



Energy Consultants,  
Architectural Design &  
Surveyors



## SAP Report Submission for Building Regulations Compliance

Client: Redmile Homes

Project: Plot 2 (Curbar) Goldthorpe Road  
Goldthorpe, Barnsley, S63 9

Contact: ESAP Energy Consultants Arch Des & Surv  
07909711677  
esapenquiry@gmail.com

Report Issue Date: 27/03/2022

# PREDICTED ENERGY ASSESSMENT

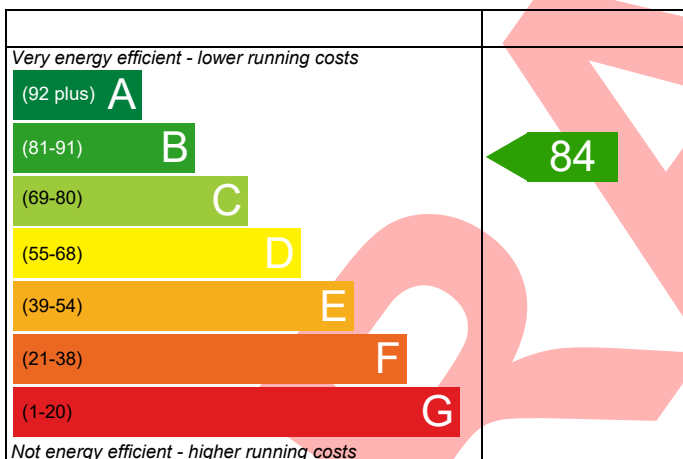
Goldthorpe Road,  
Goldthorpe,  
Barnsley,  
S63 9

Dwelling type: House, Semi-Detached  
Date of assessment: 27/03/2022  
Produced by: ESAP Energy Consultants Arch Des  
& Surv  
Total floor area: 79.26 m<sup>2</sup>

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

The energy performance has been assessed using the Government approved SAP2012 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO<sub>2</sub>) emissions.

## Energy Efficiency Rating

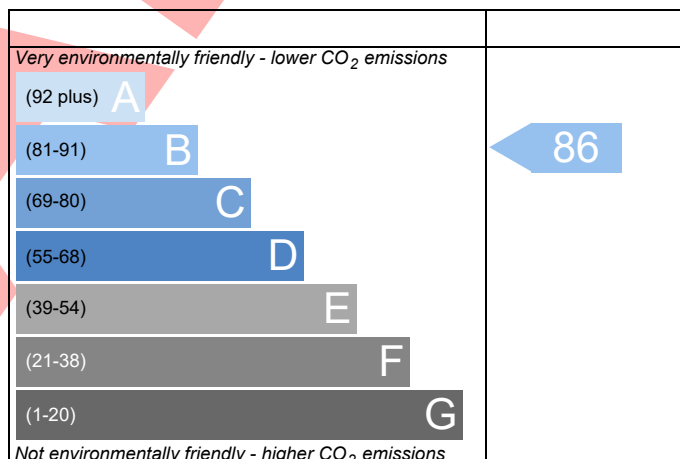


**England**

EU Directive  
2002/91/EC

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.

## Environmental Impact (CO<sub>2</sub>) Rating



**England**

EU Directive  
2002/91/EC

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO<sub>2</sub>) emissions. The higher the rating the less impact it has on the environment.

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

# BUILDING REGULATION COMPLIANCE

## Calculation Type: New Build (As Designed)

|                                    |                                                                                                     |                |                 |
|------------------------------------|-----------------------------------------------------------------------------------------------------|----------------|-----------------|
| Property Reference                 | 000592                                                                                              | Issued on Date | 27/03/2022      |
| Assessment Reference               | Plot 2 As Design                                                                                    | Prop Type Ref  | Plot 2 - Curbar |
| Property                           | Goldthorpe Road, Goldthorpe, Barnsley, S63 9                                                        |                |                 |
| SAP Rating                         | 84 B                                                                                                | DER            | 18.29           |
| Environmental                      | 86 B                                                                                                | TER            | 18.52           |
| CO <sub>2</sub> Emissions (t/year) | 1.25                                                                                                | % DER<TER      | 1.26            |
| General Requirements Compliance    | Pass                                                                                                | DLEE           | 46.69           |
|                                    |                                                                                                     | TLEE           | 52.45           |
|                                    |                                                                                                     | % DLEE<TLEE    | 10.98           |
| Assessor Details                   | Mr. Peter Edwards, ESAP Energy Consultants Arch Des & Surv, Tel: 01455883250, esapenquiry@gmail.com |                | Assessor ID     |
|                                    |                                                                                                     |                | H883-0001       |
| Client                             | Redmile Homes, Redmile Homes                                                                        |                |                 |

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

#### Criterion 1 – Achieving the TER and TLEE rate

##### 1a TER and DER

|                                             |                  |                                   |      |
|---------------------------------------------|------------------|-----------------------------------|------|
| Fuel for main heating                       | Mains gas        |                                   |      |
| Fuel factor                                 | 1.00 (mains gas) |                                   |      |
| Target Carbon Dioxide Emission Rate (TER)   | 18.52            | kgCO <sub>2</sub> /m <sup>2</sup> |      |
| Dwelling Carbon Dioxide Emission Rate (DER) | 18.29            | kgCO <sub>2</sub> /m <sup>2</sup> | Pass |
|                                             | -0.23 (-1.2%)    | kgCO <sub>2</sub> /m <sup>2</sup> |      |

##### 1b TLEE and DLEE

|                                          |               |                        |      |
|------------------------------------------|---------------|------------------------|------|
| Target Fabric Energy Efficiency (TLEE)   | 52.45         | kWh/m <sup>2</sup> /yr |      |
| Dwelling Fabric Energy Efficiency (DLEE) | 46.69         | kWh/m <sup>2</sup> /yr |      |
|                                          | -5.7 (-10.9%) | kWh/m <sup>2</sup> /yr | Pass |

#### Criterion 2 – Limits on design flexibility

##### Limiting Fabric Standards

##### 2 Fabric U-values

| Element       | Average          | Highest          |      |
|---------------|------------------|------------------|------|
| External wall | 0.27 (max. 0.30) | 0.27 (max. 0.70) | Pass |
| Party wall    | 0.00 (max. 0.20) | -                | Pass |
| Floor         | 0.14 (max. 0.25) | 0.14 (max. 0.70) | Pass |
| Roof          | 0.10 (max. 0.20) | 0.10 (max. 0.35) | Pass |
| Openings      | 1.40 (max. 2.00) | 1.40 (max. 3.30) | Pass |

##### 2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

##### 3 Air permeability

|                                |                     |                                             |      |
|--------------------------------|---------------------|---------------------------------------------|------|
| Air permeability at 50 pascals | 4.80 (design value) | m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa |      |
| Maximum                        | 10.0                | m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa | Pass |

##### Limiting System Efficiencies

##### 4 Heating efficiency

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

# BUILDING REGULATION COMPLIANCE

## Calculation Type: New Build (As Designed)

Main heating system

Boiler system with radiators or underfloor - Mains gas  
Data from database  
Vaillant ecoFIT sustain 825 VUW 256/6-3 (H-GB)  
Combi boiler  
Efficiency: 89.3% SEDBUK2009  
Minimum: 88.0%

Pass

Secondary heating system

None

### 5 Cylinder insulation

Hot water storage

No cylinder

### 6 Controls

Space heating controls

Programmer, room thermostat and TRVs

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

### 7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

### 8 Mechanical ventilation

Not applicable

## Criterion 3 – Limiting the effects of heat gains in summer

### 9 Summertime temperature

Overheating risk (East Pennines)

Not significant

Pass

Based on:

Overshading

Average

Windows facing East

7.25 m<sup>2</sup>, No overhang

Windows facing South

1.44 m<sup>2</sup>, No overhang

Windows facing West

4.06 m<sup>2</sup>, No overhang

Air change rate

4.00 ach

Blinds/curtains

None

## Criterion 4 – Building performance consistent with DER and DFEE rate

### Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/m<sup>2</sup>K

Pass

### Air permeability and pressure testing

#### 3 Air permeability

Air permeability at 50 pascals

4.80 (design value) m<sup>3</sup>/(h.m<sup>2</sup>) @ 50 Pa

Maximum

10.0 m<sup>3</sup>/(h.m<sup>2</sup>) @ 50 Pa

Pass

### 10 Key features

Party wall U-value

0.00

W/m<sup>2</sup>K

Roof U-value

0.10

W/m<sup>2</sup>K

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

# THERMAL BRIDGING

## Calculation Type: New Build (As Designed)

|                                    |                                                                                                     |                |                 |
|------------------------------------|-----------------------------------------------------------------------------------------------------|----------------|-----------------|
| Property Reference                 | 000592                                                                                              | Issued on Date | 27/03/2022      |
| Assessment Reference               | Plot 2 As Design                                                                                    | Prop Type Ref  | Plot 2 - Curbar |
| Property                           | Goldthorpe Road, Goldthorpe, Barnsley, S63 9                                                        |                |                 |
| SAP Rating                         | 84 B                                                                                                | DER            | 18.29           |
| Environmental                      | 86 B                                                                                                | TER            | 18.52           |
| CO <sub>2</sub> Emissions (t/year) | 1.25                                                                                                | % DER<TER      | 1.26            |
| General Requirements Compliance    | Pass                                                                                                | DFEE           | 46.69           |
|                                    |                                                                                                     | TFEE           | 52.45           |
|                                    |                                                                                                     | % DFEE<TFEE    | 10.98           |
| Assessor Details                   | Mr. Peter Edwards, ESAP Energy Consultants Arch Des & Surv, Tel: 01455883250, esapenquiry@gmail.com |                | Assessor ID     |
|                                    |                                                                                                     |                | H883-0001       |
| Client                             | Redmile Homes, Redmile Homes                                                                        |                |                 |

|               | Junction detail                                                  | Source Type            | Psi (W/mK) | Length (m) | Result | Reference |
|---------------|------------------------------------------------------------------|------------------------|------------|------------|--------|-----------|
| External wall | E1 Steel lintel with perforated steel base plate                 | Independently assessed | 0.030      | 10.68      | 0.32   |           |
| External wall | E3 Sill                                                          | Independently assessed | 0.015      | 9.66       | 0.14   |           |
| External wall | E4 Jamb                                                          | Independently assessed | 0.010      | 25.10      | 0.25   |           |
| External wall | E5 Ground floor (normal)                                         | Independently assessed | 0.056      | 18.67      | 1.05   |           |
| External wall | E6 Intermediate floor within a dwelling                          | Independently assessed | 0.001      | 17.66      | 0.02   |           |
| External wall | E10 Eaves (insulation at ceiling level)                          | Independently assessed | 0.101      | 10.74      | 1.08   |           |
| External wall | E12 Gable (insulation at ceiling level)                          | Independently assessed | 0.055      | 9.95       | 0.55   |           |
| External wall | E16 Corner (normal)                                              | Independently assessed | 0.059      | 12.42      | 0.73   |           |
| External wall | E17 Corner (inverted – internal area greater than external area) | Independently assessed | -0.100     | 2.40       | -0.24  |           |
| External wall | E18 Party wall between dwellings                                 | Independently assessed | 0.038      | 10.02      | 0.38   |           |
| Party wall    | P1 Party wall - Ground floor                                     | Table K1 - Default     | 0.160      | 8.95       | 1.43   |           |
| Party wall    | P2 Party wall - Intermediate floor within a dwelling             | Table K1 - Default     | 0.000      | 7.94       | 0.00   |           |
| Party wall    | P4 Party wall - Roof (insulation at ceiling level)               | Table K1 - Default     | 0.240      | 8.95       | 2.15   |           |

Total: **7.87** W/mK:  
Y-Value: **0.046** W/m²K:

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

|                                    |                                                                                                     |               |                 |                |            |
|------------------------------------|-----------------------------------------------------------------------------------------------------|---------------|-----------------|----------------|------------|
| Property Reference                 | 000592                                                                                              |               |                 | Issued on Date | 27/03/2022 |
| Assessment Reference               | Plot 2 As Design                                                                                    | Prop Type Ref | Plot 2 - Curbar |                |            |
| Property                           | Goldthorpe Road, Goldthorpe, Barnsley, S63 9                                                        |               |                 |                |            |
|                                    |                                                                                                     |               |                 |                |            |
| SAP Rating                         | 84 B                                                                                                | DER           | 18.29           | TER            | 18.52      |
| Environmental                      | 86 B                                                                                                | % DER<TER     | 1.26            |                |            |
| CO <sub>2</sub> Emissions (t/year) | 1.25                                                                                                | DFEE          | 46.69           | TFEE           | 52.45      |
| General Requirements Compliance    | Pass                                                                                                | % DFEE<TFEE   | 10.98           |                |            |
|                                    |                                                                                                     |               |                 |                |            |
| Assessor Details                   | Mr. Peter Edwards, ESAP Energy Consultants Arch Des & Surv, Tel: 01455883250, esapenquiry@gmail.com |               |                 | Assessor ID    | H883-0001  |
| Client                             | Redmile Homes, Redmile Homes                                                                        |               |                 |                |            |

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

#### DWELLING AS DESIGNED

Semi-Detached House, total floor area 79 m<sup>2</sup>

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

#### 1a TER and DER

Fuel for main heating: Mains gas  
Fuel factor: 1.00 (mains gas)  
Target Carbon Dioxide Emission Rate (TER) 18.52 kgCO<sub>2</sub>/m<sup>2</sup>  
Dwelling Carbon Dioxide Emission Rate (DER) 18.29 kgCO<sub>2</sub>/m<sup>2</sup> OK

#### 1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 52.4 kWh/m<sup>2</sup>/yr  
Dwelling Fabric Energy Efficiency (DFEE) 46.7 kWh/m<sup>2</sup>/yr OK

#### 2 Fabric U-values

| Element       | Average          | Highest          |    |
|---------------|------------------|------------------|----|
| External wall | 0.27 (max. 0.30) | 0.27 (max. 0.70) | OK |
| Party wall    | 0.00 (max. 0.20) | -                | OK |
| Floor         | 0.14 (max. 0.25) | 0.14 (max. 0.70) | OK |
| Roof          | 0.10 (max. 0.20) | 0.10 (max. 0.35) | OK |
| Openings      | 1.40 (max. 2.00) | 1.40 (max. 3.30) | OK |

#### 2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

#### 3 Air permeability

Air permeability at 50 pascals: 4.80 (design value)  
Maximum 10.0 OK

#### 4 Heating efficiency

Main heating system: Boiler system with radiators or underfloor - Mains gas  
Data from database  
Vaillant ecoFIT sustain 825 VUW 256/6-3 (H-GB)  
Combi boiler  
Efficiency: 89.3% SEDBUK2009  
Minimum: 88.0% OK

Secondary heating system: None

#### 5 Cylinder insulation

Hot water storage No cylinder

#### 6 Controls

Space heating controls: Programmer, room thermostat and TRVs OK

Hot water controls: No cylinder

Boiler interlock Yes OK

#### 7 Low energy lights

Percentage of fixed lights with low-energy fittings: 100%  
Minimum 75% OK

#### 8 Mechanical ventilation

Not applicable

#### 9 Summertime temperature

Overheating risk (East Pennines): Not significant OK  
Based on:  
Overshading: Average  
Windows facing East: 7.25 m<sup>2</sup>, No overhang  
Windows facing South: 1.44 m<sup>2</sup>, No overhang  
Windows facing West: 4.06 m<sup>2</sup>, No overhang  
Air change rate: 4.00 ach  
Blinds/curtains: None

#### 10 Key features

Party wall U-value 0.00 W/m<sup>2</sup>K  
Roof U-value 0.10 W/m<sup>2</sup>K

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)  
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

#### 1. Overall dwelling dimensions

|                                                        | Area<br>(m <sup>2</sup> ) | Storey height<br>(m)            | Volume<br>(m <sup>3</sup> ) |
|--------------------------------------------------------|---------------------------|---------------------------------|-----------------------------|
| Ground floor                                           | 40.6700 (1b)              | x 2.4000 (2b)                   | = 97.6080 (1b) - (3b)       |
| First floor                                            | 38.5900 (1c)              | x 2.6100 (2c)                   | = 100.7199 (1c) - (3c)      |
| Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n) | 79.2600                   |                                 | (4)                         |
| Dwelling volume                                        |                           | (3a)+(3b)+(3c)+(3d)+(3e)...(3n) | = 198.3279 (5)              |

#### 2. Ventilation rate

|                                                                           | main<br>heating | secondary<br>heating | other                       | total   | m <sup>3</sup> per hour |
|---------------------------------------------------------------------------|-----------------|----------------------|-----------------------------|---------|-------------------------|
| Number of chimneys                                                        | 0               | +                    | 0                           | =       | 0 * 40 = 0.0000 (6a)    |
| Number of open flues                                                      | 0               | +                    | 0                           | =       | 0 * 20 = 0.0000 (6b)    |
| Number of intermittent fans                                               |                 |                      |                             |         | 4 * 10 = 40.0000 (7a)   |
| Number of passive vents                                                   |                 |                      |                             |         | 0 * 10 = 0.0000 (7b)    |
| Number of flueless gas fires                                              |                 |                      |                             |         | 0 * 40 = 0.0000 (7c)    |
| Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = |                 |                      |                             | 40.0000 | Air changes per hour    |
| Pressure test                                                             |                 |                      |                             |         | (5) = 0.2017 (8)        |
| Measured/design AP50                                                      |                 |                      |                             |         | Yes                     |
| Infiltration rate                                                         |                 |                      |                             |         | 4.8000                  |
| Number of sides sheltered                                                 |                 |                      |                             |         | 0.4417 (18)             |
|                                                                           |                 |                      |                             |         | 2 (19)                  |
| Shelter factor                                                            |                 |                      | (20) = 1 - [0.075 x (19)] = |         | 0.8500 (20)             |
| Infiltration rate adjusted to include shelter factor                      |                 |                      | (21) = (18) x (20) =        |         | 0.3754 (21)             |

|                 | Jan    | Feb    | Mar    | Apr    | May    | Jun    | Jul    | Aug    | Sep    | Oct    | Nov    | Dec          |
|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------------|
| Wind speed      | 5.1000 | 5.0000 | 4.9000 | 4.4000 | 4.3000 | 3.8000 | 3.8000 | 3.7000 | 4.0000 | 4.3000 | 4.5000 | 4.7000 (22)  |
| Wind factor     | 1.2750 | 1.2500 | 1.2250 | 1.1000 | 1.0750 | 0.9500 | 0.9500 | 0.9250 | 1.0000 | 1.0750 | 1.1250 | 1.1750 (22a) |
| Adj infilt rate |        |        |        |        |        |        |        |        |        |        |        |              |
| Effective ac    | 0.4787 | 0.4693 | 0.4599 | 0.4130 | 0.4036 | 0.3567 | 0.3567 | 0.3473 | 0.3754 | 0.4036 | 0.4224 | 0.4411 (22b) |
|                 | 0.6146 | 0.6101 | 0.6058 | 0.5853 | 0.5814 | 0.5636 | 0.5636 | 0.5603 | 0.5705 | 0.5814 | 0.5892 | 0.5973 (25)  |

#### 3. Heat losses and heat loss parameter

| Element                                                     | Gross<br>m <sup>2</sup> | Openings<br>m <sup>2</sup> | NetArea<br>m <sup>2</sup> | U-value<br>W/m <sup>2</sup> K | A x U<br>W/K | K-value<br>kJ/m <sup>2</sup> K | A x K<br>kJ/K   |
|-------------------------------------------------------------|-------------------------|----------------------------|---------------------------|-------------------------------|--------------|--------------------------------|-----------------|
| Entrance Door                                               |                         |                            | 2.1500                    | 1.4000                        | 3.0100       |                                | (26a)           |
| Windows (Uw = 1.40)                                         |                         |                            | 7.5300                    | 1.3258                        | 9.9830       |                                | (27)            |
| Patio Doors (Uw = 1.40)                                     |                         |                            | 5.2200                    | 1.3258                        | 6.9205       |                                | (27)            |
| Main Floor                                                  |                         |                            | 40.6700                   | 0.1400                        | 5.6938       | 75.0000                        | 3050.2500 (28a) |
| Main Wall                                                   | 90.9000                 | 14.9000                    | 76.0000                   | 0.2700                        | 20.5200      | 60.0000                        | 4560.0000 (29a) |
| Main Roof                                                   | 40.6700                 |                            | 40.6700                   | 0.1000                        | 4.0670       | 9.0000                         | 366.0300 (30)   |
| Total net area of external elements Aum(A, m <sup>2</sup> ) |                         |                            | 172.2400                  |                               |              |                                | (31)            |
| Fabric heat loss, W/K = Sum (A x U)                         |                         |                            | (26)...(30) + (32) =      | 50.1942                       |              |                                | (33)            |
| Party Wall                                                  |                         |                            | 42.2000                   | 0.0000                        | 0.0000       | 110.0000                       | 4642.0000 (32)  |
| Block Walls                                                 |                         |                            | 23.1500                   |                               |              | 75.0000                        | 1736.2500 (32c) |
| Stud Walls                                                  |                         |                            | 142.2300                  |                               |              | 9.0000                         | 1280.0700 (32c) |
| First Floor                                                 |                         |                            | 38.5900                   |                               |              | 18.0000                        | 694.6200 (32d)  |
| Ground Floor Ceiling                                        |                         |                            | 38.5900                   |                               |              | 18.0000                        | 694.6200 (32e)  |

Heat capacity Cm = Sum(A x k)  
Thermal mass parameter (TMP = Cm / TFA) in kJ/m<sup>2</sup>K  
Thermal bridges (Sum(L x Psi) calculated using Appendix K)  
Total fabric heat loss  
(28)...(30) + (32) + (32a)...(32e) = 17023.8400 (34)  
214.7848 (35)  
7.8650 (36)  
(33) + (36) = 58.0592 (37)

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

|                           | Jan     | Feb     | Mar     | Apr     | May     | Jun     | Jul     | Aug     | Sep     | Oct     | Nov     | Dec          |
|---------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------------|
| (38)m                     | 40.2222 | 39.9311 | 39.6457 | 38.3052 | 38.0544 | 36.8869 | 36.8869 | 36.6706 | 37.3366 | 38.0544 | 38.5618 | 39.0922 (38) |
| Heat transfer coeff       | 98.2815 | 97.9903 | 97.7049 | 96.3644 | 96.1136 | 94.9461 | 94.9461 | 94.7299 | 95.3958 | 96.1136 | 96.6210 | 97.1514 (39) |
| Average = Sum(39)m / 12 = |         |         |         |         |         |         |         |         |         |         |         | 96.3632 (39) |

|               | Jan    | Feb    | Mar    | Apr    | May    | Jun    | Jul    | Aug    | Sep    | Oct    | Nov    | Dec         |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|
| HLP           | 1.2400 | 1.2363 | 1.2327 | 1.2158 | 1.2126 | 1.1979 | 1.1979 | 1.1952 | 1.2036 | 1.2126 | 1.2190 | 1.2257 (40) |
| HLP (average) |        |        |        |        |        |        |        |        |        |        |        | 1.2158 (40) |
| Days in month | 31     | 28     | 31     | 30     | 31     | 30     | 31     | 31     | 30     | 31     | 30     | 31 (41)     |

#### 4. Water heating energy requirements (kWh/year)

Assumed occupancy  
Average daily hot water use (litres/day)  
2.4487 (42)  
92.3559 (43)

|                     | Jan      | Feb      | Mar      | Apr      | May      | Jun     | Jul     | Aug      | Sep      | Oct      | Nov      | Dec           |
|---------------------|----------|----------|----------|----------|----------|---------|---------|----------|----------|----------|----------|---------------|
| Daily hot water use | 101.5915 | 97.8973  | 94.2030  | 90.5088  | 86.8146  | 83.1203 | 83.1203 | 86.8146  | 90.5088  | 94.2030  | 97.8973  | 101.5915 (44) |
| Energy conte        | 150.6573 | 131.7658 | 135.9705 | 118.5424 | 113.7442 | 98.1526 | 90.9528 | 104.3697 | 105.6162 | 123.0855 | 134.3575 | 145.9035 (45) |

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

|                                                                 |          |          |          |          |         |         |          |          |          |          |          |                                   |
|-----------------------------------------------------------------|----------|----------|----------|----------|---------|---------|----------|----------|----------|----------|----------|-----------------------------------|
| Energy content (annual)                                         |          |          |          |          |         |         |          |          |          |          |          | Total = Sum(45)m = 1453.1182 (45) |
| Distribution loss (46)m = 0.15 x (45)m                          |          |          |          |          |         |         |          |          |          |          |          |                                   |
| 22.5986                                                         | 19.7649  | 20.3956  | 17.7814  | 17.0616  | 14.7229 | 13.6429 | 15.6555  | 15.8424  | 18.4628  | 20.1536  | 21.8855  | (46)                              |
| Water storage loss:                                             |          |          |          |          |         |         |          |          |          |          |          |                                   |
| Total storage loss                                              |          |          |          |          |         |         |          |          |          |          |          |                                   |
| 0.0000                                                          | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000  | 0.0000  | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | (56)                              |
| If cylinder contains dedicated solar storage                    |          |          |          |          |         |         |          |          |          |          |          |                                   |
| 0.0000                                                          | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000  | 0.0000  | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | (57)                              |
| Combi loss                                                      | 1.7116   | 1.4834   | 1.4730   | 1.2338   | 1.1356  | 0.9382  | 0.8694   | 1.0420   | 1.0993   | 1.3334   | 1.5126   | (61)                              |
| Total heat required for water heating calculated for each month |          |          |          |          |         |         |          |          |          |          |          |                                   |
| 152.3689                                                        | 133.2493 | 137.4435 | 119.7762 | 114.8798 | 99.0909 | 91.8223 | 105.4117 | 106.7155 | 124.4190 | 135.8701 | 147.5611 | (62)                              |
| Solar input                                                     | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000  | 0.0000  | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | (63)                              |
| Solar input (sum of months) = Sum(63)m =                        |          |          |          |          |         |         |          |          |          |          |          | 0.0000 (63)                       |
| Output from w/h                                                 |          |          |          |          |         |         |          |          |          |          |          |                                   |
| 152.3689                                                        | 133.2493 | 137.4435 | 119.7762 | 114.8798 | 99.0909 | 91.8223 | 105.4117 | 106.7155 | 124.4190 | 135.8701 | 147.5611 | (64)                              |
| Heat gains from water heating, kWh/month                        |          |          |          |          |         |         |          |          |          |          |          |                                   |
| 50.5214                                                         | 44.1830  | 45.5785  | 39.7238  | 38.1039  | 32.8703 | 30.4592 | 34.9634  | 35.3922  | 41.2593  | 45.0520  | 48.9273  | (65)                              |

#### 5. Internal gains (see Table 5 and 5a)

|                                                                                     |          |          |          |          |          |          |          |          |          |          |          |               |
|-------------------------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|---------------|
| Metabolic gains (Table 5), Watts                                                    |          |          |          |          |          |          |          |          |          |          |          |               |
| (66)m                                                                               | Jan      | Feb      | Mar      | Apr      | May      | Jun      | Jul      | Aug      | Sep      | Oct      | Nov      | Dec           |
| 122.4335                                                                            | 122.4335 | 122.4335 | 122.4335 | 122.4335 | 122.4335 | 122.4335 | 122.4335 | 122.4335 | 122.4335 | 122.4335 | 122.4335 | (66)          |
| Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5     |          |          |          |          |          |          |          |          |          |          |          |               |
| 20.2441                                                                             | 17.9806  | 14.6228  | 11.0704  | 8.2753   | 6.9863   | 7.5490   | 9.8124   | 13.1702  | 16.7226  | 19.5178  | 20.8067  | (67)          |
| Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 |          |          |          |          |          |          |          |          |          |          |          |               |
| 217.8870                                                                            | 220.1480 | 214.4504 | 202.3208 | 187.0095 | 172.6190 | 163.0052 | 160.7442 | 166.4418 | 178.5714 | 193.8827 | 208.2732 | (68)          |
| Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5    |          |          |          |          |          |          |          |          |          |          |          |               |
| 35.2434                                                                             | 35.2434  | 35.2434  | 35.2434  | 35.2434  | 35.2434  | 35.2434  | 35.2434  | 35.2434  | 35.2434  | 35.2434  | 35.2434  | (69)          |
| Pumps, fans                                                                         | 3.0000   | 3.0000   | 3.0000   | 3.0000   | 3.0000   | 3.0000   | 3.0000   | 3.0000   | 3.0000   | 3.0000   | 3.0000   | (70)          |
| Losses e.g. evaporation (negative values) (Table 5)                                 |          |          |          |          |          |          |          |          |          |          |          |               |
| -97.9468                                                                            | -97.9468 | -97.9468 | -97.9468 | -97.9468 | -97.9468 | -97.9468 | -97.9468 | -97.9468 | -97.9468 | -97.9468 | -97.9468 | (71)          |
| Water heating gains (Table 5)                                                       |          |          |          |          |          |          |          |          |          |          |          |               |
| 67.9052                                                                             | 65.7485  | 61.2614  | 55.1720  | 51.2149  | 45.6532  | 40.9397  | 46.9939  | 49.1559  | 55.4560  | 62.5722  | 65.7625  | (72)          |
| Total internal gains                                                                | 368.7663 | 366.6071 | 353.0646 | 331.2932 | 309.2296 | 287.9885 | 274.2240 | 280.2806 | 291.4980 | 313.4801 | 338.7028 | 357.5725 (73) |

#### 6. Solar gains

| [Jan]       |          |          | Area<br>m2 |          | Solar flux<br>Table 6a<br>W/m2 |          | g<br>Specific data<br>or Table 6b |          | FF<br>Specific data<br>or Table 6c |          | Access<br>factor<br>Table 6d |  | Gains<br>W    |
|-------------|----------|----------|------------|----------|--------------------------------|----------|-----------------------------------|----------|------------------------------------|----------|------------------------------|--|---------------|
| East        |          |          | 2.0300     |          | 19.6403                        |          | 0.7600                            |          | 0.7000                             |          | 0.7700                       |  | 14.6990 (76)  |
| South       |          |          | 1.4400     |          | 46.7521                        |          | 0.7600                            |          | 0.7000                             |          | 0.7700                       |  | 24.8204 (78)  |
| West        |          |          | 4.0600     |          | 19.6403                        |          | 0.7600                            |          | 0.7000                             |          | 0.7700                       |  | 29.3980 (80)  |
| East        |          |          | 5.2200     |          | 19.6403                        |          | 0.7600                            |          | 0.7000                             |          | 0.7700                       |  | 37.7975 (76)  |
|             |          |          |            |          |                                |          |                                   |          |                                    |          |                              |  |               |
| Solar gains | 106.7149 | 200.8524 | 315.6117   | 443.3054 | 532.5499                       | 541.4203 | 516.9227                          | 450.4601 | 360.9374                           | 233.9385 | 131.5334                     |  | 88.7931 (83)  |
| Total gains | 475.4811 | 567.4595 | 668.6762   | 774.5986 | 841.7795                       | 829.4089 | 791.1466                          | 730.7407 | 652.4354                           | 547.4186 | 470.2362                     |  | 446.3657 (84) |

#### 7. Mean internal temperature (heating season)

|                                                                             |         |         |         |         |         |         |         |         |         |         |         |              |
|-----------------------------------------------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------------|
| Temperature during heating periods in the living area from Table 9, Th1 (C) |         |         |         |         |         |         |         |         |         |         |         | 21.0000 (85) |
| Utilisation factor for gains for living area, nil,m (see Table 9a)          |         |         |         |         |         |         |         |         |         |         |         |              |
| Jan                                                                         | Feb     | Mar     | Apr     | May     | Jun     | Jul     | Aug     | Sep     | Oct     | Nov     | Dec     |              |
| tau                                                                         | 48.1153 | 48.2583 | 48.3993 | 49.0725 | 49.2006 | 49.8056 | 49.8056 | 49.9193 | 49.5708 | 49.2006 | 48.9422 | 48.6750      |
| alpha                                                                       | 4.2077  | 4.2172  | 4.2266  | 4.2715  | 4.2800  | 4.3204  | 4.3204  | 4.3280  | 4.3047  | 4.2800  | 4.2628  | 4.2450       |
| util living area                                                            | 0.9961  | 0.9914  | 0.9775  | 0.9338  | 0.8341  | 0.6695  | 0.5117  | 0.5689  | 0.8151  | 0.9641  | 0.9926  | 0.9970 (86)  |
| MIT                                                                         | 19.4712 | 19.6700 | 19.9994 | 20.4176 | 20.7476 | 20.9308 | 20.9829 | 20.9735 | 20.8332 | 20.3789 | 19.8479 | 19.4413 (87) |
| Th 2                                                                        | 19.8881 | 19.8911 | 19.8939 | 19.9074 | 19.9099 | 19.9217 | 19.9217 | 19.9239 | 19.9171 | 19.9099 | 19.9048 | 19.8995 (88) |
| util rest of house                                                          | 0.9950  | 0.9888  | 0.9705  | 0.9130  | 0.7835  | 0.5791  | 0.3941  | 0.4483  | 0.7407  | 0.9488  | 0.9899  | 0.9962 (89)  |
| MIT 2                                                                       | 18.5017 | 18.7016 | 19.0289 | 19.4423 | 19.7394 | 19.8887 | 19.9169 | 19.9157 | 19.8226 | 19.4157 | 18.8901 | 18.4807 (90) |
| Living area fraction                                                        |         |         |         |         |         |         |         |         |         |         |         |              |
| MIT                                                                         | 18.7038 | 18.9034 | 19.2312 | 19.6455 | 19.9495 | 20.1059 | 20.1391 | 20.1361 | 20.0332 | 19.6164 | 19.0898 | 18.6809 (92) |
| Temperature adjustment                                                      |         |         |         |         |         |         |         |         |         |         |         | 0.0000       |
| adjusted MIT                                                                | 18.7038 | 18.9034 | 19.2312 | 19.6455 | 19.9495 | 20.1059 | 20.1391 | 20.1361 | 20.0332 | 19.6164 | 19.0898 | 18.6809 (93) |

#### 8. Space heating requirement

|                      | Jan       | Feb       | Mar       | Apr       | May      | Jun      | Jul      | Aug      | Sep      | Oct      | Nov       | Dec          |         |      |
|----------------------|-----------|-----------|-----------|-----------|----------|----------|----------|----------|----------|----------|-----------|--------------|---------|------|
| Utilisation          | 0.9932    | 0.9857    | 0.9651    | 0.9069    | 0.7856   | 0.5956   | 0.4186   | 0.4733   | 0.7498   | 0.9434   | 0.9872    | 0.9948       | (94)    |      |
| Useful gains         | 472.2661  | 559.3443  | 645.3323  | 702.5144  | 661.2993 | 493.9855 | 331.1928 | 345.8370 | 489.1890 | 516.4525 | 464.1997  | 444.0288     | (95)    |      |
| Ext temp.            | 4.3000    | 4.9000    | 6.5000    | 8.9000    | 11.7000  | 14.6000  | 16.6000  | 16.4000  | 14.1000  | 10.6000  | 7.1000    | 4.2000       | (96)    |      |
| Heat loss rate W     | 1415.6276 | 1372.1986 | 1243.9015 | 1035.4881 | 792.8911 | 522.7628 | 336.0250 | 353.9249 | 566.0046 | 866.6009 | 1158.4625 | 1406.8389    | (97)    |      |
| Month fracti         | 1.0000    | 1.0000    | 1.0000    | 1.0000    | 1.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 1.0000   | 1.0000    | 1.0000       | (97a)   |      |
| Space heating kWh    | 701.8610  | 546.2381  | 445.3355  | 239.7410  | 97.9043  | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 260.5104 | 499.8692  | 716.3307     | (98)    |      |
| Space heating        |           |           |           |           |          |          |          |          |          |          |           | 3507.7902    | (98)    |      |
| Space heating per m2 |           |           |           |           |          |          |          |          |          |          |           | (98) / (4) = | 44.2568 | (99) |

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

8c. Space cooling requirement

Not applicable

#### 9a. Energy requirements - Individual heating systems, including micro-CHP

|                                                                       |          |          |          |          |          |          |          |          |          |          |          |           |                 |
|-----------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------------|
| Fraction of space heat from secondary/supplementary system (Table 11) |          |          |          |          |          |          |          |          |          |          |          |           | 0.0000 (201)    |
| Fraction of space heat from main system(s)                            |          |          |          |          |          |          |          |          |          |          |          |           | 1.0000 (202)    |
| Efficiency of main space heating system 1 (in %)                      |          |          |          |          |          |          |          |          |          |          |          |           | 90.2000 (206)   |
| Efficiency of secondary/supplementary heating system, %               |          |          |          |          |          |          |          |          |          |          |          |           | 0.0000 (208)    |
| Space heating requirement                                             |          |          |          |          |          |          |          |          |          |          |          |           | 3888.9027 (211) |
|                                                                       | Jan      | Feb      | Mar      | Apr      | May      | Jun      | Jul      | Aug      | Sep      | Oct      | Nov      | Dec       |                 |
| Space heating requirement                                             | 701.8610 | 546.2381 | 445.3355 | 239.7410 | 97.9043  | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 260.5104 | 499.8692 | 716.3307  | (98)            |
| Space heating efficiency (main heating system 1)                      | 90.2000  | 90.2000  | 90.2000  | 90.2000  | 90.2000  | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 90.2000  | 90.2000  | 90.2000   | (210)           |
| Space heating fuel (main heating system)                              | 778.1164 | 605.5855 | 493.7201 | 265.7883 | 108.5413 | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 288.8142 | 554.1787 | 794.1582  | (211)           |
| Water heating requirement                                             | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000    | (215)           |
| Water heating requirement                                             | 152.3689 | 133.2493 | 137.4435 | 119.7762 | 114.8798 | 99.0909  | 91.8223  | 105.4117 | 106.7155 | 124.4190 | 135.8701 | 147.5611  | (64)            |
| Efficiency of water heater (217)m                                     | 87.0531  | 86.7522  | 86.0854  | 84.4949  | 81.3039  | 75.0000  | 75.0000  | 75.0000  | 75.0000  | 84.6545  | 86.4553  | 75.0000   | (216)           |
| Fuel for water heating, kWh/month                                     | 175.0299 | 153.5976 | 159.6596 | 141.7556 | 141.2968 | 132.1212 | 122.4297 | 140.5490 | 142.2874 | 146.9726 | 157.1565 | 169.2564  | (219)           |
| Water heating fuel used                                               |          |          |          |          |          |          |          |          |          |          |          | 1782.1122 | (219)           |
| Annual totals kWh/year                                                |          |          |          |          |          |          |          |          |          |          |          |           |                 |
| Space heating fuel - main system                                      |          |          |          |          |          |          |          |          |          |          |          | 3888.9027 | (211)           |
| Space heating fuel - secondary                                        |          |          |          |          |          |          |          |          |          |          |          | 0.0000    | (215)           |
| Electricity for pumps and fans:                                       |          |          |          |          |          |          |          |          |          |          |          |           |                 |
| central heating pump                                                  |          |          |          |          |          |          |          |          |          |          |          | 30.0000   | (230c)          |
| main heating flue fan                                                 |          |          |          |          |          |          |          |          |          |          |          | 45.0000   | (230e)          |
| Total electricity for the above, kWh/year                             |          |          |          |          |          |          |          |          |          |          |          | 75.0000   | (231)           |
| Electricity for lighting (calculated in Appendix L)                   |          |          |          |          |          |          |          |          |          |          |          | 357.5164  | (232)           |
| Total delivered energy for all uses                                   |          |          |          |          |          |          |          |          |          |          |          | 6103.5312 | (238)           |

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

|                                             | Energy<br>kWh/year | Emission factor<br>kg CO2/kWh | Emissions<br>kg CO2/year |       |
|---------------------------------------------|--------------------|-------------------------------|--------------------------|-------|
| Space heating - main system 1               | 3888.9027          | 0.2160                        | 840.0030                 | (261) |
| Space heating - secondary                   | 0.0000             | 0.0000                        | 0.0000                   | (263) |
| Water heating (other fuel)                  | 1782.1122          | 0.2160                        | 384.9362                 | (264) |
| Space and water heating                     |                    |                               | 1224.9392                | (265) |
| Pumps and fans                              | 75.0000            | 0.5190                        | 38.9250                  | (267) |
| Energy for lighting                         | 357.5164           | 0.5190                        | 185.5510                 | (268) |
| Total CO2, kg/year                          |                    |                               | 1449.4152                | (272) |
| Dwelling Carbon Dioxide Emission Rate (DER) |                    |                               | 18.2900                  | (273) |

#### 16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

|                                                                                 |     |         |     |
|---------------------------------------------------------------------------------|-----|---------|-----|
| DER                                                                             |     | 18.2900 | ZC1 |
| Total Floor Area                                                                | TFA | 79.2600 |     |
| Assumed number of occupants                                                     | N   | 2.4487  |     |
| CO2 emission factor in Table 12 for electricity displaced from grid             | EF  | 0.5190  |     |
| CO2 emissions from appliances, equation (L14)                                   |     | 16.2901 | ZC2 |
| CO2 emissions from cooking, equation (L16)                                      |     | 2.2428  | ZC3 |
| Total CO2 emissions                                                             |     | 36.8229 | ZC4 |
| Residual CO2 emissions offset from biofuel CHP                                  |     | 0.0000  | ZC5 |
| Additional allowable electricity generation, kWh/m²/year                        |     | 0.0000  | ZC6 |
| Resulting CO2 emissions offset from additional allowable electricity generation |     | 0.0000  | ZC7 |
| Net CO2 emissions                                                               |     | 36.8229 | ZC8 |

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)  
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

#### 1. Overall dwelling dimensions

|                                                        | Area<br>(m <sup>2</sup> ) | Storey height<br>(m)            | Volume<br>(m <sup>3</sup> ) |
|--------------------------------------------------------|---------------------------|---------------------------------|-----------------------------|
| Ground floor                                           | 40.6700 (1b)              | x 2.4000 (2b)                   | = 97.6080 (1b) - (3b)       |
| First floor                                            | 38.5900 (1c)              | x 2.6100 (2c)                   | = 100.7199 (1c) - (3c)      |
| Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n) | 79.2600                   |                                 | (4)                         |
| Dwelling volume                                        |                           | (3a)+(3b)+(3c)+(3d)+(3e)...(3n) | = 198.3279 (5)              |

#### 2. Ventilation rate

|                                                                         | main<br>heating | secondary<br>heating | other | total                       | m <sup>3</sup> per hour    |
|-------------------------------------------------------------------------|-----------------|----------------------|-------|-----------------------------|----------------------------|
| Number of chimneys                                                      | 0               | +                    | 0     | =                           | 0 * 40 = 0.0000 (6a)       |
| Number of open flues                                                    | 0               | +                    | 0     | =                           | 0 * 20 = 0.0000 (6b)       |
| Number of intermittent fans                                             |                 |                      |       |                             | 3 * 10 = 30.0000 (7a)      |
| Number of passive vents                                                 |                 |                      |       |                             | 0 * 10 = 0.0000 (7b)       |
| Number of flueless gas fires                                            |                 |                      |       |                             | 0 * 40 = 0.0000 (7c)       |
| Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) |                 |                      |       |                             | 30.0000 / (5) = 0.1513 (8) |
| Pressure test                                                           |                 |                      |       |                             | Yes                        |
| Measured/design AP50                                                    |                 |                      |       |                             | 5.0000                     |
| Infiltration rate                                                       |                 |                      |       |                             | 0.4013 (18)                |
| Number of sides sheltered                                               |                 |                      |       |                             | 2 (19)                     |
| Shelter factor                                                          |                 |                      |       | (20) = 1 - [0.075 x (19)] = | 0.8500 (20)                |
| Infiltration rate adjusted to include shelter factor                    |                 |                      |       | (21) = (18) x (20) =        | 0.3411 (21)                |

|                 | Jan    | Feb    | Mar    | Apr    | May    | Jun    | Jul    | Aug    | Sep    | Oct    | Nov    | Dec          |
|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------------|
| Wind speed      | 5.1000 | 5.0000 | 4.9000 | 4.4000 | 4.3000 | 3.8000 | 3.8000 | 3.7000 | 4.0000 | 4.3000 | 4.5000 | 4.7000 (22)  |
| Wind factor     | 1.2750 | 1.2500 | 1.2250 | 1.1000 | 1.0750 | 0.9500 | 0.9500 | 0.9250 | 1.0000 | 1.0750 | 1.1250 | 1.1750 (22a) |
| Adj infilt rate | 0.4349 | 0.4263 | 0.4178 | 0.3752 | 0.3667 | 0.3240 | 0.3240 | 0.3155 | 0.3411 | 0.3667 | 0.3837 | 0.4008 (22b) |
| Effective ac    | 0.5946 | 0.5909 | 0.5873 | 0.5704 | 0.5672 | 0.5525 | 0.5525 | 0.5498 | 0.5582 | 0.5672 | 0.5736 | 0.5803 (25)  |

#### 3. Heat losses and heat loss parameter

| Element                                                        | Gross<br>m <sup>2</sup> | Openings<br>m <sup>2</sup> | NetArea<br>m <sup>2</sup> | U-value<br>W/m <sup>2</sup> K | A x U<br>W/K | K-value<br>kJ/m <sup>2</sup> K | A x K<br>kJ/K |
|----------------------------------------------------------------|-------------------------|----------------------------|---------------------------|-------------------------------|--------------|--------------------------------|---------------|
| TER Semi-glazed door                                           |                         |                            | 2.1500                    | 1.2000                        | 2.5800       |                                | (26a)         |
| TER Opening Type (Uw = 1.40)                                   |                         |                            | 12.7500                   | 1.3258                        | 16.9034      |                                | (27)          |
| Main Floor                                                     |                         |                            | 40.6700                   | 0.1300                        | 5.2871       |                                | (28a)         |
| Main Wall                                                      | 90.9000                 | 14.9000                    | 76.0000                   | 0.1800                        | 13.6800      |                                | (29a)         |
| Main Roof                                                      | 40.6700                 |                            | 40.6700                   | 0.1300                        | 5.2871       |                                | (30)          |
| Total net area of external elements Aum(A, m <sup>2</sup> )    |                         |                            | 172.2400                  |                               |              |                                | (31)          |
| Fabric heat loss, W/K = Sum (A x U)                            |                         |                            |                           | (26)...(30) + (32) =          | 43.7376      |                                | (33)          |
| Thermal mass parameter (TMP = Cm / TFA) in kJ/m <sup>2</sup> K |                         |                            |                           |                               |              |                                | 250.0000 (35) |
| Thermal bridges (Sum(L x Psi) calculated using Appendix K)     |                         |                            |                           |                               |              |                                | 9.7936 (36)   |
| Total fabric heat loss                                         |                         |                            |                           |                               |              | (33) + (36) =                  | 53.5312 (37)  |

| Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5) | Jan     | Feb     | Mar     | Apr     | May     | Jun     | Jul     | Aug     | Sep     | Oct     | Nov     | Dec          |
|---------------------------------------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------------|
| (38)m                                                               | 38.9126 | 38.6723 | 38.4368 | 37.3304 | 37.1234 | 36.1598 | 36.1598 | 35.9814 | 36.5310 | 37.1234 | 37.5422 | 37.9800 (38) |
| Heat transfer coeff                                                 | 92.4438 | 92.2035 | 91.9680 | 90.8616 | 90.6546 | 89.6910 | 89.6910 | 89.5126 | 90.0622 | 90.6546 | 91.0734 | 91.5112 (39) |
| Average = Sum(39)m / 12 =                                           |         |         |         |         |         |         |         |         |         |         |         | 90.8606 (39) |
| HLP                                                                 | 1.1663  | 1.1633  | 1.1603  | 1.1464  | 1.1438  | 1.1316  | 1.1316  | 1.1294  | 1.1363  | 1.1438  | 1.1490  | 1.1546 (40)  |
| HLP (average)                                                       |         |         |         |         |         |         |         |         |         |         |         | 1.1464 (40)  |
| Days in month                                                       | 31      | 28      | 31      | 30      | 31      | 30      | 31      | 31      | 30      | 31      | 30      | 31 (41)      |

#### 4. Water heating energy requirements (kWh/year)

|                                              |          |          |          |          |          |         |         |          |          |                    |          |                |
|----------------------------------------------|----------|----------|----------|----------|----------|---------|---------|----------|----------|--------------------|----------|----------------|
| Assumed occupancy                            |          |          |          |          |          |         |         |          |          |                    |          | 2.4487 (42)    |
| Average daily hot water use (litres/day)     |          |          |          |          |          |         |         |          |          |                    |          | 92.3559 (43)   |
| Daily hot water use                          | 101.5915 | 97.8973  | 94.2030  | 90.5088  | 86.8146  | 83.1203 | 83.1203 | 86.8146  | 90.5088  | 94.2030            | 97.8973  | 101.5915 (44)  |
| Energy conte                                 | 150.6573 | 131.7658 | 135.9705 | 118.5424 | 113.7442 | 98.1526 | 90.9528 | 104.3697 | 105.6162 | 123.0855           | 134.3575 | 145.9035 (45)  |
| Energy content (annual)                      |          |          |          |          |          |         |         |          |          | Total = Sum(45)m = |          | 1453.1182 (45) |
| Distribution loss (46)m = 0.15 x (45)m       | 22.5986  | 19.7649  | 20.3956  | 17.7814  | 17.0616  | 14.7229 | 13.6429 | 15.6555  | 15.8424  | 18.4628            | 20.1536  | 21.8855 (46)   |
| Water storage loss:                          |          |          |          |          |          |         |         |          |          |                    |          |                |
| Total storage loss                           | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000  | 0.0000  | 0.0000   | 0.0000   | 0.0000             | 0.0000   | 0.0000 (56)    |
| If cylinder contains dedicated solar storage |          |          |          |          |          |         |         |          |          |                    |          |                |

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF TARGET EMISSIONS 09 Jan 2014

|                                                                 |          |          |          |          |          |          |          |          |          |          |          |               |
|-----------------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|---------------|
| Combi loss                                                      | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000 (57)   |
| Total heat required for water heating calculated for each month | 50.9589  | 45.0596  | 48.0048  | 44.6345  | 44.2398  | 40.9908  | 42.3572  | 44.2398  | 44.6345  | 48.0048  | 48.2781  | 50.9589 (61)  |
| Solar input                                                     | 201.6162 | 176.8254 | 183.9754 | 163.1769 | 157.9840 | 139.1435 | 133.3101 | 148.6095 | 150.2507 | 171.0904 | 182.6356 | 196.8624 (62) |
| Output from w/h                                                 | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000 (63)   |
| Heat gains from water heating, kWh/month                        | 201.6162 | 176.8254 | 183.9754 | 163.1769 | 157.9840 | 139.1435 | 133.3101 | 148.6095 | 150.2507 | 171.0904 | 182.6356 | 196.8624 (64) |
|                                                                 | 62.8333  | 55.0770  | 57.2114  | 50.5740  | 48.8799  | 42.8835  | 40.8311  | 45.7629  | 46.2760  | 52.9271  | 56.7434  | 61.2526 (65)  |

#### 5. Internal gains (see Table 5 and 5a)

|                                                                                     |          |          |          |          |          |          |          |          |          |          |          |          |      |
|-------------------------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|------|
| Metabolic gains (Table 5), Watts                                                    | Jan      | Feb      | Mar      | Apr      | May      | Jun      | Jul      | Aug      | Sep      | Oct      | Nov      | Dec      |      |
| (66)m                                                                               | 122.4335 | 122.4335 | 122.4335 | 122.4335 | 122.4335 | 122.4335 | 122.4335 | 122.4335 | 122.4335 | 122.4335 | 122.4335 | 122.4335 | (66) |
| Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5     | 20.2441  | 17.9806  | 14.6228  | 11.0704  | 8.2753   | 6.9863   | 7.5490   | 9.8124   | 13.1702  | 16.7226  | 19.5178  | 20.8067  | (67) |
| Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 | 217.8870 | 220.1480 | 214.4504 | 202.3208 | 187.0095 | 172.6190 | 163.0052 | 160.7442 | 166.4418 | 178.5714 | 193.8827 | 208.2732 | (68) |
| Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5    | 35.2434  | 35.2434  | 35.2434  | 35.2434  | 35.2434  | 35.2434  | 35.2434  | 35.2434  | 35.2434  | 35.2434  | 35.2434  | 35.2434  | (69) |
| Pumps, fans                                                                         | 3.0000   | 3.0000   | 3.0000   | 3.0000   | 3.0000   | 3.0000   | 3.0000   | 3.0000   | 3.0000   | 3.0000   | 3.0000   | 3.0000   | (70) |
| Losses e.g. evaporation (negative values) (Table 5)                                 | -97.9468 | -97.9468 | -97.9468 | -97.9468 | -97.9468 | -97.9468 | -97.9468 | -97.9468 | -97.9468 | -97.9468 | -97.9468 | -97.9468 | (71) |
| Water heating gains (Table 5)                                                       | 84.4533  | 81.9599  | 76.8971  | 70.2416  | 65.6988  | 59.5604  | 54.8805  | 61.5092  | 64.2722  | 71.1386  | 78.8103  | 82.3288  | (72) |
| Total internal gains                                                                | 385.3144 | 382.8185 | 368.7003 | 346.3629 | 323.7136 | 301.8957 | 288.1648 | 294.7959 | 306.6143 | 329.1627 | 354.9408 | 374.1388 | (73) |

#### 6. Solar gains

| [Jan]       |          |          |          | Area<br>m2 | Solar flux<br>Table 6a<br>W/m2 | g<br>Specific data<br>or Table 6b | FF<br>Specific data<br>or Table 6c | Access<br>factor<br>Table 6d | Gains<br>W   |          |          |               |
|-------------|----------|----------|----------|------------|--------------------------------|-----------------------------------|------------------------------------|------------------------------|--------------|----------|----------|---------------|
| East        |          |          |          | 7.2500     | 19.6403                        | 0.6300                            | 0.7000                             | 0.7700                       | 43.5168 (76) |          |          |               |
| South       |          |          |          | 1.4400     | 46.7521                        | 0.6300                            | 0.7000                             | 0.7700                       | 20.5748 (78) |          |          |               |
| West        |          |          |          | 4.0600     | 19.6403                        | 0.6300                            | 0.7000                             | 0.7700                       | 24.3694 (80) |          |          |               |
|             |          |          |          |            |                                |                                   |                                    |                              |              |          |          |               |
| Solar gains | 88.4610  | 166.4961 | 261.6255 | 367.4768   | 441.4558                       | 448.8090                          | 428.5017                           | 373.4077                     | 299.1981     | 193.9227 | 109.0343 | 73.6048 (83)  |
| Total gains | 473.7754 | 549.3146 | 630.3257 | 713.8397   | 765.1694                       | 750.7047                          | 716.6664                           | 668.2037                     | 605.8125     | 523.0854 | 463.9751 | 447.7437 (84) |

#### 7. Mean internal temperature (heating season)

|                                                                             |         |         |         |         |         |         |         |         |         |         |         |         |              |
|-----------------------------------------------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------------|
| Temperature during heating periods in the living area from Table 9, Th1 (C) |         |         |         |         |         |         |         |         |         |         |         |         | 21.0000 (85) |
| Utilisation factor for gains for living area, nil,m (see Table 9a)          | Jan     | Feb     | Mar     | Apr     | May     | Jun     | Jul     | Aug     | Sep     | Oct     | Nov     | Dec     |              |
| tau                                                                         | 59.5406 | 59.6958 | 59.8487 | 60.5775 | 60.7158 | 61.3681 | 61.3681 | 61.4904 | 61.1152 | 60.7158 | 60.4366 | 60.1475 |              |
| alpha                                                                       | 4.9694  | 4.9797  | 4.9899  | 5.0385  | 5.0477  | 5.0912  | 5.0912  | 5.0994  | 5.0743  | 5.0477  | 5.0291  | 5.0098  |              |
| util living area                                                            | 0.9980  | 0.9955  | 0.9873  | 0.9570  | 0.8723  | 0.7076  | 0.5385  | 0.5951  | 0.8458  | 0.9766  | 0.9959  | 0.9985  | (86)         |
| MIT                                                                         | 19.7348 | 19.8917 | 20.1589 | 20.5064 | 20.7917 | 20.9491 | 20.9896 | 20.9832 | 20.8705 | 20.4876 | 20.0474 | 19.7092 | (87)         |
| Th 2                                                                        | 19.9470 | 19.9495 | 19.9519 | 19.9631 | 19.9653 | 19.9751 | 19.9751 | 19.9769 | 19.9713 | 19.9653 | 19.9610 | 19.9565 | (88)         |
| util rest of house                                                          | 0.9974  | 0.9940  | 0.9827  | 0.9409  | 0.8258  | 0.6163  | 0.4193  | 0.4732  | 0.7738  | 0.9648  | 0.9942  | 0.9980  | (89)         |
| MIT 2                                                                       | 18.2618 | 18.4924 | 18.8819 | 19.3838 | 19.7612 | 19.9413 | 19.9713 | 19.9700 | 19.8670 | 19.3670 | 18.7286 | 18.2311 | (90)         |
| Living area fraction                                                        | 18.5688 | 18.7841 | 19.1480 | 19.6178 | 19.9760 | 20.1514 | 20.1835 | 20.1812 | 20.0761 | 19.6006 | 19.0035 | 18.5392 | (91)         |
| MIT                                                                         | 18.5688 | 18.7841 | 19.1480 | 19.6178 | 19.9760 | 20.1514 | 20.1835 | 20.1812 | 20.0761 | 19.6006 | 19.0035 | 18.5392 | (92)         |
| Temperature adjustment                                                      | 18.5688 | 18.7841 | 19.1480 | 19.6178 | 19.9760 | 20.1514 | 20.1835 | 20.1812 | 20.0761 | 19.6006 | 19.0035 | 18.5392 | (93)         |

#### 8. Space heating requirement

|                      |           |           |           |          |          |          |          |          |          |          |           |           |       |
|----------------------|-----------|-----------|-----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-------|
| Utilisation          | Jan       | Feb       | Mar       | Apr      | May      | Jun      | Jul      | Aug      | Sep      | Oct      | Nov       | Dec       |       |
| Useful gains         | 0.9960    | 0.9915    | 0.9779    | 0.9341   | 0.8263   | 0.6332   | 0.4443   | 0.4986   | 0.7823   | 0.9592   | 0.9919    | 0.9970    | (94)  |
| Ext temp.            | 471.8986  | 544.6438  | 616.3955  | 666.7717 | 632.2807 | 475.3269 | 318.3998 | 333.1768 | 473.9448 | 501.7311 | 460.2346  | 446.3915  | (95)  |
| Heat loss rate W     | 4.3000    | 4.9000    | 6.5000    | 8.9000   | 11.7000  | 14.6000  | 16.6000  | 16.4000  | 14.1000  | 10.6000  | 7.1000    | 4.2000    | (96)  |
| Month fracti         | 1319.0628 | 1280.1604 | 1163.2152 | 973.8362 | 750.2579 | 497.9080 | 321.4119 | 338.4656 | 538.2227 | 815.9430 | 1084.0888 | 1312.1937 | (97)  |
| Space heating kWh    | 1.0000    | 1.0000    | 1.0000    | 1.0000   | 1.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 1.0000   | 1.0000    | 1.0000    | (97a) |
| Space heating        | 630.2902  | 494.2671  | 406.8339  | 221.0864 | 87.7751  | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 233.7736 | 449.1751  | 644.1568  | (98)  |
| Space heating per m2 |           |           |           |          |          |          |          |          |          |          |           | 3167.3581 | (98)  |
|                      |           |           |           |          |          |          |          |          |          |          |           | 39.9616   | (99)  |

#### 8c. Space cooling requirement

Not applicable

# FULL SAP CALCULATION PRINTOUT

## Calculation Type: New Build (As Designed)

### CALCULATION OF TARGET EMISSIONS 09 Jan 2014

#### 9a. Energy requirements - Individual heating systems, including micro-CHP

|                                                                       |          |          |          |          |          |          |          |          |          |          |          |                 |
|-----------------------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------------|
| Fraction of space heat from secondary/supplementary system (Table 11) |          |          |          |          |          |          |          |          |          |          |          | 0.0000 (201)    |
| Fraction of space heat from main system(s)                            |          |          |          |          |          |          |          |          |          |          |          | 1.0000 (202)    |
| Efficiency of main space heating system 1 (in %)                      |          |          |          |          |          |          |          |          |          |          |          | 93.4000 (206)   |
| Efficiency of secondary/supplementary heating system, %               |          |          |          |          |          |          |          |          |          |          |          | 0.0000 (208)    |
| Space heating requirement                                             |          |          |          |          |          |          |          |          |          |          |          | 3391.1757 (211) |
|                                                                       | Jan      | Feb      | Mar      | Apr      | May      | Jun      | Jul      | Aug      | Sep      | Oct      | Nov      | Dec             |
| Space heating requirement                                             | 630.2902 | 494.2671 | 406.8339 | 221.0864 | 87.7751  | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 233.7736 | 449.1751 | 644.1568 (98)   |
| Space heating efficiency (main heating system 1)                      | 93.4000  | 93.4000  | 93.4000  | 93.4000  | 93.4000  | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 93.4000  | 93.4000  | 93.4000 (210)   |
| Space heating fuel (main heating system)                              | 674.8289 | 529.1939 | 435.5823 | 236.7092 | 93.9776  | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 250.2930 | 480.9155 | 689.6754 (211)  |
| Water heating requirement                                             | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000   | 0.0000 (215)    |
| Water heating requirement                                             | 201.6162 | 176.8254 | 183.9754 | 163.1769 | 157.9840 | 139.1435 | 133.3101 | 148.6095 | 150.2507 | 171.0904 | 182.6356 | 196.8624 (64)   |
| Efficiency of water heater (217)m                                     | 87.7259  | 87.5001  | 86.9928  | 85.8164  | 83.6375  | 80.3000  | 80.3000  | 80.3000  | 80.3000  | 85.8375  | 87.2285  | 80.3000 (216)   |
| Fuel for water heating, kWh/month                                     | 229.8253 | 202.0858 | 211.4835 | 190.1465 | 188.8914 | 173.2796 | 166.0150 | 185.0678 | 187.1117 | 199.3188 | 209.3760 | 224.1796 (219)  |
| Water heating fuel used                                               |          |          |          |          |          |          |          |          |          |          |          | 2366.7811 (219) |
| Annual totals kWh/year                                                |          |          |          |          |          |          |          |          |          |          |          |                 |
| Space heating fuel - main system                                      |          |          |          |          |          |          |          |          |          |          |          | 3391.1757 (211) |
| Space heating fuel - secondary                                        |          |          |          |          |          |          |          |          |          |          |          | 0.0000 (215)    |
| Electricity for pumps and fans:                                       |          |          |          |          |          |          |          |          |          |          |          |                 |
| central heating pump                                                  |          |          |          |          |          |          |          |          |          |          |          | 30.0000 (230c)  |
| main heating flue fan                                                 |          |          |          |          |          |          |          |          |          |          |          | 45.0000 (230e)  |
| Total electricity for the above, kWh/year                             |          |          |          |          |          |          |          |          |          |          |          | 75.0000 (231)   |
| Electricity for lighting (calculated in Appendix L)                   |          |          |          |          |          |          |          |          |          |          |          | 357.5164 (232)  |
| Total delivered energy for all uses                                   |          |          |          |          |          |          |          |          |          |          |          | 6190.4732 (238) |

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

|                                                                                                   | Energy<br>kWh/year | Emission factor<br>kg CO2/kWh | Emissions<br>kg CO2/year |
|---------------------------------------------------------------------------------------------------|--------------------|-------------------------------|--------------------------|
| Space heating - main system 1                                                                     | 3391.1757          | 0.2160                        | 732.4940 (261)           |
| Space heating - secondary                                                                         | 0.0000             | 0.0000                        | 0.0000 (263)             |
| Water heating (other fuel)                                                                        | 2366.7811          | 0.2160                        | 511.2247 (264)           |
| Space and water heating                                                                           |                    |                               | 1243.7187 (265)          |
| Pumps and fans                                                                                    | 75.0000            | 0.5190                        | 38.9250 (267)            |
| Energy for lighting                                                                               | 357.5164           | 0.5190                        | 185.5510 (268)           |
| Total CO2, kg/m2/year                                                                             |                    |                               | 1468.1947 (272)          |
| Emissions per m2 for space and water heating                                                      |                    |                               | 15.6916 (272a)           |
| Fuel factor (mains gas)                                                                           |                    |                               | 1.0000                   |
| Emissions per m2 for lighting                                                                     |                    |                               | 2.3410 (272b)            |
| Emissions per m2 for pumps and fans                                                               |                    |                               | 0.4911 (272c)            |
| Target Carbon Dioxide Emission Rate (TER) = (15.6916 * 1.00) + 2.3410 + 0.4911, rounded to 2 d.p. |                    |                               | 18.5200 (273)            |

# U-VALUE CALCULATOR REPORT

|                      |                                              |                |                 |
|----------------------|----------------------------------------------|----------------|-----------------|
| Property Reference   | 000592                                       | Issued on Date | 27/03/2022      |
| Assessment Reference | Plot 2 As Design                             | Prop Type Ref  | Plot 2 - Curbar |
| Project              | Goldthorpe Road, Goldthorpe, Barnsley, S63 9 |                |                 |
| Calculation Type     | New Build (As Designed)                      |                |                 |

|                                    |      |             |       |      |       |
|------------------------------------|------|-------------|-------|------|-------|
| SAP Rating                         | 84 B | DER         | 18.29 | TER  | 18.52 |
| Environmental                      | 86 B | % DER<TER   | 1.26  |      |       |
| CO <sub>2</sub> Emissions (t/year) | 1.25 | DFEE        | 46.69 | TFEE | 52.45 |
| General Requirements Compliance    | Pass | % DFEE<TFEE | 10.98 |      |       |

|                  |                                                                                                     |             |           |
|------------------|-----------------------------------------------------------------------------------------------------|-------------|-----------|
| Assessor Details | Mr. Peter Edwards, ESAP Energy Consultants Arch Des & Surv, Tel: 01455883250, esapenquiry@gmail.com | Assessor ID | H883-0001 |
| Client           | Redmile Homes, Redmile Homes                                                                        |             |           |

## Building Elements

### Roof 000004 - 300mm Mineral Wool

Roof Type: Pitched Roof, insulated flat ceiling

| Layer       | Description                                                | Thickness (mm) | Conductivity (W/m <sup>2</sup> K) | Resistance (m <sup>2</sup> K/W) | Fraction (%) |
|-------------|------------------------------------------------------------|----------------|-----------------------------------|---------------------------------|--------------|
| Ext surface |                                                            |                |                                   | 0.0400                          |              |
| Layer 1     | <b>Mineral wool</b>                                        |                |                                   |                                 |              |
|             | Main construction                                          | 300            | 0.0400                            | 7.5000                          | 100.00       |
|             | Corrections - Air Gap: Level 0, Fasteners: None or plastic |                |                                   |                                 |              |
| Layer 2     | <b>Mineral wool</b>                                        |                |                                   |                                 |              |
|             | Main construction                                          | 100            | 0.0400                            | 2.5000                          | 88.89        |
|             | Main construction                                          | 100            | 0.1300                            | 0.7692                          | 11.11        |
|             | Corrections - Air Gap: Level 0, Fasteners: None or plastic |                |                                   |                                 |              |
| Layer 3     | <b>Plasterboard, standard</b>                              |                |                                   |                                 |              |
|             | Main construction                                          | 12.5           | 0.2100                            | 0.0595                          | 100.00       |
| Layer 4     | <b>Plaster, standard</b>                                   |                |                                   |                                 |              |
|             | Main construction                                          | 3              | 0.4000                            | 0.0075                          | 100.00       |
| Int surface |                                                            |                |                                   | 0.1000                          |              |

Total resistance: Upper limit = 9.981 m<sup>2</sup> K/W Lower limit = 9.707 m<sup>2</sup> K/W Average = 9.844 m<sup>2</sup> K/W  
Total correction = 0.0000 m<sup>2</sup> K/W U-value (unrounded) = 0.1 W/m<sup>2</sup> K

Unheated space: None

Total thickness: 416 mm

U-value: 0.10 W/m<sup>2</sup> K

Kappa: n/a

# U-VALUE CALCULATOR REPORT

|                      |                                              |                |                 |
|----------------------|----------------------------------------------|----------------|-----------------|
| Property Reference   | 000592                                       | Issued on Date | 27/03/2022      |
| Assessment Reference | Plot 2 As Design                             | Prop Type Ref  | Plot 2 - Curbar |
| Project              | Goldthorpe Road, Goldthorpe, Barnsley, S63 9 |                |                 |
| Calculation Type     | New Build (As Designed)                      |                |                 |

|                                    |      |             |       |      |       |
|------------------------------------|------|-------------|-------|------|-------|
| SAP Rating                         | 84 B | DER         | 18.29 | TER  | 18.52 |
| Environmental                      | 86 B | % DER<TER   | 1.26  |      |       |
| CO <sub>2</sub> Emissions (t/year) | 1.25 | DFEE        | 46.69 | TFEE | 52.45 |
| General Requirements Compliance    | Pass | % DFEE<TFEE | 10.98 |      |       |

|                  |                                                                                                     |             |           |
|------------------|-----------------------------------------------------------------------------------------------------|-------------|-----------|
| Assessor Details | Mr. Peter Edwards, ESAP Energy Consultants Arch Des & Surv, Tel: 01455883250, esapenquiry@gmail.com | Assessor ID | H883-0001 |
|------------------|-----------------------------------------------------------------------------------------------------|-------------|-----------|

|        |                              |
|--------|------------------------------|
| Client | Redmile Homes, Redmile Homes |
|--------|------------------------------|

## Building Elements

### Wall 000001 - Newlay with Supafil 34

#### Wall Type: Standard Wall

| Layer       | Description                                                | Thickness (mm) | Conductivity (W/m <sup>2</sup> K) | Resistance (m <sup>2</sup> K/W) | Fraction (%) |
|-------------|------------------------------------------------------------|----------------|-----------------------------------|---------------------------------|--------------|
| Ext surface |                                                            |                |                                   | 0.0400                          |              |
| Layer 1     | <b>Brick, outer leaf</b>                                   |                |                                   |                                 |              |
|             | Main construction                                          | 102.5          | 0.7700                            | 0.1331                          | 82.81        |
|             | Main construction                                          | 102.5          | 0.9407                            | 0.1090                          | 17.19        |
| Layer 2     | <b>Supafil 34</b>                                          |                |                                   |                                 |              |
|             | Main construction                                          | 100            | 0.0340                            | 2.9412                          | 100.00       |
|             | Corrections - Air Gap: Level 0, Fasteners: None or plastic |                |                                   |                                 |              |
| Layer 3     | <b>Newlay, Newlite</b>                                     |                |                                   |                                 |              |
|             | Main construction                                          | 100            | 0.4300                            | 0.2326                          | 100.00       |
| Layer 4     | <b>airspace/plaster dabs</b>                               |                |                                   |                                 |              |
|             | Main construction                                          | 15             | 0.0882                            | 0.1700                          | 80.00        |
|             | Main construction                                          | 15             | 0.0882                            | 0.1700                          | 20.00        |
|             | Corrections - Cavity Unventilated, Emissivity: Normal      |                |                                   |                                 |              |
| Layer 5     | <b>Plaster, standard</b>                                   |                |                                   |                                 |              |
|             | Main construction                                          | 12.5           | 0.4000                            | 0.0313                          | 100.00       |
| Layer 6     | <b>Plaster, standard</b>                                   |                |                                   |                                 |              |
|             | Main construction                                          | 3              | 0.4000                            | 0.0075                          | 100.00       |
| Int surface |                                                            |                |                                   | 0.1300                          |              |

|                   |                                              |                                               |                                    |
|-------------------|----------------------------------------------|-----------------------------------------------|------------------------------------|
| Total resistance: | Upper limit = 3.681 m <sup>2</sup> K/W       | Lower limit = 3.681 m <sup>2</sup> K/W        | Average = 3.681 m <sup>2</sup> K/W |
|                   | Total correction = 0.0000 m <sup>2</sup> K/W | U-value (unrounded) = 0.27 W/m <sup>2</sup> K |                                    |

Unheated space: None

Total thickness: 333 mm

U-value: 0.27 W/m<sup>2</sup> K

Kappa: n/a

# U-VALUE CALCULATOR REPORT

|                      |                                              |                |                 |
|----------------------|----------------------------------------------|----------------|-----------------|
| Property Reference   | 000592                                       | Issued on Date | 27/03/2022      |
| Assessment Reference | Plot 2 As Design                             | Prop Type Ref  | Plot 2 - Curbar |
| Project              | Goldthorpe Road, Goldthorpe, Barnsley, S63 9 |                |                 |
| Calculation Type     | New Build (As Designed)                      |                |                 |

|                                    |      |             |       |      |       |
|------------------------------------|------|-------------|-------|------|-------|
| SAP Rating                         | 84 B | DER         | 18.29 | TER  | 18.52 |
| Environmental                      | 86 B | % DER<TER   | 1.26  |      |       |
| CO <sub>2</sub> Emissions (t/year) | 1.25 | DFEE        | 46.69 | TFEE | 52.45 |
| General Requirements Compliance    | Pass | % DFEE<TFEE | 10.98 |      |       |

|                  |                                                                                                     |             |           |
|------------------|-----------------------------------------------------------------------------------------------------|-------------|-----------|
| Assessor Details | Mr. Peter Edwards, ESAP Energy Consultants Arch Des & Surv, Tel: 01455883250, esapenquiry@gmail.com | Assessor ID | H883-0001 |
|------------------|-----------------------------------------------------------------------------------------------------|-------------|-----------|

|        |                              |
|--------|------------------------------|
| Client | Redmile Homes, Redmile Homes |
|--------|------------------------------|

## Building Elements

### Floor 000005 - Floor - suspended beam-and-block floor

Floor Type: Suspended Floor

Area = 40.67 m<sup>2</sup>, Perimeter = 18.67 m, Wall thickness = 300.00 mm, Soil: Clay

Depth of underfloor space below ground: 0.200 m Floor wind shielding: Average (suburban)

Floor height above ground: h = 0.000 m

U-value of walls above ground: U<sub>w</sub> = 1.500 m

Ventilation openings per perimeter length: e = 0.0015 %

Mean wind speed: v = 5.000 m/s

Resistance on solum: R<sub>g</sub> = 0.000 m<sup>2</sup>K/W

| Layer       | Description                                                | Thickness (mm) | Conductivity (W/m <sup>2</sup> K) | Resistance (m <sup>2</sup> K/W) | Fraction (%) |
|-------------|------------------------------------------------------------|----------------|-----------------------------------|---------------------------------|--------------|
| Ext surface |                                                            |                |                                   | 0.1700                          |              |
| Layer 1     | AAC (600 kg/m <sup>3</sup> )/ concrete                     |                |                                   |                                 |              |
|             | Main construction                                          | 100            | 0.1800                            | 0.5556                          | 86.30        |
|             | Main construction                                          | 100            | 1.3500                            | 0.0741                          | 13.70        |
| Layer 2     | Kooltherm K3 Floorboard (45mm +)                           |                |                                   |                                 |              |
|             | Main construction                                          | 100            | 0.0200                            | 5.0000                          | 100.00       |
|             | Corrections - Air Gap: Level 1, Fasteners: None or plastic |                |                                   |                                 |              |
| Layer 3     | Screed                                                     |                |                                   |                                 |              |
|             | Main construction                                          | 65             | 1.1500                            | 0.0565                          | 100.00       |
| Int surface |                                                            |                |                                   | 0.1700                          |              |

Total resistance: Upper limit = 5.881 m<sup>2</sup> K/W Lower limit = 5.690 m<sup>2</sup> K/W Average = 5.786 m<sup>2</sup> K/W

Total correction = 0.0075 m<sup>2</sup> K/W

U-value (unrounded) = 0.14 W/m<sup>2</sup> K

Unheated space: None

Total thickness: 265 mm

U-value: 0.14 W/m<sup>2</sup> K

Kappa: n/a

# ASSESSMENT NOTES

## Calculation Type: New Build (As Designed)

|                                    |                                                                                                     |               |                 |                |            |
|------------------------------------|-----------------------------------------------------------------------------------------------------|---------------|-----------------|----------------|------------|
| Property Reference                 | 000592                                                                                              |               |                 | Issued on Date | 27/03/2022 |
| Assessment Reference               | Plot 2 As Design                                                                                    | Prop Type Ref | Plot 2 - Curbar |                |            |
| Property                           | Goldthorpe Road, Goldthorpe, Barnsley, S63 9                                                        |               |                 |                |            |
| SAP Rating                         | 84 B                                                                                                | DER           | 18.29           | TER            | 18.52      |
| Environmental                      | 86 B                                                                                                | % DER<TER     | 1.26            |                |            |
| CO <sub>2</sub> Emissions (t/year) | 1.25                                                                                                | DFEE          | 46.69           | TFEE           | 52.45      |
| General Requirements Compliance    | Pass                                                                                                | % DFEE<TFEE   | 10.98           |                |            |
| Assessor Details                   | Mr. Peter Edwards, ESAP Energy Consultants Arch Des & Surv, Tel: 01455883250, esapenquiry@gmail.com |               |                 | Assessor ID    | H883-0001  |
| Client                             | Redmile Homes, Redmile Homes                                                                        |               |                 |                |            |

**ASSESSMENT NOTES - Last time updated on: 27.03.2022**

### SUMMARY:-

- Walls to be Brick outer 100mm Knauf Crown Supafil 34 Insulation with 100mm Newlay Newlite Block or similar
- Min. 100mm Kingspan insulation above beam and block floors with 65mm Screed floating floor finish.
- Roof to be insulated with min 400mm Mineral Wool Insulation.
- Doors, Windows and Patio Doors to achieve min 1.4W/m2K or better
- 100% Low E-Lighting
- Air Test of 4.8 or lower
- Assumed Boiler to be a Valliant ECOFIT Sustain 825 with Programmer TRVs & Room Stats or similar, and Boiler Interlock.
- CBA Accredited Thermal Bridging details to be used.

# BASIC COMPLIANCE REPORT

## Calculation Type: New Build (As Designed)

|                                    |                                                                                                     |                |                 |
|------------------------------------|-----------------------------------------------------------------------------------------------------|----------------|-----------------|
| Property Reference                 | 000592                                                                                              | Issued on Date | 27/03/2022      |
| Assessment Reference               | Plot 2 As Design                                                                                    | Prop Type Ref  | Plot 2 - Curbar |
| Property                           | Goldthorpe Road, Goldthorpe, Barnsley, S63 9                                                        |                |                 |
| SAP Rating                         | 84 B                                                                                                | DER            | 18.29           |
| Environmental                      | 86 B                                                                                                | TER            | 18.52           |
| CO <sub>2</sub> Emissions (t/year) | 1.25                                                                                                | % DER<TER      | 1.26            |
| General Requirements Compliance    | Pass                                                                                                | DfEE           | 46.69           |
|                                    |                                                                                                     | TfEE           | 52.45           |
|                                    |                                                                                                     | % DfEE<TfEE    | 10.98           |
| Assessor Details                   | Mr. Peter Edwards, ESAP Energy Consultants Arch Des & Surv, Tel: 01455883250, esapenquiry@gmail.com |                | Assessor ID     |
|                                    |                                                                                                     |                | H883-0001       |
| Client                             | Redmile Homes, Redmile Homes                                                                        |                |                 |

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

#### Criterion 1 – Achieving the TER and TfEE rate

##### 1a TER and DER

|                                             |                  |                                   |      |
|---------------------------------------------|------------------|-----------------------------------|------|
| Fuel for main heating                       | Mains gas        |                                   |      |
| Fuel factor                                 | 1.00 (mains gas) |                                   |      |
| Target Carbon Dioxide Emission Rate (TER)   | 18.52            | kgCO <sub>2</sub> /m <sup>2</sup> |      |
| Dwelling Carbon Dioxide Emission Rate (DER) | 18.29            | kgCO <sub>2</sub> /m <sup>2</sup> | Pass |
|                                             | -0.23 (-1.2%)    | kgCO <sub>2</sub> /m <sup>2</sup> |      |

##### 1b TfEE and DfEE

|                                          |               |                        |      |
|------------------------------------------|---------------|------------------------|------|
| Target Fabric Energy Efficiency (TfEE)   | 52.45         | kWh/m <sup>2</sup> /yr |      |
| Dwelling Fabric Energy Efficiency (DfEE) | 46.69         | kWh/m <sup>2</sup> /yr |      |
|                                          | -5.7 (-10.9%) | kWh/m <sup>2</sup> /yr | Pass |

#### Criterion 2 – Limits on design flexibility

##### Limiting Fabric Standards

##### 2 Fabric U-values

| Element       | Average          | Highest          |      |
|---------------|------------------|------------------|------|
| External wall | 0.27 (max. 0.30) | 0.27 (max. 0.70) | Pass |
| Party wall    | 0.00 (max. 0.20) | -                | Pass |
| Floor         | 0.14 (max. 0.25) | 0.14 (max. 0.70) | Pass |
| Roof          | 0.10 (max. 0.20) | 0.10 (max. 0.35) | Pass |
| Openings      | 1.40 (max. 2.00) | 1.40 (max. 3.30) | Pass |

##### 2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

##### 3 Air permeability

|                                |                     |      |
|--------------------------------|---------------------|------|
| Air permeability at 50 pascals | 4.80 (design value) |      |
| Maximum                        | 10.0                | Pass |

##### Limiting System Efficiencies

##### 4 Heating efficiency

# BASIC COMPLIANCE REPORT

## Calculation Type: New Build (As Designed)

Main heating system

Boiler system with radiators or underfloor - Mains gas  
Data from database  
Vaillant ecoFIT sustain 825 VUW 256/6-3 (H-GB)  
Combi boiler  
Efficiency: 89.3% SEDBUK2009  
Minimum: 88.0%

Pass

Secondary heating system

None

### 5 Cylinder insulation

Hot water storage

No cylinder

### 6 Controls

Space heating controls

Programmer, room thermostat and TRVs

Pass

Hot water controls

No cylinder

Boiler interlock

Yes

Pass

### 7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

### 8 Mechanical ventilation

Not applicable

## Criterion 3 – Limiting the effects of heat gains in summer

### 9 Summertime temperature

Overheating risk (East Pennines)

Not significant

Pass

Based on:

Overshading

Average

Windows facing East

7.25 m<sup>2</sup>, No overhang

Windows facing South

1.44 m<sup>2</sup>, No overhang

Windows facing West

4.06 m<sup>2</sup>, No overhang

Air change rate

4.00 ach

Blinds/curtains

None

## Criterion 4 – Building performance consistent with DER and DFEE rate

### Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00 W/m<sup>2</sup>K

Pass

### Air permeability and pressure testing

#### 3 Air permeability

Air permeability at 50 pascals

4.80 (design value)

Maximum

10.0

Pass

### 10 Key features

Party wall U-value

0.00 W/m<sup>2</sup>K

Roof U-value

0.10 W/m<sup>2</sup>K

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

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

|                      |                                              |                |                 |
|----------------------|----------------------------------------------|----------------|-----------------|
| Property Reference   | 000592                                       | Issued on Date | 27/03/2022      |
| Assessment Reference | Plot 2 As Design                             | Prop Type Ref  | Plot 2 - Curbar |
| Property             | Goldthorpe Road, Goldthorpe, Barnsley, S63 9 |                |                 |

|                                    |      |             |       |      |       |
|------------------------------------|------|-------------|-------|------|-------|
| SAP Rating                         | 84 B | DER         | 18.29 | TER  | 18.52 |
| Environmental                      | 86 B | % DER<TER   | 1.26  |      |       |
| CO <sub>2</sub> Emissions (t/year) | 1.25 | DFEE        | 46.69 | TFEE | 52.45 |
| General Requirements Compliance    | Pass | % DFEE<TFEE | 10.98 |      |       |

|                  |                                                                                                     |             |           |
|------------------|-----------------------------------------------------------------------------------------------------|-------------|-----------|
| Assessor Details | Mr. Peter Edwards, ESAP Energy Consultants Arch Des & Surv, Tel: 01455883250, esapenquiry@gmail.com | Assessor ID | H883-0001 |
| Client           | Redmile Homes, Redmile Homes                                                                        |             |           |

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

|                       |                      |
|-----------------------|----------------------|
| Orientation           | West                 |
| Property Tenure       | Owner-occupied       |
| Transaction Type      | New dwelling         |
| Terrain Type          | Suburban             |
| 1.0 Property Type     | House, Semi-Detached |
| 2.0 Number of Storeys | 2                    |
| 3.0 Date Built        | 2019                 |
| 4.0 Sheltered Sides   | 2                    |
| 5.0 Sunlight/Shade    | Average or unknown   |

|                  |               |                     |                      |                       |
|------------------|---------------|---------------------|----------------------|-----------------------|
| 6.0 Measurements |               | Heat Loss Perimeter | Internal Floor Area  | Average Storey Height |
|                  | Ground Floor: | 18.67 m             | 40.67 m <sup>2</sup> | 2.40 m                |
|                  | 1st Storey:   | 17.66 m             | 38.59 m <sup>2</sup> | 2.61 m                |

|                            |                     |                     |
|----------------------------|---------------------|---------------------|
| 7.0 Living Area            | 16.52               | m <sup>2</sup>      |
| 8.0 Thermal Mass Parameter | Precise calculation |                     |
| Thermal Mass               | 214.78              | kJ/m <sup>2</sup> K |

| 9.0 External Walls |             |                                                                                     |                              |                             |                              |                             |
|--------------------|-------------|-------------------------------------------------------------------------------------|------------------------------|-----------------------------|------------------------------|-----------------------------|
| Description        | Type        | Construction                                                                        | U-Value (W/m <sup>2</sup> K) | Kappa (kJ/m <sup>2</sup> K) | Gross Area (m <sup>2</sup> ) | Nett Area (m <sup>2</sup> ) |
| Main Wall          | Cavity Wall | Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure | 0.27                         | 60.00                       | 90.90                        | 76.00                       |

| 9.1 Party Walls |                                 |                                                                                             |                              |                             |                        |
|-----------------|---------------------------------|---------------------------------------------------------------------------------------------|------------------------------|-----------------------------|------------------------|
| Description     | Type                            | Construction                                                                                | U-Value (W/m <sup>2</sup> K) | Kappa (kJ/m <sup>2</sup> K) | Area (m <sup>2</sup> ) |
| Party Wall      | Filled Cavity with Edge Sealing | Single plasterboard on dabs both sides, lightweight aggregate blocks, cavity or cavity fill | 0.00                         | 110.00                      | 42.20                  |

| 9.2 Internal Walls |                                   |  |                             |                        |
|--------------------|-----------------------------------|--|-----------------------------|------------------------|
| Description        | Construction                      |  | Kappa (kJ/m <sup>2</sup> K) | Area (m <sup>2</sup> ) |
| Block Walls        | Dense block, plasterboard on dabs |  | 75.00                       | 23.15                  |
| Stud Walls         | Plasterboard on timber frame      |  | 9.00                        | 142.23                 |

| 10.0 External Roofs |                     |                                          |                              |                             |                              |                             |
|---------------------|---------------------|------------------------------------------|------------------------------|-----------------------------|------------------------------|-----------------------------|
| Description         | Type                | Construction                             | U-Value (W/m <sup>2</sup> K) | Kappa (kJ/m <sup>2</sup> K) | Gross Area (m <sup>2</sup> ) | Nett Area (m <sup>2</sup> ) |
| Main Roof           | External Plane Roof | Plasterboard, insulated at ceiling level | 0.10                         | 9.00                        | 40.67                        | 40.67                       |

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

### 10.2 Internal Ceilings

| Description          | Construction                                   | Kappa (kJ/m²K) | Area (m²) |
|----------------------|------------------------------------------------|----------------|-----------|
| Ground Floor Ceiling | Plasterboard ceiling, carpeted chipboard floor | 9.00           | 38.59     |

### 11.0 Heat Loss Floors

| Description | Type                 | Construction                       | U-Value (W/m²K) | Kappa (kJ/m²K) | Area (m²) |
|-------------|----------------------|------------------------------------|-----------------|----------------|-----------|
| Main Floor  | Ground Floor - Solid | Suspended concrete floor, carpeted | 0.14            | 75.00          | 40.67     |

### 11.2 Internal Floors

| Description | Construction                                   | Kappa (kJ/m²K) | Area (m²) |
|-------------|------------------------------------------------|----------------|-----------|
| First Floor | Plasterboard ceiling, carpeted chipboard floor | 18.00          | 38.59     |

### 12.0 Opening Types

| Description   | Data Source  | Type             | Glazing       | Glazing Gap | Argon Filled | G-value | Frame Type | Frame Factor | U Value (W/m²K) |
|---------------|--------------|------------------|---------------|-------------|--------------|---------|------------|--------------|-----------------|
| Entrance Door | Manufacturer | Half Glazed Door | Double glazed |             |              | 0.76    |            | 0.70         | 1.40            |
| Windows       | Manufacturer | Window           | Double glazed |             |              | 0.76    |            | 0.70         | 1.40            |
| Patio Doors   | Manufacturer | Window           | Double glazed |             |              | 0.76    |            | 0.70         | 1.40            |

### 13.0 Openings

| Name            | Opening Type     | Location      | Orientation | Curtain Type | Overhang Ratio | Wide Overhang | Width (m) | Height (m) | Count | Area (m²) | Curtain Closed |
|-----------------|------------------|---------------|-------------|--------------|----------------|---------------|-----------|------------|-------|-----------|----------------|
| Front Elevation | Half Glazed Door | [1] Main Wall | West        |              |                |               |           |            |       | 2.15      |                |
| Front Elevation | Window           | [1] Main Wall | West        | None         | 0.00           |               |           |            |       | 4.06      |                |
| Side Elevation  | Window           | [1] Main Wall | South       | None         | 0.00           |               |           |            |       | 1.44      |                |
| Rear Elevation  | Window           | [1] Main Wall | East        | None         | 0.00           |               |           |            |       | 5.22      |                |
| Rear Elevation  | Window           | [1] Main Wall | East        | None         | 0.00           |               |           |            |       | 2.03      |                |

### 14.0 Conservatory

None

### 15.0 Draught Proofing

100 %

### 16.0 Draught Lobby

No

### 17.0 Thermal Bridging

Calculate Bridges

### 17.1 List of Bridges

| Source Type            | Bridge Type                                                      | Length | Psi    | Imported |
|------------------------|------------------------------------------------------------------|--------|--------|----------|
| Independently assessed | E1 Steel lintel with perforated steel base plate                 | 10.68  | 0.030  | No       |
| Independently assessed | E3 Sill                                                          | 9.66   | 0.015  | No       |
| Independently assessed | E4 Jamb                                                          | 25.10  | 0.010  | No       |
| Independently assessed | E5 Ground floor (normal)                                         | 18.67  | 0.056  | No       |
| Independently assessed | E6 Intermediate floor within a dwelling                          | 17.66  | 0.001  | No       |
| Independently assessed | E10 Eaves (insulation at ceiling level)                          | 10.74  | 0.101  | No       |
| Independently assessed | E12 Gable (insulation at ceiling level)                          | 9.95   | 0.055  | No       |
| Independently assessed | E16 Corner (normal)                                              | 12.42  | 0.059  | No       |
| Independently assessed | E17 Corner (inverted – internal area greater than external area) | 2.40   | -0.100 | No       |
| Independently assessed | E18 Party wall between dwellings                                 | 10.02  | 0.038  | No       |
| Table K1 - Default     | P1 Party wall - Ground floor                                     | 8.95   | 0.160  | No       |
| Table K1 - Default     | P2 Party wall - Intermediate floor within a dwelling             | 7.94   | 0.000  | No       |
| Table K1 - Default     | P4 Party wall - Roof (insulation at ceiling level)               | 8.95   | 0.240  | No       |

Y-value 0.046 W/m²K

### 18.0 Pressure Testing

Yes

Designed AP<sub>50</sub> 4.80 m³/(h.m²) @ 50 Pa

Property Tested ?

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

As Built AP<sub>50</sub>

m<sup>3</sup>/(h.m<sup>2</sup>) @ 50 Pa

### 19.0 Mechanical Ventilation

#### Summer Overheating

Windows open in hot weather

Windows half open

Cross ventilation possible

Yes

Night Ventilation

No

Air change rate

4.00

#### Mechanical Ventilation

Mechanical Ventilation System Present

No

### 20.0 Fans, Open Fireplaces, Flues

|                              | MHS | SHS | Other | Total |
|------------------------------|-----|-----|-------|-------|
| Number of Chimneys           | 0   |     | 0     | 0     |
| Number of open flues         | 0   |     | 0     | 0     |
| Number of intermittent fans  |     |     |       | 4     |
| Number of passive vents      |     |     |       | 0     |
| Number of flueless gas fires |     |     |       | 0     |

### 21.0 Fixed Cooling System

No

### 22.0 Lighting

#### Internal

Total number of light fittings

11

Total number of L.E.L. fittings

11

Percentage of L.E.L. fittings

100.00

%

#### External

External lights fitted

Yes

Light and motion sensor

Yes

### 23.0 Electricity Tariff

Standard

### 24.0 Main Heating 1

Description

Database

Percentage of Heat

100

%

Database Ref. No.

17958

Fuel Type

Mains gas

Main Heating

BGW

SAP Code

104

In Winter

90.2

In Summer

75.0

Controls

CBE Programmer, room thermostat and TRVs

PCDF Controls

0

Delayed Start Stat

No

Sap Code

2106

Flue Type

Balanced

Fan Assisted Flue

Yes

Is MHS Pumped

Pump in heated space

Heat Emitter

Radiators

Flow Temperature

Normal (> 45°C)

Combi boiler type

Standard Combi

Combi keep hot type

None

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

25.0 Main Heating 2

Community Heating

**28.0 Water Heating**

Water Heating

Flue Gas Heat Recovery System

Waste Water Heat Recovery Instantaneous System 1

Waste Water Heat Recovery Instantaneous System 2

Waste Water Heat Recovery Storage System

Solar Panel

Water use <= 125 litres/person/day

SAP Code

29.0 Hot Water Cylinder

### Recommendations

#### Lower cost measures

None

#### Further measures to achieve even higher standards

|                                    | Typical Cost    | Typical savings per year | Ratings after improvement |                      |
|------------------------------------|-----------------|--------------------------|---------------------------|----------------------|
|                                    |                 |                          | SAP rating                | Environmental Impact |
| Solar water heating                | £4,000 - £6,000 | £27                      | B 85                      |                      |
|                                    | Typical Cost    | Typical savings per year | Ratings after improvement |                      |
|                                    |                 |                          | SAP rating                | Environmental Impact |
| Solar photovoltaic panels, 2.5 kWp | £3,500 - £5,500 | £318                     | A 96                      |                      |

# DWELLING SIGN OFF REPORT

## Section 1: Dwelling Information

**Dwelling Address** (Please confirm final postal address and post code of the dwelling.)

|              |                 |  |
|--------------|-----------------|--|
| House Name   |                 |  |
| House Number |                 |  |
| Postcode     | S63 9           |  |
| Street       | Goldthorpe Road |  |
| Locality     | Goldthorpe      |  |
| Town         | Barnsley        |  |
| County       |                 |  |

**Dwelling Orientation** West (Please confirm orientation of main entrance door of the dwelling.)

Comments

**Terrain Type** Suburban

**Property Type** House, Semi-Detached

Comments

**Overshading (called Sunlight/shade in assessment)** Average or unknown

Comments

## Section 2: Dwelling Construction Details

**Thermal Mass Parameter** Precise calculation

Thermal Mass 214.78 kJ/m²K

Comments

### External Walls

Type Cavity Wall

Construction Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure

U-value 0.27 W/m²K

Gross Area 90.90 m²

| Layer Name            | Thickness (mm) | Conductivity (W/m.K) | Resistance (m²K/W) | Bridging     |
|-----------------------|----------------|----------------------|--------------------|--------------|
| Brick, outer leaf     | 102.5          | 0.7700               | 0.1331             | 82.81 Mortar |
| Supafil 34            | 100            | 0.0340               | 2.9412             | 100.00       |
| Newlay, Newlite       | 100            | 0.4300               | 0.2326             | 100.00       |
| airspace/plaster dabs | 15             | 0.0882               | 0.1700             | 80.00 Mortar |
| Plaster, standard     | 12.5           | 0.4000               | 0.0313             | 100.00       |
| Plaster, standard     | 3              | 0.4000               | 0.0075             | 100.00       |

Comments

### Party Walls

# DWELLING SIGN OFF REPORT

| Type                            | Construction                                                                                | U-Value<br>(W/m²K) | Area<br>(m²) |
|---------------------------------|---------------------------------------------------------------------------------------------|--------------------|--------------|
| Filled Cavity with Edge Sealing | Single plasterboard on dabs both sides, lightweight aggregate blocks, cavity or cavity fill | 0.00               | 42.20        |
| Comments                        |                                                                                             |                    |              |

## External Roofs

| Type                   | External Plane Roof                      |                         |                       |              |
|------------------------|------------------------------------------|-------------------------|-----------------------|--------------|
| Construction           | Plasterboard, insulated at ceiling level |                         |                       |              |
| U-value                | 0.10                                     | W/m²K                   |                       |              |
| Gross Area             | 40.67                                    | m²                      |                       |              |
| Layer Name             | Thickness<br>(mm)                        | Conductivity<br>(W/m.K) | Resistance<br>(m²K/W) | Bridging     |
| Mineral wool           | 300                                      | 0.0400                  | 7.5000                | 100.00       |
| Mineral wool           | 100                                      | 0.0400                  | 2.5000                | 88.89 Timber |
| Plasterboard, standard | 12.5                                     | 0.2100                  | 0.0595                | 100.00       |
| Plaster, standard      | 3                                        | 0.4000                  | 0.0075                | 100.00       |

Comments

## Heat Loss Floors

| Type                             | Ground Floor - Solid               |                         |                       |              |
|----------------------------------|------------------------------------|-------------------------|-----------------------|--------------|
| Construction                     | Suspended concrete floor, carpeted |                         |                       |              |
| U-value                          | 0.14                               | W/m²K                   |                       |              |
| Area                             | 40.67                              | m²                      |                       |              |
| Layer Name                       | Thickness<br>(mm)                  | Conductivity<br>(W/m.K) | Resistance<br>(m²K/W) | Bridging     |
| AAC (600 kg/m³)/ concrete        | 100                                | 0.1800                  | 0.5556                | 86.30 Mortar |
| Kooltherm K3 Floorboard (45mm +) | 100                                | 0.0200                  | 5.0000                | 100.00       |
| Screed                           | 65                                 | 1.1500                  | 0.0565                | 100.00       |

Comments

## Opening Types

| Description   | Type             | Glazing       | Frame Type | U Value<br>(W/m²K) |
|---------------|------------------|---------------|------------|--------------------|
| Entrance Door | Half Glazed Door | Double glazed |            | 1.40               |
| Windows       | Window           | Double glazed |            | 1.40               |
| Patio Doors   | Window           | Double glazed |            | 1.40               |
| Comments      |                  |               |            |                    |

# DWELLING SIGN OFF REPORT

## Openings

| Name            | Opening Type     | Location      | Orientation | Area (m <sup>2</sup> ) |
|-----------------|------------------|---------------|-------------|------------------------|
| Front Elevation | Half Glazed Door | [1] Main Wall | West        | 2.15                   |
| Front Elevation | Window           | [1] Main Wall | West        | 4.06                   |
| Side Elevation  | Window           | [1] Main Wall | South       | 1.44                   |
| Rear Elevation  | Window           | [1] Main Wall | East        | 5.22                   |
| Rear Elevation  | Window           | [1] Main Wall | East        | 2.03                   |
| Comments        |                  |               |             |                        |

## Thermal Bridging

Calculate Bridges

### List of Bridges

| Bridge Type                                                      | Source Type            | Length (m) | Psi (W/mK) | Reference |
|------------------------------------------------------------------|------------------------|------------|------------|-----------|
| E1 Steel lintel with perforated steel base plate                 | Independently assessed | 10.68      | 0.030      |           |
| E3 Sill                                                          | Independently assessed | 9.66       | 0.015      |           |
| E4 Jamb                                                          | Independently assessed | 25.10      | 0.010      |           |
| E5 Ground floor (normal)                                         | Independently assessed | 18.67      | 0.056      |           |
| E6 Intermediate floor within a dwelling                          | Independently assessed | 17.66      | 0.001      |           |
| E10 Eaves (insulation at ceiling level)                          | Independently assessed | 10.74      | 0.101      |           |
| E12 Gable (insulation at ceiling level)                          | Independently assessed | 9.95       | 0.055      |           |
| E16 Corner (normal)                                              | Independently assessed | 12.42      | 0.059      |           |
| E17 Corner (inverted – internal area greater than external area) | Independently assessed | 2.40       | -0.100     |           |
| E18 Party wall between dwellings                                 | Independently assessed | 10.02      | 0.038      |           |
| P1 Party wall - Ground floor                                     | Table K1 - Default     | 8.95       | 0.160      |           |
| P2 Party wall - Intermediate floor within a dwelling             | Table K1 - Default     | 7.94       | 0.000      |           |
| P4 Party wall - Roof (insulation at ceiling level)               | Table K1 - Default     | 8.95       | 0.240      |           |

Y-value 0.046 W/m<sup>2</sup>K

Comments

Where specific construction details have been used documentary evidence should be provided to the SAP assessor, usually in the form of signed checklists.

## Pressure Testing

Yes

As Built AP<sub>50</sub> m<sup>3</sup>/(h.m<sup>2</sup>) @ 50 Pa

Where an air pressure test has been carried out a copy of the test certificate should be forwarded to the SAP assessor.

Comments

# DWELLING SIGN OFF REPORT

## Section 3: Dwelling Systems

### Fans, Open Fireplaces, Flues

|                              | MHS | SHS | Other | Total |
|------------------------------|-----|-----|-------|-------|
| Number of Chimneys           | 0   |     | 0     | 0     |
| Number of open flues         | 0   |     | 0     | 0     |
| Number of intermittent fans  |     |     |       | 4     |
| Number of passive vents      |     |     |       | 0     |
| Number of flueless gas fires |     |     |       | 0     |
| Comments                     |     |     |       |       |

### Internal Lighting

|                                 |        |   |
|---------------------------------|--------|---|
| Total number of light fittings  | 11     |   |
| Total number of L.E.L. fittings | 11     |   |
| Percentage of L.E.L. fittings   | 100.00 | % |
| Comments                        |        |   |

### External Lighting

|                         |     |
|-------------------------|-----|
| External lights fitted  | Yes |
| Light and motion sensor | Yes |
| Comments                |     |

### Electricity Tariff

|          |
|----------|
| Standard |
| Comments |

### Main Heating 1

|                                 |                                                     |
|---------------------------------|-----------------------------------------------------|
| Fuel Type                       | Mains gas                                           |
| Main Heating                    | Mains gas BGW Post 98 Combi condens. with auto ign. |
| Efficiency (Split Efficiencies) | 89.3 %                                              |
| Brand, Model                    | Vaillant, ecoFIT sustain 825                        |
| Flue Type                       | Balanced                                            |
| Fan Assisted Flue               | Yes                                                 |
| Heat Emitter                    | Radiators                                           |
| Flow Temperature                | Normal (> 45°C)                                     |
| Comments                        |                                                     |

### Heating Controls

|                    |                                          |
|--------------------|------------------------------------------|
| Description        | CBE Programmer, room thermostat and TRVs |
| Boiler Interlock   | Yes                                      |
| Delayed Start Stat | No                                       |
| Compensator        |                                          |
| Comments           |                                          |

# DWELLING SIGN OFF REPORT

Main Heating 2

Comments

Water Heating System

Water Heating

Supplementary Immersion

Comments

## Section 4: Dwelling Renewable Energy

## Section 5: Declaration

I confirm that all details provided above are accurate to the best of my knowledge.

Signed .....

Date .....