

Condition 11.0

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1. Summary

Condition 11 states:

Notwithstanding any details shown on the approved plans, full details of the PV arrays and ground source heat exchanger, shall be submitted to and approved in writing by the Local Planning Authority. The development shall be constructed in accordance with the details so approved and shall be so retained thereafter.

The detail design process evaluated the performance viability of ground source heating and the installation of PV arrays.

It was established:

Ground source heating was not viable to either Plot 1 or 2.

The installation of PV arrays is only viable to Plot 1. The finished floor level of Plot 2, as required under the planning permission) means the roof of this property is shaded by adjacent properties and trees, preventing adequate daylight/sunlight hitting the south facing roof plane.

With the above in mind, the detail design process focussed on ensuring each of the properties achieves a high degree of energy efficiency. SAP calculations were undertaken at an early stage to ensure the building envelope design and heating systems deliver this outcome. Calculations for each plot follow.

The energy saving approach adopted for each property is:

Design and construction of high thermal performance ground floor, wall and roof.

Specification of high-performance double-glazed windows

Installation of high efficiency gas boiler to run underfloor heating and domestic hot water supply.

Installation of 4kw solar arrays to Plot 1 to supplement heat/power supply from mains services Plot 1

Installation of Mechanical ventilation and Heat Recovery system (MVHR).

The SAP calculations conclude an 'A' rated performance will be delivered as a consequence of following the above strategy and each property meets/exceeds the standard required by The Building regulations.

2. SAP Calculation Plot 1

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Project Information

Building type Detached house

Reference

Date 17 July 2020

Client John Fawthrop Project Syke Lane
Leeds
LS14

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

1. Overall dwelling dimensions

	Area (m²)	Av. Storey height (m)	Volume (m³)	
Ground floor (1)	124.15	2.46	305.41	(3a)
First floor	117.57	3.59	422.08	(3b)
Total floor area	241.72			(4)
Dwelling volume (m ³)			727.49	(5)

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

2. Ventilation rate

	main + secondary + other heating		m³ per hour										
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)									
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)									
Number of intermittent fans	5	x 10	50.00	(7a)									
Number of passive vents	0	x 10	0.00	(7b)									
Number of flueless gas fires	0	x 40	0.00	(7c)									
			Air changes per hour										
Infiltration due to chimneys, fans and flues			0.07	(8)									
Pressure test, result q50	5.00			(17)									
Air permeability			0.32	(18)									
Number of sides on which sheltered			2.00	(19)									
Shelter factor			0.85	(20)									
Infiltration rate incorporating shelter factor			0.27	(21)									
Infiltration rate modified for monthly wind speed													
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70		
												52.50	(22)
Wind Factor													
1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18		
												13.13	(22a)
Adjusted infiltration rate (allowing for shelter and wind speed)													
0.35	0.34	0.33	0.30	0.29	0.26	0.26	0.25	0.27	0.29	0.30	0.32		
												3.56	(22b)
Ventilation : natural ventilation, intermittent extract fans													
Effective air change rate													
0.56	0.56	0.56	0.54	0.54	0.53	0.53	0.53	0.54	0.54	0.55	0.55	(25)	

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K	kappa-value kJ/m²K	A x K kJ/K					
Window - Double-glazed, argon filled (East) As Per Spec			11.670	1.15 (1.20)	13.36			(27)				
Window - Double-glazed, argon filled (North) As Per Spec			22.400	1.15 (1.20)	25.65			(27)				
Window - Double-glazed, argon filled (West) As Per Spec			27.870	1.15 (1.20)	31.91			(27)				
Window - Double-glazed, argon filled (South) As Per Spec			3.600	1.15 (1.20)	4.12			(27)				
Window - Double-glazed, argon filled (North) As Per Spec			14.630	1.15 (1.20)	16.75			(27)				
Pitched roofs insulated between joists Pitched Roof			137.39	0.17	23.36	9.00	1236.51	(30)				
Walls New Wall			233.75	0.16	37.40	60.00	14025.00	(29)				
Walls Dormer wall			6.07	0.17	1.03	9.00	54.63	(29)				
Ground floors Ground Floor			124.15	0.17	21.11	110.00	13656.50	(28)				
Flat roofs Flat roof			10.88	0.18	1.96	9.00	97.92	(30)				
Total area of external elements Sigma A, m²							592.41	(31)				
Fabric heat loss, W/K							176.65	(33)				
Thermal mass parameter, kJ/m²K (user-specified TMP)							100.00	(35)				
Effect of thermal bridges							88.86	(36)				
Total fabric heat loss							265.51	(37)				
Ventilation heat loss calculated monthly												
134.36	133.80	133.26	130.70	130.22	127.99	127.99	127.57	128.85	130.22	131.19	132.20	(38)
Heat transfer coefficient, W/K												
399.87	399.31	398.77	396.21	395.73	393.50	393.50	393.08	394.36	395.73	396.70	397.71	
											396.20	(39)
Heat loss parameter (HLP), W/m²K												
1.65	1.65	1.65	1.64	1.64	1.63	1.63	1.63	1.63	1.64	1.64	1.65	
HLP (average)											1.64	(40)
Number of days in month (Table 1a)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
31	28	31	30	31	30	31	31	30	31	30	31	

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

4. Water heating energy requirements

4. Water heating energy requirements											kWh/year	
Assumed occupancy, N											3.06	(42)
Annual average hot water usage in litres per day Vd,average											106.78	(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
117.46	113.19	108.92	104.65	100.38	96.11	96.11	100.38	104.65	108.92	113.19	117.46	(44)
Energy content of hot water used												
174.19	152.35	157.21	137.06	131.51	113.49	105.16	120.67	122.12	142.31	155.35	168.70	
Energy content (annual)											1680.13	(45)
Distribution loss												
26.13	22.85	23.58	20.56	19.73	17.02	15.77	18.10	18.32	21.35	23.30	25.30	(46)
Hot water storage volume (litres)											210.00	(50)
Hot water cylinder loss factor (kWh/day)											0.0103	(51)
Volume factor											0.8298	(52)
Temperature factor											0.5400	(53)
Energy lost from hot water cylinder (kWh/day)											0.97	(55)
Total storage loss												
30.01	27.11	30.01	29.05	30.01	29.05	30.01	30.01	29.05	30.01	29.05	30.01	(56)
Net storage loss												
30.01	27.11	30.01	29.05	30.01	29.05	30.01	30.01	29.05	30.01	29.05	30.01	(57)
Primary loss												
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)
Total heat required for water heating calculated for each month												
227.47	200.47	210.49	188.62	184.79	165.04	158.44	173.95	173.67	195.59	206.90	221.97	(62)
Output from water heater for each month, kWh/month												
227.47	200.47	210.49	188.62	184.79	165.04	158.44	173.95	173.67	195.59	206.90	221.97	(64)
											2307.40	(64)
Heat gains from water heating, kWh/month												
100.54	89.15	94.89	86.82	86.35	78.98	77.59	82.74	81.85	89.94	92.90	98.71	(65)

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
183.37	183.37	183.37	183.37	183.37	183.37	183.37	183.37	183.37	183.37	183.37	183.37	(66)
Lighting gains												
91.19	80.99	65.87	49.87	37.28	31.47	34.00	44.20	59.33	75.33	87.92	93.72	(67)
Appliances gains												
610.67	617.01	601.04	567.04	524.13	483.80	456.85	450.52	466.49	500.48	543.39	583.73	(68)
Cooking gains												
56.39	56.39	56.39	56.39	56.39	56.39	56.39	56.39	56.39	56.39	56.39	56.39	(69)
Pumps and fans gains												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses e.g. evaporation (negative values)												
-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	(71)
Water heating gains												
135.13	132.67	127.55	120.58	116.06	109.69	104.28	111.22	113.68	120.89	129.03	132.68	(72)
Total internal gains												
954.51	948.18	911.97	855.01	794.98	742.48	712.66	723.45	757.01	814.21	877.85	927.64	(73)

6. Solar gains (calculation for January)

	Area & Flux				g & FF		Shading		Gains			
Window - Double-glazed, argon filled (East) As Per Spec	11.670	19.64			0.76	--		0.77		134.1289		
Window - Double-glazed, argon filled (North) As Per Spec	22.400	10.63			0.76	--		0.77		139.3876		
Window - Double-glazed, argon filled (West) As Per Spec	27.870	19.64			0.76	--		0.77		320.3234		
Window - Double-glazed, argon filled (South) As Per Spec	3.600	46.75			0.76	--		0.77		98.4935		
Window - Double-glazed, argon filled (North) As Per Spec	14.630	10.63			0.76	--		0.77		91.0375		
Total solar gains, January										783.37	(83-1)	
Solar gains												
783.37	1490.67	2417.8	3569.4	4477.9	4645.0	4396.1	3695.5	2817.1	1753.05	967.66	650.92	(83)
Total gains												
1737.88	2438.9	3329.8	4424.4	5272.9	5387.4	5108.8	4419.0	3574.1	2567.3	1845.51	1578.56	(84)

Lighting calculations

	Area	g	FF x Shading	
Window - Double-glazed, argon filled (East) As Per Spec	0.9 x 11.67	0.80	0.70 x 0.83	4.88
Window - Double-glazed, argon filled (North) As Per Spec	0.9 x 22.40	0.80	0.70 x 0.83	9.37
Window - Double-glazed, argon filled (West) As Per Spec	0.9 x 27.87	0.80	0.70 x 0.83	11.66
Window - Double-glazed, argon filled (South) As Per Spec	0.9 x 3.60	0.80	0.70 x 0.83	1.51

Lighting calculations

Window - Double-glazed, argon filled (North) Area g FF x Shading
 As Per Spec 0.9 x 14.63 0.80 0.70 x 0.83 6.12
 $GL = 33.54 / 241.72 = 0.139$
 $C1 = 0.500$
 $C2 = 0.960$
 $EI = 644$

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)
 Heating system responsiveness 0.75

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

16.79	16.82	16.84	16.95	16.97	17.06	17.06	17.08	17.03	16.97	16.93	16.88
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alpha

2.12	2.12	2.12	2.13	2.13	2.14	2.14	2.14	2.14	2.13	2.13	2.13
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Utilisation factor for gains for living area

0.96	0.92	0.84	0.71	0.55	0.41	0.32	0.37	0.58	0.82	0.93	0.96
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 (86)

Mean internal temperature in living area T1

18.51	18.89	19.46	20.09	20.51	20.74	20.82	20.80	20.58	19.92	19.08	18.43
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 (87)

Temperature during heating periods in rest of dwelling Th2

19.57	19.58	19.58	19.58	19.59	19.59	19.59	19.59	19.59	19.59	19.58	19.58
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 (88)

Utilisation factor for gains for rest of dwelling

0.95	0.90	0.81	0.67	0.49	0.34	0.22	0.27	0.50	0.78	0.92	0.96
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 (89)

Mean internal temperature in the rest of dwelling T2

16.32	16.87	17.67	18.51	19.05	19.31	19.38	19.37	19.15	18.33	17.15	16.22
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 (90)

Living area fraction (49.88 / 241.72) 0.21 (91)

Mean internal temperature (for the whole dwelling)

16.77	17.29	18.04	18.84	19.35	19.60	19.68	19.66	19.45	18.66	17.55	16.68
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 (92)

Apply adjustment to the mean internal temperature, where appropriate

16.77	17.29	18.04	18.84	19.35	19.60	19.68	19.66	19.45	18.66	17.55	16.68
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 (93)

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
0.93	0.87	0.78	0.64	0.48	0.34	0.23	0.28	0.49	0.75	0.89	0.94	(94)
Useful gains												
1611.98	2128.9	2601.4	2831.4	2547.5	1816.50	1168.69	1216.81	1761.82	1927.93	1646.77	1481.51	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
4987.9	4947.5	4601.9	3936.5	3026.9	1968.06	1211.84	1282.78	2108.1	3190.3	4145.1	4962.0	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
2511.6	1894.08	1488.38	795.66	356.62	-	-	-	-	939.20	1798.78	2589.5	
Total space heating requirement per year (kWh/year) (October to May)											12373.83	(98)
Space heating requirement per m ² (kWh/m ² /year)											51.19	(99)

8c. Space cooling requirement - not applicable

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

9a. Energy requirements

												kWh/year	
Fraction of heat from secondary system									0.1000				(201)
Fraction of space heat from main system(s)									0.9000				(202)
Efficiency of main heating system									90.00%				(206)
Efficiency of secondary heating system									65.00%				(208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement													
2511.6	1894.08	1488.38	795.66	356.62	-	-	-	-	939.20	1798.78	2589.5		(98)
Appendix Q - monthly energy saved (main heating system 1)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(210)
Space heating fuel (main heating system 1)													
2511.6	1894.08	1488.38	795.66	356.62	-	-	-	-	939.20	1798.78	2589.5		(211)
Appendix Q - monthly energy saved (main heating system 2)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(212)
Space heating fuel (main heating system 2)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(213)
Appendix Q - monthly energy saved (secondary heating system)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00		(214)
Space heating fuel (secondary)													
386.41	291.40	228.98	122.41	54.87	-	-	-	-	144.49	276.74	398.38		(215)
Water heating													
Water heating requirement													
227.47	200.47	210.49	188.62	184.79	165.04	158.44	173.95	173.67	195.59	206.90	221.97		(64)
Efficiency of water heater												79.30	(216)
88.90	88.74	88.38	87.54	85.77	79.30	79.30	79.30	79.30	87.77	88.64	88.96		(217)
Water heating fuel													
255.86	225.91	238.16	215.47	215.44	208.13	199.79	219.36	219.01	222.83	233.41	249.53		(219)
Annual totals												kWh/year	
Space heating fuel used, main system 1												12373.83	(211)
Space heating fuel (secondary)												1903.67	(215)
Water heating fuel												2702.90	(219)
Electricity for pumps, fans and electric keep-hot													
central heating pump												30.00	(230c)
boiler with a fan-assisted flue												45.00	(230e)
Total electricity for the above, kWh/year												75.00	(231)
Electricity for lighting (100.00% fixed LEL)												644.18	(232)
Energy saving/generation technologies													
PVs 0.80 x 4.000 x 1068.070 x 1.000												3417.826	
PVs 0.80 x 0.000 x 0.000 x 0.500												0.000	
PVs 0.80 x 0.000 x 0.000 x 0.500												0.000	
												3417.826	(233)
Appendix Q -													
Energy saved or generated ():												0.000	(236a)
Energy used ():												0.000	(237a)
Total delivered energy for all uses												14281.74	(238)

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

10a. Fuel costs using Table 12 prices

	kWh/year	Fuel price p/kWh	£/year	
Space heating - main system 1	12373.826	3.480	430.61	(240)
Space heating - main system 2	0.000	0.000	0.00	(241)
Space heating - secondary system	1903.666	4.230	80.53	(242)
Water heating				
Water heating cost	2702.90	3.480	94.06	(247)
Mech vent fans cost	0.000	13.190	0.00	(249)
Pump/fan energy cost	75.000	13.190	9.89	(249)
Energy for lighting	644.176	13.190	84.97	(250)
Additional standing charges			120.00	(251)
Electricity generated - PVs	3417.826	13.190	-450.81	(252)
Appendix Q -				
Energy saved or generated ():	0.000	0.000	0.00	(253)
Energy used ():	0.000	0.000	0.00	(254)
Total energy cost			369.24	(255)

11a. SAP rating

Energy cost deflator	0.42	(256)
Energy cost factor (ECF)	0.54	(257)
SAP value	92.45	
SAP rating	92	(258)
SAP band	A	

SAP 2012 worksheet for New dwelling as designed - calculation of energy ratings

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	12373.83	0.216	2672.75	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	1903.67	0.019	36.17	(263)
Water heating	2702.90	0.216	583.83	(264)
Space and water heating			3292.74	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	644.18	0.519	334.33	(268)
Electricity generated - PVs	-3417.83	0.519	-1773.85	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			1892.14	(272)

	kg/m²/year	
CO2 emissions per m²	7.83	(273)
El value	91.16	(273a)
El rating	91	(274)
El band	B	

Calculation of stars for heating and DHW

Main heating energy efficiency	$(3.48 / 0.9000) \times (1 + (0.29 \times 0.25)) = 4.1470$, stars = 4
Main heating environmental impact	$(0.2160 / 0.9000) \times (1 + (0.29 \times 0.25)) = 0.2574$, stars = 4
Water heating energy efficiency	$3.48 / 0.8516 = 4.0865$, stars = 4
Water heating environmental impact	$0.2160 / 0.8516 = 0.2536$, stars = 4

Project Information

Building type Detached house

Reference

Date 17 July 2020

Client John Fawthrop Project Syke Lane
Leeds
LS14

SAP 2012 worksheet for notional dwelling - calculation of target emissions**1. Overall dwelling dimensions**

	Area (m ²)	Av. Storey height (m)	Volume (m ³)	
Ground floor (1)	124.15	2.46	305.41	(3a)
First floor	117.57	3.59	422.08	(3b)
Total floor area	241.72			(4)
Dwelling volume (m ³)			727.49	(5)

2. Ventilation rate

	main + secondary + other heating		m ³ per hour	
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	4	x 10	40.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

	Air changes per hour	
Infiltration due to chimneys, fans and flues	0.05	(8)
Pressure test, result q50	5.00	(17)
Air permeability	0.30	(18)
Number of sides on which sheltered	2.00	(19)
Shelter factor	0.85	(20)
Infiltration rate incorporating shelter factor	0.26	(21)
Infiltration rate modified for monthly wind speed		

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70	
52.50												(22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18	
13.13												(22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.33	0.32	0.32	0.29	0.28	0.25	0.25	0.24	0.26	0.28	0.29	0.30	
3.40												(22b)

Ventilation : natural ventilation, intermittent extract fans

0.55	0.55	0.55	0.54	0.54	0.53	0.53	0.53	0.53	0.54	0.54	0.55	(25)
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SAP 2012 worksheet for notional dwelling - calculation of target emissions

3. Heat losses and heat loss parameter

Element	Gross area, m²	Openings m²	Net area A, m²	U-value W/m²K	A x U W/K							
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (East) As Per Spec			8.800	1.33 (1.40)	11.67	(27)						
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (North) As Per Spec			11.030	1.33 (1.40)	14.62	(27)						
Pitched roofs insulated between joists Pitched Roof			137.39	0.13	17.86	(30)						
Walls New Wall			249.89	0.18	44.98	(29)						
Walls Dormer wall			9.67	0.18	1.74	(29)						
Ground floors Ground Floor			124.15	0.13	16.14	(28)						
Flat roofs Flat roof			10.88	0.13	1.41	(30)						
Total area of external elements Sigma A, m²					592.41	(31)						
Fabric heat loss, W/K					162.25	(33)						
Thermal mass parameter, kJ/m²K (user-specified TMP)					250.00	(35)						
Effect of thermal bridges					29.62	(36)						
Total fabric heat loss					191.87	(37)						
Ventilation heat loss calculated monthly												
133.15	132.64	132.14	129.80	129.36	127.32	127.32	126.94	128.10	129.36	130.24	131.17	(38)
Heat transfer coefficient, W/K												
325.02	324.51	324.01	321.67	321.23	319.19	319.19	318.81	319.97	321.23	322.12	323.04	
												321.67 (39)
Heat loss parameter (HLP), W/m²K												
1.34	1.34	1.34	1.33	1.33	1.32	1.32	1.32	1.32	1.33	1.33	1.34	
HLP (average)												1.33 (40)
Number of days in month (Table 1a)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
31	28	31	30	31	30	31	31	30	31	30	31	

SAP 2012 worksheet for notional dwelling - calculation of target emissions

4. Water heating energy requirements

4. Water heating energy requirements											kWh/year		
Assumed occupancy, N											3.06	(42)	
Annual average hot water usage in litres per day Vd,average											106.78	(43)	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in litres per day for each month													
117.46	113.19	108.92	104.65	100.38	96.11	96.11	100.38	104.65	108.92	113.19	117.46	(44)	
Energy content of hot water used													
174.19	152.35	157.21	137.06	131.51	113.49	105.16	120.67	122.12	142.31	155.35	168.70		
Energy content (annual)											1680.13	(45)	
Distribution loss													
26.13	22.85	23.58	20.56	19.73	17.02	15.77	18.10	18.32	21.35	23.30	25.30	(46)	
Cylinder volume, l							210.00						(47)
Manufacturer's declared cylinder loss factor (kWh/day)							1.70						(48)
Temperature Factor							0.5400						(49)
Energy lost from hot water cylinder (kWh/day)											0.92	(55)	
Total storage loss													
28.48	25.73	28.48	27.57	28.48	27.57	28.48	28.48	27.57	28.48	27.57	28.48	(56)	
Net storage loss													
28.48	25.73	28.48	27.57	28.48	27.57	28.48	28.48	27.57	28.48	27.57	28.48	(57)	
Primary loss													
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)	
Total heat required for water heating calculated for each month													
225.94	199.09	208.96	187.14	183.26	163.56	156.91	172.42	172.19	194.06	205.42	220.44	(62)	
Output from water heater for each month, kWh/month													
225.94	199.09	208.96	187.14	183.26	163.56	156.91	172.42	172.19	194.06	205.42	220.44	(64)	
											2289.40	(64)	
Heat gains from water heating, kWh/month													
99.32	88.05	93.67	85.63	85.13	77.80	76.36	81.52	80.67	88.72	91.71	97.49	(65)	

SAP 2012 worksheet for notional dwelling - calculation of target emissions

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
152.81	152.81	152.81	152.81	152.81	152.81	152.81	152.81	152.81	152.81	152.81	152.81	(66)
Lighting gains												
36.48	32.40	26.35	19.95	14.91	12.59	13.60	17.68	23.73	30.13	35.17	37.49	(67)
Appliances gains												
409.15	413.39	402.70	379.92	351.17	324.14	306.09	301.85	312.55	335.32	364.07	391.10	(68)
Cooking gains												
38.28	38.28	38.28	38.28	38.28	38.28	38.28	38.28	38.28	38.28	38.28	38.28	(69)
Pumps and fans gains												
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	(70)
Losses e.g. evaporation (negative values)												
-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	(71)
Water heating gains												
133.49	131.02	125.90	118.94	114.42	108.05	102.64	109.57	112.04	119.24	127.38	131.03	(72)
Total internal gains												
650.96	648.66	626.79	590.65	552.34	516.63	494.18	500.94	520.15	556.54	598.47	631.46	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (East) As Per Spec	0.9 x 8.800 19.64	0.63 x 0.70	0.77	52.8204
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (North) As Per Spec	0.9 x 11.030 10.63	0.63 x 0.70	0.77	35.8442

Lighting calculations

	Area	g	FF x Shading	
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (East) As Per Spec	0.9 x 8.80	0.80	0.70 x 0.83	3.68
Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (North) As Per Spec	0.9 x 11.03	0.80	0.70 x 0.83	4.61

Lighting calculations

Area

g

FF x Shading

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C)

21.00 (85)

Heating system responsiveness

1.00

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

51.65	51.73	51.81	52.18	52.26	52.59	52.59	52.65	52.46	52.26	52.11	51.96
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alpha

4.44	4.45	4.45	4.48	4.48	4.51	4.51	4.51	4.50	4.48	4.47	4.46
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Utilisation factor for gains for living area

1.00	1.00	0.99	0.97	0.90	0.76	0.60	0.69	0.92	0.99	1.00	1.00
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(86)

Mean internal temperature in living area T1

19.32	19.50	19.83	20.27	20.66	20.90	20.97	20.95	20.73	20.21	19.68	19.29
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(87)

Temperature during heating periods in rest of dwelling Th2

19.81	19.81	19.81	19.82	19.82	19.82	19.82	19.83	19.82	19.82	19.82	19.81
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

(88)

Utilisation factor for gains for rest of dwelling

1.00	1.00	0.99	0.96	0.86	0.66	0.45	0.54	0.86	0.99	1.00	1.00
------	------	------	------	------	------	------	------	------	------	------	------

(89)

Mean internal temperature in the rest of dwelling T2

17.56	17.83	18.30	18.94	19.48	19.76	19.82	19.81	19.59	18.87	18.10	17.52
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

(90)

Living area fraction (49.88 / 241.72)

0.21

(91)

Mean internal temperature (for the whole dwelling)

17.93	18.17	18.61	19.22	19.73	19.99	20.05	20.04	19.82	19.14	18.43	17.89
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

(92)

Apply adjustment to the mean internal temperature, where appropriate

17.93	18.17	18.61	19.22	19.73	19.99	20.05	20.04	19.82	19.14	18.43	17.89
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(93)

SAP 2012 worksheet for notional dwelling - calculation of target emissions

8. Space heating requirement

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains												
1.00	1.00	0.99	0.96	0.86	0.67	0.48	0.57	0.86	0.98	1.00	1.00	(94)
Useful gains												
958.47	1232.02	1562.09	1908.79	1988.01	1582.40	1078.51	1113.64	1405.07	1226.55	977.36	887.13	(95)
Monthly average external temperature												
4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20	(96)
Heat loss rate for mean internal temperature												
4428.9	4306.9	3925.2	3318.2	2578.1	1721.39	1102.53	1161.29	1831.34	2744.0	3648.2	4422.5	(97)
Fraction of month for heating												
1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00	
Space heating requirement for each month, kWh/month												
2582.0	2066.3	1758.14	1014.80	439.03	-	-	-	-	1129.00	1922.97	2630.3	
Total space heating requirement per year (kWh/year) (October to May)										13542.51		(98)
Space heating requirement per m ² (kWh/m ² /year)										56.03		(99)

SAP 2012 worksheet for notional dwelling - calculation of target emissions

9a. Energy requirements

kWh/year												
No secondary heating system selected												
Fraction of space heat from main system(s)								1.0000				(202)
Efficiency of main heating system								93.50%				(206)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement												
2582.0	2066.3	1758.14	1014.80	439.03	-	-	-	-	1129.00	1922.97	2630.3	(98)
Appendix Q - monthly energy saved (main heating system 1)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)
Space heating fuel (main heating system 1)												
2761.5	2209.9	1880.37	1085.34	469.55	-	-	-	-	1207.49	2056.7	2813.2	(211)
Appendix Q - monthly energy saved (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)
Space heating fuel (main heating system 2)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)
Appendix Q - monthly energy saved (secondary heating system)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)
Space heating fuel (secondary)												
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(215)
Water heating												
Water heating requirement												
225.94	199.09	208.96	187.14	183.26	163.56	156.91	172.42	172.19	194.06	205.42	220.44	(64)
Efficiency of water heater										79.80		(216)
89.53	89.45	89.23	88.65	87.06	79.80	79.80	79.80	79.80	88.75	89.34	89.57	(217)
Water heating fuel												
252.35	222.58	234.18	211.10	210.49	204.97	196.63	216.07	215.78	218.65	229.93	246.11	(219)
Annual totals										kWh/year		
Space heating fuel used, main system 1										14483.97		(211)
Space heating fuel (secondary)										0.00		(215)
Water heating fuel										2658.83		(219)
Electricity for pumps, fans and electric keep-hot												
central heating pump										30.00		(230c)
boiler with a fan-assisted flue										45.00		(230e)
Total electricity for the above, kWh/year										75.00		(231)
Electricity for lighting (100.00% fixed LEL)										644.18		(232)
Energy saving/generation technologies												
Appendix Q -												
Energy saved or generated ():										0.000		(236a)
Energy used ():										0.000		(237a)
Total delivered energy for all uses										17861.98		(238)

10a. Does not apply

11a. Does not apply

SAP 2012 worksheet for notional dwelling - calculation of target emissions

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year	
Space heating, main system 1	14483.97	0.216	3128.54	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	0.00	0.519	0.00	(263)
Water heating	2658.83	0.216	574.31	(264)
Space and water heating			3702.85	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	644.18	0.519	334.33	(268)
Electricity generated - PVs	0.00	0.519	0.00	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO ₂ , kg/year			4076.10	(272)

	kg/m ² /year	
Emissions per m ² for space and water heating	15.32	(272a)
Emissions per m ² for lighting	1.38	(272b)
Emissions per m ² for pumps and fans	0.16	(272c)
Target Carbon Dioxide Emission Rate (TER)	16.86	(273)
= (15.3187 x 1.00) + 1.3831 + 0.1610		

Project Information

Building type Detached house

Reference

Date 17 July 2020

Client John Fawthrop Project Syke Lane
Leeds
LS14

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions**1. Overall dwelling dimensions**

	Area (m ²)	Av. Storey height (m)	Volume (m ³)	
Ground floor (1)	124.15	2.46	305.41	(3a)
First floor	117.57	3.59	422.08	(3b)
Total floor area	241.72			(4)
Dwelling volume (m ³)			727.49	(5)

2. Ventilation rate

	main + secondary + other heating		m ³ per hour	
Number of chimneys	0 + 0 + 0	x 40	0.00	(6a)
Number of open flues	0 + 0 + 0	x 20	0.00	(6b)
Number of intermittent fans	5	x 10	50.00	(7a)
Number of passive vents	0	x 10	0.00	(7b)
Number of flueless gas fires	0	x 40	0.00	(7c)

	Air changes per hour	
Infiltration due to chimneys, fans and flues	0.07	(8)
Pressure test, result q50	5.00	(17)
Air permeability	0.32	(18)
Number of sides on which sheltered	2.00	(19)
Shelter factor	0.85	(20)
Infiltration rate incorporating shelter factor	0.27	(21)
Infiltration rate modified for monthly wind speed		

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5.10	5.00	4.90	4.40	4.30	3.80	3.80	3.70	4.00	4.30	4.50	4.70

52.50 (22)

Wind Factor

1.27	1.25	1.23	1.10	1.07	0.95	0.95	0.93	1.00	1.07	1.13	1.18
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13.13 (22a)

Adjusted infiltration rate (allowing for shelter and wind speed)

0.35	0.34	0.33	0.30	0.29	0.26	0.26	0.25	0.27	0.29	0.30	0.32
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3.56 (22b)

Ventilation : natural ventilation, intermittent extract fans

Effective air change rate

0.56	0.56	0.56	0.54	0.54	0.53	0.53	0.53	0.54	0.54	0.55	0.55
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(25)

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

3. Heat losses and heat loss parameter

Element	Gross area, m ²	Openings m ²	Net area A, m ²	U-value W/m ² K	A x U W/K	kappa-value kJ/m ² K	A x K kJ/K					
Window - Double-glazed, argon filled (South) As Per Spec			3.600	1.15 (1.20)	4.12			(27)				
Window - Double-glazed, argon filled (West) As Per Spec			27.870	1.15 (1.20)	31.91			(27)				
Window - Double-glazed, argon filled (North) As Per Spec			22.400	1.15 (1.20)	25.65			(27)				
Window - Double-glazed, argon filled (East) As Per Spec			11.670	1.15 (1.20)	13.36			(27)				
Window - Double-glazed, argon filled (North) As Per Spec			14.630	1.15 (1.20)	16.75			(27)				
Pitched roofs insulated between joists Pitched Roof			137.39	0.17	23.36	9.00	1236.51	(30)				
Walls New Wall			233.75	0.16	37.40	60.00	14025.00	(29)				
Walls Dormer wall			6.07	0.17	1.03	9.00	54.63	(29)				
Ground floors Ground Floor			124.15	0.17	21.11	110.00	13656.50	(28)				
Flat roofs Flat roof			10.88	0.18	1.96	9.00	97.92	(30)				
Total area of external elements Sigma A, m ²							592.41	(31)				
Fabric heat loss, W/K							176.65	(33)				
Thermal mass parameter, kJ/m ² K (user-specified TMP)							100.00	(35)				
Effect of thermal bridges							88.86	(36)				
Total fabric heat loss							265.51	(37)				
Ventilation heat loss calculated monthly												
134.36	133.80	133.26	130.70	130.22	127.99	127.99	127.57	128.85	130.22	131.19	132.20	(38)
Heat transfer coefficient, W/K												
399.87	399.31	398.77	396.21	395.73	393.50	393.50	393.08	394.36	395.73	396.70	397.71	
											396.20	(39)
Heat loss parameter (HLP), W/m ² K												
1.65	1.65	1.65	1.64	1.64	1.63	1.63	1.63	1.63	1.64	1.64	1.65	
HLP (average)											1.64	(40)
Number of days in month (Table 1a)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
31	28	31	30	31	30	31	31	30	31	30	31	

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

4. Water heating energy requirements

4. Water heating energy requirements											kWh/year	
Assumed occupancy, N											3.06	(42)
Annual average hot water usage in litres per day Vd,average											106.78	(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage in litres per day for each month												
117.46	113.19	108.92	104.65	100.38	96.11	96.11	100.38	104.65	108.92	113.19	117.46	(44)
Energy content of hot water used												
174.19	152.35	157.21	137.06	131.51	113.49	105.16	120.67	122.12	142.31	155.35	168.70	
Energy content (annual)											1680.13	(45)
Distribution loss												
26.13	22.85	23.58	20.56	19.73	17.02	15.77	18.10	18.32	21.35	23.30	25.30	(46)
Hot water storage volume (litres)											210.00	(50)
Hot water cylinder loss factor (kWh/day)											0.0103	(51)
Volume factor											0.8298	(52)
Temperature factor											0.5400	(53)
Energy lost from hot water cylinder (kWh/day)											0.97	(55)
Total storage loss												
30.01	27.11	30.01	29.05	30.01	29.05	30.01	30.01	29.05	30.01	29.05	30.01	(56)
Net storage loss												
30.01	27.11	30.01	29.05	30.01	29.05	30.01	30.01	29.05	30.01	29.05	30.01	(57)
Primary loss												
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)
Total heat required for water heating calculated for each month												
227.47	200.47	210.49	188.62	184.79	165.04	158.44	173.95	173.67	195.59	206.90	221.97	(62)
Output from water heater for each month, kWh/month												
227.47	200.47	210.49	188.62	184.79	165.04	158.44	173.95	173.67	195.59	206.90	221.97	(64)
											2307.40	(64)
Heat gains from water heating, kWh/month												
100.54	89.15	94.89	86.82	86.35	78.98	77.59	82.74	81.85	89.94	92.90	98.71	(65)

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

5. Internal gains

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains, Watts												
152.81	152.81	152.81	152.81	152.81	152.81	152.81	152.81	152.81	152.81	152.81	152.81	(66)
Lighting gains												
36.48	32.40	26.35	19.95	14.91	12.59	13.60	17.68	23.73	30.13	35.17	37.49	(67)
Appliances gains												
409.15	413.39	402.70	379.92	351.17	324.14	306.09	301.85	312.55	335.32	364.07	391.10	(68)
Cooking gains												
38.28	38.28	38.28	38.28	38.28	38.28	38.28	38.28	38.28	38.28	38.28	38.28	(69)
Pumps and fans gains												
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(70)
Losses e.g. evaporation (negative values)												
-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	-122.25	(71)
Water heating gains												
135.13	132.67	127.55	120.58	116.06	109.69	104.28	111.22	113.68	120.89	129.03	132.68	(72)
Total internal gains												
649.60	647.30	625.43	589.29	550.98	515.27	492.82	499.58	518.80	555.18	597.11	630.11	(73)

6. Solar gains (calculation for January)

	Area & Flux	g & FF	Shading	Gains
Window - Double-glazed, argon filled (South) As Per Spec	3.600 46.75	0.76 --	0.77	98.4935
Window - Double-glazed, argon filled (West) As Per Spec	27.870 19.64	0.76 --	0.77	320.3234
Window - Double-glazed, argon filled (North) As Per Spec	22.400 10.63	0.76 --	0.77	139.3876
Window - Double-glazed, argon filled (East) As Per Spec	11.670 19.64	0.76 --	0.77	134.1289
Window - Double-glazed, argon filled (North) As Per Spec	14.630 10.63	0.76 --	0.77	91.0375

Lighting calculations

	Area	g	FF x Shading	
Window - Double-glazed, argon filled (South) As Per Spec	0.9 x 3.60	0.80	0.70 x 0.83	1.51
Window - Double-glazed, argon filled (West) As Per Spec	0.9 x 27.87	0.80	0.70 x 0.83	11.66
Window - Double-glazed, argon filled (North) As Per Spec	0.9 x 22.40	0.80	0.70 x 0.83	9.37
Window - Double-glazed, argon filled (East) As Per Spec	0.9 x 11.67	0.80	0.70 x 0.83	4.88
Window - Double-glazed, argon filled (North) As Per Spec	0.9 x 14.63	0.80	0.70 x 0.83	6.12

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

7. Mean internal temperature

Temperature during heating periods in the living area, Th1 (°C) 21.00 (85)
 Heating system responsiveness 0.75

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

tau

16.79	16.82	16.84	16.95	16.97	17.06	17.06	17.08	17.03	16.97	16.93	16.88
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

alpha

2.12	2.12	2.12	2.13	2.13	2.14	2.14	2.14	2.14	2.13	2.13	2.13
------	------	------	------	------	------	------	------	------	------	------	------

Utilisation factor for gains for living area

0.97	0.93	0.86	0.73	0.57	0.43	0.33	0.39	0.61	0.85	0.95	0.98
------	------	------	------	------	------	------	------	------	------	------	------

 (86)

Mean internal temperature in living area T1

18.38	18.78	19.38	20.04	20.49	20.73	20.82	20.79	20.55	19.85	18.97	18.30
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

 (87)

Temperature during heating periods in rest of dwelling Th2

19.57	19.58	19.58	19.58	19.59	19.59	19.59	19.59	19.59	19.59	19.58	19.58
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

 (88)

Utilisation factor for gains for rest of dwelling

0.96	0.92	0.84	0.69	0.51	0.35	0.23	0.28	0.53	0.81	0.94	0.97
------	------	------	------	------	------	------	------	------	------	------	------

 (89)

Mean internal temperature in the rest of dwelling T2

16.14	16.71	17.56	18.45	19.02	19.30	19.38	19.36	19.13	18.24	16.99	16.03
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

 (90)

Living area fraction (49.88 / 241.72) 0.21 (91)

Mean internal temperature (for the whole dwelling)

16.60	17.14	17.93	18.78	19.32	19.59	19.68	19.66	19.42	18.57	17.40	16.50
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

 (92)

Apply adjustment to the mean internal temperature, where appropriate

16.60	17.14	17.93	18.78	19.32	19.59	19.68	19.66	19.42	18.57	17.40	16.50
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

 (93)

8. Space heating requirement

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

Utilisation factor for gains

0.95	0.89	0.80	0.66	0.50	0.35	0.24	0.29	0.52	0.78	0.92	0.96
------	------	------	------	------	------	------	------	------	------	------	------

 (94)

Useful gains

1356.97	1912.69	2444.7	2742.9	2508.0	1802.50	1164.05	1208.79	1720.46	1798.21	1433.07	1225.40
---------	---------	--------	--------	--------	---------	---------	---------	---------	---------	---------	---------

 (95)

Monthly average external temperature

4.30	4.90	6.50	8.90	11.70	14.60	16.60	16.40	14.10	10.60	7.10	4.20
------	------	------	------	-------	-------	-------	-------	-------	-------	------	------

 (96)

Heat loss rate for mean internal temperature

4918.7	4887.8	4558.6	3913.2	3017.2	1964.80	1210.75	1280.89	2097.8	3154.7	4086.5	4893.1
--------	--------	--------	--------	--------	---------	---------	---------	--------	--------	--------	--------

 (97)

Fraction of month for heating

1.00	1.00	1.00	1.00	1.00	-	-	-	-	1.00	1.00	1.00
------	------	------	------	------	---	---	---	---	------	------	------

Space heating requirement for each month, kWh/month

2650.0	1999.26	1572.74	842.59	378.79	-	-	-	-	1009.20	1910.50	2728.8
--------	---------	---------	--------	--------	---	---	---	---	---------	---------	--------

Total space heating requirement per year (kWh/year) (October to May) 13091.83 (98)

Space heating requirement per m² (kWh/m²/year) 54.16 (99)

8c. Space cooling requirement - not applicable

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

9a. Energy requirements

												kWh/year	
Fraction of heat from secondary system									0.1000			(201)	
Fraction of space heat from main system(s)									0.9000			(202)	
Efficiency of main heating system									90.00%			(206)	
Efficiency of secondary heating system									65.00%			(208)	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement													
2650.0	1999.26	1572.74	842.59	378.79	-	-	-	-	1009.20	1910.50	2728.8	(98)	
Appendix Q - monthly energy saved (main heating system 1)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(210)	
Space heating fuel (main heating system 1)													
2650.0	1999.26	1572.74	842.59	378.79	-	-	-	-	1009.20	1910.50	2728.8	(211)	
Appendix Q - monthly energy saved (main heating system 2)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(212)	
Space heating fuel (main heating system 2)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(213)	
Appendix Q - monthly energy saved (secondary heating system)													
0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	(214)	
Space heating fuel (secondary)													
407.68	307.58	241.96	129.63	58.28	-	-	-	-	155.26	293.92	419.81	(215)	
Water heating													
Water heating requirement													
227.47	200.47	210.49	188.62	184.79	165.04	158.44	173.95	173.67	195.59	206.90	221.97	(64)	
Efficiency of water heater											79.30		(216)
88.95	88.80	88.45	87.64	85.92	79.30	79.30	79.30	79.30	87.90	88.71	89.00	(217)	
Water heating fuel													
255.71	225.76	237.96	215.21	215.06	208.13	199.79	219.36	219.01	222.52	233.23	249.39	(219)	
Annual totals											kWh/year		
Space heating fuel used, main system 1											13091.83		(211)
Space heating fuel (secondary)											2014.13		(215)
Water heating fuel											2701.12		(219)
Electricity for pumps, fans and electric keep-hot													
central heating pump											30.00		(230c)
boiler with a fan-assisted flue											45.00		(230e)
Total electricity for the above, kWh/year											75.00		(231)
Electricity for lighting (100.00% fixed LEL)											644.18		(232)
Energy saving/generation technologies													
PVs 0.80 x 4.000 x 1068.070 x 1.000											3417.826		
PVs 0.80 x 0.000 x 0.000 x 0.500											0.000		
PVs 0.80 x 0.000 x 0.000 x 0.500											0.000		
											3417.826		(233)
Appendix Q -													
Energy saved or generated ():											0.000		(236a)
Energy used ():											0.000		(237a)
Total delivered energy for all uses											15108.43		(238)

SAP 2012 worksheet for New dwelling as designed - calculation of dwelling emissions

10a. Does not apply

11a. Does not apply

12a. Carbon dioxide emissions

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating, main system 1	13091.83	0.216	2827.83	(261)
Space heating, main system 2	0.00	0.000	0.00	(262)
Space heating, secondary	2014.13	0.019	38.27	(263)
Water heating	2701.12	0.216	583.44	(264)
Space and water heating			3449.55	(265)
Electricity for pumps and fans	75.00	0.519	38.93	(267)
Electricity for lighting	644.18	0.519	334.33	(268)
Electricity generated - PVs	-3417.83	0.519	-1773.85	(269)
Electricity generated - µCHP	0.00	0.000	0.00	(269)
Appendix Q -				
Energy saved ():	0.00	0.000	0.00	(270)
Energy used ():	0.00	0.000	0.00	(271)
Total CO2, kg/year			2048.95	(272)

	kg/m²/year	
Dwelling Carbon Dioxide Emission Rate (DER)	8.48	(273)

Project Information

Building type Detached house

Reference

Date 17 July 2020

Client John Fawthrop Project Syke Lane
Leeds
LS14

REGULATION COMPLIANCE REPORT - Approved Document L1A, 2012 Edition, England

assessed by program JPA Designer version 6.04a1, printed on 20/07/2020 at 10:35:21

New dwelling as designed

1 TER and DER

Fuel for main heating system: Gas (mains) (fuel factor = 1.00)

Target Carbon Dioxide Emission Rate	TER = 16.86	
Dwelling Carbon Dioxide Emission Rate	DER = 8.48	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	TFEE = 70.8	
Dwelling Fabric Energy Efficiency (DFEE)	DFEE = 63.1	OK

2a Thermal bridging

Thermal bridging calculated using default ψ -value of 0.15

2b Fabric U-values

Element	Average	Highest	
Wall	0.16 (max. 0.30)	0.17 (max. 0.70)	OK
Floor	0.17 (max. 0.25)	0.17 (max. 0.70)	OK
Roof	0.17 (max. 0.20)	0.18 (max. 0.35)	OK
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	OK

3 Air permeability

Air permeability at 50 pascals:	5.00	OK
Maximum :	10.00	

4 Heating efficiency

Main heating system:

Boiler and underfloor heating, mains gas

Vaillant Ecotec Plus

Source of efficiency: from boiler database

Vaillant Ecotec Plus 630

Efficiency: 89.0% SEDBUK2009

Minimum: 88.0%

OK

Secondary heating system:

Room heater systems - Solid fuel

Closed room heater

Efficiency: 65.00%

Minimum: 65.00%

OK

5 Cylinder insulation

Hot water storage	Calculated cylinder loss factor (kWh/day)	1.79	
	Permitted by DBSCG	2.30	OK
Primary pipework insulated	Yes		OK

6 Controls

(Also refer to "Domestic Building Services Compliance Guide" by the DCLG)

Space heating controls	Time and temperature zone control		OK
	Cylinderstat - Yes		OK
	Independent timer for DHW - Yes		OK
Boiler Interlock	Yes		OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings: 100.0%	
Minimum: 75.0%	OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (East Pennines):			OK
		Slight	OK
Based on:			
Thermal mass parameter :	100.00		
Overshading :	Average or unknown (20-60 % sky blocked)		
Orientation : East			
Ventilation rate :	8.00		
Blinds/curtains :			
None with blinds/shutters closed 100.00% of daylight hours			

10 Key features

Low-carbon or renewable for secondary heating fuel.
Wood logs
Photovoltaic array

Project Information

Building type Detached house

Reference

Date 17 July 2020

Client John Fawthrop Project Syke Lane
Leeds
LS14

SAP 2012 input data Printed on 20 Jul 2020 at 10:35 AM

Syke Lane

Syke Lane
Leeds
LS14

Located in: England
Region: East Pennines
Postcode: LS14
UPRN:
Date of assessment: 2018-12-10
Date of certificate: 2020-07-20
Assessment type: New dwelling as designed
Tenure: Unknown
Transaction type: New dwelling
Related party disclosure: No related party
PCDF revision number: 462

Property description

Dwelling type: Detached house
Ground floor (1) area = 124.15m² storey height = 2.46m
First floor area = 117.57m² storey height = 3.59m
Living area: 49.88 (fraction 0.206)

Front of dwelling faces: East

Doors

Windows

Window	area = 3.60	U = 1.20	- Double-glazed, argon filled (South)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 27.87	U = 1.20	- Double-glazed, argon filled (West)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 22.40	U = 1.20	- Double-glazed, argon filled (North)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 11.67	U = 1.20	- Double-glazed, argon filled (East)
Overshading:	Average or unknown (20-60 % sky blocked)		
Window	area = 14.63	U = 1.20	- Double-glazed, argon filled (North)
Overshading:	Average or unknown (20-60 % sky blocked)		

Rooflights

Opaque Elements

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Approval of JPA Designer by BRE applies only to the software, data is not subject to quality control procedures, users are themselves responsible for the accuracy of the data. The results of the calculation should not be accepted without first checking the input data.

Project Information

Building type Detached house

Reference

Date 17 July 2020

Client John Fawthrop Project Syke Lane
Leeds
LS14**SAP 2012 input data Printed on 20 Jul 2020 at 10:35 AM****Syke Lane**

Roofs	area = 137.39	U = 0.17, k = 9.0	Pitched Roof
Walls	area = 233.75	U = 0.16, k = 60.0	New Wall
Walls	area = 6.07	U = 0.17, k = 9.0	Dormer wall
Ground floors	area = 124.15	U = 0.17, k = 110.0	Ground Floor

Roofs	area = 10.88	U = 0.18, k = 9.0	Flat roof
-------	--------------	-------------------	-----------

Thermal bridges: NOT Accredited Construction Details ($\gamma = 0.1500$)

Thermal mass: User defined - 100.00

Pressure test: Yes (q50 - 5.00) : measured in this dwelling : Yes

Ventilation: Natural ventilation with intermittent extract fans

Approved Installer: No

From database:

Database revision: 462

Duct type: Rigid

Wet room count: 3 (ex. kitchens)

Number of chimneys: 0

Number of open flues: 0

Number of intermittent fans: 5

Number of passive stacks: 0

Number of sides sheltered: 2.00

Measured/design q50: 5.00

Main heating system: Central heating systems with radiators or underfloor heating

Gas boilers (including LPG) 1998 or later

Condensing with automatic ignition

Index : 10324

Eff 79.30% / 90.00% Vaillant Ecotec Plus 630

Underfloor, pipes in screed above insulation

Pump in heated space: No

Boiler has load or weather compensator: No

Boiler Interlock: Yes

Design flow temperature : Unknown

Central heating pump 2013 or later

Gas (mains)

Main heating controls: Time and temperature zone control

Boiler has load compensator: No

Project Information

Building type Detached house

Reference

Date 17 July 2020

Client John Fawthrop Project Syke Lane
Leeds
LS14**SAP 2012 input data Printed on 20 Jul 2020 at 10:35 AM****Syke Lane**

Boiler has weather compensator: No

Boiler has enhanced load compensator: No

Boiler interlock: Yes

Secondary heating system: Room heater systems
Solid fuel
Closed room heater
Wood logs

Solid fuel room heater is HETAS approved: Yes

Water heating: Hot water storage tank
Cylinder volume : 210.00
Insulation type : Factory
Insulation thickness : 100.00
Cylinder heater : Boiler feed
Cylinder in heated space: Yes
Insulated primary: Yes
Cylinder thermostat: Yes
Separate timer for domestic hot water: Yes
Solar panel: no

Water use <= 125 litres/person/day: Yes

Low energy lights: 100.0% of fixed lighting outlets

Total fixed lighting outlets: 100

Electricity tariff: Standard tariff

Photovoltaics 1: Peak kW: 4.00
45 degrees
South
None or very little (<20 % sky blocked)

Photovoltaics 2: Peak kW: 0.00

Photovoltaics 3: Heavy (>80 % sky blocked)
Peak kW: 0.00

Heavy (>80 % sky blocked)

Project Information

Building type Detached house

Reference

Date 17 July 2020

Client John Fawthrop Project Syke Lane
Leeds
LS14

SAP 2012 input data Printed on 20 Jul 2020 at 10:35 AM

Syke Lane

Conservatory: No

Fixed air conditioning: No

Smoke Control Area: No

Additional allowable electricity generation :
0.00kg/m²/year

3. SAP Calculation Plot 2

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Property Reference	20183 Gas		Issued on Date	02/10/2020	
Assessment Reference	20183 Plot 2		Prop Type Ref		
Property	Plot 2, 27 Syke Lane, Lightcliffe, Calderdale, HX3 8SY				
SAP Rating	88 B	DER	12.52	TER	16.91
Environmental	87 B	% DER<TER	25.98		
CO ₂ Emissions (t/year)	3.36	DFEE	70.00	TFEE	73.02
General Requirements Compliance	Pass	% DFEE<TFEE	4.15		
Assessor Details	Mr. William Simpson, Quadrant Approved Inpsectors, Tel: 01522719288, will.simpson@quadrantai.co.uk			Assessor ID	H077-0001
Client					

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	16.91	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	12.52	kgCO ₂ /m ²	Pass
	-4.39 (-26.0%)	kgCO ₂ /m ²	

1b TFE and DFEE

Target Fabric Energy Efficiency (TFEE)	73.02	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	70.00	kWh/m ² /yr	
	-3.0 (-4.1%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.27 (max. 0.30)	0.27 (max. 0.70)	Pass
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	Pass
Roof	0.14 (max. 0.20)	0.18 (max. 0.35)	Pass
Openings	1.60 (max. 2.00)	1.60 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Boiler system with radiators or underfloor - Mains gas Data from database Ideal LOGIC+ HEAT H30 Efficiency: 89.5% SEDBUK2009 Minimum: 88.0%	Pass
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BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Secondary heating system

Room heaters - Wood Logs
Closed room heater
Efficiency: 65%
Minimum: 65%

Pass

5 Cylinder insulation

Hot water storage

Nominal cylinder loss: 2.01 kWh/day
Permitted by DBSCG 2.30

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Continuous supply and extract system

Specific fan power

1.35

Maximum

1.5

Pass

MVHR efficiency

89

%

Minimum

70

%

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (East Pennines)

Not significant

Pass

Based on:

Overshading

Average

Windows facing North

31.24 m², No overhang

Windows facing East

19.49 m², No overhang

Windows facing South

10.56 m², No overhang

Windows facing West

11.48 m², No overhang

Air change rate

8.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

Pass

10 Key features

Floor U-value

0.11

W/m²K

Secondary heating (wood logs)

N/A

Secondary heating fuel:

wood logs

Photovoltaic array

4.00

kW

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Property Reference	20183 Gas	Issued on Date	02/10/2020
Assessment Reference	20183 Plot 2	Prop Type Ref	
Property	Plot 2, 27 Syke Lane, Lightcliffe, Calderdale, HX3 8SY		
SAP Rating	88 B	DER	12.52
Environmental	87 B	TER	16.91
CO ₂ Emissions (t/year)	3.36	% DER<TER	25.98
General Requirements Compliance	Pass	DfEE	70.00
		TFEE	73.02
		% DfEE<TFEE	4.15
Assessor Details	Mr. William Simpson, Quadrant Approved Inspectors, Tel: 01522719288, will.simpson@quadrantai.co.uk		Assessor ID
			H077-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	East
Property Tenure	Unknown
Transaction Type	New dwelling
Terrain Type	Suburban
1.0 Property Type	House, Detached
2.0 Number of Storeys	2
3.0 Date Built	2020
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown

6.0 Measurements		Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	Ground Floor:	61.72 m	141.68 m ²	2.52 m
	1st Storey:	57.02 m	120.97 m ²	3.20 m

7.0 Living Area	23.30	m ²
8.0 Thermal Mass Parameter	Simple calculation - Medium	
Thermal Mass	250.00	kJ/m ² K

9.0 External Walls		U-Value (W/m ² K)	Gross Area (m ²)	Nett Area (m ²)
Description	Type			
External Wall Stone	Cavity Wall	0.27	387.71	341.88
External Wall Zinc	Cavity Wall	0.25	48.87	21.93

10.0 External Roofs		U-Value (W/m ² K)	Gross Area (m ²)	Nett Area (m ²)
Description	Type			
Slope Roof	External Slope Roof	0.13	138.38	135.70
Insulated slope/Ceiling	External Slope Roof	0.14	30.68	30.68
Flat Roof	External Flat Roof	0.18	17.86	17.86
Terrace Roof	External Flat Roof	0.18	4.80	4.80

11.0 Heat Loss Floors		U-Value (W/m ² K)	Area (m ²)
Description	Type		
Ground Floor	Ground Floor - Solid	0.11	141.68

12.0 Opening Types

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Glazing/Doors	Manufacturer	Window	Double Low-E Hard 0.2			0.72		0.70	1.60
Velux	Manufacturer	Roof Window	Double Low-E Hard 0.2			0.72		0.70	1.60

13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m²)	Curtain Closed
East	Window	[2] External Wall Zinc	East	None	0.00					7.66	
East	Window	[1] External Wall Stone	East	None	0.00					11.83	
East	Roof Window	[1] Slope Roof	East	None						0.40	
North	Window	[2] External Wall Zinc	North	None	0.00					13.63	
North	Window	[1] External Wall Stone	North	None	0.00					17.61	
North	Roof Window	[1] Slope Roof	North	None						0.48	
West	Roof Window	[1] Slope Roof	West	None						1.80	
West	Window	[2] External Wall Zinc	West	None	0.00					5.65	
West	Window	[1] External Wall Stone	West	None	0.00					5.83	
South	Window	[1] External Wall Stone	South	None	0.00					10.56	

14.0 Conservatory

None

15.0 Draught Proofing

100 %

16.0 Draught Lobby

No

17.0 Thermal Bridging

Calculate Bridges

17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Table K1 - Approved	E2 Other lintels (including other steel lintels)	37.55	0.300	Yes
Independently assessed	E3 Sill	37.55	0.015	Yes CBA Details
Independently assessed	E4 Jamb	94.36	0.010	Yes CBA Details
Table K1 - Approved	E5 Ground floor (normal)	61.72	0.160	Yes
Independently assessed	E6 Intermediate floor within a dwelling	57.02	0.000	Yes CBA Details
Table K1 - Approved	E8 Balcony within a dwelling, wall insulation continuous	3.20	0.000	No
Table K1 - Approved	E11 Eaves (insulation at rafter level)	30.66	0.040	No
Table K1 - Approved	E13 Gable (insulation at rafter level)	21.50	0.040	No
Table K1 - Default	E15 Flat roof with parapet	21.75	0.560	No
Independently assessed	E16 Corner (normal)	55.20	0.062	No CBA Details
Independently assessed	E17 Corner (inverted – internal area greater than external area)	33.76	-0.106	No CBA Details
Table K1 - Default	R1 Head of roof window	2.90	0.080	Yes
Table K1 - Default	R2 Sill of roof window	2.90	0.060	Yes
Table K1 - Default	R3 Jamb of roof window	9.80	0.080	Yes
Table K1 - Default	R4 Ridge (vaulted ceiling)	22.08	0.080	No
Table K1 - Default	R6 Flat ceiling	11.00	0.060	No

Y-value 0.052 W/m²K

18.0 Pressure Testing

Yes

Designed AP₅₀ 4.00 m³/(h.m²) @ 50 Pa

Property Tested ?

As Built AP₅₀ m³/(h.m²) @ 50 Pa

19.0 Mechanical Ventilation

Summer Overheating

Windows open in hot weather Windows fully open

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Cross ventilation possible	Yes
Night Ventilation	No
Air change rate	8.00

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	Yes
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500201
Configuration	6
MVHR Duct Insulated	Yes
Manufacturer SFP	1.35
Duct Type	Rigid
MVHR Efficiency	89.00
Wet Rooms	6

20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0	0	0	0
Number of open flues	0	0	0	0
Number of intermittent fans				0
Number of passive vents				0
Number of flueless gas fires				0

21.0 Fixed Cooling System

No

22.0 Lighting

Internal

Total number of light fittings	43
Total number of L.E.L. fittings	43
Percentage of L.E.L. fittings	100.00 %

External

External lights fitted	Yes
Light and motion sensor	Yes

23.0 Electricity Tariff

Standard

24.0 Main Heating 1

	Database
Percentage of Heat	100 %
Database Ref. No.	18035
Fuel Type	Mains gas
Main Heating	BGB
SAP Code	102
In Winter	90.5
In Summer	79.8
Controls	CBI Time and temperature zone control
PCDF Controls	0
Delayed Start Stat	No
Sap Code	2110
Boiler Compensator	Ideal Boilers, Ideal, PRT3
Flue Type	Balanced

SUMMARY FOR INPUT DATA

Calculation Type: New Build (As Designed)

Fan Assisted Flue	Yes
Is MHS Pumped	Pump in heated space
Heat Emitter	Radiators and Underfloor
Underfloor Heating	Yes - Pipes in Concrete
Flow Temperature	Unknown
25.0 Main Heating 2	None

Community Heating	None	
27.0 Secondary Heating	RWM	
Secondary Heating	SAP table	
Description	Wood Logs RWM Closed room heater	
SHS efficiency	65.00	%
SAP Code	633	
HETAS Approved System	Yes	
Smoke Control Area	Unknown	

28.0 Water Heating	HWP From main heating 1
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
SAP Code	901

29.0 Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	Yes
Cylinder In Heated Space	Yes
Independent Time Control	Yes
Insulation Type	Foam
Insulation Thickness	80 mm
Cylinder Volume	210.00
Pipes insulation	Fully insulated primary pipework

31.0 Thermal Store	None
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32.0 Photovoltaic Unit		One Dwelling		
PV Cells kWp	Orientation	Elevation	Overshading	Connected to Dwelling
4.00	South	30°	None Or Little	Yes

Recommendations

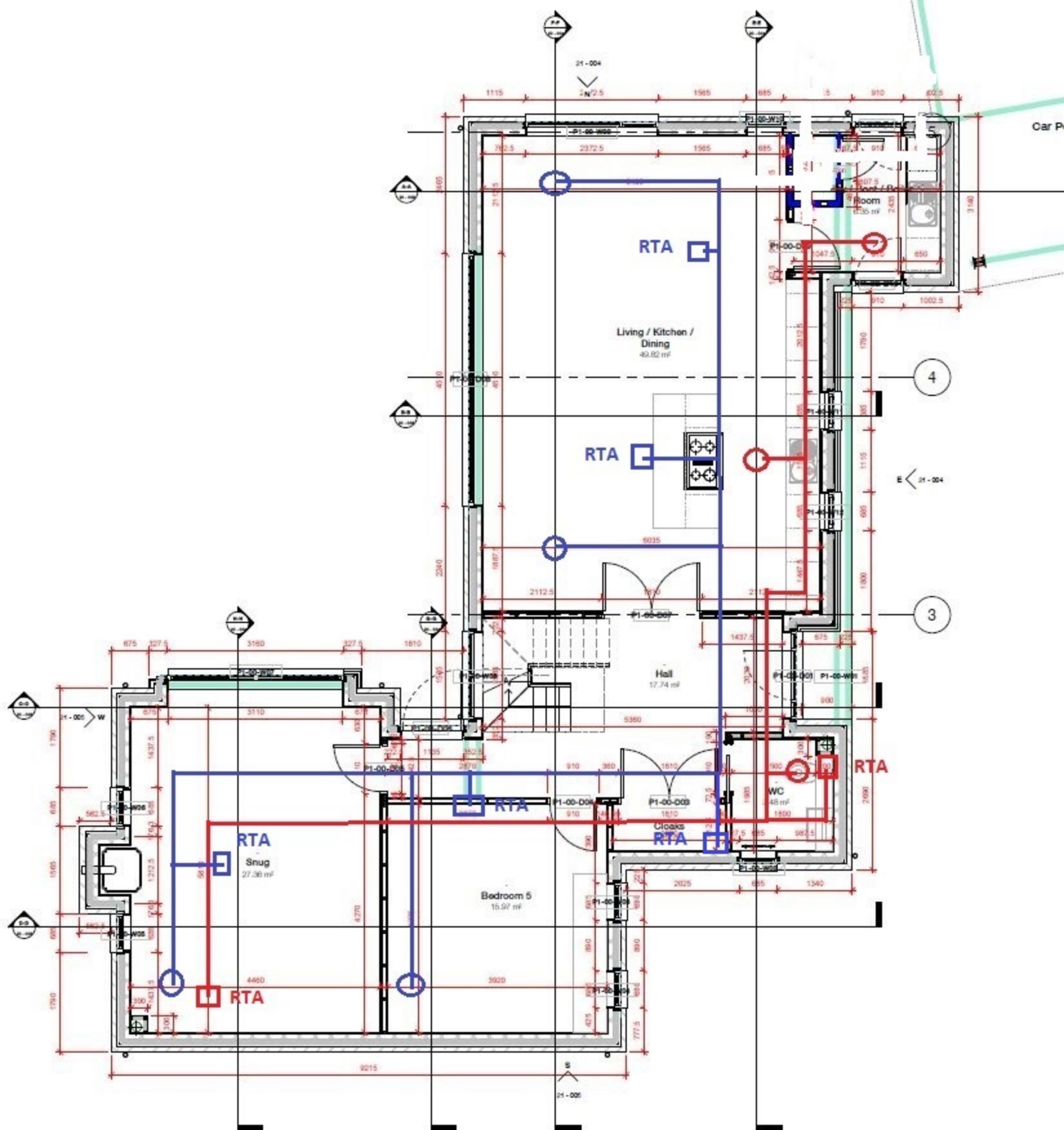
Lower cost measures

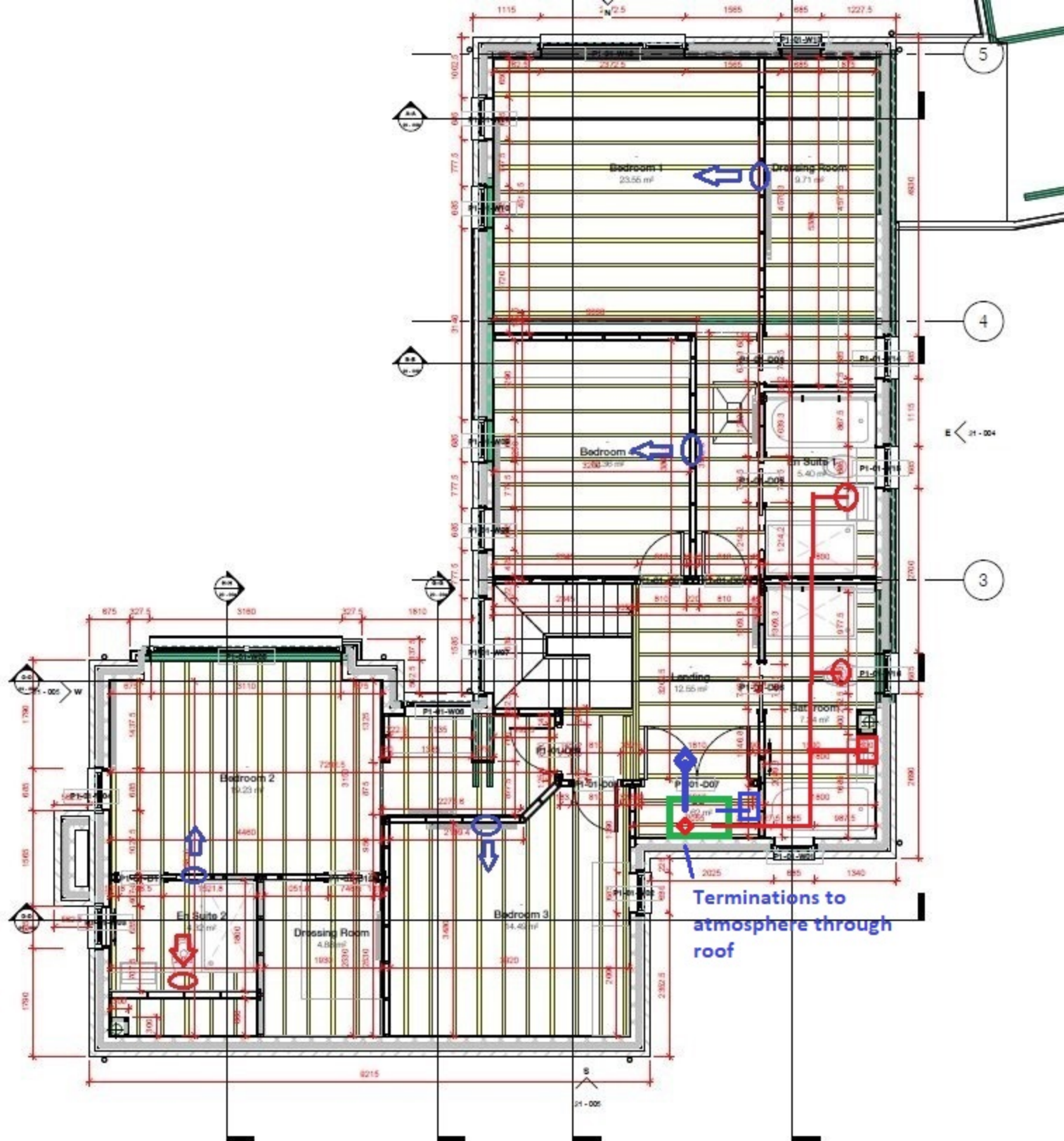
None

Further measures to achieve even higher standards

None

4. MVHR Details Plot 1





Plot 1 - Detailed First Floor Plan
1:50

5. MVHR Details Plot 2

FOR APPROVAL ISSUE

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Western Ind Estate

Caerphilly

Mid Glamorgan

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DO NOT SCALE

THIS DRAWING IS FOR ILLUSTRATION PURPOSES ONLY. IN PREPARING THIS INFORMATION NUAIRE HAS REFERRED TO RECOMMENDED GUIDELINES SET OUT WITHIN THE BUILDING REGULATIONS AND OTHER RELEVANT ADVISORY DOCUMENTS AND ACKNOWLEDGES THAT THIS DOES NOT IN ANYWAY DEMONSTRATE COMPLIANCE WITH SUCH REGULATIONS.

CLIENT COMMENTS

Hatching indicates Nuair Thermal Ductmaster ducting.

Hatching indicates wrapping with rockwool insulation

Flexible Duct

Versa-Tile Roof Terminal

Roof Pipe Cowl

Louvered Grille

Supply Valve/Grille

Extract Valve/Grille

Extract air brick

Supply air brick

Round Duct T-Piece

45° Round Duct Bend

90° Round Duct Bend

Plenum - Round to Flat

90° Flat Duct Bend

90° Thermal horizontal bend

45° Thermal horizontal bend

Thermal Duct Plenum

Thermal Flat Duct T-piece

Thermal Round Duct T-piece

90° Thermal Round Duct Bend

45° Thermal Round Duct Bend

Semi Rigid Acoustic Duct

Condensation Trap

Round Duct Reducer

Round Fire Damper

Flat Fire Wrap with Fire Collar

Flat Duct Silencer

ALL DUCTWORK TO BE RIGID PVC OR RIGID INSULATED DUCTWORK TO PREVENT CONDENSATION FORMATION. DUCTWORK IS TO BE INSULATED WITH A THERMAL RESISTANCE EQUIVALENT TO A MINIMUM OF 25MM OF INSULATING MATERIAL. WITH A THERMAL CONDUCTIVITY OF 0.04W/MK.

PLEASE ENSURE CORE CUTS THROUGH JOISTS ARE SUITABLE TO ACCOMMODATE THE DUCTWORK WHILE ALSO MAINTAINING THE STRUCTURAL INTEGRITY OF THE JOIST. PLEASE SEEK APPROVAL FROM THE JOIST MANUFACTURER OR QUALIFIED STRUCTURAL ENGINEER.

VARIATIONS TO THIS INDICATIVE DRAWING RESULTING IN ADDITIONAL DUCTING WILL BE CHARGED AT THE AGREED CONTRACT RATE.

FLEXIBLE DUCTING SHOULD BE LIMITED TO NO MORE THAN 300MM AND SHOULD ONLY BE LOCATED ADJACENT TO FAN UNITS AND AIR VALVES. FLEXIBLE DUCT SHOULD BE PULLED TAUGHT WITH SMOOTH CORRECTLY SUPPORTED BENDS ONLY.

CONDENSATE DRAIN PIPEWORK WILL BE REQUIRED IN 21.5MM. THIS IS TO BE SUPPLIED BY OTHERS. ALL CONDENSATE PIPEWORK IS TO BE INSULATED WITHIN A COLD SPACE AND HAVE A MINIMUM FALL OF 10 DEGREES.

VERTICAL EXHAUST DUCTING WILL REQUIRE A CONDENSATE TRAP IN ORDER TO PREVENT BACKFLOW OF ANY MOISTURE INTO THE FAN.

PLEASE ENSURE THE FREE AREA OF TERMINAL GRILLE OPENING IS A MINIMUM OF 90 PER CENT OF THE FREE AREA OF THE DUCTING BEING USED. PLEASE ENSURE THE SEPERATION BETWEEN INTAKE AND EXHAUST TERMINALS COMPLIES WITH CURRENT REGULATIONS.

WHEN FAN UNITS ARE INSTALLED OUTSIDE OF THE INSULATED PARTS OF THE HOME, THE COMPONENTS ARE INSULATED PROPERLY AND ROBUSTLY IN ORDER TO MEET THE DESIGN PERFORMANCE OF THE SYSTEM. THE FAN UNIT SHOULD ALSO BE ACCESSIBLE FOR MAINTENANCE. FRESH AIR INTAKE AND EXHAUST AIR LEGS ARE TO BE FULLY INSULATED BACK TO THE UNIT.

PLEASE NOTE TO COMPLY WITH CURRENT BUILDING REGULATIONS MANUAL BOOST SWITCHES ARE TO BE PROVIDED TO EACH WET AREA. THESE ARE TO BE PROVIDED AND FITTED BY OTHERS.

PLEASE ENSURE INDICATIVE DRAWING COMPLIES WITH THE ACOUSTIC REPORT, AIR QUALITY REPORT AND FIRE STRATEGY.

PLEASE ENSURE THE BUILDING COMPLIES WITH BUILDING REGULATION B3(4) AND BEST PRACTICE. PENETRATIONS THROUGH THE EXTERNAL WALL STRUCTURE ARE EITHER OF AN ACCEPTABLE SIZE OR SUITABLY FIRE PROTECTED.

PLEASE ENSURE THAT THIS INDICATIVE DRAWING IS APPROVED BY A SUITABLY QUALIFIED FIRE SPECIALIST TO ENSURE IT MEETS THE REQUIREMENTS OF THE FIRE STRATEGY. BUILDING REGULATIONS AND CURRENT BEST PRACTICE.

PLEASE ENSURE THAT WHERE DUCT TERMINATIONS/ LOUVRES ARE REQUIRED TO BE USED ABOVE 18METRES ABOVE GROUND LEVEL THEY ARE MADE OF SUITABLE MATERIAL COMPLIANT WITH CURRENT REGULATIONS.

2 First Floor
1 : 50

1 Ground Floor
1 : 50

Type

Trickle Rate = 82 L/s

Boost Rate = 82 L/s

☒ FOR APPROVAL

☐ ILLUSTRATION ONLY

☐ SEE COMMENTS

☒ PROPOSED INSTALLATION

No.	Revision Description	Date

CLIENT:

REVIEWED BY CLIENT (SIGNED):

DATE:

Checker

TITLE:

Plot 2, 27 Syke Lane

MVHR Proposal

DRG No:

NO1

SCALE:

1 : 50 @ A1

DATE:

18/11/2020

AUTHOR:

LR

REVISION:

A