Ingleton Wood

Billericay
Colchester
London
Norwich

www.ingletonwood.co.uk

Barrington and Lamble, Gospel Oak

DESIGN STAGE ENERGY STRATEGY REPORT

30.11.2015

architecture
building surveying
building services
urban planning
interior design
environmental design

Vision, form and function

Document Control

Revision	Stage	Date	Author	Checked by
1st Issue	Design Stage	30.11.2015	RP	LMT

Team

Client

Camden Borough Council

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1.0 Executive Summary

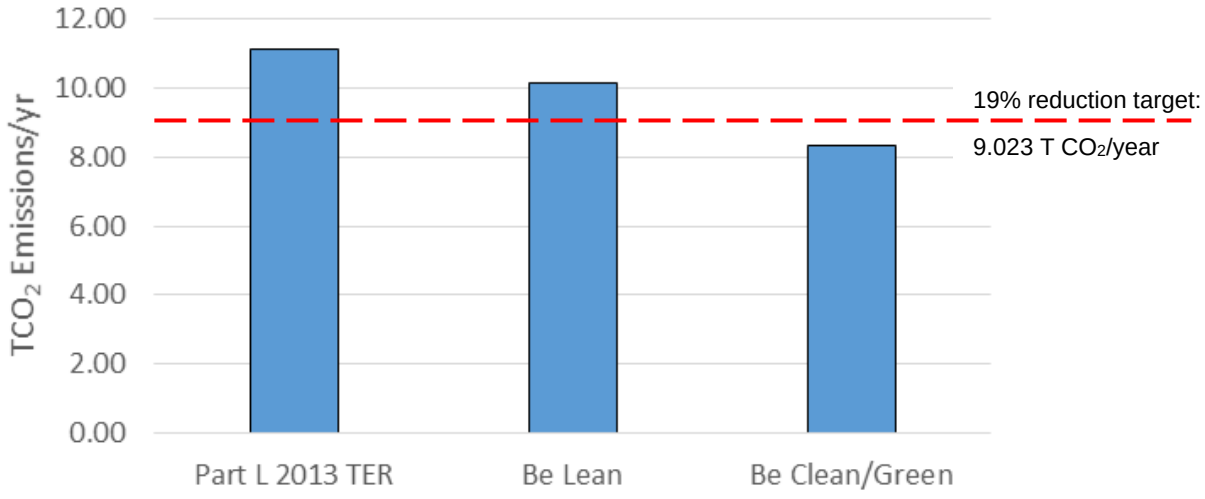
The energy strategy for Barrington and Lamble (through appropriate use of the facade, efficient system design and the use of renewable energy systems) achieves the following savings in CO_2 emissions.

An overall site-wide **25.26%** reduction in regulated CO_2 emissions compared to the Part L 2013 TER, due to:

- Building massing which maximises natural daylight and solar passive heating
- Adopting a 'fabric first' approach to ensure the building fabric of the proposed development achieves high levels of thermal performance
- Whole-house mechanical ventilation with heat recovery (site 3)
- 100% low energy lighting (all sites)
- Efficient individual gas boilers (sites 1 and 3).
- An ASHP to provide space heating and hot water all year round (site 2).
- Roof-mounted PV panels (sites 1 and 3)

		Baseline Part L 2013 (TCO_2/year)	**Proposed (TCO_2/year)**	**% Improvement**
Site 1		1.97	1.48	24.49%
Site 2		3.88	2.76	28.88%
Site 3	Unit 1	1.90	0.75	60.42%
	Unit 2	1.58	1.55	1.62%
	Unit 3	1.82	1.78	2.17%
	Combined	5.29	4.10	22.59%
Total		11.14	8.32	**25.26%**

Summary Table of Regulated CO_2 Emissions - Site-Wide



Summary Graph of Regulated CO_2 Emissions - Site-Wide

2.0 Introduction

2.1 Objective

This design stage energy assessment has been produced by Ingleton Wood for Burd Haward Architects and London Borough of Camden to demonstrate how the proposed development will achieve the required reduction in CO_2 emissions.

2.2 Background

The client is London Borough of Camden and the project is the redevelopment of three infill sites in Gospel Oak, Camden. The three sites present different challenges.

Site 1 – Corner of Lamble Street – adjoins an existing terrace of 1980s 2-storey houses designed by Benson and Forsyth.

Site 2 – Lamble Street Pram Sheds – is located between the 10 storey Barrington Court and a 1960s terrace of 4 storey maisonettes.

Site 3 – Barrington Close Boiler House and Garages – is at the southern side of the Barrington and Lamble Estate adjacent to the railway path and the mainline to Euston.

2.3 Site Analysis

Site 1 is approximately 125m2 and bounded by a high rendered wall. The site has a large adjacent tree but otherwise good access to daylight with little shading from other buildings. Renewable potential probably focuses on solar panels, whether photovoltaic or solar thermal, due to the limited space available for other options.

Site 2 is approximately 130m2 and overshadowed by the adjacent buildings and existing trees. Poor access to daylight leads us towards heat pump technologies for this site.

Site 3 is approximately 220m2 and located very close to the main railway line. It currently houses a recently decommissioned boiler house and as such, existing below ground services will need to be carefully assessed. Mechanical ventilation is being considered due to the acoustic issues of the location.

3.0 Approach

The methodology employed to determine the potential CO_2 savings for the development is in line with the three step energy hierarchy:

Reduce Energy Demand (Be Lean) – Use less energy through a range of passive measures (i.e. enhanced building fabric and air tightness, orientation, natural daylight, solar passive heating) and active measures (i.e. efficient heating systems, low energy lighting etc.)

Energy Efficiency (Be Clean) – Once demand for energy has been minimised, investigate the feasibility of connecting to an existing/proposed heat network, implementing a site-wide heat network, on-site CHP etc.

Renewable Energy (Be Green) – Use renewable and low energy sources to further reduce emissions.

Such technologies include:

- Solar thermal heating
- Biomass heating
- Ground and air source heat pumps
- Photovoltaics
- Wind turbines

The software used to generate the results throughout this document was Elmhurst Energy Systems (SAP 2012) version 3.01r13.

4.0 Specification

4.1 Site 1

Building Fabric Specification

External Wall U-value:	0.18 W/m^{2}K
Ground Floor U-value:	0.12 W/m^{2}K
Roof U-value:	0.13 W/m^{2}K
Glazing U-value:	1.11 W/m^{2}K (area weighted)
Rooflights U-value:	0.8 W/m^{2}K
Air permeability :	3m^3/m^2 at 50Pa.

M+E Specification

Heating/Hot Water:	Worcester Bosch Greenstar 27i gas boiler (27kW output)
Heating Control:	Time and temperature control, boiler interlock
Hot Water Storage:	210L cylinder
Ventilation:	Natural Ventilation
	Mechanical Extracts to Kitchens and Bathrooms
Lighting:	100% low energy lighting
Renewable tech:	2.0 kWp PV system (8no. 250W panels)

4.2 Site 2

Building Fabric Specification

External Wall U-value:	0.18 W/m^{2}K
Ground Floor U-value:	0.12 W/m^{2}K
Roof U-value:	0.13 W/m^{2}K
Glazing U-value:	1.18 W/m^{2}K (area weighted)
Rooflights U-value:	0.8 W/m^{2}K
Air permeability :	3m^3/m^2 at 50Pa.

M+E Specification

Heating/Hot Water:	Mitsubishi Ecodan 11.2kW air source heat pump
Heating Control:	Time and temperature control
Hot Water Storage:	300L cylinder
Ventilation:	Natural Ventilation
	Mechanical Extracts to Kitchens and Bathrooms
Lighting:	100% low energy lighting
Renewable tech:	none

4.3 Site 3

Building Fabric Specification

External Wall U-value:	0.18 W/m^{2}K
Ground Floor U-value:	0.12 W/m^{2}K
Roof U-value:	0.13 W/m^{2}K
Glazing U-value:	0.96 W/m^{2}K (area weighted)
Rooflights U-value:	0.8 W/m^{2}K
Air permeability :	3m^3/m^2 at 50Pa.

M+E Specification

Heating/Hot Water:	Worcester Bosch Greenstar 27i gas boiler (27kW output)
Heating Control:	Time and temperature control, boiler interlock
Hot Water Storage:	210L cylinder
Ventilation:	MVHR - Nuaire MRXBOX95AB-WH1
	Unit 1: SFP = 0.67, efficiency = 88%
	Unit 2: SFP = 0.56, efficiency = 88%
	Unit 3: SFP = 0.56, efficiency = 88%
Lighting:	100% low energy lighting
Renewable tech:	Unit 1: 2.97 kWp PV system (9no. 330W panels)
	Unit 2: none
	Unit 3: none

5.0 Summary

The energy strategy for Barrington and Lamble (through appropriate use of the facade, efficient system design and the use of renewable energy systems) achieves the following savings in CO_2 emissions.

An overall site-wide **25.26%** reduction in regulated CO_2 emissions compared to the Part L 2013 TER, due to:

- Building massing which maximises natural daylight and solar passive heating
- Adopting a 'fabric first' approach to ensure the building fabric of the proposed development achieves high levels of thermal performance
- Whole-house mechanical ventilation with heat recovery (site 3)
- 100% low energy lighting (all sites)
- Efficient individual gas boilers (sites 1 and 3).
- An ASHP to provide space heating and hot water all year round (site 2).
- Roof-mounted PV panels (sites 1 and 3)

5.1 Site 1

	Regulated CO_2 Emissions (TCO_2/year)	Savings (TCO_2/year)	% Saving
Part L 2013 TER	1.97	-	-
Lean Measures	2.12	-0.15	-7.60%
Clean / Green Measures	1.48	0.63	29.83%
Cumulative Savings		**0.48**	**24.49%**

Summary Table of Regulated CO_2 Emissions - Site 1

5.3 Site 2

	Regulated CO_2 Emissions (TCO_2/year)	Savings (TCO_2/year)	% Saving
Part L 2013 TER	3.88	-	-
Lean Measures	2.76	1.12	28.88%
Clean / Green Measures	2.76	0.00	0.00%
Cumulative Savings		**1.12**	**28.88%**

Summary Table of Regulated $_{CO2}$ Emissions - Site 2

5.3 Site 3

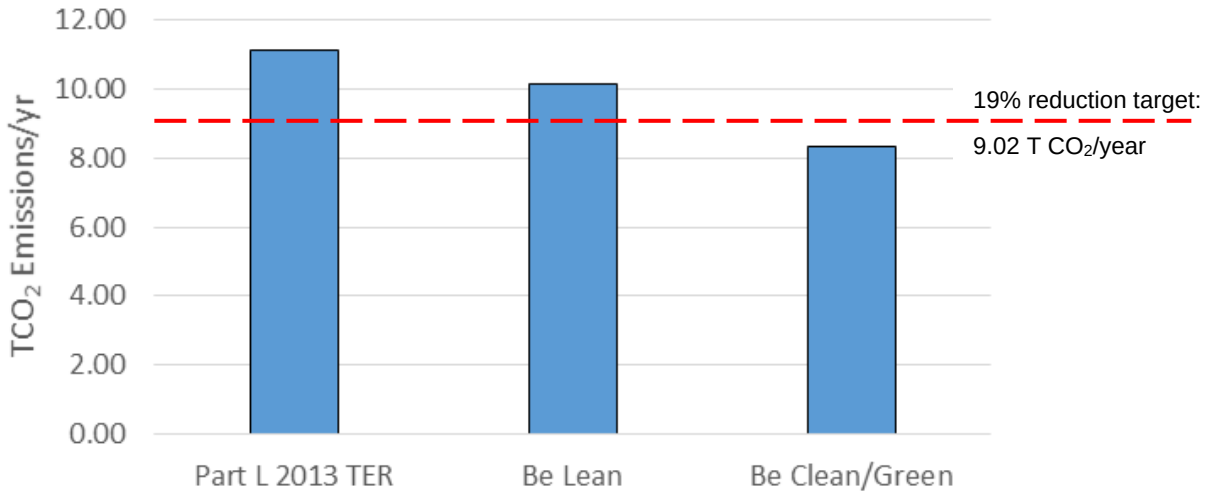
	Regulated CO_2 Emissions (TCO_2/year)	Savings (TCO_2/year)	% Saving
Part L 2013 TER	5.29	-	-
Lean Measures	5.25	0.04	0.72%
Clean / Green Measures	4.10	1.16	22.03%
Cumulative Savings		**1.20**	**22.59%**

Summary Table of Regulated CO_2 Emissions - Site 3

5.4 Site-Wide

	Regulated CO_2 Emissions (TCO_2/year)	Savings (TCO_2/year)	% Saving
Part L 2013 TER	11.14	-	-
Lean Measures	10.13	1.01	9.03%
Clean / Green Measures	8.32	1.81	17.83%
Cumulative Savings		**2.81**	**25.26%**

Summary Table of Regulated CO_2 Emissions - Site-Wide



Summary Graph of Regulated CO_2 Emissions - Site-Wide

6.0 Appendix - SAP Results

Appendix 1 - Site 1

Appendix 2 - Site 2

Appendix 3 - Site 3

- **Block Compliance**
- **Unit 1**
- **Unit 2**
- **Unit 3**

Appendix 1 - Site 1

Sample Report Ltd
1 Sample Street
Sampletown

Building Regulation Compliance

Property Reference: 004023
Survey Reference: site 1
Property:

Issued on Date: 29.Nov.2015
Prop Type Ref: site 1

SAP Rating:	89 B	**CO2 Emissions (t/year):**	1.17	**DER:**	12.89 Pass	**TER:**	17.07	**Percentage DER<TER:**	24.50 %
Environmental:	89 B	**General Requirements Compliance:**	Pass	**DFEE:**	55.12 Pass	**TFEE:**	57.36	**Percentage DFEE<TFEE:**	3.90 %

CfSH Results **Version:** November 2010 - June 2014 Addendum **ENE1 Credits:** 3.4 **ENE2 Credits:** 3.9 **ENE7 Credits:** 2 **CfSH Level:** 4

Surveyor: admin Admin, Tel: 4, Fax: s@l.f Surveyor ID: Admin
Address:
Client: Burd Haward Architects

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 3.02r10
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

1a TER and DER

Fuel for main heating:	Mains gas	
Fuel factor:	1.00 (mains gas)	
Target Carbon Dioxide Emission Rate (TER)	17.07 kg/m^2	
Dwelling Carbon Dioxide Emission Rate (DER)	12.89 kg/m^2	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	57.36 kWh/m^2	
Dwelling Fabric Energy Efficiency (DFEE)	55.12 kWh/m^2	OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof	0.13 (max. 0.20)	0.13 (max. 0.35)	OK
Openings	1.11 (max. 2.00)	1.15 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated using default y-value of 0.15

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Boiler system with radiators or underfloor - Mains gas Data from database Worcester Greenstar 27 I System Compact Efficiency: 89.0% SEDBUK2009 Minimum: 88.0%	OK
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Measured cylinder loss: 1.57 kWh/day Permitted by DBSCG 2.30	OK
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls:	Time and temperature zone control	OK
Hot water controls:	Cylinderstat	OK
	Independent timer for DHW	OK
Boiler interlock	Yes	OK

7 Low energy lights

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

Minimum	75%	OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based On:		
Overshading:	Average	
Windows facing South East:	12.34 m^2, No overhang	
Windows facing South West:	10.11 m^2, No overhang	
Windows facing North West:	12.94 m^2, No overhang	
Air change rate:	4.00 ach	
Blinds/curtains:	None	

10 Key features

Party wall U-value	0.00 W/m^2K
Floor U-value	0.12 W/m^2K
Exposed floor U-value	0.12 W/m^2K
Door U-value	1.15 W/m^2K
Window U-value	1.11 W/m^2K
Air permeability	3.0 m^3/m^2h
Photovoltaic array	

Appendix 2 - Site 2

Sample Report Ltd
1 Sample Street
Sampletown

Building Regulation Compliance

Property Reference: 004024
Survey Reference: site 2
Property:

Issued on Date: 29.Nov.2015
Prop Type Ref: site 2

SAP Rating:	81 B	**CO2 Emissions (t/year):**	2.40	**DER:**	17.35 Pass	**TER:**	24.40	**Percentage DER<TER:**	28.88 %
Environmental:	83 B	**General Requirements Compliance:**	Pass	**DFEE:**	58.62 Pass	**TFEE:**	61.27	**Percentage DFEE<TFEE:**	4.33 %

CfSH Results **Version:** November 2010 - June 2014 Addendum **ENE1 Credits:** 3.7 **ENE2 Credits:** 3.2 **ENE7 Credits:** 0 **CfSH Level:** 4

Surveyor: admin Admin, Tel: 4, Fax: s@l.f Surveyor ID: Admin
Address:
Client: Burd Haward Architects

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 3.02r10
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

1a TER and DER

Fuel for main heating:	Electricity	
Fuel factor:	1.55 (electricity)	
Target Carbon Dioxide Emission Rate (TER)	24.40 kg/m^2	
Dwelling Carbon Dioxide Emission Rate (DER)	17.35 kg/m^2	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	61.27 kWh/m^2	
Dwelling Fabric Energy Efficiency (DFEE)	58.62 kWh/m^2	OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof	0.13 (max. 0.20)	0.13 (max. 0.35)	OK
Openings	1.18 (max. 2.00)	1.18 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated using default y-value of 0.15

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Heat pump with radiators or underfloor - Electric Mitsubishi Ecodan 11.2 kW PUHZ-W112VHA-BS	
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Measured cylinder loss: 1.57 kWh/day Permitted by DBSCG 2.86	OK
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls:	Time and temperature zone control	OK
Hot water controls:	Cylinderstat	OK
	Independent timer for DHW	OK

7 Low energy lights

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

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based On:		
Overshading:	Average	
Windows facing North East:	8.24 m^2, No overhang	
Windows facing South East:	18.05 m^2, No overhang	
Windows facing South West:	3.33 m^2, No overhang	
Windows facing North West:	11.54 m^2, No overhang	
Air change rate:	4.00 ach	
Blinds/curtains:	None	

10 Key features

Party wall U-value	0.00 W/m^2K
Floor U-value	0.12 W/m^2K
Exposed floor U-value	0.12 W/m^2K
Door U-value	1.15 W/m^2K
Window U-value	1.18 W/m^2K
Air permeability	3.0 m^3/m^2h

Appendix 3 - Site 3

- **Block Compliance**
- **Unit 1**
- **Unit 2**
- **Unit 3**

Sample Report Ltd
1 Sample Street
Sampletown

Block Compliance

Property Reference: 004030
Survey Reference: site 3 - 1
Property:

Issued on Date: 29.Nov.2015
Prop Type Ref: site 3 - unit 1

Surveyor: admin Admin, Tel: 4, Fax: s@l.f
Surveyor ID: Admin
Address:
Client: Burd Haward Architects

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 3.02r10
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Dwelling As Designed

Block Compliance Report - DER

Block Reference: 000115				Block Name: Nov 2015 - Site 3			
Property-Survey Reference	**Multiplier (M)**	**Floor Area (F)**	**DER (D)**	**TER (T)**	**F x M**	**D x F x M**	**T x F x M**
004030-site 3 - 1	**1**	**115**	**6.53**	**16.50**	**115.00**	**750.95**	**1,897.14**
004031-site 3 - 2	**1**	**93.86**	**16.53**	**16.80**	**93.86**	**1,551.51**	**1,577.02**
004032-site 3 - 3	**1**	**102.9**	**17.29**	**17.67**	**102.90**	**1,779.14**	**1,818.59**
Totals:	**3**	**311.76**	**40.35**	**50.97**	**311.76**	**4,081.60**	**5,292.75**
Average DER= 13.09				PASS			
Average TER= 16.98							

Block Compliance Report - DFEE

Block Reference: 000115				Block Name: Nov 2015 - Site 3			
Property-Survey Reference	**Multiplier (M)**	**Floor Area (F)**	**DFEE (D)**	**TFEE (T)**	**F x M**	**D x F x M**	**T x F x M**
004030-site 3 - 1	**1**	**115**	**51.59**	**54.39**	**115.00**	**5,932.46**	**6,254.71**
004031-site 3 - 2	**1**	**93.86**	**46.39**	**49.45**	**93.86**	**4,354.41**	**4,641.08**
004032-site 3 - 3	**1**	**102.9**	**52.72**	**57.02**	**102.90**	**5,424.38**	**5,867.59**
Totals:	**3**	**311.76**	**150.69**	**160.86**	**311.76**	**15,711.25**	**16,763.38**
Average DFEE= 50.40				PASS			
Average TFEE= 53.77							

Sample Report Ltd
1 Sample Street
Sampletown

Building Regulation Compliance

Property Reference: 004025
Survey Reference: site 3 - 1
Property:

Issued on Date: 29.Nov.2015
Prop Type Ref: site 3 - unit 1

SAP Rating:	94 A	**CO2 Emissions (t/year):**	0.42	**DER:**	6.53 Pass	**TER:**	16.50	**Percentage DER<TER:**	60.42 %
Environmental:	95 A	**General Requirements Compliance:**	Pass	**DFEE:**	51.59 Pass	**TFEE:**	54.39	**Percentage DFEE<TFEE:**	5.15 %

CfSH Results **Version:** November 2010 - June 2014 Addendum **ENE1 Credits:** 6.3 **ENE2 Credits:** 5.1 **ENE7 Credits:** 2 **CfSH Level:** 4

Surveyor: admin Admin, Tel: 4, Fax: s@l.f Surveyor ID: Admin
Address:
Client: Burd Haward Architects

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 3.02r10
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

1a TER and DER

Fuel for main heating:	Mains gas	
Fuel factor:	1.00 (mains gas)	
Target Carbon Dioxide Emission Rate (TER)	16.50 kg/m^2	
Dwelling Carbon Dioxide Emission Rate (DER)	6.53 kg/m^2	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	54.39 kWh/m^2	
Dwelling Fabric Energy Efficiency (DFEE)	51.59 kWh/m^2	OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof	0.13 (max. 0.20)	0.13 (max. 0.35)	OK
Openings	0.97 (max. 2.00)	1.15 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated using default y-value of 0.15

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Boiler system with radiators or underfloor - Mains gas Data from database Worcester Greenstar 27 I System Compact Efficiency: 89.0% SEDBUK2009 Minimum: 88.0%	OK
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Measured cylinder loss: 1.57 kWh/day Permitted by DBSCG 2.30	OK
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls:	Time and temperature zone control	OK
Hot water controls:	Cylinderstat	OK
	Independent timer for DHW	OK
Boiler interlock	Yes	OK

7 Low energy lights

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

Minimum	75%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.67	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based On:		
Overshading:	Average	
Windows facing North East:	1.75 m^2, No overhang	
Windows facing East:	1.33 m^2, No overhang	
Windows facing South:	11.32 m^2, No overhang	
Windows facing South West:	18.04 m^2, No overhang	
Air change rate:	4.00 ach	
Blinds/curtains:	None	

10 Key features

Party wall U-value	0.00 W/m^2K
Floor U-value	0.12 W/m^2K
Exposed floor U-value	0.12 W/m^2K
Door U-value	1.15 W/m^2K
Window U-value	0.96 W/m^2K
Air permeability	3.0 m^3/m^2h
Photovoltaic array	

Sample Report Ltd
1 Sample Street
Sampletown

Building Regulation Compliance

Property Reference: 004026
Survey Reference: site 3 - 2
Property:

Issued on Date: 17.Nov.2015
Prop Type Ref: site 3 - unit 2

SAP Rating:	84 B	**CO2 Emissions (t/year):**	1.35	**DER:**	16.53 Pass	**TER:**	16.80	**Percentage DER<TER:**	1.62 %
Environmental:	86 B	**General Requirements Compliance:**	Pass	**DFEE:**	46.39 Pass	**TFEE:**	49.45	**Percentage DFEE<TFEE:**	6.18 %

CfSH Results **Version:** November 2010 - June 2014 Addendum **ENE1 Credits:** 0.2 **ENE2 Credits:** 3.5 **ENE7 Credits:** 0 **CfSH Level:** 3

Surveyor: admin Admin, Tel: 4, Fax: s@l.f Surveyor ID: Admin
Address:
Client: Burd Haward Architects

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 3.02r10
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

1a TER and DER

Fuel for main heating:	Mains gas	
Fuel factor:	1.00 (mains gas)	
Target Carbon Dioxide Emission Rate (TER)	16.80 kg/m^2	
Dwelling Carbon Dioxide Emission Rate (DER)	16.53 kg/m^2	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	49.45 kWh/m^2	
Dwelling Fabric Energy Efficiency (DFEE)	46.39 kWh/m^2	OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof	0.13 (max. 0.20)	0.13 (max. 0.35)	OK
Openings	0.98 (max. 2.00)	1.15 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated using default y-value of 0.15

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Boiler system with radiators or underfloor - Mains gas Data from database Worcester Greenstar 27 I System Compact Efficiency: 89.0% SEDBUK2009 Minimum: 88.0%	OK
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Measured cylinder loss: 1.57 kWh/day Permitted by DBSCG 2.30	OK
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls:	Time and temperature zone control	OK
Hot water controls:	Cylinderstat	OK
	Independent timer for DHW	OK
Boiler interlock	Yes	OK

7 Low energy lights

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

Minimum	75%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.56	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Slight	OK
Based On:		
Overshading:	Average	
Windows facing North:	5.07 m^2, No overhang	
Windows facing South:	10.96 m^2, No overhang	
Windows facing North West:	1.63 m^2, No overhang	
Air change rate:	4.00 ach	
Blinds/curtains:	None	

10 Key features

Party wall U-value	0.00 W/m^2K
Floor U-value	0.12 W/m^2K
Exposed floor U-value	0.12 W/m^2K
Door U-value	1.15 W/m^2K
Window U-value	0.96 W/m^2K
Air permeability	3.0 m^3/m^2h

Sample Report Ltd
1 Sample Street
Sampletown

Building Regulation Compliance

Property Reference: 004027
Survey Reference: site 3 - 3
Property:

Issued on Date: 29.Nov.2015
Prop Type Ref: site 3 - unit 3

SAP Rating:	83 B	**CO2 Emissions (t/year):**	1.54	**DER:**	17.29 Pass	**TER:**	17.67	**Percentage DER<TER:**	2.17 %
Environmental:	85 B	**General Requirements Compliance:**	Pass	**DFEE:**	52.72 Pass	**TFEE:**	57.02	**Percentage DFEE<TFEE:**	7.55 %

CfSH Results **Version:** November 2010 - June 2014 Addendum **ENE1 Credits:** 0.3 **ENE2 Credits:** 4.7 **ENE7 Credits:** 0 **CfSH Level:** 3

Surveyor: admin Admin, Tel: 4, Fax: s@l.f Surveyor ID: Admin
Address:
Client: Burd Haward Architects

Software Version: Elmhurst Energy Systems SAP2012 Calculator (Design System) version 3.02r10
SAP version: SAP 2012, Regs Region: England (Part L1A 2013), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

1a TER and DER

Fuel for main heating:	Mains gas	
Fuel factor:	1.00 (mains gas)	
Target Carbon Dioxide Emission Rate (TER)	17.67 kg/m^2	
Dwelling Carbon Dioxide Emission Rate (DER)	17.29 kg/m^2	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	57.02 kWh/m^2	
Dwelling Fabric Energy Efficiency (DFEE)	52.72 kWh/m^2	OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof	0.13 (max. 0.20)	0.13 (max. 0.35)	OK
Openings	0.97 (max. 2.00)	1.15 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated using default y-value of 0.15

3 Air permeability

Air permeability at 50 pascals:	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Boiler system with radiators or underfloor - Mains gas Data from database Worcester Greenstar 27 I System Compact Efficiency: 89.0% SEDBUK2009 Minimum: 88.0%	OK
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	Measured cylinder loss: 1.57 kWh/day Permitted by DBSCG 2.30	OK
Primary pipework insulated:	Yes	OK

6 Controls

Space heating controls:	Time and temperature zone control	OK
Hot water controls:	Cylinderstat	OK
	Independent timer for DHW	OK
Boiler interlock	Yes	OK

7 Low energy lights

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

Minimum	75%	OK

8 Mechanical ventilation

Continuous supply and extract system		
Specific fan power:	0.56	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum:	70%	OK

9 Summertime temperature

Overheating risk (Thames Valley):	Medium	OK
Based On:		
Overshading:	Average	
Windows facing North:	5.06 m^2, No overhang	
Windows facing North East:	3.75 m^2, No overhang	
Windows facing East:	9.13 m^2, No overhang	
Windows facing South:	11.23 m^2, No overhang	
Air change rate:	4.00 ach	
Blinds/curtains:	None	

10 Key features

Party wall U-value	0.00 W/m^2K
Floor U-value	0.12 W/m^2K
Door U-value	1.15 W/m^2K
Window U-value	0.96 W/m^2K
Air permeability	3.0 m^3/m^2h