

# Energy strategy report

Proposed Development Of 26 New Affordable Houses Comprising  
11 x 2 Bedroom Units Plus 15 x 3 Bedroom Units

FIRS WOOD CLOSE, NORTHAW, POTTERS BAR, EN7 4BY



April 2019

Client: Watford Community Housing Trust

Planning Consultants: DLA Planning

Prepared by



accredited SAP assessors

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## **1.0 INTRODUCTION**

### **1.1 Brief**

Monitor Energy Consultancy have been instructed by DLA Town Planning Ltd, on behalf of their Client, Watford Community Housing Trust to undertake an Energy Report, to appraise how the proposed development for the construction of the 26 new affordable houses will respond to the Welwyn Hatfield Borough Council's Energy Efficiency Policy R3 which requires the development to include measures to maximise energy conservation through the design of buildings, site layout and provision of landscaping.

The purpose of the report is to demonstrate how the development will maximise energy conservation and reduce carbon emissions beyond the requirements of current Building Regulations through passive and active energy conservation methods while providing a viable and deliverable solution appropriate for affordable housing.

### **1.2 Proposed Development**

The proposed development comprises the construction of 26 new affordable houses comprising 11 x 2 bed and 15 x 3 bed houses, each with private parking and rear gardens. The proposals have been designed to make optimum use of the land available

### **1.3 Site Description**

The site lies between Firs Wood Close to the West, Coopers Lane Road to the South and The Oshwal Centre to the East, with access proposed from Firs Wood Close.

## 2.0 EXECUTIVE SUMMARY

The following statement seeks to demonstrate that the energy efficiency of the development will achieve more than 12% improvement in total carbon emissions compared to current Building Regulations 2013 requirements.

In this instance the use of passive and active energy efficient measures have been adopted as the main approach to achieve this target. Specific commitments and key measures to achieve the target CO<sub>2</sub> reductions include:

- A consistent fabric first approach to ensure the thermal elements are insulated to a high standard in the first instance using enhanced standards of insulation for the floors, walls and roofs and high performance double-glazed windows and doors.
- Low air leakage rates.
- High standard detailing to minimise heat loss due to thermal bridging at junctions.
- Highly efficient gas combi boilers with advanced zone controls.
- 100% low energy lighting.
- Incorporation of proven and well recognised technologies with limited requirements for future maintenance.
- No visible intrusion from solar or photovoltaic panels on the development while retaining the opportunity for these to be provided in the future.

This appraisal demonstrates that by adopting the above approach a reduction in carbon emissions in excess of 12% compared to Building Regulation L1A 2013 resulting in a total saving of **5.27 tonnes of CO<sub>2</sub>/year** will be achieved for the regulated emissions from this development.

## 3.0 ESTABLISHING CO<sub>2</sub> EMISSIONS

### 3.1 Standard Case Energy Demand Assessment

The dwellings have been modelled using SAP 2012 to establish the Standard Case dwelling carbon emission rates to meet Building Regulations Part L1A 2013 compliance.

The calculated TERs (Target Emission Rates) are as tabulated below with sample individual TERS included in Appendix A.

Plot no	Total Area GIA (m2)	Type	Standard Case TER CO <sub>2</sub> kg/m2/yr	Total Regulated CO <sub>2</sub> emissions kg/yr
Plot 1	83.2	2 bed semi	18.30	1522.56
Plot 2	83.2	2 bed semi	18.30	1522.56
Plot 3	83.2	2 bed semi	18.30	1522.56
Plot 4	83.2	2 bed semi	18.30	1522.56
Plot 5	96.3	3 bed detached	17.07	1483.02
Plot 6	83.2	2 bed semi	18.30	1522.56
Plot 7	83.2	2 bed semi	18.30	1522.56
Plot 8	83.2	2 bed semi	18.25	1518.40
Plot 9	96.3	3 bed semi	17.12	1648.66
Plot 10	96.3	3 bed semi	17.12	1648.66
Plot 11	83.2	2 bed semi	18.25	1518.40
Plot 12	96.3	3 bed semi	16.90	1627.47
Plot 13	96.3	3 bed semi	16.90	1627.47
Plot 14	96.3	3 bed semi	16.77	1614.95
Plot 15	96.3	3 bed semi	16.77	1614.95
Plot 16	96.3	3 bed semi	16.77	1614.95
Plot 17	96.3	3 bed semi	16.77	1614.95
Plot 18	96.3	3 bed semi	16.77	1614.95
Plot 19	96.3	3 bed semi	16.77	1614.95
Plot 20	96.3	3 bed semi	16.77	1614.95
Plot 21	96.3	3 bed semi	16.77	1614.95
Plot 22	96.3	3 bed semi	17.24	1660.21
Plot 23	96.3	3 bed semi	17.24	1660.21
Plot 24	83.2	2 bed end	17.8	1231.36
Plot 25	96.3	2 bed mid	16.6	1381.12
Plot 26	83.2	2 bed end	17.8	1231.36
<b>TOTAL</b>	<b>2359.7</b>		<b>(average) 17.35</b>	<b>40,951.32</b>

**Table 3.1 Standard Case Regulated loads - TER results for all dwellings**

Table 3.1 demonstrates that the total regulated CO<sub>2</sub> emissions due to heating, hot water, pumps and fans and lighting for the development if built to Building Regulations Part L1A standard would be **40,951.32 kg/yr**.

### 3.2 Actual Case Energy Demand Assessment

For the actual proposed case, the following improvements have been incorporated across the development, in order to reduce energy demand:

Element	Building Regulations standard	Proposed
Ground floor U value	0.22 W/m <sup>2</sup> K	0.12 W/m <sup>2</sup> K
External walls U value	0.28 W/m <sup>2</sup> K	Fair faced brick walls 0.11 W/m <sup>2</sup> K Other walls 0.13 W/m <sup>2</sup> K
Party walls	0.2 W/m <sup>2</sup> K	0.0W/m <sup>2</sup> K
Roofs	0.16 W/m <sup>2</sup> K	0.11 W/m <sup>2</sup> K
Windows and doors	1.6 W/m <sup>2</sup> K	1.4 W/m <sup>2</sup> K
Air permeability rate	10.0m <sup>3</sup> /hm <sup>2</sup> (@50Pa)	5.0m <sup>3</sup> /hm <sup>2</sup> (@50Pa)
Thermal bridging y value	0.15	0.04 approx
Gas boiler efficiency	88%	89.7%
Boiler controls	Programmer, thermostat and TRVs	Time and temperature zone controls for separate rooms
Energy efficient lighting	75% of lights	100% of lights

#### Fabric Efficiency improvements

- Improved U values of 0.12W/m<sup>2</sup>K for the ground floor using 150mm Celotex XR4000 or similar.
- Improved U values of 0.11W/m<sup>2</sup>K for the external and sheltered walls.
- Improved U values of 0.13W/m<sup>2</sup>K for brick walls and 0.11W/m<sup>2</sup>K for rendered/ boarded walls using 150mm Xtratherm insulation and lightweight aircrete blocks internally with plasterboard dry lining.
- Improved U value of 0.0 W/m<sup>2</sup>K for the party walls by ensuring these are fully insulated so there is no heat loss.
- Improved U-value of 0.11 W/m<sup>2</sup>K for all roofs using 400mm mineral wool.

- Hi-therm lintels to minimise heat loss at this junction
- All windows to be high-performance double-glazed low e, with 16mm minimum gap, argon filled to achieve a U value of 1.4W/m<sup>2</sup>K.
- All junctions in construction to be well sealed to achieve a high level of air tightness with the properties air tested to achieve an air permeability rate of 5 or lower.
- Xtratherm thermal bridging details to be adopted for all junctions where available to ensure insulation is fully overlapped to reduce thermal bridging.

#### **Additional Energy efficiency measures**

- Ecotec or similar gas combi boiler 89.7% efficient with zone controls, underfloor heating to ground floor, radiators to first floor,
- 100% low energy lighting.

The dwellings have been modelled incorporating the improvements detailed above and the actual proposed DERs (Dwelling Emission Rates) are tabulated below in Table 3.2 with sample individual DERs included in Appendix A

Plot no	Total Area GIA (m2)	Type	Actual Case DER CO <sub>2</sub> kg/m2/yr	Total Regulated CO <sub>2</sub> emissions kg/yr
Plot 1	83.2	2 bed semi	15.39	1280.45
Plot 2	83.2	2 bed semi	15.39	1280.45
Plot 3	83.2	2 bed semi	15.39	1280.45
Plot 4	83.2	2 bed semi	15.39	1280.45
Plot 5	96.3	3 bed detached	15.4	1483.02
Plot 6	83.2	2 bed semi	15.39	1280.45
Plot 7	83.2	2 bed semi	15.39	1280.45
Plot 8	83.2	2 bed semi	15.34	1276.23
Plot 9	96.3	3 bed semi	15.32	1475.32
Plot 10	96.3	3 bed semi	15.32	1475.32
Plot 11	83.2	2 bed semi	15.34	1276.23
Plot 12	96.3	3 bed semi	15.07	1451.24
Plot 13	96.3	3 bed semi	15.07	1451.24
Plot 14	96.3	3 bed semi	14.96	1440.65
Plot 15	96.3	3 bed semi	14.91	1435.83
Plot 16	96.3	3 bed semi	14.91	1435.83
Plot 17	96.3	3 bed semi	14.96	1440.65
Plot 18	96.3	3 bed semi	14.96	1440.65
Plot 19	96.3	3 bed semi	14.91	1435.83
Plot 20	96.3	3 bed semi	14.91	1435.83
Plot 21	96.3	3 bed semi	14.96	1440.65
Plot 22	96.3	3 bed semi	15.45	1487.84
Plot 23	96.3	3 bed semi	15.45	1487.84
Plot 24	83.2	2 bed end	14.8	1231.36
Plot 25	96.3	2 bed mid	13.94	1159.81
Plot 26	83.2	2 bed end	14.8	1231.36
<b>TOTAL</b>	<b>2359.7</b>		<b>(average) 15.12</b>	<b>35675.52</b>

**Table 3.2 Actual Proposed Case Regulated loads - DER results for all dwellings**

Table 3.2 demonstrates that the total regulated CO<sub>2</sub> emissions for the development if built including the improvements listed above would be reduced to **35, 675.52 kg/yr**.

This represents a reduction of  $40951.32 - 35675.52 = 5275.80 \text{ kgCO}_2/\text{yr}$  which is a **12.88%** reduction of CO<sub>2</sub> emissions compared with current 2013 Building Regulations.



## **4.0 RENEWABLE ENERGY TECHNOLOGIES ASSESSMENT**

Seven potential renewable energy technologies were considered for integration within the proposed development. Feasibility is based on location, cost, payback for both initial payment and ongoing maintenance and suitability.

### **4.1 Photovoltaic cells**

There is an opportunity to install photovoltaic cells on the roofs however this option has been discarded for cost reasons and because of the visual intrusion these create. However, it would be possible to install these in the future.

### **4.2 Solar Water Heating**

The development also has the potential to use solar water heating with panels located on roof areas however these would therefore be competing for the same space as the PV panels and would not be able to achieve as much carbon reduction as PV.

### **4.3 Ground Source Heat pump**

Approximately 10m of trench for slinky pipes would be required to obtain 1kW output of heating. For a small to average heat pump of 6kW this would require 60m for each unit, a total of 1560m, therefore there would not be adequate space on the site for this option. The alternative method involving drilling a borehole would be extremely expensive and not generally considered a feasible option for small scale domestic applications.

### **4.4 Air Source Heat Pump**

Air source heat pumps are not as efficient as ground source heat pumps and would require individual units which would be both visually and audibly obtrusive. The units would be both more expensive to run and would potentially require more maintenance. This option has therefore been discarded.

### **4.6 Wind**

Wind turbines are only appropriate where the average wind velocity is in excess of 6m/s. The DECC wind speed database estimates the average wind speed in this location is less

than 4.17m/s at an average height of 20m above ground level which would not create a viable supply of energy. In addition, a wind turbine would be both visually and audibly intrusive and not suitable for this small site where there is insufficient space to accommodate it. This option has therefore been discarded.

#### **4.7 Biomass**

Biomass boilers would require increased management, maintenance and space for both a central energy plant room and biomass store. In addition, there would be a requirement for biomass deliveries via heavy vehicles, therefore it is considered that this site and its location are not suitable for fuel delivery, storage or local supply. This option has therefore been discarded.

### **5.0 CONCLUSIONS**

This report identifies how **12.88** % of regulated carbon emissions for which this development is responsible, are proposed to be off-set by various energy efficiency measures compared to a Building Regulations Part L1A 2013 compliant scheme.

The analysis has shown that by incorporating energy efficient construction and installations, there is a significant reduction in the development CO<sub>2</sub> emissions based on the SAP calculation method. The potential on-site low and zero carbon technologies have also been assessed taking into account the scale of this particular development and constraints such as location, visual impact, preventing additional vehicle movements and local pollution concerns.

A summary of the results of the Standard Case SAP 2012 TER and DER figures for each house type are included in **APPENDIX A**

**APPENDIX A - SAP 2012 TER and DER WORKSHEETS**

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Property Reference	001		Issued on Date	25/03/2019	
Assessment Reference	Plots 1-4, 6 and 7	Prop Type Ref	2 bed semi		
Property	Firs Wood Close, Northaw, Potters Bar, EN7 4BY				
SAP Rating	85 B	DER	15.39	TER	18.30
Environmental	88 B	% DER<TER	15.90		
CO <sub>2</sub> Emissions (t/year)	1.06	DFEE	38.19	TFEE	52.50
General Requirements Compliance	Pass	% DFEE<TFEE	27.25		
Assessor Details	Mrs. Nicola Battista, Monitor Energy Consultancy, Tel: 01752830291, nicola@monitor-ec.co.uk			Assessor ID	L706-0001
Client					

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

Orientation	South 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:	18.30 m	41.60 m <sup>2</sup>	2.40 m
1st Storey:	18.30 m	41.60 m <sup>2</sup>	2.60 m

7.0 Living Area  m<sup>2</sup>

8.0 Thermal Mass Parameter  
 Thermal Mass   
 kJ/m<sup>2</sup>K

#### 9.0 External Walls

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.13	43.92	33.98
External Wall 2	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.11	47.58	40.98

#### 9.1 Party Walls

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Party Wall 1	Filled Cavity with Edge Sealing	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill	0.00	42.50

#### 10.0 External Roofs

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	41.60	41.60

#### 11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Heat Loss Floor 1	Ground Floor - Solid	Slab on ground, screed over insulation	0.12	41.60

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

### 12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m <sup>2</sup> K)
Opening Type 1	Manufacturer	Solid Door							1.40
Opening Type 2	Manufacturer	Window	Double Low-E Hard 0.15			0.72		0.70	1.40

### 13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m <sup>2</sup> )	Curtain Closed
Opening 1	Solid Door	[1] External Wall 1	South West							2.16	
Opening 2	Window	[1] External Wall 1	South West	None	0.00					2.16	
Opening 3	Window	[2] External Wall 2	South West	None	0.00					2.16	
Opening 4	Window	[2] External Wall 2	South West	None	0.00					0.76	
Opening 5	Window	[2] External Wall 2	North East	None	0.00					0.76	
Opening 6	Window	[2] External Wall 2	North East	None	0.00					2.16	
Opening 7	Window	[1] External Wall 1	North East	None	0.00					0.76	
Opening 8	Window	[2] External Wall 2	North West	None	0.00					0.76	
Opening 9	Window	[1] External Wall 1	North East	None	0.00					4.10	
Opening 10	Window	[1] External Wall 1	North West	None	0.00					0.76	

### 14.0 Conservatory

### 15.0 Draught Proofing

 %

### 16.0 Draught Lobby

### 17.0 Thermal Bridging

### 17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	8.93	0.050	Yes
Independently assessed	E3 Sill	7.93	0.030	Yes
Independently assessed	E4 Jamb	26.50	0.020	Yes
Independently assessed	E5 Ground floor (normal)	18.30	0.050	No
Independently assessed	E6 Intermediate floor within a dwelling	18.30	0.000	No
Independently assessed	E10 Eaves (insulation at ceiling level)	9.80	0.050	No
Independently assessed	E12 Gable (insulation at ceiling level)	8.50	0.050	No
Independently assessed	E16 Corner (normal)	10.00	0.040	Yes
Table K1 - Approved	E18 Party wall between dwellings	10.00	0.060	Yes
Independently assessed	P1 Party wall - Ground floor	8.50	0.040	No
Table K1 - Default	P2 Party wall - Intermediate floor within a dwelling	8.50	0.000	No
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	8.50	0.050	No

Y-value	<input type="text" value="0.028"/>	W/m <sup>2</sup> K
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### 18.0 Pressure Testing

Designed AP <sub>50</sub>	<input type="text" value="5.00"/>	m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa
Property Tested ?	<input type="text"/>	
As Built AP <sub>50</sub>	<input type="text"/>	m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa

### 19.0 Mechanical Ventilation

#### Summer Overheating

Windows open in hot weather	<input type="text" value="Windows half open"/>
Cross ventilation possible	<input type="text" value="Yes"/>
Night Ventilation	<input type="text" value="No"/>
Air change rate	<input type="text" value="4.00"/>

#### Mechanical Ventilation

Mechanical Ventilation System Present	<input type="text" value="No"/>
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# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

### 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				3
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	12	
Total number of L.E.L. fittings	12	
Percentage of L.E.L. fittings	100.00	%

#### External

External lights fitted: No

### 23.0 Electricity Tariff

Standard

### 24.0 Main Heating 1

Percentage of Heat	100	%
Database Ref. No.	17953	
Fuel Type	Mains gas	
Main Heating	BGW	
SAP Code	104	
In Winter	90.6	
In Summer	87.1	
Controls	CBI Time and temperature zone control	
PCDF Controls	0	
Delayed Start Stat	No	
Sap Code	2110	
Boiler Compensator	Vaillant Group UK Ltd, Vaillant, VRT 350	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heat Emitter	Radiators and Underfloor	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Normal (> 45°C)	
Combi boiler type	Standard Combi	
Combi keep hot type	None	

### 25.0 Main Heating 2

None

Community Heating: None

### 28.0 Water Heating

Water Heating	HWP From main heating 1
Flue Gas Heat Recovery System	Main Heating 1
Waste Water Heat Recovery Instantaneous System 1	Yes
Waste Water Heat Recovery	No
Waste Water Heat Recovery	No

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Instantaneous System 2	
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
SAP Code	901

### 28.1 Flue Gas Heat Recovery System

29.0 Hot Water Cylinder	None
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### 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	£29	B 87	
	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar photovoltaic panels, 2.5 kWp	£5,000 - £8,000	£308	A 97	

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Property Reference	005		Issued on Date	30/04/2019	
Assessment Reference	Plot 5	Prop Type Ref	3 Bed detached		
Property	Firs Wood Close, Northaw, Potters Bar, EN7 4BY				
SAP Rating	85 B	DER	15.40	TER	17.07
Environmental	88 B	% DER<TER	9.79		
CO <sub>2</sub> Emissions (t/year)	1.24	DFEE	38.60	TFEE	50.01
General Requirements Compliance	Pass	% DFEE<TFEE	22.82		
Assessor Details	Mrs. Nicola Battista, Monitor Energy Consultancy, Tel: 01752830291, nicola@monitor-ec.co.uk			Assessor ID	L706-0001
Client					

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

Orientation	South West
Property Tenure	Owner-occupied
Transaction Type	New dwelling
Terrain Type	Suburban
1.0 Property Type	House, Detached
2.0 Number of Storeys	2
3.0 Date Built	2019
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown

#### 6.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground Floor:	28.70 m	48.15 m <sup>2</sup>	2.40 m
1st Storey:	28.70 m	48.15 m <sup>2</sup>	2.60 m

7.0 Living Area  m<sup>2</sup>

8.0 Thermal Mass Parameter  
 Thermal Mass   
 kJ/m<sup>2</sup>K

#### 9.0 External Walls

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.13	92.20	73.36

#### 9.1 Party Walls

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Area (m <sup>2</sup> )
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#### 10.0 External Roofs

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	48.18	48.18

#### 11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Heat Loss Floor 1	Ground Floor - Solid	Slab on ground, screed over insulation	0.12	48.15

#### 12.0 Opening Types



# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m <sup>2</sup> K)
Opening Type 1	Manufacturer	Solid Door							1.40
Opening Type 2	Manufacturer	Window	Double Low-E Hard 0.15			0.72		0.70	1.40

### 13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m <sup>2</sup> )	Curtain Closed
Opening 1	Solid Door	[1] External Wall 1	South West							2.05	
Opening 2	Window	[1] External Wall 1	South West	None	0.00					1.89	
Opening 3	Window	[1] External Wall 1	South West	None	0.00					2.16	
Opening 4	Window	[1] External Wall 1	South West	None	0.00					0.76	
Opening 5	Window	[1] External Wall 1	North East	None	0.00					4.00	
Opening 6	Window	[1] External Wall 1	North East	None	0.00					1.02	
Opening 7	Window	[1] External Wall 1	North East	None	0.00					4.32	
Opening 8	Window	[1] External Wall 1	South East	None	0.00					1.32	
Opening 9	Window	[1] External Wall 1	North West	None	0.00					1.32	

### 14.0 Conservatory

### 15.0 Draught Proofing

 %

### 16.0 Draught Lobby

### 17.0 Thermal Bridging

### 17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	9.87	0.050	Yes
Independently assessed	E3 Sill	8.87	0.040	Yes
Independently assessed	E4 Jamb	25.00	0.020	Yes
Independently assessed	E5 Ground floor (normal)	28.70	0.130	No
Independently assessed	E6 Intermediate floor within a dwelling	28.70	0.000	No
Independently assessed	E10 Eaves (insulation at ceiling level)	18.00	0.060	No
Independently assessed	E12 Gable (insulation at ceiling level)	10.70	0.100	No
Independently assessed	E16 Corner (normal)	20.00	0.040	No

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

### 18.0 Pressure Testing

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

Property Tested ?

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

Cross ventilation possible

Night Ventilation

Air change rate

#### Mechanical Ventilation

Mechanical Ventilation System Present

### 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				3
Number of passive vents				0
Number of flueless gas fires				0

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

<b>21.0 Fixed Cooling System</b>	<input type="text" value="No"/>	
<b>22.0 Lighting</b>		
<b>Internal</b>		
Total number of light fittings	<input type="text" value="12"/>	
Total number of L.E.L. fittings	<input type="text" value="12"/>	
Percentage of L.E.L. fittings	<input type="text" value="100.00"/>	%
<b>External</b>		
External lights fitted	<input type="text" value="No"/>	
<b>23.0 Electricity Tariff</b>	<input type="text" value="Standard"/>	
<b>24.0 Main Heating 1</b>	<input type="text" value="Database"/>	
Percentage of Heat	<input type="text" value="100"/>	%
Database Ref. No.	<input type="text" value="16842"/>	
Fuel Type	<input type="text" value="Mains gas"/>	
Main Heating	<input type="text" value="BGW"/>	
SAP Code	<input type="text" value="104"/>	
In Winter	<input type="text" value="90.2"/>	
In Summer	<input type="text" value="87.0"/>	
Controls	<input type="text" value="CBI Time and temperature zone control"/>	
PCDF Controls	<input type="text" value="0"/>	
Delayed Start Stat	<input type="text" value="No"/>	
Sap Code	<input type="text" value="2110"/>	
Boiler Compensator	<input type="text" value="Vaillant Group UK Ltd, Vaillant, VRT 350"/>	
Flue Type	<input type="text" value="Balanced"/>	
Fan Assisted Flue	<input type="text" value="Yes"/>	
Is MHS Pumped	<input type="text" value="Pump in heated space"/>	
Heat Emitter	<input type="text" value="Radiators and Underfloor"/>	
Underfloor Heating	<input type="text" value="Yes - Pipes in thin screed"/>	
Flow Temperature	<input type="text" value="Normal (&gt; 45°C)"/>	
Combi boiler type	<input type="text" value="Standard Combi"/>	
Combi keep hot type	<input type="text" value="None"/>	
<b>25.0 Main Heating 2</b>	<input type="text" value="None"/>	
Community Heating	<input type="text" value="None"/>	
<b>28.0 Water Heating</b>	<input type="text" value="HWP From main heating 1"/>	
Water Heating	<input type="text" value="Main Heating 1"/>	
Flue Gas Heat Recovery System	<input type="text" value="No"/>	
Waste Water Heat Recovery Instantaneous System 1	<input type="text" value="No"/>	
Waste Water Heat Recovery Instantaneous System 2	<input type="text" value="No"/>	
Waste Water Heat Recovery Storage System	<input type="text" value="No"/>	
Solar Panel	<input type="text" value="No"/>	
Water use <= 125 litres/person/day	<input type="text" value="Yes"/>	
SAP Code	<input type="text" value="901"/>	

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

29.0 Hot Water Cylinder

None

### 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	£31	B 86	
	Typical Cost	Typical savings per year	Ratings after improvement	
Solar photovoltaic panels, 2.5 kWp	£5,000 - £8,000	£308	A 96	

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Property Reference	001		Issued on Date	30/04/2019	
Assessment Reference	Plots 8 and 11	Prop Type Ref	2 bed semi		
Property	Firs Wood Close, Northaw, Potters Bar, EN7 4BY				
SAP Rating	85 B	DER	15.34	TER	18.25
Environmental	88 B	% DER<TER	15.94		
CO <sub>2</sub> Emissions (t/year)	1.06	DFEE	38.23	TFEE	52.41
General Requirements Compliance	Pass	% DFEE<TFEE	27.07		
Assessor Details	Mrs. Nicola Battista, Monitor Energy Consultancy, Tel: 01752830291, nicola@monitor-ec.co.uk			Assessor ID	L706-0001
Client					

### 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:	18.30 m	41.60 m <sup>2</sup>	2.40 m
1st Storey:	18.30 m	41.60 m <sup>2</sup>	2.60 m

7.0 Living Area  m<sup>2</sup>

8.0 Thermal Mass Parameter   
 Thermal Mass  kJ/m<sup>2</sup>K

#### 9.0 External Walls

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.13	43.92	33.98
External Wall 2	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.11	47.58	40.98

#### 9.1 Party Walls

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Party Wall 1	Filled Cavity with Edge Sealing	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill	0.00	42.50

#### 10.0 External Roofs

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	41.60	41.60

#### 11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Heat Loss Floor 1	Ground Floor - Solid	Slab on ground, screed over insulation	0.12	41.60

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

### 12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m <sup>2</sup> K)
Opening Type 1	Manufacturer	Solid Door							1.40
Opening Type 2	Manufacturer	Window	Double Low-E Hard 0.15			0.72		0.70	1.40

### 13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m <sup>2</sup> )	Curtain Closed
Opening 1	Solid Door	[1] External Wall 1	West							2.16	
Opening 2	Window	[1] External Wall 1	West	None	0.00					2.16	
Opening 3	Window	[2] External Wall 2	West	None	0.00					2.16	
Opening 4	Window	[2] External Wall 2	West	None	0.00					0.76	
Opening 5	Window	[2] External Wall 2	East	None	0.00					0.76	
Opening 6	Window	[2] External Wall 2	East	None	0.00					2.16	
Opening 7	Window	[1] External Wall 1	East	None	0.00					0.76	
Opening 8	Window	[2] External Wall 2	North	None	0.00					0.76	
Opening 9	Window	[1] External Wall 1	East	None	0.00					4.10	
Opening 10	Window	[1] External Wall 1	North	None	0.00					0.76	

### 14.0 Conservatory

### 15.0 Draught Proofing

 %

### 16.0 Draught Lobby

### 17.0 Thermal Bridging

### 17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	8.93	0.050	Yes
Independently assessed	E3 Sill	7.93	0.030	Yes
Independently assessed	E4 Jamb	26.50	0.020	Yes
Independently assessed	E5 Ground floor (normal)	18.30	0.050	No
Independently assessed	E6 Intermediate floor within a dwelling	18.30	0.000	No
Independently assessed	E10 Eaves (insulation at ceiling level)	9.80	0.050	No
Independently assessed	E12 Gable (insulation at ceiling level)	8.50	0.050	No
Independently assessed	E16 Corner (normal)	10.00	0.040	Yes
Table K1 - Approved	E18 Party wall between dwellings	10.00	0.060	Yes
Independently assessed	P1 Party wall - Ground floor	8.50	0.040	No
Table K1 - Default	P2 Party wall - Intermediate floor within a dwelling	8.50	0.000	No
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	8.50	0.050	No

Y-value	<input type="text" value="0.028"/>	W/m <sup>2</sup> K
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### 18.0 Pressure Testing

Designed AP <sub>50</sub>	<input type="text" value="5.00"/>	m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa
Property Tested ?	<input type="text"/>	
As Built AP <sub>50</sub>	<input type="text"/>	m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa

### 19.0 Mechanical Ventilation

#### Summer Overheating

Windows open in hot weather	<input type="text" value="Windows half open"/>
Cross ventilation possible	<input type="text" value="Yes"/>
Night Ventilation	<input type="text" value="No"/>
Air change rate	<input type="text" value="4.00"/>

#### Mechanical Ventilation

Mechanical Ventilation System Present	<input type="text" value="No"/>
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# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

### 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				3
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	12	
Total number of L.E.L. fittings	12	
Percentage of L.E.L. fittings	100.00	%

#### External

External lights fitted: No

### 23.0 Electricity Tariff

Standard

### 24.0 Main Heating 1

Percentage of Heat	100	%
Database Ref. No.	17953	
Fuel Type	Mains gas	
Main Heating	BGW	
SAP Code	104	
In Winter	90.6	
In Summer	87.1	
Controls	CBI Time and temperature zone control	
PCDF Controls	0	
Delayed Start Stat	No	
Sap Code	2110	
Boiler Compensator	Vaillant Group UK Ltd, Vaillant, VRT 350	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heat Emitter	Radiators and Underfloor	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Normal (> 45°C)	
Combi boiler type	Standard Combi	
Combi keep hot type	None	

### 25.0 Main Heating 2

None

Community Heating: None

### 28.0 Water Heating

Water Heating	HWP From main heating 1
Flue Gas Heat Recovery System	Main Heating 1
Waste Water Heat Recovery Instantaneous System 1	Yes
Waste Water Heat Recovery	No
Waste Water Heat Recovery	No

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Instantaneous System 2	
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
SAP Code	901

### 28.1 Flue Gas Heat Recovery System

29.0 Hot Water Cylinder	None
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### 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	£29	B 87	

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Property Reference	009		Issued on Date	30/04/2019	
Assessment Reference	Plots 9 and 10	Prop Type Ref	3 Bed semi next to 2 bed		
Property	Firs Wood Close, Northaw, Potters Bar, EN7 4BY				
SAP Rating	85 B	DER	15.32	TER	17.12
Environmental	88 B	% DER<TER	10.53		
CO <sub>2</sub> Emissions (t/year)	1.24	DFEE	38.20	TFEE	50.16
General Requirements Compliance	Pass	% DFEE<TFEE	23.84		
Assessor Details	Mrs. Nicola Battista, Monitor Energy Consultancy, Tel: 01752830291, nicola@monitor-ec.co.uk			Assessor ID	L706-0001
Client					

### 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:	20.20 m	48.15 m <sup>2</sup>	2.40 m
1st Storey:	20.20 m	48.15 m <sup>2</sup>	2.60 m

7.0 Living Area	19.76	m <sup>2</sup>
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8.0 Thermal Mass Parameter	Simple calculation - Medium	
Thermal Mass	250.00	kJ/m <sup>2</sup> K

9.0 External Walls	Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.13	101.00	83.48	

9.1 Party Walls	Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Party Wall 1	Solid Wall	Dense plaster both sides, dense blocks, cavity or cavity fill	0.00	42.50	

10.0 External Roofs	Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	48.15	48.15	

11.0 Heat Loss Floors	Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Heat Loss Floor 1	Ground Floor - Solid	Slab on ground, screed over insulation	0.12	48.15	

### 12.0 Opening Types



# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m <sup>2</sup> K)
Opening Type 1	Manufacturer	Solid Door							1.40
Opening Type 2	Manufacturer	Window	Double Low-E Hard 0.15			0.72		0.70	1.40

### 13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m <sup>2</sup> )	Curtain Closed
Opening 1	Solid Door	[1] External Wall 1	West							2.05	
Opening 2	Window	[1] External Wall 1	West	None	0.00					1.89	
Opening 3	Window	[1] External Wall 1	West	None	0.00					2.16	
Opening 4	Window	[1] External Wall 1	West	None	0.00					0.76	
Opening 5	Window	[1] External Wall 1	East	None	0.00					4.00	
Opening 6	Window	[1] External Wall 1	East	None	0.00					1.02	
Opening 7	Window	[1] External Wall 1	East	None	0.00					4.32	
Opening 8	Window	[1] External Wall 1	South	None	0.00					1.32	

### 14.0 Conservatory

### 15.0 Draught Proofing

 %

### 16.0 Draught Lobby

### 17.0 Thermal Bridging

### 17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	9.87	0.050	Yes
Independently assessed	E3 Sill	8.87	0.040	Yes
Independently assessed	E4 Jamb	25.00	0.020	Yes
Independently assessed	E5 Ground floor (normal)	20.20	0.130	No
Independently assessed	E6 Intermediate floor within a dwelling	20.20	0.000	No
Independently assessed	E10 Eaves (insulation at ceiling level)	9.50	0.060	No
Independently assessed	E12 Gable (insulation at ceiling level)	10.70	0.100	No
Independently assessed	E16 Corner (normal)	15.00	0.040	No
Table K1 - Approved	E18 Party wall between dwellings	5.00	0.060	No
Independently assessed	P1 Party wall - Ground floor	8.50	0.040	No
Independently assessed	P2 Party wall - Intermediate floor within a dwelling	8.50	0.000	No
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	8.50	0.050	No

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

### 18.0 Pressure Testing

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

Property Tested ?

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

Cross ventilation possible

Night Ventilation

Air change rate

#### Mechanical Ventilation

Mechanical Ventilation System Present

### 20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Number of open flues	0	0	0
Number of intermittent fans			3
Number of passive vents			0
Number of flueless gas fires			0

**21.0 Fixed Cooling System**

### 22.0 Lighting

#### Internal

Total number of light fittings	<input type="text" value="12"/>	
Total number of L.E.L. fittings	<input type="text" value="12"/>	
Percentage of L.E.L. fittings	<input type="text" value="100.00"/>	%

#### External

External lights fitted

**23.0 Electricity Tariff**

### 24.0 Main Heating 1

	<input type="text" value="Database"/>	
Percentage of Heat	<input type="text" value="100"/>	%
Database Ref. No.	<input type="text" value="16842"/>	
Fuel Type	<input type="text" value="Mains gas"/>	
Main Heating	<input type="text" value="BGW"/>	
SAP Code	<input type="text" value="104"/>	
In Winter	<input type="text" value="90.2"/>	
In Summer	<input type="text" value="87.0"/>	
Controls	<input type="text" value="CBI Time and temperature zone control"/>	
PCDF Controls	<input type="text" value="0"/>	
Delayed Start Stat	<input type="text" value="No"/>	
Sap Code	<input type="text" value="2110"/>	
Boiler Compensator	<input type="text" value="Vaillant Group UK Ltd, Vaillant, VRT 350"/>	
Flue Type	<input type="text" value="Balanced"/>	
Fan Assisted Flue	<input type="text" value="Yes"/>	
Is MHS Pumped	<input type="text" value="Pump in heated space"/>	
Heat Emitter	<input type="text" value="Radiators and Underfloor"/>	
Underfloor Heating	<input type="text" value="Yes - Pipes in thin screed"/>	
Flow Temperature	<input type="text" value="Normal (&gt; 45°C)"/>	
Combi boiler type	<input type="text" value="Standard Combi"/>	
Combi keep hot type	<input type="text" value="None"/>	

**25.0 Main Heating 2**

Community Heating

### 28.0 Water Heating

	<input type="text" value="HWP From main heating 1"/>
Water Heating	<input type="text" value="Main Heating 1"/>
Flue Gas Heat Recovery System	<input type="text" value="No"/>
Waste Water Heat Recovery Instantaneous System 1	<input type="text" value="No"/>
Waste Water Heat Recovery Instantaneous System 2	<input type="text" value="No"/>
Waste Water Heat Recovery Storage System	<input type="text" value="No"/>

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Solar Panel	No
Water use <= 125 litres/person/day	Yes
SAP Code	901

29.0 Hot Water Cylinder	None
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### 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	£31	B 87	
	Typical Cost	Typical savings per year	Ratings after improvement	
Solar photovoltaic panels, 2.5 kWp	£5,000 - £8,000	£308	SAP rating	Environmental Impact
			A 96	

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Property Reference	012		Issued on Date	30/04/2019	
Assessment Reference	Plots 12 and 13	Prop Type Ref	3 Bed semi		
Property	Firs Wood Close, Northaw, Potters Bar, EN7 4BY				
SAP Rating	86 B	DER	15.07	TER	16.90
Environmental	88 B	% DER<TER	10.85		
CO <sub>2</sub> Emissions (t/year)	1.22	DFEE	36.94	TFEE	48.88
General Requirements Compliance	Pass	% DFEE<TFEE	24.43		
Assessor Details	Mrs. Nicola Battista, Monitor Energy Consultancy, Tel: 01752830291, nicola@monitor-ec.co.uk			Assessor ID	L706-0001
Client					

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

Orientation	North 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:	19.70 m	48.15 m <sup>2</sup>	2.40 m
1st Storey:	19.70 m	48.15 m <sup>2</sup>	2.60 m

7.0 Living Area  m<sup>2</sup>

8.0 Thermal Mass Parameter  
 Thermal Mass   
 kJ/m<sup>2</sup>K

#### 9.0 External Walls

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.13	80.30	62.78
External Wall 2	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.11	18.20	18.20

#### 9.1 Party Walls

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Party Wall 1	Solid Wall	Dense plaster both sides, dense blocks, cavity or cavity fill	0.00	45.00

#### 10.0 External Roofs

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	48.15	48.15

#### 11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Heat Loss Floor 1	Ground Floor - Solid	Slab on ground, screed over insulation	0.12	48.15

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

### 12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m <sup>2</sup> K)
Opening Type 1	Manufacturer	Solid Door							1.40
Opening Type 2	Manufacturer	Window	Double Low-E Hard 0.15			0.72		0.70	1.40

### 13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m <sup>2</sup> )	Curtain Closed
Opening 1	Solid Door	[1] External Wall 1	North West							2.05	
Opening 2	Window	[1] External Wall 1	North West	None	0.00					1.89	
Opening 3	Window	[1] External Wall 1	North West	None	0.00					2.16	
Opening 4	Window	[1] External Wall 1	North West	None	0.00					0.76	
Opening 5	Window	[1] External Wall 1	South East	None	0.00					4.00	
Opening 6	Window	[1] External Wall 1	South East	None	0.00					1.02	
Opening 7	Window	[1] External Wall 1	South East	None	0.00					4.32	
Opening 8	Window	[1] External Wall 1	North East	None	0.00					1.32	

### 14.0 Conservatory

### 15.0 Draught Proofing

 %

### 16.0 Draught Lobby

### 17.0 Thermal Bridging

### 17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	9.87	0.050	Yes
Independently assessed	E3 Sill	8.87	0.040	Yes
Independently assessed	E4 Jamb	25.00	0.020	Yes
Independently assessed	E5 Ground floor (normal)	19.70	0.130	No
Independently assessed	E6 Intermediate floor within a dwelling	19.70	0.000	No
Independently assessed	E10 Eaves (insulation at ceiling level)	8.20	0.060	No
Independently assessed	E12 Gable (insulation at ceiling level)	11.50	0.100	No
Independently assessed	E16 Corner (normal)	10.00	0.040	Yes
Table K1 - Approved	E18 Party wall between dwellings	10.00	0.060	Yes
Independently assessed	P1 Party wall - Ground floor	9.00	0.040	No
Independently assessed	P2 Party wall - Intermediate floor within a dwelling	9.00	0.000	No
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	9.00	0.050	No

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

### 18.0 Pressure Testing

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

Property Tested ?

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

Cross ventilation possible

Night Ventilation

Air change rate

#### Mechanical Ventilation

Mechanical Ventilation System Present

### 20.0 Fans, Open Fireplaces, Flues

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				3
Number of passive vents				0
Number of flueless gas fires				0
<hr/>				
<b>21.0 Fixed Cooling System</b>	<input type="text" value="No"/>			
<hr/>				
<b>22.0 Lighting</b>				
<b>Internal</b>				
Total number of light fittings	<input type="text" value="12"/>			
Total number of L.E.L. fittings	<input type="text" value="12"/>			
Percentage of L.E.L. fittings	<input type="text" value="100.00"/> %			
<b>External</b>				
External lights fitted	<input type="text" value="No"/>			
<hr/>				
<b>23.0 Electricity Tariff</b>	<input type="text" value="Standard"/>			
<hr/>				
<b>24.0 Main Heating 1</b>	<input type="text" value="Database"/>			
Percentage of Heat	<input type="text" value="100"/> %			
Database Ref. No.	<input type="text" value="16842"/>			
Fuel Type	<input type="text" value="Mains gas"/>			
Main Heating	<input type="text" value="BGW"/>			
SAP Code	<input type="text" value="104"/>			
In Winter	<input type="text" value="90.2"/>			
In Summer	<input type="text" value="87.0"/>			
Controls	<input type="text" value="CBI Time and temperature zone control"/>			
PCDF Controls	<input type="text" value="0"/>			
Delayed Start Stat	<input type="text" value="No"/>			
Sap Code	<input type="text" value="2110"/>			
Boiler Compensator	<input type="text" value="Vaillant Group UK Ltd, Vaillant, VRT 350"/>			
Flue Type	<input type="text" value="Balanced"/>			
Fan Assisted Flue	<input type="text" value="Yes"/>			
Is MHS Pumped	<input type="text" value="Pump in heated space"/>			
Heat Emitter	<input type="text" value="Radiators and Underfloor"/>			
Underfloor Heating	<input type="text" value="Yes - Pipes in thin screed"/>			
Flow Temperature	<input type="text" value="Normal (&gt; 45°C)"/>			
Combi boiler type	<input type="text" value="Standard Combi"/>			
Combi keep hot type	<input type="text" value="None"/>			
<hr/>				
<b>25.0 Main Heating 2</b>	<input type="text" value="None"/>			
<hr/>				
Community Heating	<input type="text" value="None"/>			
<b>28.0 Water Heating</b>	<input type="text" value="HWP From main heating 1"/>			
Water Heating	<input type="text" value="Main Heating 1"/>			
Flue Gas Heat Recovery System	<input type="text" value="No"/>			
Waste Water Heat Recovery Instantaneous System 1	<input type="text" value="No"/>			
Waste Water Heat Recovery Instantaneous System 2	<input type="text" value="No"/>			

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
SAP Code	901

29.0 Hot Water Cylinder	None
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### 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	£31	B 87	
	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar photovoltaic panels, 2.5 kWp	£5,000 - £8,000	£308	A 96	

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Property Reference	012		Issued on Date	30/04/2019	
Assessment Reference	Plots 14-21	Prop Type Ref	3 Bed semi		
Property	Firs Wood Close, Northaw, Potters Bar, EN7 4BY				
SAP Rating	86 B	DER	14.96	TER	16.77
Environmental	88 B	% DER<TER	10.79		
CO <sub>2</sub> Emissions (t/year)	1.21	DFEE	36.52	TFEE	48.21
General Requirements Compliance	Pass	% DFEE<TFEE	24.24		
Assessor Details	Mrs. Nicola Battista, Monitor Energy Consultancy, Tel: 01752830291, nicola@monitor-ec.co.uk			Assessor ID	L706-0001
Client					

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

Orientation	North East
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:	19.70 m	48.15 m <sup>2</sup>	2.40 m
1st Storey:	19.70 m	48.15 m <sup>2</sup>	2.60 m

7.0 Living Area  m<sup>2</sup>

8.0 Thermal Mass Parameter  
 Thermal Mass   
 kJ/m<sup>2</sup>K

#### 9.0 External Walls

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.13	98.50	80.98

#### 9.1 Party Walls

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Party Wall 1	Solid Wall	Dense plaster both sides, dense blocks, cavity or cavity fill	0.00	45.00

#### 10.0 External Roofs

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	48.15	48.15

#### 11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Heat Loss Floor 1	Ground Floor - Solid	Slab on ground, screed over insulation	0.12	48.15

#### 12.0 Opening Types



# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m <sup>2</sup> K)
Opening Type 1	Manufacturer	Solid Door							1.40
Opening Type 2	Manufacturer	Window	Double Low-E Hard 0.15			0.72		0.70	1.40

### 13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m <sup>2</sup> )	Curtain Closed
Opening 1	Solid Door	[1] External Wall 1	North East							2.05	
Opening 2	Window	[1] External Wall 1	North East	None	0.00					1.89	
Opening 3	Window	[1] External Wall 1	North East	None	0.00					2.16	
Opening 4	Window	[1] External Wall 1	North East	None	0.00					0.76	
Opening 5	Window	[1] External Wall 1	South West	None	0.00					4.00	
Opening 6	Window	[1] External Wall 1	South West	None	0.00					1.02	
Opening 7	Window	[1] External Wall 1	South West	None	0.00					4.32	
Opening 8	Window	[1] External Wall 1	South East	None	0.00					1.32	

### 14.0 Conservatory

### 15.0 Draught Proofing

 %

### 16.0 Draught Lobby

### 17.0 Thermal Bridging

### 17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	9.87	0.050	Yes
Independently assessed	E3 Sill	8.87	0.040	Yes
Independently assessed	E4 Jamb	25.00	0.020	Yes
Independently assessed	E5 Ground floor (normal)	19.70	0.130	No
Independently assessed	E6 Intermediate floor within a dwelling	19.70	0.000	No
Independently assessed	E10 Eaves (insulation at ceiling level)	8.20	0.060	No
Independently assessed	E12 Gable (insulation at ceiling level)	11.50	0.100	No
Independently assessed	E16 Corner (normal)	10.00	0.040	Yes
Table K1 - Approved	E18 Party wall between dwellings	10.00	0.060	Yes
Independently assessed	P1 Party wall - Ground floor	9.00	0.040	No
Independently assessed	P2 Party wall - Intermediate floor within a dwelling	9.00	0.000	No
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	9.00	0.050	No

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

### 18.0 Pressure Testing

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

Property Tested ?

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

Cross ventilation possible

Night Ventilation

Air change rate

#### Mechanical Ventilation

Mechanical Ventilation System Present

### 20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Number of open flues	0	0	0
Number of intermittent fans			3
Number of passive vents			0
Number of flueless gas fires			0

**21.0 Fixed Cooling System**

### 22.0 Lighting

#### Internal

Total number of light fittings	<input type="text" value="12"/>	
Total number of L.E.L. fittings	<input type="text" value="12"/>	
Percentage of L.E.L. fittings	<input type="text" value="100.00"/>	%

#### External

External lights fitted

**23.0 Electricity Tariff**

### 24.0 Main Heating 1

	<input type="text" value="Database"/>	
Percentage of Heat	<input type="text" value="100"/>	%
Database Ref. No.	<input type="text" value="16842"/>	
Fuel Type	<input type="text" value="Mains gas"/>	
Main Heating	<input type="text" value="BGW"/>	
SAP Code	<input type="text" value="104"/>	
In Winter	<input type="text" value="90.2"/>	
In Summer	<input type="text" value="87.0"/>	
Controls	<input type="text" value="CBI Time and temperature zone control"/>	
PCDF Controls	<input type="text" value="0"/>	
Delayed Start Stat	<input type="text" value="No"/>	
Sap Code	<input type="text" value="2110"/>	
Boiler Compensator	<input type="text" value="Vaillant Group UK Ltd, Vaillant, VRT 350"/>	
Flue Type	<input type="text" value="Balanced"/>	
Fan Assisted Flue	<input type="text" value="Yes"/>	
Is MHS Pumped	<input type="text" value="Pump in heated space"/>	
Heat Emitter	<input type="text" value="Radiators and Underfloor"/>	
Underfloor Heating	<input type="text" value="Yes - Pipes in thin screed"/>	
Flow Temperature	<input type="text" value="Normal (&gt; 45°C)"/>	
Combi boiler type	<input type="text" value="Standard Combi"/>	
Combi keep hot type	<input type="text" value="None"/>	

**25.0 Main Heating 2**

Community Heating

### 28.0 Water Heating

	<input type="text" value="HWP From main heating 1"/>
Water Heating	<input type="text" value="Main Heating 1"/>
Flue Gas Heat Recovery System	<input type="text" value="No"/>
Waste Water Heat Recovery Instantaneous System 1	<input type="text" value="No"/>
Waste Water Heat Recovery Instantaneous System 2	<input type="text" value="No"/>
Waste Water Heat Recovery Storage System	<input type="text" value="No"/>

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Solar Panel	No
Water use <= 125 litres/person/day	Yes
SAP Code	901

29.0 Hot Water Cylinder	None
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### 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	£31	B 87	
	Typical Cost	Typical savings per year	Ratings after improvement	
Solar photovoltaic panels, 2.5 kWp	£5,000 - £8,000	£308	SAP rating	Environmental Impact
			A 96	

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Property Reference	012		Issued on Date	30/04/2019	
Assessment Reference	Plots 22 and 23	Prop Type Ref	3 Bed semi		
Property	Firs Wood Close, Northaw, Potters Bar, EN7 4BY				
SAP Rating	85 B	DER	15.45	TER	17.24
Environmental	88 B	% DER<TER	10.37		
CO <sub>2</sub> Emissions (t/year)	1.24	DFEE	38.50	TFEE	50.55
General Requirements Compliance	Pass	% DFEE<TFEE	23.83		
Assessor Details	Mrs. Nicola Battista, Monitor Energy Consultancy, Tel: 01752830291, nicola@monitor-ec.co.uk			Assessor ID	L706-0001
Client					

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

Orientation	South East
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:	19.70 m	48.15 m <sup>2</sup>	2.40 m
1st Storey:	19.70 m	48.15 m <sup>2</sup>	2.60 m

7.0 Living Area  m<sup>2</sup>

8.0 Thermal Mass Parameter  
 Thermal Mass   
 kJ/m<sup>2</sup>K

#### 9.0 External Walls

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.13	80.30	62.78
External Wall 2	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.11	18.20	18.20

#### 9.1 Party Walls

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Party Wall 1	Solid Wall	Dense plaster both sides, dense blocks, cavity or cavity fill	0.00	45.00

#### 10.0 External Roofs

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	48.15	48.15

#### 11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Heat Loss Floor 1	Ground Floor - Solid	Slab on ground, screed over insulation	0.12	48.15

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

### 12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m <sup>2</sup> K)
Opening Type 1	Manufacturer	Solid Door							1.40
Opening Type 2	Manufacturer	Window	Double Low-E Hard 0.15			0.72		0.70	1.40

### 13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m <sup>2</sup> )	Curtain Closed
Opening 1	Solid Door	[1] External Wall 1	South East							2.05	
Opening 2	Window	[1] External Wall 1	South East	None	0.00					1.89	
Opening 3	Window	[1] External Wall 1	South East	None	0.00					2.16	
Opening 4	Window	[1] External Wall 1	South East	None	0.00					0.76	
Opening 5	Window	[1] External Wall 1	North West	None	0.00					4.00	
Opening 6	Window	[1] External Wall 1	North West	None	0.00					1.02	
Opening 7	Window	[1] External Wall 1	North West	None	0.00					4.32	
Opening 8	Window	[1] External Wall 1	South West	None	0.00					1.32	

### 14.0 Conservatory

### 15.0 Draught Proofing

 %

### 16.0 Draught Lobby

### 17.0 Thermal Bridging

### 17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	9.87	0.050	Yes
Independently assessed	E3 Sill	8.87	0.040	Yes
Independently assessed	E4 Jamb	25.00	0.020	Yes
Independently assessed	E5 Ground floor (normal)	19.70	0.130	No
Independently assessed	E6 Intermediate floor within a dwelling	19.70	0.000	No
Independently assessed	E10 Eaves (insulation at ceiling level)	8.20	0.060	No
Independently assessed	E12 Gable (insulation at ceiling level)	11.50	0.100	No
Independently assessed	E16 Corner (normal)	10.00	0.040	Yes
Table K1 - Approved	E18 Party wall between dwellings	10.00	0.060	Yes
Independently assessed	P1 Party wall - Ground floor	9.00	0.040	No
Independently assessed	P2 Party wall - Intermediate floor within a dwelling	9.00	0.000	No
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	9.00	0.050	No

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

### 18.0 Pressure Testing

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

Property Tested ?

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

Cross ventilation possible

Night Ventilation

Air change rate

#### Mechanical Ventilation

Mechanical Ventilation System Present

### 20.0 Fans, Open Fireplaces, Flues

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0
Number of intermittent fans				3
Number of passive vents				0
Number of flueless gas fires				0
<hr/>				
<b>21.0 Fixed Cooling System</b>	<input type="text" value="No"/>			
<hr/>				
<b>22.0 Lighting</b>				
<b>Internal</b>				
Total number of light fittings	<input type="text" value="12"/>			
Total number of L.E.L. fittings	<input type="text" value="12"/>			
Percentage of L.E.L. fittings	<input type="text" value="100.00"/> %			
<b>External</b>				
External lights fitted	<input type="text" value="No"/>			
<hr/>				
<b>23.0 Electricity Tariff</b>	<input type="text" value="Standard"/>			
<hr/>				
<b>24.0 Main Heating 1</b>	<input type="text" value="Database"/>			
Percentage of Heat	<input type="text" value="100"/> %			
Database Ref. No.	<input type="text" value="16842"/>			
Fuel Type	<input type="text" value="Mains gas"/>			
Main Heating	<input type="text" value="BGW"/>			
SAP Code	<input type="text" value="104"/>			
In Winter	<input type="text" value="90.2"/>			
In Summer	<input type="text" value="87.0"/>			
Controls	<input type="text" value="CBI Time and temperature zone control"/>			
PCDF Controls	<input type="text" value="0"/>			
Delayed Start Stat	<input type="text" value="No"/>			
Sap Code	<input type="text" value="2110"/>			
Boiler Compensator	<input type="text" value="Vaillant Group UK Ltd, Vaillant, VRT 350"/>			
Flue Type	<input type="text" value="Balanced"/>			
Fan Assisted Flue	<input type="text" value="Yes"/>			
Is MHS Pumped	<input type="text" value="Pump in heated space"/>			
Heat Emitter	<input type="text" value="Radiators and Underfloor"/>			
Underfloor Heating	<input type="text" value="Yes - Pipes in thin screed"/>			
Flow Temperature	<input type="text" value="Normal (&gt; 45°C)"/>			
Combi boiler type	<input type="text" value="Standard Combi"/>			
Combi keep hot type	<input type="text" value="None"/>			
<hr/>				
<b>25.0 Main Heating 2</b>	<input type="text" value="None"/>			
<hr/>				
Community Heating	<input type="text" value="None"/>			
<b>28.0 Water Heating</b>	<input type="text" value="HWP From main heating 1"/>			
Water Heating	<input type="text" value="Main Heating 1"/>			
Flue Gas Heat Recovery System	<input type="text" value="No"/>			
Waste Water Heat Recovery Instantaneous System 1	<input type="text" value="No"/>			
Waste Water Heat Recovery Instantaneous System 2	<input type="text" value="No"/>			

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
SAP Code	901

29.0 Hot Water Cylinder	None
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### 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	£31	B 86	
	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar photovoltaic panels, 2.5 kWp	£5,000 - £8,000	£308	A 96	

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Property Reference	001		Issued on Date	30/04/2019	
Assessment Reference	Plots 24 and 26	Prop Type Ref	2 bed semi		
Property	Firs Wood Close, Northaw, Potters Bar, EN7 4BY				
SAP Rating	86 B	DER	14.80	TER	17.80
Environmental	89 B	% DER<TER	16.87		
CO <sub>2</sub> Emissions (t/year)	1.02	DFEE	35.90	TFEE	50.02
General Requirements Compliance	Pass	% DFEE<TFEE	28.23		
Assessor Details	Mrs. Nicola Battista, Monitor Energy Consultancy, Tel: 01752830291, nicola@monitor-ec.co.uk			Assessor ID	L706-0001
Client					

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

Orientation	North East
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:	18.30 m	41.60 m <sup>2</sup>	2.40 m
1st Storey:	18.30 m	41.60 m <sup>2</sup>	2.60 m

7.0 Living Area  m<sup>2</sup>

8.0 Thermal Mass Parameter  
 Thermal Mass   
 kJ/m<sup>2</sup>K

#### 9.0 External Walls

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.13	43.92	33.98
External Wall 2	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.11	47.58	40.98

#### 9.1 Party Walls

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Party Wall 1	Filled Cavity with Edge Sealing	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill	0.00	42.50

#### 10.0 External Roofs

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	41.60	41.60

#### 11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Heat Loss Floor 1	Ground Floor - Solid	Slab on ground, screed over insulation	0.12	41.60



# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

### 12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m <sup>2</sup> K)
Opening Type 1	Manufacturer	Solid Door							1.40
Opening Type 2	Manufacturer	Window	Double Low-E Hard 0.15			0.72		0.70	1.40

### 13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m <sup>2</sup> )	Curtain Closed
Opening 1	Solid Door	[1] External Wall 1	North East							2.16	
Opening 2	Window	[1] External Wall 1	North East	None	0.00					2.16	
Opening 3	Window	[2] External Wall 2	North East	None	0.00					2.16	
Opening 4	Window	[2] External Wall 2	North East	None	0.00					0.76	
Opening 5	Window	[2] External Wall 2	South West	None	0.00					0.76	
Opening 6	Window	[2] External Wall 2	South West	None	0.00					2.16	
Opening 7	Window	[1] External Wall 1	South West	None	0.00					0.76	
Opening 8	Window	[2] External Wall 2	South East	None	0.00					0.76	
Opening 9	Window	[1] External Wall 1	South West	None	0.00					4.10	
Opening 10	Window	[1] External Wall 1	South East	None	0.00					0.76	

### 14.0 Conservatory

### 15.0 Draught Proofing

 %

### 16.0 Draught Lobby

### 17.0 Thermal Bridging

### 17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	8.93	0.050	Yes
Independently assessed	E3 Sill	7.93	0.030	Yes
Independently assessed	E4 Jamb	26.50	0.020	Yes
Independently assessed	E5 Ground floor (normal)	18.30	0.050	No
Independently assessed	E6 Intermediate floor within a dwelling	18.30	0.000	No
Independently assessed	E10 Eaves (insulation at ceiling level)	9.80	0.050	No
Independently assessed	E12 Gable (insulation at ceiling level)	8.50	0.050	No
Independently assessed	E16 Corner (normal)	10.00	0.040	Yes
Table K1 - Approved	E18 Party wall between dwellings	10.00	0.060	Yes
Independently assessed	P1 Party wall - Ground floor	8.50	0.040	No
Table K1 - Default	P2 Party wall - Intermediate floor within a dwelling	8.50	0.000	No
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	8.50	0.050	No

Y-value	<input type="text" value="0.028"/>	W/m <sup>2</sup> K
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### 18.0 Pressure Testing

Designed AP <sub>50</sub>	<input type="text" value="5.00"/>	m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa
Property Tested ?	<input type="text"/>	
As Built AP <sub>50</sub>	<input type="text"/>	m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa

### 19.0 Mechanical Ventilation

#### Summer Overheating

Windows open in hot weather	<input type="text" value="Windows half open"/>
Cross ventilation possible	<input type="text" value="Yes"/>
Night Ventilation	<input type="text" value="No"/>
Air change rate	<input type="text" value="4.00"/>

#### Mechanical Ventilation

Mechanical Ventilation System Present	<input type="text" value="No"/>
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# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

### 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				3
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	12	
Total number of L.E.L. fittings	12	
Percentage of L.E.L. fittings	100.00	%

#### External

External lights fitted: No

### 23.0 Electricity Tariff

Standard

### 24.0 Main Heating 1

Database	Database	
Percentage of Heat	100	%
Database Ref. No.	17953	
Fuel Type	Mains gas	
Main Heating	BGW	
SAP Code	104	
In Winter	90.6	
In Summer	87.1	
Controls	CBI Time and temperature zone control	
PCDF Controls	0	
Delayed Start Stat	No	
Sap Code	2110	
Boiler Compensator	Vaillant Group UK Ltd, Vaillant, VRT 350	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heat Emitter	Radiators and Underfloor	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Normal (> 45°C)	
Combi boiler type	Standard Combi	
Combi keep hot type	None	

### 25.0 Main Heating 2

None

Community Heating: None

### 28.0 Water Heating

HWP From main heating 1	HWP From main heating 1
Water Heating	Main Heating 1
Flue Gas Heat Recovery System	Yes
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery	No

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Instantaneous System 2	
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
SAP Code	901

### 28.1 Flue Gas Heat Recovery System

29.0 Hot Water Cylinder	None
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### 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	£29	B 87	
	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar photovoltaic panels, 2.5 kWp	£5,000 - £8,000	£308	A 97	

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Property Reference	025		Issued on Date	30/04/2019	
Assessment Reference	Plot 25	Prop Type Ref	2 bed mid		
Property	Firs Wood Close, Northaw, Potters Bar, EN7 4BY				
SAP Rating	86 B	DER	13.94	TER	16.60
Environmental	90 B	% DER<TER	16.05		
CO <sub>2</sub> Emissions (t/year)	0.95	DFEE	31.94	TFEE	43.32
General Requirements Compliance	Pass	% DFEE<TFEE	26.26		
Assessor Details	Mrs. Nicola Battista, Monitor Energy Consultancy, Tel: 01752830291, nicola@monitor-ec.co.uk			Assessor ID	L706-0001
Client					

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

Orientation	South West
Property Tenure	Owner-occupied
Transaction Type	New dwelling
Terrain Type	Suburban
1.0 Property Type	House, Mid-Terrace
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:	9.80 m	41.60 m <sup>2</sup>	2.40 m
1st Storey:	9.80 m	41.60 m <sup>2</sup>	2.60 m

7.0 Living Area  m<sup>2</sup>

8.0 Thermal Mass Parameter  
 Thermal Mass   
 kJ/m<sup>2</sup>K

#### 9.0 External Walls

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.13	23.52	14.34
External Wall 2	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.11	25.48	19.64

#### 9.1 Party Walls

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Party Wall 1	Filled Cavity with Edge Sealing	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill	0.00	85.00

#### 10.0 External Roofs

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Gross Area (m <sup>2</sup> )	Nett Area (m <sup>2</sup> )
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	41.60	41.60

#### 11.0 Heat Loss Floors

Description	Type	Construction	U-Value (W/m <sup>2</sup> K)	Area (m <sup>2</sup> )
Heat Loss Floor 1	Ground Floor - Solid	Slab on ground, screed over insulation	0.11	41.60

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

### 12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Argon Filled	G-value	Frame Type	Frame Factor	U Value (W/m <sup>2</sup> K)
Opening Type 1	Manufacturer	Solid Door							1.40
Opening Type 2	Manufacturer	Window	Double Low-E Hard 0.15			0.72		0.70	1.40

### 13.0 Openings

Name	Opening Type	Location	Orientation	Curtain Type	Overhang Ratio	Wide Overhang	Width (m)	Height (m)	Count	Area (m <sup>2</sup> )	Curtain Closed
Opening 1	Solid Door	[1] External Wall 1	North East							2.16	
Opening 2	Window	[1] External Wall 1	North East	None	0.00					2.16	
Opening 3	Window	[2] External Wall 2	North East	None	0.00					2.16	
Opening 4	Window	[2] External Wall 2	North East	None	0.00					0.76	
Opening 5	Window	[1] External Wall 1	South West	None	0.00					4.10	
Opening 6	Window	[1] External Wall 1	South West	None	0.00					0.76	
Opening 7	Window	[2] External Wall 2	South West	None	0.00					0.76	
Opening 8	Window	[2] External Wall 2	South West	None	0.00					2.16	

### 14.0 Conservatory

### 15.0 Draught Proofing

 %

### 16.0 Draught Lobby

### 17.0 Thermal Bridging

### 17.1 List of Bridges

Source Type	Bridge Type	Length	Psi	Imported
Independently assessed	E2 Other lintels (including other steel lintels)	8.93	0.050	Yes
Independently assessed	E3 Sill	7.93	0.030	Yes
Independently assessed	E4 Jamb	26.50	0.020	Yes
Independently assessed	E5 Ground floor (normal)	9.80	0.050	No
Independently assessed	E6 Intermediate floor within a dwelling	9.80	0.000	No
Independently assessed	E10 Eaves (insulation at ceiling level)	9.80	0.050	No
Table K1 - Approved	E18 Party wall between dwellings	10.00	0.060	Yes
Independently assessed	P1 Party wall - Ground floor	17.00	0.040	No
Table K1 - Default	P2 Party wall - Intermediate floor within a dwelling	17.00	0.000	No
Independently assessed	P4 Party wall - Roof (insulation at ceiling level)	17.00	0.050	No

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

### 18.0 Pressure Testing

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

Property Tested ?

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

Cross ventilation possible

Night Ventilation

Air change rate

#### Mechanical Ventilation

Mechanical Ventilation System Present

### 20.0 Fans, Open Fireplaces, Flues

	MHS	SHS	Other	Total
Number of Chimneys	0		0	0
Number of open flues	0		0	0

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Number of intermittent fans	3
Number of passive vents	0
Number of flueless gas fires	0

**21.0 Fixed Cooling System**

### 22.0 Lighting

#### Internal

Total number of light fittings	<input type="text" value="12"/>	
Total number of L.E.L. fittings	<input type="text" value="12"/>	
Percentage of L.E.L. fittings	<input type="text" value="100.00"/>	%

#### External

External lights fitted

**23.0 Electricity Tariff**

### 24.0 Main Heating 1

	<input type="text" value="Database"/>	
Percentage of Heat	<input type="text" value="100"/>	%
Database Ref. No.	<input type="text" value="17953"/>	
Fuel Type	<input type="text" value="Mains gas"/>	
Main Heating	<input type="text" value="BGW"/>	
SAP Code	<input type="text" value="104"/>	
In Winter	<input type="text" value="90.6"/>	
In Summer	<input type="text" value="87.1"/>	
Controls	<input type="text" value="CBI Time and temperature zone control"/>	
PCDF Controls	<input type="text" value="0"/>	
Delayed Start Stat	<input type="text" value="No"/>	
Sap Code	<input type="text" value="2110"/>	
Boiler Compensator	<input type="text" value="Vaillant Group UK Ltd, Vaillant, VRT 350"/>	
Flue Type	<input type="text" value="Balanced"/>	
Fan Assisted Flue	<input type="text" value="Yes"/>	
Is MHS Pumped	<input type="text" value="Pump in heated space"/>	
Heat Emitter	<input type="text" value="Radiators and Underfloor"/>	
Underfloor Heating	<input type="text" value="Yes - Pipes in thin screed"/>	
Flow Temperature	<input type="text" value="Normal (&gt; 45°C)"/>	
Combi boiler type	<input type="text" value="Standard Combi"/>	
Combi keep hot type	<input type="text" value="None"/>	

**25.0 Main Heating 2**

Community Heating

### 28.0 Water Heating

	<input type="text" value="HWP From main heating 1"/>
Water Heating	<input type="text" value="Main Heating 1"/>
Flue Gas Heat Recovery System	<input type="text" value="Yes"/>
Waste Water Heat Recovery Instantaneous System 1	<input type="text" value="No"/>
Waste Water Heat Recovery Instantaneous System 2	<input type="text" value="No"/>
Waste Water Heat Recovery Storage System	<input type="text" value="No"/>

# SUMMARY FOR INPUT DATA

## Calculation Type: New Build (As Designed)

Solar Panel	No
Water use <= 125 litres/person/day	Yes
SAP Code	901

### 28.1 Flue Gas Heat Recovery System

29.0 Hot Water Cylinder	None
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### 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	£29	B 87	
	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar photovoltaic panels, 2.5 kWp	£5,000 - £8,000	£308	A 98	