	=	750.91	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	17.32	(372)
Total CO2 associated with community s	systems	(363)(366) + (368)(372	2)	=	768.23	(373)
CO2 associated with space heating (se	econdary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =			768.23	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	=	70.57	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	149.3	(379)
Total CO2, kg/year	sum of (376)(382) =				988.1	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				15.46	(384)

El rating (section 14)

87.84

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:53:58

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 60.34m²Site Reference:Highgate Road - GREENPlot Reference: 03 - I

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 18.05 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 15.55 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 45.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 37.8 kWh/m²

OK

2 Fabric U-values

 Element
 Average
 Highest

 External wall
 0.18 (max. 0.30)
 0.18 (max. 0.70)
 OK

 Party wall
 0.00 (max. 0.20)
 OK

Floor (no floor) Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ок
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	ок
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	4.7m²	
Windows facing: South East	6.09m²	
Windows facing: North West	2.92m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		l lsar I	Details:										
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa	are Ve				010943 on: 1.0.5.50					
Property Address: 03 - I Address:													
1. Overall dwelling dime	ensions:												
3		Are	a(m²)		Av. He	ight(m)		Volume(m	³)				
Ground floor			60.34	(1a) x	2	2.65	(2a) =	159.9	(3a)				
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	60.34	(4)									
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	159.9	(5)				
2. Ventilation rate:													
	main seconda heating heating	ry	other		total			m³ per hou	ır				
Number of chimneys	0 + 0	+ [0	=	0	X 4	40 =	0	(6a)				
Number of open flues	0 + 0	<u> </u>	0	Ī - Ē	0	x 2	20 =	0	(6b)				
Number of intermittent fa	ns				0	x '	10 =	0	(7a)				
Number of passive vents				Ē	0	x -	10 =	0	(7b)				
Number of flueless gas fi	res			F	0	X 4	40 =	0	(7c)				
				L									
				_			Air ch	nanges per ho	our —				
•	ys, flues and fans = (6a)+(6b)+(ontinus fr	0		÷ (5) =	0	(8)				
Number of storeys in the	een carried out or is intended, proceence	ea 10 (17),	otrierwise (onunue ir	om (9) to	(10)		0	(9)				
Additional infiltration	3 \					[(9)	-1]x0.1 =	0	(10)				
	.25 for steel or timber frame o			•	ruction			0	(11)				
if both types of wall are pudeducting areas of openia	resent, use the value corresponding t nas): if equal user 0.35	o the grea	ter wall are	a (after									
,	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)				
If no draught lobby, en	ter 0.05, else enter 0							0	(13)				
-	s and doors draught stripped							0	(14)				
Window infiltration			0.25 - [0.2	. ,	-			0	(15)				
Infiltration rate	250 averaged in autic mate		(8) + (10)					0	(16)				
•	q50, expressed in cubic metro ity value, then $(18) = [(17) \div 20] + (18)$	•	•	•	etre or e	envelope	area	3	(17)				
· ·	es if a pressurisation test has been do				is being u	sed		0.15	(10)				
Number of sides sheltere	ed							0	(19)				
Shelter factor			(20) = 1 -		19)] =			1	(20)				
Infiltration rate incorporat	•		(21) = (18) x (20) =				0.15	(21)				
Infiltration rate modified f	- 1 	1	1 4	0.5.5	0-4	Nan	Data	1					
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec						
Monthly average wind sp (22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7]					
(1	1	<u>'</u>	I	<u> </u>	l	I					
Wind Factor (22a)m = (22	' 							1					
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18						

Adjusted infiltr	ation rat	e (allowi	ing for sh	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effe		•	rate for t	пе арріі	cable ca	ise					ĺ	0.5	(23
If exhaust air h	eat pump	using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)			0.5	(23
If balanced with	h heat reco	overy: effic	ciency in %	allowing t	for in-use f	actor (fron	n Table 4h) =				75.65	(23
a) If balance	ed mech	anical ve	entilation	with he	at recov	ery (MVI	HR) (24a	a)m = (22)	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(24
b) If balance	ed mech	anical ve	entilation	without	heat red	covery (I	MV) (24b	m = (22)	2b)m + (2	23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)r		tract ver < (23b), t		•					.5 × (23b))			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)r		on or wh en (24d)		•					0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	nter (24a) or (24l	o) or (24	c) or (24	d) in bo	x (25)					
(25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25
3. Heat losse	s and he	eat loss	paramet	er:									
LEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/I	K)	k-value kJ/m²-ł		
Windows Type	∋ 1				4.7	x1	/[1/(1.4)+	0.04] =	6.23				(27
Windows Type	e 2				6.09	x1	/[1/(1.4)+	0.04] =	8.07				(27
Windows Type	e 3				2.92	x1	/[1/(1.4)+	0.04] =	3.87				(27
Walls Type1	52.	8	13.7	1	39.09) x	0.18	=	7.04		60	2345.4	(29
Walls Type2	27.3	31	0		27.3′	ı x	0.17	=	4.59		60	1638.6	(29
otal area of e	elements	s, m²			80.11	I							(31
Party wall					16.88	3 x	0	=	0		45	759.6	(32
Party floor					60.34	1					40	2413.6	(32
Party ceiling					60.34	1					30	1810.2	(32
nternal wall **	•				107.9	1				[9	971.190	1 (32
for windows and it include the are						lated using	g formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	3.2	
Fabric heat lo				is anu par	แนงกร		(26)(30) + (32) =			1	29.8	(33
Heat capacity		•	0,						(30) + (32	2) + (32a).	(32e) =	9938.59	(34
Thermal mass		` '	⊃ = Cm ÷	- TFA) ir	n kJ/m²K				÷ (4) =	, , ,	` ′	164.71	(35
or design asses an be used inste	sments wh	nere the de	tails of the	•			recisely the	e indicative	e values of	TMP in Ta	able 1f		`
Thermal bridg	es : S (L	.xY) cal	culated (using Ap	pendix l	K						7.62	(36
f details of therm		are not kn	nown (36) =	= 0.05 x (3	31)						-		_
Total fabric he								(33) +	(36) =			37.42	(37
entilation hea	at loss ca	alculated	d monthly	/			•		= 0.33 × (25)m x (5)) 	ı	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		

(38)m= 16.52	16.32	16.12	15.13	14.93	13.94	13.94	13.75	14.34	14.93	15.33	15.72		(38)
` ′		<u> </u>	13.13	14.93	13.94	13.94	13.73			l	15.72		(30)
Heat transfe		53.54	52.55	52.35	51.36	51.36	51.16	51.76	= (37) + (3 52.35	52.75	53.14		
(00)111=	00.71	00.01	02.00	02.00	01.00	01.00	01.10			Sum(39) ₁	<u> </u>	52.5	(39)
Heat loss pa	rameter (I	HLP), W	m²K						= (39)m ÷				_
(40)m= 0.89	0.89	0.89	0.87	0.87	0.85	0.85	0.85	0.86	0.87	0.87	0.88		_
Number of d	avs in mo	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	0.87	(40)
Jan	i	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 he	ating ene	rgy requ	irement:								kWh/ye	ear:	
Assumed so	ou no nov	NI											(40)
Assumed oc if TFA > 1	3.9, N = 1		[1 - exp	(-0.0003	349 x (TF	A -13.9)2)] + 0.0	0013 x (ΓFA -13.		99		(42)
if TFA £ 1: Annual avera	,	ater usad	ae in litre	es per da	ıv Vd.av	erage =	(25 x N)	+ 36		81	.49		(43)
Reduce the ann	ual average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		.70		(10)
not more that 1.						<u> </u>							
Jan Hot water usag		Mar r day for ea	Apr	May	Jun	Jul Table 1c x	Aug	Sep	Oct	Nov	Dec		
	'	83.12	79.86	76.6	73.34	73.34	76.6	79.86	83.12	86.38	89.64		
(44)m= 89.64	00.30	03.12	79.00	76.6	73.34	73.34	70.0			m(44) ₁₁₂ =	L	977.9	(44)
Energy content	of hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x E	OTm / 3600			. ,	L	077.0	(```
(45)m= 132.9	3 116.27	119.98	104.6	100.36	86.61	80.25	92.09	93.19	108.61	118.55	128.74		
If in atomton a cur	water beet	na ot noint	of upo (no	hot water	· otorogo)	antar O in	havea (16		Γotal = Su	m(45) ₁₁₂ =	=	1282.18	(45)
If instantaneous			·			1		` '	40.00	17.70	1004		(46)
(46)m= 19.94 Water storage		18	15.69	15.05	12.99	12.04	13.81	13.98	16.29	17.78	19.31		(46)
Storage volu) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community	heating a	and no ta	ınk in dw	velling, e	nter 110	litres in	(47)						
Otherwise if		hot wate	er (this in	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storag		eclared I	oss facto	or is kno	wn (kWh	n/day).					0		(48)
Temperature				01 10 1410	("uay).					0		(49)
Energy lost f				ear			(48) x (49)) =			10		(50)
b) If manufa	cturer's d	eclared o	cylinder l	loss fact									, ,
Hot water sto	•			le 2 (kW	h/litre/da	ıy)				0.	02		(51)
If community Volume factor	_		011 4.3							1	.03		(52)
Temperature			2b							—	.6		(53)
Energy lost f	rom wate	r storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	1.	.03		(54)
Enter (50) o	r (54) in (55)								1.	03		(55)
Water storag	je loss cal	culated	for each	month			((56)m = (55) × (41)ı	m				
(56)m= 32.01		32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder conta	ins dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	хН	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)

Primary circuit loss (annual) from	om Table 3			0		(58)
Primary circuit loss calculated		(58) ÷ 365 × (41)m			
(modified by factor from Tab	ole H5 if there is solar wa	ater heating and	a cylinder thermo	stat)		
(59)m= 23.26 21.01 23.26	22.51 23.26 22.51	23.26 23.26	22.51 23.26	22.51 2	23.26	(59)
Combi loss calculated for each	n month (61)m = (60) ÷ 3	365 × (41)m				
(61)m= 0 0 0	0 0 0	0 0	0 0	0	0	(61)
Total heat required for water h	neating calculated for ea	ch month (62)m :	= 0.85 × (45)m +	(46)m + (5	 7)m + (59)m + (61)m	
(62)m= 188.21 166.19 175.25	158.09 155.64 140.1	135.53 147.37	146.69 163.88	ì í	184.02	(62)
Solar DHW input calculated using App			I L O' if no solar contribut	ļļ_	l neating)	
(add additional lines if FGHRS	· · · · · ·					
(63)m = 0 0 0	0 0 0	0 0	0 0	0	0	(63)
Output from water heater		<u> </u>	1	ļl		
(64)m= 188.21 166.19 175.25	158.09 155.64 140.1	135.53 147.37	146.69 163.88	172.05 1	184.02	
(0.7)	1	-	put from water heate			(64)
Heat gains from water heating	. kWh/month 0.25 ′ [0.8], ,
(65)m= 88.42 78.6 84.11	77.57 77.59 71.59	70.91 74.84	73.78 80.33		87.03	(65)
` '	 			<u> </u>		(00)
include (57)m in calculation	. ,	is in the aweiling	or not water is if	om commu	unity neating	
5. Internal gains (see Table !	,					
Metabolic gains (Table 5), Wa		1 1 .				
Jan Feb Mar	Apr May Jun	Jul Aug	Sep Oct	Nov	Dec	(0.0)
(66)m= 99.56 99.56 99.56	99.56 99.56 99.56	99.56 99.56	99.56 99.56	99.56	99.56	(66)
Lighting gains (calculated in A	`` 	or L9a), also see	Table 5			
(67)m= 15.49 13.76 11.19	8.47 6.33 5.35	5.78 7.51	10.08 12.8	14.94 1	15.93	(67)
Appliances gains (calculated in	n Appendix L, equation I	L13 or L13a), als	o see Table 5			
(68)m= 173.8 175.61 171.06	161.39 149.17 137.69	130.03 128.22	132.77 142.44	154.66 1	166.13	(68)
Cooking gains (calculated in A	ppendix L, equation L15	5 or L15a), also s	ee Table 5			
(69)m= 32.96 32.96 32.96	32.96 32.96 32.96	32.96 32.96	32.96 32.96	32.96	32.96	(69)
Pumps and fans gains (Table	5a)	•		-		
(70)m = 0 0 0	0 0 0	0 0	0 0	0	0	(70)
Losses e.g. evaporation (nega	ative values) (Table 5)	•	•	•		
(71)m= -79.65 -79.65 -79.65	-79.65 -79.65 -79.65	-79.65 -79.65	-79.65 -79.65	-79.65	79.65	(71)
Water heating gains (Table 5)	.1 1		ļ l	I		
(72)m= 118.85 116.96 113.06	107.74 104.29 99.43	95.3 100.59	102.47 107.97	114.19 1	116.97	(72)
Total internal gains =	 	<u> </u>	+ (69)m + (70)m + (7	<u> </u>		
(73)m= 361.01 359.2 348.18	, , , , , , , , , , , , , , , , , , , 	, , , , , , , , , , , , , , , , , , , 	298.19 316.08	<u> </u>	351.9	(73)
6. Solar gains:	9:210: 200:0	200.00	200.10	000.00	50.10	
Solar gains are calculated using sola	ar flux from Table 6a and asso	ciated equations to c	onvert to the applicat	ole orientation	1.	
Orientation: Access Factor		ux	g_	FF	Gains	
Table 6d				able 6c	(W)	
Southeast 0.9x 0.77 x	6.09 ×	36.79 ×	0.63 ×	0.7	= 68.48	(77)
Southeast 0.9x 0.77 x		62.67 X	0.63 x	0.7	= 116.65](77)
0.11 ×		<u></u> "		0.7		7, ,

Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x	ch month 473.96 4 = (73)m + (8 786.63 7 g season) in the living	(83)m , watts 771.86 740.9	409.05 698.24	Sum(74)m 5 351.18 4 649.37		157.99	112.06 463.96	21	(83) (84)
Southeast 0.9x	ch month 473.96 4 = (73)m + (8 786.63 7	(83)m , watts 771.86 740.9	83)m = 409.05	Sum(74)m 5 351.18 4 649.37	.(82)m 253.46	157.99			(84)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest0.9x 0.77 x 4.0 S	ch month 473.96 4 = (73)m + (8	476.51 456.92 (83)m , watts	83)m = 409.05	Sum(74)m 5 351.18	.(82)m 253.46	157.99			
Southeast 0.9x	ch month 473.96 4	476.51 456.92	83)m =	Sum(74)m	.(82)m		112.06		(83)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest0.9x 0.77 x 4.0 S	.92 x	(8	83)m =	Sum(74)m	.(82)m		112.06		(83)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0	92 x		_			0.7			
Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 2.9		9.21	× L	0.03	J ^ L	0.1			
Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 2.9				0.63	X	0.7	=	8.22	(81)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0 Southwest 0.9x 0.77 x 2.3	no I v		X	0.63]	0.7	=	12.67	(81)
Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southwest 0.9x 0.77 x 6.6 Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 2.5 <td< td=""><td>.92 ×</td><td></td><td>X</td><td>0.63</td><td>]</td><td>0.7</td><td>_ = </td><td>25.05</td><td>(81)</td></td<>	.92 ×		X	0.63]	0.7	_ =	25.05	(81)
Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southwest 0.9x 0.77 x 6.6 Southwest 0.9x 0.77 x 6.6 Southwest 0.9x 0.77 x 6.6 Southwest 0.9x 0.77 x 4.6 Southwest 0.9x 0.77 x 4.7 Southwest 0.9x 0.77 x 4.7 Southwest 0.9x 0.77 x 4.7 Southwest 0.9x 0.77 x 4.7 Southwest 0.9x 0.77 x 4.7 Southwest 0.9x 0.77 x 4.7 Southwest 0.9x 0.77 x 4.7 Southwest 0.9x 0.77 x 4.7	.92 ×		X	0.63] x [0.7	=	44.99	(81)
Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southeast 0.9x 0.77 x 6.6 Southwest 0.9x 0.77 x 4.6 Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Northwest 0.9x 0.77 x 2.9 <td< td=""><td>.92 ×</td><td></td><td>X</td><td>0.63</td><td>] x [</td><td>0.7</td><td>=</td><td>64.81</td><td>(81)</td></td<>	.92 ×		X	0.63] x [0.7	=	64.81	(81)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0	.92 ×		X	0.63]	0.7	=	81.3	(81)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0	.92 ×	97.38	Х	0.63	_ x _	0.7	=	86.9	(81)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0	.92 ×	91.35	x	0.63] × [0.7	=	81.52	(81)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0	.92 x	67.96	X	0.63	_ x _	0.7	=	60.64	(81)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0	.92 x	41.38	X	0.63] x [0.7	=	36.93	(81)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0	.92 ×	22.97	X	0.63	_ x _	0.7	=	20.5	(81)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 4.0 Southwest0.9x 0.77 x 4.0	2.92 ×	11.28	X	0.63	_ x _	0.7	=	10.07	(81)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest0.9x 0.77 x 4.0	4.7 ×	31.49		0.63	_ x _	0.7	=	45.23	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4.	4.7 ×	44.07		0.63	_ x [0.7	=	63.3	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4.	4.7 ×	69.27		0.63	x	0.7	=	99.49	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest0.9x 0.77 x 4.0	4.7 ×	92.85		0.63	x	0.7	=	133.37	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4.	4.7 ×	104.39		0.63	x	0.7	=	149.94	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4. Southwest0.9x 0.77 x 4.	4.7 ×	113.91		0.63	_ x [0.7	=	163.62	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0	4.7 ×	118.15		0.63] x [0.7	=	169.71	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4.	4.7 ×	119.01	Ē	0.63] × [0.7	=	170.94	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4. Southwest 0.9x 0.77 x 4.	4.7 ×	106.25	Ē	0.63	x	0.7	=	152.62	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southwest 0.9x 0.77 x 4.0	4.7 ×	85.75	F	0.63] × [0.7		123.17	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0	4.7 ×		F	0.63]	0.7	=	90.02	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0	4.7 ×		F	0.63]	0.7	= =	52.85	(79)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0	3.09 X		x	0.63	」^L 1 _× 「	0.7		58.6	(77)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0	i.09 x		x	0.63	」^L 1 _× 「	0.7		82.02	(77)
Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0 Southeast 0.9x 0.77 x 6.0	3.09 ×		x F	0.63	」^L 1 _× 「	0.7		128.92	= (//) (77)
Southeast 0.9x			^ _	0.63	」^L 1 × 「	0.7		172.81	(77)
Southeast 0.9x 0.77 x 6.0			х <u>Г</u>	0.63	」 ^	0.7	=	194.29	(77)
Ozvitle z z z 4			^ <u>Г</u>	0.63	」^L 1 × 「	0.7	= -	219.9	(77)
	i.09 ×		^ _	0.63	」× L T x F	0.7		221.5	(77)
Courth a cost a c	i.09 ×		x L	0.63	Ϳ × L ͻ ͺͺ	0.7	= 	197.75	(77)
Occusto a cost	5.09 X		x	0.63	」 ×	0.7	╡ -	159.6	(77)

(86)m= 0.9	97 0.93	0.87	0.75	0.59	0.42	0.3	0.34	0.53	0.8	0.94	0.97		(86)
Mean inte	ernal tempe	rature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	' in Table	e 9c)					
(87)m= 20	.03 20.28	20.56	20.82	20.95	20.99	21	21	20.97	20.8	20.38	19.99		(87)
Temperat	ure during h	neating p	eriods ir	rest of	dwelling	from Ta	ble 9, Ti	h2 (°C)					
(88)m= 20	.17 20.18	20.18	20.19	20.2	20.21	20.21	20.21	20.2	20.2	20.19	20.18		(88)
Utilisation	factor for g	ains for	rest of d	welling,	h2,m (se	e Table	9a)						
(89)m= 0.9	96 0.92	0.85	0.72	0.55	0.37	0.25	0.28	0.48	0.76	0.92	0.97		(89)
Mean_inte	ernal tempe	rature in	the rest	of dwelli	ng T2 (f	ollow ste	ps 3 to 7	7 in Tabl	e 9c)				
(90)m= 18	19.24	19.63	19.99	20.14	20.2	20.21	20.21	20.18	19.97	19.41	18.84		(90)
								1	LA = Livin	g area ÷ (4	4) =	0.44	(91)
Mean inte	ernal tempe	rature (fo	r the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	A) × T2					
(92)m= 19		20.04	20.35	20.5	20.55	20.56	20.56	20.53	20.34	19.84	19.35		(92)
· · · · · - · ·	ustment to t	1	r		r				·				(00)
(93)m= 19	heating req	20.04	20.35	20.5	20.55	20.56	20.56	20.53	20.34	19.84	19.35		(93)
	the mean in			re obtain	ed at ste	en 11 of	Table 9	so tha	t Ti m=(76)m an	d re-calc	ulate	
	tion factor f						1 4510 01	, 00 tria					
	an Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	factor for g	r	r		I				<u> </u>	I	ı		(0.4)
(94)m= 0.9		0.85	0.72	0.56	0.39	0.27	0.3	0.5	0.77	0.92	0.96		(94)
(95)m= 469	ins, hmGm 0.79 536.92	$\frac{1}{566.33}$	537.01	442.7	303.05	202.92	212.18	325.06	438.84	454.12	446.31		(95)
` '	verage exte	l .	l					020.00	100.01		1.0.01		()
(96)m= 4.		6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss	rate for me	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]		,		
(97)m= 814		725.02	601.93	460.68	305.71	203.32	212.81	333	509.67	672	805.28		(97)
Space he (98)m= 256	ating requir	ement fo			i)m – (95 0			267.00		
(98)III= 256	0.41 173.67	116.07	46.74	13.38	0	0	0 Tota		52.7	156.87 r) = Sum(9	267.08	1084.92	(98)
Casas ha	oting roquir	omant in	Id M/b/pp3	2hroor			Tota	i per year	(KVVII/yeai) = Sum(9	0)15,912 =		╡
·	ating requir											17.98	<u>(99)</u>
•	requireme		· ·	Ĭ			ina prov	idad by	a aamm	unitu ook	2000		
	s used for sp space heat									unity Scr	ieme.	0	(301)
Fraction of	space heat	from co	mmunity	system	1 – (30	1) =						1	(302)
	ity scheme ma		•	•	,	,	allows for	CHP and i	up to four (other heat	sources; ti	he latter	
includes boile	ers, heat pump	s, geotherr	mal and wa	aste heat f					•		, I		_
Fraction of	heat from (Commun	ity boiler	S								1	(303a)
Fraction of	total space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor for	control and	charging	method	(Table	4c(3)) fo	r commu	ınity hea	iting sys	tem			1	(305)
Distribution	n loss factor	(Table 1	12c) for o	commun	ity heatii	ng syste	m					1.05	(306)
Space hea	ating										!	kWh/year	_
Annual spa	ace heating	requiren	nent									1084.92	

Space heat from Community boilers		(98) x (304a) x	(305) x (306) =	1139.16	(307a)
Efficiency of secondary/supplementary	heating system in %	(from Table 4a or Apper	ndix E)	0	(308)
Space heating requirement from secon	dary/supplementary s	ystem (98) x (301) x 1	100 ÷ (308) =	0	(309)
Water heating					_
Annual water heating requirement				1933.02	
If DHW from community scheme: Water heat from Community boilers		(64) x (303a) x	(305) x (306) =	2029.67	(310a)
Electricity used for heat distribution		0.01 × [(307a)(307	7e) + (310a)(310e)] =	31.69	(313)
Cooling System Energy Efficiency Ration	0			0	(314)
Space cooling (if there is a fixed cooling	g system, if not enter	$= (107) \div (314)$) =	0	(315)
Electricity for pumps and fans within dv mechanical ventilation - balanced, extra		om outside		128.36	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	0b) + (330g) =	128.36	(331)
Energy for lighting (calculated in Apper	ndix L)			273.64	(332)
Total delivered energy for all uses (307	') + (309) + (310) + (3	12) + (315) + (331) + (33	32)(237b) =	3570.84	(338)
12b. CO2 Emissions – Community hea	ting scheme				
12b. CO2 Emissions – Community hea	ting scheme	Energy kWh/year	Emission factor	Emissions kg CO2/year	
CO2 from other sources of space and vertice of heat source 1 (%)	water heating (not CH	kWh/year	kg CO2/kWh	kg CO2/year	(367a)
CO2 from other sources of space and v	water heating (not CH	kWh/year P)	kg CO2/kWh	kg CO2/year	(367a) (367)
CO2 from other sources of space and vertice Efficiency of heat source 1 (%)	water heating (not CH	kWh/year P) using two fuels repeat (363) to	kg CO2/kWh (366) for the second fu	kg CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%) CO2 associated with heat source 1	water heating (not CH If there is CHP t	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52	kg CO2/year el 96 = 712.99	(367)
CO2 from other sources of space and vertical energy for heat distribution	water heating (not CH If there is CHP to [(307	kWh/year P) sing two fuels repeat (363) to (367b) x (313) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52	kg CO2/year el 96 = 712.99 = 16.45	(367)
CO2 from other sources of space and vertical energy for heat distribution Total CO2 associated with community seems of space and vertical energy for heat distribution	water heating (not CH If there is CHP to [(307) systems econdary)	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(376) (309) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52	kg CO2/year el 96 = 712.99 = 16.45 = 729.43	(367) (372) (373)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so	water heating (not CH If there is CHP to [(307) systems econdary) rsion heater or instanta	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(376) (309) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52	kg CO2/year el 96 = 712.99 = 16.45 = 729.43 = 0	(367) (372) (373) (374)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community and CO2 associated with space heating (see CO2 associated with water from immerse	water heating (not CH If there is CHP to [(307) systems econdary) rsion heater or instanta water heating	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(373) (309) x aneous heater (312) x (373) + (374) + (375) =	kg CO2/kWh 0 (366) for the second fu 0.22 0.52 0 0.22	kg CO2/year el 96 = 712.99 = 16.45 = 729.43 = 0 = 0	(367) (372) (373) (374) (375)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community and CO2 associated with space heating (see CO2 associated with water from immeratoral CO2 associated with space and verifications.	water heating (not CH If there is CHP to [(307) systems econdary) rsion heater or instanta water heating ups and fans within dw	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(373) (309) x aneous heater (312) x (373) + (374) + (375) =	kg CO2/kWh 0 (366) for the second fu 0.22 0.52 0 0.22 0.52	kg CO2/year el 96 = 712.99 = 16.45 = 729.43 = 0 = 0	(367) (372) (373) (374) (375) (376)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community of the commun	water heating (not CH If there is CHP to [(307) systems econdary) rsion heater or instanta water heating ups and fans within dw ing sum of (376)(382) =	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(37) (309) x aneous heater (312) x (373) + (374) + (375) = relling (331)) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52 0 0.22	kg CO2/year el 96 = 712.99 = 16.45 = 729.43 = 0 = 0 729.43 = 66.62	(367) (372) (373) (374) (375) (376) (378)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community of the community of the community of the community of the control	water heating (not CH If there is CHP to [(307) systems econdary) rsion heater or instanta vater heating ups and fans within dw ing	kWh/year P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(37) (309) x aneous heater (312) x (373) + (374) + (375) = relling (331)) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52 0 0.22	kg CO2/year el 96 = 712.99 = 16.45 = 729.43 = 0	(367) (372) (373) (374) (375) (376) (378) (379)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:53:54

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 103.81m²

Site Reference: Highgate Road - GREEN

Plot Reference: 04 - A

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 15.34 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 13.08 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 45.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 37.3 kWh/m²

OK
2 Fabric U-values

Element Average Highest

External wall 0.18 (max. 0.30) 0.18 (max. 0.70) **OK**Party wall 0.00 (max. 0.20) - **OK**

Floor (no floor) Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ok
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	13.21m²	
Windows facing: South East	5.5m ²	
Windows facing: North West	4.61m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		l lser I	Details:						
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa					0010943 on: 1.0.5.50	
Address :	F	Property	Address	: 04 - A					
1. Overall dwelling dime	ensions:								
3		Are	a(m²)		Av. He	ight(m)		Volume(m	³)
Ground floor		1	03.81	(1a) x	2	2.65	(2a) =	275.1	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	n) 1	03.81	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	275.1	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hoι	ır
Number of chimneys	0 + 0	+	0	=	0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	<u> </u>	0	<u> </u>	0	x2	20 =	0	(6b)
Number of intermittent fa	ns				0	x ²	10 =	0	(7a)
Number of passive vents				Ē	0	x ′	10 =	0	(7b)
Number of flueless gas fi	res			F	0	X 4	40 =	0	(7c)
				L					
				_			Air ch	nanges per he	our
•	ys, flues and fans = (6a)+(6b)+(aantinua fi	0		÷ (5) =	0	(8)
Number of storeys in the	een carried out or is intended, proced ne dwelling (ns)	ea 10 (17),	otrierwise (conunue ii	om (9) to	(10)		0	(9)
Additional infiltration	3 \					[(9)-	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o			•	ruction			0	(11)
if both types of wall are pu deducting areas of openir	resent, use the value corresponding t nas): if equal user 0.35	o the grea	ter wall are	ea (after					
,	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0							0	(13)
-	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	. ,	-			0	(15)
Infiltration rate	250 amaza dia adia adia ada		(8) + (10)					0	(16)
•	q50, expressed in cubic metro ity value, then $(18) = [(17) \div 20] +$	•	•	•	ietre oi e	envelope	area	3	(17)
•	es if a pressurisation test has been do				is being u	sed		0.15	(10)
Number of sides sheltere	ed							0	(19)
Shelter factor			(20) = 1 -		19)] =			1	(20)
Infiltration rate incorporat	•		(21) = (18	s) x (20) =				0.15	(21)
Infiltration rate modified for	- 1 	1	Δ	0	0-4	Nan	Data	1	
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec	J	
Monthly average wind sp (22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7	1	
(<u></u> /	5.0	<u> </u>	1	<u> </u>	<u> </u>	1	l	J	
Wind Factor (22a)m = (22	' 		_					1	
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infilt	ration rat	e (allowi	ina for sl	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effe		•	rate for t	he appli	cable ca	se			ı			I	_
If mechanic			andiv N. (C	93h) _ (22¢	a) v Emy (aguatian (I	VEVV otho	muiaa (22h) - (220)			0.5	(23a)
If exhaust air h) = (23a)			0.5	(23b)
a) If balance		-	-	_					2h\m . /	22h) v [1 (22a)	74.8	(23c)
(24a)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3	+ 100j	(24a)
b) If balance	ļ		<u> </u>	<u> </u>	Į		Į	ļ	<u>l</u>	ļ	0.0		, ,
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole h	nouse ex	tract ver	tilation o	r positiv	/e input	L ventilatio	n from o	L outside	<u> </u>	!	<u>!</u>	l	
,	m < 0.5 ×			•					.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural if (22b)ı	ventilation								0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	r change	rate - er	nter (24a	or (24l	o) or (24	c) or (24	d) in bo	x (25)		•		•	
(25)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(25)
3. Heat losse	es and he	eat loss i	paramet	er:									
ELEMENT	Gros area	SS	Openin		Net Ar A ,r		U-val W/m2		A X U (W/l		k-value kJ/m²-l		X k /K
Windows Typ		` ,			13.2	x1	/[1/(1.4)+	0.04] =	17.51	,			(27)
Windows Typ	e 2				5.5	x1	/[1/(1.4)+	0.04] =	7.29				(27)
Windows Typ	e 3				4.61	x1	/[1/(1.4)+	0.04] =	6.11	Ħ			(27)
Walls Type1	76.1	16	23.3	2	52.84	1 X	0.18		9.51		60	3170.4	4 (29)
Walls Type2	49.7	77	0		49.77	7 X	0.17	=	8.36		60	2986.2	2 (29)
Total area of	elements	, m²			125.9	3							(31)
Party wall					12.14	1 X	0	=	0		45	546.3	(32)
Party floor					103.8	1					40	4152.4	(32a)
Party ceiling					103.8	1				Ī	30	3114.3	(32b)
Internal wall *	*				193.1	7				Ī	9	1738.5	(32c)
* for windows and ** include the are						lated using	g formula 1	/[(1/U-valu	ie)+0.04] a	as given in	paragraph	3.2	
Fabric heat lo	ss, W/K :	= S (A x	U)				(26)(30) + (32) =				48.78	(33)
Heat capacity	Cm = S	(A x k)						((28)	.(30) + (32	2) + (32a).	(32e) =	15708.13	(34)
Thermal mass	s parame	ter (TMI	P = Cm -	: TFA) ir	n kJ/m²K			= (34)	÷ (4) =			151.32	(35)
For design asses can be used inste				construct	ion are no	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f		
Thermal bridg	jes : S (L	x Y) cal	culated	using Ap	pendix	K						9.77	(36)
if details of therm		are not kr	own (36) =	= 0.05 x (3	31)			(00)	(26)				7,50
Total fabric he		alaulata :	l manthi					, ,	(36) =	'0E\m × (E)		58.55	(37)
Ventilation he	Feb	Mar	· ·	<u> </u>	Jun	Jul	Δυα	Sep	= 0.33 × (Nov	Dec		
Jan	Len	I IVIAI	Apr	May	Juli	l Jui	Aug	l seb	Oct	INOV	l pec	I	

(00)	00.0	00.40	00.40	00.40	00.00	04.07	04.07	04.00	05.00	00.00	00.70	07.44		(20)
(38)m=	28.8	28.46	28.12	26.42	26.08	24.37	24.37	24.03	25.06	26.08	26.76	27.44		(38)
Heat tr (39)m=	87.35	oefficier 87.01	1t, VV/K 86.67	84.97	84.63	82.93	82.93	82.59	(39)m 83.61	= (37) + (3 84.63	38)m 85.31	85.99		
(39)111=	67.33	67.01	00.07	04.97	04.03	02.93	02.93	02.39			Sum(39) ₁	<u> </u>	84.89	(39)
Heat Id	ss para	meter (F	HLP), W	m²K			_	_		= (39)m ÷		27		 ` ′
(40)m=	0.84	0.84	0.83	0.82	0.82	0.8	0.8	0.8	0.81	0.82	0.82	0.83		_
Numbe	er of day	rs in mor	nth (Tab	le 1a)					1	Average =	Sum(40) ₁	12 /12=	0.82	(40)
rtuinot	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. Wa	iter heat	ing ener	gy requi	rement:								kWh/ye	ear:	
Λ			\.											
		ipancy, I 9, N = 1		[1 - exp	(-0.0003	349 x (TF	-A -13.9)2)] + 0.(0013 x (ΓFA -13.		77		(42)
if TF	A £ 13.9	9, N = 1			`	,	•	, , -	,					
								(25 x N) to achieve		se target o		0.04		(43)
		•		0,	ater use, l	Ū	Ū			J J				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water	er usage ii	n litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
(44)m=	110.04	106.04	102.04	98.04	94.04	90.03	90.03	94.04	98.04	102.04	106.04	110.04		
En a rou .	aantant of	hat water	used sel	aulatad m	anthly 1	100 v Vd n	n v nm v F	Tm / 2600			m(44) ₁₁₂ =	L	1200.45	(44)
					,		1	OTm / 3600		,				
(45)m=	163.19	142.73	147.28	128.4	123.2	106.32	98.52	113.05	114.4	133.32	145.53	158.04	4572.00	(45)
If instan	taneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46)		rotai = Su	m(45) ₁₁₂ =	• [1573.98	(43)
(46)m=	24.48	21.41	22.09	19.26	18.48	15.95	14.78	16.96	17.16	20	21.83	23.71		(46)
Water	storage	loss:						ļ						
Ū		` ,		•			Ū	within sa	ame ves	sel		0		(47)
	•	_			elling, e			, ,	a ma\ a m t a	· · · (O) : · · · (47\			
	vise ii no storage		not wate	er (triis ir	iciudes i	nstantar	ieous co	mbi boil	ers) ente	er o in (47)			
	•		eclared l	oss facto	or is kno	wn (kWh	n/day):					0		(48)
Tempe	erature fa	actor fro	m Table	2b								0		(49)
•			storage	-				(48) x (49)) =		1	10		(50)
,				•	oss fact									(= 4)
		_	ee secti		e 2 (kW	n/litre/da	ıy)				0.	02		(51)
	-	from Ta		JII 4.0							1.	.03		(52)
Tempe	erature fa	actor fro	m Table	2b							-	.6		(53)
Energy	lost fro	m water	storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	1.	03		(54)
Enter	(50) or (54) in (5	55)								1.	03		(55)
Water	storage	loss cal	culated f	or each	month			((56)m = (55) × (41)ı	m				
(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinde	er contains	dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendi	хН	
(57)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)

		1
Primary circuit loss (annual) from Table 3	0	(58)
Primary circuit loss calculated for each month (59)m = (58) ÷ 365 x (41)m	otot)	
(modified by factor from Table H5 if there is solar water heating and a cylinder thermo (59)m= 23.26 21.01 23.26 22.51 23.26 22.51 23.26 22.51 23.26	22.51 23.26	(59)
	22.01 20.20	(66)
Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m		1 (04)
(61)m= 0 0 0 0 0 0 0 0 0 0	0 0	(61)
Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m +	` ` ` ` ` ` 	1` ´ ´
(62)m= 218.46 192.65 202.56 181.9 178.48 159.81 153.79 168.33 167.89 188.6	199.03 213.32	(62)
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribut	ion to water heating)	
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)		l (63)
(63)m= 0 0 0 0 0 0 0 0 0 0	0 0	(63)
Output from water heater		1
(64)m= 218.46 192.65 202.56 181.9 178.48 159.81 153.79 168.33 167.89 188.6	199.03 213.32	0004.00 (64)
Output from water heate		2224.82 (64)
Heat gains from water heating, kWh/month $0.25 \cdot [0.85 \times (45)m + (61)m] + 0.8 \times [(46)m]$		1
(65)m= 98.48 87.4 93.19 85.49 85.19 78.15 76.98 81.81 80.83 88.55	91.18 96.77	(65)
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is fr	om community h	leating
5. Internal gains (see Table 5 and 5a):		
Metabolic gains (Table 5), Watts		1
Jan Feb Mar Apr May Jun Jul Aug Sep Oct	Nov Dec	
(66)m= 138.61 138.61 138.61 138.61 138.61 138.61 138.61 138.61 138.61 138.61	138.61 138.61	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5		_
(67)m= 23.39 20.77 16.89 12.79 9.56 8.07 8.72 11.34 15.21 19.32	22.55 24.04	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5		
(68)m= 262.34 265.07 258.21 243.6 225.17 207.84 196.26 193.54 200.4 215.01	233.44 250.77	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5		
(69)m= 36.86 36.86 36.86 36.86 36.86 36.86 36.86 36.86 36.86 36.86	36.86 36.86	(69)
Pumps and fans gains (Table 5a)	•	'
(70)m= 0 0 0 0 0 0 0 0 0 0	0 0	(70)
Losses e.g. evaporation (negative values) (Table 5)		ı
(71)m= -110.88 -110.88 -110.88 -110.88 -110.88 -110.88 -110.88 -110.88 -110.88 -110.88	-110.88 -110.88	(71)
Water heating gains (Table 5)		I
(72)m= 132.37 130.06 125.26 118.73 114.5 108.53 103.47 109.96 112.27 119.02	126.65 130.07	(72)
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m$	1)m + (72)m	l
(73)m= 482.68 480.48 464.94 439.71 413.81 389.03 373.03 379.42 392.47 417.93	447.22 469.45	(73)
6. Solar gains:		
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicab	ole orientation.	
Orientation: Access Factor Area Flux g_	FF	Gains
	able 6c	(VV)
Southeast 0.9x 0.77 x 5.5 x 36.79 x 0.63 x	0.7 =	61.85 (77)
Southeast 0.9x 0.77 x 5.5 x 62.67 x 0.63 x	0.7 =	105.35 (77)

7. Mean inte		1013.57 erature			201.81	1152.72	1078	3.65 994.43	853.54	719.21	662.48		(84)
Total gains –			` 	<u> </u>	<u>`</u>				_	_		1	(6.1)
(83)m= 226.28	390.73	548.63	703.29 80	9.2 8	812.79	779.69	699	<u> </u>	435.62	2 272	193.03]	(83)
Solar gains ir	watts, ca	lculated	for each m	onth			(83)m	ı = Sum(74)m	(82)m				
Northwest 0.9x	0.77	X	4.61	X	9	9.21	X	0.63	X	0.7	=	12.98	(81)
Northwest 0.9x	0.77	×	4.61	×		14.2	X	0.63	×	0.7	=	20	(81)
Northwest _{0.9x}	0.77	x	4.61	x	2	8.07	x	0.63	x	0.7	=	39.54	(81)
Northwest _{0.9x}	0.77	X	4.61	×	5	0.42	x	0.63	x	0.7	=	71.04	(81)
Northwest 0.9x	0.77	x	4.61	x	7	2.63	x	0.63	x	0.7	=	102.32	(81)
Northwest 0.9x	0.77	X	4.61	×		91.1	x	0.63	x	0.7	=	128.35	(81)
Northwest 0.9x	0.77	x	4.61	×		7.38	x	0.63	x	0.7	=	137.2	(81)
Northwest 0.9x	0.77	x	4.61	×		1.35	X	0.63	x	0.7		128.7	(81)
Northwest _{0.9x}	0.77	x	4.61	x		7.96	X	0.63	x	0.7		95.74	(81)
Northwest 0.9x	0.77	×	4.61	×		1.38) x	0.63	×	0.7	= =	58.3	(81)
Northwest 0.9x	0.77	X	4.61	×		2.97]	0.63	×	0.7		32.36	(81)
Northwest 0.9x	0.77	^	4.61	^ x		1.28]]	0.63	_ ^	0.7	= =	15.9	(81)
Southwest _{0.9x}	0.77	$\frac{1}{x}$	13.21	$=$ $\begin{bmatrix} \\ \\ \\ \end{bmatrix}$		1.49]]	0.63	^	0.7		127.12	(79)
Southwest _{0.9x}	0.77	^ ^	13.21	$=$ $\frac{1}{x}$		4.07]]	0.63	- ^	0.7	= -	177.92	(79)
Southwest _{0.9x}	0.77	^ ^	13.21	$=$ $\frac{1}{x}$		9.27]]	0.63	- ^	0.7		279.64	(79)
Southwest _{0.9x}	0.77	-	13.21	→ x		2.85]]	0.63	- x	0.7	= -	374.86	(79)
Southwest _{0.9x}	0.77	x x	13.21	X x		13.91 04.39]]	0.63	x	0.7	- 	459.87 421.44	(79) (79)
Southwest _{0.9x} Southwest _{0.9x}	0.77	×	13.21	→ × → √		18.15]]	0.63	= X	0.7	- -	476.99	(79)
Southwesto.9x	0.77	×	13.21	×		19.01]	0.63	×	0.7	_ =	480.46	(79)
Southwesto o	0.77	X	13.21	×		06.25]	0.63	X	0.7	- -	428.95	(79)
Southwesto.9x	0.77	×	13.21	×		5.75]	0.63	×	0.7	=	346.2	(79)
Southwest _{0.9x}	0.77	x	13.21	×	6	2.67]	0.63	×	0.7	=	253.02	(79)
Southwest _{0.9x}	0.77	x	13.21	×	3	6.79]	0.63	x	0.7	=	148.54	(79)
Southeast 0.9x	0.77	x	5.5	x	3	1.49	x	0.63	x	0.7	=	52.93	(77)
Southeast 0.9x	0.77	X	5.5	X	4	4.07	X	0.63	X	0.7	=	74.08	(77)
Southeast 0.9x	0.77	X	5.5	X	6	9.27	x	0.63	X	0.7	=	116.43	(77)
Southeast 0.9x	0.77	X	5.5	X	9	2.85	x	0.63	x	0.7	=	156.07	(77)
Southeast 0.9x	0.77	X	5.5	X	10	04.39	X	0.63	X	0.7	=	175.47	(77)
Southeast 0.9x	0.77	X	5.5	х	1′	13.91	x	0.63	x	0.7	=	191.47	(77)
Southeast 0.9x	0.77	X	5.5	×	1	18.15	x	0.63	x	0.7	=	198.6	(77)
Southeast 0.9x	0.77	x	5.5	x	1	19.01	x	0.63	x	0.7	=	200.04	(77)
Southeast 0.9x	0.77	x	5.5	X	1(06.25	X	0.63	x	0.7	-	178.6	(77)

(86)m= 0.98 0.95 0.8	39 0.77 0	0.61 0.44	0.32	0.35	0.56	0.83	0.95	0.98		(86)
Mean internal temperature	in living area	T1 (follow ste	ps 3 to 7	' in Table	e 9c)					
(87)m= 19.9 20.18 20.	49 20.79 2	20.99	21	21	20.97	20.75	20.28	19.86		(87)
Temperature during heating	ng periods in re	est of dwelling	from Ta	ble 9, Ti	h2 (°C)					
(88)m= 20.22 20.22 20.	22 20.24 2	20.24 20.25	20.25	20.26	20.25	20.24	20.23	20.23		(88)
Utilisation factor for gains	for rest of dwel	lling, h2,m (se	e Table	9a)						
(89)m= 0.97 0.94 0.8	0.74	0.57 0.39	0.26	0.29	0.5	0.8	0.94	0.98		(89)
Mean_internal temperature	in the rest of	dwelling T2 (f	ollow ste	ps 3 to 7	7 in Tabl	e 9c)				
(90)m= 18.75 19.14 19.	58 19.99 2	20.25	20.25	20.26	20.22	19.95	19.3	18.69		(90)
					f	LA = Livin	g area ÷ (4	1) =	0.38	(91)
Mean internal temperature	(for the whole	e dwelling) = f	LA × T1	+ (1 – fL	A) × T2					
(92)m= 19.19 19.54 19.		20.47 20.53	20.54	20.54	20.51	20.26	19.68	19.14		(92)
Apply adjustment to the m						·				(00)
(93)m= 19.19 19.54 19. 8. Space heating requirem		20.53	20.54	20.54	20.51	20.26	19.68	19.14		(93)
Set Ti to the mean interna		obtained at st	en 11 of	Table 9	so tha	t Ti m=(76)m an	d re-calc	ulate	
the utilisation factor for ga				1 4510 01	5, 00 tria				diato	
Jan Feb M	ar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation factor for gains,		<u> </u>	I			<u> </u>	I			(0.1)
(94)m= 0.97 0.93 0.8		0.58 0.4	0.28	0.32	0.52	0.8	0.94	0.97		(94)
Useful gains, hmGm, W = (95)m= 684.71 810.29 876	` ' ' ` ' '	08.01 486.63	325.87	340.61	519.7	681.17	673.32	644.36		(95)
Monthly average external			020.0.	0.0.0.	0.0		0.0.02	000		()
(96)m= 4.3 4.9 6.4	- i	11.7 14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate for mean in	ternal tempera	ture, Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m= 1300.79 1273.63 1164	4.02 968.27 74	42.05 491.85	326.66	341.91	535.72	817.5	1073.07	1284.7		(97)
Space heating requiremen							ŕ	470.44		
(98)m= 458.37 311.36 213	.82 86.23 2	25.32 0	0	0 Tota	0	101.43	287.82	476.41	1000.70	(98)
O	a t i i a l a l a l a l a l a l a l a l a l			Tota	i per year	(KWII/yeai	r) = Sum(9	O) _{15,912} =	1960.76	╡
Space heating requiremen	·								18.89	(99)
9b. Energy requirements –					المالة عالي					
This part is used for space Fraction of space heat from							unity scr	neme.	0	(301)
Fraction of space heat from			•		,				1	(302)
The community scheme may obta		•	•	allows for	CHP and ı	up to four (other heat	l sources: tl		``′
includes boilers, heat pumps, geo	thermal and waste					-,-				_
Fraction of heat from Comr	nunity boilers								1	(303a)
Fraction of total space heat	from Commur	nity boilers				(3	02) x (303	a) =	1	(304a)
Factor for control and charg	ging method (T	able 4c(3)) fo	r commu	unity hea	iting sys	tem			1	(305)
Distribution loss factor (Tab	ole 12c) for con	nmunity heati	ng syste	m				j	1.05	(306)
Space heating								'	kWh/year	-
Annual space heating requ	irement								1960.76	
								•		

Space heat from Community boilers		(98) x (304a) x	x (305) x (306) =	2058.8	(307a)
Efficiency of secondary/supplementary	heating system in % (from Table 4a or Apper	ndix E)	0	(308
Space heating requirement from secon	dary/supplementary s	ystem (98) x (301) x 1	100 ÷ (308) =	0	(309)
Water heating					_
Annual water heating requirement				2224.82	
If DHW from community scheme: Water heat from Community boilers		(64) x (303a) x	x (305) x (306) =	2336.06	(310a)
Electricity used for heat distribution		0.01 × [(307a)(307	7e) + (310a)(310e)] =	43.95	(313)
Cooling System Energy Efficiency Ration	0			0	(314)
Space cooling (if there is a fixed cooling	g system, if not enter ($= (107) \div (314)$) =	0	(315)
Electricity for pumps and fans within dv mechanical ventilation - balanced, extra	• ,	om outside		253.73	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	0b) + (330g) =	253.73	(331)
Energy for lighting (calculated in Apper	ndix L)			412.99	(332)
Total delivered energy for all uses (307	7) + (309) + (310) + (31	12) + (315) + (331) + (33	32)(237b) =	5061.57	(338)
					_
12b. CO2 Emissions – Community hea	ting scheme				
12b. CO2 Emissions – Community hea	ting scheme	Energy kWh/year	Emission factor	r Emissions kg CO2/year	
CO2 from other sources of space and verificiency of heat source 1 (%)	water heating (not CH	kWh/year	kg CO2/kWh	kg CO2/year	(367a)
CO2 from other sources of space and v	water heating (not CHI If there is CHP u	kWh/year P)	kg CO2/kWh	kg CO2/year	(367a) (367)
CO2 from other sources of space and vertice Efficiency of heat source 1 (%)	water heating (not CHI If there is CHP u	kWh/year P) sing two fuels repeat (363) to	kg CO2/kWh	kg CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%) CO2 associated with heat source 1	water heating (not CHI If there is CHP u	kWh/year P) sing two fuels repeat (363) to b)+(310b)] x 100 ÷ (367b) x	kg CO2/kWh (366) for the second fu 0.22 0.52	kg CO2/year sel 96 = 988.84	(367)
CO2 from other sources of space and vertical energy for heat distribution	water heating (not CHI If there is CHP u [(307 systems	kWh/year P) sing two fuels repeat (363) to b)+(310b)] x 100 ÷ (367b) x [(313) x	kg CO2/kWh (366) for the second fu 0.22 0.52	kg CO2/year sel 96 = 988.84 = 22.81	(367)
CO2 from other sources of space and vertical energy for heat distribution Total CO2 associated with community seems of space and vertical energy for heat distribution	water heating (not CHI If there is CHP u [(307 systems econdary)	kWh/year P) sing two fuels repeat (363) to b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(373) (309) x	kg CO2/kWh (366) for the second fu 0.22 0.52	kg CO2/year sel 96 = 988.84 = 22.81 = 1011.65	(367) (372) (373)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so	water heating (not CHI If there is CHP u [(307 systems econdary) sion heater or instanta	kWh/year P) sing two fuels repeat (363) to b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(373) (309) x	kg CO2/kWh 0 (366) for the second fu 0.22 0.52 0	kg CO2/year sel 96 = 988.84 = 22.81 = 1011.65 = 0	(367) (372) (373) (374)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community and CO2 associated with space heating (see CO2 associated with water from immerse)	water heating (not CHI If there is CHP u [(307 systems econdary) sion heater or instanta vater heating	kWh/year P) Ising two fuels repeat (363) to b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(373) (309) x aneous heater (312) x (373) + (374) + (375) =	kg CO2/kWh 0 (366) for the second fu 0.22 0.52 0	kg CO2/year sel 96 = 988.84 = 22.81 = 1011.65 = 0 = 0	(367) (372) (373) (374) (375)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community and CO2 associated with space heating (see CO2 associated with water from immeratoral CO2 associated with space and verifications.	water heating (not CHI If there is CHP u [(307) systems econdary) sion heater or instanta vater heating ups and fans within dw	kWh/year P) Ising two fuels repeat (363) to b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(373) (309) x aneous heater (312) x (373) + (374) + (375) =	kg CO2/kWh 0 (366) for the second fu 0.22 0.52 0 0.22	kg CO2/year sel 96 = 988.84 = 22.81 = 1011.65 = 0 = 0	(367) (372) (373) (374) (375) (376)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community of the commun	water heating (not CHI If there is CHP u [(307) systems econdary) sion heater or instanta vater heating ups and fans within dw	kWh/year P) Ising two fuels repeat (363) to (367b) x (363) (366) + (368) (373) x (309) x Raneous heater (312) x (373) + (374) + (375) = (331)) x	kg CO2/kWh 0 (366) for the second f	kg CO2/year 96	(367) (372) (373) (374) (375) (376) (378)
CO2 from other sources of space and of Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community of CO2 associated with space heating (see CO2 associated with water from immer Total CO2 associated with space and of CO2 associated with electricity for pure CO2 associated with electricity for light	water heating (not CHI If there is CHP u [(307) systems econdary) sion heater or instanta vater heating ups and fans within dw ing	kWh/year P) sing two fuels repeat (363) to b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(373) (309) x aneous heater (312) x (373) + (374) + (375) = elling (331)) x	kg CO2/kWh 0 (366) for the second f	kg CO2/year 96	(367) (372) (373) (374) (375) (376) (378) (379)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:53:51

Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 62.56m2 **Plot Reference:** Site Reference : Highgate Road - GREEN 04 - B

Address:

Client Details:

Name: Address:

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 18.61 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 16.22 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 49.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 41.0 kWh/m²

OK 2 Fabric U-values

Element Average

Highest 0.18 (max. 0.70) External wall 0.18 (max. 0.30) OK Party wall 0.00 (max. 0.20) **OK**

Floor (no floor) Roof (no roof)

Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	12.71m²	
Windows facing: North West	3.46m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		Llcor	· Details:						
A No	Nie II le ele eue	USEI		- M	L		CTDO	040040	
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa					010943 on: 1.0.5.50	
Contware Hame.	Onoma 1		y Address		31011.		7 01010	71. 110.0.00	
Address :		·	•						
1. Overall dwelling dime	ensions:								
Ground floor		Aı	rea(m²)	(10) v		ight(m)	(2a) =	Volume(m³	(3a)
	-) . (41-) . (4 -) . (4 -) . (4 -)	. (4.5)		(1a) x	2	65	(2a) =	165.78	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)-	+(1n)	62.56	(4)	\	I) (O)	(0.)		_
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	165.78	(5)
2. Ventilation rate:	main sec	condary	other		total			m³ per hou	r
Number of altimospess	heating he	ating		1 _ F			40 =		_
Number of chimneys			0] = [0			0	(6a)
Number of open flues	0 +	0 +	0] = [0		20 =	0	(6b)
Number of intermittent fa				Ĺ	0		10 =	0	(7a)
Number of passive vents	i			L	0	X '	10 =	0	(7b)
Number of flueless gas fi	ires				0	X 4	40 =	0	(7c)
							Air ch	nanges per ho	our
Infiltration due to chimne	ovs flues and fans = (6a)	+(6b)+(7a)+(7b)+(7c) =	Г	0		÷ (5) =	0	(8)
•	peen carried out or is intended			ontinue fr			. (0) =	0	
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	0.25 for steel or timber fra present, use the value correspo			•	ruction			0	(11)
deducting areas of openii		oriding to the gre	eater wan are	a (anter					
If suspended wooden f	floor, enter 0.2 (unseale	d) or 0.1 (sea	aled), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
ŭ	s and doors draught stri	pped						0	(14)
Window infiltration			0.25 - [0.2	, ,	_	. (45)		0	(15)
Infiltration rate	-50		(8) + (10)	, , ,	, , ,	, ,		0	(16)
If based on air permeabil	q50, expressed in cubic	•	•	•	etre or e	envelope	area	3	(17)
•	es if a pressurisation test has b				is beina u	sed		0.15	(18)
Number of sides sheltere			,	,	3			0	(19)
Shelter factor			(20) = 1 -	0.075 x (1	19)] =			1	(20)
Infiltration rate incorporat	ting shelter factor		(21) = (18	x (20) =				0.15	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ∸ 4								
	1.23 1.1 1.08	0.95 0.95	0.92	1	1.08	1.12	1.18]	
		<u>.</u>						J	

Adjusted infiltra	tion rate	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effect		-	rate for t	he appli	cable ca	se	-	-	-	-			
If exhaust air he			endix N (2	3h) = (23a	ı) × Fmv (e	equation (N	VS)) othe	rwise (23h) = (23a)			0.5	(238
If balanced with		0 11		, ,	,	. `	,, .	`) = (20u)			0.5	(23)
		-	-	_					2h\m . /	22h) v [-	1 (220)	74.8	(230
a) If balanced (24a)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3	- 100] 	(24a
b) If balanced						<u> </u>			l		0.0	J	(=
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(24
c) If whole ho	-					<u> </u>	<u> </u>					J	•
if (22b)m				•	•				.5 × (23b))			
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural v				•	•				0.5]				
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air of	change	rate - er	iter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)	!		!	•	
25)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3]	(25
3. Heat losses	and he	ot loce r	aramoto	or:								•	
ELEMENT	Gros	·	Openin		Net Ar	ea	U-valı	Ie.	AXU		k-value	<u></u> Δ	λΧk
	area	_	m		A ,r		W/m2		(W/I	K)	kJ/m²-l		J/K
Windows Type	1				12.71	x1,	/[1/(1.4)+	0.04] =	16.85				(27
Windows Type	2				3.46	x1,	/[1/(1.4)+	0.04] =	4.59				(27
Walls Type1	46.7	2	16.17	7	30.55	5 x	0.18	□ = i	5.5		60	183	3 (29)
Walls Type2	13.7	5	0		13.75	x	0.17	Ħ =i	2.31	F i	60	825	(29
Total area of el	ements	, m²			60.47	, 							(31)
Party wall					30.32	2 x	0	=	0	\neg	45	1364	.4 (32
Party floor					62.56						40	2502	2.4 (32
Party ceiling					62.56					Ī	30	1876	=
nternal wall **					100.8	=				_ 	9	907.	=
for windows and r	oof windo	ows, use e	ffective wi	ndow U-va			formula 1	/[(1/U-valu	ıe)+0.04] a	L as given in			(0
* include the areas						-				-			
abric heat loss	s, W/K =	= S (A x	U)				(26)(30)	+ (32) =				29.25	(33
Heat capacity C	Cm = S(Axk)						((28).	(30) + (32	2) + (32a).	(32e) =	9308.8	(34
Thermal mass p	parame	ter (TMF	P = Cm ÷	- TFA) ir	ı kJ/m²K			= (34)	÷ (4) =			148.8	(35
For design assessr ean be used instea				constructi	ion are not	t known pr	ecisely the	indicative	values of	TMP in Ta	able 1f		
Thermal bridge	s : S (L	x Y) cal	culated ı	using Ap	pendix ł	<						7.08	(36
f details of thermal		are not kn	own (36) =	= 0.05 x (3	1)								
Total fabric hea									(36) =			36.33	(37
entilation heat									= 0.33 × (1	1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		/00
38)m= 17.36	17.15	16.95	15.92	15.72	14.69	14.69	14.48	15.1	15.72	16.13	16.54		(38
Heat transfer co									= (37) + (3			1	
39)m= 53.68	53.48	53.27	52.25	52.04	51.01	51.01	50.81	51.42	52.04	52.45	52.86		
Stroma FSAP 2012	Version:	1.0.5.50 (SAP 9.92)	- http://wv	ww.stroma	.com			Average =	Sum(39) ₁	12 /12=	52.1 ⊝ ag	<u>e 2 of ³⁹</u>

Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.86	0.85	0.85	0.84	0.83	0.82	0.82	0.81	0.82	0.83	0.84	0.84		
						!			Average =	Sum(40) ₁	12 /12=	0.83	(40)
Number of day	<u> </u>	1 `	· ·										
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 hea	ting ene	rgy requi	irement:								kWh/ye	ear:	
Assumed occu if TFA > 13. if TFA £ 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		05		(42)
Annual average Reduce the annual not more that 125	al average	hot water	usage by	5% if the a	lwelling is	designed i			se target o		96		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i								1 222	1 000	1			
(44)m= 91.25	87.94	84.62	81.3	77.98	74.66	74.66	77.98	81.3	84.62	87.94	91.25		
. ,		!				ļ	ļ		I Total = Su	ım(44) ₁₁₂ =	=	995.51	(44)
Energy content of	f hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600	0 kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 135.33	118.36	122.14	106.48	102.17	88.17	81.7	93.75	94.87	110.56	120.69	131.06		
									Total = Su	im(45) ₁₁₂ =	=	1305.27	(45)
If instantaneous v	vater heati	ing at point	of use (no	hot water	storage),	enter 0 in	boxes (46	to (61)					
(46)m= 20.3	17.75	18.32	15.97	15.33	13.22	12.25	14.06	14.23	16.58	18.1	19.66		(46)
Water storage Storage volum) includir	na anv si	olar or M	WHDS	etoraga	within co	ama vac	വ				(47)
· ·	•	•				· ·		airie ves	361		0		(47)
If community h Otherwise if no	•			_			. ,	ers) ente	er '0' in <i>(</i>	(47)			
Water storage			(,		()			
a) If manufact	turer's d	eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature f	actor fro	m Table	2b								0		(49)
Energy lost fro	m wate	r storage	, kWh/ye	ear			(48) x (49)) =		1	10		(50)
b) If manufact			-										
Hot water stor	-			e 2 (kW	h/litre/da	ay)				0.	.02		(51)
If community he Volume factor	_		011 4.3							1	03		(52)
Temperature f			2b							-	.6		(52)
Energy lost fro				ear			(47) x (51)) x (52) x ((53) =		03		(54)
Enter (50) or		_	, 1	Jui			(11)11(21)	, (==, (,/	-	.03		(55)
Water storage	loss cal	culated f	for each	month			((56)m = ((55) × (41)	m				, ,
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain												ix H	(00)
	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
(57)m= 32.01	20.92	32.01	30.96	32.01	30.96	32.01	32.01	30.96	32.01	<u> </u>	<u> </u>		, ,
Primary circuit	•	,			50 \	(EQ) = =					0		(58)
Primary circuit				,	•	• •	, ,		r tharma	otat)			
(modified by		1	ı —	ı —	ı —			<u> </u>	1	- 	22.22		(59)
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(38)

Combi loss ca	lculated f	or each	month (61)m =	(60) ÷ 3	65 × (41)m							
(61)m= 0	0	0	0	0	0	0 0) 0		0	0	0	0	1	(61)
	uired for	water he	eating ca	alculated	L for eac	h month	(62)ı	—— m =	0 85 x (′45)m +	(46)m +	(57)m +	ı (59)m + (61)m	
(62)m= 190.61	168.29	177.41	159.97	157.45	141.66	136.98	149.	_	148.36	165.84	174.18	186.34]	(62)
Solar DHW input	L L L L L L L L L L L L L L L L L L L	using App	endix G or	Appendix	H (negat	ive quantity	y) (ent	er '0'	if no sola	r contribu	tion to wate	r heating)	J	
(add additiona												-		
(63)m= 0	0	0	0	0	0	0	0		0	0	0	0]	(63)
Output from w	ater heat	er				•	•				•	!	•	
(64)m= 190.61	168.29	177.41	159.97	157.45	141.66	136.98	149	.03	148.36	165.84	174.18	186.34]	
						•		Outp	ut from wa	ater heate	er (annual)	12	1956.11	(64)
Heat gains fro	m water l	heating,	kWh/mo	onth 0.2	5 ´ [0.85	5 × (45)m	ı + (6	1)m	ı] + 0.8 x	c [(46)m	+ (57)m	+ (59)m]	
(65)m= 89.22	79.3	84.83	78.2	78.19	72.11	71.39	75.	39	74.34	80.98	82.92	87.8]	(65)
include (57)	m in calc	ulation o	of (65)m	only if c	ylinder	is in the	dwell	ing	or hot w	ater is f	rom com	munity h	neating	
5. Internal ga	ains (see	Table 5	and 5a):										
Metabolic gair	ns (Table	5). Wat	ts											
Jan	Feb	Mar	Apr	May	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec]	
(66)m= 102.65	102.65	102.65	102.65	102.65	102.65	102.65	102	.65	102.65	102.65	102.65	102.65	1	(66)
Lighting gains	(calculat	ed in Ap	pendix	L, equat	ion L9 c	r L9a), a	lso s	ee T	Table 5				•	
(67)m= 15.99	14.2	11.55	8.74	6.54	5.52	5.96	7.7	'5	10.4	13.21	15.42	16.43]	(67)
Appliances ga	ins (calcu	ulated in	Append	dix L, eq	uation L	.13 or L1	3a), a	also	see Tal	ble 5			•	
(68)m= 179.35	181.22	176.53	166.54	153.94	142.09	134.18	132	.32	137.01	146.99	159.59	171.44]	(68)
Cooking gains	(calculat	ted in Ap	pendix	L, equat	ion L15	or L15a), als	o se	e Table	5			-	
(69)m= 33.27	33.27	33.27	33.27	33.27	33.27	33.27	33.2	27	33.27	33.27	33.27	33.27]	(69)
Pumps and fa	ns gains	(Table 5	ia)										•	
(70)m= 0	0	0	0	0	0	0	0		0	0	0	0]	(70)
Losses e.g. ev	/aporatio	n (negat	ive valu	es) (Tab	le 5)	-					-		-	
(71)m= -82.12	-82.12	-82.12	-82.12	-82.12	-82.12	-82.12	-82.	.12	-82.12	-82.12	-82.12	-82.12]	(71)
Water heating	gains (T	able 5)											-	
(72)m= 119.92	118	114.02	108.61	105.1	100.15	95.95	101.	.34	103.25	108.85	115.17	118.01]	(72)
Total internal	gains =				(66)m + (67)m	า + (68	8)m +	- (69)m + ((70)m + (7	71)m + (72))m	-	
(73)m= 369.06	367.21	355.89	337.69	319.37	301.56	289.88	295	5.2	304.45	322.84	343.98	359.68]	(73)
6. Solar gains	s:													
Solar gains are		ŭ	r flux from	Table 6a	and assoc	ciated equa	tions 1	to co	nvert to th	e applica		tion.		
Orientation:		actor	Area m²		Flu	ıx ble 6a		т	g_ able 6b	т	FF able 6c		Gains	
_	Table 6d					DIE 0a	, ,	1	able ob	_ '	able oc		(W)	,
Northeast _{0.9x}	0.77	X	12.	71	X	11.28	X		0.63	×	0.7	=	43.83	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	22.97	X		0.63	x	0.7	=	89.21	(75)
Northeast 0.9x	0.77	X	12.	71	X .	41.38	X		0.63	x	0.7	=	160.73	(75)
Northeast 0.9x	0.77	×	12.	71	X	67.96	X		0.63	x	0.7	=	263.96	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	91.35	X		0.63	X	0.7	=	354.82	(75)

Nawthanat F		_			_		7		_				– ,,
Northeast _{0.9x}	0.77	X	12.	71	×	97.38	X	0.63	X	0.7	=	378.27	(75)
Northeast _{0.9x}	0.77	X	12.	71	x	91.1	X	0.63	X	0.7	_ =	353.87	(75)
Northeast _{0.9x}	0.77	X	12.	71	x	72.63	X	0.63	X	0.7	=	282.11	(75)
Northeast _{0.9x}	0.77	X	12.	71	x	50.42	X	0.63	X	0.7	=	195.85	(75)
Northeast _{0.9x}	0.77	X	12.	71	x	28.07	X	0.63	X	0.7	=	109.02	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	14.2	X	0.63	X	0.7	=	55.15	(75)
Northeast 0.9x	0.77	X	12.	71	x	9.21	X	0.63	X	0.7	=	35.79	(75)
Northwest _{0.9x}	0.77	X	3.4	16	x	11.28	X	0.63	x	0.7	=	11.93	(81)
Northwest _{0.9x}	0.77	X	3.4	l 6	x	22.97	X	0.63	X	0.7	=	24.29	(81)
Northwest 0.9x	0.77	X	3.4	l 6	x	41.38	X	0.63	X	0.7	=	43.75	(81)
Northwest _{0.9x}	0.77	X	3.4	16	x	67.96	X	0.63	X	0.7	=	71.86	(81)
Northwest _{0.9x}	0.77	x	3.4	16	x	91.35	X	0.63	x	0.7		96.59	(81)
Northwest _{0.9x}	0.77	x	3.4	16	x	97.38	X	0.63	x	0.7	=	102.98	(81)
Northwest _{0.9x}	0.77	x	3.4	16	x	91.1	x	0.63	x	0.7	=	96.33	(81)
Northwest 0.9x	0.77	X	3.4	16	x	72.63	X	0.63	x	0.7	=	76.8	(81)
Northwest 0.9x	0.77	x	3.4	16	x	50.42	X	0.63	×	0.7	_ =	53.32	(81)
Northwest 0.9x	0.77	x	3.4	16	х	28.07	X	0.63	x	0.7	=	29.68	(81)
Northwest 0.9x	0.77	x	3.4	16	x	14.2	X	0.63	x	0.7	=	15.01	(81)
Northwest _{0.9x}	0.77	X	3.4	16	x	9.21	X	0.63	×	0.7		9.74	(81)
L					<u> </u>		J						
Solar gains in	watts, cald	culated	for eacl	h month	1		(83)m	n = Sum(74)m .	(82)m				
(83)m= 55.76		204.48	335.82	451.41	481.2	5 450.2	358		138.7	70.16	45.53]	(83)
Total gains – i	nternal an	d solar	(84)m =	= (73)m	+ (83)r	n , watts	-	I	<u> </u>		!	J	
(84)m= 424.81	480.71	560.38	673.51	770.78	782.8	1 740.09	654	1.1 553.62	461.54	414.13	405.21]	(84)
7. Mean inter	nal tempe	rature ((heating	season)	,		,				•	
Temperature			`		<i>′</i>	a from Ta	ble 9	Th1 (°C)				21	(85)
Utilisation fac	•	•			•			()					(2-2)
Jan	Feb Feb	Mar	Apr	May	Jun		ΙΑ	ug Sep	Oct	Nov	Dec]	
(86)m= 0.98	0.96	0.91	0.78	0.59	0.41	0.3	0.3		0.87	0.96	0.98		(86)
` ′				!	!	Ļ		I	<u> </u>				
Mean interna (87)m= 19.85	,	20.37	20.75	20.94	20.99	-i	/ In I		20.66	20.2	19.82]	(87)
` ′	<u> </u>			<u> </u>		ļ			20.00	20.2	19.02		(07)
Temperature						-	1		ı		ī	1	(2.5)
(88)m= 20.2	20.21	20.21	20.22	20.23	20.24	20.24	20.	24 20.23	20.23	20.22	20.21		(88)
Utilisation fac	tor for gai	ns for r	est of d	welling,	h2,m (see Table	9a)						
(89)m= 0.97	0.95	0.9	0.76	0.55	0.36	0.25	0.3	3 0.55	0.84	0.95	0.98		(89)
Mean interna	l temperat	ture in t	he rest	of dwell	ing T2	(follow ste	eps 3	to 7 in Tabl	e 9c)				
(90)m= 18.66	18.94	19.41	19.93	20.16	20.23	20.24	20.	24 20.19	19.83	19.18	18.63		(90)
						•			LA = Liv	ring area ÷ (4) =	0.43	(91)
Mean interna	l temperat	ture (fo	r the wh	ole dwe	ıllina) –	fl A ∨ T1	+ (1	– fl Δ) ⊻ Τ2					
(92)m= 19.17	 	<u> </u>			1	1	. (1			i		1	(00)
· /	19.42	19.83	20.28	20.49	20.56	20.57	20.	57 20.52	20.19	19.62	19.14		(92)
Apply adjustr	<u> </u>			l					20.19 opriate		19.14		(92)

(93)m= 19.17	19.42	19.83	20.28	20.49	20.56	20.57	20.57	20.52	20.19	19.62	19.14		(93)
8. Space hea													
Set Ti to the return the utilisation			•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac		l	· ·				_ 3						
(94)m= 0.97	0.95	0.89	0.76	0.57	0.38	0.27	0.32	0.57	0.84	0.94	0.97		(94)
Useful gains,	hmGm	, W = (94	4)m x (8	4)m	•								
(95)m= 410.32	454.37	499.35	510.31	436.71	300.96	201.78	210.63	315.05	388.63	390.91	393.37		(95)
Monthly average	_	T T		from Ta	r e	·						ı	
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate		i	 		i	-``	· · ·	<u> </u>				ı	(0-)
(97)m= 798.2	776.21	709.91	594.7	457.66	303.93	202.28	211.64	330.02	499.01	656.71	789.76		(97)
Space heatin		1			T	ī		<u> </u>	<u> </u>		204.04		
(98)m= 288.59	216.28	156.66	60.76	15.58	0	0	0 	0	82.12	191.38	294.91	4000.00	7(00)
							rota	l per year	(Kvvn/yeai) = Sum(9	8)15,912 =	1306.29	(98)
Space heatin	g require	ement in	kWh/m²	² /year								20.88	(99)
9b. Energy red	quiremer	nts – Cor	mmunity	heating	scheme								
This part is use										unity sch	neme.		7(204)
Fraction of spa			•		-	_	(Table T	1) U II N	one			0	(301)
Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The community so									up to four	other heat	sources; t	he latter	
includes boilers, h Fraction of hea		-			rom powei	r stations.	See Appei	naix C.				1	(303a)
Fraction of total			•		nilare				(3	02) x (303	a) –	1	(304a)
Factor for cont	·			•		r commi	ınity hea	itina eve		02) X (000	u) – 	1	(305)
				,	` ''		•	illing sys	CIII				╡```
Distribution los		(Table 1	(2c) for (commun	ity neatii	ng syste	m					1.05	(306)
Space heating	-		1									kWh/yea	<u>'</u>
Annual space	•	•										1306.29	╛
Space heat fro	m Com	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	=	1371.61	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308
Space heating	require	ment fro	m secon	dary/su	oplemen	tary sys	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water heating	1												
Annual water h	neating i	equirem	ent									1956.11	
If DHW from co								(0.4) (0.6	20-) (00)	-) (000)			7(040-)
Water heat fro		•					0.04			5) x (306) :		2053.91	(310a)
Electricity used							0.01	× [(307a).	(307e) +	(310a)([310e)] =	34.26	(313)
Cooling Syster	_	•	•			_,						0	(314)
Space cooling	,			•		,		= (107) ÷	(314) =			0	(315)
Electricity for p							outoido				ĺ	450.04	(3300)
mechanical ve	าแเสแบก	- มลเสกต	eu, exif	act or po	onive in	put IIOM	outside					152.91	(330a)

warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330	b) + (330g) =		152.91	(331)
Energy for lighting (calculated in Appen	dix L)			Ī	282.38	(332)
Total delivered energy for all uses (307)) + (309) + (310) + (312	2) + (315) + (331) + (33	32)(237b) =		3860.81	(338)
12b. CO2 Emissions – Community heat	ing scheme					
		Energy kWh/year	Emission fac		missions g CO2/year	
CO2 from other sources of space and we Efficiency of heat source 1 (%)	O () ing two fuels repeat (363) to	(366) for the secon	d fuel	96	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.22	=	770.74	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	17.78	(372)
Total CO2 associated with community s	systems	(363)(366) + (368)(372	2)	=	788.52	(373)
CO2 associated with space heating (se	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immers	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and w	ater heating	(373) + (374) + (375) =			788.52	(376)
CO2 associated with electricity for pum	os and fans within dwe	elling (331)) x	0.52	=	79.36	(378)
CO2 associated with electricity for lighti	ng	(332))) x	0.52	=	146.56	(379)
Total CO2, kg/year	sum of (376)(382) =				1014.43	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				16.22	(384)

El rating (section 14)

(385)

87.36

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:53:48

Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 72.62m2 Site Reference :

Highgate Road - GREEN

Plot Reference: 04 - C

Address:

Client Details:

Name: Address:

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

18.46 kg/m² Target Carbon Dioxide Emission Rate (TER)

Dwelling Carbon Dioxide Emission Rate (DER) 15.74 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 52.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 42.5 kWh/m²

OK

2 Fabric U-values

Element Average Highest 0.18 (max. 0.70) External wall 0.18 (max. 0.30) OK Party wall 0.00 (max. 0.20) **OK**

Floor (no floor) Roof (no roof)

Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	12.71m²	
Windows facing: North West	3.46m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		l Iser-I	Details:									
Assessor Name: Software Name:	ne: Stroma FSAP 2012 Software Version : Version											
Address :	F	Property	Address	04 - C								
1. Overall dwelling dime	ensions:											
3		Are	a(m²)		Av. He	ight(m)		Volume(m ³	³)			
Ground floor		-	72.62	(1a) x	2	2.65	(2a) =	192.44	(3a)			
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) =	72.62	(4)								
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	192.44	(5)			
2. Ventilation rate:												
	main seconda heating heating	ry	other		total			m³ per hou	ır			
Number of chimneys	0 + 0	+ [0	=	0	X 4	40 =	0	(6a)			
Number of open flues	0 + 0	<u> </u>	0	Ī - Ē	0	x2	20 =	0	(6b)			
Number of intermittent fa	ns				0	x ²	10 =	0	(7a)			
Number of passive vents	;			Ē	0	x ′	10 =	0	(7b)			
Number of flueless gas fi	res			F	0	X 4	40 =	0	(7c)			
				L								
							Air ch	nanges per ho	our 			
	ys, flues and fans = (6a)+(6b)+(ontinus fr	0		÷ (5) =	0	(8)			
Number of storeys in the	neen carried out or is intended, procee he dwelling (ns)	ea 10 (17),	otrierwise	onunue ir	om (9) to	(10)		0	(9)			
Additional infiltration	3 \					[(9)-	-1]x0.1 =	0	(10)			
	.25 for steel or timber frame o			•	ruction			0	(11)			
if both types of wall are p deducting areas of openi	resent, use the value corresponding t	o the grea	ter wall are	a (after								
•	floor, enter 0.2 (unsealed) or 0	.1 (seale	ed), else	enter 0				0	(12)			
If no draught lobby, en	ter 0.05, else enter 0							0	(13)			
-	s and doors draught stripped							0	(14)			
Window infiltration			0.25 - [0.2	. ,	-	. (15) -		0	(15)			
Infiltration rate	q50, expressed in cubic metro	se nar h	(8) + (10)				area	0	(16)			
•	lity value, then $(18) = [(17) \div 20] + (18)$	•	•	•	elle oi e	rivelope	aica	0.15	(17)			
•	es if a pressurisation test has been do				is being u	sed		3.13	` ′			
Number of sides sheltere	ed		(20) 4	10 07E v (4	10)1			0	(19)			
Shelter factor Infiltration rate incorporate	ting chalter factor		(20) = 1 - (21) = (18)		19)] =			1	(20)			
Infiltration rate modified f	•		(21) = (10	/ X (20) =				0.15	(21)			
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec]				
Monthly average wind sp	1 ' 1 ' 1		<u> </u>	•	•	1		ı				
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7]				
Wind Factor (20-) (2	2)m : 4	-			-	-		-				
Wind Factor $(22a)m = (2(22a)m = 1.27 1.25)$	2)m ÷ 4 1.23	0.95	0.92	1	1.08	1.12	1.18]				
(ΔΔα)111- 1.20	1.20 1.1 1.00 0.95	1 0.95	0.32		1.00	1.12	1.10	J				

Adjusted infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m	_	_			
0.19 Calculate effe	0.19	0.18	0.16	0.16 he appli	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
If mechanica		-	ale for t	пе аррп	cable ca	30						0.5	(23
If exhaust air h	eat pump (using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	wise (23b) = (23a)			0.5	(23
If balanced with	heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				74.8	(23
a) If balance	ed mech	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	m = (22)	2b)m + (23b) × [1 – (23c)	÷ 100]	_
(24a)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(24
b) If balance	d mech	anical ve	ntilation	without	heat red	covery (N	ЛV) (24b)m = (22	2b)m + (23b)		_	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)r		tract ver (23b), t		•					.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)r		on or wh en (24d)							0.5]			1	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	iter (24a) or (24b	o) or (24	c) or (24	d) in box	(25)		•		•	
(25)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(25
3. Heat losse	s and he	eat loss r	paramete	er:									
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/		k-value kJ/m²-l		X k
Windows Type		(111)			12.71				16.85		NO/III I	τ πο/	(27
Windows Type					3.46	_	/[1/(1.4)+	Ļ	4.59	\dashv			(27
Walls Type1	72.6	2	16.1	7	56.45	=	0.18	= [10.16	╡┌	60	3387	\(\begin{align*}(2) \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\
Walls Type1	17.7		0			=			2.99	륵 ¦		1066.8	= '
Total area of e					17.78	3 ×	0.17	[2.99	[60		(31
Party wall	Jonnon	,			90.4						AF	1264.4	`
Party floor					30.32	=	0	[0	L	45	1364.4 2904.8	=
Party ceiling					72.62	=				L	40	- -	=
Internal wall **					72.62	=				Ĺ	30	2178.6	= `
* for windows and		owe uso c	effective wi	ndow I I ve	146.1		ı formula 1	/[/1/ L volu	(0) 1 0 041 4	e given in	9 naragraph	1315.50	3 (32
** include the area						ateu using	i ioiiiiuia i	/[(1/ O- valu	1 0)+0.04] a	is giveri iii	i parayrapri	1 3.2	
Fabric heat los	ss, W/K :	= S (A x	U)				(26)(30)	+ (32) =				34.58	(33
Heat capacity	Cm = S((Axk)						((28)	(30) + (32	2) + (32a).	(32e) =	12217.13	(34
Thermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			= (34)	÷ (4) =			168.23	(35
For design assess can be used inste				construct	ion are no	t known pr	ecisely the	indicative	values of	TMP in T	able 1f		_
Thermal bridge	es : S (L	x Y) cal	culated ı	using Ap	pendix I	<						7.11	(36
if details of therma		are not kn	own (36) =	= 0.05 x (3	1)			(22)	(20)				¬,,,_
Total fabric he		aloudoto -	l manthi	,					(36) =	(25)m + (F)	\	41.69	(37
Ventilation hea	Feb	i			lun	Jul	۸۰۰۰		= 0.33 × (l	1	1	
(38)m= 20.15	19.91	Mar 19.67	Apr 18.48	May 18.24	Jun 17.05	Jui 17.05	Aug 16.81	Sep 17.53	Oct 18.24	Nov 18.72	Dec 19.19		(38
20.13			10.70	10.24	17.00	17.00	L 10.01	17.55	L 10.24	<u> </u>	13.13	i	,00
11								100	(07)	00\			
Heat transfer (39)m= 61.84	coefficier 61.6	nt, W/K 61.36	60.17	59.93	58.74	58.74	58.51	(39)m 59.22	= (37) + (37) 59.93	38)m 60.41	60.89	1	

eat loss pa	rameter (HLP), W	m²K			1	1	(40)m	= (39)m ÷	· (4)			
0.85 O.85	0.85	0.84	0.83	0.83	0.81	0.81	0.81	0.82	0.83	0.83	0.84		_
umber of d	ave in mo	onth (Tah	le 1a)						Average =	Sum(40) ₁	12 /12=	0.83	(4
Jar	<u> </u>	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
)m= 31	28	31	30	31	30	31	31	30	31	30	31		(4
<u> </u>													
. Water he	ating ene	rgy requi	irement:								kWh/yea	ar:	
sumed oc	cupancy	N									04		()
if TFA > 1	3.9, N = 1		[1 - exp	(-0.0003	349 x (TF	A -13.9)2)] + 0.0	0013 x (TFA -13		31		(4
if TFA £ 13 inual aver	•	ator usar	na in litra	s nar da	v Vd av	orano –	(25 v NI)	± 36			.00		(4
duce the ani									se target o		0.02		(-
t more that 1.	25 litres per	person per	day (all w	ater use, l	not and co	ld)			,				
Jar		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
t water usag						1	· <i>'</i>			•			
)m= 97.92	94.36	90.8	87.24	83.67	80.11	80.11	83.67	87.24	90.8	94.36	97.92		— ,
ergy content	of hot water	r used - cal	culated mo	onthly = 4 .	190 x Vd,r	n x nm x D)Tm / 3600			m(44) ₁₁₂		1068.18	(4
)m= 145.2		131.05	114.25	109.63	94.6	87.66	100.59	101.8	118.63	129.5	140.63		
, 1.0.2	. 1	101.00	111.20	100.00	0 1.0	07.00	100.00		<u> </u>	m(45) ₁₁₂ =	<u> </u>	1400.56	(4
nstantaneous	s water heat	ing at point	of use (no	hot water	storage),	enter 0 in	boxes (46			(10)112	L		`
)m= 21.78	19.05	19.66	17.14	16.44	14.19	13.15	15.09	15.27	17.8	19.42	21.09		(4
ater storaç													
orage volu	•	•	•			_		ame ves	sel		0		(4
community herwise if	•			-			' '	ora) ant	or 'O' in <i>(</i>	17 \			
ater storaç		not wate	וו פוווט) ול	iciuues i	IIStaiitai	ieous co	ווטט וטוווי	ers) erik	ei U iii (47)			
If manufa		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(4
mperature	factor fro	om Table	2b								0		(4
ergy lost t	rom wate	r storage	, kWh/ye	ear			(48) x (49)) =		1	10		(5
If manufa			-										
ot water st	•			e 2 (kW	h/litre/da	ıy)				0.	.02		(5
community Jume facto	_		011 4.3							1	03		(5
mperature			2b								.6		(!
ergy lost f				ear			(47) x (51)) x (52) x (53) =		.03		(!
nter (50) o		_	,								.03		(!
ater storaç	je loss ca	lculated t	for each	month			((56)m = ((55) × (41)	m				
)m= 32.0°	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(5
ylinder conta		ed solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendix	Н	
7)m= 32.0°	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(5
mary circ	uit loss (a	nnual) fro	m Table	. 3				•	•		0		(!
mary circ	•	•			59)m = ((58) ÷ 36	65 × (41)	ım					
modified				,		. ,	, ,		r thermo	stat)			

Combi loss calculate	d for each	month (′61)m =	(60) ÷ 3	65 × (41)m							
(61)m= 0 0	0	0	0	0	0	0		0	0	0	0	1	(61)
Total heat required for	r water he	eating ca	L	L I for eac	h month	(62)r	—— n =	0.85 × (45)m +	. (46)m +	(57)m +	ı · (59)m + (61)m	
(62)m= 200.48 176.93		167.75	164.91	148.1	142.94	155.	_	155.29	173.91	182.99	195.9]	(62)
Solar DHW input calculate	d using App	endix G oı	· Appendix	: H (negati	ve quantity	/) (ente	er '0'	if no sola	r contribu	tion to wate	er heating)		
(add additional lines											0,		
(63)m= 0 0	0	0	0	0	0	0		0	0	0	0]	(63)
Output from water he	ater				•	•				•	•	•	
(64)m= 200.48 176.93	186.33	167.75	164.91	148.1	142.94	155.	.87	155.29	173.91	182.99	195.9	1	
			•	•	•		Outp	ut from wa	ater heate	er (annual)	112	2051.4	(64)
Heat gains from water	r heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (6	1)m	ı] + 0.8 x	: [(46)m	n + (57)m	+ (59)m	۱]	
(65)m= 92.5 82.17	87.8	80.78	80.67	74.25	73.37	77.6	67	76.64	83.67	85.85	90.98]	(65)
include (57)m in ca	lculation	of (65)m	only if c	ylinder i	s in the	dwelli	ing (or hot w	ater is f	from com	munity h	neating	
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 (Tab	le 5), Wat	ts											
Jan Feb		Apr	May	Jun	Jul	Αι	Jg	Sep	Oct	Nov	Dec]	
(66)m= 115.4 115.4	115.4	115.4	115.4	115.4	115.4	115	.4	115.4	115.4	115.4	115.4	1	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
(67)m= 18.13 16.1	13.09	9.91	7.41	6.26	6.76	8.7	9	11.79	14.97	17.48	18.63]	(67)
Appliances gains (ca	culated in	Append	dix L, eq	uation L	13 or L1	3a), a	also	see Tal	ole 5	-	•	•	
(68)m= 203.33 205.44	200.13	188.81	174.52	161.09	152.12	150.	.01	155.32	166.64	180.93	194.36]	(68)
Cooking gains (calcu	ated in A	ppendix	L, equat	ion L15	or L15a), also	o se	e Table	5	•	-	•	
(69)m= 34.54 34.54	34.54	34.54	34.54	34.54	34.54	34.5	54	34.54	34.54	34.54	34.54]	(69)
Pumps and fans gair	s (Table 5	ōa)			•							•	
(70)m= 0 0	0	0	0	0	0	0		0	0	0	0]	(70)
Losses e.g. evaporat	ion (negat	tive valu	es) (Tab	le 5)	-					-	-	-	
(71)m= -92.32 -92.32	-92.32	-92.32	-92.32	-92.32	-92.32	-92.	32	-92.32	-92.32	-92.32	-92.32]	(71)
Water heating gains	Table 5)				•		•			•		•	
(72)m= 124.33 122.28	118.01	112.2	108.43	103.13	98.61	104.	.39	106.45	112.46	119.24	122.28]	(72)
Total internal gains	=			(66))m + (67)m	ı + (68)m +	- (69)m + (70)m + (71)m + (72))m	•	
(73)m= 403.41 401.44	388.85	368.54	347.98	328.09	315.11	320.	.81	331.19	351.69	375.27	392.9]	(73)
6. Solar gains:													
Solar gains are calculate	•	r flux from	Table 6a		•	itions t	0 CO	nvert to th	e applica		tion.		
Orientation: Access Table 6		Area m²		Flu	ıx ble 6a		т.	g_ able 6b	-	FF Table 6c		Gains (W)	
						1 1	1 (_ '				1
Northeast 0.9x 0.7	7 ×	12.	71	X	11.28	X		0.63	_ ×	0.7	=	43.83	(75)
Northeast 0.9x 0.7		12.			22.97	X		0.63	x	0.7	=	89.21	(75)
Northeast 0.9x 0.7		12.		-	41.38	X		0.63	x	0.7	=	160.73	(75)
Northeast 0.9x 0.7		12.	71	-	67.96	X		0.63	x [0.7	=	263.96	(75)
Northeast 0.9x 0.7	7 ×	12.	71	x (91.35	x		0.63	X	0.7	=	354.82	(75)

Naw46		_			г			1		_				– ,,
Northeast _{0.9x}	0.77	×	12.	71	×	9	7.38	X	0.63	×	0.7	=	378.27	(75)
Northeast _{0.9x}	0.77	X	12.	71	X		91.1	X	0.63	X	0.7	_ =	353.87	(75)
Northeast _{0.9x}	0.77	X	12.	71	×	7	2.63	X	0.63	X	0.7	=	282.11	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	5	0.42	X	0.63	X	0.7	=	195.85	(75)
Northeast _{0.9x}	0.77	X	12.	71	x	2	8.07	X	0.63	X	0.7	=	109.02	(75)
Northeast _{0.9x}	0.77	X	12.	71	x	•	14.2	X	0.63	X	0.7	=	55.15	(75)
Northeast 0.9x	0.77	X	12.	71	x [(9.21	X	0.63	X	0.7	=	35.79	(75)
Northwest _{0.9x}	0.77	X	3.4	-6	x	1	1.28	X	0.63	X	0.7	=	11.93	(81)
Northwest _{0.9x}	0.77	X	3.4	-6	x [2	2.97	X	0.63	X	0.7	=	24.29	(81)
Northwest 0.9x	0.77	X	3.4	-6	x [4	1.38	x	0.63	x	0.7		43.75	(81)
Northwest _{0.9x}	0.77	X	3.4	6	x	6	7.96	x	0.63	х	0.7	=	71.86	(81)
Northwest _{0.9x}	0.77	x	3.4	6	x	9	1.35	x	0.63	x	0.7	_	96.59	(81)
Northwest _{0.9x}	0.77	x	3.4	-6	x	9	7.38	х	0.63	x	0.7		102.98	(81)
Northwest _{0.9x}	0.77	x	3.4	-6	x	(91.1	х	0.63	x	0.7		96.33	(81)
Northwest _{0.9x}	0.77	x	3.4	-6	x [7	2.63	х	0.63	x	0.7	_	76.8	(81)
Northwest _{0.9x}	0.77	×	3.4	6	x [5	0.42	x	0.63	×	0.7		53.32	(81)
Northwest 0.9x	0.77	×	3.4	6	x	2	8.07	X	0.63	×	0.7	=	29.68	(81)
Northwest 0.9x	0.77	x	3.4	-6	х		14.2	X	0.63	×	0.7		15.01	(81)
Northwest 0.9x	0.77	×	3.4	-6	x [(9.21	X	0.63	×	0.7		9.74	(81)
_								,						
Solar gains in watts, calculated for each month $(83)m = Sum(74)m(82)m$														
(83)m= 55.76		204.48	335.82	451.41	_	31.25	450.2	358		138.7	70.16	45.53		(83)
Total gains – i	nternal and	d solar	(84)m =	(73)m	+ (8	33)m	, watts				!	Į.		
(84)m= 459.17	514.94 5	93.33	704.36	799.39	80	9.34	765.31	679	.71 580.35	490.4	445.43	438.43		(84)
7. Mean inter	nal temper	ature (heating	seasor	າ)									
Temperature	•					area f	rom Tab	ole 9.	Th1 (°C)				21	(85)
Utilisation fac	•	• .			_				, ,					``
Jan	Feb	Mar	Apr	May	<u> </u>	Jun	Jul	Α	ug Sep	Oct	Nov	Dec		
(86)m= 0.99		0.94	0.84	0.65	+	0.46	0.34	0.3		0.91	0.98	0.99		(86)
Mean interna	l tomporati	uro in I	ivina or	DO T1 /f	مالم	w cto	nc 2 to 7	Tin T	able (le)	<u>!</u>	-1	<u> </u>		
(87)m= 19.91	 	20.38	20.74	20.93	1	0.99	21	2		20.66	20.23	19.89		(87)
` '		20.00								20.00	20.20	10.00		(=: /
Temperature	during boo	_				ellina	from Ta	ahla (ኔ Th2 /ºC\				-	
· -		ating po			_			1			1 00 00	00.00		(00)
(88)m= 20.21		ating po	eriods ir 20.23	20.23	_	0.25	20.25	20.		20.23	20.23	20.22		(88)
· -	20.21	20.21	20.23	20.23	20	0.25	20.25	20.		20.23	20.23	20.22		(88)
(88)m= 20.21	20.21 2	20.21	20.23	20.23	h2,	0.25	20.25	20.	25 20.24	0.89	0.97	0.99		(88)
(88)m= 20.21 Utilisation fac	20.21 2 etor for gair 0.97	20.21 ns for r	20.23 est of d	20.23 welling, 0.61	h2,	0.25 m (se	20.25 ee Table 0.28	20. 9a)	25 20.24	0.89				
(88)m= 20.21 Utilisation fac (89)m= 0.98	20.21 2 etor for gair 0.97	20.21 ns for r	20.23 est of d	20.23 welling, 0.61	h2,i	0.25 m (se	20.25 ee Table 0.28	20. 9a)	25 20.24 33 0.6 to 7 in Tabl	0.89	0.97			
Utilisation factors (89)m= 0.98 Mean internal	20.21 2 etor for gair 0.97	20.21 ns for r 0.93 ure in t	20.23 est of double 0.81 he rest	20.23 welling, 0.61 of dwell	h2,i	0.25 m (se).41 T2 (fo	20.25 ee Table 0.28 ollow ste	9a) 0.3	25 20.24 33 0.6 to 7 in Table 25 20.2	0.89 le 9c)	0.97	0.99	0.38	(89)
(88)m= 20.21 Utilisation factors (89)m= 0.98 Mean internation (90)m= 18.74	20.21 2 etor for gair 0.97 I temperatu 18.99	20.21 ns for r 0.93 ure in t	20.23 est of do 0.81 he rest 19.93	20.23 welling, 0.61 of dwell 20.17	h2,i ng 20	0.25 m (se).41 T2 (fo 0.24	20.25 ee Table 0.28 ollow ste 20.24	9a) 0.3 eps 3 20.	25 20.24 33 0.6 to 7 in Tabl 25 20.2	0.89 le 9c) 19.84 fLA = Liv	0.97	0.99	0.38	(89)
Utilisation factors (89)m= 0.98 Mean internation (90)m= 18.74	20.21 2 ctor for gair 0.97 I temperate 18.99	20.21 ns for r 0.93 ure in t	20.23 est of do 0.81 he rest 19.93	20.23 welling, 0.61 of dwell 20.17	h2,i h2,i ing 20	0.25 m (se).41 T2 (fo 0.24	20.25 ee Table 0.28 ollow ste 20.24	9a) 0.3 eps 3 20.	25 20.24 33 0.6 to 7 in Table 25 20.2 - fLA) × T2	0.89 le 9c) 19.84 fLA = Liv	0.97 19.23 ving area ÷ (4	0.99	0.38	(89)
(88)m= 20.21 Utilisation factors (89)m= 0.98 Mean internation (90)m= 18.74	20.21 2 etor for gair 0.97 I temperatu 18.99	20.21 ns for r 0.93 ure in t 19.42 ure (for 19.79	20.23 est of do 0.81 he rest 19.93 r the wh 20.24	20.23 welling, 0.61 of dwell 20.17 ole dwe	20 h2,1 o	0.25 m (see 0.41 T2 (fo 0.24 g) = fl 0.53	20.25 ee Table 0.28 collow ste 20.24 _A × T1 20.53	20. 9a) 0.3 eps 3 20. + (1	25 20.24 33 0.6 to 7 in Table 25 20.2 	0.89 le 9c) 19.84 fLA = Liv	0.97 19.23 ving area ÷ (-	0.99 18.72 4) =	0.38	(89) (90) (91)

			1			1							
(93)m= 19.19	19.41	19.79	20.24	20.46	20.53	20.53	20.54	20.49	20.15	19.61	19.17		(93)
8. Space hea					- 1 -1 -1	44 . (T-1-1-0		. T' /	70)	1	I-1-	
Set Ti to the rethe utilisation			•		ied at ste	ер 11 от	i abie 9i	o, so tna	t 11,m=(76)m an	d re-caic	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm):										
(94)m= 0.98	0.97	0.93	0.81	0.62	0.43	0.3	0.35	0.62	0.88	0.96	0.98		(94)
Useful gains,	hmGm	, W = (94	4)m x (8	4)m									
(95)m= 449.99	497.58	549.78	572.64	498.55	344.88	230.65	240.9	360.02	433.61	429.81	431.1		(95)
Monthly avera	_	T T				ī				·			
(96)m= 4.3	(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m- (96)m]												(96)
					i	-``	<u> </u>	<u> </u>					(07)
(97)m= 920.89	893.8	815.46	682.31	525.12	348.22	231.14	241.92	378.27	572.65	755.98	911.39		(97)
Space heating (98)m= 350.35	g require 266.26	197.66	r each n 78.97	19.77	/Vh/moni	I	24 x [(97])m – (95 0)m] x (4 103.45	1)m 234.84	357.33		
(98)m= 350.35	200.20	197.00	78.97	19.77	0	0						4000.00	7(00)
							rota	ı per year	(Kvvn/yeai	r) = Sum(9	8)15,912 =	1608.62	(98)
Space heating	g require	ement in	kWh/m²	/year							L	22.15	(99)
9b. Energy red	•		The state of the s	Ĭ									
This part is use										unity sch	neme.	0	(301)
Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none Fraction of space heat from community system 1 – (301) =										1	(302)		
•			•	•	,	,	allows for	CUD and	un to forum	other boot			(302)
The community so includes boilers, h									ip to rour	otner neat	sources; tr	ie iaπer	
Fraction of hea		-										1	(303a)
Fraction of total	al space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor for cont	rol and	charging	method	(Table	4c(3)) fo	r comm	unity hea	iting sys	tem		Ī	1	(305)
Distribution los	s factor	(Table 1	2c) for c	commun	ity heatii	ng syste	m				Ì	1.05	(306)
Space heating	a										L	kWh/yea	 r
Annual space	-	requiren	nent									1608.62	7
Space heat fro	m Com	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	= [1689.05	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)	Ī	0	(308
Space heating	require	ment fro	m secon	dary/su _l	oplemen	tary sys	tem	(98) x (30	01) x 100 ·	÷ (308) =	Ī	0	(309)
Water heating													_
Annual water h		equirem	ent								ſ	2051.4	٦
If DHW from co													_
Water heat fro	m Comr	nunity bo	oilers					(64) x (30	03a) x (30	5) x (306) :	- [2153.97	(310a)
Electricity used	d for hea	at distribu	ution				0.01	× [(307a).	(307e) +	· (310a)(310e)] =	38.43	(313)
Cooling Syster	m Energ	y Efficie	ncy Rati	0								0	(314)
Space cooling	(if there	is a fixe	d coolin	g systen	n, if not e	enter 0)		= (107) ÷	(314) =			0	(315)
Electricity for p											-		_
mechanical ve	ntilation	- balanc	ed, extra	act or po	sitive in	put from	outside					177.49	(330a)

						_					
warm air heating system fans					0	(330b)					
pump for solar water heating					0	(330g)					
Total electricity for the above, kWh/year		=(330a) + (330	b) + (330g) =		177.49	(331)					
Energy for lighting (calculated in Appen		320.14	(332)								
Total delivered energy for all uses (307)	Ī	4340.66	(338)								
12b. CO2 Emissions – Community heating scheme											
		Energy kWh/year	Emission fac		missions g CO2/year						
CO2 from other sources of space and w Efficiency of heat source 1 (%)	•) ing two fuels repeat (363) to	(366) for the secon	d fuel	96	(367a)					
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.22	=	864.68	(367)					
Electrical energy for heat distribution		[(313) x	0.52	=	19.95	(372)					
Total CO2 associated with community s	ystems	(363)(366) + (368)(372	2)	=	884.62	(373)					
CO2 associated with space heating (see	condary)	(309) x	0	=	0	(374)					
CO2 associated with water from immers	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)					
Total CO2 associated with space and w	ater heating	(373) + (374) + (375) =			884.62	(376)					
CO2 associated with electricity for pump	os and fans within dwe	elling (331)) x	0.52	=	92.12	(378)					
CO2 associated with electricity for lighti	ng	(332))) x	0.52	=	166.15	(379)					
Total CO2, kg/year	sum of (376)(382) =				1142.9	(383)					
Dwelling CO2 Emission Rate	(383) ÷ (4) =				15.74	(384)					

El rating (section 14)

(385)

86.98

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 06 December 2021 at 10:53:45*

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 53.96m²Site Reference:Highgate Road - GREENPlot Reference:04 - D

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 19.25 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 16.23 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 48.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 39.2 kWh/m²

OK

2 Fabric U-values

 Element
 Average
 Highest

 External wall
 0.17 (max. 0.30)
 0.18 (max. 0.70)
 OK

 Party wall
 0.00 (max. 0.20)
 OK

Floor (no floor) Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	12.07m ²	
Ventilation rate:	4.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		User [Details:											
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa	are Ve				010943 on: 1.0.5.50						
Address :	Property Address: 04 - D Address:													
1. Overall dwelling dime	ensions:													
		Are	a(m²)		Av. He	ight(m)	_	Volume(m ³	<u>''</u>					
Ground floor		ţ	53.96	(1a) x	2	2.65	(2a) =	142.99	(3a)					
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n) (53.96	(4)										
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	142.99	(5)					
2. Ventilation rate:														
	main seconda heating heating	ry	other		total			m³ per hou	ır					
Number of chimneys	0 + 0	+	0] = [0	X 4	40 =	0	(6a)					
Number of open flues	0 + 0	+	0	=	0	x 2	20 =	0	(6b)					
Number of intermittent fa	ins				0	Χ.	10 =	0	(7a)					
Number of passive vents	3				0	X ·	10 =	0	(7b)					
Number of flueless gas fi	ires			Ī	0	X 4	40 =	0	(7c)					
				_			A : I-							
Letter Const. Letter L. Const. Const.	(Ca) (Cb) (7-\.(7 .).	(7 -)	_				nanges per ho	_					
	ys, flues and fans = (6a)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b			continue fr	0 rom (9) to		÷ (5) =	0	(8)					
Number of storeys in the		(/,			(-)	(• •)		0	(9)					
Additional infiltration						[(9)	-1]x0.1 =	0	(10)					
	.25 for steel or timber frame o resent, use the value corresponding to			•	ruction			0	(11)					
deducting areas of openi		o ine grea	ler wall are	a (aner										
•	floor, enter 0.2 (unsealed) or 0	.1 (seale	ed), else	enter 0				0	(12)					
If no draught lobby, en	•							0	(13)					
Window infiltration	s and doors draught stripped		0.25 - [0.2	2 x (14) ÷ 1	1001 =			0	(14)					
Infiltration rate			(8) + (10)		_	+ (15) =		0	(15)					
	q50, expressed in cubic metre	es per ho	our per s	quare m	etre of e	envelope	area	3	(17)					
If based on air permeabil	lity value, then $(18) = [(17) \div 20] + (18)$	8), otherw	rise (18) = ((16)				0.15	(18)					
	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			7					
Number of sides sheltere Shelter factor	90		(20) = 1 -	[0.075 x (²	19)] =			0	(19)					
Infiltration rate incorporate	ting shelter factor		(21) = (18	3) x (20) =				0.15	(21)					
Infiltration rate modified f									`					
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec							
Monthly average wind sp	peed from Table 7							_						
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7							
Wind Factor (22a)m = (2.	2)m ÷ 4													
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18							
								ı						

Adjusted infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m				-	
0.19 Calculate effect	0.19 Ctive air	0.18 Change i	0.16 ate for t	0.16 he appli	0.14 cable ca	0.14 SE	0.14	0.15	0.16	0.17	0.18]	
If mechanica		_										0.5	(23a
If exhaust air h	eat pump ı	using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			0.5	(23k
If balanced with	n heat reco	overy: effic	ency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				75.65	(230
a) If balance	ed mecha	anical ve	ntilation	with he	at recove	ery (MVI	HR) (24a	m = (22)	2b)m + (23b) × [1 – (23c)) ÷ 100]	
(24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(248
b) If balance	ed mecha	anical ve	ntilation	without	heat red	covery (N	ЛV) (24b	m = (22)	2b)m + (23b)	ī	,	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)n	ouse ex n < 0.5 ×			•					5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24
d) If natural if (22b)n	ventilation			•	•				0.5]			•	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24
Effective air	change	rate - er	iter (24a) or (24b	o) or (24	c) or (24	d) in box	(25)		-	-	_	
(25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3]	(25)
3. Heat losse	s and he	eat loss r	paramete	er:									
ELEMENT	Gros	·	Openin		Net Ar	ea	U-valı	re	AXU		k-value	e A	λΧk
	area	(m^2)	' m		A ,r	m²	W/m2	K	(W/I	K)	kJ/m²•	K k	J/K
Windows					12.07	x1.	/[1/(1.4)+	0.04] =	16				(27)
Walls Type1	27.6	66	12.0	7	15.59	X	0.18	= [2.81		60	935	.4 (29)
Walls Type2	24.2	24	0		24.24	, x	0.17	= [4.07		60	1454	4.4 (29)
Total area of e	elements	, m²			51.9								(31)
Party wall					31.67	, x	0	= [0		45	1425	i.15 (32)
Party floor					53.96	5					40	2158	3.4 (32
Party ceiling					53.96	5					30	1618	3.8 (32)
Internal wall **	ŧ				95.03	3					9	855.	27 (32
* for windows and						ated using	formula 1	/[(1/U-valu	e)+0.04] a	as given in	paragrapi	h 3.2	
** include the area				ls and par	titions		(00) (00)	(20)				_	
Fabric heat los		•	U)				(26)(30)		(00) - (0)	0) - (00-)	(00-)	22.88	(33)
Heat capacity	,	,		TEA) :				***	.(30) + (32)	2) + (32a).	(32e) =	8447.42	(34)
Thermal mass For design assess	•	•		•			ooisoly the	` '	\div (4) =	TMD in T	ahla 1f	156.55	(35)
can be used inste				CONSTRUCT	ion are noi	known pi	ecisely lile	illulcative	values of	TIVIT III I	able II		
Thermal bridge	es : S (L	x Y) cal	culated ı	using Ap	pendix l	<						6.04	(36)
if details of therma		are not kn	own (36) =	= 0.05 x (3	1)								
Total fabric he								(33) +	(36) =			28.91	(37)
Ventilation hea	at loss ca	alculated	monthly	/					= 0.33 × ((25)m x (5) T	1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	4	4=
(38)m= 14.77	14.59	14.42	13.53	13.35	12.47	12.47	12.29	12.82	13.35	13.71	14.06	J	(38)
Heat transfer of		nt, W/K			·	·			= (37) + (38)m		1	
(39)m= 43.68	43.51	43.33	42.45	42.27	41.38	41.38	41.21	41.74	42.27	42.62	42.98		
									Average =	Sum(39) ₁	12 /12=	42.4	(39)

Heat loss	s parar	meter (H	HLP), W/	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	0.81	0.81	0.8	0.79	0.78	0.77	0.77	0.76	0.77	0.78	0.79	0.8		
										Average =	Sum(40) ₁	12 /12=	0.79	(40)
Number	of day		nth (Tab	le 1a)			·	ı						
_	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. Wate	r heati	ng ene	rgy requi	rement:								kWh/ye	ear:	
Assumed if TFA if TFA	> 13.9	, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		81		(42)
Annual a Reduce the not more th	e annuai	l average	hot water	usage by	5% if the a	lwelling is	designed t	` ,		se target o		.11		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water u		litres per	day for ea		,		Table 1c x	_	· ·		!			
(44)m=	84.82	81.74	78.65	75.57	72.49	69.4	69.4	72.49	75.57	78.65	81.74	84.82		
										Total = Su	m(44) ₁₁₂ =		925.35	(44)
Energy cor	ntent of I	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x D	Tm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 1	25.79	110.02	113.53	98.98	94.97	81.95	75.94	87.14	88.18	102.77	112.18	121.82		
If in atomton		ator booti	na ot noint	of upo (no	, hot water	, ataragal	antar O in	haves (46		Total = Su	m(45) ₁₁₂ =	- [1213.27	(45)
If instantan				,		, , , , , , , , , , , , , , , , , , ,	·	` '	,	1	ı	1		(10)
(46)m= Mater sto	18.87 Orage	16.5	17.03	14.85	14.25	12.29	11.39	13.07	13.23	15.42	16.83	18.27		(46)
Storage	_		includin	a anv so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If commu		` '					_					<u> </u>		(/
Otherwis	-	_			-			' '	ers) ente	er '0' in ((47)			
Water sto	•													
a) If mar	nufactu	ırer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempera	ature fa	ctor fro	m Table	2b								0		(49)
Energy lo			•					(48) x (49)) =		1	10		(50)
b) If marHot wate				-								02		(51)
If commu		-			C 2 (KVV)	ii/iiti C/GC	·y /				0.	02		(31)
Volume f		_									1.	03		(52)
Tempera	ature fa	actor fro	m Table	2b							0	.6		(53)
Energy lo	ost fror	m water	storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter (5	0) or (54) in (5	55)								1.	03		(55)
Water sto	orage l	loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder of	contains	dedicate	d solar sto	rage, (57)ı	n = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendi	ix H	
(57)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary o	circuit	loss (ar	nual) fro	m Table	3							0		(58)
Primary		`	,			59)m = ((58) ÷ 36	65 × (41)	m			-		• /
•					,		. ,	, ,	cylinde	r thermo	stat)			
(59)m= 2	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi loss cal	culated :	for each	month ((61)m –	(60) ± 3	R65 v (11	/m						
(61)m= 0	0	0	0	0 0	00) + 0	0 7 (41) o	0	0	0	0	1	(61)
		-	-									J · (59)m + (61)m	(- /
(62)m= 181.07	159.94	168.8	152.47	150.25	135.45		142.4	_	158.05	165.67	177.1	1	(62)
Solar DHW input c									ļ]	(-)
(add additional										morrio wan	or riodiirig)		
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(63)
Output from wa	ater heat	ter				1	·	I	!	-1	!	1	
(64)m= 181.07	159.94	168.8	152.47	150.25	135.45	131.22	142.4	12 141.68	158.05	165.67	177.1	1	
	'						C	Output from w	ater heat	er (annual)	112	1864.11	(64)
Heat gains fror	n water	heating,	kWh/mo	onth 0.2	5 ´ [0.8	5 × (45)m	ı + (61)m] + 0.8	x [(46)m	n + (57)m	+ (59)m		-
(65)m= 86.05	76.52	81.97	75.7	75.8	70.04	69.47	73.2	72.12	78.39	80.1	84.73]	(65)
include (57)r	n in calc	culation of	of (65)m	only if c	ylinder	is in the	dwellir	ng or hot w	ater is f	from com	munity h	neating	
5. Internal ga			. ,		•						•		
Metabolic gains	s (Table	5), Wat	ts										
Jan	Feb	Mar	Apr	May	Jun	Jul	Au	g Sep	Oct	Nov	Dec		
(66)m= 90.34	90.34	90.34	90.34	90.34	90.34	90.34	90.3	4 90.34	90.34	90.34	90.34		(66)
Lighting gains	(calculat	ted in Ap	pendix	L, equat	ion L9	or L9a), a	lso se	e Table 5	-		-	•	
(67)m= 14.04	12.47	10.14	7.68	5.74	4.85	5.24	6.81	9.13	11.6	13.54	14.43]	(67)
Appliances gai	ns (calc	ulated in	Append	dix L, eq	uation I	_13 or L1	3a), a	lso see Ta	ble 5	-	_	•	
(68)m= 157.5	159.14	155.02	146.25	135.18	124.78	117.83	116.	2 120.31	129.08	140.15	150.55		(68)
Cooking gains	(calcula	ted in A	opendix	L, equat	ion L15	or L15a), also	see Table	5	•	-	•	
(69)m= 32.03	32.03	32.03	32.03	32.03	32.03	32.03	32.0	3 32.03	32.03	32.03	32.03		(69)
Pumps and far	ns gains	(Table 5	āa)					•				•	
(70)m= 0	0	0	0	0	0	0	0	0	0	0	0		(70)
Losses e.g. ev	aporatio	n (negat	ive valu	es) (Tab	le 5)	-		-	-	-	-	•	
(71)m= -72.27	-72.27	-72.27	-72.27	-72.27	-72.27	-72.27	-72.2	7 -72.27	-72.27	-72.27	-72.27		(71)
Water heating	gains (T	able 5)		-		-		-	-	-	-	•	
(72)m= 115.65	113.87	110.17	105.15	101.88	97.28	93.38	98.3	8 100.16	105.37	111.24	113.88		(72)
Total internal	gains =				(60	6)m + (67)m	n + (68)	m + (69)m +	(70)m + (71)m + (72))m	•	
(73)m= 337.3	335.58	325.44	309.18	292.9	277.01	266.54	271.4	9 279.71	296.15	315.03	328.97		(73)
6. Solar gains):												
Solar gains are c	alculated ı	using sola	r flux from	Table 6a	and asso	ciated equa	ations to	convert to the	ne applica	ble orienta	tion.		
Orientation: A		actor	Area			UX		g_ Table 6b	-	FF		Gains	
_	able 6d		m²		- 18	able 6a		Table 6b	_ '	Table 6c		(W)	_
Northeast _{0.9x}	0.77	X	12.	07	x	11.28	X	0.63	x	0.7	=	41.62	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	22.97	X	0.63	x	0.7	=	84.72	(75)
Northeast _{0.9x}	0.77	X	12.	07	x	41.38	X	0.63	x	0.7	=	152.64	(75)
Northeast _{0.9x}	0.77	Х	12.	07	X	67.96	X	0.63	x	0.7	=	250.67	(75)
Northeast _{0.9x}	0.77	X	12.	07	X	91.35	X	0.63	x	0.7	=	336.95	(75)

Northeast _{0.9x}	0.77	X	12.	07	x	97.38	X		0.63	X	0.7	=	359.23	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	91.1	X		0.63	x	0.7	=	336.05	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	72.63	X		0.63	x	0.7	=	267.9	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	50.42	X		0.63	x	0.7	=	185.99	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	28.07	X		0.63	x	0.7	=	103.53	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	14.2	X		0.63	X	0.7	=	52.37	(75)
Northeast 0.9x	0.77	Х	12.	07	x	9.21	X		0.63	x	0.7	=	33.99	(75)
Solar gains in	watts, ca	alculated	for eac	h month	_		(83)m	n = Si	um(74)m .	(82)m	_			
(83)m= 41.62	84.72	152.64	250.67	336.95	359.2	3 336.05	267	7.9	185.99	103.53	52.37	33.99		(83)
Total gains –	internal a	and solar	(84)m =	= (73)m	+ (83)	m , watts						•	•	
(84)m= 378.92	420.3	478.07	559.85	629.86	636.2	4 602.59	539	.39	465.7	399.68	367.4	362.95		(84)
7. Mean inte	rnal temp	perature	(heating	season)									
Temperature	during h	neating p	eriods ir	n the livi	ng are	a from Ta	ble 9	, Th	1 (°C)				21	(85)
Utilisation fa	ctor for g	ains for I	living are	ea, h1,m	(see	Table 9a)								
Jan	Feb	Mar	Apr	May	Jui	n Jul	Α	ug	Sep	Oct	Nov	Dec		
(86)m= 0.98	0.96	0.91	0.79	0.6	0.41	0.3	0.3	35	0.59	0.86	0.96	0.98		(86)
Mean interna	al temner	ature in	living an		llow s	tens 3 to	7 in T	 Table	2 9c)					
(87)m= 20.03	20.19	20.48	20.8	20.95	20.9	_i	2		20.97	20.74	20.34	20		(87)
, ,					-l 113		-1-1- (-0 (00)		1			
Temperature (88)m= 20.25	20.25	20.25	20.26	20.27	20.2	<u> </u>	20.		12 (°C) 20.28	20.27	20.26	20.26		(88)
. ,	ļ			<u> </u>	<u> </u>	!	<u> </u>	20	20.20	20.27	20.20	20.26		(00)
Utilisation fa	 					`	T			1	1	1	1	(2.2)
(89)m= 0.97	0.95	0.9	0.76	0.56	0.37	0.25	0.3	3	0.54	0.83	0.95	0.98		(89)
Mean interna	al temper	ature in	the rest	of dwell	ng T2	(follow ste	eps 3	to 7	7 in Tabl	e 9c)	_			
(90)m= 18.94	19.19	19.59	20.03	20.22	20.2	3 20.28	20.	28	20.25	19.97	19.41	18.92		(90)
									f	LA = Livir	ng area ÷ (4) =	0.47	(91)
Mean interna	al temper	ature (fo	r the wh	ole dwe	lling) :	= fLA × T1	+ (1	– fL	A) × T2					
(92)m= 19.45	19.66	20.01	20.4	20.57	20.6	2 20.62	20.	62	20.59	20.33	19.85	19.43		(92)
Apply adjust	ment to t	he mean	interna	l temper	ature	from Table	e 4e,	whe	re appro	opriate				
(93)m= 19.45	19.66	20.01	20.4	20.57	20.6	2 20.62	20.	62	20.59	20.33	19.85	19.43		(93)
8. Space hea	ating requ	uirement												
Set Ti to the					ed at	step 11 of	Tabl	le 9b	o, so tha	t Ti,m=	(76)m an	d re-calc	culate	
the utilisation	1			i			Ι,		0	0.1	NI.			
Jan Utilisation fo	Feb	Mar	Apr	May	Jui	n Jul	A	ug	Sep	Oct	Nov	Dec		
Utilisation fa	0.95	0.89	0.76	0.57	0.39	0.28	0.3	32	0.56	0.84	0.94	0.97		(94)
Useful gains				<u> </u>	0.50	0.20	0.0	,,,	0.50	0.04	0.54	0.57		(0.)
(95)m= 365.75	`	427.33	427.25	360.81	247.2	2 166.11	173	.41	261.73	334.22	345.95	352.08		(95)
Monthly ave				<u> </u>		1					1		1	, ,
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16	.4	14.1	10.6	7.1	4.2		(96)
Heat loss rat				l .	Lm , \	V =[(39)m]	1	I	I	
(97)m= 661.94		585.42	487.92	374.76	248.9		173		270.77	411.33	543.52	654.55		(97)
Space heatir	ng require	ement fo	r each n	nonth, k	Nh/m	$\frac{1}{\text{onth}} = 0.02$	24 x [[(97)	m – (95)m] x (4	1)m		•	
(98)m= 220.37	164.48	117.62	43.69	10.37	0	0	0)	0	57.37	142.25	225.03		
	-				-	•	•			-	•	-	•	

т	otal per year (kWh/	/year) = Sum(98) _{15,912} =	981.18	(98)
Space heating requirement in kWh/m²/year			18.18	(99)
9b. Energy requirements – Community heating scheme				
This part is used for space heating, space cooling or water heating properties fraction of space heat from secondary/supplementary heating (Table	•	mmunity scheme.	0	(301)
Fraction of space heat from community system 1 – (301) =	,	F	1	(302)
The community scheme may obtain heat from several sources. The procedure allows	for CHP and up to t	ـــ four other heat sources; the	e latter	_
includes boilers, heat pumps, geothermal and waste heat from power stations. See Approximation of heat from Community boilers	ppendix C.	Г	1	(303a)
Fraction of total space heat from Community boilers		(302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for community h	neating system		1] (305)
Distribution loss factor (Table 12c) for community heating system	3 - 7		1.05	」 (306)
Space heating		L	kWh/year	_
Annual space heating requirement			981.18	
Space heat from Community boilers	(98) x (304a) x	(305) x (306) =	1030.24	(307a)
Efficiency of secondary/supplementary heating system in % (from Ta	ble 4a or Apper	ndix E)	0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x 1	100 ÷ (308) =	0	(309)
Water heating		_		_
Annual water heating requirement		L	1864.11	
If DHW from community scheme: Water heat from Community boilers	(64) x (303a) x	(305) x (306) =	1957.32	(310a)
Electricity used for heat distribution	0.01 × [(307a)(307	7e) + (310a)(310e)] =	29.88	(313)
Cooling System Energy Efficiency Ratio			0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314)) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside	de	Γ	114.79	(330a)
warm air heating system fans		Ī	0	(330b)
pump for solar water heating		Ī	0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330	0b) + (330g) =	114.79	(331)
Energy for lighting (calculated in Appendix L)			247.96	(332)
Total delivered energy for all uses (307) + (309) + (310) + (312) + (31	15) + (331) + (33	32)(237b) =	3350.31	(338)
12b. CO2 Emissions – Community heating scheme				
	Energy kWh/year	Emission factor E kg CO2/kWh k	missions g CO2/year	
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP using two forms	uels repeat (363) to	(366) for the second fuel	96	(367a)
CO2 associated with heat source 1 [(307b)+(310b)]] x 100 ÷ (367b) x	0.22 =	672.2	(367)
Electrical energy for heat distribution [(313)	x	0.52	15.51	(372)

Total CO2 associated with community	systems	(363)(366) + (368)(372)		=	687.71	(373)
CO2 associated with space heating (se	econdary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =			687.71	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	=	59.58	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	128.69	(379)
Total CO2, kg/year	sum of (376)(382) =				875.97	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				16.23	(384)
El rating (section 14)					88.14	(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:53:42

Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 69.61m² **Plot Reference:** Site Reference : Highgate Road - GREEN 04 - E

Address:

Client Details:

Name: Address:

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 18.52 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 16.10 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 50.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 41.2 kWh/m²

OK 2 Fabric U-values

Element Average

Highest 0.18 (max. 0.70) External wall 0.18 (max. 0.30) OK Party wall 0.00 (max. 0.20) OK

Floor (no floor)

Roof 0.13 (max. 0.20) 0.13 (max. 0.35) OK Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	8.97m²	
Windows facing: South West	2.92m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m ² K	
Community heating, heat from boilers – mains gas		

		Hear	Details:						
A No	Nail leadean	USEI		- M	L		CTDO	040040	
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Stroma Softwa					010943 on: 1.0.5.50	
Contware Hame.	0.10111a 1 0711 2012		y Address:		31011.		7 01010	71. 110.0.00	
Address :		·	·						
1. Overall dwelling dime	ensions:								
Ground floor		Aı	rea(m²)	(10) v		ight(m)	(2a) =	Volume(m³	(3a)
	-) . (4 -) . (4 -) . (4 -) . (4 -)	(4.5)		(1a) x	2	65	(2a) =	184.47	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	F(1n)	69.61	(4)) (O.) (O.)	I) (O)	(0.)		_
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	184.47	(5)
2. Ventilation rate:	main sec	ondary	other		total			m³ per hou	r
Number of altimospess	heating he	ating		1 _ F			40 =		_
Number of chimneys			0] = [0			0	(6a)
Number of open flues	0 +	0 +	0] = [0		20 =	0	(6b)
Number of intermittent fa				Ĺ	0		10 =	0	(7a)
Number of passive vents	;			L	0	X '	10 =	0	(7b)
Number of flueless gas fi	ires				0	X 4	40 =	0	(7c)
							Air ch	nanges per ho	our
Infiltration due to chimne	vs_flues and fans = (6a)	+(6b)+(7a)+(7b))+(7c) =	Г	0		÷ (5) =	0	(8)
•	peen carried out or is intended,			ontinue fr			- (3) =	0	(0)
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber fra resent, use the value correspo			•	ruction			0	(11)
deducting areas of openii		maing to the gre	aler wall are	a (anter					
If suspended wooden f	floor, enter 0.2 (unsealed	d) or 0.1 (sea	aled), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
ŭ	s and doors draught strip	oped						0	(14)
Window infiltration			0.25 - [0.2	, ,	_	. (45)		0	(15)
Infiltration rate	aEO avaraged in pubic	motroe per	(8) + (10)	, , ,	, , ,	, ,	oroo	0	(16)
If based on air permeabil	q50, expressed in cubic $(18) = (17)$	•	•	•	etre or e	envelope	area	3	(17)
•	es if a pressurisation test has b				is being u	sed	ļ	0.15	(18)
Number of sides sheltere			,	,	Ü			0	(19)
Shelter factor			(20) = 1 -	0.075 x (1	19)] =			1	(20)
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.15	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ∸ 4								
	1.23 1.1 1.08	0.95 0.95	0.92	1	1.08	1.12	1.18]	
								J	

ajustea iriiliti	ation rat	e (allowi	ing for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m				-	
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18]	
<i>alcul<mark>ate effed</mark></i> If mechanica		_	rate for t	ne appli	cable ca	se						0.5	(2
If exhaust air he			endix N. (2	3b) = (23a	a) × Fmv (e	equation (I	N5)) . othe	wise (23b) = (23a)			0.5	=\(\frac{1}{2}\)
If balanced with									, , ,			74.8	=\\(^2
a) If balance		•	-	_					2h\m + (23h) √ [·	1 _ (23c)		(2
4a)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3]	(2
b) If balance					l		l			23h)		J	
4b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(2
c) If whole h	OUSE EX	tract ver	tilation (or nositiv	e input v	<u>l</u> ventilatio	n from c	utside				J	
,			then (24	•	•				5 × (23b)			
4c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(2
d) If natural	ventilatio	on or wh	ole hous	e positiv	/e input	ventilatio	on from I	oft	ļ.		<u>!</u>	1	
,			m = (221)		•				0.5]			_	
4d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(:
Effective air	change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in box	(25)				_	
5)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3]	(:
3. Heat losse	s and he	at lose r	naramet	or:									
LEMENT	Gros	·	Openin		Net Ar	A 2	U-valı	IA	AXU		k-value	Δ Δ	Χk
LEIVIEINI	area	_	m		A,r		W/m2		(W/I	<)	kJ/m²-		/K
indows Type	· 1				8.97	x1.	/[1/(1.4)+	0.04] =	11.89				(
indows Type	2				2.92	x1,	/[1/(1.4)+	0.04] =	3.87				(
alls Type1	41.5	i9	11.89	9	29.7	X	0.18		5.35	=	60	1782	
/alls Type2	18.4	<u> </u>	0		18.41	x	0.17	=	3.09	=	60	1104.6	$\frac{1}{6}$
oof	69.6		0		69.61	=	0.13	<u> </u>	9.05	ᅴ ;	9	626.49	=
otal area of e					129.6	=	0.10		0.00			020.40	Ш,
arty wall	iomonto	,				=		— r			45) م
•					38.68	=	0	=	0		45	1740.6	〓.
arty floor					69.61					Ĺ	40	2784.4	= '
ternal wall **					136.2					L	9	1225.8	89 (
or windows and include the area						ated using	formula 1	/[(1/U-valu	ıe)+0.04] a	s given in	paragraph	1 3.2	
abric heat los							(26)(30)	+ (32) =				33.25	
eat capacity		•	- /					((28)	.(30) + (32	2) + (32a).	(32e) =	9263.98	\exists
nermal mass	,	,	⊃ = Cm -	- TFA) ir	n kJ/m²K			= (34)	÷ (4) =	, , ,	, ,	133.08	\exists
r design assess	•	•		,			ecisely the			TMP in Ta	able 1f	100.00	`
n be used inste						·							
nermal bridge	es : S (L	x Y) cal	culated (using Ap	pendix ł	<						7.36	
details of therma		are not kn	own (36) =	= 0.05 x (3	1)								_
otal fabric he									(36) =			40.61	(
entilation hea						<u> </u>	1		= 0.33 × (1	1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
8)m= 19.31	19.08	18.86	17.71	17.49	16.34	16.34	16.12	16.8	17.49	17.94	18.4]	(
eat transfer o	oefficier	nt, W/K						(39)m	= (37) + (3	38)m			

leat lo	ss para	meter (F	HLP), W	m²K					(40)m	= (39)m ÷	- (4)			
l0)m=	0.86	0.86	0.85	0.84	0.83	0.82	0.82	0.81	0.82	0.83	0.84	0.85		_
umbe	or of day	re in mor	nth (Tab	lo 1a)					,	Average =	Sum(40) ₁	12 /12=	0.84	(4
umbe	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
l1)m=	31	28	31	30	31	30	31	31	30	31	30	31		(4
,														
4. Wa	iter heat	ing ener	gy requi	rement:								kWh/ye	ear:	
ccum	ad acci	inancy I	NI.]		/ 4
if TF				[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		24		(4
nnua	laverag	e hot wa					erage =					7.32		(4
		_		usage by : day (all w		_	designed (ld)	to achieve	a water us	se target o	of			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
ot wate							Table 1c x		ОСР		1407			
4)m=	96.05	92.56	89.07	85.57	82.08	78.59	78.59	82.08	85.57	89.07	92.56	96.05		
											m(44) ₁₁₂ =	L	1047.84	(4
nergy (content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x D	Tm / 3600	kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
5)m=	142.44	124.58	128.56	112.08	107.54	92.8	85.99	98.68	99.86	116.37	127.03	137.95		_
instanı	aneous w	ater heatii	ng at point	of use (no	hot water	storage).	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	= [1373.88	(4
6)m=	21.37	18.69	19.28	16.81	16.13	13.92	12.9	14.8	14.98	17.46	19.05	20.69		(4
,	storage		10.20	10.01	10.10	10.02	12.0	14.0	14.00	17.40	10.00	20.00		`
torag	e volum	e (litres)	includir	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(4
	•	_			-		litres in	' '						
			hot wate	er (this in	ıcludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in ((47)			
	storage anufact		eclared I	oss facto	or is kno	wn (kWh	n/day).					0		(4
•			m Table) 10 IU10	(1	"aay).					0		(4
-				, kWh/ye	ear			(48) x (49)) =			10		(5
			_	ylinder l		or is not		· / · /			<u> </u>	10		(-
		•		om Tabl	e 2 (kWl	h/litre/da	ıy)				0.	02		(5
	-	eating s from Tal	ee secti	on 4.3										
			oie ∠a m Table	2h								.6		(<u>t</u>
•				, kWh/ye	ar			(47) x (51)) x (52) x (53) =				(5
٠.		(54) in (5	•	, 10011/90	Jai			(11) X (01)	/ X (OZ) X (<i>-</i>		.03		(5
		. , .	•	or each	month			((56)m = (55) × (41):	m				·
6)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(5
												m Appendi	x H	,
7)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(5
imar	v circuit	lose (an	nual) fro	m Table	3 3	<u> </u>	<u> </u>	<u> </u>	<u>I</u>	!		0		(5
	•	•	,			59)m = ((58) ÷ 36	65 × (41)	m			-		,,
	-				•		er heati	, ,		r thermo	stat)			
9)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(!

Combi loss o	ralculated	for each	month ((61)m –	(60) ± 3	65 v (41)m							
(61)m= 0	0	0	0	0	00) - 0	00 x (+1) 0		0	0	T 0	0	1	(61)
	<u>l</u>			alculated	for eac	h month							J · (59)m + (61)m	` ,
(62)m= 197.7		183.83	165.57	162.82	146.29	141.27	153	_	153.35	171.65	180.52	193.22	1	(62)
Solar DHW inpu			<u> </u>						if no sola		1		1	` ,
(add addition												· · · · · · · · · · · · · · · · · ·		
(63)m= 0	0	0	0	0	0	0	0		0	0	0	0	1	(63)
Output from	water hea	ter	ı										•	
(64)m= 197.7		183.83	165.57	162.82	146.29	141.27	153	.96	153.35	171.65	180.52	193.22	1	
			ı			1		Outp	out from wa	ater heate	er (annual) ₁	112	2024.72	(64)
Heat gains fi	rom water	heating,	kWh/m	onth 0.2	5 ´ [0.85	5 × (45)m	ı + (6	1)m	n] + 0.8 x	κ [(46)m	+ (57)m	+ (59)m	n]	_
(65)m= 91.58	81.36	86.97	80.06	79.98	73.65	72.81	77.0	03	76	82.92	85.03	90.09]	(65)
include (5	7)m in cald	culation	of (65)m	only if c	ylinder	is in the	dwell	ing	or hot w	ater is f	rom com	munity h	neating	
5. Internal	gains (see	e Table 5	and 5a):										
Metabolic ga	ins (Table	e 5), Wat	ts											
Jan		Mar	Apr	May	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec]	
(66)m= 111.8	3 111.83	111.83	111.83	111.83	111.83	111.83	111.	.83	111.83	111.83	111.83	111.83]	(66)
Lighting gair	ns (calcula	ted in Ap	pendix	L, equat	ion L9 d	r L9a), a	lso s	ee ¯	Table 5				_	
(67)m= 18.0 ²	16.02	13.03	9.87	7.37	6.23	6.73	8.7	4	11.74	14.9	17.39	18.54]	(67)
Appliances of	gains (calc	ulated ir	Append	dix L, eq	uation L	.13 or L1	3a), a	also	see Ta	ble 5		-	_	
(68)m= 196.3	9 198.42	193.29	182.36	168.55	155.58	146.92	144.	.88	150.02	160.95	174.75	187.72]	(68)
Cooking gair	ns (calcula	ted in A	ppendix	L, equat	ion L15	or L15a), als	o se	e Table	5	-	-	-	
(69)m= 34.18	34.18	34.18	34.18	34.18	34.18	34.18	34.	18	34.18	34.18	34.18	34.18]	(69)
Pumps and t	ans gains	(Table 5	5a)										_	
(70)m= 0	0	0	0	0	0	0	0		0	0	0	0]	(70)
Losses e.g.	evaporatio	on (nega	tive valu	es) (Tab	le 5)									
(71)m= -89.4	6 -89.46	-89.46	-89.46	-89.46	-89.46	-89.46	-89.	46	-89.46	-89.46	-89.46	-89.46]	(71)
Water heating	ng gains (T	able 5)											_	
(72)m= 123.1	121.08	116.89	111.2	107.5	102.29	97.87	103	.54	105.55	111.45	118.1	121.09]	(72)
Total intern	al gains =				(66	i)m + (67)m	า + (68	3)m +	- (69)m + ((70)m + (7	71)m + (72))m	_	
(73)m= 394.0	7 392.08	379.76	359.97	339.98	320.65	308.06	313	.71	323.86	343.85	366.79	383.9		(73)
6. Solar gai														
Solar gains ar		•				•	tions 1	to co		e applica		tion.		
Orientation:	Access F Table 6d		Area m²		Fli Ta	ıx ıble 6a		Т	g_ able 6b	Т	FF able 6c		Gains (W)	
Northoast o o							1 1					_	. ,	1,75
Northeast 0.93		X				11.28	X]		0.63	×	0.7	=	30.93	(75)
	<u> </u>	X				22.97	X]		0.63	_	0.7	_ =	62.96	(75)
Northeast 0.9	<u> </u>	X	8.9			41.38	X]		0.63	×	0.7	=	113.43	[(75)
Northeast 0.9		X	8.9		<u> </u>	67.96	X		0.63	×	0.7	=	186.29](75)] ₍₇₅₎
Northeast 0.9	0.77	X	8.9	97	X	91.35	X		0.63	X	0.7	=	250.41	(75)

		_			_		7		_		_		_
Northeast _{0.9x}	0.77	X	8.9	7	x _	97.38	X	0.63	×	0.7	=	266.96	(75)
Northeast _{0.9x}	0.77	X	8.9	7	x	91.1	X	0.63	X	0.7	=	249.74	(75)
Northeast _{0.9x}	0.77	X	8.9	7	x	72.63	X	0.63	X	0.7	=	199.1	(75)
Northeast _{0.9x}	0.77	X	8.9	7	x	50.42	X	0.63	X	0.7	=	138.22	(75)
Northeast _{0.9x}	0.77	X	8.9	7	x	28.07	X	0.63	X	0.7	=	76.94	(75)
Northeast _{0.9x}	0.77	X	8.9	7	х	14.2	X	0.63	X	0.7	=	38.92	(75)
Northeast 0.9x	0.77	X	8.9	7	x	9.21	X	0.63	X	0.7	=	25.26	(75)
Southwest _{0.9x}	0.77	X	2.9	2	x	36.79]	0.63	X	0.7	=	32.83	(79)
Southwest _{0.9x}	0.77	X	2.9	2	x	62.67		0.63	X	0.7	=	55.93	(79)
Southwest _{0.9x}	0.77	×	2.9	12	x	85.75]	0.63	X	0.7	=	76.52	(79)
Southwest _{0.9x}	0.77	x	2.9	2	x	106.25		0.63	X	0.7	=	94.82	(79)
Southwest _{0.9x}	0.77	x	2.9	12	x	119.01		0.63	X	0.7	=	106.2	(79)
Southwest _{0.9x}	0.77	×	2.9	2	x	118.15]	0.63	X	0.7	=	105.44	(79)
Southwest _{0.9x}	0.77	X	2.9	2	x	113.91		0.63	X	0.7	=	101.65	(79)
Southwest _{0.9x}	0.77	×	2.9	2	x	104.39]	0.63	x	0.7	=	93.16	(79)
Southwest _{0.9x}	0.77	×	2.9	2	x	92.85]	0.63	x	0.7	=	82.86	(79)
Southwest _{0.9x}	0.77	×	2.9	2	x	69.27	Ī	0.63	x	0.7	=	61.81	(79)
Southwest _{0.9x}	0.77	×	2.9	2	x	44.07	1	0.63	x	0.7	=	39.33	(79)
Southwest _{0.9x}	0.77	×	2.9	2	x	31.49	Ī	0.63	x	0.7	=	28.1	(79)
Solar gains in						4 1 054 00	ř	n = Sum(74)m .		70.05	50.00		(02)
(83)m= 63.76 Total gains – i		39.96 Solar	281.11	356.62	372.4		292	.25 221.08	138.76	78.25	53.36		(83)
(84)m= 457.84		30iai 39.72	641.07	696.59	693.0		605	.97 544.94	482.6	445.04	437.26		(84)
` '					<u> </u>	000.40	1 003	.57 544.54	402.0	1 443.04	437.20		(01)
7. Mean inter			,		<i></i>	, -		TI 4 (00)					7,
Temperature	Ū	٠.			•		ole 9	, Ih1 (°C)				21	(85)
Utilisation fac	 	$\overline{}$			`				0.1	l Ni-			
Jan	 	Mar	Apr	May	Jur	+	 	ug Sep	Oct	0.96	Dec		(86)
(86)m= 0.97).92	0.83	0.69	0.51	0.38		10 0.66			0.98		(00)
Mean interna					•			12 0.66	0.88	0.00	<u> </u>		
	1 1					_i	7 in T	able 9c)					(07)
(87)m= 19.7	1 1	re in I 0.21	iving are	ea T1 (fo 20.85	20.9	_i		able 9c)	20.57		19.68		(87)
(87)m= 19.7 Temperature	19.9 2	0.21	20.6	20.85	20.9	7 20.99	7 in T	able 9c) 99 20.91					(87)
	19.9 2 during hea	0.21	20.6	20.85	20.9	7 20.99 ng from Ta	7 in T	able 9c) 99 20.91 9, Th2 (°C)		20.09			(87)
Temperature	19.9 2 during hea 20.2 2	0.21 ting p	20.6 eriods ir 20.22	20.85 n rest of 20.22	20.9° dwelli 20.24	7 20.99 ng from Ta 4 20.24	7 in T 20. able 9 20.	able 9c) 99 20.91 9, Th2 (°C)	20.57	20.09	19.68		, ,
Temperature (88)m= 20.2	during hea 20.2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	0.21 ting p	20.6 eriods ir 20.22	20.85 n rest of 20.22	20.9° dwelli 20.24	7 20.99 ng from Ta 4 20.24 (see Table	7 in T 20. able 9 20.	Fable 9c) 99 20.91 9, Th2 (°C) 24 20.23	20.57	20.09	19.68		, ,
Temperature (88)m= 20.2 Utilisation fact (89)m= 0.97	19.9 2 during hea 20.2 2 ctor for gain 0.95 0	0.21 ting p 0.21 s for r	20.6 eriods ir 20.22 est of do 0.81	20.85 n rest of 20.22 welling, 0.65	20.9° dwelli 20.24 h2,m 0.45	ng from Ta 4 20.24 (see Table 0.31	7 in T 20. able 9 20. 9a) 0.3	Fable 9c) 99 20.91 9, Th2 (°C) 24 20.23	20.57	20.09	19.68		(88)
Temperature (88)m= 20.2 Utilisation fac	during hear 20.2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	0.21 ting p 0.21 s for r	20.6 eriods ir 20.22 est of do 0.81	20.85 n rest of 20.22 welling, 0.65	20.9° dwelli 20.24 h2,m 0.45	ng from Ta 4 20.24 (see Table 0.31 (follow ste	7 in T 20. able 9 20. 9a) 0.3	Fable 9c) 99 20.91 9, Th2 (°C) 24 20.23 86 0.6 8 to 7 in Table	20.57	20.09	19.68		(88)
Temperature (88)m= 20.2 Utilisation fac (89)m= 0.97 Mean interna	during hear 20.2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	o.21 ting pool.21 s for r	20.6 eriods ir 20.22 est of do 0.81 the rest	20.85 n rest of 20.22 welling, 0.65 of dwelli	20.9 dwelli 20.24 h2,m (0.45	ng from Ta 4 20.24 (see Table 0.31 (follow ste	7 in T 20. able (20. 9a) 0.3	Fable 9c) 99 20.91 9, Th2 (°C) 24 20.23 36 0.6 3 to 7 in Tabl 23 20.15	20.57 20.22 0.85 e 9c) 19.71	20.09	19.68 20.21 0.97	0.38	(88)
Temperature (88)m= 20.2 Utilisation fac (89)m= 0.97 Mean interna (90)m= 18.46	19.9 2 during heat 20.2 2 ctor for gain 0.95 0 al temperature 18.74 1	0.21 ting pr 0.21 s for r 0.91 re in t	20.6 eriods ir 20.22 est of do 0.81 the rest 19.73	20.85 n rest of 20.22 welling, 0.65 of dwelli 20.07	20.9 dwelli 20.24 h2,m 0.45 ing T2 20.2	7 20.99 ng from Ta 4 20.24 (see Table 0.31 (follow ste 1 20.23	7 in T 20. able 9 20. 9a) 0.3 eps 3	Fable 9c) 99 20.91 9, Th2 (°C) 24 20.23 36 0.6 3 to 7 in Table 23 20.15	20.57 20.22 0.85 e 9c) 19.71	20.09 20.22 0.95	19.68 20.21 0.97	0.38	(88) (89) (90)
Temperature (88)m= 20.2 Utilisation fact (89)m= 0.97 Mean internation (90)m= 18.46	during hear 20.2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	0.21 ting pr 0.21 s for r 0.91 re in t	20.6 eriods ir 20.22 est of do 0.81 the rest 19.73	20.85 n rest of 20.22 welling, 0.65 of dwelli 20.07	20.9 dwelli 20.24 h2,m 0.45 ing T2 20.2	7 20.99 ng from Ta 4 20.24 (see Table	7 in T 20. able 9 20. 9a) 0.3 eps 3	Fable 9c) 99 20.91 9, Th2 (°C) 24 20.23 36 0.6 3 to 7 in Tabl 23 20.15	20.57 20.22 0.85 e 9c) 19.71	20.09 20.22 0.95 19.02 ring area ÷ (-	19.68 20.21 0.97	0.38	(88) (89) (90)
Temperature (88)m= 20.2 Utilisation fac (89)m= 0.97 Mean interna (90)m= 18.46	19.9 2 during heat 20.2 2 ctor for gain 0.95 0 It temperature 18.74 1 It temperature 19.18 1	0.21 ting pool 0.21 s for r 0.91 re in t 9.19 re (fo 9.58	20.6 eriods ir 20.22 est of do 0.81 the rest 19.73 r the wh	20.85 n rest of 20.22 welling, 0.65 of dwelli 20.07 ole dwe 20.37	20.9 dwelli 20.24 h2,m 0.45 ng T2 20.2 llling) = 20.5	7 20.99 ng from Ta 4 20.24 (see Table 0.31 (follow ste 1 20.23 = fLA × T1 20.52	7 in T 20. able 9 20. 9a) 0.3 eps 3 20. + (1 20.	Fable 9c) 99 20.91 9, Th2 (°C) 24 20.23 36 0.6 3 to 7 in Tabl 23 20.15 - fLA) × T2 52 20.44	20.57 20.22 0.85 e 9c) 19.71 iLA = Liv	20.09 20.22 0.95 19.02 ring area ÷ (-	19.68 20.21 0.97 18.43 4) =	0.38	(88) (89) (90) (91)

												•	
(93)m= 18.93	19.18	19.58	20.06	20.37	20.5	20.52	20.52	20.44	20.04	19.43	18.9		(93)
8. Space hea													
Set Ti to the the utilisation			•		ed at st	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	<u> </u>	l	· ·				79	- Gop					
(94)m= 0.96	0.94	0.9	0.8	0.65	0.47	0.34	0.38	0.62	0.85	0.94	0.96		(94)
Useful gains,	hmGm	, W = (94	4)m x (8	4)m	Į.	Į.					Į.		
(95)m= 439.27	480.25	511.52	515.27	455.14	326.24	221.49	230.62	336.01	408.15	416.96	421.82		(95)
Monthly aver	age exte	rnal tem	perature	from Ta	able 8							•	
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate	1	i —			i —						i	ı	
(97)m= 876.88	852.5	777.76	651.09	503.53	335.98	223.41	233.76	363.88	548.54	721.97	867.71		(97)
Space heatin	i i	1	1		I	I						İ	
(98)m= 325.58	250.15	198.08	97.79	36	0	0	0	0	104.45	219.61	331.75	.=== .=	¬(00)
							Tota	l per year	(kWh/yeaı) = Sum(9	8) _{15,912} =	1563.42	(98)
Space heating	g require	ement in	kWh/m²	/year								22.46	(99)
9b. Energy red	quiremer	nts – Cor	mmunity	heating	scheme								
This part is us										unity sch	neme.		¬
Fraction of spa	ace heat	from se	condary,	/supplen	nentary I	neating	(Table 1	1) '0' if n	one			0	(301)
Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The community s									up to four	other heat	sources; ti	he latter	
includes boilers, l Fraction of he		-			rom powe	r stations.	See Appei	ndix C.			i	1	(303a)
			•						-	> (╡`
Fraction of tot	•			•						02) x (303	a) =	1	(304a)
Factor for con				,	` ''		•	ting sys	tem			1	(305)
Distribution los	ss factor	(Table 1	2c) for o	commun	ity heatii	ng syste	m					1.05	(306)
Space heatin	g											kWh/yea	<u>r_</u>
Annual space	heating	requiren	nent									1563.42	
Space heat fro	om Comi	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	=	1641.6	(307a)
Efficiency of s	econdar	y/supple	mentary	heating	system	in % (fro	om Table	4a or A	ppendix	E)		0	(308
Space heating	require	ment fro	m secon	dary/su	oplemen	tary sys	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water heating	~										'		_
Annual water		equirem	ent									2024.72	7
If DHW from c	ommuni	ty schem	ne:										
Water heat fro								(64) x (30	03a) x (30	5) x (306) :	=	2125.95	(310a)
								[(207-)	(2070) 1	(310a)((2100)] -	07.00	(313)
Electricity use		at distribu	ution				0.01	x [(307a).	(3076) +	(0.00)((310e)] =	37.68	(313)
	d for hea			0			0.01	x [(307a).	(307e) 1	(6 / 64)((310e)] =	0	(314)
Electricity use	d for hea m Energ	y Efficie	ncy Rati		n, if not e	enter 0)		= (107) ÷		(6.63)((3 TOE)] =		╡``
Electricity use Cooling Syste	d for hea m Energ	y Efficie	ncy Rati	g systen		,				(6.00)((310e)] =	0	(314)
Electricity use Cooling Syste Space cooling	d for heam Energer (if there bumps a	y Efficie	ncy Rational Report of the cooling within dv	g systen velling (1	Γable 4f)	:				(0.00)	(310e)] = 	0	(314)

warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	b) + (330g) =		170.14	(331)
Energy for lighting (calculated in Apper	ndix L)			Ī	318.62	(332)
Total delivered energy for all uses (307	(309) + (310) + (31	2) + (315) + (331) + (33	32)(237b) =	Ī	4256.31	(338)
12b. CO2 Emissions – Community hea	ting scheme					
		Energy kWh/year	Emission factor kg CO2/kWh		missions g CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)) ing two fuels repeat (363) to	(366) for the second	fuel	96	(367a)
CO2 associated with heat source 1	[(307b	o)+(310b)] x 100 ÷ (367b) x	0.22	=	847.7	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	19.55	(372)
Total CO2 associated with community	systems	(363)(366) + (368)(372	2)	=	867.25	(373)
CO2 associated with space heating (se	econdary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =			867.25	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	=	88.3	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	165.36	(379)
Total CO2, kg/year	sum of (376)(382) =			Γ	1120.92	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				16.1	(384)

El rating (section 14)

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:53:40

Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 50.62m2

Plot Reference: Site Reference : Highgate Road - GREEN 04 - F

Address:

Client Details:

Name: Address:

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 21.42 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 18.26 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 57.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 46.0 kWh/m²

OK

2 Fabric U-values

Element Average Highest 0.18 (max. 0.70) External wall 0.17 (max. 0.30) OK Party wall 0.00 (max. 0.20) OK

Floor (no floor)

Roof 0.13 (max. 0.20) 0.13 (max. 0.35) OK OK

Openings 1.40 (max. 2.00) 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	8.97m²	
Ventilation rate:	4.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

User Details:										
Assessor Name: Neil Ingham Stroma Number: STRO010 Software Name: Stroma FSAP 2012 Software Version: 1										
Property Address: 04 - F Address:										
1. Overall dwelling dimensions:										
Š	olume(m³)									
Ground floor 50.62 (1a) x 2.65 (2a) =	134.14 (3a)									
Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 50.62 (4)										
Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$	134.14 (5)									
2. Ventilation rate:										
main secondary other total m heating heating	³ per hour									
Number of chimneys $0 + 0 = 0 \times 40 =$	0 (6a)									
Number of open flues $0 + 0 + 0 = 0 \times 20 =$	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	0 (7c)									
	```									
Air changes per hour										
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ $\div (5) = 0$	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	3 (17)									
If based on air permeability value, then $(18) = [(17) \div 20] + (8)$ , otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used	0.15 (18)									
Number of sides sheltered	0 (19)									
Shelter factor (20) = 1 - [0.075 x (19)] =	1 (20)									
Infiltration rate incorporating shelter factor (21) = (18) x (20) =	0.15 (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= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7										
Wind Factor (22a)m = (22)m ÷ 4										
Wind 1 actor (22a)iii = (22)iii + 4										

0.19	0.19	0.18	0.16	0.16	0.14	0.14	(21a) x	0.15	0.16	0.17	0.18	]	
Calculate effe		•	rate for t	he appli	cable ca	se	<u> </u>			<u> </u>			
If mechanic												0.5	(2:
If exhaust air h		0		, ,	,	. `	,, .	,	) = (23a)			0.5	(2
If balanced wit		-	-	_								75.65	(2
a) If balance		anical ve				<del></del>	HR) (24a	ŕ	2b)m + (	23b) × [	1 – (23c)	) ÷ 100]	
24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(2
b) If balance							r ``	<del>í `</del>	<del>-                                    </del>	r í	ı	1	,_
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0	]	(2
c) If whole h				•	•				F (22h	. \			
	n < 0.5 ×	(236), t	nen (240	c) = (230 0	o); other	wise (24	C) = (220)	0) m + 0.	5 × (230	0	0	1	(2
							<u> </u>		U			]	(2
d) If natural if (22b)r	ventilation								0.51				
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0	]	(2
Effective air	change	rate - en	ıter (24a	or (24b	o) or (24	c) or (24	d) in box	· (25)				4	
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Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.92	0.91	0.91	0.89	0.89	0.88	0.88	0.87	0.88	0.89	0.9	0.9		
		!	<u>.                                    </u>	!		!	!		Average =	Sum(40) ₁	12 /12=	0.89	(40)
Number of day	<u> </u>	<u> </u>	· ·						<u> </u>				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(44)
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ting ene	rgy requ	irement:								kWh/ye	ear:	
Assumed occurring TFA > 13.1 if TFA £ 13.1	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9	)2)] + 0.0	0013 x ( ⁻	TFA -13		71		(42)
Annual average Reduce the annual not more that 125	al average	hot water	usage by	5% if the $a$	lwelling is	designed i			se target c		.77		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i	n litres pe	r day for ea				Table 1c x		<u>'</u>	!	!	<u> </u>		
(44)m= 82.25	79.26	76.27	73.28	70.29	67.3	67.3	70.29	73.28	76.27	79.26	82.25		
_						_				im(44) ₁₁₂ =	L	897.28	(44)
Energy content of	f hot water	used - cal	culated m	onthly = 4.	190 x Vd,r	n x nm x E	OTm / 3600	) kWh/mor	nth (see Ta	ables 1b, 1			
(45)m= 121.98	106.68	110.09	95.97	92.09	79.47	73.64	84.5	85.51	99.65	108.78	118.13		<b>—</b> ,
If instantaneous v	vater heati	ing at point	of use (no	o hot water	· storage).	enter 0 in	boxes (46		Total = Su	ım(45) ₁₁₂ =	= [	1176.48	(45)
(46)m= 18.3	16	16.51	14.4	13.81	11.92	11.05	12.68	12.83	14.95	16.32	17.72		(46)
Water storage	1	10.01	14.4	10.01	11.52	11.00	12.00	12.00	14.55	10.02	17.72		(1.0)
Storage volum	ne (litres	) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	neating a	and no ta	ınk in dw	/elling, e	nter 110	litres in	(47)						
Otherwise if no		hot wate	er (this in	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (	(47)			
Water storage a) If manufact		oclared I	occ foct	or ic kno	wo (k\\/k	2/d2v/):							(40)
•				JI IS KIIO	WII (KVVI	i/uay).					0		(48)
Temperature f Energy lost fro				oor			(48) x (49)	١ _			0		(49)
b) If manufact		•			or is not		(40) X (49)	) =		1	10		(50)
Hot water stor			-							0.	02		(51)
If community h	_		on 4.3										
Volume factor			Oh.							-	.03		(52)
Temperature f							(47) (54)	) ( <b>50</b> ) (	50)	0	.6		(53)
Energy lost fro Enter (50) or		_	, KVVh/ye	ear			(47) x (51)	) x (52) x (	53) =	-	03		(54) (55)
Water storage	` , ` `	,	for each	month			((56)m = (	(55) × (41)	m	1.	.03		(33)
		1			20.00		. , ,	. , , ,	ı	T 20 00	22.04		(56)
(56)m= 32.01 If cylinder contain	28.92 s dedicate	32.01	30.98	32.01 m = (56)m	30.98 x [(50) = (	32.01 H11)] ÷ (5	32.01 0) else (5	30.98 $7)m = (56)$	32.01	30.98 (H11) is fro	32.01	хH	(50)
		1								1		X11	(EZ)
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit	•	,			<b>-</b> 0)	(=o) -	,				0		(58)
Primary circuit				,		` '	, ,		r thormo	setat)			
(modified by (59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
(33)11= 23.20	21.01	23.20	ا لا. 22	20.20	ا ل. 22	20.20	20.20	22.01	23.20	22.01	23.20		(00)

Combi loss calculated for each month $(61)m = (60) \div 365 \times (41)m$														
(61)m= 0	0	0	0	0	0	0	) 0	П	0	0	0	0	1	(61)
	uired for	water he	eating ca	alculated	L for eac	h month	(62)r	—— m =	0 85 x (	 ′45)m +	(46)m +	(57)m +	ı · (59)m + (61)m	
(62)m= 177.25	156.61	165.36	149.47	147.37	132.96	128.91	139.	_	139	154.93	162.27	173.4	]	(62)
Solar DHW input	calculated ι	ısing App	endix G or	Appendix	H (negati	ve quantity	/) (ent	er '0'	if no sola	r contribu	tion to wate	r heating)		
(add additiona												•		
(63)m= 0	0	0	0	0	0	0	0		0	0	0	0	]	(63)
Output from w	ater heat	er				•		•			•	•	•	
(64)m= 177.25	156.61	165.36	149.47	147.37	132.96	128.91	139.	.78	139	154.93	162.27	173.4	]	
	•					•		Outp	ut from wa	ater heate	er (annual)	12	1827.32	(64)
Heat gains fro	m water l	neating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (6	1)m	] + 0.8 x	c [(46)m	+ (57)m	+ (59)m	١]	
(65)m= 84.78	75.41	80.82	74.71	74.84	69.22	68.71	72.3	32	71.23	77.36	78.96	83.5	]	(65)
include (57)	m in calc	ulation o	of (65)m	only if c	ylinder i	s in the o	dwelli	ing o	or hot w	ater is f	rom com	munity h	neating	
5. Internal ga	ains (see	Table 5	and 5a	):										
Metabolic gair	ns (Table	5), Wat	ts											
Jan	Feb	Mar	Apr	May	Jun	Jul	Αι	Jg	Sep	Oct	Nov	Dec	]	
(66)m= 85.42	85.42	85.42	85.42	85.42	85.42	85.42	85.4	42	85.42	85.42	85.42	85.42	]	(66)
Lighting gains	(calculat	ed in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso s	ee T	Table 5				-	
(67)m= 13.59	12.07	9.81	7.43	5.55	4.69	5.07	6.5	9	8.84	11.22	13.1	13.97	]	(67)
Appliances ga	ins (calcu	ılated in	Append	dix L, eq	uation L	13 or L1	3a), a	also	see Tal	ble 5		_	-	
(68)m= 148.84	150.39	146.5	138.21	127.75	117.92	111.35	109.	.81	113.7	121.99	132.45	142.28	]	(68)
Cooking gains	(calculat	ed in A	opendix	L, equat	ion L15	or L15a)	), also	o se	e Table	5	-	-	-	
(69)m= 31.54	31.54	31.54	31.54	31.54	31.54	31.54	31.5	54	31.54	31.54	31.54	31.54	]	(69)
Pumps and fa	ns gains	(Table 5	āa)										-	
(70)m= 0	0	0	0	0	0	0	0		0	0	0	0	]	(70)
Losses e.g. ev	/aporation	n (nega	ive valu	es) (Tab	le 5)								-	
(71)m= -68.33	-68.33	-68.33	-68.33	-68.33	-68.33	-68.33	-68.	33	-68.33	-68.33	-68.33	-68.33	]	(71)
Water heating	gains (Ta	able 5)											_	
(72)m= 113.95	112.22	108.64	103.76	100.59	96.14	92.35	97.	2	98.93	103.97	109.67	112.23	]	(72)
Total internal	gains =				(66	)m + (67)m	ı + (68	)m +	(69)m + (	(70)m + (7	71)m + (72)	)m	_	
(73)m= 325.01	323.3	313.57	298.03	282.52	267.37	257.39	262.	.22	270.09	285.81	303.84	317.1	]	(73)
6. Solar gain	s:													
Solar gains are		ŭ					itions t	o cor	nvert to th	e applica		tion.		
Orientation:	Access Fa Table 6d	actor	Area m²		Flu Ta	ıx ble 6a		Τź	g_ able 6b	т	FF able 6c		Gains (W)	
_							1 1	- 10						1
Northeast 0.9x	0.77	×	8.9		-	11.28	X		0.63	_  ×	0.7	=	30.93	(75)
Northeast 0.9x	0.77	×	8.9			22.97	X		0.63	╛ [×] ╘	0.7	_ =	62.96	(75)
Northeast 0.9x	0.77	×	8.9			41.38	X		0.63	_  ×	0.7	=	113.43	(75)
Northeast 0.9x	0.77	X	8.9	_	-	67.96	X		0.63	_  ×	0.7	=	186.29	(75)
Northeast _{0.9x}	0.77	X	8.9	7	x (	91.35	X		0.63	X	0.7	=	250.41	(75)

Northeast _{0.9x}	0.77	X	8.9	7	x	97.38	x		0.63	x	0.7	=	266.96	(75)
Northeast _{0.9x}	0.77	x	8.9	7	x	91.1	x		0.63	x	0.7	=	249.74	(75)
Northeast _{0.9x}	0.77	X	8.9	7	x	72.63	x		0.63	x	0.7	=	199.1	(75)
Northeast _{0.9x}	0.77	Х	8.9	17	х	50.42	x		0.63	x	0.7	=	138.22	(75)
Northeast _{0.9x}	0.77	x	8.9	17	x	28.07	x		0.63	x	0.7		76.94	(75)
Northeast _{0.9x}	0.77	x	8.9	7	х	14.2	x		0.63	x	0.7		38.92	(75)
Northeast 0.9x	0.77	X	8.9	7	х	9.21	x		0.63	_ x [	0.7	=	25.26	(75)
•		<u> </u>					-							
Solar gains in	watts, ca	alculated	for eacl	n month			(83)m	= Sur	m(74)m .	(82)m				
(83)m= 30.93	62.96	113.43	186.29	250.41	266.96	249.74	199.	.1	138.22	76.94	38.92	25.26		(83)
Total gains –	internal a	nd solar	(84)m =	(73)m	+ (83)m	, watts							•	
(84)m= 355.94	386.26	427.01	484.32	532.94	534.34	507.13	461.	32	408.31	362.75	342.76	342.36		(84)
7. Mean inte	rnal temp	erature	(heating	season	)									
Temperature	during h	eating p	eriods ir	the livi	ng area	from Tal	ble 9,	Th1	(°C)				21	(85)
Utilisation fa	ctor for g	ains for I	iving are	ea, h1,m	(see Ta	able 9a)								
Jan	Feb	Mar	Apr	May	Jun	Jul	Αι	ıg 📗	Sep	Oct	Nov	Dec		
(86)m= 0.97	0.96	0.93	0.85	0.7	0.51	0.38	0.43	3	0.68	0.89	0.96	0.98		(86)
Mean interna	al temper	atura in	living ar	22 T1 (f	ollow eta	one 3 to 3	7 in T	ـــــــــــــــــــــــــــــــــــــ	9c)					
(87)m= 19.72	19.89	20.19	20.59	20.85	20.97	20.99	20.9	-	20.9	20.56	20.09	19.7		(87)
` '	ļ				<u> </u>	ļ								, ,
Temperature (88)m= 20.15	20.16				20.19	<u> </u>			<u> </u>	20.47	20.47	20.46		(88)
(88)m= 20.15	20.16	20.16	20.17	20.17	20.19	20.19	20.1	19	20.18	20.17	20.17	20.16		(00)
Utilisation fac	T	ains for r			h2,m (s	ee Table	9a)				Т		Ī	
(89)m= 0.97	0.96	0.92	0.82	0.65	0.45	0.31	0.36	6	0.62	0.86	0.95	0.97		(89)
Mean interna	al temper	ature in	the rest	of dwell	ing T2 (	follow ste	eps 3	to 7	in Tabl	e 9c)	_			
(90)m= 18.45	18.68	19.12	19.67	20.02	20.16	20.18	20.1	18	20.09	19.65	18.99	18.42		(90)
									f	LA = Livir	ng area ÷ (	4) =	0.49	(91)
Mean interna	al temper	ature (fo	r the wh	ole dwe	lling) = 1	fLA × T1	+ (1 -	– fLA	A) × T2					
(92)m= 19.07	19.27	19.64	20.12	20.43	20.56	20.58	20.5	58	20.49	20.1	19.53	19.05		(92)
Apply adjust	ment to tl	ne mean	internal	temper	ature fro	om Table	4e, v	wher	e appro	priate		Į.		
(93)m= 19.07	19.27	19.64	20.12	20.43	20.56	20.58	20.5	58	20.49	20.1	19.53	19.05		(93)
8. Space hea	ating requ	uirement												
Set Ti to the					ned at st	tep 11 of	Table	e 9b,	so tha	t Ti,m=(	76)m an	d re-calc	culate	
the utilisation	1				Ι	1	١.		_		<del> </del>	_	l	
Jan	Feb	Mar	Apr	May	Jun	Jul	Αι	ıg	Sep	Oct	Nov	Dec		
Utilisation factors (94)m= 0.96	0.95	0.91	0.82	0.67	0.48	0.34	0.39	<u>а</u> Т	0.64	0.86	0.94	0.97		(94)
Useful gains					0.40	0.34	0.5	9	0.04	0.00	0.94	0.91		(04)
(95)m= 342.25	_	388.32	396.27	354.46	255.99	174.71	181.0	67	260.98	312.14	322.6	330.69		(95)
Monthly avei					ļ	1		•		0.2	022.0	000.00		, ,
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	4	14.1	10.6	7.1	4.2		(96)
Heat loss rat	L				l .	<u> </u>				]	1	I	1	
(97)m= 686.17		606.21	508.18	393.82	263.86	176.3	184.		285.2	428.51	565.03	679.91		(97)
Space heatir	ng require	ement fo	r each m	nonth, k	Wh/mor	$\frac{1}{1}$ th = 0.02	24 x [(	(97)r	n – (95	)m] x (4	1)m		1	
(98)m= 255.88	201.37	162.11	80.57	29.28	0	0	0		0	86.58	174.55	259.82		
	-				-	-	-				-		•	

	Total per year (kWh/	year) = Sum(98) _{15,912} =	1250.16	(98)
Space heating requirement in kWh/m²/year			24.7	(99)
9b. Energy requirements – Community heating scheme				
This part is used for space heating, space cooling or water heating Fraction of space heat from secondary/supplementary heating (Tab		nmunity scheme.	0	(301)
Fraction of space heat from community system 1 – (301) =	,	F	1	(302)
The community scheme may obtain heat from several sources. The procedure allow	vs for CHP and up to f	∟ our other heat sources; the	e latter	
includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community boilers	Appendix C.	Γ	1	(303a)
Fraction of total space heat from Community boilers		(302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for community	heating system	Ī	1	(305)
Distribution loss factor (Table 12c) for community heating system		Ī	1.05	(306)
Space heating		_	kWh/yea	<u>-</u>
Annual space heating requirement			1250.16	
Space heat from Community boilers	(98) x (304a) x	(305) x (306) =	1312.67	(307a)
Efficiency of secondary/supplementary heating system in % (from 7	Table 4a or Appen	dix E)	0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x 1	00 ÷ (308) =	0	(309)
Water heating		_		_
Annual water heating requirement			1827.32	
If DHW from community scheme: Water heat from Community boilers	(64) x (303a) x	(305) x (306) =	1918.69	(310a)
Electricity used for heat distribution	0.01 × [(307a)(307	(e) + (310a)(310e)] =	32.31	(313)
Cooling System Energy Efficiency Ratio		Ī	0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314)	=	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from out	side		107.68	(330a)
warm air heating system fans		Ė	0	(330b)
pump for solar water heating		Ĺ	0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330	b) + (330g) =	107.68	(331)
Energy for lighting (calculated in Appendix L)		Ĺ	239.96	(332)
Total delivered energy for all uses (307) + (309) + (310) + (312) + (	315) + (331) + (33	32)(237b) =	3579	(338)
12b. CO2 Emissions – Community heating scheme				
	Energy kWh/year	Emission factor Ekg CO2/kWh k	missions g CO2/year	
CO2 from other sources of space and water heating (not CHP)  Efficiency of heat source 1 (%)  If there is CHP using two	o fuels repeat (363) to	(366) for the second fuel		7(267-)
			96	(367a)
	b)] x 100 ÷ (367b) x	0.22	727.05	(367)
Electrical energy for heat distribution [(313)	3) X	0.52	16.77	(372)

Total CO2 associated with community	systems	(363)(366) + (368)(372)	)	=	743.83	(373)
CO2 associated with space heating (se	econdary)	(309) x	0	=	0	(374)
CO2 associated with water from immer	rsion heater or instanta	nneous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and v	water heating	(373) + (374) + (375) =			743.83	(376)
CO2 associated with electricity for pur	nps and fans within dwo	elling (331)) x	0.52	=	55.89	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52	=	124.54	(379)
Total CO2, kg/year	sum of (376)(382) =				924.25	(383)
<b>Dwelling CO2 Emission Rate</b>	(383) ÷ (4) =				18.26	(384)
El rating (section 14)					87.05	(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:53:38

Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:** 

Flat

Dwelling Details:

Site Reference :

**NEW DWELLING DESIGN STAGE** Total Floor Area: 63.92m²

**Plot Reference:** 04 - G

Address:

Client Details:

Name: Address:

This report covers items included within the SAP calculations.

Highgate Road - GREEN

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 19.33 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 17.12 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 54.1 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 45.7 kWh/m²

OK

2 Fabric U-values

**Element Average Highest** 0.18 (max. 0.70) External wall 0.18 (max. 0.30) OK Party wall 0.00 (max. 0.20) OK

Floor (no floor)

Roof 0.13 (max. 0.20) 0.13 (max. 0.35) OK

Openings 1.40 (max. 2.00) 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

OK

7 Low energy lights		
7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	ОК
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	9.56m²	
Windows facing: South East	8.76m²	
Ventilation rate:	6.00	
10 Key features		
	2.0 m ³ /m ² h	
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

Sassessor Name:   Neil Ingham   Stroma FSAP 2012   Software Version:   Version: 1.0.5.50			Us <u>er [</u>	Details:						
## Acade   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Section   Secti		•								
Area(m²)			Property	Address	: 04 - G					
A c a (m²)   A c a (m²)   A c a (m²)   A c a (m²)   A c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B c a (m²)   B		oncione:								
Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   Common   C	1. Overall dwelling dime	211510115.	Δre	a(m²)		Δν Ηρ	iaht(m)		Volume(m	3)
Dwelling volume	Ground floor		_		(1a) x			_		<u>-</u>
Dwelling volume	Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	63 92	] [(4)			_		
2. Ventilation rate:    main   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heating   heati					J	n)+(3c)+(3c	d)+(3e)+	(3n) =	400.00	
Number of chimneys					(00)1(00	,,,,(00),(00	2)1(00)1	(011) =	169.39	(5)
Number of chimneys	2. Ventilation rate:	main seconda	ary	other		total			m³ per hou	ır
Number of open flues	Number of chimneys	heating heating			л <u>-</u> г		x	40 =	-	_
Number of intermittent fans    0	•		ᆜ		╛╘					╡` ′
Number of passive vents	·			0	┚╶┋	0			0	<b>=</b>  ``
Number of flueless gas fires	Number of intermittent fa	ins			L	0	×	10 =	0	(7a)
Air changes per hour	Number of passive vents	3				0	X	10 =	0	(7b)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =	Number of flueless gas f	ires				0	X	40 =	0	(7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =								Air ch	anges per h	our.
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)	Indituation due to alcient	fl (Co).(Ch).	( <b>7</b> 0) . ( <b>7</b> b) .	(70)	_					_
Number of storeys in the dwelling (ns)		•			continue fi	-	(16)	÷ (5) =	0	(8)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction   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			ou 10 (11),			o (o) to	( . 0)		0	(9)
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  If no draught lobby, enter 0.05, else enter 0  Percentage of windows and doors draught stripped  Window infiltration  0.25 - [0.2 × (14) ÷ 100] = 0  Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0  Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area  If based on air permeability value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16)  Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used  Number of sides sheltered  Shelter factor  (20) = 1 - [0.075 × (19)] = 0  Infiltration rate incorporating shelter factor  (21) = (18) × (20) = 0  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= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7  Wind Factor (22a)m = (22)m ÷ 4	Additional infiltration						[(9	)-1]x0.1 =	0	(10)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0   0   (12)					•	ruction			0	(11)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0  If no draught lobby, enter 0.05, else enter 0  Percentage of windows and doors draught stripped  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  If based on air permeability value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16)  Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used  Number of sides sheltered  Shelter factor  (20) = 1 - [0.075 x (19)] = 0 (19)  Infiltration rate incorporating shelter factor  (21) = (18) x (20) = 0.15  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= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7  Wind Factor (22a)m = (22)m ÷ 4			to the grea	iter wall are	ea (after					
Percentage of windows and doors draught stripped  Window infiltration $0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times$	=		0.1 (seal	ed), else	enter 0				0	(12)
Window infiltration $0.25 - [0.2 \times (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 If based on air permeability value, then $ (18) = [(17) \div 20] + (8), \text{ otherwise } (18) = (16) $ [18] Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered $ (20) = 1 - [0.075 \times (19)] = 0 $ [19] $ (20) = 1 - [0.075 \times (19)] = 0 $ [19] Infiltration rate incorporating shelter factor $ (21) = (18) \times (20) = 0 $ [19] Infiltration rate modified for monthly wind speed Infiltration rate modified for monthly wind speed Infiltration rate wind speed from Table 7 $ (22)m = 5.1 + 5 + 4.9 + 4.4 + 4.3 + 3.8 + 3.8 + 3.7 + 4 + 4.3 + 4.5 + 4.7 $ Wind Factor $ (22a)m = (22)m \div 4 $	If no draught lobby, en	ter 0.05, else enter 0							0	(13)
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 If based on air permeability value, then $(18) = [(17) \div 20] + (8)$ , otherwise $(18) = (16)$ 0.15 (18)  Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used  Number of sides sheltered $(20) = 1 - [0.075 \times (19)] = 1$ (20)  Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = 1$ (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= $5.1$ $5$ $4.9$ $4.4$ $4.3$ $3.8$ $3.8$ $3.7$ $4$ $4.3$ $4.5$ $4.7$ Wind Factor (22a)m = (22)m $\div 4$	•	s and doors draught stripped							0	(14)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area  If based on air permeability value, then $(18) = [(17) \div 20] + (8)$ , otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used  Number of sides sheltered  Shelter factor $(20) = 1 - [0.075 \times (19)] = $ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = $ 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 $(22)m = 5.1  5  4.9  4.4  4.3  3.8  3.8  3.7  4  4.3  4.5  4.7$ Wind Factor $(22a)m = (22)m \div 4$							(4-)		0	=
If based on air permeability value, then $(18) = [(17) \div 20] + (8)$ , otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used  Number of sides sheltered  Shelter factor $(20) = 1 - [0.075 \times (19)] =$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ $(21) = (18) \times (20) =$ Monthly average wind speed from Table 7 $(22)m = 5.1  5  4.9  4.4  4.3  3.8  3.8  3.7  4  4.3  4.5  4.7$ Wind Factor $(22a)m = (22)m \div 4$		.50		, , , ,	. , , ,	, , ,	` '			=
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used  Number of sides sheltered  Shelter factor $(20) = 1 - [0.075 \times (19)] = 1  (20)$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = 1 \cdot [0.075 \times (19)] = 1  (20)$ 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 $(22)m = 5.1  5  4.9  4.4  4.3  3.8  3.8  3.7  4  4.3  4.5  4.7$ Wind Factor $(22a)m = (22)m \div 4$	•	• • •	•	•	•	etre of e	envelop	e area		=
Number of sides sheltered $ (20) = 1 - [0.075 \times (19)] = $ $ (20) = 1 - [0.075 \times (19)] = $ $ (20) = 1 - [0.075 \times (19)] = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (22) = (18) \times (20) = $ $ (22) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (22) = (18) \times (20) = $ $ (22) = (18) \times (20) = $ $ (21) = (18) \times (20) = $ $ (22) = (18) \times (20) = $ $ (22) = (18) \times (20) = $ $ (23) = (18) \times (20) = $ $ (24) = (18) \times (20) = $ $ (24) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (18) \times (20) = $ $ (25) = (20) \times (20) = $ $ (25) = (20) \times (20) = $ $ (25) = (20) \times (20) = $ $ (25) = (20) \times (20) = $ $ (25) = (20) \times (20) = $ $ (25) = (20) \times (20) = $ $ (25) = (20) \times (20) = $	•	•				is being u	sed		0.15	(10)
Infiltration rate incorporating shelter factor					·				0	(19)
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= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7  Wind Factor (22a)m = (22)m ÷ 4	Shelter factor			(20) = 1 -	[0.075 x (	19)] =			1	(20)
Jan         Feb         Mar         Apr         May         Jun         Jul         Aug         Sep         Oct         Nov         Dec           Monthly average wind speed from Table 7           (22)m=         5.1         5         4.9         4.4         4.3         3.8         3.7         4         4.3         4.5         4.7           Wind Factor (22a)m = (22)m ÷ 4	·	•		(21) = (18	3) x (20) =				0.15	(21)
Monthly average wind speed from Table 7 (22)m= $\begin{bmatrix} 5.1 & 5 & 4.9 & 4.4 & 4.3 & 3.8 & 3.8 & 3.7 & 4 & 4.3 & 4.5 & 4.7 \end{bmatrix}$ Wind Factor (22a)m = (22)m $\div$ 4		<del></del>	1	1 .	<del>-</del>	T _	1	1 -	1	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			Jul	Aug	Sep	Oct	Nov	Dec		
Wind Factor (22a)m = (22)m ÷ 4	<del> </del>		1	T	1 .	1	T	1	1	
	(22)m= 5.1 5	4.9   4.4   4.3   3.8	3.8	3.7	<u> </u>	4.3	4.5	4.7	J	
(22a)m= 1.27 1.25 1.23 1.1 1.08 0.95 0.95 0.92 1 1.08 1.12 1.18	Wind Factor (22a)m = (2	2)m ÷ 4								
	(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18	]	

Adjusted infiltrati	on rate	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
1 1	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effection If mechanical v		•	rate for t	he appli	cable ca	se	-	-	-	-			
If exhaust air heat			endix N (2	3h) = (23a	ı) × Fmv (e	equation (1	N5)) othe	rwise (23h	) = (23a)			0.5	(23)
If balanced with he		0		, ,	, ,	. ,	,, .	`	) — ( <b>20</b> 0)			0.5	(23)
a) If balanced		-		_					2h\m + (	23h) ~ [	1 _ (23c)	75.65	(23
	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3	÷ 100j	(24
b) If balanced						<u> </u>	l .				1 0.0	J	`
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(24
c) If whole hou		ract ven						<u> </u>				l	•
if (22b)m <				•					5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0	]	(24
d) If natural ve	ntilatio	n or wh	ole hous	e positiv	/e input	ventilatio	on from I	oft	<u> </u>	<u>I</u>	!	ı	
if (22b)m =				•	•				0.5]			_	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air ch	ange r	rate - er	iter (24a	) or (24b	o) or (24	c) or (24	d) in box	(25)					
(25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25
3. Heat losses a	and he	at loss r	paramete	er:									
ELEMENT	Gros	•	Openin		Net Ar	ea	U-valı	re	AXU		k-value	e A	Χk
	area (	(m²)	· m		A ,r	m²	W/m2	K	(W/I	<b>&lt;</b> )	kJ/m²-l	K kJ	/K
Windows Type 1					9.56	х1	/[1/( 1.4 )+	0.04] =	12.67				(27
Windows Type 2					8.76	x1	/[1/( 1.4 )+	0.04] =	11.61				(27)
Walls Type1 [	61.09	9	18.3	2	42.77	7 X	0.18	=	7.7		60	2566.2	2 (29)
Walls Type2	3.86	i	0		3.86	X	0.17	=	0.65		60	231.6	(29
Roof	63.92	2	0		63.92	<u>x</u>	0.13	=	8.31		9	575.28	3 (30
- Total area of ele	ments,	m²			128.8	7							— (31
Party wall					37.5	x	0		0	$\neg$ [	45	1687.5	(32)
Party floor					63.92	2					40	2556.8	3 (32)
Internal wall **					113.4	7				[	9	1021.2	=
* for windows and ro	of windo	ws, use e	ffective wi	ndow U-va			formula 1	/[(1/U-valu	ıe)+0.04] a	ו ns given in			``
** include the areas o	on both s	sides of in	ternal wal	ls and part	titions								
Fabric heat loss,	W/K =	S (A x	U)				(26)(30)	+ (32) =				40.94	(33
Heat capacity Cr	n = S(A)	Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	8638.61	(34
Thermal mass pa		,		•				` '	÷ (4) =			135.15	(35
For design assessme can be used instead				constructi	ion are no	t known pr	ecisely the	indicative	values of	TMP in T	able 1f		
Thermal bridges				ısina An	nendix k	<						8.3	(36
if details of thermal b	•	•			•	`						0.3	(30
Total fabric heat			()	(0	-/			(33) +	(36) =			49.24	(37
Ventilation heat I	oss ca	lculated	l monthly	/				(38)m	= 0.33 × (	25)m x (5	)		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 17.5	17.29	17.08	16.03	15.82	14.77	14.77	14.56	15.19	15.82	16.24	16.66		(38
Heat transfer coe	efficien	t, W/K				-	-	(39)m	= (37) + (37)	 38)m	-	•	
	66.53	66.32	65.27	65.06	64.01	64.01	63.8	64.43	65.06	65.48	65.9		

Heat loss para	ımeter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 1.04	1.04	1.04	1.02	1.02	1	1	1	1.01	1.02	1.02	1.03		
<u> </u>									Average =	Sum(40) ₁	12 /12=	1.02	(40)
Number of day		<del>- ` -</del>	<u> </u>	Max	1	11	A	Can		Nov	Dag		
(41)m= 31	Feb 28	Mar 31	Apr 30	May 31	Jun 30	Jul 31	Aug 31	Sep 30	Oct 31	Nov 30	Dec 31		(41)
(41)111= 31	20	31	30	31	30	31	31	30	31	30	31		(41)
1 Water been	ting one	ray roau	romonti								Id/Mb/ya	or.	
4. Water hea	ung ene	rgy requi	rement:								kWh/ye	ear:	
Assumed occu if TFA > 13.9 if TFA £ 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9	)2)] + 0.0	0013 x ( ⁻	TFA -13		09		(42)
Annual average Reduce the annual not more that 125	al average	hot water	usage by	5% if the $a$	lwelling is	designed t			se target o		3.84		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i								1 300	1 300	1			
(44)m= 92.22	88.87	85.51	82.16	78.81	75.45	75.45	78.81	82.16	85.51	88.87	92.22		
_						_				ım(44) ₁₁₂ =	L	1006.06	(44)
Energy content of					190 x Vd,r					1			
(45)m= 136.76	119.61	123.43	107.61	103.25	89.1	82.56	94.74	95.88	111.73	121.97	132.45		
If instantaneous w	vater heati	ng at point	of use (no	o hot water	storage),	enter 0 in	boxes (46		Total = Su	ım(45) ₁₁₂ =	<u> </u>	1319.1	(45)
(46)m= 20.51	17.94	18.51	16.14	15.49	13.37	12.38	14.21	14.38	16.76	18.29	19.87		(46)
Water storage	· ·												` ,
Storage volum	ne (litres)	) includir	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	-			_			, ,		(01.1	( 4 <b>-</b> )			
Otherwise if no Water storage		not wate	er (this in	iciuaes i	nstantar	neous co	ilod idmo	ers) ente	er 'U' in (	(47)			
a) If manufact		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature f	actor fro	m Table	2b								0		(49)
Energy lost fro	m wate	storage	, kWh/ye	ear			(48) x (49)	) =		1	10		(50)
b) If manufact			-										
Hot water storal If community h	-			ie Z (KVV	n/IItre/da	iy)				0.	02		(51)
Volume factor	•									1.	.03		(52)
Temperature f	actor fro	m Table	2b							0	.6		(53)
Energy lost fro	m wate	storage	, kWh/ye	ear			(47) x (51)	) x (52) x (	53) =	1.	03		(54)
Enter (50) or	` , ` `	,								1.	.03		(55)
Water storage	loss cal	culated 1	or each	month			((56)m = (	(55) × (41)	m				
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contains	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (	H11)] ÷ (5		/)m = (56)	m where (	(H11) is fro	m Appendi	хH	
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit	loss (ar	nual) fro	m Table	e 3							0		(58)
Primary circuit				,		` '	, ,		41	-4-1			
(modified by							<del></del>	<del>-</del>	1	<del>-                                    </del>	22.00		(50)
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi loss ca	lculated	for each	month (	(61)m –	(60) ± 3	65 v (41	١m						
(61)m= 0	0	0	0	0 0	00) + 3	03 × (41)	)   0	0	T 0	0	0	1	(61)
												J (59)m + (61)m	(- )
(62)m= 192.04	169.54	178.71	161.1	158.53	142.59	137.84	150.0		<del>`                                    </del>	<del>`                                    </del>	187.72	]	(62)
Solar DHW input	<u> </u>											J	(/
(add additiona									ar contino	mon to wat	or ricating)		
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0	]	(63)
Output from w	ater hea	ter					<b>!</b>	ļ.			<u> </u>	J	
(64)m= 192.04	169.54	178.71	161.1	158.53	142.59	137.84	150.0	)2 149.37	167.01	175.46	187.72	1	
	1	<u> </u>	<u> </u>	ļ.		Į	C	Output from v	vater heat	_ <b>I</b> er (annual)₁	112	1969.94	(64)
Heat gains fro	m water	heating,	kWh/me	onth 0.2	5 ′ [0.85	5 × (45)m	+ (61	)m] + 0.8	x [(46)n	n + (57)m	+ (59)m	1]	-
(65)m= 89.69	79.71	85.26	78.58	78.55	72.42	71.67	75.7	<del>`                                    </del>	81.37	83.35	88.26	]	(65)
include (57)	m in cald	culation of	of (65)m	only if c	vlinder	is in the	dwellir	ng or hot v	vater is	from com	munity h	ı neating	
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 gair	Ì												
Jan	Feb	Mar	Apr	May	Jun	Jul	Au	g Sep	Oct	Nov	Dec	]	
(66)m= 104.5	104.5	104.5	104.5	104.5	104.5	104.5	104.	5 104.5	104.5	104.5	104.5		(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
(67)m= 16.29	14.47	11.77	8.91	6.66	5.62	6.07	7.9	10.6	13.46	15.7	16.74	]	(67)
Appliances ga	ins (calc	ulated in	Append	dix L, eq	uation L	.13 or L1	3a), a	lso see Ta	able 5	•	•	•	
(68)m= 182.71	184.61	179.83	169.66	156.82	144.75	136.69	134.	8 139.57	149.75	162.58	174.65	]	(68)
Cooking gains	(calcula	ted in A	ppendix	L, equat	ion L15	or L15a	), also	see Table	e 5	•	-	-	
(69)m= 33.45	33.45	33.45	33.45	33.45	33.45	33.45	33.4	5 33.45	33.45	33.45	33.45	]	(69)
Pumps and fa	ns gains	(Table 5	ōa)					•	•			•	
(70)m= 0	0	0	0	0	0	0	0	0	0	0	0	]	(70)
Losses e.g. ev	/aporatio	n (nega	tive valu	es) (Tab	le 5)			•	•	•	•	•	
(71)m= -83.6	-83.6	-83.6	-83.6	-83.6	-83.6	-83.6	-83.6	6 -83.6	-83.6	-83.6	-83.6	]	(71)
Water heating	gains (T	able 5)		-		-		-	-	-	-	-	
(72)m= 120.56	118.62	114.6	109.13	105.58	100.58	96.34	101.7	78 103.71	109.37	115.76	118.63	]	(72)
Total internal	gains =				(66	)m + (67)m	ı + (68)	m + (69)m +	(70)m + (	71)m + (72)	)m	-	
(73)m= 373.91	372.05	360.55	342.05	323.41	305.31	293.45	298.8	32 308.23	326.92	348.4	364.37	]	(73)
6. Solar gain	s:												
Solar gains are	calculated	using sola	r flux from	Table 6a	and assoc	ciated equa	itions to	convert to t	he applica	able orienta	tion.		
Orientation:			Area		Flu			g_ Table 6b	_	FF		Gains	
_	Table 6d		m²			ble 6a		Table 60	) — -	Table 6c		(W)	-
Northeast _{0.9x}	0.77	Х	9.5	56	x	11.28	x	0.63	x	0.7	=	32.96	(75)
Northeast _{0.9x}	0.77	X	9.5	56	X	22.97	X	0.63	x	0.7	=	67.1	(75)
Northeast 0.9x	0.77	X	9.5	56	X	41.38	X	0.63	x	0.7	=	120.89	(75)
Northeast 0.9x	0.77	Х	9.5	56	X	67.96	X	0.63	x	0.7	=	198.54	(75)
Northeast _{0.9x}	0.77	X	9.5	56	X	91.35	X	0.63	Х	0.7	=	266.88	(75)

N		_					_		_				<b>–</b> 1
Northeast _{0.9x}	0.77	×	9.5	56	×	97.38	X	0.63	×	0.7	=	284.52	(75)
Northeast _{0.9x}	0.77	X	9.5	66	X	91.1	×	0.63	X	0.7	=	266.17	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x L	72.63	×	0.63	X	0.7	=	212.19	(75)
Northeast _{0.9x}	0.77	X	9.5	66	x	50.42	X	0.63	X	0.7	=	147.31	(75)
Northeast _{0.9x}	0.77	X	9.5	56	x	28.07	X	0.63	X	0.7	=	82	(75)
Northeast _{0.9x}	0.77	X	9.5	66	X	14.2	X	0.63	X	0.7	=	41.48	(75)
Northeast 0.9x	0.77	X	9.5	56	x	9.21	X	0.63	X	0.7	=	26.92	(75)
Southeast 0.9x	0.77	X	8.7	<b>'</b> 6	x	36.79	X	0.63	X	0.7	=	98.5	(77)
Southeast 0.9x	0.77	X	8.7	<b>'</b> 6	x	62.67	X	0.63	X	0.7	=	167.79	(77)
Southeast 0.9x	0.77	X	8.7	<b>'</b> 6	x [	85.75	x	0.63	X	0.7	=	229.57	(77)
Southeast _{0.9x}	0.77	X	8.7	<b>'</b> 6	x	106.25	x	0.63	х	0.7	=	284.45	(77)
Southeast _{0.9x}	0.77	x	8.7	<b>'</b> 6	x [	119.01	×	0.63	x	0.7		318.61	(77)
Southeast 0.9x	0.77	x	8.7	<b>'</b> 6	x T	118.15	×	0.63	x	0.7	=	316.31	(77)
Southeast 0.9x	0.77	x	8.7	<b>'</b> 6	x	113.91	x	0.63	x	0.7	=	304.95	(77)
Southeast 0.9x	0.77	×	8.7	<b>'</b> 6	x	104.39	×	0.63	×	0.7	= =	279.47	(77)
Southeast 0.9x	0.77	X	8.7	<b>'</b> 6	x F	92.85	T x	0.63	X	0.7	=	248.58	(77)
Southeast 0.9x	0.77	x	8.7	<b>'</b> 6	x [	69.27	×	0.63	×	0.7		185.44	(77)
Southeast 0.9x	0.77	×	8.7		x F	44.07	╡ ×	0.63	= x	0.7	= =	117.98	(77)
Southeast 0.9x	0.77	x	8.7		x [	31.49	╡ ×	0.63	= x	0.7	= =	84.3	(77)
L				•	L								` ′
Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m													
(83)m= 131.47		350.47	483	585.49	$\overline{}$	0.83 571.12	<del>- ` ` ` </del>	<del></del>	267.4	1 159.46	111.22		(83)
Total gains – i	nternal and	d solar	(84)m =	= (73)m	+ (8	B)m , watts	<b></b>	·	<u> </u>	_!			
(84)m= 505.38	606.94	711.02	825.05	908.91	906	6.14 864.5	7 790	.48 704.13	594.3	7 507.86	475.59		(84)
7. Mean inter	nal tempe	rature	(heating	season	)	<u>'</u>		·		_			
Temperature			`		<i></i>	rea from T	ahle 9	Th1 (°C)				21	(85)
Utilisation fac	_	•			_			, 1111 ( 0)				21	(00)
Jan	Feb	Mar	Apr	May	Ť	un Jul	<del>′                                      </del>	ug Sep	Oct	Nov	Dec		
(86)m= 0.96	0.93	0.87	0.76	0.6	+	44 0.32	0.3	<del></del>	0.82	0.94	0.97		(86)
	<u> </u>	!				<u> </u>		I	0.02	1 0.0 .	0.0.		, ,
Mean interna	т <u>.</u> т	1		· `	1	i	1		I 00.55	1 40.00	40.45	1	(97)
(87)m= 19.5	19.8	20.19	20.61	20.86	20	.97 20.99	20.	99 20.91	20.55	19.96	19.45		(87)
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)													
· -					_	<del> </del>	Table 9	9, Th2 (°C)	ī			Ī	
(88)m= 20.05		ating po	eriods ir 20.07	rest of 20.07	_	lling from - .08 20.08	1	<del></del>	20.07	20.06	20.06		(88)
· -	20.05	20.05	20.07	20.07	20	.08 20.08	20.	<del></del>	20.07	20.06	20.06		(88)
(88)m= 20.05	20.05	20.05	20.07	20.07	20 h2,n	.08 20.08	20.	08 20.08	20.07	20.06	20.06	 	(88)
(88)m= 20.05  Utilisation fac (89)m= 0.96	20.05 etor for gain	20.05 ns for r	20.07 est of d	20.07 welling, 0.55	20 h2,n 0.	.08 20.08 n (see Tab 38 0.26	20. le 9a)	08 20.08	0.79				
(88)m= 20.05 Utilisation fac	20.05 etor for gain 0.92	20.05 ns for r	20.07 est of d	20.07 welling, 0.55	20 h2,n 0.	.08 20.08 n (see Tab 38 0.26	20. le 9a) 0.2 steps 3	08 20.08 29 0.51 to 7 in Tab	0.79	0.92			
Utilisation factors (89)m= 0.96  Mean internal	20.05 etor for gain 0.92	20.05 ns for r 0.85 ure in t	20.07 est of d 0.73 the rest	20.07 welling, 0.55 of dwell	20 h2,n 0.	20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08	20. le 9a) 0.2 steps 3	08 20.08  29 0.51  to 7 in Tab  08 20	0.79 le 9c)	0.92	0.96	0.38	(89)
(88)m= 20.05  Utilisation fac (89)m= 0.96  Mean interna (90)m= 18.07	20.05 etor for gain 0.92 I temperat 18.48	20.05 ns for r 0.85 ure in t 19.03	20.07  est of d  0.73  the rest  19.61	20.07 welling, 0.55 of dwell 19.92	20 h2,n 0. ing 7	20.08 20.08 20.08 20.08 20.08 20.08 20.08	20. le 9a) 0.2 steps 3	08 20.08  29 0.51  to 7 in Tab  08 20	0.79 le 9c) 19.55 fLA = Liv	0.92	0.96	0.38	(89)
Utilisation fact (89)m= 0.96  Mean internation (90)m= 18.07	20.05 ctor for gain 0.92 I temperat 18.48 I temperat	20.05 ns for r 0.85 ure in t 19.03 ure (fo	est of d 0.73 the rest 19.61	20.07 welling, 0.55 of dwell 19.92 ole dwe	20 h2,n 0. ing 7 20	20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08	20. le 9a) 0.2 steps 3	08 20.08 29 0.51 to 7 in Tab 08 20 - fLA) × T2	0.79 le 9c) 19.55 fLA = Liv	0.92 18.73 ring area ÷ (	0.96 18 4) =	0.38	(89) (90) (91)
(88)m= 20.05  Utilisation fac (89)m= 0.96  Mean interna (90)m= 18.07	20.05 etor for gain 0.92 I temperat 18.48 I temperat 18.98	20.05 ns for r 0.85 ure in t 19.03 ure (fo	20.07 est of d 0.73 the rest 19.61 r the wh	20.07 welling, 0.55 of dwell 19.92 ole dwe	20 h2,n 0. ing 7 20 elling	20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.08 20.42 20.42	20. le 9a) 0.2 steps 3 20. 1 + (1 20.	08   20.08 29   0.51 to 7 in Tab 08   20 - fLA) × T2 42   20.34	0.79 le 9c) 19.55 fLA = Liv	0.92 18.73 ring area ÷ (-	0.96	0.38	(89)

					•	•							
(93)m= 18.61	18.98	19.47	19.99	20.28	20.4	20.42	20.42	20.34	19.93	19.2	18.55		(93)
8. Space hea													
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(	76)m an	d re-calc	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac				1			1 3						
(94)m= 0.94	0.91	0.84	0.72	0.56	0.4	0.28	0.32	0.53	0.78	0.91	0.95		(94)
Useful gains,	hmGm	, W = (9	4)m x (8	4)m									
(95)m= 476.23	549.73	597.81	595.72	513.13	361.46	242.67	253.25	375.54	465.92	462.07	452.07		(95)
Monthly aver	<del></del>	rnal tem	<del>i                                      </del>	from Ta	r	ı						ı	
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate	1	ì	· ·	i —			<del> </del>				· ·	ı	(0-)
(97)m= 955.2	936.83	860.35	723.65	558.12	371.3	244.8	256.62	402.24	607.14	792.19	945.94		(97)
Space heatin (98)m= 356.35	<del></del>	195.33	92.11	33.47	I	I					267.42		
(98)m= 356.35	260.14	195.33	92.11	33.47	0	0	0	0	105.06	237.69	367.43	4047.50	7(00)
							Tota	l per year	(Kvvn/yeai	) = Sum(9	8)15,912 =	1647.58	(98)
Space heatin	g requir	ement in	kWh/m²	² /year								25.78	(99)
9b. Energy red	quiremer	nts – Coi	mmunity	heating	scheme								
This part is us										unity sch	neme.		7(204)
Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none								0	(301)				
Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.													
Fraction of hea		-			rom powei	r stations.	See Appe	naix C.				1	(303a)
Fraction of total			-		oilere				(3	02) x (303	a) –		(304a)
Factor for con	•			•		r commi	unity hea	itina svst		02) X (303	a) = 	1	(305)
				•	` ,,			unig oyo	.0111				╡`
Distribution los		(Table	12C) 10f (	commun	ity neatii	ng syste	erri					1.05	(306)
Space heating	_										İ	kWh/yea	r ¬
Annual space	_	·										1647.58	╣
Space heat fro	om Com	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	=	1729.96	(307a)
Efficiency of s	econdar	y/supple	mentary	heating	system	in % (fro	om Table	4a or A	ppendix	E)		0	(308
Space heating	require	ment fro	m secon	dary/su	oplemen	tary sys	tem	(98) x (30	01) x 100 -	= (308) =		0	(309)
Water heating	a												
Annual water		equirem	ent									1969.94	
If DHW from c													<u> </u>
Water heat fro	m Comr	nunity bo	oilers					(64) x (30	03a) x (30	=	2068.44	(310a)	
Electricity use	d for hea	at distrib	ution				0.01	× [(307a).	(307e) +	(310e)] =	37.98	(313)	
Cooling Syste	m Energ	y Efficie	ncy Rati	0								0	(314)
Space cooling	(if there	is a fixe	ed coolin	g systen	n, if not e	enter 0)		= (107) ÷	(314) =			0	(315)
Electricity for p											ı		_
mechanical ve	ntilation	- baland	ed, extra	act or po	sitive in	put from	outside					135.98	(330a)

warm air heating system fans					0	(330b)					
pump for solar water heating					0	(330g)					
Total electricity for the above, kWh/yea	r	=(330a) + (330	b) + (330g) =		135.98	(331)					
Energy for lighting (calculated in Appen		287.67	(332)								
Total delivered energy for all uses (307		4222.04	(338)								
12b. CO2 Emissions – Community heating scheme											
		Energy kWh/year	Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emission factors in the Emissi		missions g CO2/year						
CO2 from other sources of space and v Efficiency of heat source 1 (%)	O (	P) sing two fuels repeat (363) to	(366) for the secon	d fuel	96	(367a)					
CO2 associated with heat source 1	[(307b	o)+(310b)] x 100 ÷ (367b) x	0.22	=	854.64	(367)					
Electrical energy for heat distribution		[(313) x	0.52	=	19.71	(372)					
Total CO2 associated with community s	systems	(363)(366) + (368)(372	2)	=	874.35	(373)					
CO2 associated with space heating (se	condary)	(309) x	0	=	0	(374)					
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)					
Total CO2 associated with space and w	vater heating	(373) + (374) + (375) =			874.35	(376)					
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52	=	70.57	(378)					
CO2 associated with electricity for lighting	ing	(332))) x	0.52	=	149.3	(379)					
Total CO2, kg/year	sum of (376)(382) =				1094.23	(383)					
<b>Dwelling CO2 Emission Rate</b>	(383) ÷ (4) =				17.12	(384)					

El rating (section 14)

86.54

(385)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:53:37

Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:** Flat

Dwelling Details:

**NEW DWELLING DESIGN STAGE** Total Floor Area: 60.34m² Site Reference :

**Plot Reference:** Highgate Road - GREEN 04 - H

Address:

Client Details:

Name: Address:

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 19.72 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 17.26 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 54.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 44.9 kWh/m²

OK 2 Fabric U-values

**Element Average** 

**Highest** 0.18 (max. 0.70) External wall 0.18 (max. 0.30) OK Party wall 0.00 (max. 0.20) OK

Floor (no floor)

Roof 0.13 (max. 0.20) 0.13 (max. 0.35) OK Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ок
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	ок
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	4.7m²	
Windows facing: South East	6.09m²	
Windows facing: North West	2.92m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m ² K	
Community heating, heat from boilers – mains gas		

		Heor	Details:						
A a a a a a a a a a Maria a a	Noil le place	USEI		- M	L		CTDO	040040	
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa					010943 on: 1.0.5.50	
Contware reame.	0.10111a 1 0711 2012		y Address		31011.		V 01010	71. 110.0.00	
Address :		·	-						
1. Overall dwelling dime	ensions:								
Ground floor		Aı	rea(m²)	(10) v		ight(m)	(2a) =	Volume(m³	(3a)
	-\.(A -\.(A-\.(A-\).(A-\).	. (4.5)		(1a) x	2	2.65	(2a) =	159.9	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	F(1n)	60.34	(4)	) (O.) (O.)	I) (O.)	(0.)		_
Dwelling volume				(3a)+(3b)	)+(3c)+(3c	d)+(3e)+	.(3n) =	159.9	(5)
2. Ventilation rate:	main sec	condary	other		total			m³ per hou	r
Number of allipsesses	heating he	ating		,			40 =		_
Number of chimneys		<u> </u>	0	] = [	0			0	(6a)
Number of open flues	0 +	0 +	0	] = [	0		20 =	0	(6b)
Number of intermittent fa				Ĺ	0		10 =	0	(7a)
Number of passive vents	<b>i</b>			L	0	X	10 =	0	(7b)
Number of flueless gas fi	ires				0	X 4	40 =	0	(7c)
							Air ch	nanges per ho	our
Infiltration due to chimne	vs_flues and fans = (6a)	+(6b)+(7a)+(7b	)+(7c) =	Г	0		÷ (5) =	0	(8)
'	peen carried out or is intended,			ontinue fr			. (0) –	0	
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	0.25 for steel or timber fra resent, use the value correspo			•	ruction			0	(11)
deducting areas of openii		maing to the gre	ealer wan are	a (aner					
If suspended wooden t	floor, enter 0.2 (unsealed	d) or 0.1 (sea	aled), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0							0	(13)
ŭ	s and doors draught strip	pped						0	(14)
Window infiltration			0.25 - [0.2		_			0	(15)
Infiltration rate			(8) + (10)	, , ,	, , ,	, ,		0	(16)
•	q50, expressed in cubic	•	•	•	etre of e	envelope	area	3	(17)
If based on air permeabil	IITY Value, then $(10) = 1(17)$ es if a pressurisation test has b				is boing u	sod		0.15	(18)
Number of sides sheltere		de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contraction de la contra	regree all pe	meability	is being u	seu		0	(19)
Shelter factor	· <del>·</del>		(20) = 1 -	0.075 x (1	19)] =			1	(20)
Infiltration rate incorporat	ting shelter factor		(21) = (18	x (20) =				0.15	(21)
Infiltration rate modified f	or monthly wind speed						'		
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ∸ 4								
	1.23 1.1 1.08	0.95 0.95	0.92	1	1.08	1.12	1.18	]	
` '					L			J	

Adjusted infiltr	ation rate	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.19 Calculate effe	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
If mechanica		•	ale for t	пе аррп	cable ca	30						0.5	(23
If exhaust air h	eat pump u	sing Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b	) = (23a)			0.5	(231
If balanced with	n heat recov	very: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h	) =				75.65	(230
a) If balance	ed mecha	nical ve	ntilation	with he	at recov	ery (MVI	HR) (24a	a)m = (22)	2b)m + (	23b) × [	1 – (23c)	÷ 100]	
(24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(24
b) If balance	d mecha	inical ve	ntilation	without	heat red	covery (N	ЛV) (24b	m = (22)	2b)m + (2	23b)	•	1	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24)
c) If whole h if (22b)r	ouse extended on $< 0.5 \times$			•	•				.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
d) If natural if (22b)r	ventilatio n = 1, the				•				0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
Effective air	change r	rate - er	iter (24a	) or (24l	o) or (24	c) or (24	d) in box	x (25)					
(25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(25)
3. Heat losse	s and he	at loss p	paramete	er:									
ELEMENT	Gross area (	S	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/I	<b>〈</b> )	k-value kJ/m²-l		X k /K
Windows Type	e 1				4.7	x1.	/[1/( 1.4 )+	0.04] =	6.23				(27)
Windows Type	2				6.09	x1.	/[1/( 1.4 )+	0.04] =	8.07				(27)
Windows Type	e 3				2.92	x1.	/[1/( 1.4 )+	0.04] =	3.87				(27)
Walls Type1	52.8		13.7	1	39.09	) x	0.18		7.04		60	2345.4	(29)
Walls Type2	27.3	1	0		27.31	1 x	0.17	<u> </u>	4.59		60	1638.6	(29)
Roof	60.34	4	0		60.34	1 ×	0.13	<u> </u>	7.84		9	543.06	(30)
Total area of e	elements,	m²			140.4	5							(31)
Party wall					16.88	3 X	0	=	0		45	759.6	(32)
Party floor					60.34	1					40	2413.6	(32
Internal wall **	:				107.9	1					9	971.190	1 (32
* for windows and ** include the area						lated using	ı formula 1	/[(1/U-valu	ıe)+0.04] a	ns given in	paragraph	3.2	_
Fabric heat los	ss, W/K =	S (A x	U)				(26)(30)	) + (32) =				37.64	(33)
Heat capacity	Cm = S(A)	Axk)						((28).	(30) + (32	2) + (32a).	(32e) =	8671.45	(34)
Thermal mass	paramet	er (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			= (34)	÷ (4) =			143.71	(35)
For design assess can be used inste				construct	ion are no	t known pr	ecisely the	e indicative	e values of	TMP in Ta	able 1f		
Thermal bridge	,	,		• .	•	K						7.99	(36
if details of therma		are not kn	own (36) =	= 0.05 x (3	11)			(22) -	(26)				¬,
Total fabric he		loulotoo	l manthi	,				. ,	· (36) =	25\m v (F)	\ \	45.63	(37
Ventilation hea					ميا	1,.1	۸۰۰۰	<del>- ` ` ` </del>	= 0.33 x (	<u> </u>	_	1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	I	

(30)	16.22	16.12	15 12	14.02	12.04	12.04	12.75	14.24	14.02	15.22	15.70		(38)
(38)m= 16.52	16.32	16.12	15.13	14.93	13.94	13.94	13.75	14.34	14.93	15.33	15.72		(36)
Heat transfer (39)m= 62.15	61.95	61.75	60.76	60.56	59.57	59.57	59.38	(39)m 59.97	= (37) + (3 60.56	38)m 60.96	61.35		
(39)11= 02.13	01.93	01.75	00.70	00.50	39.37	39.37	39.30			Sum(39) ₁	<u> </u>	60.71	(39)
Heat loss para	ameter (l	HLP), W	m²K						= (39)m ÷				<b>」</b> ` ′
(40)m= 1.03	1.03	1.02	1.01	1	0.99	0.99	0.98	0.99	1	1.01	1.02		_
Number of day	vs in mo	nth (Tab	le 1a)					/	Average =	Sum(40) ₁	12 /12=	1.01	(40)
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 hea	ting ene	rgy requi	rement:								kWh/ye	ar:	
Assumed occu	ınancv	N								1	99		(42)
if TFA > 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	A -13.9	)2)] + 0.0	0013 x (T	ΓFA -13.		.99		(42)
Annual averag	•	ater usaç	ge in litre	es per da	y Vd,av	erage =	(25 x N)	+ 36		81	.49		(43)
Reduce the annuance not more that 125	-				-	-	to achieve	a water us	se target o	f			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i						<u> </u>		Sep	Oct	INOV	Dec		
(44)m= 89.64	86.38	83.12	79.86	76.6	73.34	73.34	76.6	79.86	83.12	86.38	89.64		
	!	!				<u> </u>	<u> </u>	-	Γotal = Su	<u> </u>	=	977.9	(44)
Energy content of	f hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x E	OTm / 3600	kWh/mon	th (see Ta	ables 1b, 1	c, 1d)		_
(45)m= 132.93	116.27	119.98	104.6	100.36	86.61	80.25	92.09	93.19	108.61	118.55	128.74		_
If instantaneous v	vater heati	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46)		Γotal = Su	m(45) ₁₁₂ =	= [	1282.18	(45)
(46)m= 19.94	17.44	18	15.69	15.05	12.99	12.04	13.81	13.98	16.29	17.78	19.31		(46)
Water storage	loss:	<u> </u>											
Storage volum	` '					•		ame ves	sel		0		(47)
If community hotherwise if no	_			_			. ,	ore) onto	or 'Ο' in <i>(</i>	<b>47</b> )			
Water storage		not wate	i (uno ii	iciuues i	iistaiitai	ieous cc	יווטט טטוויונ	ers) erite	51 U III (	41)			
a) If manufact		eclared I	oss facto	or is kno	wn (kWh	n/day):					0		(48)
Temperature f	actor fro	m Table	2b								0		(49)
Energy lost fro		-	-				(48) x (49)	) =		1	10		(50)
b) If manufact Hot water stor			-								02		(51)
If community h	•			C 2 (KVV)	1711110700	·y /				0.	02		(31)
Volume factor	from Ta	ble 2a								1.	.03		(52)
Temperature f	actor fro	m Table	2b							0	.6		(53)
Energy lost fro		_	, kWh/ye	ear			(47) x (51)	x (52) x (	53) =		.03		(54)
Enter (50) or	. , .	,	or oook	month			//E6\~ '	FF) (44\-	<b>m</b>	1.	.03		(55)
Water storage					00.00		((56)m = (						(FC)
(56)m= 32.01 If cylinder contain	28.92 s dedicate	32.01 d solar sto	30.98 rage, (57)	32.01 m = (56)m	30.98 x [(50) – (	32.01 H11)] ÷ (5	32.01 0). else (5	30.98 7)m = (56)	32.01 m where (	30.98 H11) is fro	32.01	ix H	(56)
		r				32.01					1	•	(57)
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(37)

Primary circuit loss (annual) from	om Table 3			0		(58)
Primary circuit loss calculated		(58) ÷ 365 × (41	)m			
(modified by factor from Tab	ole H5 if there is solar wa	ater heating and	a cylinder thermo	stat)		
(59)m= 23.26 21.01 23.26	22.51 23.26 22.51	23.26 23.26	22.51 23.26	22.51 2	23.26	(59)
Combi loss calculated for each	n month (61)m = (60) ÷ 3	365 × (41)m				
(61)m= 0 0 0	0 0 0	0 0	0 0	0	0	(61)
Total heat required for water h	neating calculated for ea	ch month (62)m :	= 0.85 × (45)m +	(46)m + (5	 7)m + (59)m + (61)m	
(62)m= 188.21 166.19 175.25	158.09 155.64 140.1	135.53 147.37	146.69 163.88	<del>ì í</del>	184.02	(62)
Solar DHW input calculated using App			I L  O' if no solar contribut	ļļ_	l neating)	
(add additional lines if FGHRS	· · · · · ·					
(63)m = 0 0 0	0 0 0	0 0	0 0	0	0	(63)
Output from water heater		<u> </u>	1	ļl		
(64)m= 188.21 166.19 175.25	158.09 155.64 140.1	135.53 147.37	146.69 163.88	172.05 1	184.02	
(0.7)	1	<del>-</del>	put from water heate			(64)
Heat gains from water heating	. kWh/month 0 25 ′ [0 8					], ,
(65)m= 88.42 78.6 84.11	77.57 77.59 71.59	70.91 74.84	73.78 80.33		87.03	(65)
` '	<del>                                     </del>			<u> </u>		(00)
include (57)m in calculation	. ,	is in the aweiling	or not water is if	om commu	unity neating	
5. Internal gains (see Table !	,					
Metabolic gains (Table 5), Wa		1 1 .				
Jan Feb Mar	Apr May Jun	Jul Aug	Sep Oct	Nov	Dec	(0.0)
(66)m= 99.56 99.56 99.56	99.56 99.56 99.56	99.56 99.56	99.56 99.56	99.56	99.56	(66)
Lighting gains (calculated in A	<del>```</del>	or L9a), also see	Table 5			
(67)m= 15.49 13.76 11.19	8.47 6.33 5.35	5.78 7.51	10.08 12.8	14.94 1	15.93	(67)
Appliances gains (calculated in	n Appendix L, equation I	L13 or L13a), als	o see Table 5			
(68)m= 173.8 175.61 171.06	161.39 149.17 137.69	130.03 128.22	132.77 142.44	154.66 1	166.13	(68)
Cooking gains (calculated in A	ppendix L, equation L15	5 or L15a), also s	ee Table 5			
(69)m= 32.96 32.96 32.96	32.96 32.96 32.96	32.96 32.96	32.96 32.96	32.96	32.96	(69)
Pumps and fans gains (Table	5a)	•		-		
(70)m = 0 0 0	0 0 0	0 0	0 0	0	0	(70)
Losses e.g. evaporation (nega	ative values) (Table 5)	•	•	•		
(71)m= -79.65 -79.65 -79.65	-79.65 -79.65 -79.65	-79.65 -79.65	-79.65 -79.65	-79.65	79.65	(71)
Water heating gains (Table 5)	.1 1		ļ l	II		
(72)m= 118.85 116.96 113.06	107.74 104.29 99.43	95.3 100.59	102.47 107.97	114.19 1	116.97	(72)
Total internal gains =	<del>                                     </del>	<u> </u>	+ (69)m + (70)m + (7	<u> </u>		
(73)m= 361.01 359.2 348.18	<del>, , , , , , , , , , , , , , , , , , , </del>	<del>, , , , , , , , , , , , , , , , , , , </del>	298.19 316.08	<u> </u>	351.9	(73)
6. Solar gains:	9:210:   200:0	200.00	200.10	000.00	50.10	
Solar gains are calculated using sola	ar flux from Table 6a and asso	ciated equations to c	onvert to the applicat	ole orientation	1.	
Orientation: Access Factor		ux	g_	FF	Gains	
Table 6d				able 6c	(W)	
Southeast 0.9x 0.77 x	6.09 ×	36.79 ×	0.63 ×	0.7	= 68.48	(77)
Southeast 0.9x 0.77 x		62.67 X	0.63 x	0.7	= 116.65	](77)
0.11 ×		<u></u> "		0.7		7, ,

Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x	ch month 473.96 4 = (73)m + (8 786.63 7 g season) in the living	(83)m , watts 771.86 740.9	409.05 698.24	Sum(74)m 5 351.18 4 649.37		157.99	112.06 463.96	21	(83) (84)
Southeast 0.9x	ch month 473.96 4 = (73)m + (8 786.63 7	(83)m , watts 771.86 740.9	83)m = 409.05	Sum(74)m 5 351.18 4 649.37	.(82)m 253.46	157.99			(84)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           S	ch month 473.96 4 = (73)m + (8	476.51 456.92 (83)m , watts	83)m = 409.05	Sum(74)m 5 351.18	.(82)m 253.46	157.99			
Southeast 0.9x	ch month 473.96 4	476.51 456.92	83)m =	Sum(74)m	.(82)m		112.06		(83)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           S	.92 x	(8	83)m =	Sum(74)m	.(82)m		112.06		(83)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0	92 x		_			0.7			
Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         2.9		9.21	× L	0.03	J ^ L	0.1			
Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         2.9				0.63	X	0.7	=	8.22	(81)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         2.3	no I v		X	0.63	]	0.7	=	12.67	(81)
Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southwest 0.9x         0.77         x         6.6           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         2.5 <td< td=""><td>.92 ×</td><td></td><td>X</td><td>0.63</td><td>]</td><td>0.7</td><td>_ =  </td><td>25.05</td><td>(81)</td></td<>	.92 ×		X	0.63	]	0.7	_ =	25.05	(81)
Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southwest 0.9x         0.77         x         6.6           Southwest 0.9x         0.77         x         6.6           Southwest 0.9x         0.77         x         6.6           Southwest 0.9x         0.77         x         4.6           Southwest 0.9x         0.77         x         4.7           Southwest 0.9x         0.77         x         4.7           Southwest 0.9x         0.77         x         4.7           Southwest 0.9x         0.77         x         4.7           Southwest 0.9x         0.77         x         4.7           Southwest 0.9x         0.77         x         4.7           Southwest 0.9x         0.77         x         4.7           Southwest 0.9x         0.77         x         4.7	.92 ×		X	0.63	] x [	0.7	=	44.99	(81)
Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southeast 0.9x         0.77         x         6.6           Southwest 0.9x         0.77         x         4.6           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Northwest 0.9x         0.77         x         2.9 <td< td=""><td>.92 ×</td><td></td><td>X</td><td>0.63</td><td>] x [</td><td>0.7</td><td>=</td><td>64.81</td><td>(81)</td></td<>	.92 ×		X	0.63	] x [	0.7	=	64.81	(81)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0	.92 ×		X	0.63	]	0.7	=	81.3	(81)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest 0.9x         0.77         x         6.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0	.92 ×	97.38	Х	0.63	_ x _	0.7	=	86.9	(81)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0	.92 ×	91.35	x	0.63	] × [	0.7	=	81.52	(81)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0	.92 x	67.96	X	0.63	_ x _	0.7	=	60.64	(81)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest 0.9x         0.77         x         6.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0	.92 x	41.38	X	0.63	] x [	0.7	=	36.93	(81)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0	.92 ×	22.97	X	0.63	_ x _	0.7	=	20.5	(81)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0	2.92 ×	11.28	X	0.63	_ x _	0.7	=	10.07	(81)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0	4.7 ×	31.49		0.63	_ x _	0.7	=	45.23	(79)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.	4.7 ×	44.07		0.63	_ x _	0.7	=	63.3	(79)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.	4.7 ×	69.27		0.63	x	0.7	=	99.49	(79)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0           Southwest0.9x         0.77         x         4.0	4.7 ×	92.85		0.63	x	0.7	=	133.37	(79)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.	4.7 ×	104.39		0.63	x	0.7	=	149.94	(79)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.           Southwest0.9x         0.77         x         4.	4.7 ×	113.91		0.63	_ x [	0.7	=	163.62	(79)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0           Southwest 0.9x         0.77         x         4.0	4.7 ×	118.15		0.63	] x [	0.7	=	169.71	(79)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.           Southwest 0.9x         0.77         x         4.	4.7 ×	119.01	Ē	0.63	] × [	0.7	=	170.94	(79)
Southeast 0.9x       0.77       x       6.0         Southeast 0.9x       0.77       x       6.0         Southeast 0.9x       0.77       x       6.0         Southeast 0.9x       0.77       x       6.0         Southeast 0.9x       0.77       x       6.0         Southeast 0.9x       0.77       x       6.0         Southeast 0.9x       0.77       x       6.0         Southeast 0.9x       0.77       x       6.0         Southwest 0.9x       0.77       x       4.         Southwest 0.9x       0.77       x       4.         Southwest 0.9x       0.77       x       4.	4.7 ×	106.25	Ē	0.63	x	0.7	=	152.62	(79)
Southeast 0.9x       0.77       x       6.0         Southeast 0.9x       0.77       x       6.0         Southeast 0.9x       0.77       x       6.0         Southeast 0.9x       0.77       x       6.0         Southeast 0.9x       0.77       x       6.0         Southeast 0.9x       0.77       x       6.0         Southeast 0.9x       0.77       x       6.0         Southeast 0.9x       0.77       x       6.0         Southwest 0.9x       0.77       x       4.0	4.7 ×	85.75	F	0.63	] × [	0.7		123.17	(79)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0	4.7 ×		F	0.63	]	0.7	=	90.02	(79)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0	4.7 ×		F	0.63	]	0.7	= =	52.85	(79)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0	3.09 X		x	0.63	」^L 1 _× 「	0.7		58.6	(77)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0	i.09 x		x	0.63	」^L 1 _× 「	0.7		82.02	(77)
Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0           Southeast 0.9x         0.77         x         6.0	3.09 ×		x F	0.63	」^L 1 _× 「	0.7		128.92	= (//)  (77)
Southeast 0.9x			^ L	0.63	」^L 1 × 「	0.7		172.81	(77)
Southeast 0.9x 0.77 x 6.0			х <u>Г</u>	0.63	」 ^	0.7	=	194.29	(77)
Ozvitle z z z 4			^ <u>Г</u>	0.63	」^L 1 × 「	0.7	= -	219.9	(77)
	i.09 ×		^ _	0.63	」× L T x F	0.7		221.5	(77)
Courth a cost a c	i.09 ×		x L	0.63	Ϳ × L ͻ ͺͺ	0.7	=   	197.75	(77)
Occusto a cost	5.09 X		x	0.63	」 ×	0.7	╡ -	159.6	(77)

(86)m= 0.96 0.93 0.88 0.78 0.64 0.47 0.35 0.38 0.59 0.82 0.94 0.97		(86)
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)		
(87)m= 19.63 19.91 20.25 20.62 20.85 20.96 20.99 20.99 20.92 20.61 20.06 19.59		(87)
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)		
(88)m= 20.06 20.06 20.06 20.08 20.08 20.09 20.09 20.1 20.09 20.08 20.07 20.07		(88)
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)		
(89)m= 0.96 0.92 0.86 0.75 0.59 0.41 0.28 0.31 0.52 0.79 0.92 0.96		(89)
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)		
(90)m= 18.25 18.64 19.13 19.63 19.93 20.06 20.09 20.09 20.02 19.63 18.88 18.19		(90)
fLA = Living area ÷ (4) =	0.44	(91)
Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$		
(92)m= 18.86 19.2 19.63 20.07 20.34 20.46 20.49 20.49 20.42 20.06 19.4 18.81		(92)
Apply adjustment to the mean internal temperature from Table 4e, where appropriate		
(93)m= 18.86 19.2 19.63 20.07 20.34 20.46 20.49 20.49 20.42 20.06 19.4 18.81		(93)
8. Space heating requirement	-1-	
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate utilisation factor for gains using Table 9a	ate	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec		
Utilisation factor for gains, hm:		
(94)m= 0.95 0.91 0.85 0.75 0.61 0.44 0.31 0.34 0.55 0.79 0.91 0.95		(94)
Useful gains, hmGm , W = (94)m x (84)m		
(95)m= 465.42 533.41 568.62 555.14 476.73 338.83 229.49 239.5 355.24 448.51 451.25 442.25		(95)
Monthly average external temperature from Table 8		(06)
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2		(96)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m- (96)m] (97)m=		(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m		(- /
(98)m= 327.12 237.01 180.1 89.01 34.61 0 0 0 0 92.73 215.16 337.84		
Total per year (kWh/year) = Sum(98) _{15,912} =	1513.58	(98)
Space heating requirement in kWh/m²/year	25.08	(99)
9b. Energy requirements – Community heating scheme		l
This part is used for space heating, space cooling or water heating provided by a community scheme.		
Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none	0	(301)
Fraction of space heat from community system 1 – (301) =	1	(302)
The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the	latter	1
includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.		l ₍₀₀₀₋₎
Fraction of heat from Community boilers	1	(303a)
Fraction of total space heat from Community boilers (302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for community heating system	1	(305)
Distribution loss factor (Table 12c) for community heating system	1.05	(306)
Space heating	kWh/year	
Annual space heating requirement	1513.58	

Space heat from Community boilers		(98) x (304a) x	(305) x (306) =		1589.26	(307a)
Efficiency of secondary/supplementary heating	system in % (from Tab	le 4a or Appen	dix E)	-	0	(308
Space heating requirement from secondary/sup	pplementary system	(98) x (301) x 10	00 ÷ (308) =		0	(309)
Water heating						
Annual water heating requirement					1933.02	]
If DHW from community scheme: Water heat from Community boilers		(64) x (303a) x	(305) x (306) =	Г	2029.67	(310a)
Electricity used for heat distribution	0.0	11 × [(307a)(307	e) + (310a)(310e)	)] =	36.19	(313)
Cooling System Energy Efficiency Ratio					0	(314)
Space cooling (if there is a fixed cooling system	n, if not enter 0)	= (107) ÷ (314)	=		0	(315)
Electricity for pumps and fans within dwelling (Tmechanical ventilation - balanced, extract or po		Э		Γ	128.36	(330a)
warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330b	o) + (330g) =		128.36	(331)
Energy for lighting (calculated in Appendix L)					273.64	(332)
Total delivered energy for all uses (307) + (309)	) + (310) + (312) + (315	5) + (331) + (33	2)(237b) =		4020.94	(338)
12b. CO2 Emissions – Community heating scho	200					
12b. 002 Emissions Community heating some	eme					
125. GGZ Emissions Community heating series	Eı	nergy Vh/year	Emission fac		missions g CO2/year	
CO2 from other sources of space and water he	Eı k\	Vh/year	kg CO2/kWh	kç		](367a)
CO2 from other sources of space and water he	Ei k\ ating (not CHP)	Vh/year	kg CO2/kWh	kç	g CO2/year	](367a) ](367)
CO2 from other sources of space and water he Efficiency of heat source 1 (%)	Enkly ating (not CHP) If there is CHP using two fue	Vh/year	kg CO2/kWh	<b>kç</b> d fuel	CO2/year	J
CO2 from other sources of space and water he Efficiency of heat source 1 (%) CO2 associated with heat source 1	ating (not CHP)  If there is CHP using two fue  [(307b)+(310b)];	Vh/year	(366) for the second  0.22  0.52	<b>kç</b> d fuel =	96 814.26	(367)
CO2 from other sources of space and water he Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution	En kV ating (not CHP)  If there is CHP using two fue [(307b)+(310b)]:  [(313) x (363)(	Wh/year els repeat (363) to ( (100 ÷ (367b) x	(366) for the second  0.22  0.52	kç d fuel = =	96 814.26 18.78	(367)
CO2 from other sources of space and water he Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems	En kV ating (not CHP)  If there is CHP using two fue [(307b)+(310b)]:  [(313) x (363)( ) (309) x	Wh/year els repeat (363) to (367b) x $(366) + (368)(372)$	(366) for the second  0.22  0.52	kç d fuel = = =	96 814.26 18.78 833.04	(367) (372) (373)
CO2 from other sources of space and water he Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary	ating (not CHP)  If there is CHP using two fue  [(307b)+(310b)]:  [(313) x  (363)( 309) x  ster or instantaneous here)	Wh/year els repeat (363) to (367b) x $(366) + (368)(372)$	(366) for the second  0.22  0.52	kç d fuel = = = =	96 814.26 18.78 833.04	](367) ](372) ](373) ](374)
CO2 from other sources of space and water he Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary CO2 associated with water from immersion heat	En kV ating (not CHP)  If there is CHP using two fue  [(307b)+(310b)]:  [(313) x (363)( 309) x  atter or instantaneous heating (373) + 6	Vh/year els repeat (363) to (3100 ÷ (367b) x  366) + (368)(372) eater (312) x  374) + (375) =	(366) for the second  0.22  0.52	kç d fuel = = = =	96 814.26 18.78 833.04 0	](367) ](372) ](373) ](374) ](375)
CO2 from other sources of space and water he Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary CO2 associated with water from immersion heat Total CO2 associated with space and water heat	En kV ating (not CHP)  If there is CHP using two fue  [(307b)+(310b)]:  [(313) x (363)( 309) x  atter or instantaneous heating (373) + 6	Vh/year  els repeat (363) to (367b) x  366) + (368)(372)  eater (312) x  374) + (375) =  81)) x	kg CO2/kWh  (366) for the second  0.22  0.52  0  0.22	kç d fuel = = = = =	96 814.26 18.78 833.04 0	](367) ](372) ](373) ](374) ](375) ](376)
CO2 from other sources of space and water he Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary CO2 associated with water from immersion heat Total CO2 associated with space and water heat CO2 associated with electricity for pumps and for CO2 associated with electricity for lighting Total CO2, kg/year sum of constant source 1  Sum of constant source 1  Electrical energy for heat distribution Total CO2 associated with space heating (secondary CO2 associated with electricity for jumps and for constant source 1  Electrical energy for heat distribution Total CO2 associated with space heating (secondary CO2 associated with electricity for jumps and for constant source 1  Electrical energy for heat distribution  Total CO2 associated with space heating (secondary CO2 associated with electricity for jumps and for constant source 1  Electrical energy for heat distribution  Total CO2, kg/year	ating (not CHP) If there is CHP using two fue  [(307b)+(310b)] 3  [(313) x  (363)( 2) (309) x  atter or instantaneous here ating (373) + (382) =	Vh/year  els repeat (363) to (367b) x  366) + (368)(372)  eater (312) x  374) + (375) =  81)) x	kg CO2/kWh  (366) for the second  0.22  0.52  0  0.22	kç d fuel = = = = =	96 814.26 18.78 833.04 0 0 833.04 66.62	](367) ](372) ](373) ](374) ](375) ](376) ](378)
CO2 from other sources of space and water he Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary CO2 associated with water from immersion heat Total CO2 associated with space and water heat CO2 associated with electricity for pumps and for CO2 associated with electricity for lighting	ating (not CHP) If there is CHP using two fue  [(307b)+(310b)] 3  [(313) x  (363)( 2) (309) x  atter or instantaneous here ating (373) + (382) =	Vh/year  els repeat (363) to (367b) x  366) + (368)(372)  eater (312) x  374) + (375) =  81)) x	kg CO2/kWh  (366) for the second  0.22  0.52  0  0.22	kç d fuel = = = = =	96 814.26 18.78 833.04 0 0 833.04 66.62 142.02	](367) ](372) ](373) ](374) ](375) ](376) ](378) ](379)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:53:35

Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:** 

Flat

Dwelling Details:

**NEW DWELLING DESIGN STAGE** Total Floor Area: 103.81m² **Plot Reference:** 05 - A Site Reference : Highgate Road - GREEN

Address:

Client Details:

Name: Address:

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 15.34 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 13.08 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 45.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 37.3 kWh/m²

OK 2 Fabric U-values

**Element Average Highest** 

0.18 (max. 0.70) External wall 0.18 (max. 0.30) OK Party wall 0.00 (max. 0.20) **OK** 

Floor (no floor)

Roof (no roof) Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ok
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	13.21m²	
Windows facing: South East	5.5m²	
Windows facing: North West	4.61m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		Hear	Details:						
Access an Name	Noil lo abore	Usei		- M	<b>L</b>		CTDO	040040	
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Stroma Softwa					010943 on: 1.0.5.50	
Continuito Humo.			Address:		0.011.		7 0 10 10	711 11010100	
Address :									
1. Overall dwelling dime	ensions:								
Ground floor			ea(m²)	(10) v		ight(m)	(2a) =	Volume(m³	(3a)
	a) · (4 b) · (4 a) · (4 d) · (4 a) ·			(1a) x	2	65	(2a) =	275.1	(Sa)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	(1n) [	103.81	(4)	\	I) (O )	(0.)		_
Dwelling volume				(3a)+(3b)	)+(3c)+(3c	d)+(3e)+	.(3n) =	275.1	(5)
2. Ventilation rate:	main sec	ondary	other		total			m³ per hou	r
Number of altimospess	heating hea	ating		1			40 =		_
Number of chimneys			0	] = [	0			0	(6a)
Number of open flues	0 +	0 +	0	] = [	0		20 =	0	(6b)
Number of intermittent fa				L	0		10 =	0	(7a)
Number of passive vents	i			L	0	X '	10 =	0	(7b)
Number of flueless gas fi	ires				0	X 4	40 =	0	(7c)
							Air ch	nanges per ho	our
Infiltration due to chimne	ovs flues and fans = (6a)	+(6b)+(7a)+(7b)-	+(7c) =	Г	0		÷ (5) =	0	(8)
•	peen carried out or is intended,			ontinue fr			- (3) =	0	(0)
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	0.25 for steel or timber fra present, use the value correspo			•	ruction			0	(11)
deducting areas of openii		inding to the grea	aler wan area	a (anter					
If suspended wooden f	floor, enter 0.2 (unsealed	d) or 0.1 (sea	led), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
ŭ	s and doors draught strip	oped						0	(14)
Window infiltration			0.25 - [0.2		_	. (45)		0	(15)
Infiltration rate	aco avaraged is subject		(8) + (10) -	, , ,	, , ,	, ,		0	(16)
If based on air permeabil	q50, expressed in cubic	•	•	•	etre or e	envelope	area	3	(17)
•	es if a pressurisation test has b				is beina u	sed		0.15	(18)
Number of sides sheltere			. J	,	3			0	(19)
Shelter factor			(20) = 1 - [	0.075 x (1	19)] =			1	(20)
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.15	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ∸ 4								
	1.23 1.1 1.08	0.95 0.95	0.92	1	1.08	1.12	1.18	]	
		!			<u> </u>			J	

Adjusted infilt	ration rat	e (allowi	ina for sl	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effe		•	rate for t	he appli	cable ca	se			ı			I	<b>_</b>
If mechanic			andiv N. (C	93h) — (93 <i>a</i>	a) v Emy (	aguatian (I	VEVV otho	muiaa (22h	) - (220)			0.5	(23a)
If exhaust air h									) = (23a)			0.5	(23b)
a) If balance		-	-	_					2h\m . /	22h) v [	1 (22a)	74.8	(23c)
(24a)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3	+ 100j	(24a)
b) If balance	ļ		<u> </u>	<u> </u>	Į		Į	ļ	<u>l</u>	ļ	0.0		, ,
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole h	nouse ex	tract ver	tilation o	r positiv	/e input	L ventilatio	n from o	L outside	<u> </u>	!	<u>!</u>	l	
,	m < 0.5 ×			•					.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural if (22b)ı	ventilation								0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	r change	rate - er	nter (24a	or (24l	o) or (24	c) or (24	d) in bo	x (25)				•	
(25)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(25)
3. Heat losse	es and he	eat loss i	paramet	er:									
ELEMENT	Gros area	SS	Openin		Net Ar A ,r		U-val W/m2		A X U (W/l		k-value kJ/m²-l		X k /K
Windows Typ		` ,			13.2	x1	/[1/( 1.4 )+	0.04] =	17.51	,			(27)
Windows Typ	e 2				5.5	x1	/[1/( 1.4 )+	0.04] =	7.29				(27)
Windows Typ	e 3				4.61	x1	/[1/( 1.4 )+	0.04] =	6.11				(27)
Walls Type1	76.1	16	23.3	2	52.84	1 X	0.18		9.51		60	3170.4	4 (29)
Walls Type2	49.7	77	0		49.77	7 X	0.17	=	8.36		60	2986.2	2 (29)
Total area of	elements	, m²			125.9	3							(31)
Party wall					12.14	1 X	0	=	0		45	546.3	(32)
Party floor					103.8	1					40	4152.4	(32a)
Party ceiling					103.8	1				Ī	30	3114.3	(32b)
Internal wall *	*				193.1	7				Ī	9	1738.5	(32c)
* for windows and ** include the are						lated using	g formula 1	/[(1/U-valu	ie)+0.04] a	as given in	paragraph	3.2	
Fabric heat lo	ss, W/K :	= S (A x	U)				(26)(30	) + (32) =				48.78	(33)
Heat capacity	Cm = S	(A x k )						((28)	.(30) + (32	2) + (32a).	(32e) =	15708.13	(34)
Thermal mass	s parame	ter (TMI	P = Cm -	: TFA) ir	n kJ/m²K			= (34)	÷ (4) =			151.32	(35)
For design asses can be used inste				construct	ion are no	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f		
Thermal bridg	jes : S (L	x Y) cal	culated	using Ap	pendix	K						9.77	(36)
if details of therm		are not kr	own (36) =	= 0.05 x (3	31)			(00)	(26)				7,50
Total fabric he		alaulata :	l manthi					, ,	(36) =	'0E\m + (E)		58.55	(37)
Ventilation he	Feb	Mar	· ·	<u> </u>	Jun	Jul	Δυα	Sep	= 0.33 × (	Nov	Dec		
Jan	Len	I IVIAI	Apr	May	Juli	l Jui	Aug	l seb	Oct	INOV	l pec	I	

(00)	00.0	00.40	00.40	00.40	00.00	04.07	04.07	04.00	05.00	00.00	00.70	07.44		(20)
(38)m=	28.8	28.46	28.12	26.42	26.08	24.37	24.37	24.03	25.06	26.08	26.76	27.44		(38)
Heat tr (39)m=	87.35	oefficier 87.01	1t, VV/K 86.67	84.97	84.63	82.93	82.93	82.59	(39)m 83.61	= (37) + (3 84.63	38)m 85.31	85.99		
(39)111=	67.33	67.01	00.07	04.97	04.03	02.93	02.93	02.39			Sum(39) ₁	<u> </u>	84.89	(39)
Heat Id	ss para	meter (F	HLP), W	m²K			_	_		= (39)m ÷		27		<b></b>  ` ′
(40)m=	0.84	0.84	0.83	0.82	0.82	0.8	0.8	0.8	0.81	0.82	0.82	0.83		_
Numbe	er of day	rs in mor	nth (Tab	le 1a)					1	Average =	Sum(40) ₁	12 /12=	0.82	(40)
rtuinot	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. Wa	iter heat	ing ener	gy requi	rement:								kWh/ye	ear:	
Λ			\.											
		ipancy, I 9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9	)2)] + 0.(	0013 x (	ΓFA -13.		77		(42)
if TF	A £ 13.9	9, N = 1			`	,	•	, , <del>-</del>	,					
								(25 x N) to achieve		se target o		0.04		(43)
		•		0,	ater use, l	Ū	Ū			J J				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water	er usage ii	n litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
(44)m=	110.04	106.04	102.04	98.04	94.04	90.03	90.03	94.04	98.04	102.04	106.04	110.04		
En a rou .	aantant of	hat water	used sel	aulatad m	anthly 1	100 v Vd n	n nm F	Tm / 2600			m(44) ₁₁₂ =	L	1200.45	(44)
					,		1	OTm / 3600		,				
(45)m=	163.19	142.73	147.28	128.4	123.2	106.32	98.52	113.05	114.4	133.32	145.53	158.04	4572.00	(45)
If instan	taneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46)		rotai = Su	m(45) ₁₁₂ =	• [	1573.98	(43)
(46)m=	24.48	21.41	22.09	19.26	18.48	15.95	14.78	16.96	17.16	20	21.83	23.71		(46)
Water	storage	loss:						ļ						
Ū		` ,		•			Ū	within sa	ame ves	sel		0		(47)
	•	_			elling, e			, ,	a ma\ a m t a	· · · (O) : · · · (	47\			
	vise ii no storage		not wate	er (triis ir	iciudes i	nstantar	ieous co	mbi boil	ers) ente	er o in (	47)			
	•		eclared l	oss facto	or is kno	wn (kWh	n/day):					0		(48)
Tempe	erature fa	actor fro	m Table	2b								0		(49)
•			storage	-				(48) x (49)	) =		1	10		(50)
,				•	oss fact									(= 4)
		_	ee secti		e 2 (kW	n/litre/da	ıy)				0.	02		(51)
	-	from Ta		JII 4.0							1.	.03		(52)
Tempe	erature fa	actor fro	m Table	2b							-	.6		(53)
Energy	lost fro	m water	storage	, kWh/ye	ear			(47) x (51)	x (52) x (	53) =	1.	03		(54)
Enter	(50) or (	54) in (5	55)								1.	03		(55)
Water	storage	loss cal	culated f	or each	month			((56)m = (	55) × (41)ı	m				
(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinde	er contains	dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (	H11)] ÷ (5	0), else (5	7)m = (56)	m where (	H11) is fro	m Appendi	хН	
(57)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)

		1											
Primary circuit loss (annual) from Table 3	0	(58)											
Primary circuit loss calculated for each month (59)m = (58) ÷ 365 x (41)m	otot)												
(modified by factor from Table H5 if there is solar water heating and a cylinder thermo (59)m= 23.26 21.01 23.26 22.51 23.26 22.51 23.26 22.51 23.26	22.51 23.26	(59)											
	22.01 20.20	(66)											
Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m		1 (04)											
(61)m= 0 0 0 0 0 0 0 0 0 0	0 0	(61)											
Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m +	<del>` ` ` ` ` ` </del>	1 ` ′ ′											
(62)m= 218.46 192.65 202.56 181.9 178.48 159.81 153.79 168.33 167.89 188.6	199.03 213.32	(62)											
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribut	ion to water heating)												
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)		l (63)											
(63)m= 0 0 0 0 0 0 0 0 0 0	0 0	(63)											
Output from water heater		1											
(64)m= 218.46 192.65 202.56 181.9 178.48 159.81 153.79 168.33 167.89 188.6	199.03 213.32	0004.00 (64)											
Output from water heater $(annual)_{112}$ 2224.82 (64) Heat gains from water heating, kWh/month 0.25 $'$ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m]													
	<del></del>	1											
(65)m= 98.48 87.4 93.19 85.49 85.19 78.15 76.98 81.81 80.83 88.55	91.18 96.77	(65)											
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is fr	om community h	eating											
5. Internal gains (see Table 5 and 5a):													
Metabolic gains (Table 5), Watts		1											
Jan Feb Mar Apr May Jun Jul Aug Sep Oct	Nov Dec												
(66)m= 138.61 138.61 138.61 138.61 138.61 138.61 138.61 138.61 138.61 138.61	138.61 138.61	(66)											
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5		_											
(67)m= 23.39 20.77 16.89 12.79 9.56 8.07 8.72 11.34 15.21 19.32	22.55 24.04	(67)											
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
(68)m= 262.34 265.07 258.21 243.6 225.17 207.84 196.26 193.54 200.4 215.01	233.44 250.77	(68)											
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
(69)m= 36.86 36.86 36.86 36.86 36.86 36.86 36.86 36.86 36.86 36.86	36.86 36.86	(69)											
Pumps and fans gains (Table 5a)	•	'											
(70)m= 0 0 0 0 0 0 0 0 0 0	0 0	(70)											
Losses e.g. evaporation (negative values) (Table 5)		ı											
(71)m= -110.88 -110.88 -110.88 -110.88 -110.88 -110.88 -110.88 -110.88 -110.88 -110.88	-110.88 -110.88	(71)											
Water heating gains (Table 5)		I											
(72)m= 132.37 130.06 125.26 118.73 114.5 108.53 103.47 109.96 112.27 119.02	126.65 130.07	(72)											
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m$	1)m + (72)m	l											
(73)m= 482.68 480.48 464.94 439.71 413.81 389.03 373.03 379.42 392.47 417.93	447.22 469.45	(73)											
6. Solar gains:													
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicab	ole orientation.												
Orientation: Access Factor Area Flux g_	FF	Gains											
	able 6c	(VV)											
Southeast 0.9x 0.77 x 5.5 x 36.79 x 0.63 x	0.7 =	61.85 (77)											
Southeast 0.9x 0.77 x 5.5 x 62.67 x 0.63 x	0.7 =	105.35 (77)											

7. Mean inte		1013.57 erature			201.81	1152.72	1078	3.65 994.43	853.54	719.21	662.48		(84)
Total gains –			<del>`                                    </del>	<u> </u>	<u>`</u>				_	_		1	(6.1)
(83)m= 226.28	390.73	548.63	703.29 80	9.2 8	812.79	779.69	699	<u> </u>	435.62	2 272	193.03	]	(83)
Solar gains ir	watts, ca	lculated	for each m	onth			(83)m	ı = Sum(74)m	(82)m				
Northwest 0.9x	0.77	X	4.61	X	9	9.21	X	0.63	X	0.7	=	12.98	(81)
Northwest 0.9x	0.77	×	4.61	×		14.2	X	0.63	×	0.7	=	20	(81)
Northwest _{0.9x}	0.77	x	4.61	x	2	8.07	x	0.63	x	0.7	=	39.54	(81)
Northwest _{0.9x}	0.77	X	4.61	×	5	0.42	x	0.63	x	0.7	=	71.04	(81)
Northwest 0.9x	0.77	x	4.61	x	7	2.63	x	0.63	x	0.7	=	102.32	(81)
Northwest 0.9x	0.77	X	4.61	×		91.1	x	0.63	x	0.7	=	128.35	(81)
Northwest 0.9x	0.77	x	4.61	×		7.38	x	0.63	x	0.7	=	137.2	(81)
Northwest 0.9x	0.77	x	4.61	×		1.35	X	0.63	x	0.7	_ =	128.7	(81)
Northwest _{0.9x}	0.77	x	4.61	x		7.96	X	0.63	x	0.7		95.74	(81)
Northwest 0.9x	0.77	×	4.61	×		1.38	) x	0.63	×	0.7	= =	58.3	(81)
Northwest 0.9x	0.77	X	4.61	×		2.97	]	0.63	×	0.7		32.36	(81)
Northwest 0.9x	0.77	^	4.61	^   x		1.28	] ]	0.63	_ ^	0.7	= =	15.9	(81)
Southwest _{0.9x}	0.77	$\frac{1}{x}$	13.21	$=$ $\begin{bmatrix} \\ \\ \\ \end{bmatrix}$		1.49	]   ]	0.63	^	0.7		127.12	(79)
Southwest _{0.9x}	0.77	^ ^	13.21	$=$ $\frac{1}{x}$		4.07	]   ]	0.63	<b>-</b>   ^	0.7	= -	177.92	(79)
Southwest _{0.9x}	0.77	^ ^	13.21	$=$ $\frac{1}{x}$		9.27	]   ]	0.63	<b>-</b>   ^	0.7		279.64	(79)
Southwest _{0.9x}	0.77	<b>-</b>	13.21	→       x		2.85	]   ]	0.63	-     x	0.7	= -	374.86	(79)
Southwest _{0.9x}	0.77	x x	13.21	X x		13.91 04.39	]   ]	0.63	x	0.7	<del>- </del>	459.87 421.44	(79)
Southwest _{0.9x} Southwest _{0.9x}	0.77	×	13.21	→   ×     →   √		18.15	]   ]	0.63	= X	0.7	<b>-</b>   -	476.99	(79)
Southwesto.9x	0.77	×	13.21	×		19.01	]	0.63	×	0.7	_ =	480.46	(79)
Southwesto o	0.77	X	13.21	×		06.25	]	0.63	X	0.7	<b>-</b>   -	428.95	(79)
Southwesto.9x	0.77	×	13.21	×		5.75	]	0.63	×	0.7	=	346.2	(79)
Southwest _{0.9x}	0.77	x	13.21	×	6	2.67	]	0.63	×	0.7	=	253.02	(79)
Southwest _{0.9x}	0.77	x	13.21	×	3	6.79	]	0.63	x	0.7	=	148.54	(79)
Southeast 0.9x	0.77	x	5.5	x	3	1.49	x	0.63	x	0.7	=	52.93	(77)
Southeast 0.9x	0.77	X	5.5	X	4	4.07	X	0.63	X	0.7	=	74.08	(77)
Southeast 0.9x	0.77	X	5.5	X	6	9.27	x	0.63	X	0.7	=	116.43	(77)
Southeast 0.9x	0.77	X	5.5	X	9	2.85	x	0.63	x	0.7	=	156.07	(77)
Southeast 0.9x	0.77	X	5.5	X	10	04.39	X	0.63	X	0.7	=	175.47	(77)
Southeast 0.9x	0.77	X	5.5	х	1′	13.91	x	0.63	x	0.7	=	191.47	(77)
Southeast 0.9x	0.77	X	5.5	×	1	18.15	x	0.63	x	0.7	=	198.6	(77)
Southeast 0.9x	0.77	x	5.5	x	1	19.01	x	0.63	x	0.7	=	200.04	(77)
Southeast 0.9x	0.77	x	5.5	X	1(	06.25	X	0.63	x	0.7	<del>-</del>	178.6	(77)

(86)m= 0.98 0.95 0.8	39 0.77 0	0.61 0.44	0.32	0.35	0.56	0.83	0.95	0.98		(86)
Mean internal temperature	in living area	T1 (follow ste	ps 3 to 7	' in Table	e 9c)					
(87)m= 19.9 20.18 20.	49 20.79 2	20.99	21	21	20.97	20.75	20.28	19.86		(87)
Temperature during heating	ng periods in re	est of dwelling	from Ta	ble 9, Ti	h2 (°C)					
(88)m= 20.22 20.22 20.	22 20.24 2	20.24 20.25	20.25	20.26	20.25	20.24	20.23	20.23		(88)
Utilisation factor for gains	for rest of dwel	lling, h2,m (se	e Table	9a)						
(89)m= 0.97 0.94 0.8	0.74	0.57 0.39	0.26	0.29	0.5	0.8	0.94	0.98		(89)
Mean_internal temperature	in the rest of	dwelling T2 (f	ollow ste	ps 3 to 7	7 in Tabl	e 9c)				
(90)m= 18.75 19.14 19.	58 19.99 2	20.25	20.25	20.26	20.22	19.95	19.3	18.69		(90)
					f	LA = Livin	g area ÷ (4	1) =	0.38	(91)
Mean internal temperature	(for the whole	e dwelling) = f	LA × T1	+ (1 – fL	A) × T2					
(92)m= 19.19 19.54 19.		20.47 20.53	20.54	20.54	20.51	20.26	19.68	19.14		(92)
Apply adjustment to the m		<del></del>				·				(00)
(93)m= 19.19 19.54 19. 8. Space heating requirem		20.53	20.54	20.54	20.51	20.26	19.68	19.14		(93)
Set Ti to the mean interna		obtained at st	en 11 of	Table 9	so tha	t Ti m=(	76)m an	d re-calc	ulate	
the utilisation factor for ga				1 4510 01	5, 00 tria				diato	
Jan Feb M	ar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation factor for gains,		<u> </u>	I			<u> </u>	I			(0.4)
(94)m= 0.97 0.93 0.8		0.58 0.4	0.28	0.32	0.52	0.8	0.94	0.97		(94)
Useful gains, hmGm, W = (95)m= 684.71 810.29 876	<del>` ' ' ` ' '</del>	08.01 486.63	325.87	340.61	519.7	681.17	673.32	644.36		(95)
Monthly average external			020.0.	0.0.0.	0.0		0.0.02	000		()
(96)m= 4.3 4.9 6.4	<del>- i</del>	11.7 14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate for mean in	ternal tempera	ture, Lm , W =	=[(39)m :	x [(93)m	– (96)m	]				
(97)m= 1300.79 1273.63 1164	4.02 968.27 74	42.05 491.85	326.66	341.91	535.72	817.5	1073.07	1284.7		(97)
Space heating requiremen						<del></del>	ŕ	470.44		
(98)m= 458.37 311.36 213	.82 86.23 2	25.32 0	0	0 Tota	0	101.43	287.82	476.41	1000.70	(98)
O	a t i i a l a l a l a l a l a l a l a l a l			Tota	i per year	(KWII/yeai	r) = Sum(9	O) _{15,912} =	1960.76	╡
Space heating requiremen	·								18.89	(99)
9b. Energy requirements –					المالة عالي					
This part is used for space Fraction of space heat from							unity scr	neme.	0	(301)
Fraction of space heat from			•		,				1	(302)
The community scheme may obta		•	•	allows for	CHP and ı	up to four (	other heat	l sources: tl		``′
includes boilers, heat pumps, geo	thermal and waste					-,-				_
Fraction of heat from Comr	nunity boilers								1	(303a)
Fraction of total space heat	from Commur	nity boilers				(3	02) x (303	a) =	1	(304a)
Factor for control and charg	ging method (T	able 4c(3)) fo	r commu	unity hea	iting sys	tem			1	(305)
Distribution loss factor (Tab	ole 12c) for con	nmunity heati	ng syste	m				j	1.05	(306)
Space heating								'	kWh/year	<b>-</b>
Annual space heating requ	irement								1960.76	
								•		

Space heat from Community boilers		(98) x (304a) x	x (305) x (306) =	2058.8	(307a)
Efficiency of secondary/supplementary	heating system in % (	from Table 4a or Apper	ndix E)	0	(308
Space heating requirement from secon	dary/supplementary s	ystem (98) x (301) x 1	100 ÷ (308) =	0	(309)
Water heating					_
Annual water heating requirement				2224.82	
If DHW from community scheme: Water heat from Community boilers		(64) x (303a) x	x (305) x (306) =	2336.06	(310a)
Electricity used for heat distribution		0.01 × [(307a)(307	7e) + (310a)(310e)] =	43.95	(313)
Cooling System Energy Efficiency Ration	0			0	(314)
Space cooling (if there is a fixed cooling	g system, if not enter (	$= (107) \div (314)$	) =	0	(315)
Electricity for pumps and fans within dv mechanical ventilation - balanced, extra	• ,	om outside		253.73	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	0b) + (330g) =	253.73	(331)
Energy for lighting (calculated in Apper	ndix L)			412.99	(332)
Total delivered energy for all uses (307	7) + (309) + (310) + (31	12) + (315) + (331) + (33	32)(237b) =	5061.57	(338)
12b. CO2 Emissions – Community hea	ting scheme				
12b. CO2 Emissions – Community hea	ting scheme	Energy kWh/year	Emission factor	r Emissions kg CO2/year	
CO2 from other sources of space and verticiency of heat source 1 (%)	water heating (not CH	kWh/year	kg CO2/kWh	kg CO2/year	(367a)
CO2 from other sources of space and v	water heating (not CHI If there is CHP u	<b>kWh/year</b> P)	kg CO2/kWh	kg CO2/year	(367a) (367)
CO2 from other sources of space and vertice Efficiency of heat source 1 (%)	water heating (not CHI If there is CHP u	kWh/year P) sing two fuels repeat (363) to	kg CO2/kWh	kg CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%) CO2 associated with heat source 1	water heating (not CHI If there is CHP u	kWh/year  P) sing two fuels repeat (363) to b)+(310b)] x 100 ÷ (367b) x	kg CO2/kWh  (366) for the second fu  0.22  0.52	kg CO2/year  sel 96 = 988.84	(367)
CO2 from other sources of space and vertical energy for heat distribution	water heating (not CHI If there is CHP u [(307 systems	kWh/year  P) sing two fuels repeat (363) to b)+(310b)] x 100 ÷ (367b) x  [(313) x	kg CO2/kWh  (366) for the second fu  0.22  0.52	kg CO2/year  sel 96 = 988.84 = 22.81	(367)
CO2 from other sources of space and vertical energy for heat distribution Total CO2 associated with community seems of space and vertical energy for heat distribution	water heating (not CHI If there is CHP u [(307 systems econdary)	kWh/year  P) sing two fuels repeat (363) to  b)+(310b)] x 100 ÷ (367b) x  [(313) x  (363)(366) + (368)(373)  (309) x	kg CO2/kWh  (366) for the second fu  0.22  0.52	kg CO2/year  sel 96 = 988.84 = 22.81 = 1011.65	(367) (372) (373)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so	water heating (not CHI If there is CHP u  [(307 systems econdary) sion heater or instanta	kWh/year  P) sing two fuels repeat (363) to  b)+(310b)] x 100 ÷ (367b) x  [(313) x  (363)(366) + (368)(373)  (309) x	kg CO2/kWh  0 (366) for the second fu  0.22  0.52  0	kg CO2/year  sel 96 = 988.84 = 22.81 = 1011.65 = 0	(367) (372) (373) (374)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community and CO2 associated with space heating (see CO2 associated with water from immerse)	water heating (not CHI If there is CHP u  [(307 systems econdary) sion heater or instanta vater heating	kWh/year  P) Ising two fuels repeat (363) to  b)+(310b)] x 100 ÷ (367b) x  [(313) x  (363)(366) + (368)(373)  (309) x  aneous heater (312) x  (373) + (374) + (375) =	kg CO2/kWh  0 (366) for the second fu  0.22  0.52  0	kg CO2/year  sel 96 = 988.84 = 22.81 = 1011.65 = 0 = 0	(367) (372) (373) (374) (375)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community and CO2 associated with space heating (see CO2 associated with water from immeratoral CO2 associated with space and verifications.	water heating (not CHI If there is CHP u  [(307) systems econdary) sion heater or instanta vater heating ups and fans within dw	kWh/year  P) Ising two fuels repeat (363) to  b)+(310b)] x 100 ÷ (367b) x  [(313) x  (363)(366) + (368)(373)  (309) x  aneous heater (312) x  (373) + (374) + (375) =	kg CO2/kWh  0 (366) for the second fu  0.22  0.52  0  0.22	kg CO2/year  sel 96 = 988.84 = 22.81 = 1011.65 = 0 = 0	(367) (372) (373) (374) (375) (376)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the community of the commun	water heating (not CHI If there is CHP u  [(307) systems econdary) sion heater or instanta vater heating ups and fans within dw	kWh/year  P)  Ising two fuels repeat (363) to (367b) x (363) (366) + (368) (373) x (309) x  Raneous heater (312) x (373) + (374) + (375) = (331)) x	kg CO2/kWh  0 (366) for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second f	kg CO2/year    96	(367) (372) (373) (374) (375) (376) (378)
CO2 from other sources of space and of Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community of CO2 associated with space heating (see CO2 associated with water from immer Total CO2 associated with space and of CO2 associated with electricity for pure CO2 associated with electricity for light	water heating (not CHI If there is CHP u  [(307) systems econdary) sion heater or instanta vater heating ups and fans within dw ing	kWh/year  P)  Ising two fuels repeat (363) to (367b) x (363) (366) + (368) (373) x (309) x  Raneous heater (312) x (373) + (374) + (375) = (331)) x	kg CO2/kWh  0 (366) for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second f	kg CO2/year    96	(367) (372) (373) (374) (375) (376) (378) (379)

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:53:34

Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:** Flat

Dwelling Details:

**NEW DWELLING DESIGN STAGE** Total Floor Area: 62.56m2 **Plot Reference:** Site Reference : Highgate Road - GREEN 05 - B

Address:

Client Details:

Name: Address:

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 18.61 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 16.22 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 49.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 41.0 kWh/m²

OK 2 Fabric U-values

**Element Average** 

**Highest** 0.18 (max. 0.70) External wall 0.18 (max. 0.30) OK Party wall 0.00 (max. 0.20) **OK** 

Floor (no floor) Roof (no roof)

Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	12.71m²	
Windows facing: North West	3.46m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		Lleo	r Details:						
A a a a a a a a a a Maria a a	Nied lankers	USE		- M	L		CTDO	040040	
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Stroma Softwa					010943 on: 1.0.5.50	
Contware reame.	Ottoma 1		ty Address:		31011.		7 01010	71. 110.0.00	
Address :		·							
1. Overall dwelling dime	ensions:								
Ground floor		A	rea(m²)	(10) ×		ight(m)	(2a) =	Volume(m³	(3a)
	a) · (4b) · (4 a) · (4 d) · (4 a)	. (4p)		(1a) x	2	65	(2a) =	165.78	(Sa)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	+(1n)	62.56	(4)	\	I) (O )	(0.)		_
Dwelling volume				(3a)+(3b)	)+(3c)+(3c	d)+(3e)+	.(3n) =	165.78	(5)
2. Ventilation rate:	main sec	condary	other		total			m³ per hou	r
Number of allipsychia	heating he	ating		,			40 =		_
Number of chimneys			0	] = [	0			0	(6a)
Number of open flues	0 +	0 +	0	] = [	0		20 =	0	(6b)
Number of intermittent fa				L	0		10 =	0	(7a)
Number of passive vents	i				0	X '	10 =	0	(7b)
Number of flueless gas fi	ires				0	X 4	40 =	0	(7c)
							Air ch	nanges per ho	our
Infiltration due to chimne	ovs flues and fans = (6a)	+(6b)+(7a)+(7b	o)+(7c) =	Г	0		÷ (5) =	0	(8)
'	peen carried out or is intended,			ontinue fr			. (0) =	0	
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	0.25 for steel or timber fra present, use the value correspo			•	ruction			0	(11)
deducting areas of openii		maing to the gi	eater wan are	a (anter					
If suspended wooden f	floor, enter 0.2 (unsealed	d) or 0.1 (se	aled), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
ŭ	s and doors draught strip	pped						0	(14)
Window infiltration			0.25 - [0.2		_	. (45)		0	(15)
Infiltration rate	aEO avaraged in aubic	motroe ner	(8) + (10)	, , ,	, , ,	, ,	oroo	0	(16)
If based on air permeabil	q50, expressed in cubic	•	•	•	etre or e	envelope	area	3	$= \begin{pmatrix} (17) \\ (49) \end{pmatrix}$
	es if a pressurisation test has b				is being u	sed	ļ	0.15	(18)
Number of sides sheltere				•	· ·			0	(19)
Shelter factor			(20) = 1 -	0.075 x (1	19)] =			1	(20)
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.15	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May	Jun Ju	I Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4								
	1.23 1.1 1.08	0.95 0.99	5 0.92	1	1.08	1.12	1.18		
		<del></del>						•	

Adjusted infiltra	tion rate	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effect		-	rate for t	he appli	cable ca	se	-	-	-	-			
If exhaust air he			endix N (2	3h) = (23a	ı) <b>×</b> Fmv (e	equation (N	VS)) othe	rwise (23h	) = (23a)			0.5	(238
If balanced with		0 11		, ,	,	. `	,, .	`	) = (20u)			0.5	(23)
		-	-	_					2h\m . /	22h) v [-	1 (220)	74.8	(230
a) If balanced (24a)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3	<del>-</del> 100] 	(24a
b) If balanced						<u> </u>			l		0.0	J	(=
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(24
c) If whole ho	-					<u> </u>	<u> </u>					J	•
if (22b)m				•	•				.5 × (23b	<b>)</b> )			
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural v				•	•				0.5]				
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air of	change	rate - er	iter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)			!	•	
25)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3	]	(25
3. Heat losses	and he	ot loce r	aramoto	or:								•	
ELEMENT	Gros	·	Openin		Net Ar	ea	U-valı	Ie.	AXU		k-value	<u></u> Δ	λΧk
	area	_	m		A ,r		W/m2		(W/I	K)	kJ/m²-l		J/K
Windows Type	1				12.71	x1,	/[1/( 1.4 )+	0.04] =	16.85				(27
Windows Type	2				3.46	x1,	/[1/( 1.4 )+	0.04] =	4.59				(27
Walls Type1	46.7	2	16.17	7	30.55	5 x	0.18	□ = i	5.5		60	183	3 (29)
Walls Type2	13.7	5	0		13.75	x	0.17	Ħ =i	2.31	F i	60	825	(29
Total area of el	ements	, m²			60.47	<del>,                                    </del>							(31)
Party wall					30.32	2 x	0	=	0	$\neg$	45	1364	.4 (32
Party floor					62.56						40	2502	2.4 (32
Party ceiling					62.56					Ī	30	1876	<b>=</b>
nternal wall **					100.8	=				_ 	9	907.	=
for windows and r	oof windo	ows, use e	ffective wi	ndow U-va			formula 1	/[(1/U-valu	ıe)+0.04] a	L as given in			(0
* include the areas						-				-			
abric heat loss	s, W/K =	= S (A x	U)				(26)(30)	+ (32) =				29.25	(33
Heat capacity C	Cm = S(	Axk)						((28).	(30) + (32	2) + (32a).	(32e) =	9308.8	(34
Thermal mass p	parame	ter (TMF	P = Cm ÷	- TFA) ir	ı kJ/m²K			= (34)	÷ (4) =			148.8	(35
For design assessr ean be used instea				constructi	ion are not	t known pr	ecisely the	indicative	values of	TMP in Ta	able 1f		
Thermal bridge	s : S (L	x Y) cal	culated ı	using Ap	pendix ł	<						7.08	(36
f details of thermal		are not kn	own (36) =	= 0.05 x (3	1)								
Total fabric hea									(36) =			36.33	(37
entilation heat						<del></del>			= 0.33 × (		1	1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		/00
38)m= 17.36	17.15	16.95	15.92	15.72	14.69	14.69	14.48	15.1	15.72	16.13	16.54		(38
Heat transfer co									= (37) + (			1	
39)m= 53.68	53.48	53.27	52.25	52.04	51.01	51.01	50.81	51.42	52.04	52.45	52.86		
Stroma FSAP 2012	Version:	1.0.5.50 (	SAP 9.92)	- http://wv	ww.stroma	.com			Average =	Sum(39) ₁	12 /12=	52.1 <b>⊝</b> ag	<u>e 2 of ³⁹</u>

Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.86	0.85	0.85	0.84	0.83	0.82	0.82	0.81	0.82	0.83	0.84	0.84		
						!			Average =	Sum(40) ₁	12 /12=	0.83	(40)
Number of day	<u> </u>	<del>1 `</del>	· ·										
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 hea	ting ene	rgy requi	irement:								kWh/ye	ear:	
Assumed occu if TFA > 13. if TFA £ 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9	)2)] + 0.0	0013 x ( ⁻	TFA -13		05		(42)
Annual average Reduce the annual not more that 125	al average	hot water	usage by	5% if the $a$	lwelling is	designed i			se target o		96		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i								1 222	1 000	1			
(44)m= 91.25	87.94	84.62	81.3	77.98	74.66	74.66	77.98	81.3	84.62	87.94	91.25		
. ,		!				ļ	<u> </u>		I Total = Su	ım(44) ₁₁₂ =	=	995.51	(44)
Energy content of	f hot water	used - cal	culated m	onthly $= 4$ .	190 x Vd,r	m x nm x E	OTm / 3600	0 kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 135.33	118.36	122.14	106.48	102.17	88.17	81.7	93.75	94.87	110.56	120.69	131.06		
									Total = Su	im(45) ₁₁₂ =	=	1305.27	(45)
If instantaneous v	vater heati	ing at point	of use (no	hot water	storage),	enter 0 in	boxes (46	to (61)					
(46)m= 20.3	17.75	18.32	15.97	15.33	13.22	12.25	14.06	14.23	16.58	18.1	19.66		(46)
Water storage Storage volum		) includir	na anv e	olar or M	WHDS	etoraga	within co	ama vac	വ				(47)
· ·	•	•				· ·		airie ves	361		0		(47)
If community hotherwise if no	•			_			. ,	ers) ente	er '0' in <i>(</i>	(47)			
Water storage			(					,		( )			
a) If manufact	turer's d	eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature f	actor fro	m Table	2b								0		(49)
Energy lost fro	m wate	r storage	, kWh/ye	ear			(48) x (49)	) =		1	10		(50)
b) If manufact			-										
Hot water stor	-			e 2 (kW	h/litre/da	ay)				0.	.02		(51)
If community he Volume factor	_		011 4.3							1	03		(52)
Temperature f			2b							-	.6		(52)
Energy lost fro				ear			(47) x (51)	) x (52) x (	(53) =		03		(54)
Enter (50) or		_	, 1	Jui			(11)11(21)	, (==, (	,/	-	.03		(55)
Water storage	loss cal	culated f	for each	month			((56)m = (	(55) × (41)	m				, ,
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain												ix H	(00)
	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
(57)m= 32.01	20.92	32.01	30.96	32.01	30.96	32.01	32.01	30.96	32.01	<u> </u>	<u> </u>		, ,
Primary circuit	•	,			<b>50</b> \	(EO)					0		(58)
Primary circuit				,	•		, ,		r tharma	otat)			
(modified by		1	ı —	ı —	ı —		<del></del>	<u> </u>	1	<del>-                                    </del>	22.22		(59)
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(38)

Combi loss ca	lculated f	or each	month (	61)m =	(60) ÷ 3	65 × (41	)m							
(61)m= 0	0	0	0	0	0	0 0	)   0		0	0	0	0	1	(61)
	uired for	water he	eating ca	alculated	L for eac	h month	(62)ı	—— m =	0 85 x (	 ′45)m +	(46)m +	(57)m +	ı (59)m + (61)m	
(62)m= 190.61	168.29	177.41	159.97	157.45	141.66	136.98	149.	_	148.36	165.84	174.18	186.34	]	(62)
Solar DHW input	L L L L L L L L L L L L L L L L L L L	using App	endix G or	Appendix	H (negat	ive quantity	y) (ent	er '0'	if no sola	r contribu	tion to wate	r heating)	J	
(add additiona												-		
(63)m= 0	0	0	0	0	0	0	0		0	0	0	0	]	(63)
Output from w	ater heat	er				•	•				•	!	•	
(64)m= 190.61	168.29	177.41	159.97	157.45	141.66	136.98	149	.03	148.36	165.84	174.18	186.34	]	
						•		Outp	ut from wa	ater heate	er (annual)	12	1956.11	(64)
Heat gains fro	m water l	heating,	kWh/mo	onth 0.2	5 ´ [0.85	5 × (45)m	ı + (6	1)m	ı] + 0.8 x	((46)m	+ (57)m	+ (59)m	]	
(65)m= 89.22	79.3	84.83	78.2	78.19	72.11	71.39	75.	39	74.34	80.98	82.92	87.8	]	(65)
include (57)	m in calc	ulation o	of (65)m	only if c	ylinder	is in the	dwell	ing	or hot w	ater is f	rom com	munity h	neating	
5. Internal ga	ains (see	Table 5	and 5a	):										
Metabolic gair	ns (Table	5). Wat	ts											
Jan	Feb	Mar	Apr	May	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec	]	
(66)m= 102.65	102.65	102.65	102.65	102.65	102.65	102.65	102	.65	102.65	102.65	102.65	102.65	1	(66)
Lighting gains	(calculat	ed in Ap	pendix	L, equat	ion L9 c	r L9a), a	lso s	ee T	Table 5				•	
(67)m= 15.99	14.2	11.55	8.74	6.54	5.52	5.96	7.7	'5	10.4	13.21	15.42	16.43	]	(67)
Appliances ga	ins (calcu	ulated in	Append	dix L, eq	uation L	.13 or L1	3a), a	also	see Tal	ble 5			•	
(68)m= 179.35	181.22	176.53	166.54	153.94	142.09	134.18	132	.32	137.01	146.99	159.59	171.44	]	(68)
Cooking gains	(calculat	ted in Ap	pendix	L, equat	ion L15	or L15a	), als	o se	e Table	5			-	
(69)m= 33.27	33.27	33.27	33.27	33.27	33.27	33.27	33.2	27	33.27	33.27	33.27	33.27	]	(69)
Pumps and fa	ns gains	(Table 5	ia)										•	
(70)m= 0	0	0	0	0	0	0	0		0	0	0	0	]	(70)
Losses e.g. ev	/aporatio	n (negat	ive valu	es) (Tab	le 5)	-					-		-	
(71)m= -82.12	-82.12	-82.12	-82.12	-82.12	-82.12	-82.12	-82.	.12	-82.12	-82.12	-82.12	-82.12	]	(71)
Water heating	gains (T	able 5)											-	
(72)m= 119.92	118	114.02	108.61	105.1	100.15	95.95	101.	.34	103.25	108.85	115.17	118.01	]	(72)
Total internal	gains =				(66	)m + (67)m	า + (68	8)m +	- (69)m + (	(70)m + (7	71)m + (72)	)m	-	
(73)m= 369.06	367.21	355.89	337.69	319.37	301.56	289.88	295	5.2	304.45	322.84	343.98	359.68	]	(73)
6. Solar gains	s:													
Solar gains are		ŭ	r flux from	Table 6a	and assoc	ciated equa	tions 1	to co	nvert to th	e applica		tion.		
Orientation:		actor	Area m²		Flu	ıx ble 6a		т	g_ able 6b	т	FF able 6c		Gains	
_	Table 6d					DIE 0a	, ,	1	able ob	_ '	able oc		(W)	,
Northeast _{0.9x}	0.77	X	12.	71	X	11.28	X		0.63	×	0.7	=	43.83	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	22.97	X		0.63	x	0.7	=	89.21	(75)
Northeast 0.9x	0.77	X	12.	71	X .	41.38	X		0.63	x	0.7	=	160.73	(75)
Northeast 0.9x	0.77	×	12.	71	X	67.96	X		0.63	x	0.7	=	263.96	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	91.35	X		0.63	X	0.7	=	354.82	(75)

Nawthanat F		_			_		7		_				<b>–</b> ,,
Northeast _{0.9x}	0.77	X	12.	71	×	97.38	X	0.63	X	0.7	=	378.27	(75)
Northeast _{0.9x}	0.77	X	12.	71	x	91.1	X	0.63	X	0.7	_ =	353.87	(75)
Northeast _{0.9x}	0.77	X	12.	71	x	72.63	X	0.63	X	0.7	=	282.11	(75)
Northeast _{0.9x}	0.77	X	12.	71	x	50.42	X	0.63	X	0.7	=	195.85	(75)
Northeast _{0.9x}	0.77	X	12.	71	x	28.07	X	0.63	X	0.7	=	109.02	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	14.2	X	0.63	X	0.7	=	55.15	(75)
Northeast 0.9x	0.77	X	12.	71	x	9.21	X	0.63	X	0.7	=	35.79	(75)
Northwest 0.9x	0.77	X	3.4	16	x	11.28	X	0.63	x	0.7	=	11.93	(81)
Northwest _{0.9x}	0.77	X	3.4	<b>l</b> 6	x	22.97	X	0.63	X	0.7	=	24.29	(81)
Northwest 0.9x	0.77	X	3.4	<b>l</b> 6	x	41.38	X	0.63	X	0.7	=	43.75	(81)
Northwest _{0.9x}	0.77	X	3.4	16	x	67.96	X	0.63	X	0.7	=	71.86	(81)
Northwest _{0.9x}	0.77	x	3.4	16	x	91.35	X	0.63	x	0.7		96.59	(81)
Northwest _{0.9x}	0.77	x	3.4	16	x	97.38	X	0.63	x	0.7	=	102.98	(81)
Northwest _{0.9x}	0.77	x	3.4	16	x	91.1	x	0.63	x	0.7	=	96.33	(81)
Northwest 0.9x	0.77	X	3.4	16	x	72.63	X	0.63	x	0.7	=	76.8	(81)
Northwest 0.9x	0.77	x	3.4	16	x	50.42	X	0.63	×	0.7	_ =	53.32	(81)
Northwest 0.9x	0.77	x	3.4	16	x	28.07	X	0.63	x	0.7	<del>=</del>	29.68	(81)
Northwest 0.9x	0.77	x	3.4	16	x	14.2	X	0.63	x	0.7	=	15.01	(81)
Northwest _{0.9x}	0.77	X	3.4	16	x	9.21	X	0.63	×	0.7		9.74	(81)
L					<u> </u>		J						
Solar gains in	watts, cald	culated	for eacl	h month	1		(83)m	n = Sum(74)m .	(82)m				
(83)m= 55.76		204.48	335.82	451.41	481.2	5 450.2	358		138.7	70.16	45.53	]	(83)
Total gains – i	nternal an	d solar	(84)m =	= (73)m	+ (83)r	n , watts	-	I	<u> </u>		!	J	
(84)m= 424.81	480.71	560.38	673.51	770.78	782.8	1 740.09	654	1.1 553.62	461.54	414.13	405.21	]	(84)
7. Mean inter	nal tempe	rature (	(heating	season	)	•		,				•	
Temperature			`		<i>′</i>	a from Ta	ble 9	Th1 (°C)				21	(85)
Utilisation fac	•	•			•			( )					(2-2)
Jan	Feb	Mar	Apr	May	Jun	<del></del>	ΙΑ	ug Sep	Oct	Nov	Dec	]	
(86)m= 0.98	0.96	0.91	0.78	0.59	0.41	0.3	0.3	<del></del>	0.87	0.96	0.98		(86)
` ′				!	!	Ļ		I	<u> </u>				
Mean interna (87)m= 19.85	,	20.37	20.75	20.94	20.99	-i	/ In I		20.66	20.2	19.82	]	(87)
` ′	<u> </u>			<u> </u>		ļ			20.00	20.2	19.02		(07)
Temperature					_	<del>-</del>	1	<del></del>	ı		ī	1	(2.5)
(88)m= 20.2	20.21	20.21	20.22	20.23	20.24	20.24	20.	24 20.23	20.23	20.22	20.21		(88)
Utilisation fac	tor for gai	ns for r	est of d	welling,	h2,m (	see Table	9a)						
(89)m= 0.97	0.95	0.9	0.76	0.55	0.36	0.25	0.3	3 0.55	0.84	0.95	0.98		(89)
Mean interna	l temperat	ture in t	he rest	of dwell	ing T2	(follow ste	eps 3	to 7 in Tabl	e 9c)				
(90)m= 18.66	18.94	19.41	19.93	20.16	20.23	20.24	20.	24 20.19	19.83	19.18	18.63		(90)
						•			LA = Liv	ring area ÷ (	4) =	0.43	(91)
Mean interna	l temperat	ture (fo	r the wh	ole dwe	ıllina) –	fl A ∨ T1	+ (1	– fl Δ) <b>⊻</b> Τ2					
(92)m= 19.17	<del> </del>	<u> </u>			1	1	. (1	<del></del>		i	<del></del>	1	(00)
· /	19.42	19.83	20.28	20.49	20.56	20.57	20.	57   20.52	20.19	19.62	19.14		(92)
Apply adjustr	<u> </u>			l					20.19 opriate		19.14		(92)

(93)m= 19.17	19.42	19.83	20.28	20.49	20.56	20.57	20.57	20.52	20.19	19.62	19.14		(93)
8. Space hea													
Set Ti to the return the utilisation			•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(	76)m an	d re-calc	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac		l	· ·				5						
(94)m= 0.97	0.95	0.89	0.76	0.57	0.38	0.27	0.32	0.57	0.84	0.94	0.97		(94)
Useful gains,	hmGm	, W = (94	4)m x (8	4)m	•								
(95)m= 410.32	454.37	499.35	510.31	436.71	300.96	201.78	210.63	315.05	388.63	390.91	393.37		(95)
Monthly average	_	T T	<del></del>	from Ta	r e	·						ı	
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate		i	<del> </del>		i	<del>-``</del>	· · ·	<u> </u>				ı	(0-)
(97)m= 798.2	776.21	709.91	594.7	457.66	303.93	202.28	211.64	330.02	499.01	656.71	789.76		(97)
Space heatin	<del></del>	1			T	ī		<u> </u>	<u> </u>		204.04		
(98)m= 288.59	216.28	156.66	60.76	15.58	0	0	0 	0	82.12	191.38	294.91	4000.00	7(00)
							rota	l per year	(Kvvn/yeai	) = Sum(9	8)15,912 =	1306.29	(98)
Space heatin	g require	ement in	kWh/m²	² /year								20.88	(99)
9b. Energy red	quiremer	nts – Cor	mmunity	heating	scheme								
This part is use										unity sch	neme.		7(204)
Fraction of spa			•		-	_	(Table T	1) U II N	one			0	(301)
Fraction of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The community so									up to four	other heat	sources; t	he latter	
includes boilers, h Fraction of hea		-			rom powei	r stations.	See Appei	naix C.				1	(303a)
Fraction of total			•		nilare				(3	02) x (303	a) –	1	(304a)
Factor for cont	·			•		r commi	ınity hea	itina eve		02) X (000	u) – 	1	(305)
				,	` ''		•	illing sys	CIII				╡```
Distribution los		(Table 1	(2c) for (	commun	ity neatii	ng syste	m					1.05	(306)
Space heating	_		1									kWh/yea	<u>'</u>
Annual space	•	•										1306.29	╛
Space heat fro	m Com	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	=	1371.61	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308
Space heating	require	ment fro	m secon	dary/su	oplemen	tary sys	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water heating	1												
Annual water h	neating i	equirem	ent									1956.11	
If DHW from co								(0.4) (0.6	20-) (00)	<del>-</del> ) (000)			7(040-)
Water heat fro		•					0.04			5) x (306) :		2053.91	(310a)
Electricity used							0.01	× [(307a).	(307e) +	(310a)(	[310e)] =	34.26	(313)
Cooling Syster	_	•	•			_,						0	(314)
Space cooling	,			•		,		= (107) ÷	(314) =			0	(315)
Electricity for p							outoido				ĺ	450.04	(3300)
mechanical ve	าแเสแบก	- มลเสกต	eu, exif	act or po	onive in	put IIOM	outside					152.91	(330a)

warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330	b) + (330g) =		152.91	(331)
Energy for lighting (calculated in Appen	dix L)			Ī	282.38	(332)
Total delivered energy for all uses (307)	) + (309) + (310) + (312	2) + (315) + (331) + (33	32)(237b) =		3860.81	(338)
12b. CO2 Emissions – Community heat	ing scheme					
		Energy kWh/year	Emission fac		missions g CO2/year	
CO2 from other sources of space and we Efficiency of heat source 1 (%)	<b>O</b> (	) ing two fuels repeat (363) to	(366) for the secon	d fuel	96	(367a)
CO2 associated with heat source 1	[(307b	)+(310b)] x 100 ÷ (367b) x	0.22	=	770.74	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	17.78	(372)
Total CO2 associated with community s	systems	(363)(366) + (368)(372	2)	=	788.52	(373)
CO2 associated with space heating (se	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immers	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and w	ater heating	(373) + (374) + (375) =			788.52	(376)
CO2 associated with electricity for pum	os and fans within dwe	elling (331)) x	0.52	=	79.36	(378)
CO2 associated with electricity for lighti	ng	(332))) x	0.52	=	146.56	(379)
Total CO2, kg/year	sum of (376)(382) =				1014.43	(383)
<b>Dwelling CO2 Emission Rate</b>	(383) ÷ (4) =				16.22	(384)

El rating (section 14)

(385)

87.36

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 06 December 2021 at 10:53:32* 

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 72.62m²Site Reference:Highgate Road - GREENPlot Reference: 05 - C

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 18.46 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 15.74 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 52.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 42.5 kWh/m²

OK

2 Fabric U-values

 Element
 Average
 Highest

 External wall
 0.18 (max. 0.30)
 0.18 (max. 0.70)
 OK

 Party wall
 0.00 (max. 0.20)
 OK

Floor (no floor) Roof (no roof)

Openings 1.40 (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 3.00 (design value)

Maximum 10.0 **OK** 

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	12.71m²	
Windows facing: North West	3.46m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		l Iser-I	Details:						
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa	are Vei				010943 on: 1.0.5.50	
Address :	F	Property	Address	05 - C					
Overall dwelling dime	nsions:								
		Are	a(m²)		Av. He	ight(m)		Volume(m ³	³ )
Ground floor			72.62	(1a) x	2	2.65	(2a) =	192.44	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	n) 📑	72.62	(4)					
Dwelling volume				(3a)+(3b	)+(3c)+(3c	d)+(3e)+	.(3n) =	192.44	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	] + [	0	] = [	0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	<b>T</b> + [	0	] = [	0	x 2	20 =	0	(6b)
Number of intermittent fa	ns			Ī	0	x 1	10 =	0	(7a)
Number of passive vents				Ē	0	x 1	10 =	0	(7b)
Number of flueless gas fi	res				0	x 4	40 =	0	(7c)
				L					
							Air ch	nanges per ho	our
•	ys, flues and fans = $(6a)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6b)+(6a)+(6b)+(6a)+(6b)+(6b)+(6a)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b)+(6b$				0		÷ (5) =	0	(8)
Number of storeys in the	een carried out or is intended, proced ne dwelling (ns)	ed to (17),	otherwise (	ontinue tr	om (9) to (	(16)		0	(9)
Additional infiltration	io arrowing (rio)					[(9)-	-1]x0.1 =	0	(10)
Structural infiltration: 0.	.25 for steel or timber frame o	r 0.35 fo	r masoni	y constr	uction			0	(11)
if both types of wall are pri deducting areas of openir	resent, use the value corresponding t	o the grea	ter wall are	a (after					
,	loor, enter 0.2 (unsealed) or (	).1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, ent	ter 0.05, else enter 0							0	(13)
Percentage of windows	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	. ,	-			0	(15)
Infiltration rate			(8) + (10)					0	(16)
•	q50, expressed in cubic metro ity value, then $(18) = [(17) \div 20] +$		•	•	etre of e	envelope	area	3	(17)
•	s if a pressurisation test has been do				is being u	sed		0.15	(18)
Number of sides sheltere			,	,	Ū			0	(19)
Shelter factor			(20) = 1 -	0.075 x (1	9)] =			1	(20)
Infiltration rate incorporat	_		(21) = (18	x (20) =				0.15	(21)
Infiltration rate modified for	<del></del>	1	T .	_	T _	1	_	1	
L 1	Mar   Apr   May   Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp		1 00	1 0.7	4	1 40	1.5	4.7	1	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m =	2)m ÷ 4							_	
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m	_	_			
0.19 Calculate effe	0.19	0.18	0.16	0.16 he appli	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
If mechanica		-	ale for t	пе аррп	cable ca	30						0.5	(23
If exhaust air h	eat pump (	using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	wise (23b	) = (23a)			0.5	(23
If balanced with	heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h	) =				74.8	(23
a) If balance	ed mech	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	m = (22)	2b)m + (	23b) × [	1 – (23c)	÷ 100]	_
(24a)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(24
b) If balance	d mech	anical ve	ntilation	without	heat red	covery (N	ЛV) (24b	)m = (22	2b)m + (	23b)		_	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)r		tract ver (23b), t		•					.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)r		on or wh en (24d)							0.5]			1	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	iter (24a	) or (24b	o) or (24	c) or (24	d) in box	(25)		•		•	
(25)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(25
3. Heat losse	s and he	eat loss r	paramete	er:									
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/		k-value kJ/m²-l		X k
Windows Type		(111 )			12.71	<del></del>			16.85		NO/III I	τ πο/	(27
Windows Type					3.46	_	/[1/( 1.4 )+	Ļ	4.59	$\dashv$			(27
Walls Type1	72.6	2	16.1	7	56.45	=	0.18	= [	10.16	╡┌	60	3387	\(\begin{align*}(2) \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\
Walls Type1	17.7		0			=			2.99	륵 ¦		1066.8	= '
Total area of e					17.78	3 ×	0.17	[	2.99	[	60		(31
Party wall	Jonnon	,			90.4						AF		`
Party floor					30.32	=	0	[	0	L	45	1364.4 2904.8	=
Party ceiling					72.62	=				L	40	-         -	=
Internal wall **					72.62	=				Ĺ	30	2178.6	=  `
* for windows and		owe uso c	effective wi	ndow I I ve	146.1		ı formula 1	/[/1/  L volu	(0) 1 0 041 (	e given in	9 naragraph	1315.50	3 (32
** include the area						ateu using	i ioiiiiuia i	/[( 1/ <b>O-</b> valu	1 <del>0</del> )+0.04] a	is giveri iii	i parayrapri	1 3.2	
Fabric heat los	ss, W/K :	= S (A x	U)				(26)(30)	+ (32) =				34.58	(33
Heat capacity	Cm = S(	(Axk)						((28)	(30) + (32	2) + (32a).	(32e) =	12217.13	(34
Thermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			= (34)	÷ (4) =			168.23	(35
For design assess can be used inste				construct	ion are no	t known pr	ecisely the	indicative	values of	TMP in T	able 1f		_
Thermal bridge	es : S (L	x Y) cal	culated ı	using Ap	pendix I	<						7.11	(36
if details of therma		are not kn	own (36) =	= 0.05 x (3	1)			(22)	(20)				¬,,,_
Total fabric he		aloudoto -	l manthi	,					(36) =	(25)m + (F)	\	41.69	(37
Ventilation hea	Feb	i			lun	Jul	۸۰۰۰		= 0.33 × (	l	1	1	
(38)m= 20.15	19.91	Mar 19.67	Apr 18.48	May 18.24	Jun 17.05	Jui 17.05	Aug 16.81	Sep 17.53	Oct 18.24	Nov 18.72	Dec 19.19		(38
20.13			10.70	10.24	17.00	17.00	L 10.01	17.55	L 10.24	<u> </u>	13.13	i	,00
11								100	(07)	00\			
Heat transfer (39)m= 61.84	coefficier 61.6	nt, W/K 61.36	60.17	59.93	58.74	58.74	58.51	(39)m 59.22	= (37) + (37) 59.93	38)m 60.41	60.89	1	

eat loss pa	rameter (	HLP), W	m²K			1	1	(40)m	= (39)m ÷	· (4)			
0.85 O.85	0.85	0.84	0.83	0.83	0.81	0.81	0.81	0.82	0.83	0.83	0.84		_
umber of d	ave in mo	onth (Tah	le 1a)						Average =	Sum(40) ₁	12 /12=	0.83	(4
Jar	<u> </u>	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
)m= 31	28	31	30	31	30	31	31	30	31	30	31		(4
<u> </u>		1											
. Water he	ating ene	rgy requi	irement:								kWh/yea	ar:	
sumed oc	cupancy	N									04		()
if TFA > 1	3.9, N = 1		[1 - exp	(-0.0003	349 x (TF	A -13.9	)2)] + 0.0	0013 x (	TFA -13		31		(4
if TFA £ 13 inual aver	•	ator usar	na in litra	s nar da	v Vd av	orano –	(25 v NI)	± 36					(4
duce the ani									se target o		0.02		(-
t more that 1.	25 litres per	person per	day (all w	ater use, l	not and co	ld)			,				
Jar		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
t water usag	<del></del>					1	· <i>'</i>						
)m= 97.92	94.36	90.8	87.24	83.67	80.11	80.11	83.67	87.24	90.8	94.36	97.92		<b>—</b> ,
ergy content	of hot water	r used - cal	culated mo	onthly = $4$ .	190 x Vd,r	n x nm x D	)Tm / 3600			m(44) ₁₁₂		1068.18	(4
)m= 145.2		131.05	114.25	109.63	94.6	87.66	100.59	101.8	118.63	129.5	140.63		
,	. 1	101.00	111.20	100.00	0 1.0	07.00	100.00		<u> </u>	m(45) ₁₁₂ =	<u> </u>	1400.56	(4
nstantaneous	s water heat	ing at point	of use (no	hot water	storage),	enter 0 in	boxes (46			(10)112	L		`
)m= 21.78	19.05	19.66	17.14	16.44	14.19	13.15	15.09	15.27	17.8	19.42	21.09		(4
ater storaç													
orage volu	•	•	•			_		ame ves	sel		0		(4
community herwise if	•			-			' '	ora) ant	or 'O' in <i>(</i>	<b>17</b> \			
ater storaç		not wate	וו פוווט) ול	iciuues i	IIStaiitai	ieous co	ווטט וטוווי	ers) erik	ei U iii (	47)			
If manufa		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(4
mperature	factor fro	om Table	2b								0		(4
ergy lost t	rom wate	r storage	, kWh/ye	ear			(48) x (49)	) =		1	10		(5
If manufa			-										
ot water st	•			e 2 (kW	h/litre/da	ıy)				0.	.02		(5
community Jume facto	_		011 4.3							1	03		(5
mperature			2b							<b></b>	.6		(!
ergy lost f				ear			(47) x (51)	) x (52) x (	53) =		.03		(!
nter (50) o		_	,								.03		(!
ater storaç	je loss ca	lculated t	for each	month			((56)m = (	(55) × (41)	m				
)m= 32.0°	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(5
ylinder conta		ed solar sto	rage, (57)ı	m = (56)m	x [(50) – (	H11)] ÷ (5	0), else (5	7)m = (56)	m where (	H11) is fro	m Appendix	Н	
7)m= 32.0°	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(5
mary circ	uit loss (a	nnual) fro	m Table	. 3				•	•		0		( !
mary circ	•	•			59)m = (	(58) ÷ 36	65 × (41)	ım					
modified				,		. ,	, ,		r thermo	stat)			

Combi loss calculate	d for each	month (	′61)m =	(60) ÷ 3	65 × (41	)m							
(61)m= 0 0	0	0	0	0	0	0		0	0	0	0	1	(61)
Total heat required for	r water he	eating ca	L	L I for eac	h month	(62)r	—— n =	0.85 × (	45)m +	. (46)m +	(57)m +	ı · (59)m + (61)m	
(62)m= 200.48 176.93		167.75	164.91	148.1	142.94	155.	_	155.29	173.91	182.99	195.9	]	(62)
Solar DHW input calculate	d using App	endix G oı	· Appendix	: H (negati	ve quantity	/) (ente	er '0'	if no sola	r contribu	tion to wate	er heating)		
(add additional lines											0,		
(63)m= 0 0	0	0	0	0	0	0		0	0	0	0	]	(63)
Output from water he	ater				•	•				•	•	•	
(64)m= 200.48 176.93	186.33	167.75	164.91	148.1	142.94	155.	.87	155.29	173.91	182.99	195.9	1	
			•	•	•		Outp	ut from wa	ater heate	er (annual)	112	2051.4	(64)
Heat gains from water	r heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (6	1)m	ı] + 0.8 x	: [(46)m	n + (57)m	+ (59)m	١]	
(65)m= 92.5 82.17	87.8	80.78	80.67	74.25	73.37	77.6	67	76.64	83.67	85.85	90.98	]	(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 (Tab	le 5), Wat	ts											
Jan Feb		Apr	May	Jun	Jul	Αι	Jg	Sep	Oct	Nov	Dec	]	
(66)m= 115.4 115.4	115.4	115.4	115.4	115.4	115.4	115	.4	115.4	115.4	115.4	115.4	1	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
(67)m= 18.13 16.1	13.09	9.91	7.41	6.26	6.76	8.7	9	11.79	14.97	17.48	18.63	]	(67)
Appliances gains (ca	culated in	Append	dix L, eq	uation L	13 or L1	3a), a	also	see Tal	ole 5	-	•	•	
(68)m= 203.33 205.44	200.13	188.81	174.52	161.09	152.12	150.	.01	155.32	166.64	180.93	194.36	]	(68)
Cooking gains (calcu	ated in A	ppendix	L, equat	ion L15	or L15a	), also	o se	e Table	5	•	-	•	
(69)m= 34.54 34.54	34.54	34.54	34.54	34.54	34.54	34.5	54	34.54	34.54	34.54	34.54	]	(69)
Pumps and fans gair	s (Table 5	ōa)			•							•	
(70)m= 0 0	0	0	0	0	0	0		0	0	0	0	]	(70)
Losses e.g. evaporat	ion (negat	tive valu	es) (Tab	le 5)	-					-	-	-	
(71)m= -92.32 -92.32	-92.32	-92.32	-92.32	-92.32	-92.32	-92.	32	-92.32	-92.32	-92.32	-92.32	]	(71)
Water heating gains	Table 5)				•		•			•		•	
(72)m= 124.33 122.28	118.01	112.2	108.43	103.13	98.61	104.	.39	106.45	112.46	119.24	122.28	]	(72)
Total internal gains	=			(66)	)m + (67)m	ı + (68	)m +	- (69)m + (	70)m + (	71)m + (72)	)m	•	
(73)m= 403.41 401.44	388.85	368.54	347.98	328.09	315.11	320.	.81	331.19	351.69	375.27	392.9	]	(73)
6. Solar gains:													
Solar gains are calculate	•	r flux from	Table 6a		•	itions t	0 CO	nvert to th	e applica		tion.		
Orientation: Access Table 6		Area m²		Flu	ıx ble 6a		т.	g_ able 6b	-	FF Table 6c		Gains (W)	
						1 1	1 (		_ '				1
Northeast 0.9x 0.7	7 ×	12.	71	X	11.28	X		0.63	_  ×	0.7	=	43.83	(75)
Northeast 0.9x 0.7		12.			22.97	X		0.63	x	0.7	=	89.21	(75)
Northeast 0.9x 0.7		12.		-	41.38	X		0.63	x	0.7	=	160.73	(75)
Northeast 0.9x 0.7		12.	71	-	67.96	X		0.63	x [	0.7	=	263.96	(75)
Northeast 0.9x 0.7	7 ×	12.	71	x (	91.35	x		0.63	X	0.7	=	354.82	(75)

Naw46		_			г			1		_				<b>–</b> ,,
Northeast _{0.9x}	0.77	×	12.	71	×	9	7.38	X	0.63	×	0.7	=	378.27	(75)
Northeast _{0.9x}	0.77	X	12.	71	X		91.1	X	0.63	X	0.7	_ =	353.87	(75)
Northeast _{0.9x}	0.77	X	12.	71	×	7	2.63	X	0.63	X	0.7	=	282.11	(75)
Northeast _{0.9x}	0.77	X	12.	71	X	5	0.42	X	0.63	X	0.7	=	195.85	(75)
Northeast _{0.9x}	0.77	X	12.	71	x	2	8.07	X	0.63	X	0.7	=	109.02	(75)
Northeast _{0.9x}	0.77	X	12.	71	x	•	14.2	X	0.63	X	0.7	=	55.15	(75)
Northeast 0.9x	0.77	X	12.	71	x [	(	9.21	X	0.63	X	0.7	=	35.79	(75)
Northwest _{0.9x}	0.77	X	3.4	-6	x	1	1.28	X	0.63	X	0.7	=	11.93	(81)
Northwest _{0.9x}	0.77	X	3.4	-6	<b>x</b> [	2	2.97	X	0.63	X	0.7	=	24.29	(81)
Northwest 0.9x	0.77	X	3.4	-6	x [	4	1.38	x	0.63	x	0.7		43.75	(81)
Northwest _{0.9x}	0.77	X	3.4	6	x	6	7.96	x	0.63	х	0.7	=	71.86	(81)
Northwest _{0.9x}	0.77	x	3.4	6	x	9	1.35	x	0.63	x	0.7	_	96.59	(81)
Northwest _{0.9x}	0.77	X	3.4	-6	x	9	7.38	х	0.63	x	0.7		102.98	(81)
Northwest _{0.9x}	0.77	x	3.4	-6	x	(	91.1	х	0.63	x	0.7		96.33	(81)
Northwest _{0.9x}	0.77	x	3.4	-6	x [	7	2.63	х	0.63	x	0.7	_	76.8	(81)
Northwest _{0.9x}	0.77	×	3.4	6	x [	5	0.42	x	0.63	×	0.7		53.32	(81)
Northwest 0.9x	0.77	×	3.4	6	x	2	8.07	X	0.63	×	0.7	=	29.68	(81)
Northwest 0.9x	0.77	x	3.4	-6	х		14.2	X	0.63	×	0.7		15.01	(81)
Northwest 0.9x	0.77	×	3.4	-6	x [	(	9.21	X	0.63	×	0.7		9.74	(81)
_								,						
Solar gains in watts, calculated for each month $(83)m = Sum(74)m(82)m$														
(83)m= 55.76		204.48	335.82	451.41	_	31.25	450.2	358		138.7	70.16	45.53		(83)
Total gains – i	nternal and	d solar	(84)m =	(73)m	+ (8	33)m	, watts				<b>!</b>	Į.		
(84)m= 459.17	514.94 5	93.33	704.36	799.39	80	9.34	765.31	679	.71 580.35	490.4	445.43	438.43		(84)
7. Mean inter	nal temper	ature (	heating	seasor	າ)									
Temperature	•					area f	rom Tab	ole 9.	Th1 (°C)				21	(85)
Utilisation fac	•	• .			_				, ,					``
Jan	Feb	Mar	Apr	May	<u> </u>	Jun	Jul	Α	ug Sep	Oct	Nov	Dec		
(86)m= 0.99		0.94	0.84	0.65	+	0.46	0.34	0.3	<del></del>	0.91	0.98	0.99		(86)
Mean interna	l tomporati	uro in I	ivina or	DO T1 /f	مالم	w cto	nc 2 to 7	Tin T	able (le)	<u>!</u>	-1	<u> </u>		
(87)m= 19.91	<del> </del>	20.38	20.74	20.93	1	0.99	21	2		20.66	20.23	19.89		(87)
` '		20.00								20.00	20.20	10.00		(=: /
Temperature	during boo	_				ellina	from Ta	ahla (	ì Th2 /ºC\				-	
· -		ating po			_			1	<del></del>		1 00 00	00.00		(00)
(88)m= 20.21		ating po	eriods ir 20.23	20.23	_	0.25	20.25	20.	<del></del>	20.23	20.23	20.22		(88)
· -	20.21	20.21	20.23	20.23	20	0.25	20.25	20.	<del></del>	20.23	20.23	20.22		(88)
(88)m= 20.21	20.21 2	20.21	20.23	20.23	h2,	0.25	20.25	20.	25 20.24	0.89	0.97	0.99		(88)
(88)m= 20.21 Utilisation fac	20.21 2 etor for gair 0.97	20.21 ns for r	20.23 est of d	20.23 welling, 0.61	h2,	0.25 m (se	20.25 ee Table 0.28	20. 9a)	25 20.24	0.89				
(88)m= 20.21  Utilisation fac (89)m= 0.98	20.21 2 etor for gair 0.97	20.21 ns for r	20.23 est of d	20.23 welling, 0.61	h2,i	0.25 m (se	20.25 ee Table 0.28	20. 9a)	25 20.24 33 0.6 to 7 in Tabl	0.89	0.97			
Utilisation factors (89)m= 0.98  Mean internal	20.21 2 etor for gair 0.97	20.21 ns for r 0.93 ure in t	20.23 est of double 0.81 he rest	20.23 welling, 0.61 of dwell	h2,i	0.25 m (se ).41 T2 (fo	20.25 ee Table 0.28 ollow ste	9a) 0.3	25 20.24 33 0.6 to 7 in Table 25 20.2	0.89 le 9c)	0.97	0.99	0.38	(89)
(88)m= 20.21  Utilisation factors (89)m= 0.98  Mean internation (90)m= 18.74	20.21 2 etor for gair 0.97 I temperatu 18.99	20.21 ns for r 0.93 ure in t	20.23  est of do 0.81  he rest 19.93	20.23 welling, 0.61 of dwell 20.17	h2,i ng 20	0.25 m (se ).41 T2 (fo 0.24	20.25 ee Table 0.28 ollow ste 20.24	9a) 0.3 eps 3 20.	25 20.24 33 0.6 to 7 in Tabl 25 20.2	0.89 le 9c) 19.84 fLA = Liv	0.97	0.99	0.38	(89)
Utilisation factors (89)m= 0.98  Mean internation (90)m= 18.74	20.21 2 ctor for gair 0.97 I temperate 18.99	20.21 ns for r 0.93 ure in t	20.23  est of do 0.81  he rest 19.93	20.23 welling, 0.61 of dwell 20.17	h2,i h2,i ing 20	0.25 m (se ).41 T2 (fo 0.24	20.25 ee Table 0.28 ollow ste 20.24	9a) 0.3 eps 3 20.	25 20.24 33 0.6 to 7 in Table 25 20.2 - fLA) × T2	0.89 le 9c) 19.84 fLA = Liv	0.97 19.23 ving area ÷ (4	0.99	0.38	(89)
(88)m= 20.21  Utilisation factors (89)m= 0.98  Mean internation (90)m= 18.74	20.21 2 etor for gair 0.97 I temperatu 18.99	20.21 ns for r 0.93 ure in t 19.42 ure (for 19.79	20.23 est of do 0.81 he rest 19.93 r the wh 20.24	20.23 welling, 0.61 of dwell 20.17 ole dwe	20 h2,1 o	0.25 m (see 0.41 T2 (fo 0.24 g) = fl 0.53	20.25 ee Table 0.28 collow ste 20.24  -A × T1 20.53	20. 9a) 0.3 eps 3 20. + (1	25 20.24 33 0.6 to 7 in Table 25 20.2 	0.89 le 9c) 19.84 fLA = Liv	0.97 19.23 ving area ÷ (-	0.99 18.72 4) =	0.38	(89) (90) (91)

			1			1							
(93)m= 19.19	19.41	19.79	20.24	20.46	20.53	20.53	20.54	20.49	20.15	19.61	19.17		(93)
8. Space hea					- 1 -1 -1	44 . (	T-1-1-0		. T' /	70)	1	I-1-	
Set Ti to the rethe utilisation			•		ied at ste	ер 11 от	i abie 9i	o, so tna	t 11,m=(	76)m an	d re-caic	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm	):										
(94)m= 0.98	0.97	0.93	0.81	0.62	0.43	0.3	0.35	0.62	0.88	0.96	0.98		(94)
Useful gains,	hmGm	, W = (94	4)m x (8	4)m									
(95)m= 449.99	497.58	549.78	572.64	498.55	344.88	230.65	240.9	360.02	433.61	429.81	431.1		(95)
Monthly avera	_	T T	<del></del>			Ī				·			
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate			<del></del>		i	<del>-``</del>	<u> </u>	<u> </u>					(07)
(97)m= 920.89	893.8	815.46	682.31	525.12	348.22	231.14	241.92	378.27	572.65	755.98	911.39		(97)
Space heating (98)m= 350.35	g require 266.26	197.66	r each n 78.97	19.77	/vn/mon	I	24 x [(97]	)m – (95 0	)m] x (4 103.45	1)m 234.84	357.33		
(98)m= 350.35	200.20	197.00	78.97	19.77	0	0						4000.00	7(00)
Total per year (kWh/year) = Sum(98) _{15,912} =												1608.62	(98)
Space heating	g require	ement in	kWh/m²	/year							L	22.15	(99)
9b. Energy red	•		The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s	Ĭ									
This part is use										unity sch	neme.	0	(301)
Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none  Fraction of space heat from community system 1 – (301) –											1	(302)	
Fraction of space heat from community system 1 – (301) =													(302)
The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.													
Fraction of hea		-										1	(303a)
Fraction of total	al space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor for cont	rol and	charging	method	(Table	4c(3)) fo	r comm	unity hea	iting sys	tem		Ī	1	(305)
Distribution los	s factor	(Table 1	2c) for c	commun	ity heatii	ng syste	m				Ì	1.05	(306)
Space heating	a										L	kWh/yea	 r
Annual space	_	requiren	nent									1608.62	7
Space heat fro	m Com	munity b	oilers					(98) x (30	04a) x (30	5) x (306) :	= [	1689.05	(307a)
Efficiency of se	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)	Ī	0	(308
Space heating	require	ment fro	m secon	dary/su _l	oplemen	tary sys	tem	(98) x (30	01) x 100 ·	÷ (308) =	Ī	0	(309)
Water heating													_
Annual water h		equirem	ent								ſ	2051.4	٦
If DHW from co													_
Water heat fro	m Comr	nunity bo	oilers					(64) x (30	03a) x (30	5) x (306) :	- [	2153.97	(310a)
Electricity used	d for hea	at distribu	ution				0.01	× [(307a).	(307e) +	· (310a)(	310e)] =	38.43	(313)
Cooling Syster	m Energ	y Efficie	ncy Rati	0								0	(314)
Space cooling	(if there	is a fixe	d coolin	g systen	n, if not e	enter 0)		= (107) ÷	(314) =			0	(315)
Electricity for p											-		_
mechanical ve	ntilation	- balanc	ed, extra	act or po	sitive in	put from	outside					177.49	(330a)

						_					
warm air heating system fans					0	(330b)					
pump for solar water heating					0	(330g)					
Total electricity for the above, kWh/year		=(330a) + (330	b) + (330g) =		177.49	(331)					
Energy for lighting (calculated in Appen		320.14	(332)								
Total delivered energy for all uses (307)	Ī	4340.66	(338)								
12b. CO2 Emissions – Community heating scheme											
		Energy kWh/year	Emission fac		missions g CO2/year						
CO2 from other sources of space and w Efficiency of heat source 1 (%)	•	) ing two fuels repeat (363) to	(366) for the secon	d fuel	96	(367a)					
CO2 associated with heat source 1	[(307b	)+(310b)] x 100 ÷ (367b) x	0.22	=	864.68	(367)					
Electrical energy for heat distribution		[(313) x	0.52	=	19.95	(372)					
Total CO2 associated with community s	ystems	(363)(366) + (368)(372	2)	=	884.62	(373)					
CO2 associated with space heating (see	condary)	(309) x	0	=	0	(374)					
CO2 associated with water from immers	sion heater or instanta	neous heater (312) x	0.22	=	0	(375)					
Total CO2 associated with space and w	ater heating	(373) + (374) + (375) =			884.62	(376)					
CO2 associated with electricity for pump	os and fans within dwe	elling (331)) x	0.52	=	92.12	(378)					
CO2 associated with electricity for lighti	ng	(332))) x	0.52	=	166.15	(379)					
Total CO2, kg/year	sum of (376)(382) =				1142.9	(383)					
<b>Dwelling CO2 Emission Rate</b>	(383) ÷ (4) =				15.74	(384)					

El rating (section 14)

(385)

86.98

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:53:31

Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:** 

Flat

Dwelling Details:

**NEW DWELLING DESIGN STAGE** Total Floor Area: 53.96m² **Plot Reference:** Site Reference : Highgate Road - GREEN 05 - D

Address:

Client Details:

Name: Address:

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

20.99 kg/m² Target Carbon Dioxide Emission Rate (TER)

Dwelling Carbon Dioxide Emission Rate (DER) 17.99 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 57.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 46.3 kWh/m²

OK

2 Fabric U-values

**Element Average Highest** 0.18 (max. 0.70) External wall 0.17 (max. 0.30) OK Party wall 0.00 (max. 0.20) OK Floor (no floor) Roof 0.13 (max. 0.20) 0.13 (max. 0.35) OK

Openings 1.40 (max. 2.00) 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

OK

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.47	
Maximum	1.5	OK
MVHR efficiency:	89%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	12.07m ²	
Ventilation rate:	4.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		l Isar I	Details:						
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Strom Softwa	are Ve				010943 on: 1.0.5.50	
Address :	F	Property	Address	05 - D					
1. Overall dwelling dime	nsions:								
		Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Ground floor		;	53.96	(1a) x	2	.65	(2a) =	142.99	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	n) (	53.96	(4)					
Dwelling volume				(3a)+(3b	)+(3c)+(3c	d)+(3e)+	(3n) =	142.99	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	+	0	] = [	0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	+ [	0	] = [	0	x 2	20 =	0	(6b)
Number of intermittent fa	ns			Ī	0	x 1	10 =	0	(7a)
Number of passive vents				Ī	0	x 1	10 =	0	(7b)
Number of flueless gas fi	res			Ē	0	x 4	40 =	0	(7c)
				L					
				_			Air ch	anges per ho	our —
•	ys, flues and fans = (6a)+(6b)+( een carried out or is intended, procee			ontinuo fr	0		÷ (5) =	0	(8)
Number of storeys in the		iu io (17),	ourerwise (	onunue n	om (9) to	(10)		0	(9)
Additional infiltration	<b>3</b> ( )					[(9)-	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o			•	ruction			0	(11)
if both types of wall are pr deducting areas of openir	resent, use the value corresponding t gas): if equal user 0.35	o the grea	ter wall are	a (after					
,	loor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, ent	ter 0.05, else enter 0							0	(13)
<del>-</del>	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	. ,	-	()		0	(15)
Infiltration rate	250 amaza dia adia adia mata		(8) + (10)					0	(16)
•	q50, expressed in cubic metro ity value, then $(18) = [(17) \div 20] + (18)$	-	•	•	etre or e	envelope	area	3	(17)
•	s if a pressurisation test has been do				is being u	sed		0.15	(10)
Number of sides sheltere	d							0	(19)
Shelter factor			(20) = 1 -		19)] =			1	(20)
Infiltration rate incorporat	_		(21) = (18	) x (20) =				0.15	(21)
Infiltration rate modified for	<del></del>	T	1 .					1	
L 1	Mar   Apr   May   Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp (22)m= 5.1 5	eed from Table 7 4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7	1	
(22)m= 5.1 5	7.0   4.4   4.3   3.8	] 3.6	3.1	4	4.3	J 4.0	4.1		
Wind Factor (22a)m = (22	2)m ÷ 4					,		•	
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18	]	
Calculate effe		•	ate for t	he appli	cable ca	se							_
If mechanic												0.5	(2
If exhaust air h		0		, ,	,	. `	,, .	•	) = (23a)			0.5	(2
If balanced with		-	•	_								75.65	(2
a) If balance						<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u>`</u>	i ÷ 100]	
24a)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3		(2
b) If balance							<u> </u>	,	<u> </u>		1	1	
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
c) If whole h				•	•				F (00h	`			
	$0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 \times 0.5 $	(23b), tl	nen (240 0	$\frac{(230)}{0}$	o); otnerv	vise (24)	0 = (220)	0) m + 0.	5 × (230	0	0	1	(2
									U	U			(2
d) If natural if (22b)r		on or who en (24d)ı		•					0.51				
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0	]	(2
Effective air	change	rate - en	ter (24a	or (24b	o) or (240	c) or (24	d) in box	(25)				1	
25)m= 0.31	0.31	0.31	0.29	0.28	0.26	0.26	0.26	0.27	0.28	0.29	0.3	]	(2
0											•	•	
3. Heat losse		·			NI-t A-		Haral		A V I I		la combos	- ^ >	/ L-
LEMENT	Gros area		Openin m		Net Ar A ,n		U-valı W/m2		A X U (W/ł	<)	k-value kJ/m²-l		
/indows		` ,			12.07	<del></del>	/[1/( 1.4 )+	0.04] =	` 16	, 			(2
/alls Type1	27.6	6	12.07	7	15.59	x	0.18	─ <b> </b>	2.81	=	60	935.4	$\bigcap_{i=1}^{n}$
Valls Type2	24.2	=	0	=	24.24	=	0.17	<b>=</b>	4.07	=	60	1454.4	٦ (2
oof	53.9		0	=	53.96	=	0.13	<u> </u>	7.01	<b>-</b>	9	485.64	╡
otal area of e					105.80	=	0.10		7.01				`` ;)
arty wall		,			31.67	=	0		0	<b>–</b> 1	45	1425.15	¬ `
•						_	0					╡	╡
					53.96	=				Ĺ	40	2158.4	=
•					95.03	·				L	9	855.27	(3
nternal wall **			ffactive wi	adam II va	البيمامي مياي		formula 1	/F/4/11 valu	01.0047	a air .a a in	naraarank		
nternal wall ** for windows and	roof windo					ated using	formula 1,	/[(1/U-valu	e)+0.04] a	s given in	paragraph	1 3.2	
nternal wall ** for windows and include the are	roof windo	sides of in	ternal wall				formula 1.		e)+0.04] a	s given in	paragraph	29.89	<b>]</b> (:
nternal wall ** for windows and include the area abric heat los	roof windo as on both ss, W/K =	sides of in	ternal wall					+ (32) =	e)+0.04] a				=
nternal wall ** for windows and include the area abric heat los	roof windo as on both ss, W/K = Cm = S(	sides of in = S (A x A x k)	ternal wali U)	s and part	titions			+ (32) = ((28)				29.89	] (:
nternal wall ** for windows and include the area abric heat los leat capacity hermal mass	roof windons on both ss, W/K = Cm = S( parame	sides of in = S (A x A x k ) ter (TMF	ternal wall U) P = Cm ÷	s and part	titions n kJ/m²K		(26)(30)	+ (32) = ((28) = (34)	.(30) + (32 ÷ (4) =	?) + (32a).	(32e) =	29.89 7314.26	] (:
nternal wall ** for windows and include the area abric heat los leat capacity hermal mass or design assess an be used inste	roof windons on both ss, W/K = Cm = S( parame sments who ad of a det	sides of in  = S (A x   A x k )  ter (TMF)  ere the detailed calculates.	ternal wall U) P = Cm ÷ tails of the	s and part - TFA) in	n kJ/m²K ion are not	known pr	(26)(30)	+ (32) = ((28) = (34)	.(30) + (32 ÷ (4) =	?) + (32a).	(32e) =	29.89 7314.26 135.55	
nternal wall ** for windows and include the area abric heat los leat capacity hermal mass or design assess an be used inste hermal bridg	roof windons on both  SS, W/K =  Cm = S(  parame  sments who ad of a det  es : S (L	sides of in  = S (A x k)  A x k)  ter (TMP  ere the det  tailed calcu  x Y) calcu	ternal wall  U)  P = Cm ÷ tails of the lation. culated t	s and part - TFA) in constructi	n kJ/m²K ion are not pendix h	known pr	(26)(30)	+ (32) = ((28) = (34)	.(30) + (32 ÷ (4) =	?) + (32a).	(32e) =	29.89 7314.26	
ternal wall ** for windows and include the area abric heat los leat capacity hermal mass or design assess an be used inste hermal bridg details of therma	roof windons on both  SS, W/K =  Cm = S(  parame  sments who ad of a det es : S (L al bridging	sides of in  = S (A x k)  A x k)  ter (TMP  ere the det  tailed calcu  x Y) calcu	ternal wall  U)  P = Cm ÷ tails of the lation. culated t	s and part - TFA) in constructi	n kJ/m²K ion are not pendix h	known pr	(26)(30)	+ (32) = ((28) = (34) • indicative	.(30) + (32	?) + (32a).	(32e) =	29.89 7314.26 135.55	
nternal wall ** for windows and include the area abric heat los leat capacity hermal mass or design assess an be used inste hermal bridg details of therma otal fabric he	roof windons on both  SS, W/K =  Cm = S(  parame  sments who ad of a det  es : S (L  al bridging  at loss	sides of in  = S (A x   A x k )  ter (TMP  ere the det tailed calcu x Y) calcu are not know	ternal wall U) P = Cm ÷ tails of the llation. culated to	s and part TFA) in constructi using Ap	n kJ/m²K ion are not pendix h	known pr	(26)(30)	+ (32) = ((28) = (34) e indicative (33) +	.(30) + (32) $\div (4) =$ values of $.(36) =$	?) + (32a). TMP in Ta	(32e) = able 1f	29.89 7314.26 135.55	
for windows and include the area abric heat loss leat capacity thermal mass for design assess an be used instead thermal bridg details of thermal fotal fabric hermal centilation hear	roof windons on both ss, W/K = Cm = S( parame sments who ad of a det es : S (L al bridging at loss at loss ca	sides of in  = S (A x A x k)  ter (TMF ere the det tailed calcu x Y) calcu are not known	ternal wall U) P = Cm ÷ tails of the ulation. culated u own (36) =	s and part TFA) in constructi using Ap	kJ/m²K ion are not pendix k	known pr	(26)(30)	+ (32) = ((28) = (34) • indicative (33) + (38)m	.(30) + (32) $\div (4) =$ values of (36) = $= 0.33 \times (30)$	2) + (32a). TMP in Ta 25)m x (5)	(32e) = able 1f	29.89 7314.26 135.55	
for windows and include the area abric heat los leat capacity thermal mass for design assessan be used instead details of thermal bridg details of thermal fotal fabric heat lation heat land	roof windons on both ss, W/K = Cm = S( parame sments who ad of a det es : S (L al bridging at loss at loss ca	sides of in  = S (A x   A x k )  ter (TMF ere the detailed calculated  Mar	ternal wall  O = Cm ÷ tails of the ulation. culated u own (36) =  monthly	TFA) in constructiusing Ap 0.05 x (3	kJ/m²K ion are not pendix k 1)	known pr	(26)(30) ecisely the	+ (32) =	.(30) + (32 ÷ (4) = values of (36) = = 0.33 × (1)	2) + (32a).  TMP in Ta  25)m x (5)  Nov	(32e) = able 1f  Dec	29.89 7314.26 135.55	
for windows and include the area abric heat loss leat capacity hermal mass or design assessan be used instead details of thermal total fabric hermal bridg details of thermal otal fabric here total fabric hermal bridg leating the details of thermal total fabric hermal bridg leating total fabric hermal bridg leating to the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of the details of th	roof windons on both ss, W/K = Cm = S( parame sments who ad of a det es : S (L al bridging at loss at loss ca Feb 14.59	sides of in  = S (A x   A x k )  ter (TMF) ere the detailed calculated are not known alculated  Mar  14.42	ternal wall U) P = Cm ÷ tails of the ulation. culated u own (36) =	s and part TFA) in constructi using Ap	kJ/m²K ion are not pendix k	known pr	(26)(30)	+ (32) = ((28) = (34) * indicative (33) + (38)m Sep 12.82	.(30) + (32 ÷ (4) = values of (36) = = 0.33 × (1) Oct 13.35	2) + (32a).  TMP in Ta  25)m x (5)  Nov  13.71	(32e) = able 1f	29.89 7314.26 135.55	
	roof windons on both ss, W/K = Cm = S( parame sments who ad of a det es : S (L al bridging at loss at loss ca Feb 14.59	sides of in  = S (A x   A x k )  ter (TMF) ere the detailed calculated are not known alculated  Mar  14.42	ternal wall  O = Cm ÷ tails of the ulation. culated u own (36) =  monthly	TFA) in constructiusing Ap 0.05 x (3	kJ/m²K ion are not pendix k 1)	known pr	(26)(30) ecisely the	+ (32) = ((28) = (34) * indicative (33) + (38)m Sep 12.82	.(30) + (32 ÷ (4) = values of (36) = = 0.33 × (1)	2) + (32a).  TMP in Ta  25)m x (5)  Nov  13.71	(32e) = able 1f  Dec	29.89 7314.26 135.55	

leat lo	ss para	meter (F	ILP), W	m²K					(40)m	= (39)m ÷	- (4)			
0)m=	0.95	0.94	0.94	0.92	0.92	0.9	0.9	0.9	0.91	0.92	0.93	0.93		
umba	or of dov	o in moi	nth (Tab	lo 1o\					,	Average =	Sum(40) ₁	12 /12=	0.92	(4
umbe	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1)m=	31	28	31	30	31	30	31	31	30 30	31	30	31		(4
.,	<u> </u>		<b>.</b>		0.			<b>.</b>		<u> </u>		<u> </u>		`
1 \//	tor boot	ing once	gy requi	romont:								kWh/ye	or:	
+. VV <i>c</i>	ilei neal	ing ener	gy requi	rement.								KVVII/ye	ai.	
if TF				[1 - exp	(-0.0003	349 x (TF	FA -13.9	)2)] + 0.0	0013 x (	TFA -13		81		(4
nnua	averag	e hot wa						(25 x N)				1.11		(4
		_		usage by : day (all w		-	-	to achieve	a water us	se target d	of .			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
ot wate				ach month					Seb	<u> </u>	INOV	Dec		
4)m=	84.82	81.74	78.65	75.57	72.49	69.4	69.4	72.49	75.57	78.65	81.74	84.82		
,									<u> </u>		m(44) ₁₁₂ =	L	925.35	(4
nergy (	content of	hot water	used - cal	culated mo	onthly $= 4$ .	190 x Vd,r	n x nm x D	OTm / 3600	) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
5)m=	125.79	110.02	113.53	98.98	94.97	81.95	75.94	87.14	88.18	102.77	112.18	121.82		
										Total = Su	m(45) ₁₁₂ =		1213.27	(4
instani	aneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46 ₎	) to (61)					
6)m=	18.87	16.5	17.03	14.85	14.25	12.29	11.39	13.07	13.23	15.42	16.83	18.27		(4
	storage e volum		includin	na anv sa	olar or M	///HRS	storane	within sa	ame ves	امء		0		(4
_		, ,		nk in dw			_		21110 100	001		0		(-
	-	_			_			mbi boil	ers) ente	er '0' in (	(47)			
	storage			`					,	·	,			
) If m	anufact	urer's de	eclared l	oss facto	or is kno	wn (kWh	n/day):					0		(4
empe	rature fa	actor fro	m Table	2b								0		(4
			_	, kWh/ye				(48) x (49)	) =		1	10		(5
•				ylinder l										
		•	ee secti	om Tabl	e z (KVVI	n/iitre/ua	iy)				0.	02		(5
	-	from Tal		JII 4.5							1.	03		(5
			m Table	2b								.6		(5
neray	lost fro	m water	storage	, kWh/ye	ear			(47) x (51)	) x (52) x (	53) =	1	03		(5
٠.		54) in (5	•									03		(5
ater	storage	loss cal	culated f	or each	month			((56)m = (	55) × (41):	m				
6)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(5
												m Appendi	хН	
7)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(5
•						<u> </u>	<u> </u>	<u> </u>	<u> </u>			0		` (5
	•	•	•	m Table for each		50)m - 1	'58\ <u>-</u> 36	65 × (41)	m			U		(5
	-				•	•	. ,	ng and a		r thermo	stat)			
(mod	$\mathbf{a}$													

Combi loss cal	culated :	for each	month (	(61)m –	(60) ± 3	R65 v (11	/m						
(61)m= 0	0	0	0	0 0	00) + 0	0 7 (41	) o	0	0	0	0	1	(61)
		-	-									J · (59)m + (61)m	(- /
(62)m= 181.07	159.94	168.8	152.47	150.25	135.45		142.4	_	158.05	165.67	177.1	1	(62)
Solar DHW input c									ļ			]	(- )
(add additional										morrio wan	or riouting)		
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(63)
Output from wa	ater heat	ter				1	·	<b>I</b>	!	-1	!	1	
(64)m= 181.07	159.94	168.8	152.47	150.25	135.45	131.22	142.4	12 141.68	158.05	165.67	177.1	1	
	'						C	Output from w	ater heat	er (annual)	112	1864.11	(64)
Heat gains fror	n water	heating,	kWh/mo	onth 0.2	5 ´ [0.8	5 × (45)m	ı + (61	)m] + 0.8	x [(46)m	n + (57)m	+ (59)m		-
(65)m= 86.05	76.52	81.97	75.7	75.8	70.04	69.47	73.2	72.12	78.39	80.1	84.73	]	(65)
include (57)r	n in calc	culation of	of (65)m	only if c	ylinder	is in the	dwellir	ng or hot w	ater is f	from com	munity h	neating	
5. Internal ga			. ,		•						•		
Metabolic gains	s (Table	5), Wat	ts										
Jan	Feb	Mar	Apr	May	Jun	Jul	Au	g Sep	Oct	Nov	Dec		
(66)m= 90.34	90.34	90.34	90.34	90.34	90.34	90.34	90.3	4 90.34	90.34	90.34	90.34		(66)
Lighting gains	(calculat	ted in Ap	pendix	L, equat	ion L9	or L9a), a	lso se	e Table 5	-		-	•	
(67)m= 14.04	12.47	10.14	7.68	5.74	4.85	5.24	6.81	9.13	11.6	13.54	14.43	]	(67)
Appliances gai	ns (calc	ulated in	Append	dix L, eq	uation I	_13 or L1	3a), a	lso see Ta	ble 5	-	_	•	
(68)m= 157.5	159.14	155.02	146.25	135.18	124.78	117.83	116.	2 120.31	129.08	140.15	150.55		(68)
Cooking gains	(calcula	ted in A	opendix	L, equat	ion L15	or L15a	), also	see Table	5	•	-	•	
(69)m= 32.03	32.03	32.03	32.03	32.03	32.03	32.03	32.0	3 32.03	32.03	32.03	32.03		(69)
Pumps and far	ns gains	(Table 5	āa)					•				•	
(70)m= 0	0	0	0	0	0	0	0	0	0	0	0		(70)
Losses e.g. ev	aporatio	n (negat	ive valu	es) (Tab	le 5)	-		-	-	-	-	•	
(71)m= -72.27	-72.27	-72.27	-72.27	-72.27	-72.27	-72.27	-72.2	7 -72.27	-72.27	-72.27	-72.27		(71)
Water heating	gains (T	able 5)		-		-		-		-	-	•	
(72)m= 115.65	113.87	110.17	105.15	101.88	97.28	93.38	98.3	8 100.16	105.37	111.24	113.88		(72)
Total internal	gains =				(60	6)m + (67)m	n + (68)	m + (69)m +	(70)m + (	71)m + (72)	)m	•	
(73)m= 337.3	335.58	325.44	309.18	292.9	277.01	266.54	271.4	9 279.71	296.15	315.03	328.97		(73)
6. Solar gains	):												
Solar gains are c	alculated ı	using sola	r flux from	Table 6a	and asso	ciated equa	ations to	convert to the	ne applica	ble orienta	tion.		
Orientation: A		actor	Area			UX		g_ Table 6b	-	FF		Gains	
_	able 6d		m²		- 18	able 6a		Table 6b	_ '	Table 6c		(W)	_
Northeast _{0.9x}	0.77	X	12.	07	x	11.28	X	0.63	x	0.7	=	41.62	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	22.97	X	0.63	x	0.7	=	84.72	(75)
Northeast _{0.9x}	0.77	X	12.	07	x	41.38	X	0.63	x	0.7	=	152.64	(75)
Northeast _{0.9x}	0.77	Х	12.	07	X	67.96	X	0.63	x	0.7	=	250.67	(75)
Northeast _{0.9x}	0.77	X	12.	07	X	91.35	X	0.63	x	0.7	=	336.95	(75)

Northeast _{0.9x}	0.77	X	12.	07	x	97.38	x		0.63	x	0.7	=	359.23	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	91.1	x		0.63	x	0.7	=	336.05	(75)
Northeast _{0.9x}	0.77	х	12.	07	x	72.63	x		0.63	x	0.7	=	267.9	(75)
Northeast _{0.9x}	0.77	х	12.	07	х	50.42	x_[		0.63	х	0.7	=	185.99	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	28.07	x		0.63	x	0.7	=	103.53	(75)
Northeast _{0.9x}	0.77	x	12.	07	x	14.2	Īx		0.63	x	0.7		52.37	(75)
Northeast 0.9x	0.77	x	12.	07	х	9.21	i x		0.63	_ x [	0.7	=	33.99	(75)
'					_		- '							_
Solar gains in	watts, ca	alculated	for eac	h month			(83)m	ı = Su	ım(74)m .	(82)m				
(83)m= 41.62	84.72	152.64	250.67	336.95	359.2	3 336.05	267	7.9	185.99	103.53	52.37	33.99		(83)
Total gains -	internal a	and solar	(84)m =	= (73)m	+ (83)r	n , watts								
(84)m= 378.92	420.3	478.07	559.85	629.86	636.2	4 602.59	539.	.39	465.7	399.68	367.4	362.95		(84)
7. Mean inte	rnal temp	perature	(heating	season	)									
Temperature			`		,	a from Ta	ble 9,	Th1	I (°C)				21	(85)
Utilisation fa	_				_				, ,					
Jan	Feb	Mar	Apr	May	Jun	<del></del>	Au	ug	Sep	Oct	Nov	Dec		
(86)m= 0.97	0.96	0.92	0.82	0.65	0.47	0.35	0.4	<del>-  </del>	0.65	0.88	0.95	0.97		(86)
Mean interna	al tompor	aturo in	living or	00 T1 /f/	llow c	tone 2 to	7 in T	L	00)		1	1		
(87)m= 19.6	19.79	20.14	20.58	20.85	20.97	<del>-i</del>	20.9		20.9	20.52	20	19.57		(87)
` '	ļ	<u> </u>		<u> </u>		<u> </u>				20.02		10.07		(- /
Temperature	<del></del>			ı	1	Ť	Т		` ,	00.45	1 00 45	T 00.44	1	(00)
(88)m= 20.13	20.13	20.13	20.15	20.15	20.17	20.17	20.1	17	20.16	20.15	20.15	20.14		(88)
Utilisation fa	ctor for g	ains for i	rest of d	welling,	h2,m (	see Table	9a)				<del> </del>	т	İ	
(89)m= 0.97	0.95	0.9	0.79	0.61	0.42	0.29	0.3	34	0.59	0.85	0.94	0.97		(89)
Mean interna	al temper	ature in	the rest	of dwell	ing T2	(follow ste	eps 3	to 7	in Tabl	e 9c)				
(90)m= 18.26	18.54	19.03	19.64	20	20.14	20.16	20.1	16	20.06	19.58	18.84	18.22		(90)
									f	LA = Livir	ng area ÷ (	4) =	0.47	(91)
Mean interna	al temper	ature (fo	r the wh	ole dwe	lling) =	fLA × T1	+ (1 -	– fL/	A) × T2					
(92)m= 18.89	19.13	19.56	20.08	20.4	20.53		20.5		20.46	20.02	19.39	18.86		(92)
Apply adjust	ment to t	he mean	interna	l temper	ature f	rom Table	e 4e, v	whe	re appro	priate		1		
(93)m= 18.89	19.13	19.56	20.08	20.4	20.53	20.55	20.5	55	20.46	20.02	19.39	18.86		(93)
8. Space hea	ating requ	uirement												
Set Ti to the					ned at	step 11 of	Table	e 9b	, so tha	t Ti,m=(	76)m an	id re-cald	culate	
the utilisation	1			i		T	1 .		_	_	1	I _	1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Au	ug	Sep	Oct	Nov	Dec		
Utilisation fa	ctor for g			0.62	I 0.44	1 0 22	1 00	, T	0.64	0.05	0.02	0.06		(94)
(94)m= 0.96		0.89	0.79	<u> </u>	0.44	0.32	0.3	» <i>1</i>	0.61	0.85	0.93	0.96		(94)
Useful gains (95)m= 362.43		426.56	439.99	391.78	280.7	190.8	198.	37	285.09	337.91	343.31	349		(95)
Monthly ave				<u> </u>		130.0	1 130.	.57	200.00	337.31	040.01	J 343		(00)
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2		(96)
Heat loss rat	1			l	l		1					<u> </u>		, ,
(97)m= 744.25	1	661.41	556.62	431.6	288.8	<del></del>	201.	<del></del>	311.87	467.27	613.87	737.48		(97)
Space heatir	ng require	ement fo	r each n	nonth, k	Wh/mc	onth = 0.02	24 x [	(97)ı	m – (95	)m] x (4	1)m	-	l	
(98)m= 284.07	Ť	174.73	83.98	29.63	0	0	0	Ť	0	96.24	194.8	289.02		
<u> </u>	-			!			<del>'</del>				-		1	

		_
Total per year (kWh/year) = $Sum(98)_{15,912}$ =	1373.7	(98)
Space heating requirement in kWh/m²/year	25.46	(99)
9b. Energy requirements – Community heating scheme		
This part is used for space heating, space cooling or water heating provided by a community scheme. Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none	0	(301)
Fraction of space heat from community system 1 – (301) =	1	(302)
The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the	he latter	_
includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.  Fraction of heat from Community boilers	1	(303a)
Fraction of total space heat from Community boilers (302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for community heating system	1	(305)
Distribution loss factor (Table 12c) for community heating system	1.05	(306)
Space heating	kWh/year	_
Annual space heating requirement	1373.7	
Space heat from Community boilers (98) x (304a) x (305) x (306) =	1442.38	(307a)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0	(308
Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) =	0	(309)
Water heating		_
Annual water heating requirement	1864.11	
If DHW from community scheme:  Water heat from Community boilers  (64) x (303a) x (305) x (306) =	1957.32	(310a)
Electricity used for heat distribution 0.01 × [(307a)(307e) + (310a)(310e)] =	34	(313)
Cooling System Energy Efficiency Ratio	0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0) = $(107) \div (314) =$	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside	114.79	(330a)
warm air heating system fans	0	(330b)
pump for solar water heating	0	(330g)
Total electricity for the above, kWh/year =(330a) + (330b) + (330g) =	114.79	(331)
Energy for lighting (calculated in Appendix L)	247.96	(332)
Total delivered energy for all uses (307) + (309) + (310) + (312) + (315) + (331) + (332)(237b) =	3762.45	(338)
12b. CO2 Emissions – Community heating scheme		
Energy Emission factor kWh/year kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and water heating (not CHP)  Efficiency of heat source 1 (%)  If there is CHP using two fuels repeat (363) to (366) for the second fuel	96	(367a)
CO2 associated with heat source 1 [(307b)+(310b)] x 100 ÷ (367b) x 0.22 =		(367)
<u></u>		] (372)

Total CO2 associated with community	systems	(363)(366) + (368)(372)		=	782.58	(373)
CO2 associated with space heating (s	econdary)	(309) x	0	=	0	(374)
CO2 associated with water from imme	rsion heater or instant	aneous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and	water heating	(373) + (374) + (375) =			782.58	(376)
CO2 associated with electricity for pur	nps and fans within dw	velling (331)) x	0.52	=	59.58	(378)
CO2 associated with electricity for ligh	ting	(332))) x	0.52	=	128.69	(379)
Total CO2, kg/year	sum of (376)(382) =				970.85	(383)
<b>Dwelling CO2 Emission Rate</b>	(383) ÷ (4) =				17.99	(384)
El rating (section 14)					86.85	(385)

#### **Regulations Compliance Report**

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:53:30

Project Information:

Assessed By: Neil Ingham (STRO010943) **Building Type:** Flat

Dwelling Details:

**NEW DWELLING DESIGN STAGE** Total Floor Area: 86.78m² **Plot Reference:** 05 - E

Site Reference : Highgate Road - GREEN

Address:

Client Details:

Name: Address:

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

18.07 kg/m² Target Carbon Dioxide Emission Rate (TER)

Dwelling Carbon Dioxide Emission Rate (DER) 16.12 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 55.1 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 46.7 kWh/m²

OK 2 Fabric U-values

**Element Average Highest** 

0.18 (max. 0.70) External wall 0.18 (max. 0.30) OK Party wall 0.00 (max. 0.20) OK

Floor (no floor)

Roof 0.13 (max. 0.20) 0.13 (max. 0.35) OK Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

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 supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	15.46m²	
Windows facing: South West	5.57m ²	
Windows facing: South West	5.9m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

User Details:	
Assessor Name: Neil Ingham Stroma Number: STRO01 Software Name: Stroma FSAP 2012 Software Version: Version:	10943 1.0.5.50
Property Address: 05 - E  Address:	
1. Overall dwelling dimensions:	
· · · · · · · · · · · · · · · · · · ·	Volume(m³)
Ground floor 86.78 (1a) x 2.65 (2a) =	229.97 (3a)
Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 86.78 (4)	
Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$	229.97 (5)
2. Ventilation rate:	
main secondary other total heating heating	m³ per hour
Number of chimneys $0 + 0 = 0 \times 40 =$	0 (6a)
Number of open flues $0 + 0 + 0 = 0 \times 20 =$	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	0 (7c)
Air char	nges per hour
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ $\div (5) = 0$	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 $0.25 - [0.2 \times (14) \div 100] =$	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	3 (17)
If based on air permeability value, then $(18) = [(17) \div 20] + (8)$ , otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used	0.15 (18)
Number of sides sheltered	0 (19)
Shelter factor (20) = 1 - [0.075 x (19)] =	1 (20)
Infiltration rate incorporating shelter factor (21) = (18) x (20) =	0.15 (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= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7	
Wind Factor $(22a)m = (22)m \div 4$	

Adjusted infiltr	ation rate	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effe If mechanic		•	iale ioi l	пе аррп	Cable Ca	SE						0.5	(23
If exhaust air h	eat pump u	sing Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b	) = (23a)			0.5	(23
If balanced with	n heat reco	very: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h	) =				74.8	(23
a) If balance	ed mecha	anical ve	entilation	with he	at recov	ery (MVI	HR) (24a	a)m = (2	2b)m + (	23b) × [	1 – (23c)	÷ 100]	_
24a)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(24
b) If balance	ed mecha	anical ve	entilation	without	heat red	covery (I	ЛV) (24b	m = (22)	2b)m + (2	23b)		_	
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)r	ouse ext n < 0.5 ×			•					.5 × (23b	o)			
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)r	ventilation				•				0.5]				
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change i	rate - er	nter (24a	) or (24b	o) or (24	c) or (24	d) in box	x (25)				_	
25)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(25
3. Heat losse	s and he	at loss p	paramete	er:									
LEMENT	Gros area	S	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/I	<b>〈</b> )	k-value kJ/m²-l		X k /K
Vindows Type	e 1				15.46	x1	/[1/( 1.4 )+	0.04] =	20.5				(2
Vindows Type	2				5.57	x1	/[1/( 1.4 )+	0.04] =	7.38				(2
Vindows Type	e 3				5.9	x1	/[1/( 1.4 )+	0.04] =	7.82				(2
Valls Type1	62.7	1	26.9	3	35.78	3 x	0.18	=	6.44		60	2146.8	3 (2
Valls Type2	20.9	)	0		20.9	X	0.17	=	3.51		60	1254	(2
Roof	86.78	8	0		86.78	3 x	0.13	=	11.28		9	781.02	2 (3
otal area of e	elements,	m²			170.3	9							(3
arty wall					26.3	X	0	=	0		45	1183.5	5 (3
Party floor					86.78	3					40	3471.2	2 (3
nternal wall **					169.0	2					9	1521.1	8 (3
for windows and * include the area						ated using	ı formula 1	/[(1/U-valu	ıe)+0.04] a	s given in	paragraph	1 3.2	
abric heat los	ss, W/K =	S (A x	U)				(26)(30)	) + (32) =				56.93	(3
leat capacity	Cm = S(	Axk)						((28).	(30) + (32	2) + (32a).	(32e) =	10357.7	(3
hermal mass	paramet	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			= (34)	÷ (4) =			119.36	(3
or design asses: an be used inste				construct	ion are no	t known pi	ecisely the	e indicative	e values of	TMP in Ta	able 1f		
hermal bridge	•	,		• .	•	<						8.51	(3
details of therma		are not kn	own (36) =	= 0.05 x (3	11)			(00)	(26)				<b>-</b>
otal fabric he		- عدمانیما	المصمحالاك					. ,	(36) =	QE\m :: (5)		65.44	(3
entilation hea					1	11	۸	<del>- ` ` ` </del>	= 0.33 × (	<del></del>		1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	J	

(20)	00.70	00.54	22.00	24.0	20.20	20.20	1 20 00	20.05	24.0	00.07	22.04		(38)
(38)m= 24.08	23.79	23.51	22.08	21.8	20.38	20.38	20.09	20.95	21.8	22.37	22.94		(36)
Heat transfer of 89.52	89.24	188.95	87.53	87.24	85.82	85.82	85.54	(39)m 86.39	= (37) + ( 87.24	38)m 87.81	88.38		
(59)111=   69.52	09.24	00.93	07.33	07.24	03.02	03.02	00.04			Sum(39) ₁	<u> </u>	87.46	(39)
Heat loss para	meter (H	HLP), W	m²K				_		= (39)m ÷				<b></b> _` ′
(40)m= 1.03	1.03	1.03	1.01	1.01	0.99	0.99	0.99	1	1.01	1.01	1.02		_
Number of day	s in mo	nth (Tab	le 1a)					/	Average =	Sum(40) ₁	12 /12=	1.01	(40)
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 heat	ing ene	rgy requi	rement:								kWh/ye	ar:	
Assumed occu	inancy	N									.58		(42)
if TFA > 13.9	9, N = 1		[1 - exp	(-0.0003	849 x (TF	A -13.9	)2)] + 0.0	0013 x (1	ΓFA -13		.50		(42)
if TFA £ 13.9 Annual averag	•	ater usad	ae in litre	es per da	av Vd.av	erage =	(25 x N)	+ 36		95	5.45		(43)
Reduce the annua	ıl average	hot water	usage by	5% if the $a$	lwelling is	designed			se target o				(10)
not more that 125		· ·				<u> </u>				T			
Jan Hot water usage ir	Feb	Mar day for ea	Apr	May	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m= 105	101.18	97.36	93.54	89.72	85.91	85.91	89.72	93.54	97.36	101.18	105		
(44)111= 103	101.10	97.30	93.34	09.72	05.91	05.91	09.72			m(44) ₁₁₂ =	<del></del>	1145.42	(44)
Energy content of	hot water	used - cal	culated mo	onthly $= 4$ .	190 x Vd,r	n x nm x E	OTm / 3600			· /	<u> </u>		`
(45)m= 155.71	136.18	140.53	122.52	117.56	101.44	94	107.87	109.16	127.21	138.86	150.79		
If instantaneous w	ator hoati	na at noint	of use (no	hot water	r storaga)	enter () in	hoves (46		Γotal = Su	m(45) ₁₁₂ =	=	1501.83	(45)
(46)m= 23.36	20.43	21.08	18.38	17.63	15.22	14.1	16.18	16.37	19.08	20.83	22.62		(46)
Water storage		21.00	10.30	17.03	13.22	14.1	10.10	10.37	19.00	20.03	22.02		(10)
Storage volum	e (litres)	) includir	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	_			-			. ,			\			
Otherwise if no Water storage		hot wate	er (this in	icludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in (	47)			
a) If manufact		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature fa	actor fro	m Table	2b								0		(49)
Energy lost fro		-	-				(48) x (49)	) =		1	10		(50)
b) If manufact Hot water stora			-								00		(51)
If community h	_			G Z (KVV	ii/iiti <del>c</del> /ua	iy <i>)</i>				0.	02		(51)
Volume factor	_									1.	.03		(52)
Temperature fa	actor fro	m Table	2b							0	.6		(53)
Energy lost fro		_	, kWh/ye	ear			(47) x (51)	x (52) x (	53) =	1.	.03		(54)
Enter (50) or (	, ,	•	ا سما	ma a 41:			(/50)	EE) (44)	_	1.	.03		(55)
Water storage							((56)m = (				05.7		(FC)
(56)m= 32.01 If cylinder contains	28.92	32.01	30.98	32.01	30.98 x [(50) = (	32.01 H11)1 ÷ (5	32.01 0) else (5)	30.98 7)m = (56)	32.01 m where (	30.98 H11) is fro	32.01	ιH	(56)
		r		1	ı					r			(E7\
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)

Primary circuit loss (annual) from Table 3	3		0	(58)
Primary circuit loss calculated for each n		365 × (41)m		1
(modified by factor from Table H5 if the	ere is solar water hea	ating and a cylinder thermo	ostat)	
(59)m= 23.26 21.01 23.26 22.51	23.26 22.51 23.26	23.26 22.51 23.26	22.51 23.26	(59)
Combi loss calculated for each month (6	61)m = (60) ÷ 365 × (4	<b>l</b> 1)m		
(61)m= 0 0 0 0	0 0 0	0 0 0	0 0	(61)
Total heat required for water heating calc	culated for each mon	th $(62)$ m = $0.85 \times (45)$ m +	(46)m + (57)m +	(59)m + (61)m
	172.83 154.94 149.2	<del>-                                    </del>	192.36 206.07	(62)
Solar DHW input calculated using Appendix G or A	Appendix H (negative quan	tity) (enter '0' if no solar contribu	tion to water heating)	ı
(add additional lines if FGHRS and/or W	/WHRS applies, see A	Appendix G)		
(63)m= 0 0 0 0	0 0 0	0 0 0	0 0	(63)
Output from water heater				ı
(64)m= 210.98 186.11 195.81 176.01	172.83 154.94 149.2	8 163.15 162.65 182.49	192.36 206.07	
	'	Output from water heate	er (annual) ₁₁₂	2152.67 (64)
Heat gains from water heating, kWh/mor	nth 0.25 ´ [0.85 × (45)	m + (61)m] + 0.8 x [(46)m	+ (57)m + (59)m	]
	83.31 76.52 75.48	1 1 1	88.97 94.36	(65)
include (57)m in calculation of (65)m o	only if cylinder is in the	e dwelling or hot water is f	rom community h	eating
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	
	128.95 128.95 128.9	<del>                                     </del>	128.95 128.95	(66)
Lighting gains (calculated in Appendix L,	equation L9 or L9a)	also see Table 5	<u> </u>	
(67)m= 20.77 18.45 15.01 11.36	8.49 7.17 7.75	10.07 13.52 17.16	20.03 21.35	(67)
Appliances gains (calculated in Appendix	x Leguation I 13 or I		<u> </u>	
(68)m= 233.03 235.45 229.35 216.38	200 184.61 174.3		207.36 222.75	(68)
Cooking gains (calculated in Appendix L	equation I 15 or I 15	ia) also see Table 5		
(69)m= 35.9 35.9 35.9 35.9	35.9 35.9 35.9	35.9 35.9 35.9	35.9 35.9	(69)
Pumps and fans gains (Table 5a)		1 1 1		, ,
(70)m= 0 0 0 0	0 0 0	0 0 0	0 0	(70)
Losses e.g. evaporation (negative values				( - /
	-103.16 -103.16 -103.1	6 -103.16 -103.16 -103.16	-103.16 -103.16	(71)
Water heating gains (Table 5)	100.10   100.10   100.1	0 100.10 100.10 100.10	100.10	\
	111.97 106.28 101.4	5 107.64 109.85 116.29	123.56 126.83	(72)
` '	I	m + (68)m + (69)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (7	<u> </u>	(, 2)
Total internal gains =  (73)m=	382.16 359.75 345.2		412.63 432.61	(73)
(73)m= 444.51 442.4 428.28 405.44 6. Solar gains:	362.10 359.75 345.2	1 351.51 305.00 366.12	412.03 432.01	(13)
Solar gains are calculated using solar flux from To	able 6a and associated ed	uations to convert to the applica	ble orientation.	
Orientation: Access Factor Area	Flux	g_	FF	Gains
Table 6d m²	Table 6a		able 6c	(W)
Northeast 0.9x 0.77 x 15.46	6 × 11.28	x 0.63 x	0.7 =	53.31 (75)
Northeast 0.9x 0.77 x 15.46	=	x 0.63 x	0.7 =	108.51 (75)
0.7.			<b></b>	

Utilisation fact	_	٠.	living area,		•		Au		Oct	Nov	Dec	l <u> </u>	
7. Mean internature of				· ·	g area f	rom Tah	ole 9.	Th1 (°C)				21	(85)
		924.39	<u> </u>		1234.03	1174.94	1060.	39 926.76	761.54	634.2	586.52		(84)
Total gains – in	ternal ar	nd solai	<del>`````</del>		<u> </u>					•	•	-	
(83)m= 182.29	328.21	496.1		8.77	874.28	829.73	709.0		375.42	221.56	153.91	]	(83)
Solar gains in v	vatts. cal	lculated	I for each m	onth			(83)m :	= Sum(74)m .	(82)m				
Southwest _{0.9x}	0.77	Х	5.9		3	1.49	J L	0.63	X	0.7	=	56.78	(79)
Southwest _{0.9x}	0.77	X	5.57		-	1.49	ļ <u>Ļ</u>	0.63	x [	0.7	=	53.6	(79)
Southwest _{0.9x}	0.77	x	5.9		4	4.07	<u> </u>	0.63	×	0.7	=	79.46	(79)
Southwest _{0.9x}	0.77	x	5.57	,	4	4.07	ļ <u>[</u>	0.63	x [	0.7	=	75.02	(79)
Southwest _{0.9x}	0.77	X	5.9	)	6	9.27	<u> </u>	0.63	×	0.7	=	124.9	(79)
Southwest _{0.9x}	0.77	x	5.57	)	6	9.27		0.63	x	0.7	=	117.91	(79)
Southwest _{0.9x}	0.77	X	5.9	)	9	2.85	] [	0.63	x [	0.7	=	167.42	(79)
Southwest _{0.9x}	0.77	x	5.57	)	( 9	2.85		0.63	x	0.7	=	158.06	(79)
Southwest _{0.9x}	0.77	х	5.9	)	( 10	04.39		0.63	x	0.7	=	188.23	(79)
Southwest _{0.9x}	0.77	x	5.57		( 10	04.39		0.63	x	0.7	=	177.7	(79)
Southwest _{0.9x}	0.77	x	5.9	)	( 1	13.91		0.63	x	0.7	=	205.39	(79)
Southwest _{0.9x}	0.77	х	5.57	)	( 1	13.91		0.63	x	0.7	=	193.9	(79)
Southwest _{0.9x}	0.77	х	5.9	)	( 1	18.15	] [	0.63	x	0.7	=	213.04	(79)
Southwest _{0.9x}	0.77	×	5.57	)	( 1	18.15		0.63	x [	0.7	=	201.12	(79)
Southwest _{0.9x}	0.77	x	5.9		( 1	19.01	Ī	0.63	×	0.7	=	214.59	(79)
Southwest _{0.9x}	0.77	x	5.57	<u> </u>	( 1	19.01	Ī	0.63	x	0.7	=	202.59	(79)
Southwest _{0.9x}	0.77	x	5.9	<u> </u>	( 10	06.25	j ř	0.63	x	0.7	=	191.58	(79)
Southwest _{0.9x}	0.77	x	5.57	<b>=</b>		06.25	i F	0.63	x	0.7	= =	180.87	(79)
Southwest _{0.9x}	0.77	x	5.9	=		5.75	i F	0.63	x	0.7	=	154.62	(79)
Southwest _{0.9x}	0.77	X	5.57	=		5.75	i F	0.63	x	0.7		145.97	(79)
Southwest _{0.9x}	0.77	×	5.9	_		2.67	i	0.63	^   x	0.7	= =	113.01	(79)
Southwest _{0.9x}	0.77	=  ^	5.57	_		2.67	;	0.63	^ [ x [	0.7		106.69	(79)
Southwest _{0.9x}	0.77	^ ^	5.57	=		6.79	] [	0.63	^ [ x [	0.7		66.34	(79)
Southwest _{0.9x}	0.77	<b>-</b>	15.46 5.57	믁		6.79	ј ^ L ] Г	0.63	x	0.7	=	62.63	(79)
Northeast 0.9x	0.77	×	15.46	_		4.2	」× ] _× 「	0.63		0.7	<b> </b>	67.08	(75)
Northeast 0.9x	0.77	×	15.46	=		8.07	」	0.63	×	0.7	_ =	132.61	(75)
Northeast 0.9x	0.77	x	15.46	=		0.42	] х ] "Г	0.63	×	0.7	_ =	238.23	(75)
Northeast 0.9x	0.77	×	15.46	_		2.63	]	0.63	×	0.7	<b>-</b>   -	343.15	(75)
Northeast 0.9x	0.77	x	15.46	=		01.1	]	0.63	×	0.7	=	430.43	(75)
Northeast _{0.9x}	0.77	x	15.46	<del></del>		7.38	] х ] "Г	0.63	×	0.7	_ =	460.12	(75)
Northeast 0.9x	0.77	X	15.46	_		1.35	] X [	0.63	X [	0.7	=	431.59	(75)
Northeast 0.9x	0.77	X	15.46		<b>6</b>	7.96	] X [	0.63	x	0.7	_ =	321.08	(75)
Northcost		<del></del>		_			i F		<b>=</b> i		=		=

(86)m=	0.96	0.93	0.87	0.75	0.59	0.43	0.32	0.36	0.58	0.82	0.94	0.97		(86)
Mear	interna	l temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	in Table	e 9c)					
(87)m=	19.29	19.62	20.06	20.54	20.83	20.96	20.99	20.98	20.88	20.46	19.79	19.24		(87)
Temp	erature	during h	eating p	eriods ir	n rest of	dwelling	from Ta	ıble 9, Ti	h2 (°C)					
(88)m=	20.06	20.06	20.06	20.08	20.08	20.09	20.09	20.1	20.09	20.08	20.07	20.07		(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling,	h2,m (se	e Table	9a)						
(89)m=	0.96	0.92	0.85	0.72	0.54	0.37	0.25	0.29	0.52	0.79	0.92	0.96		(89)
Mear	interna	l temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	os 3 to 7	7 in Tabl	le 9c)				
(90)m=	17.78	18.25	18.88	19.53	19.9	20.06	20.08	20.08	19.98	19.45	18.51	17.71		(90)
						Į.			1	fLA = Livin	g area ÷ (4	4) =	0.51	(91)
Mear	interna	l temner	ature (fo	r the wh	ole dwe	lling) = fl	Δ <b>ν</b> Τ1	+ (1 – fl	Δ) <b>v</b> T2					
(92)m=	18.55	18.95	19.48	20.05	20.37	20.51	20.54	20.54	20.44	19.96	19.16	18.49		(92)
	/ adjustn	nent to tl	he mean	interna	L I temper	ı ature fro	m Table	4e, whe	re appr	respriate				
(93)m=	18.55	18.95	19.48	20.05	20.37	20.51	20.54	20.54	20.44	19.96	19.16	18.49		(93)
8. Sp	ace hea	ting requ	uirement											
				•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(	76)m an	d re-calc	ulate	
the u			or gains					Δ.	0		NI.			
l Itilie	Jan	Feb	Mar ains, hm	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(94)m=	0.94	0.9	0.84	0.71	0.56	0.4	0.28	0.33	0.54	0.79	0.91	0.95		(94)
		hmGm .	. W = (9 ⁴			<u> </u>								, ,
(95)m=	<u> </u>	696.66	772.99	785.01	686.06	490.24	334.19	347.32	501.44	599.93	577.95	557.72		(95)
Mont	hly avera	age exte	rnal tem	perature	from Ta	able 8			-		-			
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
			1	· ·	1	Lm , W =	<del>- `                                   </del>		<u> </u>	r				
` '	1275.65			ļ	756.71	507.51	338.52	354.11	547.61	816.8	1059.45	1262.67		(97)
	e heating 509.59					Wh/mont			T .	Î		504.40		
(98)m=	509.59	374.23	284.08	137.26	52.57	0	0	0	0	161.35	346.68	524.48	0000.04	7(00)
								rota	ı per year	(kWh/year	') = Sum(9	8)15,912 =	2390.24	(98)
Spac	e heatin	g require	ement in	kWh/m²	² /year								27.54	(99)
						scheme								
						ing or wa nentary l					unity sch	neme. I	0	(301)
	•			•		-		Table I	1) 0 11 11	OHE		[		= ' '
Fractio	on of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
	-	-				rces. The p from powe				up to four (	other heat	sources; tl	he latter	
			commun			rom power	Stations.	осс Аррсі	idix O.				1	(303a)
Fractio	on of tota	al space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
		•			•		r commi	ınity hoo	iting cyc		, (	/ [		╣
					,	4c(3)) fo		•	illig sys	tem			1	(305)
Distrib	ution los	ss tactor	(Table 1	12c) for (	commun	ity heatii	ng syste	m					1.05	(306)
_	heating	_										ı	kWh/year	¬
Annua	ı space	neating	requiren	ient									2390.24	

Space heat from Community boilers		(98) x (304a) x	(305) x (306) =		2509.76	(307a)
Efficiency of secondary/supplementary he	ating system in % (fror	n Table 4a or Appen	dix E)		0	(308
Space heating requirement from seconda	ry/supplementary syste	em (98) x (301) x 1	00 ÷ (308) =		0	(309)
Water heating						
Annual water heating requirement					2152.67	]
If DHW from community scheme: Water heat from Community boilers		(64) x (303a) x	(305) x (306) =		2260.31	(310a)
Electricity used for heat distribution		0.01 × [(307a)(307	e) + (310a)(310e)] =		47.7	(313)
Cooling System Energy Efficiency Ratio					0	(314)
Space cooling (if there is a fixed cooling s	ystem, if not enter 0)	= (107) ÷ (314)	=		0	(315)
Electricity for pumps and fans within dwell mechanical ventilation - balanced, extract	<b>-</b> ,	outside			212.1	(330a)
warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330b	o) + (330g) =		212.1	(331)
Energy for lighting (calculated in Appendix	( L)				366.89	(332)
Total delivered energy for all uses (307) +	(309) + (310) + (312)	+ (315) + (331) + (33	2)(237b) =		5349.05	(338)
12b. CO2 Emissions - Community heating	g scheme					
		Energy kWh/year	Emission factor kg CO2/kWh		issions CO2/year	
CO2 from other sources of space and wat Efficiency of heat source 1 (%)			kg CO2/kWh	kg (		(367a)
•	If there is CHP using	kWh/year	kg CO2/kWh	kg (	CO2/year	](367a) ](367)
Efficiency of heat source 1 (%)	If there is CHP using [(307b)+(3	kWh/year two fuels repeat (363) to	kg CO2/kWh (366) for the second fu	kg (	CO2/year 96	]
Efficiency of heat source 1 (%) CO2 associated with heat source 1	If there is CHP using [(307b)+(307b)	kWh/year two fuels repeat (363) to (310b)] x 100 ÷ (367b) x	(366) for the second fu 0.22 0.52	kg (	96 1073.26	(367)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution	If there is CHP using [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+(3) [(307b)+	kWh/year two fuels repeat (363) to (310b)] x 100 ÷ (367b) x 313) x	(366) for the second fu 0.22 0.52	kg (	96 1073.26 24.76	(367) (372)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community sys	If there is CHP using  [(307b)+(3  [(307b)+(3  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3	kWh/year two fuels repeat (363) to (310b)] x 100 ÷ (367b) x 313) x 363)(366) + (368)(372	kg CO2/kWh  (366) for the second fu  0.22  0.52	kg (	96 1073.26 24.76 1098.02	(367) (372) (373)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community sys CO2 associated with space heating (seco	If there is CHP using  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+	kWh/year two fuels repeat (363) to (310b)] x 100 ÷ (367b) x 313) x 363)(366) + (368)(372	kg CO2/kWh  (366) for the second fu  0.22  0.52	kg (	96 1073.26 24.76 1098.02	](367) ](372) ](373) ](374)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community sys CO2 associated with space heating (seco	If there is CHP using  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+	kWh/year  two fuels repeat (363) to (310b)] x 100 ÷ (367b) x  313) x  363)(366) + (368)(372  309) x  bus heater (312) x  373) + (374) + (375) =	kg CO2/kWh  (366) for the second fu  0.22  0.52	kg (	96 1073.26 24.76 1098.02 0	](367) ](372) ](373) ](374) ](375)
Efficiency of heat source 1 (%)  CO2 associated with heat source 1  Electrical energy for heat distribution  Total CO2 associated with community sys  CO2 associated with space heating (second community sys)  CO2 associated with water from immersion  Total CO2 associated with space and water	If there is CHP using  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+	kWh/year  two fuels repeat (363) to (310b)] x 100 ÷ (367b) x  313) x  363)(366) + (368)(372  309) x  bus heater (312) x  373) + (374) + (375) =	kg CO2/kWh  (366) for the second fu  0.22  0.52  0  0.22	kg (	96 1073.26 24.76 1098.02 0 0	](367) ](372) ](373) ](374) ](375) ](376)
Efficiency of heat source 1 (%)  CO2 associated with heat source 1  Electrical energy for heat distribution  Total CO2 associated with community sys  CO2 associated with space heating (second community sys)  Total CO2 associated with water from immersion  Total CO2 associated with space and wate  CO2 associated with electricity for pumps  CO2 associated with electricity for lighting	If there is CHP using  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+	kWh/year  two fuels repeat (363) to (310b)] x 100 ÷ (367b) x  313) x  363)(366) + (368)(372  309) x  bus heater (312) x  373) + (374) + (375) =  19 (331)) x	kg CO2/kWh  (366) for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for	kg (	96 1073.26 24.76 1098.02 0 0 1098.02 110.08	](367) ](372) ](373) ](374) ](375) ](376) ](378)
Efficiency of heat source 1 (%)  CO2 associated with heat source 1  Electrical energy for heat distribution  Total CO2 associated with community systems  CO2 associated with space heating (second CO2 associated with water from immersion Total CO2 associated with space and water CO2 associated with electricity for pumps CO2 associated with electricity for lighting CO2 associated with electricity for lighting CO2 associated with electricity for lighting CO2 associated with electricity for lighting CO2 associated with electricity for lighting CO2 associated with electricity for lighting CO2 associated with electricity for lighting CO2 associated with electricity for lighting CO2 associated with electricity for lighting CO2 associated with electricity for lighting CO2 associated with electricity for lighting CO2 associated with electricity for lighting CO2 associated with electricity for lighting CO2 associated with electricity for lighting CO2 associated with electricity for lighting CO2 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with electricity for lighting CO2 associated	If there is CHP using  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  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[(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+	kWh/year  two fuels repeat (363) to (310b)] x 100 ÷ (367b) x  313) x  363)(366) + (368)(372  309) x  bus heater (312) x  373) + (374) + (375) =  19 (331)) x	kg CO2/kWh  (366) for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for 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for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for the second for	kg (	96 1073.26 24.76 1098.02 0 1098.02 110.08 190.41	](367) ](372) ](373) ](374) ](375) ](376) ](378) ](379)

#### **Regulations Compliance Report**

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 06 December 2021 at 10:53:29* 

Project Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 103.81m²

Site Reference: Highgate Road - GREEN

Plot Reference: 06 - A

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 17.03 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 14.76 kg/m² **OK** 

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 54.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 44.2 kWh/m²

OK
2 Fabric U-values

Element Average Highest

External wall 0.18 (max. 0.30) 0.18 (max. 0.70) OK
Party wall 0.00 (max. 0.20) - OK
Floor (no floor)

(110 11001)

 Roof
 0.13 (max. 0.20)
 0.13 (max. 0.35)
 OK

 Openings
 1.40 (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 3.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

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 supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	13.21m²	
Windows facing: South East	5.5m²	
Windows facing: North West	4.61m²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		Llea	r Details:						
Access Name	No: Un also as	Use		- M	<b>L</b>		CTDO	010010	
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Stroma Softwa					010943 on: 1.0.5.50	
			ty Address:						
Address :									
1. Overall dwelling dime	nsions:								
Ground floor		A	rea(m²) 103.81	(1a) x		ight(m) .65	(2a) =	Volume(m ³	(3a)
	a) . (1b) . (1a) . (1d) . (1a)	(10)				.00	(2a) –	2/5.1	(Ja)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)-	+(111)	103.81	(4)	) . (2-) . (2-	1) . (2 -) .	(2-)		_
Dwelling volume				(3a)+(3b)	)+(3c)+(3c	l)+(3e)+	.(3h) =	275.1	(5)
2. Ventilation rate:	main sec	condary	other		total			m³ per hou	r
Number of chimneys	heating he	ating		1 = [			40 =		_
•			0	]	0		20 =	0	(6a)
Number of open flues		0 +	0	」 ⁻ └	0			0	(6b)
Number of intermittent fa				Ļ	0		10 =	0	(7a)
Number of passive vents				Ļ	0		10 =	0	(7b)
Number of flueless gas fi	res				0	X 4	40 =	0	(7c)
							Air ch	anges per ho	our
Infiltration due to chimne	ys, flues and fans = (6a)	+(6b)+(7a)+(7b	)+(7c) =	Г	0		÷ (5) =	0	(8)
•	een carried out or is intended			continue fr			` '	<u> </u>	` ` ′
Number of storeys in the	ne dwelling (ns)							0	(9)
Additional infiltration	25 for stool or timber fr	omo or 0.25	for mason	v oonatr	ruotion	[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber fra resent, use the value correspo			•	uction			0	(11)
deducting areas of openir	ngs); if equal user 0.35						ı		_
·	loor, enter 0.2 (unseale	d) or 0.1 (sea	aled), else	enter 0				0	(12)
If no draught lobby, ent	s and doors draught stri	nned						0	$=$ $\frac{(13)}{(14)}$
Window infiltration	s and doors draught still	ppeu	0.25 - [0.2	x (14) ÷ 1	001 =			0	(14)
Infiltration rate			(8) + (10)		_	+ (15) =		0	(16)
	q50, expressed in cubic	metres per	hour per so	uare m	etre of e	envelope	area	3	(17)
If based on air permeabil	•	•	•	•		'		0.15	(18)
•	s if a pressurisation test has b				is being u	sed			
Number of sides sheltere	d							0	(19)
Shelter factor			(20) = 1 -		19)] =			1	(20)
Infiltration rate incorporat	-		(21) = (18)	x (20) =				0.15	(21)
Infiltration rate modified for	<del></del>					<del></del>		1	
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	1 1					·		1	
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m = $(22a)$ m =	2)m ÷ 4							_	
(22a)m= 1.27 1.25	1.23 1.1 1.08	0.95 0.95	0.92	1	1.08	1.12	1.18		

Adjusted infilt	ration rate	e (allowi	ina for sl	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18		
Calculate effe		•	rate for t	he appli	cable ca	se			ı			I	<b>_</b>
If mechanic			andiv N. (C	93h) — (93 <i>a</i>	a) v Emy (	aguatian (I	VEVV otho	nuina (22h	) - (220)			0.5	(23a)
If exhaust air h									) = (23a)			0.5	(23b)
		-	-	_					2h\m . /	22h) v [	1 (22a)	74.8	(23c)
a) If balance (24a)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3	+ 100j	(24a)
b) If balance			Į	<u> </u>	Į	ļ	ļ	ļ	<u>l</u>	<u>Į</u>	0.0		, ,
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole h	nouse ext	tract ver	ntilation o	r positiv	/e input	ventilatio	n from o	utside				I	
,	m < 0.5 x			•					5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural if (22b)ı	ventilation			•	•				0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	change	rate - er	nter (24a	or (24l	o) or (24	c) or (24	d) in bo	x (25)	-	-	-		
(25)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(25)
3. Heat losse	es and he	at loss	paramet	er:									
ELEMENT	Gros area	ss	Openir m	ıgs	Net Ar A ,r		U-val W/m2		A X U (W/l		k-value kJ/m²-l		X k I/K
Windows Typ		` ,			13.2	x1	/[1/( 1.4 )+	0.04] =	17.51	<u></u>			(27)
Windows Typ	e 2				5.5	x1	/[1/( 1.4 )+	0.04] =	7.29	一			(27)
Windows Typ	e 3				4.61	x1	/[1/( 1.4 )+	0.04] =	6.11				(27)
Walls Type1	76.1	6	23.3	2	52.84	1 X	0.18	= i	9.51		60	3170.	4 (29)
Walls Type2	49.7	7	0		49.77	7 X	0.17	<u> </u>	8.36		60	2986.	2 (29)
Roof	103.8	31	0		103.8	1 X	0.13	<del></del>	13.5		9	934.2	9 (30)
Total area of	elements	, m²			229.7	4		<u> </u>					(31)
Party wall					12.14	1 x	0	=	0		45	546.3	(32)
Party floor					103.8	1					40	4152.	4 (32a)
Internal wall *	*				193.1	7				Ī	9	1738.5	(32c)
* for windows and ** include the are						lated using	formula 1	1/[(1/U-valu	ie)+0.04] a	as given in	paragraph	3.2	_
Fabric heat lo	ss, W/K =	= S (A x	U)				(26)(30	) + (32) =				62.28	(33)
Heat capacity	Cm = S(	Axk)						((28).	(30) + (32	2) + (32a).	(32e) =	13528.12	(34)
Thermal mass	s parame	ter (TMF	⊃ = Cm -	: TFA) ir	n kJ/m²K	•		= (34)	÷ (4) =			130.32	(35)
For design asses can be used inste				construct	ion are no	t known pr	ecisely the	e indicative	values of	TMP in Ta	able 1f		
Thermal bridg	es : S (L	x Y) cal	culated	using Ap	pendix l	K						10.29	(36)
if details of therm		are not kr	nown (36) :	= 0.05 x (3	31)			(00)	(00)				<b></b> .
Total fabric he		aloulote :	d no o natic !					. ,	(36) =	(OE) (E)		72.57	(37)
Ventilation he	Feb		<u> </u>	<u> </u>	lun	101	۸۰۰۵	<del>- `                                   </del>	<u> </u>	(25)m x (5)		]	
Jan	l Len	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	I	

(20)	00.40	00.40	00.40	00.00	04.07	04.07	1 24 02	25.00	20.00	00.70	07.44		(38)
(38)m= 28.8	28.46	28.12	26.42	26.08	24.37	24.37	24.03	25.06	26.08	26.76	27.44		(36)
Heat transfer (39)m= 101.37	101.03	nt, W/K 100.69	98.99	98.65	96.94	96.94	96.6	(39)m 97.63	98.65	38)m 99.33	100.01		
(59)111= 101.37	101.03	100.09	90.99	90.03	90.94	90.94	90.0			Sum(39) ₁	1	98.9	(39)
Heat loss para	meter (l	HLP), W	/m²K				_		= (39)m ÷				`
(40)m= 0.98	0.97	0.97	0.95	0.95	0.93	0.93	0.93	0.94	0.95	0.96	0.96		_
Number of day	/s in mo	nth (Tab	le 1a)					/	Average =	Sum(40) ₁	12 /12=	0.95	(40)
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 hea	ting ene	rgy requi	irement:								kWh/ye	ar:	
Assumed occu	inancy	N									77		(42)
if TFA > 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9	)2)] + 0.0	0013 x (	ΓFA -13.		.77		(42)
if TFA £ 13.5 Annual average	,	ater usad	ne in litre	es ner da	ıv Vd av	erane –	(25 x N)	+ 36		100	0.04		(43)
Reduce the annua	al average	hot water	usage by	5% if the $a$	welling is	designed t			se target o		0.04		(40)
not more that 125		person pei T		rater use, l ı	not and co	<u> </u>							
Jan Hot water usage i	Feb	Mar r day for ea	Apr	May	Jun	Jul Table 10 x	Aug	Sep	Oct	Nov	Dec		
	106.04	102.04	98.04	94.04	90.03	90.03	94.04	98.04	102.04	106.04	110.04		
(44)m= 110.04	106.04	102.04	96.04	94.04	90.03	90.03	94.04			m(44) ₁₁₂ =	<del></del>	1200.45	(44)
Energy content of	hot water	used - cal	culated m	onthly $= 4$ .	190 x Vd,r	n x nm x E	OTm / 3600			· /	L		
(45)m= 163.19	142.73	147.28	128.4	123.2	106.32	98.52	113.05	114.4	133.32	145.53	158.04		
If instantaneous v	vater heati	na at noint	of use (no	n hot water	r storaga)	enter∩in	hoves (16		Γotal = Su	m(45) ₁₁₂ =	-	1573.98	(45)
	21.41	22.09	19.26	18.48	15.95	14.78	16.96	17.16	20	21.83	23.71		(46)
(46)m= 24.48 Water storage	l	22.09	19.20	10.40	15.95	14.70	10.90	17.16	20	21.03	23.71		(40)
Storage volum	ne (litres)	) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	-			_			. ,						
Otherwise if no Water storage		hot wate	er (this ir	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (	47)			
a) If manufact		eclared I	oss facto	or is kno	wn (kWh	n/day):					0		(48)
Temperature f	actor fro	m Table	2b								0		(49)
Energy lost fro		_	-				(48) x (49)	) =		1	10		(50)
<ul><li>b) If manufact</li><li>Hot water stor</li></ul>			-								20		(E4)
If community h	•			IE Z (KVV	ii/iitie/ua	iy <i>)</i>				0.	.02		(51)
Volume factor	_									1.	.03		(52)
Temperature f	actor fro	m Table	2b							0	0.6		(53)
Energy lost fro		_	, kWh/ye	ear			(47) x (51)	x (52) x (	53) =	1.	.03		(54)
Enter (50) or	. , .	•	<b>.</b>				((50)	==> (44)		1.	.03		(55)
Water storage							((56)m = (			ı			(==)
(56)m= 32.01 If cylinder contain	28.92	32.01	30.98	32.01 m = (56)m	30.98 x [(50) = (	32.01 H11)1 ÷ (5	32.01 0) else (5)	30.98 7)m = (56)	32.01 m where (	30.98 H11) is fro	32.01	x H	(56)
			1			1						X 1 1	/E7\
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)

		1
Primary circuit loss (annual) from Table 3	0	(58)
Primary circuit loss calculated for each month (59)m = (58) ÷ 365 x (41)m	otot)	
(modified by factor from Table H5 if there is solar water heating and a cylinder thermo (59)m= 23.26 21.01 23.26 22.51 23.26 22.51 23.26 22.51 23.26	22.51 23.26	(59)
	22.01 20.20	(66)
Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m		1 (04)
(61)m= 0 0 0 0 0 0 0 0 0 0	0 0	(61)
Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m +	<del>` ` ` ` ` ` </del>	1 ` ′ ′
(62)m= 218.46 192.65 202.56 181.9 178.48 159.81 153.79 168.33 167.89 188.6	199.03 213.32	(62)
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribut	ion to water heating)	
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)		l (63)
(63)m= 0 0 0 0 0 0 0 0 0 0	0 0	(63)
Output from water heater		1
(64)m= 218.46 192.65 202.56 181.9 178.48 159.81 153.79 168.33 167.89 188.6	199.03 213.32	0004.00 (64)
Output from water heate		2224.82 (64)
Heat gains from water heating, kWh/month $0.25 \cdot [0.85 \times (45)m + (61)m] + 0.8 \times [(46)m]$	<del></del>	1
(65)m= 98.48 87.4 93.19 85.49 85.19 78.15 76.98 81.81 80.83 88.55	91.18 96.77	(65)
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is fr	om community h	leating
5. Internal gains (see Table 5 and 5a):		
Metabolic gains (Table 5), Watts		1
Jan Feb Mar Apr May Jun Jul Aug Sep Oct	Nov Dec	
(66)m= 138.61 138.61 138.61 138.61 138.61 138.61 138.61 138.61 138.61 138.61	138.61 138.61	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5		_
(67)m= 23.39 20.77 16.89 12.79 9.56 8.07 8.72 11.34 15.21 19.32	22.55 24.04	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5		
(68)m= 262.34 265.07 258.21 243.6 225.17 207.84 196.26 193.54 200.4 215.01	233.44 250.77	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5		
(69)m= 36.86 36.86 36.86 36.86 36.86 36.86 36.86 36.86 36.86 36.86	36.86 36.86	(69)
Pumps and fans gains (Table 5a)	•	'
(70)m= 0 0 0 0 0 0 0 0 0 0	0 0	(70)
Losses e.g. evaporation (negative values) (Table 5)		ı
(71)m= -110.88 -110.88 -110.88 -110.88 -110.88 -110.88 -110.88 -110.88 -110.88 -110.88	-110.88 -110.88	(71)
Water heating gains (Table 5)		I
(72)m= 132.37 130.06 125.26 118.73 114.5 108.53 103.47 109.96 112.27 119.02	126.65 130.07	(72)
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m + (70)m$	1)m + (72)m	l
(73)m= 482.68 480.48 464.94 439.71 413.81 389.03 373.03 379.42 392.47 417.93	447.22 469.45	(73)
6. Solar gains:		
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicab	ole orientation.	
Orientation: Access Factor Area Flux g_	FF	Gains
	able 6c	(VV)
Southeast 0.9x 0.77 x 5.5 x 36.79 x 0.63 x	0.7 =	61.85 (77)
Southeast 0.9x 0.77 x 5.5 x 62.67 x 0.63 x	0.7 =	105.35 (77)

7. Mean inte		1013.57 erature			201.81	1152.72	1078	3.65 994.43	853.54	719.21	662.48		(84)
Total gains –			<del>`                                    </del>	<u> </u>	<u>`</u>					_		1	(6.1)
(83)m= 226.28	390.73	548.63	703.29 80	9.2 8	812.79	779.69	699	<u> </u>	435.62	2 272	193.03	]	(83)
Solar gains ir	watts, ca	lculated	for each m	onth			(83)m	ı = Sum(74)m	(82)m				
Northwest 0.9x	0.77	X	4.61	X	9	9.21	X	0.63	X	0.7	=	12.98	(81)
Northwest 0.9x	0.77	×	4.61	×		14.2	X	0.63	×	0.7	=	20	(81)
Northwest _{0.9x}	0.77	x	4.61	x	2	8.07	x	0.63	x	0.7	=	39.54	(81)
Northwest _{0.9x}	0.77	X	4.61	×	5	0.42	x	0.63	x	0.7	=	71.04	(81)
Northwest 0.9x	0.77	x	4.61	x	7	2.63	x	0.63	x	0.7	=	102.32	(81)
Northwest 0.9x	0.77	X	4.61	×		91.1	x	0.63	x	0.7	=	128.35	(81)
Northwest 0.9x	0.77	x	4.61	×		7.38	x	0.63	x	0.7	=	137.2	(81)
Northwest 0.9x	0.77	x	4.61	×		1.35	X	0.63	x	0.7	_ =	128.7	(81)
Northwest _{0.9x}	0.77	x	4.61	x		7.96	X	0.63	x	0.7		95.74	(81)
Northwest 0.9x	0.77	×	4.61	×		1.38	) x	0.63	×	0.7	= =	58.3	(81)
Northwest 0.9x	0.77	X	4.61	×		2.97	]	0.63	×	0.7		32.36	(81)
Northwest 0.9x	0.77	^	4.61	^   x		1.28	] ]	0.63	_ ^	0.7	= =	15.9	(81)
Southwest _{0.9x}	0.77	$\frac{1}{x}$	13.21	$=$ $\begin{bmatrix} \\ \\ \\ \end{bmatrix}$		1.49	]   ]	0.63	^	0.7		127.12	(79)
Southwest _{0.9x}	0.77	^ ^	13.21	$=$ $\frac{1}{x}$		4.07	]   ]	0.63	<b>-</b>   ^	0.7	= -	177.92	(79)
Southwest _{0.9x}	0.77	^ ^	13.21	$=$ $\frac{1}{x}$		9.27	]   ]	0.63	<b>-</b>   ^	0.7		279.64	(79)
Southwest _{0.9x}	0.77	<b>-</b>	13.21	→       x		2.85	]   ]	0.63	<b>-</b>   ^	0.7	= -	374.86	(79)
Southwest _{0.9x}	0.77	×	13.21	X x		13.91 04.39	]   ]	0.63	x	0.7	<del>- </del>	459.87 421.44	(79) (79)
Southwest _{0.9x} Southwest _{0.9x}	0.77	×	13.21	→   ×     →   √		18.15	]   ]	0.63	= X	0.7	<b>-</b>   -	476.99	(79)
Southwesto.9x	0.77	×	13.21	×		19.01	]	0.63	×	0.7	_ =	480.46	(79)
Southwesto o	0.77	X	13.21	×		06.25	]	0.63	X	0.7	<b>-</b>   -	428.95	(79)
Southwesto.9x	0.77	×	13.21	×		5.75	]	0.63	×	0.7	=	346.2	(79)
Southwest _{0.9x}	0.77	x	13.21	×	6	2.67	]	0.63	×	0.7	=	253.02	(79)
Southwest _{0.9x}	0.77	x	13.21	×	3	6.79	]	0.63	x	0.7	=	148.54	(79)
Southeast 0.9x	0.77	x	5.5	x	3	1.49	x	0.63	x	0.7	=	52.93	(77)
Southeast 0.9x	0.77	X	5.5	X	4	4.07	X	0.63	X	0.7	=	74.08	(77)
Southeast 0.9x	0.77	X	5.5	X	6	9.27	x	0.63	X	0.7	=	116.43	(77)
Southeast 0.9x	0.77	X	5.5	X	9	2.85	x	0.63	x	0.7	=	156.07	(77)
Southeast 0.9x	0.77	X	5.5	X	10	04.39	X	0.63	X	0.7	=	175.47	(77)
Southeast 0.9x	0.77	X	5.5	х	1′	13.91	x	0.63	x	0.7	=	191.47	(77)
Southeast 0.9x	0.77	x	5.5	×	1	18.15	x	0.63	x	0.7	=	198.6	(77)
Southeast 0.9x	0.77	x	5.5	x	1	19.01	x	0.63	x	0.7	=	200.04	(77)
Southeast 0.9x	0.77	x	5.5	X	1(	06.25	X	0.63	x	0.7	<del>-</del>	178.6	(77)

(86)m=	0.97	0.94	0.89	0.8	0.66	0.49	0.36	0.4	0.61	0.85	0.95	0.98		(86)
Mean	interna	l temper	ature in	living ar	ea T1 (fo	ollow ste	ps 3 to 7	' in Table	e 9c)					
(87)m=	19.46	19.77	20.15	20.56	20.82	20.95	20.99	20.98	20.9	20.53	19.92	19.41		(87)
Temp	erature	during h	neating p	eriods ir	n rest of	dwelling	from Ta	ıble 9, Ti	h2 (°C)					
(88)m=	20.1	20.11	20.11	20.12	20.12	20.14	20.14	20.14	20.13	20.12	20.12	20.11		(88)
Utilisa	ation fac	tor for a	ains for	rest of d	wellina.	h2.m (se	ee Table	9a)						
(89)m=	0.97	0.93	0.88	0.77	0.61	0.43	0.29	0.33	0.55	0.82	0.94	0.97		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	na T2 (f	ollow ste	ens 3 to 7	7 in Tabl	le 9c)				
(90)m=	18.04	18.48	19.03	19.6	19.94	20.1	20.13	20.13	20.04	19.57	18.72	17.98		(90)
		<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u>!</u> 1	fLA = Livin	g area ÷ (4	4) =	0.38	(91)
Mean	interna	l tampar	atura (fo	r the wh	ole dwe	lling) – fl	LA × T1	⊥ /1 _ fl	Δ) ~ T2			l		_
(92)m=	18.59	18.97	19.46	19.96	20.28	20.43	20.46	20.46	20.37	19.94	19.18	18.53		(92)
		nent to t	<u> </u>		<u> </u>	<u> </u>	m Table		<u> </u>					
(93)m=	18.59	18.97	19.46	19.96	20.28	20.43	20.46	20.46	20.37	19.94	19.18	18.53		(93)
8. Spa	ace hea	ting requ	uirement											
				•		ed at ste	ep 11 of	Table 9	o, so tha	nt Ti,m=(	76)m an	d re-calc	ulate	
the ut		factor fo												
1 14:11:0.4	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(94)m=	0.96	tor for g	0.86	0.76	0.62	0.45	0.32	0.36	0.57	0.81	0.93	0.96		(94)
		hmGm				0.40	0.02	0.00	0.07	0.01	0.00	0.00		(-1)
(95)m=		802.16	875.29	871.39	759.09	544.33	369.74	385.37	565.31	690.11	666.56	637.87		(95)
Month	nly aver	age exte	rnal tem	perature	from Ta	able 8	<u> </u>			<u> </u>	<u> </u>			
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	e for mea	an intern	al temp	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m	]	•			
(97)m=	1448.29	1421.99	1304.63	1095.25	846.29	565	374.25	392.01	612.12	921.41	1200.31	1432.83		(97)
Space						Wh/mon	th = 0.02	24 x [(97)	)m – (95	)m] x (4	1)m			
(98)m=	573.58	416.52	319.43	161.18	64.88	0	0	0	0	172.08	384.3	591.45		_
								Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	2683.43	(98)
Space	e heatin	g require	ement in	kWh/m²	² /year								25.85	(99)
9b. En	ergy red	quiremer	nts – Cor	mmunity	heating	scheme								
							ater heat				unity sch	neme.		<b>¬</b>
Fractio	n of spa	ace heat	from se	condary	/supplen	nentary I	heating (	Table 1	1) '0' if n	one		l	0	(301)
Fractio	n of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
	-						orocedure r stations.			up to four	other heat	sources; th	he latter	
		at from C	-			•							1	(303a)
Fractio	n of tota	al space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor	for cont	trol and	charging	method	(Table	4c(3)) fo	r commu	unity hea	ting sys	tem		Ī	1	(305)
Distrib	ution los	ss factor	(Table 1	2c) for (	commun	ity heatii	ng syste	m					1.05	(306)
Space	heating	g										'	kWh/yeaı	 r
_		heating	requiren	nent									2683.43	7
												ı	<u> </u>	_

					_
Space heat from Community boilers		(98) x (304a) x	(305) x (306) =	2817.6	(307a)
Efficiency of secondary/supplementary h	eating system in % (fron	n Table 4a or Appen	ndix E)	0	(308
Space heating requirement from second	ary/supplementary syste	em (98) x (301) x 1	00 ÷ (308) =	0	(309)
Water heating Annual water heating requirement				2224.82	ר
If DHW from community scheme:				2224.02	
Water heat from Community boilers		(64) x (303a) x	(305) x (306) =	2336.06	(310a)
Electricity used for heat distribution		0.01 × [(307a)(307	'e) + (310a)(310e)] =	51.54	(313)
Cooling System Energy Efficiency Ratio				0	(314)
Space cooling (if there is a fixed cooling	system, if not enter 0)	= (107) ÷ (314)	=	0	(315)
Electricity for pumps and fans within dwe mechanical ventilation - balanced, extract	<b>-</b> ,	outside		253.73	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330l	b) + (330g) =	253.73	(331)
Energy for lighting (calculated in Append	lix L)			412.99	(332)
Total delivered energy for all uses (207)	. (200) . (210) . (212)	. /245\ . /224\ . /22	)() ()()()()	5820.38	(338)
Total delivered energy for all uses (307)	+ (309) + (310) + (312) -	+ (313) + (331) + (33	52)(237D) =	3020.50	(330)
12b. CO2 Emissions – Community heating		+ (313) + (331) + (33	52)(2370) =	3020.30	_(330)
<u></u>		Energy kWh/year	Emission factor		
<u></u>	ng scheme ater heating (not CHP)	Energy	Emission factor kg CO2/kWh	Emissions kg CO2/year	(367a)
12b. CO2 Emissions – Community heating CO2 from other sources of space and was	ng scheme ater heating (not CHP) If there is CHP using	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
12b. CO2 Emissions – Community heating CO2 from other sources of space and was Efficiency of heat source 1 (%)	ng scheme  ater heating (not CHP)  If there is CHP using  [(307b)+(3	Energy kWh/year two fuels repeat (363) to	Emission factor kg CO2/kWh  (366) for the second fue	Emissions kg CO2/year	](367a)
CO2 from other sources of space and was Efficiency of heat source 1 (%) CO2 associated with heat source 1	ng scheme  ater heating (not CHP)  If there is CHP using  [(307b)+(3	Energy kWh/year two fuels repeat (363) to 810b)] x 100 ÷ (367b) x	Emission factor kg CO2/kWh  (366) for the second fue  0.22	Emissions kg CO2/year	](367a) ](367)
CO2 from other sources of space and was Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution	ng scheme  ater heating (not CHP)  If there is CHP using  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)  [(307b)+(3)	Energy kWh/year two fuels repeat (363) to 810b)] x 100 ÷ (367b) x 313) x	Emission factor kg CO2/kWh  (366) for the second fue  0.22  0.52	Emissions kg CO2/year  96 1159.57 26.75	(367a) (367) (372)
CO2 from other sources of space and was Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community sy	ng scheme  ater heating (not CHP)  If there is CHP using  [(307b)+(3)  //stems (3)  ondary) (3)	Energy kWh/year two fuels repeat (363) to 310b)] x 100 ÷ (367b) x 313) x 363)(366) + (368)(372	Emission factor kg CO2/kWh  (366) for the second fue  0.22  0.52	Emissions kg CO2/year  96  1159.57  26.75  1186.32	(367a) (367) (372) (373)
CO2 from other sources of space and was Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community sy CO2 associated with space heating (sec	ng scheme  ater heating (not CHP)  If there is CHP using  [(307b)+(3)  //stems  (3)  ondary)  (3)  fon heater or instantance	Energy kWh/year two fuels repeat (363) to 310b)] x 100 ÷ (367b) x 313) x 363)(366) + (368)(372	Emission factor kg CO2/kWh  (366) for the second fue  0.22  0.52	Emissions kg CO2/year  96  1159.57  26.75  1186.32	(367a) (367) (372) (373) (374)
CO2 from other sources of space and was Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community sy CO2 associated with space heating (sec	ater heating (not CHP) If there is CHP using  [(307b)+(3)  //stems (3) ondary) (3) ion heater or instantance ater heating (3)	Energy kWh/year two fuels repeat (363) to 310b)] x 100 ÷ (367b) x 313) x 363)(366) + (368)(372 309) x bus heater (312) x 373) + (374) + (375) =	Emission factor kg CO2/kWh  (366) for the second fue  0.22  0.52  0  0.22	Emissions kg CO2/year  96 1159.57 26.75 1186.32 0 0	(367a) (367) (372) (373) (374) (375)
CO2 from other sources of space and was Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with space heating (sec CO2 associated with water from immersionated CO2 associated with space and was compared to the compared control of the compared control of the compared control of the compared control of the compared control of the compared control of the compared control of the compared control of the compared control of the compared control of the compared control of the compared control of the compared control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control	ater heating (not CHP) If there is CHP using  [(307b)+(3) //stems (3) ondary) (3) ion heater or instantaneous ater heating (3) s and fans within dwelling	Energy kWh/year two fuels repeat (363) to 310b)] x 100 ÷ (367b) x 313) x 363)(366) + (368)(372 309) x bus heater (312) x 373) + (374) + (375) =	Emission factor kg CO2/kWh  (366) for the second fue  0.22  0.52  0  0.22	Emissions kg CO2/year  96 1159.57 26.75 1186.32 0 1186.32	(367a) (367) (372) (373) (374) (375) (376)
CO2 from other sources of space and water Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community sy CO2 associated with space heating (sec CO2 associated with water from immersion total CO2 associated with space and water CO2 associated with electricity for pump CO2 associated with electricity for lighting	ater heating (not CHP) If there is CHP using  [(307b)+(3) //stems (3) ondary) (3) ion heater or instantaneous ater heating (3) s and fans within dwelling	Energy kWh/year two fuels repeat (363) to 310b)] x 100 ÷ (367b) x 313) x 363)(366) + (368)(372 309) x bus heater (312) x 373) + (374) + (375) = 39 (331)) x	Emission factor kg CO2/kWh  (366) for the second fue  0.22  0.52  0  0.22	Emissions kg CO2/year  96 1159.57 26.75 1186.32 0 1186.32	(367a) (367) (372) (373) (374) (375) (376) (378)
CO2 from other sources of space and water Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community sy CO2 associated with space heating (sec CO2 associated with water from immersion total CO2 associated with space and water CO2 associated with electricity for pump CO2 associated with electricity for lighting Total CO2, kg/year	ater heating (not CHP) If there is CHP using  [(307b)+(3) //stems (3) ondary) (3) fon heater or instantaneous ater heating (3) s and fans within dwelling (3)	Energy kWh/year two fuels repeat (363) to 310b)] x 100 ÷ (367b) x 313) x 363)(366) + (368)(372 309) x bus heater (312) x 373) + (374) + (375) = 39 (331)) x	Emission factor kg CO2/kWh  (366) for the second fue  0.22  0.52  0  0.22	Emissions kg CO2/year  96 1159.57 26.75 1186.32 0 1186.32 131.68 214.34	(367a) (367) (372) (373) (374) (375) (376) (378) (379)

#### **Regulations Compliance Report**

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 06 December 2021 at 10:53:28

Proiect Information:

Assessed By: Neil Ingham (STRO010943) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 133.02m²

Site Reference: Highgate Road - GREEN

Plot Reference: 06 - B

Address:

Client Details:

Name: Address :

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 system: Mains gas (c)

Fuel factor: 1.00 (mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 17.24 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

15.11 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 61.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 50.3 kWh/m²

OK
2 Fabric U-values

Element Average Highest

External wall 0.18 (max. 0.30) 0.18 (max. 0.70) OK
Party wall 0.00 (max. 0.20) - OK

Floor (no floor)

 Roof
 0.13 (max. 0.20)
 0.13 (max. 0.35)
 OK

 Openings
 1.40 (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 3.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

# **Regulations Compliance Report**

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ок
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.54	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	28.56m²	
Windows facing: South East	5.5m ²	
Windows facing: North West	5.47m ²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	
Party Walls U-value	0 W/m²K	
Community heating, heat from boilers – mains gas		

		Hear	Details:						
Access on Names	Nail la ala ara	USEI		- NI	<b>L</b>		CTDO	040040	
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 2012		Stroma Softwa					010943 on: 1.0.5.50	
Continui o Humo.	0.101110 T 07 11 20 12	Property	/ Address:		OlOII.		7 0 10 10	711 11010100	
Address :									
1. Overall dwelling dime	ensions:								
Ground floor			ea(m²)	(10) v		ight(m)	(2a) =	Volume(m³	(3a)
	a) . (4 la) . (4 a) . (4 al) . (4 a) .			(1a) x	2	65	(2a) =	352.5	(Sa)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	·(1n)	133.02	(4)	) (O.) (O.)	I) (O )	(0.)		_
Dwelling volume				(3a)+(3b)	)+(3c)+(3c	d)+(3e)+	.(3n) =	352.5	(5)
2. Ventilation rate:	main sec	ondary	other		total			m³ per hou	r
Number of allipsychia	heating hea	ating		r			40 =		_
Number of chimneys		<u> </u>	0	] = [	0			0	(6a)
Number of open flues	0 +	0 +	0	] = [	0		20 =	0	(6b)
Number of intermittent fa				Ĺ	0		10 =	0	(7a)
Number of passive vents	<b>;</b>			L	0	X '	10 =	0	(7b)
Number of flueless gas fi	ires				0	X 4	40 =	0	(7c)
							Air ch	nanges per ho	our
Infiltration due to chimne	vs. flues and fans = $(6a)$	+(6b)+(7a)+(7b)-	н(7c) =	Г	0		÷ (5) =	0	(8)
'	peen carried out or is intended,			continue fr			- (3) =	0	(0)
Number of storeys in the	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber fra resent, use the value correspon			•	uction			0	(11)
deducting areas of openii		riding to the grea	aler wall are	a (aitei					
If suspended wooden f	floor, enter 0.2 (unsealed	d) or 0.1 (sea	led), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
ŭ	s and doors draught strip	ped						0	(14)
Window infiltration			0.25 - [0.2		_	. (45)		0	(15)
Infiltration rate	aEO aypragad in auhia	matraa nar h	(8) + (10)	, , ,	, , ,	, ,	oroo	0	(16)
If based on air permeabil	q50, expressed in cubic	•	•	•	etre or e	envelope	area	3	$= \begin{pmatrix} (17) \\ (49) \end{pmatrix}$
	es if a pressurisation test has be				is being u	sed	ļ	0.15	(18)
Number of sides sheltere			,	·	J			0	(19)
Shelter factor			(20) = 1 -	[0.0 <b>75</b> x (1	9)] =			1	(20)
Infiltration rate incorporat	ting shelter factor		(21) = (18)	x (20) =				0.15	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7							_	
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4								
	<del>'                                    </del>	0.95 0.95	0.92	1	1.08	1.12	1.18		
		<del></del>	•					•	

Adjusted infiltr	ation rate	e (allowi	ing for sh	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
0.19	0.19	0.18	0.16	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18	]	
Calculate effe If mechanic		•	iale ioi l	пе аррп	cable ca	ise						0.5	(23
If exhaust air h	eat pump ι	using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b	) = (23a)			0.5	(23
If balanced with	h heat reco	very: effic	eiency in %	allowing f	for in-use f	actor (fron	n Table 4h	ı) =				74.8	(23
a) If balance	ed mecha	anical ve	entilation	with he	at recov	ery (MVI	HR) (24a	a)m = (2	2b)m + (	23b) × [	1 – (23c)	÷ 100]	_
(24a)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(24
b) If balance	ed mecha	anical ve	entilation	without	heat red	covery (I	MV) (24b	o)m = (22	2b)m + (2	23b)		_	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)r	nouse ext n < 0.5 ×			•					.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)r	ventilation $v = 1$ , the								0.5]			'	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	nter (24a	) or (24k	o) or (24	c) or (24	d) in bo	x (25)	-	-	-		
(25)m= 0.32	0.31	0.31	0.29	0.29	0.27	0.27	0.26	0.28	0.29	0.29	0.3		(25
3. Heat losse	s and he	eat loss i	paramet	er:									
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/I	K)	k-value kJ/m²-l		X k /K
Nindows Type	e 1				28.56	₃ x1	/[1/( 1.4 )+	0.04] =	37.86				(27
Windows Type	e 2				5.5	_x 1	/[1/( 1.4 )+	0.04] =	7.29				(2
Nindows Type	e 3				5.47	_x 1	/[1/( 1.4 )+	0.04] =	7.25				(2
Walls Type1	95.1	6	39.5	3	55.63	3 x	0.18	=	10.01		60	3337.8	3 (2
Walls Type2	41.0	2	0		41.02	2 x	0.17	=	6.89		60	2461.2	2 (29
Roof	133.0	02	0		133.0	2 x	0.13	<u> </u>	17.29		9	1197.1	8 (30
Total area of e	elements	, m²			269.2	2							(3
Party wall					12.16	3 x	0	=	0		45	547.2	(3
Party floor					133.0	2					40	5320.8	3 (32
nternal wall **	•				196.4	7				Ī	9	1768.2	3 (32
* for windows and ** include the are						lated using	g formula 1	l/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	1 3.2	
abric heat lo	ss, W/K =	= S (A x	U)				(26)(30	) + (32) =				86.6	(33
Heat capacity	Cm = S(	Axk)						((28).	(30) + (32	2) + (32a).	(32e) =	14632.41	(34
Thermal mass	parame	ter (TMF	= Cm -	- TFA) ir	n kJ/m²K			= (34)	÷ (4) =			110	(3
For design asses can be used inste				construct	ion are no	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f		
Thermal bridg	•	,		• .	•	K						11.16	(3
f details of therma		are not kn	own (36) =	= 0.05 x (3	31)			(22) •	(36) -			<b></b>	¬
Total fabric he		aloulotos	1 monthly	,				. ,	(36) =	25\m v (5)		97.77	(3
entilation hea			·		lı	16.0	۸	<del>- `                                   </del>	= 0.33 × (	<u>, , , , , , , , , , , , , , , , , , , </u>		1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	j	

(20) 20.0	1 20 47	20.02	22.05	22.44	24.02	24.02	20.0	22.44	22.44	1 24 20	25.40		(38)
(38)m= 36.9	36.47	36.03	33.85	33.41	31.23	31.23	30.8	32.11	33.41	34.29	35.16		(36)
Heat transfer (39)m= 134.67	134.23	133.8	131.62	131.18	129	129	128.56	(39)m 129.87	= (37) + (31.18)	38)m 132.05	132.93		
(39)111= 134.67	134.23	133.6	131.02	131.16	129	129	126.56			Sum(39) ₁		131.51	(39)
Heat loss para	ameter (l	HLP), W	m²K						= (39)m ÷		12712—	101.01	
(40)m= 1.01	1.01	1.01	0.99	0.99	0.97	0.97	0.97	0.98	0.99	0.99	1		_
Number of day	vs in mo	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	0.99	(40)
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 hea	ting ene	rgy requi	irement:								kWh/ye	ar:	
Assumed occu	unancy	N											(42)
if TFA > 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9	)2)] + 0.0	0013 x (	ΓFA -13		.9		(42)
Annual averag	ge hot wa										3.13		(43)
Reduce the annuant not more that 125	_		• •		-	-	to achieve	a water us	se target o	of			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i			<u> </u>			<u> </u>		Сор		1 1101			
(44)m= 113.45	109.32	105.2	101.07	96.94	92.82	92.82	96.94	101.07	105.2	109.32	113.45		
							- /			m(44) ₁₁₂ =		1237.59	(44)
Energy content of			i	,	·	i			`		· ,		
(45)m= 168.24	147.14	151.84	132.37	127.02	109.61	101.57	116.55	117.94	137.45	150.03	162.93	1600.67	(45)
If instantaneous v	vater heati	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46		10tai = Su	m(45) ₁₁₂ =	· [	1622.67	<b></b> (45)
(46)m= 25.24	22.07	22.78	19.86	19.05	16.44	15.23	17.48	17.69	20.62	22.51	24.44		(46)
Water storage			Į.								<u> </u>		
Storage volum	, ,		•			•		ame ves	sel		0		(47)
If community hotherwise if no	•			_			. ,	ers) ente	er '0' in <i>(</i>	(47)			
Water storage			(					,		, ,			
a) If manufact	turer's de	eclared I	oss facto	or is kno	wn (kWh	n/day):					0		(48)
Temperature f											0		(49)
Energy lost from b) If manufact		_	-		or ic not		(48) x (49)	) =		1	10		(50)
Hot water stor			-							0.	02		(51)
If community h	•		on 4.3										
Volume factor			Ol-							-	03		(52)
Temperature f								>	>	0	.6		(53)
Energy lost fro Enter (50) or		_	, KVVN/ye	ear			(47) x (51)	) x (52) x (	53) =		03		(54) (55)
Water storage	. , .	,	for each	month			((56)m = (	55) × (41)ı	m	1.	03		(00)
(56)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contain												хH	. ,
(57)m= 32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)

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 the	rmostat)
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 23.26 22.51 23.	26 22.51 23.26 (59)
Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m	
	0 0 0 (61)
Total heat required for water heating calculated for each month (62)m = $0.85 \times (45)$ n	m + (46)m + (57)m + (59)m + (61)m
(62)m= 223.51 197.07 207.11 185.87 182.29 163.1 156.84 171.82 171.43 192	
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar cont	tribution to water heating)
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)	3,
	0 0 (63)
Output from water heater	
(64)m= 223.51 197.07 207.11 185.87 182.29 163.1 156.84 171.82 171.43 192	2.72 203.53 218.2
Output from water h	<u> </u>
Heat gains from water heating, kWh/month 0.25 $^{\prime}$ [0.85 $\times$ (45)m + (61)m] + 0.8 $\times$ [(46)	
(65)m= 100.16 88.87 94.71 86.81 86.45 79.24 77.99 82.97 82.01 89.	<del></del>
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water	is from community neating
5. Internal gains (see Table 5 and 5a):	
Metabolic gains (Table 5), Watts	
	Oct Nov Dec
(66)m= 145.12 145.12 145.12 145.12 145.12 145.12 145.12 145.12 145.12 145.12 145.12 145.12	5.12   145.12   145.12   (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	
(67)m= 26.86 23.86 19.4 14.69 10.98 9.27 10.02 13.02 17.48 22.	19 25.9 27.61 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	5
(68)m= 301.32 304.45 296.57 279.8 258.62 238.72 225.43 222.3 230.18 246	6.95     268.13     288.03       (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	
(69)m= 37.51 37.51 37.51 37.51 37.51 37.51 37.51 37.51 37.51 37.51 37.51	51 37.51 37.51 (69)
Pumps and fans gains (Table 5a)	
(70)m= 0 0 0 0 0 0 0 0 0 0	0 0 (70)
Losses e.g. evaporation (negative values) (Table 5)	
(71)m= -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -16.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -116.1 -11	6.1 -116.1 -116.1 (71)
Water heating gains (Table 5)	
(72)m= 134.62 132.24 127.29 120.57 116.2 110.05 104.83 111.52 113.9 120	0.86   128.72   132.25   (72)
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m$	
(73)m= 529.35 527.09 509.81 481.59 452.34 424.58 406.81 413.38 428.09 456	
6. Solar gains:	(1.07)
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the app	plicable orientation.
Orientation: Access Factor Area Flux g_	FF Gains
Table 6d m ² Table 6a Table 6b	Table 6c (W)
Northeast 0.9x 0.77 x 28.56 x 11.28 x 0.63	x 0.7 = 98.48 (75)
North cost a c	$\times$ 0.7 = 200.46 (75)
0.00	200.40

Temperature of Utilisation fact	during he	eating p	eriods in the	living			ole 9,	Th1 (°C)				21	(85)
(84)m= 708.54 7. Mean interr		1084.29 erature			635.98	1545.73	1344	1.17 1108.54	864.8	7 711.01	663.18		(84)
Total gains – in			<u> </u>		<u>`</u>		40.	147 4400 7 1	00:5	7 744 24	000 10	1	(0.4)
(83)m= 179.19		574.48				1138.92	930.	.79 680.45	408.3	3 221.72	148.75		(83)
Solar gains in v	vatts, ca	culated	for each mo	onth_			(83)m	= Sum(74)m	(82)m			1	
. 35.4.110000.9X	0.77	X	5.47			).21	<b>^</b>	0.63	X	0.7	=	15.4	(01)
Northwest 0.9x	0.77	×	5.47	× x	_	4.2	X X	0.63	X     →	0.7	<b>-</b>   -	23.73	(81)
Northwest 0.9x	0.77	×	5.47	x		8.07	X	0.63	X     J     J	0.7	=	46.92	(81)
Northwest 0.9x	0.77	X	5.47	X		0.42	X	0.63	X	0.7	_ =	84.29	(81)
Northwest 0.9x	0.77	X	5.47	X	-	2.63	X	0.63	×	0.7	=	121.41	(81)
Northwest 0.9x	0.77	×	5.47	×		1.1	X	0.63	×	0.7	=	152.29	(81)
Northwest 0.9x	0.77	X	5.47	X	9	7.38	X	0.63	X	0.7	=	162.8	(81)
Northwest _{0.9x}	0.77	x	5.47	X	9	1.35	x	0.63	×	0.7	=	152.7	(81)
Northwest 0.9x	0.77	x	5.47	X	6	7.96	X	0.63	×	0.7	=	113.6	(81)
Northwest _{0.9x}	0.77	x	5.47	X	4	1.38	x	0.63	×	0.7	=	69.17	(81)
Northwest 0.9x	0.77	x	5.47	X	2	2.97	x	0.63	X	0.7	=	38.39	(81)
Northwest 0.9x	0.77	x	5.47	X	1	1.28	X	0.63	X	0.7	=	18.86	(81)
Southeast 0.9x	0.77	х	5.5	X	3	1.49	x	0.63	X	0.7	=	52.93	(77)
Southeast 0.9x	0.77	X	5.5	X	4	4.07	x	0.63	X	0.7	=	74.08	(77)
Southeast 0.9x	0.77	x	5.5	X	6	9.27	X	0.63	X	0.7	=	116.43	(77)
Southeast 0.9x	0.77	×	5.5	X	9	2.85	X	0.63	×	0.7	=	156.07	(77)
Southeast 0.9x	0.77	X	5.5	X	10	)4.39	x	0.63	×	0.7	=	175.47	(77)
Southeast 0.9x	0.77	x	5.5	X	11	3.91	x	0.63	×	0.7	=	191.47	(77)
Southeast 0.9x	0.77	×	5.5	x	11	8.15	x	0.63	×	0.7	=	198.6	(77)
Southeast 0.9x	0.77	x	5.5	X	11	9.01	x	0.63	×	0.7	=	200.04	(77)
Southeast _{0.9x}	0.77	x	5.5	×	10	06.25	x	0.63	×	0.7		178.6	(77)
Southeast 0.9x	0.77	×	5.5	x	8	5.75	x	0.63	×	0.7		144.14	(77)
Southeast 0.9x	0.77	x	5.5	X		2.67	X	0.63	×	0.7	=	105.35	(77)
Southeast 0.9x	0.77	×	5.5	x	-	6.79	X	0.63	×	0.7	= =	61.85	(77)
Northeast 0.9x	0.77	= x	28.56	$\frac{1}{x}$	-	.21	x	0.63	d x	0.7		80.42	(75)
Northeast 0.9x	0.77	= ^	28.56	$\exists \hat{x}$		4.2	x	0.63	^   x	0.7		123.91	(75)
Northeast 0.9x	0.77	$=$ $\frac{1}{x}$	28.56	$\exists \hat{x}$		8.07	] ^     _x	0.63	$=$ $\frac{1}{x}$	0.7		244.98	(75)
Northeast 0.9x	0.77	$=$ $\frac{1}{x}$	28.56	$\exists \hat{x}$		0.42	^     x	0.63	$\frac{1}{x}$	0.7		440.09	(75)
Northeast 0.9x	0.77	=  ^	28.56	$\exists \hat{x}$		2.63	^     _x	0.63	$\frac{1}{x}$	0.7	<del>-</del>	633.91	(75)
Northeast 0.9x	0.77	$=$ $\frac{1}{x}$	28.56	$\exists \hat{x}$		1.1	] ^     _x	0.63	$=$ $\frac{1}{x}$	0.7	_ =	795.16	(75)
Northeast 0.9x	0.77	=  ^	28.56	$\exists \hat{x}$		7.38	) ^     x	0.63	$\frac{1}{x}$	0.7	<del></del>	850	(75)
Northeast 0.9x	0.77	— x	28.56	$\exists \hat{x}$	-	1.35	x	0.63	$=$ $\frac{1}{x}$	0.7		797.3	(75)
Northeast 0.9x	0.77	X	28.56	<b>=</b> x		7.96	X	0.63	×	0.7	╡ .	593.14	(75)

(86)m= 0.98	0.96	0.92	0.81	0.64	0.47	0.36	0.42	0.67	0.89	0.97	0.98		(86)
Mean interna	al temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	' in Table	e 9c)					
(87)m= 18.94	19.24	19.74	20.35	20.75	20.93	20.98	20.96	20.79	20.21	19.47	18.89		(87)
Temperature	during h	neating p	eriods ir	n rest of	dwelling	from Ta	ıble 9, Ti	h2 (°C)					
(88)m= 20.07	20.08	20.08	20.09	20.09	20.11	20.11	20.11	20.1	20.09	20.09	20.08		(88)
Utilisation fa	ctor for g	ains for	rest of d	welling,	h2,m (se	ee Table	9a)						
(89)m= 0.98	0.95	0.9	0.78	0.6	0.42	0.29	0.35	0.61	0.87	0.96	0.98		(89)
Mean interna	al temper	ature in	the rest	of dwelli	ing T2 (f	ollow ste	ps 3 to 7	7 in Tabl	le 9c)				
(90)m= 17.29	17.73	18.45	19.3	19.82	20.05	20.09	20.09	19.9	19.13	18.07	17.23		(90)
			-	-			-	1	fLA = Livin	g area ÷ (	4) =	0.51	(91)
Mean interna	al temper	ature (fo	r the wh	ole dwe	lling) = f	LA × T1	+ (1 – fL	.A) × T2			·		
(92)m= 18.12	18.49	19.1	19.83	20.29	20.49	20.54	20.53	20.35	19.67	18.77	18.07		(92)
Apply adjust	ment to t	he mear	interna	l temper	ature fro	m Table	4e, whe	ere appr	opriate	•	•		
(93)m= 18.12	18.49	19.1	19.83	20.29	20.49	20.54	20.53	20.35	19.67	18.77	18.07		(93)
8. Space hea	ating requ	uirement											
Set Ti to the			•		ned at st	ep 11 of	Table 9	o, so tha	t Ti,m=(	76)m an	d re-calc	culate	
the utilisation	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fa			<u> </u>	Iviay	Juli	Jui	Aug	Зер	Oct	INOV	Dec		
(94)m= 0.97	0.94	0.89	0.77	0.61	0.44	0.32	0.38	0.63	0.86	0.95	0.97		(94)
Useful gains	, hmGm	, W = (94	4)m x (8	4)m									
(95)m= 684.11	819.77	961.78	1055.9	977.49	720.69	497.42	512.66	696.57	742.71	673.27	643.87		(95)
Monthly ave	rage exte	rnal tem	perature	from Ta	able 8								
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rat	e for me	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m	]				
(97)m= 1861.34					760.2	508.39	530.98	812.05		1541.61	1843.77		(97)
Space heatir	<del></del>	1							<del></del>	<del></del>		I	
(98)m= 875.86	675.39	538.87	275.36	111.09	0	0	0	0	333.05	625.21	892.72		7,
							Tota	l per year	(kWh/year	r) = Sum(9	8)15,912 =	4327.55	(98)
Space heatir	ng require	ement in	kWh/m²	²/year								32.53	(99)
9b. Energy re	quiremer	nts – Cor	mmunity	heating	scheme	;							
This part is us			• .		_		<b>.</b>	•		unity scl	neme.		7,
Fraction of sp	ace heat	from se	condary	/supplen	nentary I	neating (	Table 1	1) 'U' if n	one			0	(301)
Fraction of sp	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The community sincludes boilers,									up to four	other heat	sources; t	he latter	
Fraction of he		-			rom powe	stations.	see Appei	iuix C.				1	(303a)
Fraction of tot	al space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor for con	·			•		r commu	unity hea	iting sys	tem			1	(305)
Distribution lo				,	,		•	0 ,				1.05	(306)
Space heating			,		•	- ,						kWh/yea	l r
Annual space	_	requiren	nent									4327.55	
	3	•											

Space heat from Community boilers		(98) x (304a) x	x (305) x (306) =	Г	4543.92	(307a)
Efficiency of secondary/supplementary	heating system in % (	from Table 4a or Apper	ndix E)	F	0	] (308
Space heating requirement from secon	dary/supplementary s	ystem (98) x (301) x 1	100 ÷ (308) =	F	0	(309)
Water heating						_
Annual water heating requirement					2273.51	
If DHW from community scheme: Water heat from Community boilers		(64) x (303a) x	x (305) x (306) =		2387.19	(310a)
Electricity used for heat distribution		0.01 × [(307a)(307	7e) + (310a)(310e)]	=	69.31	(313)
Cooling System Energy Efficiency Ration	0				0	(314)
Space cooling (if there is a fixed cooling	g system, if not enter (	= (107) ÷ (314)	) =		0	(315)
Electricity for pumps and fans within dv mechanical ventilation - balanced, extra	• ,	m outside			325.12	(330a)
warm air heating system fans				Ī	0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330		325.12	(331)	
Energy for lighting (calculated in Apper	ndix L)				474.41	(332)
Total delivered energy for all uses (307	') + (309) + (310) + (31	2) + (315) + (331) + (33	32)(237b) =		7730.65	(338)
12b. CO2 Emissions – Community hea	ting scheme					
12b. CO2 Emissions – Community hea	ting scheme	Energy kWh/year	Emission factor		missions g CO2/year	
CO2 from other sources of space and verificiency of heat source 1 (%)	water heating (not CHI	kWh/year	kg CO2/kWh	kç		(367a)
CO2 from other sources of space and v	water heating (not CHF If there is CHP u	kWh/year	kg CO2/kWh	kç	g CO2/year	(367a) (367)
CO2 from other sources of space and vertice Efficiency of heat source 1 (%)	water heating (not CHF If there is CHP u	kWh/year  P) sing two fuels repeat (363) to	kg CO2/kWh	<b>k</b> (	g CO2/year	J ` ` `
CO2 from other sources of space and v Efficiency of heat source 1 (%) CO2 associated with heat source 1	water heating (not CHF If there is CHP u	kWh/year  P) sing two fuels repeat (363) to p)+(310b)] x 100 ÷ (367b) x	kg CO2/kWh  (366) for the second  0.22  0.52	fuel =	96 1559.5	(367)
CO2 from other sources of space and vertical energy for heat distribution	water heating (not CHF If there is CHP u [(307) systems	kWh/year  P) sing two fuels repeat (363) to p)+(310b)] x 100 ÷ (367b) x  [(313) x	kg CO2/kWh  (366) for the second  0.22  0.52	fuel = =	96 1559.5 35.97	(367)
CO2 from other sources of space and vertical energy for heat distribution Total CO2 associated with community seems of space and vertical energy for heat distribution	water heating (not CHF If there is CHP u [(307) systems econdary)	kWh/year  P) sing two fuels repeat (363) to p)+(310b)] x 100 ÷ (367b) x  [(313) x  (363)(366) + (368)(376)  (309) x	kg CO2/kWh  (366) for the second  0.22  0.52	fuel = = = =	96 1559.5 35.97 1595.47	(367) (372) (373)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so	water heating (not CHF  If there is CHP u  [(307) systems econdary) rsion heater or instanta	kWh/year  P) sing two fuels repeat (363) to p)+(310b)] x 100 ÷ (367b) x  [(313) x  (363)(366) + (368)(376)  (309) x	kg CO2/kWh  0 (366) for the second  0.22  0.52  0	fuel = = = = =	96 1559.5 35.97 1595.47	(367) (372) (373) (374)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community and CO2 associated with space heating (see CO2 associated with water from immerse	water heating (not CHF  If there is CHP us  [(307) systems econdary) rsion heater or instantal water heating	kWh/year  P) sing two fuels repeat (363) to p)+(310b)] x 100 ÷ (367b) x  [(313) x  (363)(366) + (368)(373)  (309) x  neous heater (312) x  (373) + (374) + (375) =	kg CO2/kWh  0 (366) for the second  0.22  0.52  0	fuel = = = = =	96 1559.5 35.97 1595.47 0	(367) (372) (373) (374) (375)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community and CO2 associated with space heating (see CO2 associated with water from immeratoral CO2 associated with space and verifications.	water heating (not CHF  If there is CHP us  [(307)  systems econdary) rsion heater or instantal water heating ups and fans within dwa	kWh/year  P) sing two fuels repeat (363) to p)+(310b)] x 100 ÷ (367b) x  [(313) x  (363)(366) + (368)(373)  (309) x  neous heater (312) x  (373) + (374) + (375) =	kg CO2/kWh  0 (366) for the second  0.22  0.52  0  0  0.22	fuel = = = = = = = =	96 1559.5 35.97 1595.47 0	(367) (372) (373) (374) (375) (376)
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CO2 from other sources of space and of Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community of CO2 associated with space heating (see CO2 associated with water from immer Total CO2 associated with space and of CO2 associated with electricity for pure CO2 associated with electricity for light	water heating (not CHF  If there is CHP us  [(307) systems econdary) rsion heater or instantal water heating ups and fans within dwo	kWh/year  P) sing two fuels repeat (363) to p)+(310b)] x 100 ÷ (367b) x  [(313) x  (363)(366) + (368)(37  (309) x  neous heater (312) x  (373) + (374) + (375) =  elling (331)) x	kg CO2/kWh  0 (366) for the second  0.22  0.52  0  0.22	fuel	96 1559.5 35.97 1595.47 0 0 1595.47 168.74 246.22	(367) (372) (373) (374) (375) (376) (378) (379)