Project Information Building type Semi-detached house

Plotnumber Plot 5 Reference 08/02/2016 Date **Byatt Oliver** Project New Dwelling Plot 5 As-Designed Client Unit 1B Whitebridge Way Victoria Court May Bank Whitebridge Industrial Estate Brampron Stone ST5 Staffordshire ST158LQ Tel: 01785719268 Email: david@byattoliver.co.uk

SAP 2012 worksheet for notional dwelling - calculation of target emissions

1. Overall dwelling dimensions

| | Area | Av. Storey | Volume | |
|-----------------------------------|--------|------------|--------|------|
| | (m²) | height (m) | (m³) | |
| Ground floor (1) | 44.77 | 2.40 | 107.45 | (3a) |
| Firstfloor | 44.17 | 2.65 | 117.05 | (3b) |
| Second floor | 25.42 | 2.05 | 52.11 | (3c) |
| Total floor area | 114.36 | | | (4) |
| Dwelling volume (m ³) | | | 276.61 | (5) |

JPA Designer Version 6.01x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 1 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

2. Ventilation rate

| | | | | | | | | | | | m [°] per ho | our |
|---------------------|--------------------------|-----------------------|--------------|------------|-----------|-----------|-----------|------------|-----------|------|-----------------------|--------------|
| | | | | | | | main + s | eonda | ry + othe | er | - | |
| | | | | | | | heating | | | | | (a) |
| Numbe | erofchim | neys | | | | | 0 + 0 + 0 | | x 40 | | 0.00 | (6a) |
| Numbe | erotopen | flues | | | | | 0 + 0 + 0 | | x 20 | | 0.00 | (6b) |
| Numbe | erofinteri | mittentfa | ans | | | | 4 | | x 10 | | 40.00 | (7a) |
| Numbe | erotpass | ive vents | 5 | | | | 0 | | x 10 | | 0.00 | (7b) |
| Numbe | eroffluele | ess gas f | ires | | | | 0 | | x 40 | | 0.00 | (7c) |
| | | | | | | | | | | | Air chang | ges per hour |
| Infiltrat | ion due t | o chimne | eys, fans | and flue | S | | | | | | 0.14 | (8) |
| Pressu | re test, r | esult q50 | <u>כ</u> | | | | | | 5.00 | | | (17) |
| Airperi | neability | | | | | | | | | | 0.39 | (18) |
| Numbe | erofsides | s on whic | ch shelter | ed | | | | | | | 2.00 | (19) |
| Shelter | factor | | | | | | | | | | 0.85 | (20) |
| Infiltrat | ion rate ir | ncorpora | ting shelf | ter factor | | | | | | | 0.34 | (21) |
| Infiltrat | ion rate n | nodified | for month | nly wind s | 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 | |
| | a ata r | | | | | | | | | | 52.50 | (22) |
| | actor | | | | | | | | | | | |
| 1.27 | 1.25 | 1.23 | 1.10 | 1.08 | 0.95 | 0.95 | 0.93 | 1.00 | 1.08 | 1.13 | 1.18 | |
| | | | | | | | | | | | 13.13 | (22a) |
| Adjuste | ed infiltra | tion rate | (allowing | for shell | ter and v | vind spee | ed) | | | | | |
| 0.43 | 0.42 | 0.41 | 0.37 | 0.36 | 0.32 | 0.32 | 0.31 | 0.34 | 0.36 | 0.38 | 0.39 | |
| | л. | - A | | | л. | | | - k | | | 4.40 | (22b) |
| Ventila Effectiv | tion : nat /e air cha | ural vent nge rate | tilation, ir | itermitte | nt extrac | ct fans | | | | | | |
| 0.59 | 0.59 | 0.58 | 0.57 | 0.57 | 0.55 | 0.55 | 0.55 | 0.56 | 0.57 | 0.57 | 0.58 | (25) |
| | | | | | | | | | | | | |

Page 2 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

| 3. Heat losses | and heat los | ss paramete | r | | | | |
|--------------------|--------------------------|-------------|---------|-------------|---------------|-----|----------|
| Element | Gross | Openings | Netarea | U-value | ΑxU | | |
| | area, m² | m² | A, m² | W/m²K | W/K | | |
| Window-Double | e-glazed, | | 1.350 | 1.33 (1.40) | 1.79 | (27 | 7) |
| air-filled, low-E, | En=0.1, soft | | | | | | |
| coat (West) | | | | | | | |
| Data | | | | | | | |
| Window - Double | e-glazed, | | 2.280 | 1.33 (1.40) | 3.02 | (27 | 7) |
| air-filled, low-E, | En=0.1, soft | | | | | | |
| coat (South) | | | | | | | |
| Data | | | 7 470 | 4 00 (4 40) | 0.00 | (0- | |
| Window - Double | e-glazed, | | 7.470 | 1.33 (1.40) | 9.90 | (2) | () |
| air-illed, low-E, | En=0.1, soit | | | | | | |
| Dete | | | | | | | |
| Window, Doubl | o alazod | | 2 600 | 1 22 /1 40) | 4 77 | (27 | 7) |
| air-filled low-E | E-glazeu, En-0.1 soft | | 3.000 | 1.33 (1.40) | 4.77 | (27 | ') |
| coat (West) | LII-0.1, 30it | | | | | | |
| Data | | | | | | | |
| Half glazed door | r - | | 2,100 | 1.20 | 2 52 | (26 | 6) |
| Double-glazed. | air-filled. | | | | | (| -) |
| low-E, En=0.1, | soft coat | | | | | | |
| (East) | | | | | | | |
| Data | | | | | | | |
| Full glazed door | · _ | | 8.400 | 1.40 | 11.76 | (26 | 6) |
| Double-glazed, | air-filled, | | | | | | |
| low-E, En=0.1, | soft coat | | | | | | |
| (West) | | | | | | | |
| Data | | | | | | | |
| Pitched roofs in: | sulated betwe | en joists | 29.56 | 0.13 | 3.84 | (30 | J) |
| Walls | | | 15.20 | 0.18 | 2.74 | (29 | 9) |
| l imber partitio | n to roofspace | 9 | 4 50 | 0.40 | 0.00 | | <u>_</u> |
| vvalls | | | 1.53 | 0.18 | 0.28 | (25 | J) |
| Dormerwalls | | | 90.06 | 0.19 | 11 01 | (30 | 0) |
| Groundfloore | | | 02.20 | 0.10 | 14.01 5.92 | (23 | 9) 9) |
| Pitched roofs in | sulated betwe | onraftors | 44.77 | 0.13 | 1.02 | (20 | 5) N |
| Party wall | Bulated betwe | emaiters | 55 14 | 0.10 | 0.00 | (00 | " |
| Internal wall | | | 141 52 | 0.00 | 0.00 | | |
| Internal timber | partition | | | 0.00 | 0.00 | | |
| Internal floor | | | 70.80 | 0.00 | 0.00 | | |
| Internal ceiling | | | 70.80 | 0.00 | 0.00 | | |
| 8 | | | | | | | |

JPA Designer Version 6.01x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 3 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

| 3. Heat l | osses a | and heat | t loss pa | aramete | r | | | | | | | |
|------------|-----------|----------------------|-----------|-----------|-----------|--------|--------|--------|--------|--------|--------|--------|
| Element | | Gross | Ope | enings | Netarea | a U-\ | /alue | ΑxU | | | | |
| | | area, m ² | m² | | A, m² | W/ | ′m²K | W/K | | | | |
| Total are: | anfexte | arnal elei | ments Si | ama A n | n² | | | | | | 212 77 | (31) |
| Fabric be | a ol cxii | W/K | | gina A, i | | | | | | | 63.10 | (33) |
| Thermal | masspa | rameter | k.l/m²K | (user-sp | ecified T | MP) | | | | | 250.00 | (35) |
| Effectoft | hermal | bridaes | , | | oomoa n | , , | | | | | 10.54 | . (36) |
| Total fabr | ric heat | loss | | | | | | | | | 73.64 | . (37) |
| Ventilatio | on heat l | oss calc | ulated m | onthly | | | | | | | | |
| 53.99 | 53.66 | 53.35 | 51.85 | 51.57 | 50.27 | 50.27 | 50.03 | 50.78 | 51.57 | 52.14 | 52.73 | (38) |
| Heattran | sfercoe | efficient, V | W/K | | | я | | Л | | | | |
| 127.63 | 127.30 | 126.99 | 125.49 | 125.22 | 123.92 | 123.92 | 123.67 | 124.42 | 125.22 | 125.78 | 126.37 | |
| | | | | | | л | | J | | ., | 125.49 | (39) |
| Heat loss | param | eter (HLF | P), W/m²l | K | | | | | | | | . , |
| 1.12 | 1.11 | 1.11 | 1.10 | 1.09 | 1.08 | 1.08 | 1.08 | 1.09 | 1.09 | 1.10 | 1.11 | |
| HLP (aver | rage) | А | | | | я | n. | л | | | 1.10 | (40) |
| Number | ofdaysi | n month | (Table 1a | a) | | | | | | | | . , |

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 31 | 28 | 31 | 30 | 31 | 30 | 31 | 31 | 30 | 31 | 30 | 31 |

JPA Designer Version 6.01 x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 4 of 45

| 4. Wate | er heatin | g energ ancy N | y requir | ements | | | | | | | kWh/year 2 84 | <i>(Δ</i> : |
|---|--|------------------------------------|---------------------|-------------|-----------|----------|--------|--------|--------|--------|-------------------------------------|--------------------------|
| Annual | average | not water | usageir | n litres pe | er day Vd | ,average | 9 | | | | 101.62 | (4 |
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | |
| Hot wat | er usage | in litres p | ber day f | or each r | nonth | | | | | | | |
| 111.78 | 107.71 | 103.65 | 99.58 | 95.52 | 91.46 | 91.46 | 95.52 | 99.58 | 103.65 | 107.71 | 111.78 | (4 |
| Energy | content o | of hot wat | ter used | | | | | | | | | |
| 165.76 | 144.98 | 149.61 | 130.43 | 125.15 | 108.00 | 100.07 | 114.84 | 116.21 | 135.43 | 147.83 | 160.53 | |
| Energy Distribu | content (a tion loss | annual) | | | | | | | | | 1598.83 | (4 |
| 24.86 | 21.75 | 22.44 | 19.56 | 18.77 | 16.20 | 15.01 | 17.23 | 17.43 | 20.31 | 22.17 | 24.08 | (4 |
| Hot wate Volume Temper Energy Total sto | er cylinde factor ature fact lost from prage los | er loss fa or store (k\ s | ctor (kW Nh/day) | h/day) | | | | | | | 0.0000 0.0000 0.0000 0.000 | (5) (5) (5) (5) |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (5 |
| Net stor | age loss | Л | 1 | 1 | J | Л | J | Л | Л | Л | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (5 |
| Primary | loss | A | | | , | я | | Л | л | | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (5 |
| Combi l | oss calcu | lated for | each mo | onth | 31 | я | | JL | н | | | |
| 50.96 | 46.03 | 50.96 | 49.11 | 48.68 | 45.10 | 46.60 | 48.68 | 49.11 | 50.96 | 49.32 | 50.96 | (6 |
| Total he | atrequir | ed for wa | ter heati | ng calcul | ated for | each mo | nth | | | | | |
| 216.72 | 191.01 | 200.56 | 179.54 | 173.83 | 153.10 | 146.68 | 163.51 | 165.32 | 186.39 | 197.15 | 211.49 | (6 |
| Output f | from wate | er heater | for each | month, k | wh/mor | nth | | | | | | |
| 216.72 | 191.01 | 200.56 | 179.54 | 173.83 | 153.10 | 146.68 | 163.51 | 165.32 | 186.39 | 197.15 | 211.49 | (6 |
| Heatga | ins from | water hea | ating, kW | /h/month | | | | | | | 2185.29 | (6 |
| 67.86 | 59.71 | 62.48 | 55.65 | 53.78 | 47.18 | 44.93 | 50.35 | 50.92 | 57.77 | 61.48 | 66.12 | (6 |

Page 5 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

5. Internal gains

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-----------|------------|------------|----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Metabol | ic gains, | Watts | | | | | | | | ~ | |
| 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 |
| Lighting | gains | | | | | | | | | | |
| 27.06 | 24.04 | 19.55 | 14.80 | 11.06 | 9.34 | 10.09 | 13.12 | 17.61 | 22.35 | 26.09 | 27.81 |
| Appliand | ces gains | 6 | | | | | | | | | |
| 277.68 | 280.56 | 273.30 | 257.84 | 238.33 | 219.99 | 207.74 | 204.85 | 212.12 | 227.57 | 247.09 | 265.43 |
| Cooking | gains | | | | | | | | | | |
| 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 |
| Pumpsa | 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 |
| Lossese | e.g.evap | oration (r | negative | values) | | | | | | | |
| -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 |
| Waterhe | eating ga | ins | | | | | | | | | |
| 91.21 | 88.86 | 83.98 | 77.29 | 72.29 | 65.53 | 60.38 | 67.68 | 70.72 | 77.65 | 85.39 | 88.87 |
| Totalinte | ernal gaiı | ns | | | | | | | | | |
| 464.52 | 462.03 | 445.41 | 418.50 | 390.25 | 363.44 | 346.79 | 354.23 | 369.02 | 396.15 | 427.15 | 450.69 |

6. Solar gains (calculation for January)

| | | | | Area | a & Flux | 9 | g & FF | S | hading | Gains | |
|-----------------|---------------|-------------|-------------|---------|-----------|--------|--------------|--------|--------|---------|----------|
| Window-Do | uble-glazed, | air-filled, | low-E, | 0.9> | < 1.350 1 | 9.64 | 0.63 x 0.7 | 0 0. | .77 | 8.1031 | |
| En=0.1, soft | coat (West) | | | | | | | | | | |
| Data | | | | | | | | | | | |
| Window-Do | uble-glazed, | air-filled, | low-E, | 0.9> | < 2.280 4 | 6.75 | 0.63 x 0.7 | 0 0. | .77 | 32.5767 | , |
| En=0.1, soft | coat (South) | | | | | | | | | | |
| Data | | | | | | | | | | | |
| Window-Do | uble-glazed, | air-filled, | low-E, | 0.9> | 7.470 1 v | 9.64 | 0.63 x 0.7 | 0 0. | .77 | 44.8373 | } |
| En=0.1, soft | coat (East) | | | | | | | | | | |
| Data | | | | | | | | | | | |
| Window - Do | uble-glazed, | air-filled, | low-E, | 0.9> | c 3.600 1 | 9.64 | 0.63 x 0.7 | 0 0. | .77 | 21.6084 | ŀ |
| En=0.1, soft | coat (West) | | | | | | | | | | |
| Data | | | | | | | | | | | |
| Halfglazedd | loor - Double | -glazed, a | air-filled, | 0.93 | < 2.100 0 | 0.00 | 0.63 x 0.7 | 0 0. | .77 | 0.0000 |) |
| low-E, En=0 | .1, soft coat | (East) | | | | | | | | | |
| Data | _ | | | | o | | . | | | | |
| Full glazed d | oor - Double- | -glazed, a | ur-filled, | 0.9> | ×8.400 1 | 9.64 | 0.63 x 0.7 | 0 0. | .// | 50.4195 |) |
| low-E, En=0 | .1, soft coat | (West) | | | | | | | | | |
| Data | | | | | | | | | | | (00 A) |
| l otal solar ga | ains, January | / | | | | | | | | 157.55 | o (83-1) |
| Solargains | | | | | | | | | | | |
| 157.55 297 | 7.82 470.56 | 663.98 | 799.64 | 813.66 | 776.57 | 675.50 | 539.23 | 347.62 | 194.44 | 130.92 | (83) |
| Total gains | | | | | | | | | | | |
| 622.07 759 | 9.85 915.97 | 1082.48 | 1189.89 | 1177.10 | 1123.36 | 1029.7 | 3 908.25 | 743.78 | 621.58 | 581.60 | (84) |

JPA Designer Version 6.01x , SAP Version 9.92 Licensed to Laurence Jay Limited Page 6 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

7. Mean internal temperature

| Temper | ature dur | ing heati | na perio | dsinthel | iving are | a Th1(° | C) | | | | 21.0 | 8) 0(| 35) |
|-----------|-------------|------------|-------------|------------|------------|---------|----------|-------|-------|-------|-------|-------|-----------------|
| Heating | system | esponsiv | /eness | | i ing al o | α, πη (| 0) | | | | 1.0 | 0 |) |
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| tau | | | | | <u>д</u> | A | | κ | л | | | | |
| 62.22 | 62.38 | 62.54 | 63.28 | 63.42 | 64.09 | 64.09 | 64.21 | 63.83 | 63.42 | 63.14 | 62.84 | | |
| alpha | | | | | | | | | | | | | |
| 5.15 | 5.16 | 5.17 | 5.22 | 5.23 | 5.27 | 5.27 | 5.28 | 5.26 | 5.23 | 5.21 | 5.19 | | |
| Utilisati | on factor | forgains | forliving | area | | | | | | | | | |
| 1.00 | 1.00 | 0.99 | 0.94 | 0.83 | 0.64 | 0.48 | 0.54 | 0.82 | 0.98 | 1.00 | 1.00 | (8 | 6) |
| Meanin | ternal ter | nperatur | e in living | area T1 | | | | | | | | | |
| 19.75 | 19.93 | 20.22 | 20.59 | 20.85 | 20.97 | 20.99 | 20.99 | 20.90 | 20.52 | 20.06 | 19.72 | (8 | 57) |
| Temper | ature du | ring heati | ng perio | ds in rest | ofdwelli | ng Th2 | | | | | | | |
| 19.99 | 19.99 | 19.99 | 20.00 | 20.00 | 20.01 | 20.01 | 20.02 | 20.01 | 20.00 | 20.00 | 20.00 | (8 | 8) |
| Utilisati | on factor | for gains | for rest o | ofdwellir | ng | | | | | | | | |
| 1.00 | 0.99 | 0.98 | 0.92 | 0.78 | 0.56 | 0.38 | 0.43 | 0.74 | 0.96 | 1.00 | 1.00 | (8 | 9) |
| Mean in | iternal tei | mperatur | re in the r | estofdw | elling T2 | 2 | | | | | | | |
| 18.32 | 18.58 | 19.01 | 19.53 | 19.87 | 20.00 | 20.01 | 20.01 | 19.93 | 19.45 | 18.78 | 18.28 | (9 |)0) |
| Livinga | rea fracti | on (20.91 | 1/114.36 | 5) | | | | | | | 0.1 | 8 (9 |) 1) |
| Meanin | ternal ter | nperatur | e (for the | whole d | welling) | | | | | | | | |
| 18.58 | 18.83 | 19.23 | 19.72 | 20.05 | 20.17 | 20.19 | 20.19 | 20.11 | 19.64 | 19.02 | 18.54 | (9 |)2) |
| Applya | djustmen | t to the m | iean inte | rnaltem | perature, | where a | ppropria | ite | | | | | |
| 18.58 | 18.83 | 19.23 | 19.72 | 20.05 | 20.17 | 20.19 | 20.19 | 20.11 | 19.64 | 19.02 | 18.54 | (9 |)3) |

8. Space heating requirement

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | |
|----------------------|-----------------------|----------------------|-----------------------|----------------------------------|--------------------|-----------|-----------|--------|---------|---------|------------------|---|
| Utilisatic | on factor | for gains | | | | | | | | | | |
| 1.00 | 0.99 | 0.98 | 0.92 | 0.78 | 0.57 | 0.39 | 0.45 | 0.75 | 0.96 | 0.99 | 1.00 | (|
| Useful g | ains | | | | | | | | | | | |
| 620.45 | 754.33 | 894.24 | 993.49 | 928.71 | 672.90 | 443.06 | 464.83 | 680.25 | 713.19 | 617.86 | 580.52 | (|
| Monthly | average | external | temperat | ture | | | | | | | | |
| 4.30 | 4.90 | 6.50 | 8.90 | 11.70 | 14.60 | 16.60 | 16.40 | 14.10 | 10.60 | 7.10 | 4.20 | (|
| Heat los | s rate for | mean in | ternal ter | nperatur | e | | | | | | | |
| 1822.37 | 1772.91 | 1616.33 | 1357.91 | 1045.15 | 690.69 | 445.11 | 468.86 | 747.88 | 1132.28 | 1498.92 | 1812.68 | (|
| Fraction | ofmonth | n for heat | ing | | | | | | | | | |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | - | - | - | - | 1.00 | 1.00 | 1.00 | |
| Space h | eating re | quireme | ntforead | ch month | , kWh/m | onth | | | | | | |
| 894.23 | 684.48 | 537.23 | 262.38 | 86.64 | - | - | - | - | 311.80 | 634.36 | 916.73 | |
| Total spa Space h | ace heat eating re | ing requi quireme | rement p nt per m² | er year ((kWh/m ² | kWh/yea ²/year) | ar) (Octo | ber to Ma | ay) | | | 4327.86 37.84 | |

JPA Designer Version 6.01x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 7 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

9a. Energy requirements

| | | | | | | | | | | | kWh/year | |
|---|---|---------------------------------------|------------------------------------|----------------------------|----------|-----------|--------|--------|-----------------|--------|--|-------------------------|
| No seco Fractior Efficien | ondary he n of space cy of mai | eating sys e heat fro n heating | stem selo om main : g system | ected system(s | 5) | | | 9 | 1.0000 3.40% | | | (202) (206) |
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | |
| Spaceh | neating re | quireme | nt | | я | я | 1 | J | J | | | |
| 894.23 | 684.48 | 537.23 | 262.38 | 86.64 | - | - | - | - | 311.80 | 634.36 | 916.73 | (98) |
| Append | lix Q - mo | nthly ene | ergy save | ed (main | heating | system ' | 1) | κ. | λ | л | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | 0.00 | 0.00 | 0.00 | (210) |
| Space | neating fu | iel (main | heating | system 1 |) | <i>х</i> | | κ | R | | | |
| 957.42 | 732.85 | 575.20 | 280.92 | 92.76 | - | - | - | - | 333.84 | 679.19 | 981.50 | (211) |
| Append | lix Q - mo | nthly ene | ergy save | ed (main | heating | system | 2) | | л | | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | 0.00 | 0.00 | 0.00 | (212) |
| Space | neating fu | iel (main | heating | system 2 | 2) | я | | | J | л | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | 0.00 | 0.00 | 0.00 | (213) |
| Append | lix Q - mo | nthly ene | ergy save | ed (seco | ndary he | ating sys | stem) | | л | A | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | 0.00 | 0.00 | 0.00 | (214) |
| Spaceh | neating fu | el (secor | ndary) | | я | я | | | J | | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | 0.00 | 0.00 | 0.00 | (215) |
| Waterh | eating | | | | | | | | | | | |
| Waterh | eating red | quiremer | nt " | 1 | γ | v | 1 | 1 | γ <u> </u> | γ |)) | |
| 216.72 | 191.01 | 200.56 | 179.54 | 173.83 | 153.10 | 146.68 | 163.51 | 165.32 | 186.39 | 197.15 | 211.49 | (64) |
| Efficien | cy of wate | erheater | 1 | 1 | 7 | 1 | 10 | | 7 | 1 | 80.30 | (216) |
| 88.24 | 87.99 | 87.41 | 86.01 | 83.40 | 80.30 | 80.30 | 80.30 | 80.30 | 86.34 | 87.78 | 88.32 | (217) |
| Waterh | eating fue | el | 1 | 1 | 7 | | 7 | | 7 | 1 | 1 | |
| 245.62 | 217.09 | 229.45 | 208.75 | 208.43 | 190.66 | 182.66 | 203.63 | 205.87 | 215.88 | 224.58 | 239.47 | (219) |
| Annual Space I Space I Water h | totals neating fu neating fu leating fue | ıel used, el (secor el | main sy ndary) | stem 1 | | | | | | | kWh/year 4633.68 0.00 2572.09 | (211) (215) (219) |
| Electric centra boiler | ity for pur I heating with a fan | mps, fan: pump -assistee | s and ele d flue | ectric kee | ep-hot | | | | | | 30.00 45.00 | (230c) (230e) |
| Total ele Electric Energy | ectricity for ity for ligh saving/ge lix O - | or the abouting (100 eneration | ove, kWh).00% fix technolo | n/year ed LEL) ogies | | | | | | | 75.00 477.91 | (231) (232) |
| Energ | y saved o yy used () | or genera : | ated (): | | | | | | | | 0.000 0.000 | (236a) (237a) |
| Total de | eliverede | nergy for | alluses | | | | | | | | 7758.69 | (238) |

10a. Does not apply

11a. Does not apply

Page 8 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

12a. Carbon dioxide emissions

| | Energy | Emission factor | Emission | S |
|--------------------------------|----------|-----------------|----------|-------|
| | kWh/year | kg CO2/kWh | kg CO2/y | ear |
| Space heating, main system 1 | 4633.68 | 0.216 | 1000.88 | (261) |
| Space heating, main system 2 | 0.00 | 0.000 | 0.00 | (262) |
| Space heating, secondary | 0.00 | 0.519 | 0.00 | (263) |
| Waterheating | 2572.09 | 0.216 | 555.57 | (264) |
| Space and water heating | | | 1556.45 | (265) |
| Electricity for pumps and fans | 75.00 | 0.519 | 38.93 | (267) |
| Electricity for lighting | 477.91 | 0.519 | 248.04 | (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 CO2, kg/year | | | 1843.41 | (272) |

| | kg/m²/yea | r |
|--|-----------|--------|
| Emissions per m ² for space and water heating | 13.61 | (272a) |
| Emissions per m ² for lighting | 2.17 | (272b) |
| Emissions per m ² for pumps and fans | 0.34 | (272c) |
| Target Carbon Dioxide Emission Rate (TER) | 16.12 | (273) |
| $=(13,6101 \times 1,00) + 2,1689 + 0,3404$ | | |

 $= (13.6101 \times 1.00) + 2.1689 + 0.3404$

JPA Designer Version 6.01x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 9 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

Building type Semi-detached house

| Plotnumber | Plot 5 | | |
|------------|-------------------------------|---------|---------------------------------|
| Reference | | | |
| Date | 08/02/2016 | | |
| Client | Byatt Oliver | Project | New Dwelling Plot 5 As-Designed |
| | Unit 1B Whitebridge Way | | Victoria Court |
| | Whitebridge Industrial Estate | | May Bank |
| | Stone | | Brampron |
| | Staffordshire | | ST5 |
| | ST158LQ | | |
| Tel: | 01785719268 | | |
| Email: | david@byattoliver.co.uk | | |

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

1. Overall dwelling dimensions

| | Area | Av. Storey | Volume | |
|-----------------------------------|--------|------------|--------|------|
| | (m²) | height (m) | (m³) | |
| Ground floor (1) | 44.77 | 2.40 | 107.45 | (3a) |
| Firstfloor | 44.17 | 2.65 | 117.05 | (3b) |
| Second floor | 25.42 | 2.05 | 52.11 | (3c) |
| Total floor area | 114.36 | | | (4) |
| Dwelling volume (m ³) | | | 276.61 | (5) |

Page 10 of 45

2. Ventilation rate

| | | | | | | | | | | | m³ per ho | our |
|---------------------|--------------------------|-----------------------|-------------|-----------|-----------|----------|---------------------|--------|-----------|----------|-----------|--------------|
| | | | | | | | main + s heating | seonda | ry + othe | er | | |
| Numbe | rofchim | neys | | | | | 0 + 0 + 0 |) | x 40 | | 0.00 | (6a) |
| Numbe | rofopen | flues | | | | | 0 + 0 + 0 |) | x 20 | | 0.00 | (6b) |
| Numbe | rofinter | mittent fa | ins | | | | 2 | | x 10 | | 20.00 | (7a) |
| Numbe | rofpass | ive vents | | | | | 0 | | x 10 | | 0.00 | (7b) |
| Numbe | eroffluele | ess gas fi | ires | | | | 0 | | x 40 | | 0.00 | (7c) |
| | | | | | | | | | | | Air chang | jes per hour |
| Infiltrat | ion due t | o chimne | eys, fans | and flues | S | | | | | | 0.07 | (8) |
| Pressu | re test, r | esult q50 |) | | | | | | 3.00 | | | (17) |
| Air perr | neability | | | | | | | | | | 0.32 | (18) |
| Numbe | er of sides | s on whic | h shelter | ed | | | | | | | 2.00 | (19) |
| Shelter | factor | | | | | | | | | | 0.85 | (20) |
| Infiltrati | ion rate ir | ncorpora | ting shelt | er factor | | | | | | | 0.27 | (21) |
| Infiltrat | ion rate n | nodifiedf | for month | ly wind s | 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 | |
| Wind F | actor | | | | | | | | | | 52.50 | (22) |
| 1.27 | 1.25 | 1.23 | 1.10 | 1.08 | 0.95 | 0.95 | 0.93 | 1.00 | 1.08 | 1.13 | 1.18 | |
| | | | | | | | | | J | I | 13.13 | (22a) |
| Adjuste | ed infiltra | tion rate | (allowing | forshelt | ter and w | vind spe | ed) | | | | | |
| 0.35 | 0.34 | 0.34 | 0.30 | 0.29 | 0.26 | 0.26 | 0.25 | 0.27 | 0.29 | 0.31 | 0.32 | |
| | | | R | | | _ | , | | JL | <u>R</u> | 3.60 | (22b) |
| Ventila Effectiv | tion : nat ⁄e air cha | ural vent nge rate | ilation, in | termitte | nt extrac | t fans | | | | | | |
| 0.56 | 0.56 | 0.56 | 0.55 | 0.54 | 0.53 | 0.53 | 0.53 | 0.54 | 0.54 | 0.55 | 0.55 | (25) |
| | | | | | | | | | | | | |

Page 11 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

| 3. Heat losses | and heat los | s paramete | r | | | | | |
|--------------------|----------------|------------|---------|-------------|-------|-------------|---------|------|
| Element | Gross | Openings | Netarea | U-value | ΑxU | kappa-value | AxK | |
| | area, m² | m² | A, m² | W/m²K | W/K | kJ/m²K | kJ/K | |
| Window-Double | e-glazed, | | 1.350 | 1.33 (1.40) | 1.79 | | | (27) |
| argon filled, low- | ·E, En=0.05, | | | | | | | |
| soft coat (West) | | | | | | | | |
| Data | | | | | | | | |
| Window-Double | e-glazed, | | 3.600 | 1.33 (1.40) | 4.77 | | | (27) |
| argon filled, low- | ·E, En=0.05, | | | | | | | |
| soft coat (West) | | | | | | | | |
| Data | | | | | | | | |
| Window-Double | e-glazed, | | 7.470 | 1.33 (1.40) | 9.90 | | | (27) |
| argon filled, low- | E, En=0.05, | | | | | | | |
| soft coat (East) | | | | | | | | |
| Data | | | | | | | | |
| Window-Double | e-glazed, | | 2.280 | 1.33 (1.40) | 3.02 | | | (27) |
| argon filled, low- | ·E, En=0.05, | | | | | | | |
| soft coat (South) |) | | | | | | | |
| Data | | | | | | | | |
| Half glazed door | r – | | 2.100 | 1.10 | 2.31 | | | (26) |
| Double-glazed, a | argon filled, | | | | | | | |
| low-E, En=0.05, | , soft coat | | | | | | | |
| (East) | | | | | | | | |
| Data | | | | | | | | |
| Full glazed door | · - | | 8.400 | 1.40 | 11.76 | | | (26) |
| Double-glazed, a | argon filled, | | | | | | | |
| low-E, En=0.05, | , soft coat | | | | | | | |
| (West) | | | | | | | | |
| Data | | | | | | | | |
| Pitched roofs ins | sulated betwe | en joists | 29.56 | 0.14 | 4.14 | 9.00 | 266.04 | (30) |
| Walls | | | 15.20 | 0.22 | 3.34 | 9.00 | 136.80 | (29) |
| Timber partitio | n to roofspace | e | | | | | | |
| Walls | | | 1.53 | 0.22 | 0.34 | 9.00 | 13.77 | (29) |
| Dormer walls | | | | | | | | |
| Walls | | | 82.26 | 0.20 | 16.45 | 60.00 | 4935.60 | (29) |
| Ground floors | | | 44.77 | 0.12 | 5.37 | 80.00 | 3581.60 | (28) |
| Pitched roofs ins | sulated betwe | en rafters | 14.25 | 0.15 | 2.14 | 9.00 | 128.25 | (30) |
| Party wall | | | 55.14 | 0.00 | 0.00 | 70.00 | 3859.80 | |
| Internalwall | | | 141.52 | 0.00 | 0.00 | 9.00 | 1273.68 | |
| Internal timber | partition | | | • • • | | | | |
| Internal floor | | | 70.80 | 0.00 | 0.00 | 18.00 | 1274.40 | |
| Internal ceiling | | | 70.80 | 0.00 | 0.00 | 9.00 | 637.20 | |

JPA Designer Version 6.01x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 12 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

| 3. Heat | losses a | and hea | t loss pa | aramete | r | | | | | | | |
|-----------|------------|------------|----------------------|----------|---------|--------|--------|--------|--------|-----------|--------|---------|
| Element | : | Gross | Ope | enings | Netarea | a U-v | /alue | ΑxU | ka | ippa-valu | еАхК | |
| | | area, m² | m² | | A, m² | W/ | m²K | W/K | kJ | /m²K | kJ/K | |
| Total are | ea of exte | ernal elei | ments Si | gma A, n | n² | | | | | | 212. | 77 (31) |
| Fabric h | eat loss | , W/K | | | | | | | | | 65.3 | 34 (33) |
| Heat cap | pacity | | | | | | | | | | 19.3 | 35 (34) |
| Therma | l mass pa | arameter | , kJ/m²K | | | | | | | | 140.8 | 35 (35) |
| Effectof | thermal | bridges | | | | | | | | | 19.3 | 35 (36) |
| Total fat | oric heat | loss | | | | | | | | | 84.0 | 39 (37) |
| Ventilati | on heat | oss calc | ulated m | onthly | | | | | | | | |
| 51.21 | 50.99 | 50.78 | 49.79 | 49.60 | 48.73 | 48.73 | 48.57 | 49.07 | 49.60 | 49.98 | 50.37 | (38) |
| Heattra | nsfer coe | efficient, | W/K | | | | | | | | | |
| 135.90 | 135.68 | 135.47 | 134.48 | 134.29 | 133.42 | 133.42 | 133.26 | 133.76 | 134.29 | 134.67 | 135.06 | |
| | | | | | | | | | | | 134.4 | 48 (39) |
| Heat los | s param | eter (HLF | ²), W/m² | K | | | | | | | | |
| 1.19 | 1.19 | 1.18 | 1.18 | 1.17 | 1.17 | 1.17 | 1.17 | 1.17 | 1.17 | 1.18 | 1.18 | |
| HLP (ave | erage) | | | | | | | | | | 1.1 | 18 (40) |
| Number | ofdaysi | n month | (Table 1 | a) | | | | | | | | |
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | |
| 31 | 28 | 31 | 30 | 31 | 30 | 31 | 31 | 30 | 31 | 30 | 31 | |

JPA Designer Version 6.01x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 13 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

| 4. Wate Assume | e r heatin ed occupa | g energ ancy, N | y requir | ements | | | | | | | kWh/year 2.84 | (42 |
|--|--|------------------------------------|---------------------|-------------|-----------|----------|--------|--------|--------|--------|-------------------------------------|----------------------|
| Annual | average | hot wate | r usage ir | n litres pe | er day Vd | ,average | 9 | | | | 101.62 | (4 |
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | |
| Hot wat | er usage | in litres | ber day f | or each r | nonth | | | | | | | |
| 111.78 | 107.71 | 103.65 | 99.58 | 95.52 | 91.46 | 91.46 | 95.52 | 99.58 | 103.65 | 107.71 | 111.78 | (4 |
| Energy | content of | of hot wat | ter used | | | | | | | | | |
| 165.76 | 144.98 | 149.61 | 130.43 | 125.15 | 108.00 | 100.07 | 114.84 | 116.21 | 135.43 | 147.83 | 160.53 | |
| Energy Distribu | content (a ition loss | annual) | | | | | | | | | 1598.83 | (4 |
| 24.86 | 21.75 | 22.44 | 19.56 | 18.77 | 16.20 | 15.01 | 17.23 | 17.43 | 20.31 | 22.17 | 24.08 | (4 |
| Hot wat Volume Temper Energy Total ste | er cylinde factor ature fact lost from orage los | er loss fa or store (k\ s | ctor (kW Nh/day) | h/day) | | | | | | | 0.0000 0.0000 0.0000 0.000 | (5 (5 (5 (5 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (5 |
| Net stor | rage loss | <u>д</u> | | | , | л | | | | | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (5 |
| Primary | loss | | , | | | | | | ~ | | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (5 |
| Combi l | oss calcı | lated for | each mo | onth | <u>д</u> | <i>R</i> | | R | л | | | |
| 12.64 | 11.42 | 12.64 | 12.23 | 12.64 | 12.23 | 12.64 | 12.64 | 12.23 | 12.64 | 12.23 | 12.64 | (6 |
| Total he | eatrequir | ed for wa | ter heati | ng calcul | ated for | each mo | nth | | | | | |
| 178.41 | 156.40 | 162.25 | 142.66 | 137.79 | 120.23 | 112.71 | 127.48 | 128.44 | 148.07 | 160.06 | 173.17 | (6 |
| Output | from wate | er heater | for each | month, k | wh/mor | nth | | | | | | |
| 178.41 | 156.40 | 162.25 | 142.66 | 137.79 | 120.23 | 112.71 | 127.48 | 128.44 | 148.07 | 160.06 | 173.17 | (6 |
| Heatga | ins from | water he | ating, kW | /h/month | ı | | | | | | 1747.67 | (6 |
| 58.28 | 51.06 | 52.90 | 46.43 | 44.77 | 38.97 | 36.43 | 41.34 | 41.70 | 48.19 | 52.21 | 56.54 | (6 |

Page 14 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

5. Internal gains

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|----------------|------------|------------|----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Metabol | ic gains, | Watts | | | | A | | | | | |
| 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 |
| Lighting gains | | | | | | | | | | | |
| 27.06 | 24.04 | 19.55 | 14.80 | 11.06 | 9.34 | 10.09 | 13.12 | 17.61 | 22.35 | 26.09 | 27.81 |
| Applianc | ces gains | 5 | | | | | | | | | |
| 277.68 | 280.56 | 273.30 | 257.84 | 238.33 | 219.99 | 207.74 | 204.85 | 212.12 | 227.57 | 247.09 | 265.43 |
| Cooking | gains | | | | | | | | | | |
| 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 |
| Pumps a | and fans | gains | | | | | | | | | |
| 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| Lossese | e.g.evap | oration (r | negative | values) | | | | | | | |
| -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 |
| Waterhe | eating ga | ins | | | | | | | | | |
| 78.33 | 75.98 | 71.11 | 64.48 | 60.18 | 54.12 | 48.97 | 55.57 | 57.91 | 64.77 | 72.52 | 75.99 |
| Total inte | ernal gaiı | ns | | | | | | | | | |
| 458.65 | 456.16 | 439.53 | 412.70 | 385.15 | 359.03 | 342.38 | 349.12 | 363.21 | 390.28 | 421.27 | 444.81 |

6. Solar gains (calculation for January)

| | Area & Flux | g & FF | Shading | Gains |
|---|-------------------|-------------|-------------|---------|
| Window - Double-glazed, argon filled, low-E, En=0.05, soft coat (West) Data | 0.9 x 1.350 19.64 | 0.63 x 0.70 | 0.77 | 8.1031 |
| Window - Double-glazed, argon filled, low-E, En=0.05, soft coat (West) Data | 0.9 x 3.600 19.64 | 0.63 x 0.70 | 0.77 | 21.6084 |
| Window - Double-glazed, argon filled, low-E, En=0.05, soft coat (East) Data | 0.9 x 7.470 19.64 | 0.63 x 0.70 | 0.77 | 44.8373 |
| Window - Double-glazed, argon filled, low-E, En=0.05, soft coat (South) Data | 0.9 x 2.280 46.75 | 0.63 x 0.70 | 0.77 | 32.5767 |
| Halfglazed door - Double-glazed, argon filled, low-E, En=0.05, soft coat (East) Data | 0.9 x 2.100 0.00 | 0.63 x 0.70 | 0.77 | 0.0000 |
| Full glazed door - Double-glazed, argon filled, low-E, En=0.05, soft coat (West) Data | 0.9 x 8.400 19.64 | 0.63 x 0.70 | 0.77 | 50.4195 |
| Lighting calculations | | | | |
| | Area | g | FF x Shadir | ng |
| Window - Double-glazed, argon filled, low-E, En=0.05, soft coat (West) Data | 0.9 x 1.35 | 0.80 | 0.70 x 0.83 | 0.56 |
| Window - Double-glazed, argon filled, low-E, En=0.05, soft coat (West) Data | 0.9 x 3.60 | 0.80 | 0.70 x 0.83 | 1.51 |

JPA Designer Version 6.01x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 15 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

Lighting calculations

| 99 | | | | |
|--|------------|------|--------------|------|
| | Area | g | FF x Shading | |
| Window - Double-glazed, argon filled, low-E, | 0.9 x 7.47 | 0.80 | 0.70 x 0.83 | 3.12 |
| En=0.05, soft coat (East) | | | | |
| Data | | | | |
| Window - Double-glazed, argon filled, low-E, | 0.9 x 2.28 | 0.80 | 0.70 x 0.83 | 0.95 |
| En=0.05, soft coat (South) | | | | |
| Data | | | | |
| GL = 6.15 / 114.36 = 0.054 | | | | |
| C1 = 0.500 | | | | |
| C2 = 1.049 | | | | |
| EI = 478 | | | | |

7. Mean internal temperature

| Temper Heating | ature dur system r | ing heati esponsiv | ing perio /eness | ds in the l | iving are | a, Th1 (° | C) | | | | 21.00 1.00 |) (85)) |
|---------------------|---------------------------|-----------------------|------------------------|----------------|---------------|-----------|----------|-------|-------|-------|---------------|-------------|
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | |
| tau | | | | | | | | | | · | | |
| 32.92 | 32.98 | 33.03 | 33.27 | 33.32 | 33.53 | 33.53 | 33.57 | 33.45 | 33.32 | 33.22 | 33.13 | |
| alpha | | | | | | | | | | | | |
| 3.19 | 3.20 | 3.20 | 3.22 | 3.22 | 3.24 | 3.24 | 3.24 | 3.23 | 3.22 | 3.21 | 3.21 | |
| Utilisatio | on factor | for gains | forliving | area | <u>д</u> | R | | | л | | | |
| 0.99 | 0.98 | 0.95 | 0.89 | 0.78 | 0.63 | 0.49 | 0.55 | 0.77 | 0.94 | 0.98 | 0.99 | (86) |
| Meanin | ternal ter | nperatur | e in living | area T1 | λ | Α | л | | л. | | | |
| 18.94 | 19.20 | 19.64 | 20.17 | 20.60 | 20.86 | 20.95 | 20.93 | 20.72 | 20.12 | 19.42 | 18.89 | (87) |
| Temper | ature du | ring heati | ing perio | ds in rest | ofdwelli | ng Th2 | | | л | | | |
| 19.93 | 19.93 | 19.93 | 19.94 | 19.94 | 19.95 | 19.95 | 19.95 | 19.94 | 19.94 | 19.94 | 19.94 | (88) |
| Utilisatio | on factor | for gains | for rest | of dwellir | ng | | | | | | | |
| 0.99 | 0.97 | 0.94 | 0.87 | 0.74 | 0.55 | 0.39 | 0.44 | 0.71 | 0.92 | 0.98 | 0.99 | (89) |
| Mean in | ternal ter | nperatu | re in the r | estofdw | elling T2 | 2 | | | | | | |
| 17.17 | 17.56 | 18.18 | 18.94 | 19.51 | 19.83 | 19.92 | 19.91 | 19.68 | 18.89 | 17.88 | 17.10 | (90) |
| Living a Mean in | rea fractio ternal ter | on (20.9´ nperatur | 1/114.36 e (for the | 3) whole dv | welling) | | | | | | 0.18 | 3 (91) |
| 17.50 | 17.86 | 18.45 | 19.16 | 19.71 | 20.02 | 20.11 | 20.10 | 19.87 | 19.11 | 18.16 | 17.43 | (92) |
| Applya | djustmen | t to the m | nean inte | rnal temp | , perature | , where a | ppropria | ite | л | _n | л | |
| 17.50 | 17.86 | 18.45 | 19.16 | 19.71 | 20.02 | 20.11 | 20.10 | 19.87 | 19.11 | 18.16 | 17.43 | (93) |

JPA Designer Version 6.01x , SAP Version 9.92 Licensed to Laurence Jay Limited

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

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.

Page 16 of 45

8. Space heating requirement

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|------------|------------|------------|-----------------------|-----------|---------|-----------|-----------|--------|---------|---------|---------|
| Utilisatio | on factor | for gains | | | | | | | | | |
| 0.98 | 0.96 | 0.92 | 0.85 | 0.73 | 0.56 | 0.40 | 0.46 | 0.70 | 0.90 | 0.96 | 0.98 |
| Useful g | ains | | | | | | | | | | |
| 602.72 | 724.42 | 840.89 | 912.63 | 859.10 | 656.40 | 451.63 | 467.55 | 632.48 | 662.07 | 594.10 | 565.33 |
| Monthly | average | external | temperat | ure | | A | | | | | |
| 4.30 | 4.90 | 6.50 | 8.90 | 11.70 | 14.60 | 16.60 | 16.40 | 14.10 | 10.60 | 7.10 | 4.20 |
| Heat los | s rate for | meanin | ternal ter | nperatur | e | | | | | | |
| 1793.41 | 1758.19 | 1618.64 | 1380.02 | 1075.94 | 722.94 | 468.30 | 492.53 | 771.80 | 1143.03 | 1489.94 | 1786.64 |
| Fraction | ofmonth | n for heat | ing | | | A | | | | | |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | - | - | - | - | 1.00 | 1.00 | 1.00 |
| Space h | eating re | quireme | ntforead | ch month | , kWh/m | onth | | | | | |
| 885.87 | 694.69 | 578.65 | 336.52 | 161.33 | - | - | - | - | 357.83 | 645.01 | 908.65 |
| Total sp | ace heat | ing requi | rementp | er year (| kWh/yea | ar) (Octo | ber to Ma | ay) | | | 4568.56 |
| Spaceh | eating re | quireme | nt per m ² | (kWh/m | ²/year) | | | | | | 39.95 |

8c. Space cooling requirement - not applicable

JPA Designer Version 6.01x , SAP Version 9.92 Licensed to Laurence Jay Limited Page 17 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

9a. Energy requirements

| | | | | | | | | | | | kWh/year | |
|----------------------------------|--|-------------------------------------|---------------------------------|-------------------|----------------|-----------|------------------|----------|---------------------------|---------|-------------------------------|-------------------------|
| Fraction Fraction Efficien | n of heat f n of space cy of mai | from sec e heat fro n heating | ondary s om main g system | ystem system(s | s) | | | 9 | 0.1000 0.9000 2.90% | | - | (201) (202) (206) |
| | Feb | Mar | | May | lun | l lul | Δυα | 0 Son | 0.00% | Nov | Dec | (200) |
| Spacet | | | μΑρι nt | iviay | Jun | Jui | Aug | Sep | | INOV | Dec | |
| 885 87 | | 578 65 | 336 52 | 161 33 | | | | | 357.83 | 645.01 | 008 65 | (98) |
| Append | lix Q - mc | nthly en | erav sav | ed (main | l - heating | svstem ' | <u> </u> - 1) | | 557.05 | 043.01 | 300.03 | (00) |
| | | | | | | - | · / | _ | 0.00 | 0.00 | 0.00 | (210) |
| Space I | neating fu | lel (main | heating | svstem 1 | 1) | | | | 0.00 | 0.00 | 0.00 | (210) |
| 858 22 | 673.01 | 560.58 | 326.02 | 156 29 | ., _ | - | - | _ | 346 66 | 624 87 | 880 29 | (211) |
| Append | lix Q - mo | nthly en | erav sav | ed (main | l heating | svstem 2 | 2) | | 0-10.00 | 02-1.07 | 000.20 | (=) |
| 0.00 | | | 0.00 | | - | - | -/ | _ | 0.00 | 0.00 | 0.00 | (212) |
| Space I | neating fu | lel (main | heating | svstem 2 | 2) | l | | | 0.00 | 0.00 | 0.00 | (= · =) |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | _ | 0.00 | 0.00 | 0.00 | (213) |
| Append | lix Q - mo | nthly ene | eravsave | ed (seco | ا ndarv he | ating sve | stem) | | 10.00 | | | () |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | - | - | - | - | 0.00 | 0.00 | 0.00 | (214) |
| Space | neating fu | el (secor | ndary) | | | | 1 | И | 1 | 1 | | () |
| . 104.22 | 81.73 | 68.08 | 39.59 | 18.98 | - | - | - | - | 42.10 | 75.88 | 106.90 | (215) |
| Waterh | eating | JL | JL |][| JL | J | 1 | J(| | | | . , |
| Waterh | eating re | quiremer | nt | | | | | | | | | |
| 178.41 | 156.40 | 162.25 | 142.66 | 137.79 | 120.23 | 112.71 | 127.48 | 128.44 | 148.07 | 160.06 | 173.17 | (64) |
| Efficien | cyofwate | erheater | | | | | | | | | 87.30 | (216) |
| 89.41 | 89.37 | 89.27 | 89.05 | 88.61 | 87.30 | 87.30 | 87.30 | 87.30 | 89.06 | 89.33 | 89.43 | (217) |
| Waterh | eating fu | el | | | | | | | | | | |
| 199.53 | 175.00 | 181.75 | 160.20 | 155.49 | 137.72 | 129.11 | 146.02 | 147.12 | 166.25 | 179.19 | 193.63 | (219) |
| Annual Space I Space I | totals heating fu neating fu | uel used, Iel (secor | main sy ndary) | stem 1 | | | | | | | kWh/year 4425.94 537.48 | (211) (215) |
| Water h Electric | eating fu ity for pu | el mps, fan: | s and ele | ectric kee | ep-hot | | | | | | 1971.03 | (219) (230c) |
| boiler | with a fan | pump i-assister | dflue | | | | | | | | 45.00 | (2300) (230e) |
| Total el | ectricity f | or the ab | ove, kWł | h/year | | | | | | | 175.00 | (231) |
| Electric Energy | ity for ligh saving/ge lix Q - | nting (100 eneration | 0.00% fix technolo | (ed LEL) ogies | | | | | | | 477.91 | (232) |
| Energ | y saved o y used () | or genera): | ated (): | | | | | | | | 0.000 0.000 | (236a) (237a) |
| Total de | elivered e | nergy for | alluses | | | | | | | | 7587.36 | (238) |

10a. Does not apply

11a. Does not apply

Page 18 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

12a. Carbon dioxide emissions

| | Energy | Emission factor | Emissions | |
|--------------------------------|----------|-----------------|-----------|-------|
| | kWh/year | kg CO2/kWh | kg CO2/y | ear |
| Space heating, main system 1 | 4425.94 | 0.216 | 956.00 | (261) |
| Space heating, main system 2 | 0.00 | 0.000 | 0.00 | (262) |
| Space heating, secondary | 537.48 | 0.216 | 116.10 | (263) |
| Waterheating | 1971.03 | 0.216 | 425.74 | (264) |
| Space and water heating | | | 1497.84 | (265) |
| Electricity for pumps and fans | 175.00 | 0.519 | 90.83 | (267) |
| Electricity for lighting | 477.91 | 0.519 | 248.04 | (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 CO2, kg/year | | | 1836.70 | (272) |

Dwelling Carbon Dioxide Emission Rate (DER)

kg/m²/year 16.06 (273)

JPA Designer Version 6.01 x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 19 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

Building type Semi-detached house

| Plotnumber | Plot 5 | | |
|------------|-------------------------------|---------|---------------------------------|
| Reference | | | |
| Date | 08/02/2016 | | |
| Client | Byatt Oliver | Project | New Dwelling Plot 5 As-Designed |
| | Unit 1B Whitebridge Way | - | Victoria Court |
| | Whitebridge Industrial Estate | | May Bank |
| | Stone | | Brampron |
| | Staffordshire | | ST5 |
| | ST158LQ | | |
| Tel: | 01785719268 | | |
| Email: | david@byattoliver.co.uk | | |

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

assessed by program JPA Designer version 6.03a1, printed on 8/2/2016 at 3:53:39 PM

New dwelling as designed

| 1 TER and DER Fuel for main heating system: Gas (mains) (fuel factor = 1.00) Target Carbon Dioxide Emission Rate Dwelling Carbon Dioxide Emission Rate | TER = 16.12 DER = 16.06 | ОК |
|--|----------------------------|----|
| 1b TFEE and DFEE Target Fabric Energy Efficiency (TFEE) Dwelling Fabric Energy Efficiency (DFEE) | TFEE = 49.7 DFEE = 47.4 | ОК |

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

| 2b Fabric U-values | | | | |
|--------------------|----------------|-------------------|------------------|----|
| | Element | Average | Highest | |
| | Wall | 0.20 (max. 0.30) | 0.22 (max. 0.70) | OK |
| | Floor | 0.12 (max. 0.25) | 0.12 (max. 0.70) | OK |
| | Roof | 0.14 (max. 0.20) | 0.15 (max. 0.35) | OK |
| | Openings | 1.39 (max. 2.00) | 1.40 (max. 3.30) | OK |
| 3 Air permeability | | | | |
| | Air permeabili | ty at 50 pascals: | 3.00 | OK |
| | Maximum : | | 10.00 | |

JPA Designer Version 6.01x, SAP Version 9.92 Licensed to Laurence Jay Limited

Page 20 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

| 4 Heating efficiency Main heating system: | , | | |
|---|---------------------------------------|---|----|
| main neating eyetern | rs, mains gas | | |
| a | Ideal Logic Code | Combi ES | |
| Source of efficiency: | from boiler databa | | |
| | Ideal Logic Code | -OMDIES 33 Efficiency: 89.0% SEDBLIK 2009 | |
| | | Minimum: 88.0% | OK |
| Secondary heating sy | stem: | | ÖR |
| , | Room heater syst | ems - Gas | |
| | Condensing gas fi | re | |
| | | Efficiency: 85.00% | |
| | | Minimum: 63.00% | OK |
| 5 Cylinder insulatio | n | | |
| Hot water storage | Nocylinder | | |
| 6 Controls | | | |
| (Also refer to "Domes | tic Building Service | s Compliance Guide" by the DCLG) | |
| Space heating contro | ls | Time and temperature zone control | OK |
| Hot water controls No cylinder | | | |
| Boiler Interlock Yes | | | |
| Hot water controls | | Nocylinder | |
| 7 Low energy lights | | | |
| 0, 0 | | Percentage of fixed lights with low-energy fittings: 100.0% | |
| | | Minimum: 75.0% | OK |
| 8 Mechanical ventil | ation | | |
| | | Notapplicable | |
| 9 Summertime terre | perature | | |
| Overheating risk (Mid | ands). | | ОК |
| e verneating her (initia | | Slight | OK |
| Based on: | | | |
| Thermal mass para | meter : | 140.85 | |
| Overshading: | | Average or unknown (20-60 % sky blocked) | |
| Orientation : East | | | |
| Ventilation rate : | | 4.00 | |
| Blinds/curtains : | · · · · · · · · · · · · · · · · · · · | | |
| Light-coloured curta | un or roller blind wit | n blings/snutters closed 0.00% of daylight hours | |
| None with blinds/sh | utters closed 0.00% | o of daylight hours | |
| | | | |
| 10 Key features | | | |

Double-glazed, argon filled, low-E, En=0.05, soft coat U-value 1.10 W/m²K Ground floors U-value 0.12 W/m²K Design air permeability 3.0 m³/h.m²

JPA Designer Version 6.01x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 21 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

Building type Semi-detached house

| Plotnumber | Plot 5 | | |
|------------|-------------------------------|---------|---------------------------------|
| Reference | | | |
| Date | 08/02/2016 | | |
| Client | ByattOliver | Project | New Dwelling Plot 5 As-Designed |
| | Unit 1B Whitebridge Way | | Victoria Court |
| | Whitebridge Industrial Estate | | May Bank |
| | Stone | | Brampron |
| | Staffordshire | | ST5 |
| | ST158LQ | | |
| Tel: | 01785719268 | | |
| Email: | david@byattoliver.co.uk | | |
| | | | |

SAP 2012 input data Printed on 8 Feb 2016 at 03:53 PM

Plot 5 Victoria Court Development As-Designed

| New Dwelling Plot 5 As-Des Victoria Court May Bank Brampron | gned | | |
|---|--|--|--|
| ST5 | | | |
| Located in: Region: Postcode: UPRN: | England Midlands ST5 | | |
| Date of assessment: Date of certificate: Assessment type: Tenure: Transaction type: Related party disclosure: PCDF revision number: | 2016-02-08 2016-02-08 New dwelling as de Unknown New dwelling No related party 387 | esigned | |
| Property description Dwelling type: Ground floor (1) First floor Second floor | Semi-detached ho area = 44.77m ² area = 44.17m ² area = 25.42m ² | use storey height = 2.40m storey height = 2.65m storey height = 2.05m | 1 1 1 |
| Living area: | 20.91 (fraction 0.1) | 83) | |
| Front of dwelling faces: | East | | |
| Doors Halfglazed door | area = 2.10 | U = 1.10 | - Double-glazed, argon filled, low-E, En=0.05, soft coat (East) |
| Full glazed door | area = 8.40 | U = 1.40 | - Double-glazed, argon filled, low-E, En=0.05, soft coat (West) |
| Windows | | | |
| Window | area = 1.35 | U = 1.40 | - Double-glazed, argon filled, low-E, En=0.05, soft coat (West) |
| Overshading: | Average or unknow | wn (20-60 % sky blocke | d) |
| | | Page 22 of 45 | |

JPA Designer Version 6.01x , SAP Version 9.92 Licensed to Laurence Jay Limited

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

Building type Semi-detached house

| Plotnumber | Plot 5 | | |
|------------|-------------------------------|---------|---------------------------------|
| Reference | | | |
| Date | 08/02/2016 | | |
| Client | Byatt Oliver | Project | New Dwelling Plot 5 As-Designed |
| | Unit 1B Whitebridge Way | | Victoria Court |
| | Whitebridge Industrial Estate | | May Bank |
| | Stone | | Brampron |
| | Staffordshire | | ST5 |
| | ST158LQ | | |
| Tel: | 01785719268 | | |
| Email: | david@byattoliver.co.uk | | |
| | | | |

SAP 2012 input data Printed on 8 Feb 2016 at 03:53 PM

Plot 5 Victoria Court Development As-Designed

| Window | area = 3.60 | U = 1.40 | - Double-glazed, argon filled, low-E, En=0.05, soft coat (West) |
|--|---|--|---|
| Overshading: | Average or unkr | nown (20-60 % sky block | ed) |
| Window | area = 7.47 | U = 1.40 | - Double-glazed, argon filled, low-E, En=0.05, soft coat (East) |
| Overshading: | Average or unkr | nown (20-60 % sky block | ed) |
| Window | area = 2.28 | U = 1.40 | - Double-glazed, argon filled, low-E, En=0.05, soft coat (South) |
| Overshading: | Average or unkr | nown (20-60 % sky block | ed) |
| Rooflights | | | |
| Opaque Elements Roofs Walls Walls Walls Ground floors Roofs | area = 29.56 area = 15.20 area = 1.53 area = 82.26 area = 44.77 area = 14.25 | U = 0.14, k = 9.0 U = 0.22, k = 9.0 U = 0.22, k = 9.0 U = 0.20, k = 60.0 U = 0.12, k = 80.0 U = 0.15, k = 9.0 | Timber partition to roofspace Dormer walls |
| Thermal bridges: E10 Eaves (insulation at | Htb = 19.35 0.060 | 0.060 | 11.300 |
| E12 Gable (insulation at ceiling level) [A] E10 | 0.240 | 0.240 | 6.900 |
| E13 Gable (insulation at rafter level) [A] E13 | 0.040 | 0.040 | 7.000 |
| E16 Corner (normal) [A] E16 | 0.090 | 0.090 | 10.800 |
| E17 Corner (inverted – internal area greater than external area) [A] E17 | -0.090 | -0.090 | 10.800 |
| E18 Party wall between dwellings (c) [A] E18 | 0.060 | 0.060 | 10.200 |

JPA Designer Version 6.01x , SAP Version 9.92

Page 23 of 45

Licensed to Laurence Jay Limited

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

Building type Semi-detached house

| Plotnumber | Plot 5 | | |
|----------------|--|---------|---|
| Date | 08/02/2016 | | |
| Client | Byatt Oliver Unit 1B Whitebridge Way Whitebridge Industrial Estate | Project | New Dwelling Plot 5 As-Designed Victoria Court May Bank |
| | Stone | | Brampron |
| | Statiordshire ST158LQ | | 515 |
| Tel: Email: | 01785719268 david@byattoliver.co.uk | | |

SAP 2012 input data Printed on 8 Feb 2016 at 03:53 PM

Plot 5 Victoria Court Development As-Designed

| E2 Other lintels (including other steel lintels) [A] E2 | 0.300 | 0.300 | 18.550 |
|--|--|---|-------------------|
| E25 Staggered party wall between dwellings (c) [D] E25 | 0.000 | 0.120 | 10.800 |
| E3 Sill [A] E3 | 0.040 | 0.040 | 18.550 |
| E4 Jamb [A] E4 | 0.050 | 0.050 | 31.200 |
| E5 Ground floor (normal) [A] E5 | 0.160 | 0.160 | 13.700 |
| E6 Intermediate floor within a dwelling [A] E6 | 0.070 | 0.070 | 23.900 |
| P1 Ground floor (c) [D] P1 | 0.000 | 0.160 | 8.970 |
| P2 Intermediate floor within a dwelling (c) [D] P2 | 0.000 | 0.000 | 8.970 |
| P4 Roof (insulation at ceiling level) (c) [D] P4 | 0.000 | 0.240 | 3.000 |
| P5 Roof (insulation at rafter level) (c) [D] P5 | 0.000 | 0.080 | 6.900 |
| R8 Roof to wall (rafter) [D] R9 | 0.000 | 0.060 | 6.500 |
| Thermal mass: Pressure test: Ventilation: Number of chimneys: Number of open flues: Number of intermittent fans: | Calculated from k value Yes (q50 - 3.00) : me Natural ventilation with 0 2 | ues asured in this dwelling th intermittent extract f | g:No ans |
| Number of passive stacks: Number of sides sheltered: Measured/design q50: | 0 2.00 3.00 | | |
| Main heating system: | Central heating syste Gas boilers (including Condensing combi w Index: 17179 | ms with radiators or ur g LPG) 1998 or later ith automatic ignition | nderfloor heating |

JPA Designer Version 6.01x , SAP Version 9.92

Licensed to Laurence Jay Limited

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

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.

Page 24 of 45

Building type Semi-detached house

| Plot number Reference | Plot 5 | | |
|--------------------------|-------------------------------|---------|---------------------------------|
| Date | 08/02/2016 | | |
| Client | ByattOliver | Project | New Dwelling Plot 5 As-Designed |
| | Unit 1B Whitebridge Way | | Victoria Court |
| | Whitebridge Industrial Estate | | May Bank |
| | Stone | | Brampron |
| | Staffordshire | | ST5 |
| | ST158LQ | | |
| Tel: | 01785719268 | | |
| Email: | david@byattoliver.co.uk | | |
| | | | |

SAP 2012 input data Printed on 8 Feb 2016 at 03:53 PM

Plot 5 Victoria Court Development As-Designed

| Main heating controls: Boiler has load compensator: Boiler has weather compensator: Boiler has emhanced load compensator: Boiler interlock: | Eff 87.30% / 89.90% Ideal Logic Code Combi ES 33 Radiators Pump in heated space: Yes Boiler has load or weather compensator: Yes Boiler Interlock: Yes Design flow temperature : > 45°C Central heating pump pre-2013 Gas (mains) Time and temperature zone control No Yes No Yes |
|--|---|
| Secondary heating system: | Room heater systems Gas Condensing gas fire |
| | Gas (mains) |
| Water heating: | Combination boiler Combination boiler type : Instantaneous Solar panel: no |
| Water use <= 125 litres/person/day: | Yes |
| Low energy lights: Total fixed lighting outlets: Electricity tariff: Photovoltaics 1: Photovoltaics 2: | 100.0% of fixed lighting outlets 10 Standard tariff Peak kW: 0.00 Peak kW: 0.00 |

JPA Designer Version 6.01x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 25 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

Building type Semi-detached house

| Plotnumber | Plot 5 | | |
|------------|-------------------------------|---------|---------------------------------|
| Reference | | | |
| Date | 08/02/2016 | | |
| Client | Byatt Oliver | Project | New Dwelling Plot 5 As-Designed |
| | Unit 1B Whitebridge Way | | Victoria Court |
| | Whitebridge Industrial Estate | | May Bank |
| | Stone | | Brampron |
| | Staffordshire | | ST5 |
| | ST158LQ | | |
| Tel: | 01785719268 | | |
| Email: | david@byattoliver.co.uk | | |
| | | | |

SAP 2012 input data Printed on 8 Feb 2016 at 03:53 PM

Plot 5 Victoria Court Development As-Designed

Photovoltaics 3:Peak kW: 0.00Conservatory:NoFixed air conditioning:NoSmoke Control Area:Not specifiedAdditional allowable electricity generation :0.00kg/m²/year

Page 26 of 45

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.

New Dwelling Plot 5 As-Designed Dwelling type: Victoria Court May Bank Brampron ST5

Date of assessment: Produced by Total floor area:

Semi-detached house 8 February 2016 Laurence Jay Limited 114 m²

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

Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO_2) emissions.



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



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

Building type Semi-detached house

| Plotnumber | Plot 5 | | |
|------------|-------------------------------|---------|---------------------------------|
| Reference | | | |
| Date | 08/02/2016 | | |
| Client | Byatt Oliver | Project | New Dwelling Plot 5 As-Designed |
| | Unit 1B Whitebridge Way | | Victoria Court |
| | Whitebridge Industrial Estate | | May Bank |
| | Stone | | Brampron |
| | Staffordshire | | ST5 |
| | ST158LQ | | |
| Tel: | 01785719268 | | |
| Email: | david@byattoliver.co.uk | | |
| | | | |

SAP 2012 worksheet for - calculation of fabric energy efficiency

1. Overall dwelling dimensions

| | Area | Av. Storey | Volume | |
|-----------------------------------|--------|------------|--------|------|
| | (m²) | height (m) | (m³) | |
| Ground floor (1) | 44.77 | 2.40 | 107.45 | (3a) |
| Firstfloor | 44.17 | 2.65 | 117.05 | (3b) |
| Second floor | 25.42 | 2.05 | 52.11 | (3c) |
| Total floor area | 114.36 | | | (4) |
| Dwelling volume (m ³) | | | 276.61 | (5) |

JPA Designer Version 6.01 x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 28 of 45

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.

1 uge 20 01 40

2. Ventilation rate

| | | | | | | | | | | | m³ per ho | our |
|---------------------|--------------------------|-----------------------|-------------|-----------|-----------|-----------|---------------------|--------|-----------|------|-----------|--------------|
| | | | | | | | main + s heating | seonda | ry + othe | er | | |
| Numbe | rofchim | neys | | | | | 0 + 0 + 0 |) | x 40 | | 0.00 | (6a) |
| Numbe | rofopen | flues | | | | | 0 + 0 + 0 |) | x 20 | | 0.00 | (6b) |
| Numbe | rofinterr | nittent fa | ins | | | | 4 | | x 10 | | 40.00 | (7a) |
| Numbe | rofpassi | ve vents | | | | | 0 | | x 10 | | 0.00 | (7b) |
| Numbe | roffluele | ess gas fi | res | | | | 0 | | x 40 | | 0.00 | (7c) |
| | | | | | | | | | | | Air chang | ges per hour |
| Infiltrati | on due to | o chimne | eys, fans | and flues | S | | | | | | 0.14 | (8) |
| Pressu | re test, re | esult q50 |) | | | | | | 5.00 | | | (17) |
| Airpern | neability | | | | | | | | | | 0.39 | (18) |
| Numbe | r of sides | s on whic | h shelter | ed | | | | | | | 2.00 | (19) |
| Shelter | factor | | | | | | | | | | 0.85 | (20) |
| Infiltrati | on rate in | ncorpora | ting shelt | erfactor | | | | | | | 0.34 | (21) |
| Infiltrati | on rate n | nodifiedf | for month | ly wind s | 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 | |
| Wind E | actor | | | | | | | | | | 52.50 | (22) |
| 1.27 | 1.25 | 1.23 | 1.10 | 1.08 | 0.95 | 0.95 | 0.93 | 1.00 | 1.08 | 1.13 | 1.18 | |
| | | Л | | | | | N | | - Л. | I | 13.13 | (22a) |
| Adjuste | ed infiltrat | tion rate | (allowing | forshelf | ter and w | vind spee | ed) | | | | | |
| 0.43 | 0.42 | 0.41 | 0.37 | 0.36 | 0.32 | 0.32 | 0.31 | 0.34 | 0.36 | 0.38 | 0.39 | |
| | | _, | | | | | | | | | 4.40 | (22b) |
| Ventila Effectiv | tion : natu e air cha | ural vent nge rate | ilation, in | termitte | nt extrac | t fans | | | | | | |
| 0.59 | 0.59 | 0.58 | 0.57 | 0.57 | 0.55 | 0.55 | 0.55 | 0.56 | 0.57 | 0.57 | 0.58 | (25) |
| | | | | | | | | | | | | |

Page 29 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

SAP 2012 worksheet for - calculation of fabric energy efficiency

| 3. Heat losses | and heat los | ss paramete | r | | | | | |
|--------------------|----------------|-------------|---------|-------------|-------|-------------|---------|------|
| Element | Gross | Openings | Netarea | U-value | ΑxU | kappa-value | A x K | |
| | area, m² | m² | A, m² | W/m²K | W/K | kJ/m²K | kJ/K | |
| Window-Double | e-glazed, | | 1.350 | 1.33 (1.40) | 1.79 | | | (27) |
| argon filled, low- | -E, En=0.05, | | | | | | | |
| soft coat (West) |) | | | | | | | |
| Data | | | | | | | | |
| Window-Double | e-glazed, | | 2.280 | 1.33 (1.40) | 3.02 | | | (27) |
| argon filled, low- | -E, En=0.05, | | | | | | | |
| soft coat (South |) | | | | | | | |
| Data | | | | | | | | |
| Window - Double | e-glazed, | | 7.470 | 1.33 (1.40) | 9.90 | | | (27) |
| argon filled, low- | -E, En=0.05, | | | | | | | . , |
| soft coat (East) | | | | | | | | |
| Data | | | | | | | | |
| Window - Double | e-glazed, | | 3.600 | 1.33 (1.40) | 4.77 | | | (27) |
| argon filled, low- | -E, En=0.05, | | | 、 | | | | () |
| soft coat (West) |) | | | | | | | |
| Data | | | | | | | | |
| Half glazed doo | r- | | 2.100 | 1.10 | 2.31 | | | (26) |
| Double-glazed. | argon filled. | | | | | | | () |
| low-E. En=0.05 | soft coat | | | | | | | |
| (Fast) | , | | | | | | | |
| Data | | | | | | | | |
| Full glazed door | | | 8 400 | 1 40 | 11 76 | | | (26) |
| Double-glazed | argonfilled | | 0.100 | | 11110 | | | (_0) |
| low-F En=0.05 | soft coat | | | | | | | |
| (West) | , con cour | | | | | | | |
| Data | | | | | | | | |
| Pitched roofs in: | sulated betwe | en ioists | 29.56 | 0 14 | 4 14 | 9.00 | 266 04 | (30) |
| Walls | | lonjoloto | 15 20 | 0.22 | 3.34 | 9.00 | 136.80 | (29) |
| Timber partitio | n to roofspace | 2 | 10.20 | 0.22 | 0.01 | 0.00 | 100.00 | (20) |
| Walls | into recipiedo | - | 1.53 | 0.22 | 0.34 | 9.00 | 13 77 | (29) |
| Dormerwalls | | | 1.00 | 0.22 | 0.01 | 0.00 | 10.11 | (20) |
| Walls | | | 82 26 | 0.20 | 16 45 | 60.00 | 4935 60 | (29) |
| Groundfloors | | | 44 77 | 0.12 | 5.37 | 80.00 | 3581.60 | (28) |
| Pitched roofs ins | sulated betwe | enrafters | 14 25 | 0.12 | 2 14 | 9.00 | 128 25 | (30) |
| Party wall | | omatoro | 55 14 | 0.00 | 0.00 | 70.00 | 3859 80 | (00) |
| Internal wall | | | 141 52 | 0.00 | 0.00 | 9.00 | 1273.68 | |
| Internal timber | partition | | 111.02 | 0.00 | 0.00 | 0.00 | .2.0.00 | |
| Internal floor | | | 70 80 | 0.00 | 0.00 | 18 00 | 1274 40 | |
| Internal ceiling | | | 70.80 | 0.00 | 0.00 | 9.00 | 637 20 | |
| | | | 10.00 | 0.00 | 0.00 | 0.00 | 501.20 | |

JPA Designer Version 6.01x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 30 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

| 3. Heat | losses a | and hea | t loss pa | aramete | r | | | | | | | |
|-----------|------------|------------|-------------------------|----------|---------|--------|--------|--------|--------|----------|---------|---------|
| Element | : | Gross | Ope | enings | Netarea | a U-\ | /alue | ΑxU | ka | ppa-valu | еАхК | |
| | | area, m² | ² m² | | A, m² | W/ | ′m²K | W/K | kJ | /m²K | kJ/K | |
| Total are | ea of exte | ernal ele | ments Si | gma A, r | n² | | | | | | 212. | 77 (31) |
| Fabric h | eat loss | , W/K | | | | | | | | | 65.3 | 34 (33) |
| Heat cap | pacity | | | | | | | | | | 16107.1 | 14 (34) |
| Therma | l mass pa | arameter | , kJ/m²K | | | | | | | | 140.8 | 35 (35) |
| Effectof | thermal | bridges | | | | | | | | | 19.3 | 35 (36) |
| Total fat | oric heat | loss | | | | | | | | | 84.0 | 59 (37) |
| Ventilati | on heat l | loss calc | ulated m | onthly | | | | | | | | |
| 53.99 | 53.66 | 53.35 | 51.85 | 51.57 | 50.27 | 50.27 | 50.03 | 50.78 | 51.57 | 52.14 | 52.73 | (38) |
| Heat tra | nsfer coe | efficient, | W/K | | | | | | | | | |
| 138.68 | 138.35 | 138.04 | 136.54 | 136.26 | 134.97 | 134.97 | 134.72 | 135.47 | 136.26 | 136.83 | 137.42 |] |
| | | | | | | | | | | | 136. | 54 (39) |
| Heat los | sparam | eter (HLF | ^{>}), W/m² | K | | | | | | | | |
| 1.21 | 1.21 | 1.21 | 1.19 | 1.19 | 1.18 | 1.18 | 1.18 | 1.18 | 1.19 | 1.20 | 1.20 |] |
| HLP (ave | erage) | | | | | | | | | | 1.1 | 19 (40) |
| Number | ofdaysi | in month | (Table 1 | a) | | | | | | | | |
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |] |
| 31 | 28 | 31 | 30 | 31 | 30 | 31 | 31 | 30 | 31 | 30 | 31 | |

JPA Designer Version 6.01 x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 31 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

SAP 2012 worksheet for - calculation of fabric energy efficiency

| 4. Wate | er heatin | g energ ancy N | y requir | ements | | | | | | | kWh/year 2 84 | (42 |
|--|--|--|---------------------------------|-------------|----------|----------|--------|--------|--------|--------|--|---------------------------------|
| Annual | averagel | hot water | r usage ir | n litres pe | erday Vd | ,average | 9 | | | | 101.62 | (43 |
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | |
| Hot wat | er usage | in litres p | ber day f | or each r | nonth | л | Л | н. | Л | n | | |
| 111.78 | 107.71 | 103.65 | 99.58 | 95.52 | 91.46 | 91.46 | 95.52 | 99.58 | 103.65 | 107.71 | 111.78 | (44 |
| Energy | content c | of hot wat | ter used | | 3 | я | Л | | л | | | |
| 165.76 | 144.98 | 149.61 | 130.43 | 125.15 | 108.00 | 100.07 | 114.84 | 116.21 | 135.43 | 147.83 | 160.53 | |
| Energy Distribu | content (a ition loss | annual) | | | A | | | | | | 1598.83 | (45 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (46 |
| Hot wat Hot wat Volume Temper Energy Total st | er storage er cylinde factor ature fact lost from orage los | e volume er loss fa or store (k\ s | (litres) ctor (kW Wh/day) | h/day) | | | | | | | 0.00 0.0000 0.0000 0.0000 0.00 | (50 (51 (52 (53 (55 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (56 |
| Net stor | rage loss | A | | | 5 | я | | | Я | | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (57 |
| Primary | loss | | , | | | | | | | | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (59 |
| Combi I | oss calcu | lated for | each mo | onth | | | | | | | | |
| 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 he | eatrequire | ed for wa | ter heati | ng calcul | ated for | each mo | nth | | | | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (62 |
| Output | from wate | er heater | for each | month, k | wh/mor | nth | | | | | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (64 |
| Heat ga | ins from | water hea | ating, kW | /h/month |) 1 | 1 | 1 | 1 | 1 | | 0.00 | (64 |
| 35.23 | 30.81 | 31.79 | 27.72 | 26.59 | 22.95 | 21.27 | 24.40 | 24.69 | 28.78 | 31.41 | 34.11 | (65 |

Page 32 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

SAP 2012 worksheet for - calculation of fabric energy efficiency

5. Internal gains

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-----------|------------|------------|----------|---------|---------|---------|---------|---------|---------|---------|---------|
| Metabol | ic gains, | Watts | | | | | | | | | |
| 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 |
| Lighting | gains | | | | | | | | | | |
| 27.06 | 24.04 | 19.55 | 14.80 | 11.06 | 9.34 | 10.09 | 13.12 | 17.61 | 22.35 | 26.09 | 27.81 |
| Appliand | ces gains | 5 | | | | | | | | | |
| 277.68 | 280.56 | 273.30 | 257.84 | 238.33 | 219.99 | 207.74 | 204.85 | 212.12 | 227.57 | 247.09 | 265.43 |
| Cooking | gains | | | | | | | | | | |
| 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 |
| Pumps a | 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 |
| Lossese | e.g.evap | oration (r | negative | values) | | | | | | | |
| -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 |
| Waterhe | eating ga | ins | | | | | | | | | |
| 47.35 | 45.85 | 42.73 | 38.49 | 35.75 | 31.87 | 28.58 | 32.80 | 34.30 | 38.68 | 43.63 | 45.85 |
| Totalinte | ernal gaiı | ns | | | | | | | | | |
| 417.66 | 416.02 | 401.15 | 376.71 | 350.71 | 326.78 | 311.99 | 316.35 | 329.60 | 354.19 | 382.39 | 404.67 |

6. Solar gains (calculation for January)

| | Area & Flux | g & FF | Shading | Gains |
|---|-------------------|-------------|-------------|---------|
| Window - Double-glazed, argon filled, low-E, En=0.05, soft coat (West) Data | 0.9 x 1.350 19.64 | 0.63 x 0.70 | 0.77 | 8.1031 |
| Window - Double-glazed, argon filled, low-E, En=0.05, soft coat (South) Data | 0.9 x 2.280 46.75 | 0.63 x 0.70 | 0.77 | 32.5767 |
| Window - Double-glazed, argon filled, low-E, En=0.05, soft coat (East) Data | 0.9 x 7.470 19.64 | 0.63 x 0.70 | 0.77 | 44.8373 |
| Window - Double-glazed, argon filled, low-E, En=0.05, soft coat (West) Data | 0.9 x 3.600 19.64 | 0.63 x 0.70 | 0.77 | 21.6084 |
| Halfglazed door - Double-glazed, argon filled, low-E, En=0.05, soft coat (East) Data | 0.9 x 2.100 0.00 | 0.63 x 0.70 | 0.77 | 0.0000 |
| Full glazed door - Double-glazed, argon filled, low-E, En=0.05, soft coat (West) Data | 0.9 x 8.400 19.64 | 0.63 x 0.70 | 0.77 | 50.4195 |
| Lighting calculations | _ | | | |
| | Area | g | FF x Shadi | ng |
| Window - Double-glazed, argon filled, low-E, En=0.05, soft coat (West) Data | 0.9 x 1.35 | 0.80 | 0.70 x 0.83 | 0.56 |
| Window - Double-glazed, argon filled, low-E, En=0.05, soft coat (South) Data | 0.9 x 2.28 | 0.80 | 0.70 x 0.83 | 0.95 |

JPA Designer Version 6.01x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 33 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

| Lightin | g calcul | ations | | | | | | | | | | | |
|----------------------|---------------------------|-----------------------|-----------------------|--|-----------|-----------|----------|-------|----------|------------|---------|-----|------|
| - | - | | | | Area | а | 9 | g | | FF x Shad | ding | | |
| Window | -Double | -glazed, | argon fill | led, low-l | Ξ, 0.9 | x 7.47 | | 0.80 | | 0.70 x 0.8 | 3 3. | .12 | |
| En=0.08 Data | 5, soft co | at (East) | | | | | | | | | | | |
| Window | -Double | e-glazed, | argon fil | led, low-l | E, 0.9 | x 3.60 | | 0.80 | | 0.70 x 0.8 | 3 1. | .51 | |
| En=0.08 Data | 5, soft co | at (West | :) | | | | | | | | | | |
| 7. Mean | n interna | i tempe | <i>rature</i> | de in the l | iving are | a Th1 (° | C) | | | | 21 | 00 | (85) |
| Heating | systemr | esponsiv | /eness | 13 11 11 10 1 | iving are | α, πη (| 0) | | | | 1 | .00 | (00) |
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | 7 | |
| tau | | | J | <u>1 </u> | 1 | | | | <u> </u> | U | <u></u> | _ | |
| 32.26 | 32.34 | 32.41 | 32.77 | 32.83 | 33.15 | 33.15 | 33.21 | 33.03 | 32.83 | 32.70 | 32.56 |] | |
| alpha | | | | | | | | | | | | _ | |
| 3.15 | 3.16 | 3.16 | 3.18 | 3.19 | 3.21 | 3.21 | 3.21 | 3.20 | 3.19 | 3.18 | 3.17 | | |
| Utilisatio | on factor | for gains | forliving | area | | | | | | | | | |
| 0.99 | 0.98 | 0.96 | 0.90 | 0.80 | 0.65 | 0.51 | 0.56 | 0.79 | 0.94 | 0.98 | 0.99 | | (86) |
| Meanin | ternal ter | nperatur | e in living | area T1 | | | | | | | | _ | |
| 18.85 | 19.12 | 19.56 | 20.11 | 20.57 | 20.85 | 20.95 | 20.93 | 20.69 | 20.06 | 19.35 | 18.80 | | (87) |
| Temper | ature dur | ring heat | ing perio | ds in rest | ofdwelli | ng Th2 | | | | | | _ | |
| 19.91 | 19.91 | 19.91 | 19.92 | 19.93 | 19.94 | 19.94 | 19.94 | 19.93 | 19.93 | 19.92 | 19.92 | | (88) |
| Utilisatio | on factor | for gains | for rest o | ofdwellir | ng | | | | | | | | |
| 0.99 | 0.98 | 0.95 | 0.88 | 0.75 | 0.57 | 0.40 | 0.46 | 0.72 | 0.93 | 0.98 | 0.99 | | (89) |
| Meanin | ternal ter | mperatu | re in the r | estofdw | elling T2 | 2 | | | | | | _ | |
| 17.94 | 18.21 | 18.65 | 19.19 | 19.61 | 19.85 | 19.92 | 19.91 | 19.73 | 19.16 | 18.45 | 17.90 | | (90) |
| Living au Mean in | rea fractio ternal ter | on (20.9´ nperatur | 1/114.36 e(for the | s) whole dv | vellina) | | | | | | 0. | .18 | (91) |
| 18 11 | 18.38 | 18 82 | 19.36 | 19 78 | 20.03 | 20 10 | 20.09 | 19 91 | 19.32 | 18.61 | 18.07 | ٦ | (92) |
| Applya | e.ee diustmen | t to the m | nean inte | rnal tem | perature | , where a | ppropria | ate | 10.02 | | 10.07 | _ | () |
| 18.11 | 18.38 | 18.82 | 19.36 | 19.78 | 20.03 | 20.10 | 20.09 | 19.91 | 19.32 | 18.61 | 18.07 | 7 | (93) |

JPA Designer Version 6.01 x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 34 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

SAP 2012 worksheet for - calculation of fabric energy efficiency

8. Space heating requirement

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | | |
|--|------------|------------|------------|----------|---------|--------|--------|--------|---------|---------|---------|--|--|--|
| Utilisation factor for gains | | | | | | | | | | | | | | |
| 0.98 | 0.97 | 0.94 | 0.87 | 0.74 | 0.58 | 0.42 | 0.47 | 0.72 | 0.91 | 0.97 | 0.99 | | | |
| Useful g | ains | | | | | | | | | | | | | |
| 566.05 | 692.15 | 816.88 | 900.36 | 856.44 | 657.87 | 454.03 | 469.01 | 628.12 | 641.63 | 561.62 | 528.67 | | | |
| 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 | | | |
| Heat los | s rate for | meanin | ternal ter | mperatur | е | | | | | | | | | |
| 1914.88 | 1864.47 | 1700.06 | 1428.45 | 1101.49 | 732.87 | 473.02 | 497.58 | 786.80 | 1188.64 | 1575.56 | 1905.83 | | | |
| Fraction | ofmonth | n for heat | ing | | | | | | | | | | | |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | - | - | - | - | 1.00 | 1.00 | 1.00 | | | |
| Space h | eating re | quireme | ntforead | ch month | , kWh/m | onth | | | | | | | | |
| 1003.53 | 787.80 | 657.08 | 380.22 | 182.32 | - | - | - | - | 406.97 | 730.03 | 1024.60 | | | |
| Total space heating requirement per year (kWh/year) (October to May)5172.57Space heating requirement per m² (kWh/m²/year)45.23 | | | | | | | | | | | | | | |

Page 35 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

SAP 2012 worksheet for - calculation of fabric energy efficiency

8c. Space cooling requirement

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|--|--------------------------|----------------------|-------------------|---------------------|---------|---------|---------|-------------|----------|------|----------------|
| Externa | altempera | aturers | | | л | A | | , | X | | |
| - | - | - | - | - | 14.60 | 16.60 | 16.40 | - | - | - | - |
| Heat lo | ss rate W | Î | | л | π | A | л | л | λ. | | |
| - | - | - | - | - | 1268.67 | 998.74 | 1023.91 | - | - | - | - |
| Utilisati | on factor | for loss | л | | я | 31 | Л | 3 | 31 | | |
| - | - | - | - | - | 0.81 | 0.87 | 0.84 | - | - | - | - |
| Useful | loss W | | | л | л | я | | л | _1 | | |
| - | - | - | - | - | 1027.36 | 867.95 | 858.09 | - | - | - | - |
| Interna | l gains W | | л | Л | | , | | л | _1 | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 495.20 | 475.51 | 482.99 | 0.00 | 0.00 | 0.00 | 0.00 |
| Solar g | ains W | х | | | л | , | | л | <u> </u> | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 951.03 | 907.67 | 789.55 | 0.00 | 0.00 | 0.00 | 0.00 |
| Gains V | Ń | л | <u>"</u> | | Л | , | Л | J | _1 | | |
| - | - | - | - | - | 1446.24 | 1383.18 | 1272.53 | \$ - | - | - | - |
| Fractio | n of mont | h for cool | ling | | л | , | Л | л | <u> </u> | Д | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Space I | heating k | Ŵh | <u>л</u> | JL | л | 1 | Д | J | _1 | N | |
| - | - | - | - | - | 17.67 | -53.41 | -50.87 | - | - | - | - |
| Space | cooling k | Ŵh | л | Л | J | J | Л | Л | | | |
| - | - | - | - | - | 301.59 | 383.33 | 308.34 | - | - | - | - |
| Total | | | Л | л | л | J | л | л | JL | | 993.27 |
| Cooled | fraction | | | | | | | | | | 1.00 |
| Intermit | ttency fac | tor | | 1 | 7 | 1 | 1 | 1 | | | |
| - | - | - | - | - | 0.25 | 0.25 | 0.25 | - | - | - | - |
| Space | cooling re | quireme | nt for mo | nth | | 2 | | 1 | -)r | | |
| - | - | - | - | - | 75.40 | 95.83 | 77.09 | - | - | - | - |
| Space of Spa | cooling (J cooling re | lune to A quireme | ugust) ntperm² | ^r (kWh/m | ²/year) | | | | | | 248.32 2.17 |

8f. Fabric Energy Efficiency

| | kWh/year | |
|-----------------------------------|----------|-------|
| Energy for space heating | 45.23 | (99) |
| Energy for space cooling | 2.17 | (108) |
| Total | 47.40 | (109) |
| Dwelling Fabric Energy Efficiency | 47.4 | (109) |

JPA Designer Version 6.01x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 36 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

Building type Semi-detached house

| Plotnumber | Plot 5 | | |
|------------|-------------------------------|---------|---------------------------------|
| Reference | | | |
| Date | 08/02/2016 | | |
| Client | Byatt Oliver | Project | New Dwelling Plot 5 As-Designed |
| | Unit 1B Whitebridge Way | | Victoria Court |
| | Whitebridge Industrial Estate | | May Bank |
| | Stone | | Brampron |
| | Staffordshire | | ST5 |
| | ST158LQ | | |
| Tel: | 01785719268 | | |
| Email: | david@byattoliver.co.uk | | |
| | | | |

1. Overall dwelling dimensions

| | Area | Av. Storey | Volume | |
|-----------------------------------|--------|------------|--------|------|
| | (m²) | height (m) | (m³) | |
| Ground floor (1) | 44.77 | 2.40 | 107.45 | (3a) |
| Firstfloor | 44.17 | 2.65 | 117.05 | (3b) |
| Second floor | 25.42 | 2.05 | 52.11 | (3c) |
| Total floor area | 114.36 | | | (4) |
| Dwelling volume (m ³) | | | 276.61 | (5) |

Page 37 of 45

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.

2. Ventilation rate

| | | | | | | | | | | | m³ per ho | our |
|-----------------------|--------------------------|-----------------------|-------------|------------|-----------|-----------|---------------------|--------|-----------|------|-----------|--------------|
| | | | | | | | main + s heating | eondai | ry + othe | ər | | |
| Number | rofchimr | neys | | | | | 0 + 0 + 0 | | x 40 | | 0.00 | (6a) |
| Number | rofopen | flues | | | | | 0 + 0 + 0 | | x 20 | | 0.00 | (6b) |
| Number | rofintern | nittent fa | ins | | | | 4 | | x 10 | | 40.00 | (7a) |
| Number | ofpassi | ve vents | | | | | 0 | | x 10 | | 0.00 | (7b) |
| Number | roffluele | ess gas fi | ires | | | | 0 | | x 40 | | 0.00 | (7c) |
| | | | | | | | | | | | Air chang | ges per hour |
| Infiltratio | on due to | o chimne | eys, fans | and flue | s | | | | | | 0.14 | (8) |
| Pressur | e test, re | esult q50 |) | | | | | | 5.00 | | | (17) |
| Air perm | neability | | | | | | | | | | 0.39 | (18) |
| Number | rofsides | on whic | h shelte | red | | | | | | | 2.00 | (19) |
| Shelter | factor | | | | | | | | | | 0.85 | (20) |
| Infiltratio | on rate in | corpora | ting shelt | ter factor | | | | | | | 0.34 | (21) |
| Infiltratio | on rate m | nodified f | for month | nly wind s | 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 | |
| Wind Fa | actor | | | | | | | | | | 52.50 | (22) |
| 1.27 | 1.25 | 1.23 | 1.10 | 1.08 | 0.95 | 0.95 | 0.93 | 1.00 | 1.08 | 1.13 | 1.18 | |
| | 1 | | | R | _, | | R | л | | | 13.13 | (22a) |
| Adjuste | d infiltrat | ion rate | (allowing | g for shel | ter and w | vind spee | ed) | | | | | |
| 0.43 | 0.42 | 0.41 | 0.37 | 0.36 | 0.32 | 0.32 | 0.31 | 0.34 | 0.36 | 0.38 | 0.39 | |
| | | | | | | | ų | | | д | 4.40 | (22b) |
| Ventilat Effective | ion : natu e air char | ural vent nge rate | ilation, ir | ntermitte | nt extrac | t fans | | | | | | |
| 0.59 | 0.59 | 0.58 | 0.57 | 0.57 | 0.55 | 0.55 | 0.55 | 0.56 | 0.57 | 0.57 | 0.58 | (25) |

Page 38 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

| 3. Heat losses | and heat los | ss paramete | r | | | | | |
|--------------------|-----------------|-------------|-------------------|--------------------|-------|-------------|---------|------|
| Element | Gross | Openings | Netarea | U-value | AxU | kappa-value | AxK | |
| | area, m² | m² | A, m ² | W/m ² K | W/K | kJ/m²K | kJ/K | () |
| Window - Double | e-glazed, | | 1.350 | 1.33 (1.40) | 1.79 | | | (27) |
| air-filled, low-E, | En=0.1, soft | | | | | | | |
| coat (West) | | | | | | | | |
| Data | | | | | 4 77 | | | (07) |
| Window-Double | e-glazed, | | 3.600 | 1.33 (1.40) | 4.77 | | | (27) |
| air-filled, low-E, | En=0.1, soft | | | | | | | |
| coat (vvest) | | | | | | | | |
| Data | | | 7 470 | 4 00 (4 40) | 0.00 | | | (07) |
| vvindow - Double | e-glazed, | | 7.470 | 1.33 (1.40) | 9.90 | | | (27) |
| air-iiled, low-E, | En=0.1, son | | | | | | | |
| Coal (East) | | | | | | | | |
| Window, Doubl | o alozod | | 2 200 | 1 22 (1 40) | 3 0 2 | | | (27) |
| air filled low E | En=0 1 coff | | 2.200 | 1.33 (1.40) | 3.02 | | | (27) |
| an-nneu, now-L, | LII-0.1, 50II | | | | | | | |
| Data | | | | | | | | |
| Half dazed doo | r_ | | 2 100 | 1 20 | 2 52 | | | (26) |
| Double-glazed | air-filled | | 2.100 | 1.20 | 2.02 | | | (20) |
| low-F En=0.1 | soft coat | | | | | | | |
| (East) | oon oour | | | | | | | |
| Data | | | | | | | | |
| Full glazed door | r- | | 8.400 | 1.40 | 11.76 | | | (26) |
| Double-glazed, | air-filled, | | | | | | | () |
| low-E, En=0.1, | soft coat | | | | | | | |
| (West) | | | | | | | | |
| Data | | | | | | | | |
| Pitched roofs in: | sulated betwe | en joists | 29.56 | 0.13 | 3.84 | 9.00 | 266.04 | (30) |
| Walls | | | 15.20 | 0.18 | 2.74 | 9.00 | 136.80 | (29) |
| Timber partitic | on to roofspace | Э | | | | | | |
| Walls | | | 1.53 | 0.18 | 0.28 | 9.00 | 13.77 | (29) |
| Dormer walls | | | | | | | | |
| Walls | | | 82.26 | 0.18 | 14.81 | 60.00 | 4935.60 | (29) |
| Groundfloors | | - | 44.77 | 0.13 | 5.82 | 80.00 | 3581.60 | (28) |
| Pitched roofs ins | sulated betwe | enrafters | 14.25 | 0.13 | 1.85 | 9.00 | 128.25 | (30) |
| Party wall | | | 55.14 | 0.00 | 0.00 | 70.00 | 3859.80 | |
| Internal wall | | | 141.52 | 0.00 | 0.00 | 9.00 | 12/3.68 | |
| Internal timber | partition | | 70.00 | 0.00 | 0.00 | 10.00 | 1074 40 | |
| | | | 70.80 | 0.00 | 0.00 | 10.00 | 1274.40 | |
| internalcelling | | | 70.80 | 0.00 | 0.00 | 9.00 | 031.20 | |

JPA Designer Version 6.01x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 39 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

| | 3. | Heat | losses | and | heat | loss | parameter |
|--|----|------|--------|-----|------|------|-----------|
|--|----|------|--------|-----|------|------|-----------|

| Element | | Gross area, m² | Ope m² | enings | Netarea A, m² | a U-\ W/ | /alue m²K | A x U W/K | ka kJ | ppa-valu /m²K | e AxK kJ/K | |
|-----------|------------|-------------------|-----------|----------|------------------|-------------|--------------|--------------|----------|------------------|---------------|--------|
| Total are | ea of exte | ernal elei | ments Si | gma A, r | n² | | | | | | 212.7 | 7 (31) |
| Thermal | l mass pa | arameter | , kJ/m²K | (user-sp | ecified T | MP) | | | | | 250.0 | 0 (33) |
| Effectof | thermal | bridges | | | | | | | | | 10.5 | 4 (36) |
| Total fat | oric heat | loss | | | | | | | | | 73.6 | 4 (37) |
| Ventilati | on heat l | loss calc | ulated m | onthly | | | | | | | | |
| 53.99 | 53.66 | 53.35 | 51.85 | 51.57 | 50.27 | 50.27 | 50.03 | 50.78 | 51.57 | 52.14 | 52.73 | (38) |
| Heattra | nsfer coe | efficient, | W/K | | A | A | | λ | λ | | | |
| 127.63 | 127.30 | 126.99 | 125.49 | 125.22 | 123.92 | 123.92 | 123.67 | 124.42 | 125.22 | 125.78 | 126.37 | |
| | A | | | | л | <i>x</i> | | <u>д</u> | <u>д</u> | R | 125.4 | 9 (39) |
| Heat los | s param | eter (HLF | P), W/m² | K | | | | | | | | |
| 1.12 | 1.11 | 1.11 | 1.10 | 1.09 | 1.08 | 1.08 | 1.08 | 1.09 | 1.09 | 1.10 | 1.11 | |

HLP (average) 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 |

JPA Designer Version 6.01 x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 40 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

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.

1.10 (40)

| 4. Wate | er heatin | g energ ancy N | y requir | ements | | | | | | | kWh/year 2 84 | (42 |
|--|--|------------------------------------|---------------------|-------------|----------|----------|--------|--------|--------|--------|------------------------------------|----------------------|
| Annual | average | hot wate | r usage ir | n litres pe | erday Vd | ,average | 9 | | | | 101.62 | (43 |
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | |
| Hot wat | er usage | in litres | per day f | or each r | nonth | я | | JL | 31 | | | |
| 111.78 | 107.71 | 103.65 | 99.58 | 95.52 | 91.46 | 91.46 | 95.52 | 99.58 | 103.65 | 107.71 | 111.78 | (44 |
| Energy | content o | of hot wa | ter used | | | | | | | | | |
| 165.76 | 144.98 | 149.61 | 130.43 | 125.15 | 108.00 | 100.07 | 114.84 | 116.21 | 135.43 | 147.83 | 160.53 | |
| Energy Distribu | content (a Ition loss | annual) | | | | | | | | | 1598.83 | (4 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (4 |
| Hot wat Volume Temper Energy Total ste | er cylinde factor ature fact lost from orage los | er loss fa or store (k\ s | ctor (kW Nh/day) | h/day) | | | | | | | 0.000 0.0000 0.0000 0.000 | (5 (5 (5 (5 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (5 |
| Net stor | rage loss | Л | Л | J | J | Л | J | JL | Л | Л | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (5 |
| Primary | / loss | я | Л | | | я | | | Л | | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (5 |
| Combi I | oss calcı | lated for | each mo | onth | | <u>д</u> | | х | л | | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (6 |
| Total he | eatrequir | ed for wa | ter heati | ng calcul | ated for | each mo | nth | | | | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (6 |
| Output | from wate | er heater | for each | month, k | wh/mor | nth | | | | | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (6 |
| Heatga | ins from | water he | ating, kV | /h/month | 1 | | | | | | 0.00 | (6 |
| 35.23 | 30.81 | 31.79 | 27.72 | 26.59 | 22.95 | 21.27 | 24.40 | 24.69 | 28.78 | 31.41 | 34.11 | (6 |

Page 41 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

5. Internal gains

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | | |
|----------------------|------------|------------|----------|---------|---------|---------|---------|---------|---------|---------|---------|--|--|--|
| Metabol | lic gains, | Watts | | | | A | | | | A | | | | |
| 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | 141.93 | | | |
| | | | | | | | | | | | | | | |
| 27.06 | 24.04 | 19.55 | 14.80 | 11.06 | 9.34 | 10.09 | 13.12 | 17.61 | 22.35 | 26.09 | 27.81 | | | |
| Appliances gains | | | | | | | | | | | | | | |
| 277.68 | 280.56 | 273.30 | 257.84 | 238.33 | 219.99 | 207.74 | 204.85 | 212.12 | 227.57 | 247.09 | 265.43 | | | |
| Cooking gains | | | | | | | | | | | | | | |
| 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | 37.19 | | | |
| Pumps a | 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 | | | |
| Lossese | e.g.evap | oration (r | negative | values) | | | | | | | | | | |
| -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | -113.54 | | | |
| Waterh | eating ga | ins | | | | | | | | | | | | |
| 47.35 | 45.85 | 42.73 | 38.49 | 35.75 | 31.87 | 28.58 | 32.80 | 34.30 | 38.68 | 43.63 | 45.85 | | | |
| Total internal gains | | | | | | | | | | | | | | |
| 417.66 | 416.02 | 401.15 | 376.71 | 350.71 | 326.78 | 311.99 | 316.35 | 329.60 | 354.19 | 382.39 | 404.67 | | | |

JPA Designer Version 6.01 x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 42 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

| Lightin | g calcul | ations | | | A | _ | | | | | l' | |
|---|------------|------------|-------------|------------|-----------|-----------|----------|-------|-------------------------|---------------|-------|--------|
| Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (East) | | | | 0.9 x 7.47 | | g 0.80 | | (| -F x Shac).70 x 0.8 | 1ing 3 3.1 | 2 | |
| Data Window - Double-glazed, air-filled, low-E, En=0.1, soft coat (South) Data | | | | 0.9 x 2.28 | | 0.80 | | (| 0.70 x 0.83 | | 95 | |
| 7. Mean internal temperatureTemperature during heating periods in the living area, Th1 (°C)21.00Heating system responsiveness1.00 | | | | | | | | | | | | |
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | |
| tau | | | | | | | | | | | | |
| 62.22 | 62.38 | 62.54 | 63.28 | 63.42 | 64.09 | 64.09 | 64.21 | 63.83 | 63.42 | 63.14 | 62.84 | |
| alpha | | | | | | | | | | | | |
| 5.15 | 5.16 | 5.17 | 5.22 | 5.23 | 5.27 | 5.27 | 5.28 | 5.26 | 5.23 | 5.21 | 5.19 | |
| Utilisation factor for gains for living area | | | | | | | | | | | | |
| 1.00 | 1.00 | 0.99 | 0.95 | 0.84 | 0.66 | 0.49 | 0.56 | 0.84 | 0.98 | 1.00 | 1.00 | (86) |
| Meanin | ternal ter | nperatur | e in living | area T1 | | | | | | | | |
| 19.71 | 19.89 | 20.19 | 20.56 | 20.84 | 20.97 | 20.99 | 20.99 | 20.89 | 20.49 | 20.03 | 19.69 | (87) |
| Temper | ature dur | ring heati | ing perio | ds in rest | ofdwelli | ng Th2 | | | | | | |
| 19.99 | 19.99 | 19.99 | 20.00 | 20.00 | 20.01 | 20.01 | 20.02 | 20.01 | 20.00 | 20.00 | 20.00 | (88) |
| Utilisatio | on factor | for gains | for rest o | ofdwellir | ig | | | | | | | |
| 1.00 | 1.00 | 0.98 | 0.93 | 0.79 | 0.57 | 0.39 | 0.45 | 0.76 | 0.97 | 1.00 | 1.00 | (89) |
| Mean in | ternal ter | nperatu | re in the r | estofdw | elling T2 | 2 | | | | | | |
| 18.81 | 18.99 | 19.29 | 19.65 | 19.90 | 20.00 | 20.01 | 20.01 | 19.95 | 19.59 | 19.13 | 18.79 | (90) |
| Living area fraction (20.91/114.36) 0.18 | | | | | | | | | | | | 8 (91) |
| Meanin | ternalter | nperatur | e (for the | whole d | welling) | | | | | | | |
| 18.97 | 19.16 | 19.45 | 19.82 | 20.07 | 20.18 | 20.19 | 20.19 | 20.12 | 19.76 | 19.30 | 18.95 | (92) |
| Apply ad | djustmen | t to the m | nean inte | rnal temp | perature | , where a | ppropria | ate | | | | |
| 18.97 | 19.16 | 19.45 | 19.82 | 20.07 | 20.18 | 20.19 | 20.19 | 20.12 | 19.76 | 19.30 | 18.95 | (93) |

Page 43 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

8. Space heating requirement

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | |
|---|---------|---------|---------|---------|--------|--------|--------|--------|---------|---------|---------|--------|
| Utilisation factor for gains | | | | | | | | | | | | |
| 1.00 | 1.00 | 0.98 | 0.93 | 0.80 | 0.59 | 0.41 | 0.47 | 0.77 | 0.97 | 1.00 | 1.00 | (94) |
| Useful gains | | | | | | | | | | | | |
| 574.29 | 710.31 | 856.01 | 968.02 | 918.06 | 670.75 | 442.77 | 464.13 | 670.84 | 679.88 | 574.61 | 535.00 | (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 | | | | | | | | | | | | |
| 1872.77 | 1814.73 | 1644.56 | 1370.37 | 1048.31 | 691.03 | 445.13 | 468.90 | 749.25 | 1146.71 | 1534.07 | 1864.12 | (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 | | | | | | | | | | | | |
| 966.07 | 742.17 | 586.68 | 289.69 | 96.91 | - | - | - | - | 347.33 | 690.81 | 988.87 | |
| Total space heating requirement per year (kWh/year) (October to May) | | | | | | | | | | | | 2 (98) |
| Space heating requirement per m ² (kWh/m ² /year) | | | | | | | | | | | 41.1 | 7 (99) |

Page 44 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP

8c. Space cooling requirement

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | |
|------------|-----------|------------|-----------------------|------------|---------|---------|---------|------|------|------|--------|------|
| Externa | Itempera | iturers | | | | | | | | | | |
| - | - | - | - | - | 14.60 | 16.60 | 16.40 | - | - | - | - | |
| Heat los | ss rate W | Î | | | | | | | λ. | | | |
| - | - | - | - | - | 1164.81 | 916.97 | 939.93 | - | - | - | - | (100 |
| Utilisatio | on factor | for loss | | | | A | | | R | | | |
| - | - | - | - | - | 0.92 | 0.96 | 0.94 | - | - | - | - | (101 |
| Useful l | oss W | | | | | | | | л | | | |
| - | - | - | - | - | 1067.30 | 878.69 | 881.63 | - | - | - | - | (102 |
| Internal | gains W | | 1 | 1 | | | | л | | | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 495.20 | 475.51 | 482.99 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Solar ga | ains W | A | | | | A | A | | л | | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 951.03 | 907.67 | 789.55 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Gains V | V | 31 | | | | e | | | J | | | |
| - | - | - | - | - | 1446.24 | 1383.18 | 1272.53 | - | - | - | - | (103 |
| Fraction | ofmontl | n for cool | ing | | | A | A | | л | | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | (103 |
| Spaceh | neating k | Wh | | | 31 | | | | J | 1 | | |
| - | - | - | - | - | 1311.94 | 1532.11 | 1511.82 | - | - | - | - | (98) |
| Space of | ooling k | Nh | | | | | | | л | | | |
| - | - | - | - | - | 272.83 | 375.34 | 290.83 | - | - | - | - | (104 |
| Total | 9L | 31 | | | 31 | a | | 31 | J | | 939.01 | (104 |
| Cooledf | fraction | | | | | | | | | | 1.00 | (105 |
| Intermit | tency fac | tor | 1 | 10 | 1 | | 10 | 1 | 1 | 10 | | |
| - | - | - | - | - | 0.25 | 0.25 | 0.25 | - | - | - | - | (106 |
| Spacec | oolingre | quireme | nt for mo | nth | | | 1 | 1 | 1 | 10 | | |
| - | - | - | - | - | 68.21 | 93.84 | 72.71 | - | - | - | - | |
| Space of | ooling (J | une to A | ugust) | /I-\A/I= / | 2/ | | | | | | 234.75 | (107 |
| Spaced | coolingre | quireme | nt per m ² | (KVVh/m | -/year) | | | | | | 2.05 | (108 |

8f. Fabric Energy Efficiency

| | kWh/year | |
|-------------------------------------|----------|-------|
| Energy for space heating | 41.17 | (99) |
| Energy for space cooling | 2.05 | (108) |
| Total | 43.23 | (109) |
| Target Fabric Energy Efficiency | 49.7 | (109) |
| = 43.2256 x 1.15, rounded to 1 d.p. | | |

JPA Designer Version 6.01x , SAP Version 9.92 Licensed to Laurence Jay Limited

Page 45 of 45

C:\Program Files\JPATL\JPA Designer 981\Brampton Road ADF Construction.JDP