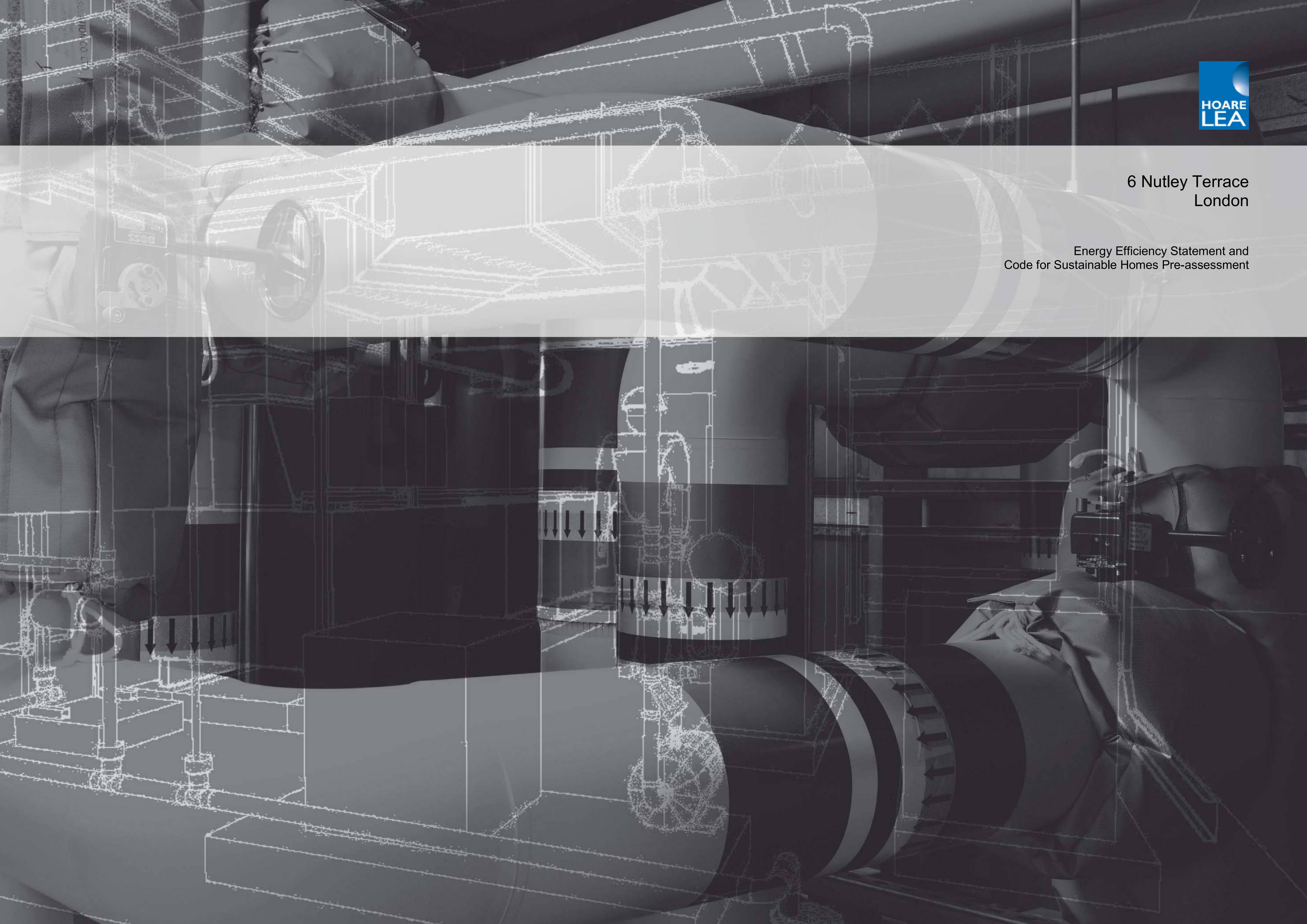


6 Nutley Terrace
London

Energy Efficiency Statement and
Code for Sustainable Homes Pre-assessment

Audit Sheet

Revision	Description	Date	Issued by	Reviewed by
-	Draft for Comment	Nov 2011	C Parkin	
02	For Planning	Feb 2012	C Parkin	C Dougan
03	Revised for Planning	Oct 2012	C Parkin	C Dougan

Contents

1.0 Executive Summary

To meet the requirements of the London Borough of Camden planning policies relating to energy and sustainability and to meet the requirements of the Building Regulation Approved Document Part L1A 2010 the following measures are proposed:

- Enhanced building fabric performance – U-values and air tightness
- Enhanced buildings services performance – high efficiency equipment and low energy lighting
- Use of air source heat pumps and underfloor heating
- Use of solar PV

Use of micro-CHP, solar hot water and wind turbines were considered but are not feasible on this development.

The proposed measures result in the following outcomes:

- Approximately 50% CO2 reduction compared to a Part L 2010 compliant dwelling. This is compared to the planning target of a 25% reduction.
- A 17% reduction in CO2 emissions from low and zero Carbon technologies. This figure is derived from the SAP calculations undertaken and comes from a combination of Air Source Heat Pumps and solar PV. Air source heat pumps and solar PV are recognised as renewable technologies under Camden planning policy guidance CPG3 on Sustainability.
- Dwellings that can work with natural ventilation and maintain occupant comfort
- Code for Sustainable Homes (CSH) Level 4 compliance with a 65% of the energy credits achievable (15% higher than Camden target of 50%)

In addition to the energy credits it is proposed that approximately 65% of the CSH Water credits are achievable, 50% of the Materials credits and 75% of the Waste credits. The full CSH pre-assessment is appended to this document. The pre-assessment demonstrates one possible route to achieving CSH Level 4 and a minimum of 50% of credits in the Energy, Water, Materials and Waste sections.

2.0 Introduction

This report has been prepared to provide a summary of the energy efficiency measures for the proposed 6 Nutley Terrace development. It is intended to address the London Borough of Camden's policies relating to climate change and sustainable design and construction, specifically CS 13 – Tackling Climate Change through Promoting Higher Environmental Standards and DP22 – Promoting Sustainable Design and Construction. It is also written with the requirements of the Camden Planning Guidance 3 – Sustainability document in mind.

3.0 Summary of Key Points from Camden Sustainability Supplementary Planning Guidance

The list below gives the headline requirements of the Camden sustainability planning guidance relating to energy:

- Follow the "*be lean, be clean, be green"* approach
- Account for regulated and unregulated energy using modelled or benchmark data for minor developments
- Demonstrate via modelling that overheating is not an issue
- Demonstrate that natural ventilation has been considered in the design
- Connect to existing district heating networks or provide CHP onsite
- Aim to achieve a 20% CO2 reduction from renewables
- Aim to achieve at least 50% of energy credits under the Code for Sustainable Homes

4.0 Summary of Key Points from Part L1A 2010

Part L1A 2010 gives five criteria by which a development must provide evidence of compliance (refer to table below). Note that Criteria 4 and 5 will be evidenced at the construction/completion stage. This report addresses steps taken to improve the design in order to meet Criterion 1, 2 and 3.

CRITERION 1:	*"The calculated rate of CO_2 emissions from the dwelling (the Dwelling Emission Rate, DER) must not be greater than the Target Emission Rate, TER)"*
CRITERION 2:	*"The performance of the building fabric and the fixed building services* [heating, hot water and fixed lighting systems] *should achieve reasonable overall standards of energy efficiency"*
CRITERION 3:	*"The dwelling has appropriate passive control measures to limit the effect of solar gains on indoor temperatures in summer, regardless of whether or not the dwelling has mechanical cooling."*
CRITERION 4:	*"The performance of the dwelling, as built, is consistent with the DER"*
CRITERION 5:	*"The necessary provisions for energy efficient operation of the dwelling should be put in place."*

4.1 Achievement of Compliance

Some additional information on how to meet each criterion is provided below:

Criterion 1

To pass Criterion 1, the Dwelling Emission Rate (DER) must be less than the Target Emissions Rate (TER), i.e. DER<TER.

The development aims to demonstrate a good level of energy efficiency that will reduce carbon emissions due to heating, hot water generation, lighting, fans and pumps.

Criterion 2

To pass Criterion 2 the minimum performance standards set out in the Approved Documents and supporting documentation must be met or exceeded. These are set out in Sections 4.2 and 4.3.

Criterion 3

To pass Criterion 3, the dwelling must have less than a "High" risk of high internal temperatures. The table below shows the range of possible outcomes ranging from "Not Significant" to "High".

$T_{threshold}$	Likelihood of high internal temperature in hot weather
<20.5°C	Not significant
≤ 20.5°C and <22°C	Slight
≤ 22.0°C and <22°C	Medium
≥ 23.5°C	High

4.2 Fabric Performance

The limiting standards from the approved documents relating to building fabric are shown in the table below:

	Approved Document L1A 2010 Table 2	Approved Document C 2004
Element	**Maximum area-weighted average U-value** ($W/m^2.K$)	**Absolute Maximum U-value** ($W/m^2.K$)
Roof	0.20	0.35
Wall	0.30	0.7
Ground Floor	0.25	0.7
Party Wall	0.2	No limit
Windows, roof windows, glazed rooflights, curtain walling and pedestrian doors	2.0	No limit

Other limiting standards are:

1. Air permeability – shall be <10 $m^3/hr.m^2$ @ 50Pa
2. Thermal bridging – *"the building fabric should be constructed such that there are no reasonably avoidable thermal bridges".*

4.3 Fixed Building Services Performance

The limiting standards from the approved documents and supporting documents relating to building services are shown below:

Plant Item	**Criteria**
Air Source Heat Pumps (space heating)	COP > 2.2
Air Source Heat Pumps (DHW)	COP > 2.0
Air Source Heat Pumps	Seasonal Performance Factor > 2.7
Air Source Heat Pumps (cooling)	EER > 2.4
Ventilation unit (MVHR) Specific Fan Power	<1.5W/l/s
MVHR heat recovery efficiency	>70%

Minimum efficiency standards also apply to domestic lighting installations.

For fixed internal lighting these are:

1. At least 75% of frequently used light fittings shall be low energy type.
2. Low energy lights shall have an efficacy >45 lumens per circuit Watt

For fixed external lighting these are:

1. External lighting with automatic presence and daylight control shall have a lamp capacity of <100 Watts
2. External lighting with automatic presence and manual control shall have an efficacy >45 lumens per circuit Watt

5.0 Proposed Measures to meet Camden Sustainability Policies and Part L1A 2010

The following section summarises the proposed energy efficiency strategy.

5.1 Software Modelling

A sample SAP assessment (using NHER software Plan Assessor Version v5.4.1) has been carried out on the proposed development. The SAP worksheets are contained within the Appendices.

5.2 Baseline Energy Assessment

The baseline CO2 emissions are based on a Part L 2010 compliant building. The Target Emission Rate (TER) figures are used to calculate the baseline. The baseline shown is for the single house modelled.

kgCO2 per annum				
Space Heating	**Domestic Hot Water**	**Cooling**	**Lighting**	**Fans & Pumps**
10,374	791	0	720	74

Total CO2 emissions are 11,959 kg per annum.

5.3 Fabric Performance (be lean)

To reduce energy demand by passive means (*be lean*) the building fabric performance will significantly exceed the requirements of Part L1A 2010.

The values in the table below are those currently proposed.

Element	U-value (W/m^2.K)
Roof	0.13
External Wall	0.18
Ground Floor	0.18
Party Wall	N/A
Windows and glazed rooflights	1.5

Air permeability target construction value of shall be < 3.5 m^3/hr.m^2 @ 50Pa to achieve a maximum of 5 m^3/hr.m^2 @ 50Pa.

It is assumed that quality assured accredited construction details to limit the effects of thermal bridging will not be employed. Refer to "*Limiting thermal bridging and air leakage: robust construction details for dwellings and similar buildings*", TSO, 2001 for such details. The default thermal bridge y-value of 0.15 is therefore assumed.

All windows are assumed to be fully openable and provide (as a minimum) single sided ventilation to assist in reducing summertime temperatures. Glazing areas are limited to reduce overheating risk and to reduce heat loss.

A medium [thermal] weight structure is assumed.

5.4 Fixed Building Services Performance (be lean)

To further reduce energy demand by active means (*be lean*) the building services performance will significantly exceed the requirements of Part L1A 2010.

The following plant criteria are proposed:

Plant Item	Proposed Design
Air Source Heat Pumps (space heating)	COP > 2.8
Air Source Heat Pumps (DHW)	COP > 2.2
Air Source Heat Pumps	Seasonal Performance Factor > 3.0
Air Source Heat Pumps (cooling)	EER > 2.8
Ventilation unit (MVHR) Specific Fan Power	< 0.7W/l/s
MVHR heat recovery efficiency	>85%

In addition, the MVHR unit will be SAP Appendix Q registered.

Lighting is assumed to meet the minimum standards.

5.5 Air Source Heat Pumps (be lean/green)

Air source heat pumps are proposed as an appropriate low carbon technology for this development. The ASHPs will be linked to an underfloor heating system which shall run at low temperature appropriate for use with ASHPs. This is an efficient means of providing space heating and provides a comfortable living environment by the use of a radiant heating source.

The table below shows the CO2 emissions from the analysed house with air source heat pumps.

kgCO2 per annum				
Space Heating	**Domestic Hot Water**	**Cooling**	**Lighting**	**Fans & Pumps**
5037	555	8	700	970

Total CO2 emissions after the application of ASHPs are 7,270 kg per annum.

ASHPs outdoor condenser units will be located at the rear of the properties gardens and will visually screened. Acoustic mitigation measures will be put in place to ensure that noise is not a nuisance for the neighbours. A noise level of 40dBA at 1m from the nearest residential window will be targeted. This should meet any planning conditions relating to noise and will ensure noise is not a nuisance

5.6 Solar PV (be green)

Solar PV panels are proposed as an appropriate renewable technology for this development. The proposed panel layouts are shown on the architect's drawings.

The table below shows the CO2 emissions from the analysed house with air source heat pumps and solar PV.

kgCO2 per annum					
Space Heating	**Domestic Hot Water**	**Cooling**	**Lighting**	**Fans & Pumps**	**Solar PV Generation**
5037	555	8	700	970	-1512

Total CO2 emissions after the application of solar PV are 5,758 kg per annum.

5.7 Other low Carbon and renewable technologies

There are no district networks in the local area which can be feasibly connected to and the site is not appropriate for a Strategic Site to support large scale CHP units to feed a wider district network.

An assessment has been made of micro-CHP units. However, the CO2 reduction benefit of installing these units is very limited. This is due to the mismatch between the high thermal output from the micro-CHP units and the low heat load of each house which leads to the units operating inefficiently. CHP is therefore not appropriate for this development.

Solar thermal panels were considered for the development however the available roof space has been taken by solar PV panels. It is therefore not possible to locate any solar hot water panels on the roof. Inclusion of solar water hot water panels would also reduce the contribution of the low Carbon heat from the ASHPs.

Wind turbines were considered for the development but are not considered appropriate due the excessive height that would be required for them to be clear above trees in the vicinity of the development. Wind turbines are unlikely to be acceptable in the townscape and may produce noise complaints that are not possible to treat with acoustic measures.

5.8 Headline Camden Policies and Summary

The sections above outline the proposed "*be lean, be clean, be green"* approach in line with the Camden hierarchy.

Overheating is addressed under Part L Criterion 3 below.

The main living areas of House 6B will be provided with comfort cooling due to market expectation. However, occupants will always have the choice of using natural ventilation as an alternative. Designing an appropriate, low energy cooling system into the scheme at an early stage will avoid occupants retrofitting inefficient systems at a later date. As can be seen in the SAP worksheet results and above, CO2 emissions due to cooling are negligible.

The proposed measures results in a DER approximately 50% lower than the TER (see Appendices).

The Borough's requirements for Code for Sustainable Homes are exceeded.

6.0 Part L1A 2010 Results

See the Appendices for the building regulations compliance reports.

6.1 Criterion 1

The area weighted TER is 23.13kgCO$_2$/m^2/yr
The area weighted DER is 11.7kgCO$_2$/m^2/yr

The building is therefore in compliance with the requirements for Part L1A criterion 1.

6.2 Criterion 2

All of the fabric and building services performance standards are shown in the previous sections to be met or exceeded.

The building is therefore in compliance with the requirements for Part L1A criterion 2.

6.3 Criterion 3

The house assessed has an overheating risk of "Not Significant". Therefore the building is compliance with the requirements for Part L1A criterion 3. This also satisfies the Camden policy on preventing overheating and demonstrates that the building can be comfortably occupied without the need for comfort cooling.

Appendix A – Part L1A Building Regulations Compliance Report & SAP Worksheet

SAP 2009 Worksheet

Design - Draft

NHER

This design submission has been carried out using Approved SAP software. It has been prepared from plans and specifications and may not reflect the property as constructed.

Assessor name	Mrs Vicki Limbrick	Assessor number	5907
Client		Last modified	15/11/2011
Address	6B Nutley Terrace 6B, London, NM3* **		

1. Overall dwelling dimensions

		Area (m²)			Average storey height (m)			Volume (m³)	
Lowest occupied		186.50	(1a)	x	2.70	(2a)	=	503.55	(3a)
+1		142.50	(1b)	x	2.70	(2b)	=	384.75	(3b)
+2		126.00	(1c)	x	2.70	(2c)	=	340.20	(3c)
+3		93.30	(1d)	x	2.50	(2d)	=	233.25	(3d)
Total floor area	(1a) + (1b) + (1c) + (1d)...(1n) =	548.30	(4)						
Dwelling volume					(3a) + (3b) + (3c) + (3d)...(3n) =			1461.75	(5)

2. Ventilation rate

			m³ per hour	
Number of chimneys	0	x 40 =	0	(6a)
Number of open flues	0	x 20 =	0	(6b)
Number of intermittent fans	0	x 10 =	0	(7a)
Number of passive vents	0	x 10 =	0	(7b)
Number of flueless gas fires	0	x 40 =	0	(7c)
			Air changes per hour	
Infiltration due to chimneys, flues, fans, PSVs (6a) + (6b) + (7a) + (7b) + (7c) =	0	÷ (5) =	0.00	(8)

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

Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area		5.00	(17)
If based on air permeability value, then (18) = [(17) ÷ 20] + (8), otherwise (18) = (16)		0.25	(18)

Air permeability value applies if a pressurisation test has been done, or a design or specified air permeability is being used

Number of sides on which dwelling is sheltered		1	(19)
Shelter factor	1 - [0.075 x (19)] =	0.92	(20)
Adjusted infiltration rate	(18) x (20) =	0.23	(21)

Infiltration rate modified for monthly wind speed:

Monthly average wind speed from Table 7

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(22)m	5.40	5.10	5.10	4.50	4.10	3.90	3.70	3.70	4.20	4.50	4.80	5.10

∑(22)1...12 = 54.10 (22)

Wind Factor (22a)m = (22)m ÷ 4

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(22a)m	1.35	1.27	1.27	1.12	1.02	0.98	0.92	0.92	1.05	1.12	1.20	1.27

∑(22a)1...12 = 13.52 (22a)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(22b)m	0.31	0.29	0.29	0.26	0.24	0.23	0.21	0.21	0.24	0.26	0.28	0.29

∑(22b)1...12 = 3.13 (22b)

Calculate effective air change rate for the applicable case:

If mechanical ventilation: air change rate through system 0.50 (23a)

If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)), otherwise (23b) = (23a) 0.50 (23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 75.65 (23c)

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

(24a)m	0.43	0.42	0.42	0.38	0.36	0.35	0.34	0.34	0.36	0.38	0.40	0.42	(24a)

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

(25)m	0.43	0.42	0.42	0.38	0.36	0.35	0.34	0.34	0.36	0.38	0.40	0.42	(25)

3. Heat losses and heat loss parameter

The κ-value is the heat capacity per unit area, see Table 1e.

Element	**Gross Area, m²**	**Openings, m²**	**Net area A, m²**		**U-value, W/m²K**		**A x U, W/K**	**κ-value, kJ/m².K**	**A x κ, kJ/K**	
Window*			70.10	x	1.42	=	99.20	N/A	N/A	(27)
Roof window*			2.20	x	1.42	=	3.11	N/A	N/A	(27a)
Basement floor			186.50	x	0.18	=	33.57	N/A	N/A	(28)
Basement wall			134.03	x	0.18	=	24.13	N/A	N/A	(29)
Party Wall			25.38	x	0.00	=	0.00	N/A	N/A	(32)
External wall			347.92	x	0.18	=	62.63	N/A	N/A	(29a)
Roof			196.50	x	0.13	=	25.54	N/A	N/A	(30)
Total area of external elements ∑A, m²			937.25	(31)						

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

Fabric heat loss, W/K = ∑(A × U) (26)...(30) + (32) = 248.18 (33)

Heat capacity Cm = ∑(A x κ) (28)...(30) + (32) + (32a)...(32e) = N/A (34)

Thermal mass parameter (TMP) in kJ/m²K Calculated separately = 250.00 (35)

Thermal bridges: ∑(L x Ψ) calculated using Appendix K 140.59 (36)

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

Total fabric heat loss (33) + (36) = 388.76 (37)

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

(38)m	209.32	200.96	200.96	184.22	173.07	167.49	161.91	161.91	175.86	184.22	192.59	200.96	(38)

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

(39)m	598.09	589.72	589.72	572.99	561.83	556.26	550.68	550.68	564.62	572.99	581.35	589.72	

Average = ∑(39)1...12/12 = 573.22 (39)

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

(40)m	1.09	1.08	1.08	1.05	1.02	1.01	1.00	1.00	1.03	1.05	1.06	1.08	

Average = ∑(40)1...12/12 = 1.05 (40)

4. Water heating energy requirement

kWh/year

Assumed occupancy, N 3.45 (42)

If TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA - 13.9)²)] + 0.0013 x (TFA - 13.9)

If TFA ≤ 13.9, N = 1

Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 116.25 (43)

Annual average hot water usage has been reduced by 5% if the dwelling is designed to achieve a water use target of not more than 125 litres per person per day (all water use, hot and cold)

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

	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
(44)m	127.87	123.22	118.57	113.92	109.27	104.62	104.62	109.27	113.92	118.57	123.22	127.87

∑(44)1...12 = 1395.00 (44)

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

(45)m	190.09	166.25	171.56	149.57	143.51	123.84	114.76	131.69	133.26	155.30	169.52	184.09

∑(45)1...12 = 1833.43 (45)

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

For community heating include distribution loss whether or not hot water tank is present

Distribution loss 0.15 x (45)m

(46)m	28.51	24.94	25.73	22.44	21.53	18.58	17.21	19.75	19.99	23.30	25.43	27.61	(46)

Water storage loss:

a) If manufacturer's declared loss factor is known (kWh/day):	2.50	(47)
Temperature factor from Table 2b	0.54	(48)
Energy lost from water storage, kWh/day (47) x (48)	1.35	(49)
Enter (49) or (54) in (55)	1.35	(55)

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

(56)m	41.85	37.80	41.85	40.50	41.85	40.50	41.85	41.85	40.50	41.85	40.50	41.85	(56)

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

(57)m	41.85	37.80	41.85	40.50	41.85	40.50	41.85	41.85	40.50	41.85	40.50	41.85	(57)

Primary circuit loss (annual) from Table 3   360.00 (58)

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

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

(59)m	30.58	27.62	30.58	29.59	30.58	29.59	30.58	30.58	29.59	30.58	29.59	30.58	(59)

Combi loss for each month from Table 3a, 3b or 3c (enter '0' if not a combi boiler)

(61)m	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)

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

(62)m	262.51	231.67	243.98	219.66	215.94	193.93	187.18	204.11	203.35	227.73	239.61	256.52	(62)

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

(63)m	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

∑(63)1...12 = 0.00 (63)

Output from water heater for each month, kWh/month (62)m + (63)m

(64)m	262.51	231.67	243.98	219.66	215.94	193.93	187.18	204.11	203.35	227.73	239.61	256.52

∑(64)1...12 = 2686.18 (64)

if (64)m < 0 then set to 0

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

(65)m	121.14	107.61	114.98	105.80	105.66	97.25	96.10	101.73	100.38	109.58	112.44	119.15	(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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	207.28	207.28	207.28	207.28	207.28	207.28	207.28	207.28	207.28	207.28	207.28	207.28	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
(67)m	191.74	170.30	138.50	104.85	78.38	66.17	71.50	92.94	124.74	158.39	184.86	197.07	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
(68)m	951.88	961.76	936.87	883.88	816.98	754.12	712.12	702.24	727.13	780.12	847.01	909.88	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
(69)m	59.18	59.18	59.18	59.18	59.18	59.18	59.18	59.18	59.18	59.18	59.18	59.18	(69)
Pumps and fans gains (Table 5a)													
(70)m	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	(70)
Losses e.g. evaporation (negative values) (Table 5)													
(71)m	-138.19	-138.19	-138.19	-138.19	-138.19	-138.19	-138.19	-138.19	-138.19	-138.19	-138.19	-138.19	(71)
Water heating gains (Table 5)													
(72)m	162.83	160.14	154.55	146.95	142.01	135.07	129.16	136.73	139.42	147.28	156.16	160.15	(72)

Total internal gains (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m

(73)m	1444.73	1430.47	1368.19	1273.95	1175.66	1093.63	1051.06	1070.18	1129.57	1224.07	1326.31	1405.37	(73)

6. Solar gains

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

Rows (74) to (82) are used 12 times, one for each month, repeating as needed if there is more than one window type.

Details for month of January and annual totals are shown below:

	Access factor Table 6d		Area m²		Solar flux W/m²		g Specific data or Table 6b		FF Specific data or Table 6c		Gains (W)	
North	0.54	x	5.75	x	10.73	x 0.9 x	0.65	x	0.70	=	13.64	(74)
North	0.77	x	16.95	x	10.73	x 0.9 x	0.65	x	0.70	=	57.33	(74)
East	0.77	x	3.60	x	19.87	x 0.9 x	0.65	x	0.70	=	22.56	(76)
South	0.54	x	10.00	x	47.32	x 0.9 x	0.65	x	0.70	=	104.65	(78)
South	1.00	x	26.80	x	47.32	x 0.9 x	0.65	x	0.70	=	519.35	(78)
West	0.54	x	2.50	x	19.87	x 0.9 x	0.65	x	0.70	=	10.99	(80)
West	0.77	x	4.50	x	19.87	x 0.9 x	0.65	x	0.70	=	28.20	(80)
Rooflights	1.00	x	2.20	x	26.00	x 0.9 x	0.65	x	0.70	=	23.42	(82)

Solar gains in watts, calculated for each month ∑(74)m...(82)m

(83)m	780.13	1320.75	1739.05	2166.66	2445.68	2533.90	2460.90	2229.43	1923.48	1495.82	933.27	668.20	(83)

Total gains - internal and solar (73)m + (83)m

(84)m	2224.86	2751.22	3107.24	3440.61	3621.34	3627.53	3511.96	3299.62	3053.04	2719.89	2259.58	2073.58	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1(˚C) 21.00 (85)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains for living area, η1,m (see Table 9a)													
(86)m	1.00	1.00	1.00	0.99	0.96	0.84	0.62	0.66	0.92	0.99	1.00	1.00	(86)
Mean internal temp of living area T1 (steps 3 to 7 in Table 9c)													
(87)m	19.96	20.08	20.26	20.47	20.72	20.88	20.94	20.94	20.82	20.54	20.18	19.98	(87)
Temperature during heating periods in the living area from Table 9, Th2(˚C)													
(88)m	20.01	20.02	20.02	20.05	20.06	20.07	20.08	20.08	20.06	20.05	20.04	20.02	(88)
Utilisation factor for gains for rest of dwelling η2,m (see Table 9a)													
(89)m	1.00	1.00	1.00	0.98	0.93	0.76	0.49	0.52	0.87	0.99	1.00	1.00	(89)
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)													
(90)m	18.59	18.78	19.05	19.38	19.74	19.95	20.01	20.01	19.87	19.47	18.94	18.64	(90)
Living area fraction								fLA 87.50		÷ (4) =		0.16	(91)
Mean internal temperature for the whole dwelling fLA x T1 +(1 - fLA) x T2													
(92)m	18.81	18.99	19.24	19.55	19.89	20.10	20.16	20.15	20.03	19.64	19.14	18.86	(92)
Apply adjustment to the mean internal temperature from Table 4e, where appropriate													
(93)m	18.81	18.99	19.24	19.55	19.89	20.10	20.16	20.15	20.03	19.64	19.14	18.86	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that tim = (93)m and recalculate the utilisation factor for gains using Table 9a)													
Utilisation factor for gains, ηm													
(94)m	1.00	1.00	0.99	0.98	0.93	0.77	0.50	0.53	0.87	0.98	1.00	1.00	(94)
Useful gains, ηmGm, W = (94)m x (84)m													
(95)m	2223.45	2745.80	3088.39	3377.41	3361.54	2782.89	1772.67	1765.17	2653.65	2676.12	2256.17	2072.54	(95)
Monthly average external temperature from Table 8													
(96)m	4.50	5.00	6.80	8.70	11.70	14.60	16.90	16.90	14.30	10.80	7.00	4.90	(96)
Heat loss rate for mean internal temperature, Lm, W													
(97)m	8558.90	8249.49	7338.30	6218.13	4604.11	3058.51	1793.12	1792.34	3232.77	5066.85	7058.17	8230.12	(97)

Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m

(98)m	4713.57	3698.48	3161.93	2045.31	924.47	0.00	0.00	0.00	0.00	1778.70	3457.43	4581.24

Total per year (kWh/year) = ∑(98)1...5, 10...12 = 24361.15 (98)

Space heating requirement in kWh/m²/year (98) ÷ (4) 44.43 (99)

8c. Space cooling requirement

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

Calculated for June, July and August. See Table 10b.

Heat loss rate Lm (calculated using 24˚C internal temperature and external temperature from Table 10)

(100)m	0.00	0.00	0.00	0.00	0.00	4783.80	3414.20	3414.20	0.00	0.00	0.00	0.00	(100)

Utilisation factor for loss, ηm

(101)m	0.00	0.00	0.00	0.00	0.00	0.77	0.90	0.87	0.00	0.00	0.00	0.00	(101)

Useful loss, ηmLm (Watts) = (100)m x (101)m

(102)m	0.00	0.00	0.00	0.00	0.00	3676.09	3059.03	2981.74	0.00	0.00	0.00	0.00	(102)

Gains (internal gains as for heating except that column (A) of Table 5 is always used; solar gains calculated for applicable weather region based on Table 10, not Table 6a)

(103)m	0.00	0.00	0.00	0.00	0.00	4043.59	3864.43	3628.93	0.00	0.00	0.00	0.00	(103)

Space cooling requirement for the month, whole dwelling, continuous (kWh) = 0.024 x [(103)m - (102)m] x (41)m

set (104)m to zero if (104)m < 3 x (98)m with (98)m with (98)m calculated using weather data from Table 10

(104)m	0.00	0.00	0.00	0.00	0.00	264.60	599.22	481.51	0.00	0.00	0.00	0.00

Total = ∑(104)6...8 = 1345.33 (104)

Cooled fraction fc = cooled area ÷ (4) = 0.18 (105)

Intermittency factor (Table 10b)

(106)m	0.00	0.00	0.00	0.00	0.00	0.25	0.25	0.25	0.00	0.00	0.00	0.00

Total = ∑(106)6...8 = 0.75 (106)

Space cooling requirement for month = (104)m x (105) x (106)m

(107)m	0.00	0.00	0.00	0.00	0.00	12.06	27.32	21.95	0.00	0.00	0.00	0.00

Total = ∑(107)6...8 = 61.34 (107)

Space cooling requirement in kWh/m²/year (107) ÷ (4) = 0.11 (108)

9a. Energy Requirements - Individual heating systems including micro-CHP

Space heating:

Fraction of space heating from secondary/supplementary system (Table 11)	0.00	(201)
Fraction of space heating from main system(s) 1 - (201)	1.00	(202)
Fraction of main heating from main system 2	0.00	(203)
Fraction of total space heat from main system 1 (202) x [1 - (203)]	1.00	(204)
Fraction of total space heat from main system 2 (202) x (203)	0.00	(205)
Efficiency of main space heating system 1 (%)	250.00	(206)

(from database or Table 4a/4b, adjusted where appropriate by the amount shown in the 'space efficiency adjustment' column of Table 4c)

Cooling System Energy Efficiency Ratio (see Table 10c) 3.78 (209)

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

Space heating requirement, kWh/month (as calculated above)

(98)m	4713.57	3698.48	3161.93	2045.31	924.47	0.00	0.00	0.00	0.00	1778.70	3457.43	4581.24

Space heating fuel (main heating system 1), kWh/month = (98)m x (204) x 100 ÷ (206)

(211)m	1885.43	1479.39	1264.77	818.13	369.79	0.00	0.00	0.00	0.00	711.48	1382.97	1832.50

Total per year (kWh/year) = ∑(211)1...5, 10...12 = 9744.46 (211)

Water heating:

Output from water heater, kWh/month (calculated above)

(64)m	262.51	231.67	243.98	219.66	215.94	193.93	187.18	204.11	203.35	227.73	239.61	256.52

∑(64)1...12 = 2686.18 (64)

Efficiency of water heater per month

(217)m	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00

Fuel for water heating, kWh/month = (64)m x 100 ÷ (217)m

(219)m	105.01	92.67	97.59	87.86	86.38	77.57	74.87	81.64	81.34	91.09	95.84	102.61

Total per year (kWh/year) = ∑(219)1...12 = 1074.47 (219)

Space cooling

Space cooling fuel, kWh/month (107)m ÷ (209)

(221)m	0.00	0.00	0.00	0.00	0.00	3.19	7.23	5.81	0.00	0.00	0.00	0.00

Total per year (kWh/year) = ∑(221)6...8 = 16.23 (221)

Annual Totals Summary:	**kWh/year**	**kWh/year**	
Space heating fuel used, main system 1		9744.46	(211)
Water heating fuel used		1074.47	(219)
Space cooling fuel used		16.23	(221)
Electricity for pumps, fans and electric keep-hot (Table 4f):			
mechanical ventilation fans - balanced, extract or positive input from outside	1747.67		(230a)
warm air heating system fans	0.00		(230b)
central heating pump	130.00		(230c)
oil boiler pump	0.00		(230d)
boiler flue fan	0.00		(230e)
maintaining electric keep-hot facility for gas combi boiler	0.00		(230f)
pump for solar water heating	0.00		(230g)
Total electricity for the above	∑(230a)...(230g)	1877.67	(231)
Electricity for lighting (calculated in Appendix L):		1354.48	(232)

10a. Fuel costs - Individual heating systems including micro-CHP

	Fuel kWh/year		**Fuel price (Table 12)**		**Fuel cost £/year**	
Space heating - main system 1	9744.46	x	11.46	x 0.01 =	1116.72	(240)
Water heating cost (other fuel)	1074.47	x	11.46	x 0.01 =	123.13	(247)
Space cooling	16.23	x	11.46	x 0.01 =	1.86	(248)
Pumps, fans and electric keep-hot	1877.67	x	11.46	x 0.01 =	215.18	(249)
Energy for lighting	1354.48	x	11.46	x 0.01 =	155.22	(250)
Additional standing charges (Table 12)					0.00	(251)
Total energy cost				(240)...(242) + (245)...(254)	1612.11	(255)

11a. SAP rating - Individual heating systems including micro-CHP

Energy cost deflator (Table 12)		0.47	(256)
Energy cost factor (ECF)	[(255) x (256)] ÷ [(4) + 45.0] =	1.28	(257)
SAP value		82.18	
SAP rating		82	(258)
SAP band		B	

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year		**Emissions Factor**		**Emissions (kgCO2/year)**	
Space heating - main system 1	9744.46	x	0.517	=	5037.89	(261)
Water heating	1074.47	x	0.517	=	555.50	(264)
Space and water heating				(261) + (262) + (263) + (264) =	5593.39	(265)
Space cooling	16.23	x	0.517	=	8.39	(266)
Pumps, fans and electric keep-hot	1877.67	x	0.517	=	970.75	(267)

Lighting	1354.48	x	0.517	=	700.27	(268)
Total carbon dioxide emissions				∑(261)...(271) =	7272.80	(272)
Dwelling carbon dioxide emissions rate				(272) ÷ (4) =	13.26	(273)
EI value					83.57	
EI rating (see section 14)					84	(274)
EI band					B	

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year		Primary Energy Factor		Primary Energy	
Space heating - main system 1	9744.46	x	2.92	=	28453.83	(261*)
Water heating	1074.47	x	2.92	=	3137.46	(264*)
Space and water heating				(261*) + (262*) + (263*) + (264*) =	31591.29	(265*)
Space cooling	16.23	x	2.92	=	47.38	(266*)
Pumps, fans and electric keep-hot	1877.67	x	2.92	=	5482.79	(267*)
Lighting	1354.48	x	2.92	=	3955.08	(268*)
Total primary energy kWh/year				∑(261*)...(271*) =	41076.54	(272*)
Primary energy kWh/m2/year				(272*) ÷ (4) =	74.92	(273*)

TER 2009 Worksheet

Design - Draft

This design submission has been carried out using Approved SAP software. It has been prepared from plans and specifications and may not reflect the property as constructed.

Assessor name	Mrs Vicki Limbrick	Assessor number	5907
Client		Last modified	15/11/2011
Address	6B Nutley Terrace 6B, London, NM3* **		

1. Overall dwelling dimensions

		Area (m²)			Average storey height (m)			Volume (m³)	
Lowest occupied		186.50	(1a)	x	2.70	(2a)	=	503.55	(3a)
+1		142.50	(1b)	x	2.70	(2b)	=	384.75	(3b)
+2		126.00	(1c)	x	2.70	(2c)	=	340.20	(3c)
+3		93.30	(1d)	x	2.50	(2d)	=	233.25	(3d)
Total floor area	(1a) + (1b) + (1c) + (1d)...(1n) =	548.30	(4)						
Dwelling volume					(3a) + (3b) + (3c) + (3d)...(3n) =			1461.75	(5)

2. Ventilation rate

			m³ per hour	
Number of chimneys	0	x 40 =	0	(6a)
Number of open flues	0	x 20 =	0	(6b)
Number of intermittent fans	3	x 10 =	30	(7a)
Number of passive vents	0	x 10 =	0	(7b)
Number of flueless gas fires	0	x 40 =	0	(7c)
			Air changes per hour	
Infiltration due to chimneys, flues, fans, PSVs (6a) + (6b) + (7a) + (7b) + (7c) =	30	÷ (5) =	0.02	(8)

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

Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area		10.00	(17)
If based on air permeability value, then (18) = [(17) ÷ 20] + (8), otherwise (18) = (16)		0.52	(18)

Air permeability value applies if a pressurisation test has been done, or a design or specified air permeability is being used

Number of sides on which dwelling is sheltered		2	(19)
Shelter factor	1 - [0.075 x (19)] =	0.85	(20)
Adjusted infiltration rate	(18) x (20) =	0.44	(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	5.40	5.10	5.10	4.50	4.10	3.90	3.70	3.70	4.20	4.50	4.80	5.10

∑(22)1...12 = 54.10 (22)

Wind Factor (22a)m = (22)m ÷ 4

(22a)m	1.35	1.27	1.27	1.12	1.02	0.98	0.92	0.92	1.05	1.12	1.20	1.27

∑(22a)1...12 = 13.52 (22a)

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

(22b)m	0.60	0.56	0.56	0.50	0.45	0.43	0.41	0.41	0.46	0.50	0.53	0.56

∑(22b)1...12 = 5.98 (22b)

Calculate effective air change rate for the applicable case:

If mechanical ventilation: air change rate through system N/A (23a)

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

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

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

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

(24d)m	0.68	0.66	0.66	0.62	0.60	0.59	0.58	0.58	0.61	0.62	0.64	0.66	(24d)

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

(25)m	0.68	0.66	0.66	0.62	0.60	0.59	0.58	0.58	0.61	0.62	0.64	0.66	(25)

3. Heat losses and heat loss parameter

The κ-value is the heat capacity per unit area, see Table 1e.

Element	Gross Area, m²	Openings, m²	Net area A, m²		U-value, W/m²K		A x U, W/K	κ-value, kJ/m².K	A x κ, kJ/K	
Doors			1.85	x	2.00	=	3.70	N/A	N/A	(26)
Window*			135.22	x	1.85	=	250.42	N/A	N/A	(27)
Basement floor			186.50	x	0.25	=	46.62	N/A	N/A	(28)
Party Wall			25.38	x	0.00	=	0.00	N/A	N/A	(32)
External wall			414.98	x	0.35	=	145.24	N/A	N/A	(29a)
Roof			198.70	x	0.16	=	31.79	N/A	N/A	(30)
Total area of external elements ∑A, m²			937.25	(31)						

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

Fabric heat loss, W/K = ∑(A × U) (26)...(30) + (32) = 477.77 (33)

Heat capacity Cm = ∑(A x κ) (28)...(30) + (32) + (32a)...(32e) = N/A (34)

Thermal mass parameter (TMP) in kJ/m²K Calculated separately = 250.00 (35)

Thermal bridges: ∑(L x Ψ) calculated using Appendix K 103.10 (36)

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

Total fabric heat loss (33) + (36) = 580.87 (37)

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

(38)m	327.24	317.94	317.94	300.94	290.79	286.07	281.59	281.59	293.24	300.94	309.18	317.94	(38)

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

(39)m	908.11	898.81	898.81	881.82	871.67	866.94	862.46	862.46	874.12	881.82	890.05	898.81	

Average = ∑(39)1...12/12 = 882.99 (39)

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

(40)m	1.66	1.64	1.64	1.61	1.59	1.58	1.57	1.57	1.59	1.61	1.62	1.64	

Average = ∑(40)1...12/12 = 1.61 (40)

4. Water heating energy requirement

kWh/year

Assumed occupancy, N 3.45 (42)

If TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA - 13.9)²)] + 0.0013 x (TFA - 13.9)

If TFA ≤ 13.9, N = 1

Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 122.37 (43)

Annual average hot water usage has been reduced by 5% if the dwelling is designed to achieve a water use target of not more than 125 litres per person per day (all water use, hot and cold)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(44)m	134.60	129.71	124.82	119.92	115.03	110.13	110.13	115.03	119.92	124.82	129.71	134.60

∑(44)1...12 = 1468.42 (44)

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

(45)m	200.09	175.00	180.59	157.44	151.07	130.36	120.80	138.62	140.27	163.47	178.44	193.78

∑(45)1...12 = 1929.93 (45)

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

For community heating include distribution loss whether or not hot water tank is present

Distribution loss 0.15 x (45)m

(46)m	30.01	26.25	27.09	23.62	22.66	19.55	18.12	20.79	21.04	24.52	26.77	29.07	(46)

Water storage loss:

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

Cylinder volume (litres) including any solar storage within same cylinder 150.00 (50)

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

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

Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51)

If community heating see SAP 2009 section 4.3

Volume factor from Table 2a 0.93 (52)

Temperature factor from Table 2b 0.54 (53)

Energy lost from water storage, kWh/day (50) x (51) x (52) x (53) 1.44 (54)

Enter (49) or (54) in (55) 1.44 (55)

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

(56)m	44.53	40.22	44.53	43.09	44.53	43.09	44.53	44.53	43.09	44.53	43.09	44.53	(56)

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

(57)m	44.53	40.22	44.53	43.09	44.53	43.09	44.53	44.53	43.09	44.53	43.09	44.53	(57)

Primary circuit loss (annual) from Table 3 610.00 (58)

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

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

(59)m	51.81	46.79	51.81	50.14	51.81	50.14	51.81	51.81	50.14	51.81	50.14	51.81	(59)

Combi loss for each month from Table 3a, 3b or 3c (enter '0' if not a combi boiler)

(61)m	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(61)

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

(62)m	296.43	262.02	276.92	250.67	247.40	223.59	217.13	234.95	233.50	259.81	271.67	290.12	(62)

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

(63)m	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

∑(63)1...12 = 0.00 (63)

Output from water heater for each month, kWh/month (62)m + (63)m

(64)m	296.43	262.02	276.92	250.67	247.40	223.59	217.13	234.95	233.50	259.81	271.67	290.12

∑(64)1...12 = 3064.21 (64)

if (64)m < 0 then set to 0

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

(65)m	143.60	127.80	137.11	126.93	127.30	117.93	117.23	123.16	121.22	131.42	133.92	141.50	(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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	172.74	172.74	172.74	172.74	172.74	172.74	172.74	172.74	172.74	172.74	172.74	172.74	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
(67)m	96.66	85.85	69.82	52.86	39.51	33.36	36.04	46.85	62.88	79.84	93.19	99.34	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
(68)m	637.76	644.38	627.70	592.20	547.38	505.26	477.12	470.50	487.18	522.68	567.50	609.62	(68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

(69)m	40.27	40.27	40.27	40.27	40.27	40.27	40.27	40.27	40.27	40.27	40.27	40.27	(69)
Pumps and fans gains (Table 5a)													
(70)m	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	(70)
Losses e.g. evaporation (negative values) (Table 5)													
(71)m	-138.19	-138.19	-138.19	-138.19	-138.19	-138.19	-138.19	-138.19	-138.19	-138.19	-138.19	-138.19	(71)
Water heating gains (Table 5)													
(72)m	193.01	190.18	184.29	176.29	171.10	163.79	157.57	165.54	168.37	176.65	185.99	190.19	(72)
Total internal gains (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m													
(73)m	1012.25	1005.22	966.63	906.17	842.81	787.22	755.56	767.71	803.25	863.99	931.50	983.97	(73)

6. Solar gains

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

Rows (74) to (82) are used 12 times, one for each month, repeating as needed if there is more than one window type.

Details for month of January and annual totals are shown below:

	Access factor Table 6d		Area m²		Solar flux W/m²		g Specific data or Table 6b		FF Specific data or Table 6c		Gains (W)	
East	0.77	x	135.22	x	19.87	x 0.9 x	0.72	x	0.70	=	938.59	(76)

Solar gains in watts, calculated for each month ∑(74)m...(82)m													
(83)m	938.59	1819.25	2907.75	4317.31	5252.94	5481.17	5320.10	4630.20	3476.33	2215.50	1166.91	774.24	(83)
Total gains - internal and solar (73)m + (83)m													
(84)m	1950.83	2824.47	3874.38	5223.48	6095.75	6268.40	6075.66	5397.91	4279.58	3079.49	2098.41	1758.21	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1(˚C) 21.00 (85)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains for living area, η1,m (see Table 9a)													
(86)m	1.00	1.00	0.99	0.97	0.89	0.75	0.55	0.61	0.90	0.99	1.00	1.00	(86)
Mean internal temp of living area T1 (steps 3 to 7 in Table 9c)													
(87)m	18.96	19.18	19.60	20.09	20.58	20.86	20.97	20.96	20.68	20.06	19.37	19.00	(87)
Temperature during heating periods in the living area from Table 9, Th2(˚C)													
(88)m	19.58	19.59	19.59	19.61	19.63	19.63	19.64	19.64	19.62	19.61	19.60	19.59	(88)
Utilisation factor for gains for rest of dwelling η2,m (see Table 9a)													
(89)m	1.00	1.00	0.99	0.95	0.84	0.63	0.38	0.43	0.83	0.98	1.00	1.00	(89)
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)													
(90)m	17.74	17.97	18.38	18.88	19.34	19.57	19.63	19.63	19.45	18.86	18.16	17.79	(90)

Living area fraction fLA 87.50 ÷ (4) = 0.16 (91)

Mean internal temperature for the whole dwelling fLA x T1 +(1 - fLA) x T2													
(92)m	17.93	18.16	18.58	19.07	19.54	19.78	19.85	19.84	19.64	19.05	18.35	17.98	(92)
Apply adjustment to the mean internal temperature from Table 4e, where appropriate													
(93)m	17.93	18.16	18.58	19.07	19.54	19.78	19.85	19.84	19.64	19.05	18.35	17.98	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that tim = (93)m and recalculate the utilisation factor for gains using Table 9a)													
Utilisation factor for gains, ηm													
(94)m	1.00	1.00	0.99	0.95	0.84	0.65	0.41	0.46	0.83	0.98	1.00	1.00	(94)
Useful gains, ηmGm, W = (94)m x (84)m													
(95)m	1949.27	2815.48	3821.37	4950.60	5116.11	4062.77	2492.13	2466.55	3549.21	3015.31	2094.51	1757.17	(95)
Monthly average external temperature from Table 8													
(96)m	4.50	5.00	6.80	8.70	11.70	14.60	16.90	16.90	14.30	10.80	7.00	4.90	(96)
Heat loss rate for mean internal temperature, Lm, W													
(97)m	12196.18	11831.50	10586.15	9145.77	6834.85	4487.69	2540.24	2536.68	4670.64	7277.65	10106.17	11758.71	(97)

Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m

(98)m	7623.70	6058.77	5033.00	3020.52	1278.74	0.00	0.00	0.00	0.00	3171.18	5768.39	7441.14

Total per year (kWh/year) = ∑(98)1...5, 10...12 = 39395.44 (98)

Space heating requirement in kWh/m²/year (98) ÷ (4) 71.85 (99)

9a. Energy Requirements - Individual heating systems including micro-CHP

Space heating:

Fraction of space heating from secondary/supplementary system (Table 11)	0.10	(201)
Fraction of space heating from main system(s) 1 - (201)	0.90	(202)
Fraction of main heating from main system 2	0.00	(203)
Fraction of total space heat from main system 1 (202) x [1 - (203)]	0.90	(204)
Fraction of total space heat from main system 2 (202) x (203)	0.00	(205)
Efficiency of main space heating system 1 (%)	78.90	(206)

(from database or Table 4a/4b, adjusted where appropriate by the amount shown in the 'space efficiency adjustment' column of Table 4c)

Efficiency of secondary/supplementary heating system, from Table 4a or Appendix E (%)	100.00	(208)

Space heating requirement, kWh/month (as calculated above)

Space heating fuel (main heating system 1), kWh/month = (98)m x (204) x 100 ÷ (206)

Space heating fuel (secondary), kWh/month = (98)m x (201) x 100 ÷ (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(98)m	7623.70	6058.77	5033.00	3020.52	1278.74	0.00	0.00	0.00	0.00	3171.18	5768.39	7441.14
(211)m	8696.24	6911.14	5741.06	3445.46	1458.64	0.00	0.00	0.00	0.00	3617.31	6579.92	8488.00
(215)m	762.37	605.88	503.30	302.05	127.87	0.00	0.00	0.00	0.00	317.12	576.84	744.11

Total per year (kWh/year) = ∑(211)1...5, 10...12 = 44937.77 (211)

Total per year (kWh/year) = ∑(215)1...5, 10...12 = 3939.54 (215)

Water heating:

Output from water heater, kWh/month (calculated above)

(64)m	296.43	262.02	276.92	250.67	247.40	223.59	217.13	234.95	233.50	259.81	271.67	290.12

∑(64)1...12 = 3064.21 (64)

Efficiency of water heater per month

(217)m	78.42	78.37	78.24	77.93	76.90	68.80	68.80	68.80	68.80	77.95	78.33	78.42

Fuel for water heating, kWh/month = (64)m x 100 ÷ (217)m

(219)m	377.99	334.32	353.95	321.64	321.71	324.98	315.60	341.50	339.39	333.32	346.84	369.94

Total per year (kWh/year) = ∑(219)1...12 = 4081.19 (219)

Annual Totals Summary:	kWh/year	kWh/year	
Space heating fuel used, main system 1		44937.77	(211)
Space heating fuel used, secondary		3939.54	(215)
Water heating fuel used		4081.19	(219)
Electricity for pumps, fans and electric keep-hot (Table 4f):			
mechanical ventilation fans - balanced, extract or positive input from outside	0.00		(230a)
warm air heating system fans	0.00		(230b)
central heating pump	130.00		(230c)
oil boiler pump	0.00		(230d)
boiler flue fan	45.00		(230e)
maintaining electric keep-hot facility for gas combi boiler	0.00		(230f)
pump for solar water heating	0.00		(230g)
Total electricity for the above	∑(230a)...(230g)	175.00	(231)
Electricity for lighting (calculated in Appendix L):		1706.98	(232)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year		Emissions Factor		Emissions (kgCO2/year)	
Space heating - main system 1	44937.77	x	0.194	=	8717.93	(261)
Space heating - secondary	3939.54	x	0.422	=	1662.49	(263)
Water heating	4081.19	x	0.194	=	791.75	(264)
Space and water heating			(261) + (262) + (263) + (264) =		11172.17	(265)
Pumps, fans and electric keep-hot	175.00	x	0.422	=	73.85	(267)
Lighting	1706.98	x	0.422	=	720.35	(268)
Total carbon dioxide emissions			∑(261)...(271) =		11966.36	(272)
Emissions per m² for space and water heating					20.51	(272a)
Emissions per m² for lighting					1.31	(272b)
Target Carbon Dioxide Emissions Rate (TER)			[(20.51 × FF × EFA) + (1.31 × EFA)] × (0.6)		23.13	(273)

Appendix B – Code for Sustainable Homes Pre-assessment

Results

Development Name: Nutley Terrace
Dwelling Description: Single Dwelling - Detached House
Name of Company: Hoare Lea Consulting Engineers
Code Assessor's Name:
Company Address: Hoare Lea Consulting Engineers

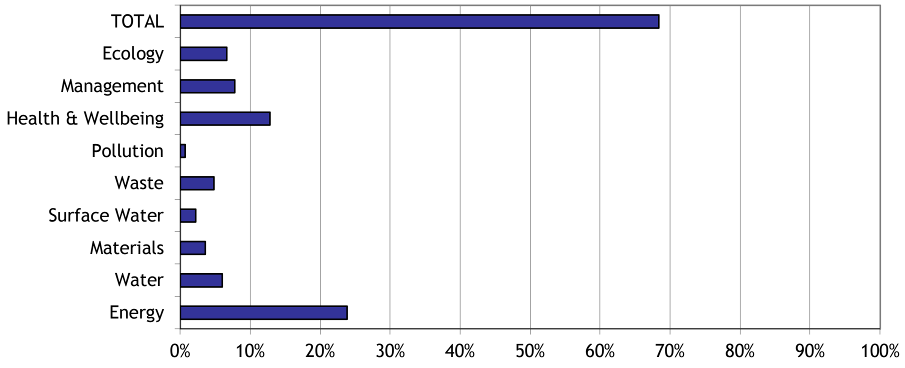
Notes/Comments:

PREDICTED RATING - CODE LEVEL: 4

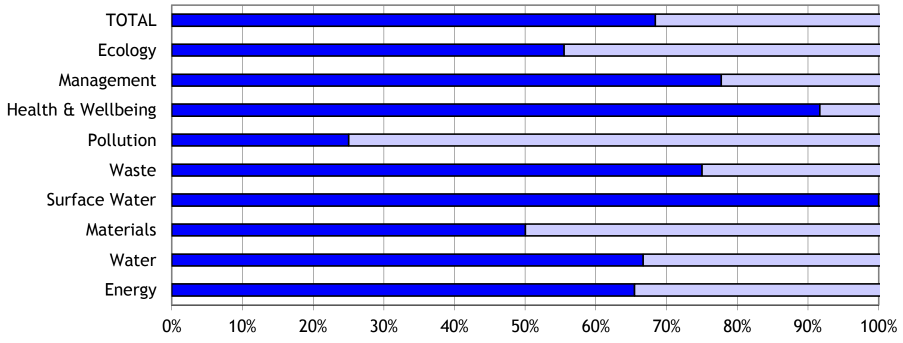
Mandatory Requirements: **All Levels**

% Points:	**68.39%**	**- Code Level: 4**
Breakdown:	**Energy**	**- Code Level: 4**
	Water	**- Code Level: 4**

Graph 1: Predicted contribution of individual sections to the total score and percentage of total achievable score



Graph 2: Predicted percentage of credits achievable: Total and by Category



NOTE: The rating obtained by using this Pre Assessment Estimator is for guidance only. Predicted ratings may differ from those obtained through a formal assessment, which must be carried out by a licensed Code assessor.

CATEGORY 1 ENERGY	Overall Level: 4	Overall Score	68.39	Assumptions Made	Evidence Required (The below cells can be formatted by assessors if required.)
% of Section Credits Predicted:	65.48	Credits	Level		
Contribution to Overall % Score:	23.83 points	20.3 of 31 Credits	Level 4		
Ene 1 Dwelling Emission Rate	Credits are awarded based on the percentage improvement of the Dwelling Emission Rate (DER) over the Target Emission Rate (TER) as calculated using SAP 2009. Minimum standards for each Code level apply. The Code energy calculator can be used to calculate a predicted score. Enter the predicted score What is the predicted number of credits? 5.2 OR Are zero net CO_2 emissions achieved? ☐	5.2 of 10 Credits	Level 4		
Ene 2 Fabric Energy Efficiency	Credits are awarded based on the Fabric Energy Efficiency (kWh/m^2/yr) of the dwelling. Minimum standards apply at Code levels 5 and 6. The Code energy calculator can be used to calculate a predicted score. Enter the predicted score Apartments, Mid-terrace ○ OR End terrace, Semi and Detached ● OR Staggered Mid terrace ○ What is the predicted number of credits? 3.1	3.1 of 9 Credits	-		
Ene 3 Energy Display Devices	Credits are awarded where a correctly specified Energy Display Device is installed monitoring electricity and/or primary heating fuel consumption. Select whether the EDD monitors electricity and/or fuel None Specified ○ Primary Heating only ○ OR Electricity only ○ OR Electricity and primary heating fuel ●	2 of 2 Credits	-		

Issue		Credits	Level	Assumptions Made	Evidence Required
Ene 4 Drying Space	One credit is awarded for the provision of either internal or external secure drying space with posts and footings or fixings capable of holding 4m+ of drying line for 1-2 bed dwellings and 6m+ for dwellings with 3 bedrooms or greater. Will drying space meeting the criteria be provided? Yes ● OR No ○	1 of 1 Credits	-		
Ene 5 Energy Labelled White Goods	Credits are awarded where each dwelling is provided with either information about the EU Energy Labelling Scheme, White Goods with ratings ranging from A+ to B or a combination of the previous according to the technical guide. Select the appropriate option below EU Energy labelling information only ☐ A+ rated appliances ☐ A+, A and B rated appliances ☐ Combination of compliant rated white goods with EU Energy Labelling Scheme ☑	2 of 2 Credits	-		
Ene 6 External Lighting	Credits are awarded based on the provision of space lighting* with dedicated energy efficient fittings and security lighting fittings with appropriate control gear.. Space Lighting None provided ○ OR Non Code compliant lighting ○ OR Code compliant lighting ● Security Lighting None provided ○ OR Non Code compliant lighting ○ OR Code compliant lighting and controls ● Dual lamp luminaires Compliant with both above criteria ☐ * Statutory safety lighting is not covered by this requirement	2 of 2 Credits	-		

Issue		Credits	Level	Assumptions Made	Evidence Required
Ene 7 Low or Zero Carbon Technologies	Credits are awarded where there is a 10% or 15% reduction in CO_2 emissions resulting from the use of low or zero carbon technologies. Select % contribution made by low or zero carbon technologies Less than 10% of demand ○ OR 10% of demand or greater ○ OR 15% of demand or greater ●	2 of 2 Credits	-		
Ene 8 Cycle Storage	Credits are awarded where adequate, safe, secure and weather proof cycle storage is provided according to the Code requirements. Fill in the development details below Number of bedrooms: 5 Number of cycles stored per dwelling* 4.0 * if you have storage for 1 cycle per two dwellings insert 0.5 in number of cycles stored per dwelling	2 of 2 Credits	-		
Ene 9 Home Office	A credit is awarded for the provision of a home office. The location, space and services provided must meet the Code requirements. Will there be provision for a Home Office? Yes ● OR No ○	1 of 1 Credits	-		

CATEGORY 2 WATER	Overall Level: 4	Overall Score	68.39	Assumptions Made	Evidence Required (The below cells can be formatted by assessors if required.)
% of Section Credits Predicted:	66.66	Credits	Level		
Contribution to Overall Score:	6.00 points	4 of 6 Credits	Level 4		
Wat 1 Indoor Water Use	Credits are awarded based on the predicted average household water consumption, calculated using the Code Water Calculator Tool. Minimum standards for each code level apply. Select the predicted water use / Mandatory Requirement greater than 120 litres/ person/ day ○ OR ≤ less than 120 litres/ person/ day ○ OR ≤ less than 110 litres/ person/ day ○ OR ≤ less than 105 litres/ person/ day ● OR ≤ less than 90 litres/ person/ day ○ OR ≤ less than 80 litres/ person/ day ○	3 of 5 Credits	Level 3 AND Level 4		
Wat 2 External Water Use	A credit is awarded where a compliant system is specified for collecting rainwater for external irrigation purposes. Where no outdoor space is provided the credit can be achieved by default. Select the scenario that applies No internal or communal outdoor space ○ OR Outdoor space with collection system ● OR Outdoor space without collection system ○	1 of 1 Credits	-		

CATEGORY 3 MATERIALS	Overall Level: 4	Overall Score	68.39	Assumptions Made	Evidence Required (The below cells can be formatted by assessors if required.)
% of Section Credits Predicted:	50.00	Credits	Level		
Contribution to Overall Score:	3.60 points	12 of 24 Credits	All Levels		
Mat 1 Environmental Impact of Materials	Mandatory Requirement: At least three of the five key building elements must achieve a Green Guide 2008 Rating of A+ to D. Tradable Credits: Points are awarded on a scale based on the Green Guide Rating of the specifications. The Code Materials Calculator can be used to predict a potential score. Mandatory Requirement Will the mandatory requirement be met? ☑ Enter the predicted score What is the predicted number of credits? 8	8 of 15 Credits	All Levels		
Mat 2 Responsible Sourcing of Materials - Basic Building Elements	Credits are awarded where materials used in the basic building elements are responsibly sourced. The Code Materials Calculator can be used to predict a potential score. Enter the predicted Score What is the predicted number of credits? 3	3 of 6 Credits	-		
Mat 3 Responsible Sourcing of Materials - Finishing Elements	Credits are awarded where materials used in the finishing elements are responsibly sourced. The Code Materials Calculator can be used to predict a potential score. Enter the predicted Score What is the predicted number of credits? 1	1 of 3 Credits	-		

CATEGORY 4 SURFACE WATER RUN-OFF	**Overall Level: 4**	**Overall Score**	**68.39**	**Assumptions Made**	**Evidence Required (The below cells can be formatted by assessors if required.)**
% of Section Credits Predicted:	**100.00%**	**Credits**	**Level**		
Contribution to Overall Score:	**2.20 points**	**4 of 4 Credits**	**All Levels**		
Sur 1 Management of Surface Water Run-off from developments	Mandatory Requirement: Peak rate of run-off into watercourses is no greater for the developed site than it was for the pre-development site and that the additional predicted volume of rainwater discharge caused by the new development is entirely reduced as far as possible in accordance with the assessment criteria. Desiging the drainage system to be able to cope with local drainage system failure. Tradable Credits: Where SUDS are used to improve water quality of the rainwater discharged or for protecting the quality of the receiving waters. Mandatory Requirement Will the mandatory requirement be met? ☑ Select the appropriate option No SUDS ☐ No runoff into watercourses for the first 5 mm of rainfall ☑ Runoff from hard surfaces will receive an appropriate level of treatment ☑	**2 of 2 Credits**	**All Levels**		
Sur 2 Flood Risk	Credits are awarded where developments are located in areas of low flood risk or where in areas of medium or high flood risk appropriate measures are taken to prevent damage to the property and its contents in accordance with the Code criteria in the technical guide. Select the annual probability of flooding (from PPS25*) Zone 1 - Low ● OR Zone 2 - Medium ○ OR Zone 3 - High ○ Select the apropriate option(s) Low risk of flooding from FRA** ☑ All measures of protection are demonstrated in FRA ☐ Ground floor level and access routes are 600 mm above design flood level ☐ * Planning Policy Statement 25 - Planning and Flood Risk ** FRA - Flood Risk Assessment	**2 of 2 Credits**	-		

CATEGORY 5 WASTE	Overall Level: 4	Overall Score	68.39	Assumptions Made	Evidence Required (The below cells can be formatted by assessors if required.)
% of Section Credits Predicted:	75.00%	Credits	Level		
Contribution to Overall Score:	4.80 points	6 of 8 Credits	All Levels		
Was 1 Storage of non-recyclable waste and recyclable household waste	Mandatory Requirement: The space provided for waste storage should be sized to hold the larger of either all external containers provided by the Local Authority or the min capacity calculated from BS 5906. Tradable Credits are awarded for adequate internal and/ or external recycling facilities. Mandatory Requirement Will the minimum space be provided and be accessible to disabled people? ☑ Internal Recyclable household waste storage Where there is no external recyclable waste storage and no Local Authority collection scheme Internal storage (capacity 60 litres) ☐ Local Authority collection Scheme Post Collection sorting Internal storage (capacity 30 litres) ☐ Pre-collection sorting Internal storage (3 separate bins, capacity 30 litres) ☑ External Storage, no Local Authority collection scheme 3 separate internal storage bins (capacity 30 litres) ☐ **AND** Houses External Storage(capacity 180 litres) ☐ Flats Private recycling operator ☐ 3 or greater types of waste collected ☐	0 of 2 Credits 4 of 4 Credits 0 of 4 Credits	All Levels		

Issue		Credits	Level	Assumptions Made	Evidence Required
Was 2 Construction Site Waste Management	A credit is awarded where a compliant SWMP is provided with targets and procedures to minimise construction waste. Credits are available where the SWMP include procedures and commitments for diverting either 50% or 85% of waste generated from landfill. SWMP details Does the SWMP include: + No SWMP ○ + SWMP with targets and procedures to minimise waste? ● + SWMP with procedures to divert 50% of waste ○ + SWMP with procedures to divert 85% of waste ○	1 of 3 Credits			
Was 3 Composting	A credit is awarded where individual home composting facilities are provided, or where a community/ communal composting service, either run by the Local Authority or overseen by a management plan is in operation. Select the facilities available No composting facilities ○ Individual composting facilities ● OR Communal/ community composting*? ○ Local Authority ☐ OR Private with management plan ☐ * including if an automated waste collection system is in place	1 of 1 Credit	-		

CATEGORY 6 POLLUTION	**Overall Level: 4**	**Overall Score**	**68.39**	**Assumptions Made**	**Evidence Required** **(The below cells can be formatted by assessors if required.)**
% of Section Credits Predicted:	**25.00%**	**Credits**	**Level**		
Contribution to Overall Score:	**0.70 points**	**1 of 4 Credits**	**All Levels**		
Pol 1 Global Warming Potential (GWP) of Insulants	A credit is awarded where <u>all</u> insulating materials only use substances (in manufacture AND installation) that have a GWP of less than 5. Select the most appropriate option All insulants have a GWP less than 5 ● OR Some insulants have a GWP of less than 5 ○ OR No insulants have a GWP of less than 5 ○	**1 of 1 Credits**	**-**		
Pol 2 NOx Emissions	Credits are awarded on the basis of NOx emissions arising from the operation of the space and water heating system within the dwelling. Select the most appropriate option Greater than 100 mg/kWh ● OR Less than 100 mg/kWh ○ OR Less than 70 mg/kWh ○ OR Less than 40 mg/kWh ○ OR Class 4 boiler ○ OR Class 5 boiler ○ OR All space and hot water energy requirements are met by systems who do not produce NOx emissions ○	**0 of 3 Credits**	**-**		

CATEGORY 7 HEALTH & WELLBEING	Overall Level: 4	Overall Score	68.39	Assumptions Made	Evidence Required (The below cells can be formatted by assessors if required.)
% of Section Credits Predicted:	91.00%	Credits	Level		
Contribution to Overall Score:	12.83 points	11 of 12 Credits	No level		
Hea 1 Daylighting	Credits are awarded for ensuring key rooms in the dwelling have high daylight factors (DF) and a view of the sky. Select the compliant areas Room Kitchen: Avg DF of at least 2% ☑ Living Room*: Avg DF of at least 1.5% ☑ Dining Room*: Avg DF of at least 1.5% ☑ Study*: Avg DF of at least 1.5% ☑ 80% of working plane in all above rooms receive direct light from the sky? ☐ Any room used for Ene 9 Home Office must also achieve a min DF of 1.5%.	2 of 3 Credits	-		
Hea 2 Sound Insulation	Credits are awarded where performance standards exceed those required in Building Regulations Part E. This can be demonstrated by carrying out pre-completion testing or through the use of Robust Details Limited. Select a type of property Detached Property ● Attached Properties: - Separating walls and floors only exist between non habitable spaces ○ - Separating walls and floors exist between habitable spaces ○ Select a performance standard Performance standard not sought ● Airborne: 3db higher; Impact: 3dB lower ○ OR Airborne: 5db higher; Impact: 5dB lower ○ OR Airborne: 8db higher; Impact: 8dB lower ○	4 of 4 Credits	-		

Issue		Credits	Level	Assumptions Made	Evidence Required
Hea 3 Private Space	A credit is awarded for the provision of an outdoor space that is at least partially private. The space must allow easy access to all occupants. Will a private/ semi-private space be provided? Yes, private/semi-private space will be provided ● OR No private/semi-private space ○	1 of 1 Credits	-		
Hea 4 Lifetime Homes	Mandatory Requirement: Lifetime Homes is mandatory when a dwelling is to achieve Code Level 6. Tradable credits: Credits are awarded where the developer has implemented all of the principles of the Lifetime Homes scheme. Mandatory Requirement Dwelling to achieve Code Level 6? ☐ Lifetime Homes Compliance All Lifetime Homes criteria will be met ● OR Exemption from LTH criteria 2/3 applied ○ Credit not sought ○	4 of 4 Credits	No level		

CATEGORY 8 MANAGEMENT	Overall Level: 4	Overall Score	68.39	Assumptions Made	Evidence Required (The below cells can be formatted by assessors if required.)
% of Section Credits Predicted:	77.00%	Credits	Level		
Contribution to Overall Score:	7.77 points	7 of 9 Credits	All Levels		
Man 1 Home User Guide	Credits are awarded where a simple guide is provided to each dwelling covering information relevant to the 'non-technical' home occupier, in accordance with the Code requirements. Tick the topics covered by the Home User Guide Operational Issues? ☑ Site and Surroundings? ☑ Is available in alternative formats? ☑	3 of 3 Credits	-		
Man 2 Considerate Constructors Scheme	Credits are awarded where there is a commitment to comply with best practice site management principles using either the Considerate Constructors Scheme or an alternative locally/ nationally recognised scheme. Select the appropriate scheme and score No scheme used ○ Considerate Constructors OR Best Practice: Score between 24 and 31.5 ● OR Best Practice+: Score between 32 and 40 ○ Alternative Scheme* OR Mandatory + 50% optional requirements ○ OR Mandatory + 80% optional requirements ○ * In the first instance, contact a Code Service Provider if you are considering to use an alternative scheme.	1 of 2 Credits	-		
Man 3 Construction Site Impacts	Credits are awarded where there is a commitment and strategy to operate site management procedures on site as following: Tick the impacts that will be addressed Monitor, report and set targets, where applicable, for: - CO$_2$/ energy use from site activities ☑ - CO$_2$/ energy use from site related transport ☑ - water consumption from site activities ☐ Adopt best practice policies in respect of: - air (dust) pollution from site activities ☐ - water (ground and surface) pollution on site ☐ 80% of site timber is reclaimed, re-used or responsibly sourced ☑	1 of 2 Credits	-		

Issue		Credits	Level	Assumptions Made	Evidence Required
Man 4 Security	Credits are awarded for complying with Section 2 - Physical Security from Secured by Design - New Homes. An Architectural Liaison Officer (ALO), or alternative, needs to be appointed early in the design process and their recommendations incorporated. Secured by Design Compliance Credit not sought ○ OR Secured by Design Section 2 Compliance ●	2 of 2 Credits	-		

CATEGORY 9 ECOLOGY	Overall Level: 4	Overall Score	68.39	Assumptions Made	Evidence Required (The below cells can be formatted by assessors if required.)
% of Section Credits Predicted:	55.00%	Credits	Level		
Contribution to Overall Score:	6.66 points	5 of 9 Credits	All Levels		
Eco 1 Ecological Value of Site	One credit is awarded for developing land of inherently low value. Select the appropriate option Credit not sought ○ OR Land has ecological value ● OR Land has low/ insignificant ecological value* ○ * Low ecological value is determined either a) by using Checklist Eco 1 across the whole development site; or b) where an suitably qualified ecologist is appointed and can confirm or c) produces an independent ecological report of the site, that the construction zone is of low/ insignificant value; AND the rest of the development site will remain undisturbed by the works.	0 of 1 Credits	-		
Eco 2 Ecological Enhancement	A credit is awarded where there is a commitment to enhance the ecological value of the development site. Tick the appropriate boxes Will a *Suitably Qualified Ecologist* be appointed to recommend appropriate ecological features? ☑ AND Will all key recommendations be adopted? ☑ AND 30% of other recommendations be adopted? ☑	1 of 1 Credits	-		
Eco 3 Protection of Ecological Features	A credit is awarded where there is a commitment to maintain and adequately protect features of ecological value. Type and protection of existing features Site with features of ecological value? ● OR Site of low ecological value (as Eco 1)? ○ AND All* existing features potentially affected by site works are maintained and adequately protected? ☑ *If a suitably qualified ecologist has confirmed that a feature can be removed due to insignificant ecological value or poor health conditions, as long all the rest have been protected, then this box can be ticked.	1 of 1 Credits	-		

Issue		Credits	Level	Assumptions Made	Evidence Required
Eco 4 Change of Ecological Value of Site	Credits are awarded where the change in ecological value has been calculated in accordance with the Code requirements and is calculated to be: Change in Ecological Value Major negative change: fewer than -9 ○ Minor negative change: between -9 and -3 ○ OR Neutral: between -3 and +3 ● Minor enhancement: between +3 and +9 ○ Major enhancement: greater than 9 ○	**2 of 4 Credits**	-		
Eco 5 Building Footprint	Credits are awarded where the ratio of combined floor area of all dwellings on the site to their footprint is: Ratio of Net Internal Floor Area: Net Internal Ground Floor Area Credit Not Sought ○ OR Houses: 2.5:1 OR Flats: 3:1 ● OR Houses: 3:1 OR Flats: 4:1 ○ OR Houses & Flats Weighted (2.5:1 & 3:1) ○ OR Houses & Flats Weighted (3:1 & 4:1) ○	**1 of 2 Credits**			