



Designed SAP Calculation

Development at 16 Richmond Road, Caversham, Reading
Carbon Emissions Calculation - Part L1A

17th August 2021

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Melin Consultants are accredited to provide a range of calculation, assessment and testing services.

They are members of CIBSE Low Carbon Consultants.

Melin Consultants fully check all work prior to completion and a robust audit trail exists to demonstrate accountability.

All information within this document is based on evidence provided in the form of drawings and specifications.

CPD (Continual Professional Development) records are kept and all technical staff are required to complete a minimum 20 hours per year in training activities.

Low Carbon Consultants have the expertise and necessary qualifications to offer advice in a professional capacity on matters relating to Part L of the Building Regulations and sustainability within the construction sector.

This document contains the following information:

1. U Values used
2. Building Regulations Reports and Predicted Energy Assessment
3. Overview

Project Ref: 709214

Report Date: 17/08/2021

Report author: Gideon Griffiths

Function: Technical Consultant

Authorised by: Darren Baker

Function: Senior Consultant

1. U Values

The table below outlines the Part L1A threshold or 'back-stop' U values alongside the proposed dwelling U values that have been used to run the calculation.

Building Element	Part L1A Threshold U Value	Proposed U Values*
Wall	0.30	0.18
Floor	0.25	0.16
Roof	0.20	0.17
Window	1.8	1.5

*Please note that these U Values are based on the element's component parts listed in section 3 of this report. If the element construction changes the U value may also change.

Appendix 1: SAP Calculation Outputs

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.41
 Printed on 17 August 2021 at 14:37:32

Project Information:

Assessed By: Gideon Griffiths (STRO030315)

Building Type: Detached House

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 272.97m²

Site Reference : 709214

Plot Reference: House 1

Address : House 1, Development at 16 Richmond Rd, Reading

Client Details:

Name: Orwell RE Richmond

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER) 19.62 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 16.47 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 52.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 47.6 kWh/m² **OK**

2 Fabric U-values

Element	Average	Highest	
External wall	0.19 (max. 0.30)	0.21 (max. 0.70)	OK
Floor	0.16 (max. 0.25)	0.16 (max. 0.70)	OK
Roof	0.16 (max. 0.20)	0.17 (max. 0.35)	OK
Openings	1.50 (max. 2.00)	1.50 (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 5.00 (design value)
 Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Heat pumps with radiators or underfloor heating - electric
 Air source heat pump with flow temperature ≤ 35°C

Secondary heating system: Room heaters - wood
 Closed room heater
 Efficiency 65.0 %
 Minimum 65.0 % **OK**

5 Cylinder insulation

Hot water Storage: Measured cylinder loss: 2.27 kWh/day
 Permitted by DBSCG: 2.86 kWh/day **OK**

Regulations Compliance Report

Primary pipework insulated: Yes

OK

6 Controls

Space heating controls TTZC by plumbing and electrical services
 Hot water controls: Cylinderstat
 Independent timer for DHW

OK

OK

OK

7 Low energy lights

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

OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South West England): Not significant

OK

Based on:

Overshading: Average or unknown
 Windows facing: North West 8.72m²
 Windows facing: South East 18.64m²
 Windows facing: South West 8.22m²
 Roof windows facing: North East 1.46m²
 Ventilation rate: 8.00

10 Key features

Secondary heating (wood logs)
 Secondary heating fuel wood logs

Predicted Energy Assessment



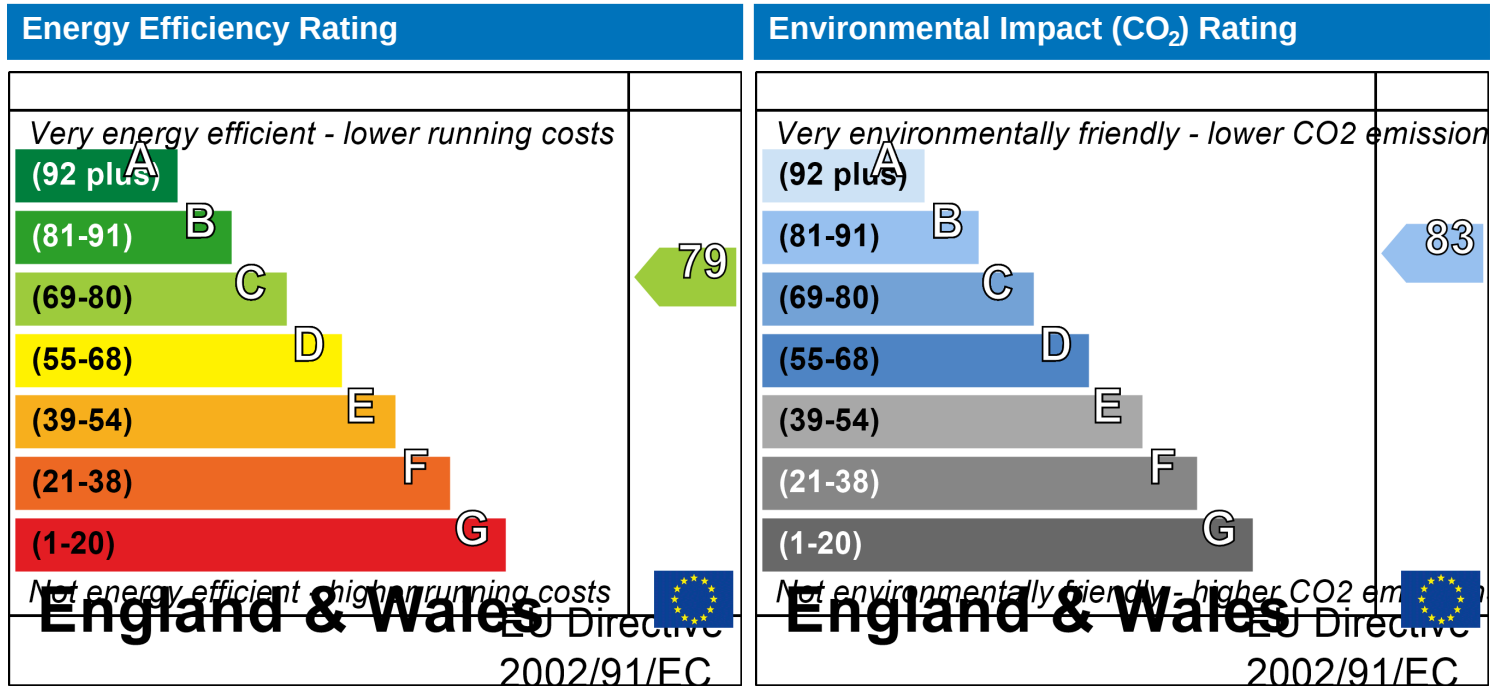
House 1
Development at 16 Richmond Rd
Reading

Dwelling type:
Date of assessment:
Produced by:
Total floor area:

Detached House
17 August 2021
Gideon Griffiths
272.97 m²

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

Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO₂) emissions.



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

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions. The higher the rating the less impact it has on the environment.

SAP Input

Property Details: House 1

Address: House 1, Development at 16 Richmond Rd, Reading
Located in: England
Region: South West England
UPRN:
Date of assessment: 17 August 2021
Date of certificate: 17 August 2021
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Calculated 172.66
Water use <= 125 litres/person/day: True
PCDF Version: 480

Property description:

Dwelling type: House
Detachment: Detached
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 116.15 m² 2.85 m
 Floor 1 115.78 m² 2.65 m
 Floor 2 41.04 m² 1.6 m
Living area: 21.4 m² (fraction 0.078)
Front of dwelling faces: North West

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
NW	SAP 2012	Half glazed	double-glazed	No	PVC-U
SE	SAP 2012	Half glazed	double-glazed	No	PVC-U
NW	Manufacturer	Windows	double-glazed	No	PVC-U
SE	Manufacturer	Windows	double-glazed	No	PVC-U
SW	Manufacturer	Windows	double-glazed	No	PVC-U
NE	Manufacturer	Roof Windows	double-glazed	No	PVC-U

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
NW	mm	0.7	0.76	1.5	2.5	1
SE	mm	0.7	0.76	1.5	2.2	1
NW	16mm or more	0.7	0.76	1.5	8.72	1
SE	16mm or more	0.7	0.76	1.5	18.64	1
SW	16mm or more	0.7	0.76	1.5	8.22	1
NE	16mm or more	0.7	0.76	1.5	1.46	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
NW		External Walls	North West	0	0
SE		External Walls	South East	0	0
NW		External Walls	North West	0	0
SE		External Walls	South East	0	0
SW		External Walls	South West	0	0
NE		Sloped	North East	0.001	0

Overshading: Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
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SAP Input

External Elements

External Walls	220.68	40.28	180.4	0.18	0	False	150
Secondary Walls	42.19	0	42.19	0.21	0	False	9
Sloped	60.92	1.46	59.46	0.17	0		9
Plane	64.04	0	64.04	0.14	0		9
Flat	20.13	0	20.13	0.16	0		9
GF	116.15			0.16			110
Exposed FF	16.2			0.16			20

Internal Elements

Internal walls	190.17						9
FF	91.78						9
SF	41.04						9
FF	91.78						18
SF	41.04						18

Party Elements

Thermal bridges:

Thermal bridges:	User-defined (individual PSI-values) Y-Value = 0.0535					
	Length	Psi-value				
[Approved]	25.86	0.3	E2	Other lintels (including other steel lintels)		
[Approved]	17.65	0.04	E3	Sill		
[Approved]	53.68	0.05	E4	Jamb		
[Approved]	50.84	0.16	E5	Ground floor (normal)		
[Approved]	71.91	0.07	E6	Intermediate floor within a dwelling		
[Approved]	50.84	0.04	E11	Eaves (insulation at rafter level)		
[Approved]	0	0.04	E13	Gable (insulation at rafter level)		
[Approved]	50.6	0.09	E16	Corner (normal)		
[Approved]	22.2	-0.09	E17	Corner (inverted internal area greater than external area)		

Ventilation:

Pressure test:	Yes (As designed)
Ventilation:	Natural ventilation (extract fans)
Number of chimneys:	0
Number of open flues:	1 (main: 0, secondary: 1, other: 0)
Number of fans:	6
Number of passive stacks:	0
Number of sides sheltered:	2
Pressure test:	5

Main heating system:

Main heating system:	Heat pumps with radiators or underfloor heating
	Electric heat pumps
	Fuel: Electricity
	Info Source: SAP Tables
	SAP Table: 214
	Air source heat pump with flow temperature <= 35°C
	Underfloor heating and radiators, pipes in screed above insulation
	Central heating pump : 2013 or later
	Design flow temperature: Unknown
	Open
	Boiler interlock: Yes

Main heating Control:

Main heating Control:	Time and temperature zone control by suitable arrangement of plumbing and electrical services
	Control code: 2207

Secondary heating system:

Secondary heating system:	Room heaters
	Solid fuel room heaters
	Fuel :wood logs
	Info Source: SAP Tables
	Closed room heater
	HETAS Approved

SAP Input

Water heating:

Water heating:	From main heating system
	Water code: 901
	Fuel :Electricity
	Hot water cylinder
	Cylinder volume: 300 litres
	Cylinder insulation: Factory 100 mm
	Primary pipework insulation: True
	Cylinderstat: True
	Cylinder in heated space: True
	Solar panel: False

Others:

Electricity tariff:	Standard Tariff
In Smoke Control Area:	Unknown
Conservatory:	No conservatory
Low energy lights:	100%
Terrain type:	Low rise urban / suburban
EPC language:	English
Wind turbine:	No
Photovoltaics:	None
Assess Zero Carbon Home:	No

Regulations Compliance Report

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 Printed on 17 August 2021 at 14:37:28

Project Information:

Assessed By: Gideon Griffiths (STRO030315)

Building Type: Detached House

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 272.97m²

Site Reference : 709214

Plot Reference: House 2

Address : House 2, Development at 16 Richmond Rd, Reading

Client Details:

Name: Orwell RE Richmond

Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)

20.02 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

16.82 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

53.3 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

48.8 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.19 (max. 0.30)

0.21 (max. 0.70)

OK

Floor

0.16 (max. 0.25)

0.16 (max. 0.70)

OK

Roof

0.16 (max. 0.20)

0.17 (max. 0.35)

OK

Openings

1.50 (max. 2.00)

1.50 (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

5.00 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Heat pumps with radiators or underfloor heating - electric

Air source heat pump with flow temperature ≤ 35°C

Secondary heating system:

Room heaters - wood

Closed room heater

Efficiency 65.0 %

Minimum 65.0 %

OK

5 Cylinder insulation

Hot water Storage:

Measured cylinder loss: 2.27 kWh/day

Permitted by DBSCG: 2.86 kWh/day

OK

Regulations Compliance Report

Primary pipework insulated: Yes

OK

6 Controls

Space heating controls TTZC by plumbing and electrical services
 Hot water controls: Cylinderstat
 Independent timer for DHW

OK

OK

OK

7 Low energy lights

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

OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (South West England): Not significant

OK

Based on:

Overshading: Average or unknown
 Windows facing: North West 8.72m²
 Windows facing: South East 18.64m²
 Windows facing: North East 8.22m²
 Roof windows facing: South West 1.46m²
 Ventilation rate: 8.00

10 Key features

Secondary heating (wood logs)
 Secondary heating fuel wood logs

Predicted Energy Assessment



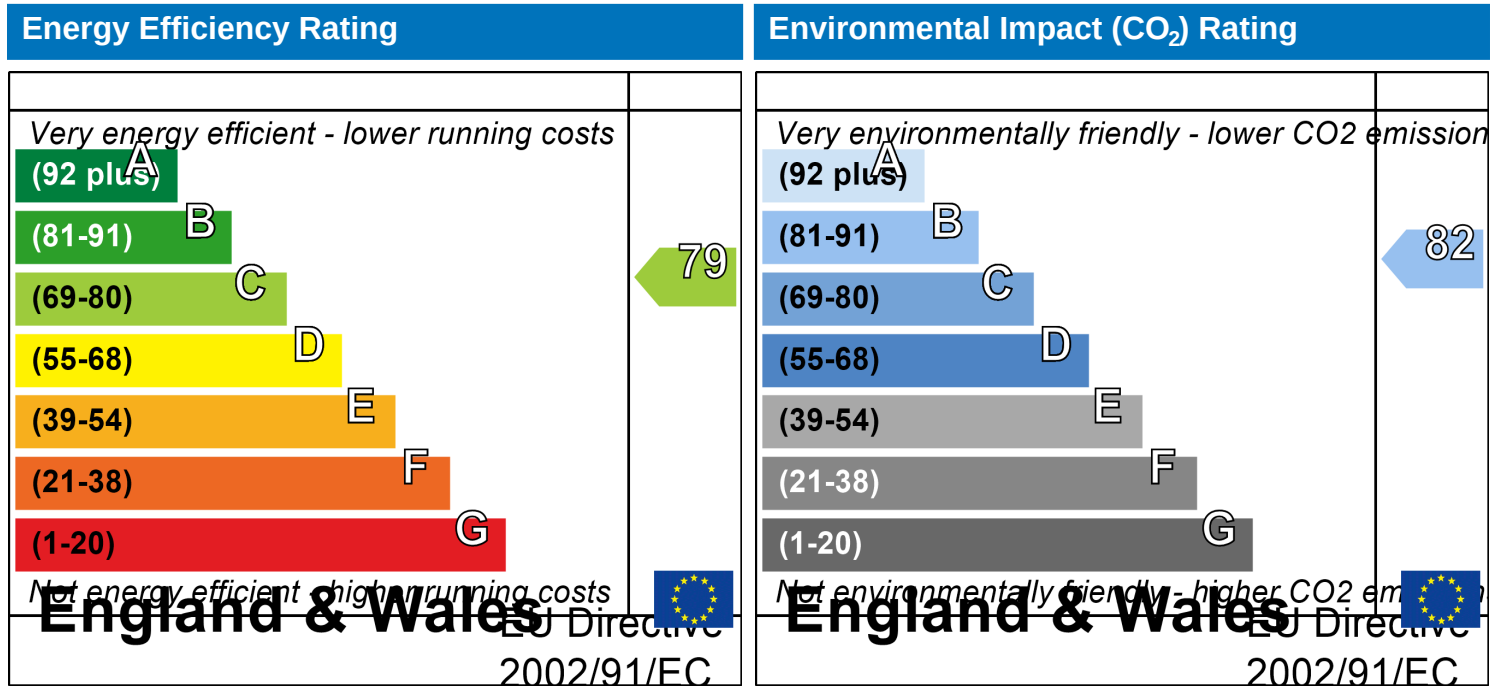
House 2
Development at 16 Richmond Rd
Reading

Dwelling type:
Date of assessment:
Produced by:
Total floor area:

Detached House
17 August 2021
Gideon Griffiths
272.97 m²

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SAP Input

Property Details: House 2

Address: House 2, Development at 16 Richmond Rd, Reading
Located in: England
Region: South West England
UPRN:
Date of assessment: 17 August 2021
Date of certificate: 17 August 2021
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Calculated 172.66
Water use <= 125 litres/person/day: True
PCDF Version: 480

Property description:

Dwelling type: House
Detachment: Detached
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 116.15 m² 2.85 m
 Floor 1 115.78 m² 2.65 m
 Floor 2 41.04 m² 1.6 m
Living area: 21.4 m² (fraction 0.078)
Front of dwelling faces: North West

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
NW	SAP 2012	Half glazed	double-glazed	No	PVC-U
SE	SAP 2012	Half glazed	double-glazed	No	PVC-U
NW	Manufacturer	Windows	double-glazed	No	PVC-U
SE	Manufacturer	Windows	double-glazed	No	PVC-U
SW	Manufacturer	Windows	double-glazed	No	PVC-U
NE	Manufacturer	Roof Windows	double-glazed	No	PVC-U

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
NW	mm	0.7	0.76	1.5	2.5	1
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Name:	Type-Name:	Location:	Orient:	Width:	Height:
NW		External Walls	North West	0	0
SE		External Walls	South East	0	0
NW		External Walls	North West	0	0
SE		External Walls	South East	0	0
SW		External Walls	North East	0	0
NE		Sloped	South West	0.001	0

Overshading: Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
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Party Elements

Thermal bridges:

Thermal bridges:	User-defined (individual PSI-values) Y-Value = 0.0535					
	Length	Psi-value				
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[Approved]	17.65	0.04	E3	Sill		
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[Approved]	50.84	0.16	E5	Ground floor (normal)		
[Approved]	71.91	0.07	E6	Intermediate floor within a dwelling		
[Approved]	50.84	0.04	E11	Eaves (insulation at rafter level)		
[Approved]	0	0.04	E13	Gable (insulation at rafter level)		
[Approved]	50.6	0.09	E16	Corner (normal)		
[Approved]	22.2	-0.09	E17	Corner (inverted internal area greater than external area)		

Ventilation:

Pressure test:	Yes (As designed)
Ventilation:	Natural ventilation (extract fans)
Number of chimneys:	0
Number of open flues:	1 (main: 0, secondary: 1, other: 0)
Number of fans:	6
Number of passive stacks:	0
Number of sides sheltered:	2
Pressure test:	5

Main heating system:

Main heating system:	Heat pumps with radiators or underfloor heating
	Electric heat pumps
	Fuel: Electricity
	Info Source: SAP Tables
	SAP Table: 214
	Air source heat pump with flow temperature <= 35°C
	Underfloor heating and radiators, pipes in screed above insulation
	Central heating pump : 2013 or later
	Design flow temperature: Unknown
	Open
	Boiler interlock: Yes

Main heating Control:

Main heating Control:	Time and temperature zone control by suitable arrangement of plumbing and electrical services
	Control code: 2207

Secondary heating system:

Secondary heating system:	Room heaters
	Solid fuel room heaters
	Fuel :wood logs
	Info Source: SAP Tables
	Closed room heater
	HETAS Approved

SAP Input

Water heating:

Water heating:	From main heating system
	Water code: 901
	Fuel :Electricity
	Hot water cylinder
	Cylinder volume: 300 litres
	Cylinder insulation: Factory 100 mm
	Primary pipework insulation: True
	Cylinderstat: True
	Cylinder in heated space: True
	Solar panel: False

Others:

Electricity tariff:	Standard Tariff
In Smoke Control Area:	Unknown
Conservatory:	No conservatory
Low energy lights:	100%
Terrain type:	Low rise urban / suburban
EPC language:	English
Wind turbine:	No
Photovoltaics:	None
Assess Zero Carbon Home:	No

Overview

Development at 16 Richmond Road, Caversham,
Reading



Building Element	Construction	U Value
Wall	Cavity Wall, 100mm Ecotherm	0.18
Floor	100mm Celotex	0.16
Roof	Various U Value	0.17/0.16/0.14
Window	As per U Value given	1.5
Door	As per U Value given	1.5
System		Efficiency/Details
Primary heating	Air Source Heat Pump feeding underfloor heating and radiators	170%
Additional heating	Log burner	65%
Water Heating	300L cylinder from main heating system	
Heating controls	Time and temperature zone control	
Ventilation	Natural throughout	
Renewables	None used	
Others		
	A design air permeability of $5\text{m}^3/(\text{h.m}^2)$ at 50Pa has been allowed for.	
Thermal Bridging	Accredited Construction Details (ACD's) have been adopted.	
Lighting	100% L.E.L fittings have been allowed for.	

Upon completion, to enable Melin to issue the as built SAP and EPC please provide/confirm the following (please allow 5 working days from Melin receiving the information below to complete the as built SAP and EPC):

I confirm that the building has been built in accordance with the specification provided.	
Confirm exact make and model of boiler.	
Confirm full postal address.	
Provide manufacture literature of windows, external doors and roof lights confirming unit u-values and g-values.	
To enable the as-built SAP reports and EPCs to be issued please ensure that this form is signed and dated below	
Client/contractor Signature:	Date: