

ENERGY AND SUSTAINABILITY ASSESSMENT

—
THE FORMER SHRUBLANDS NURSEY
ROUNDSTONE LANE, ANGMERING
BN16 4AT

—
PREPARED FOR
SIGMA HOMES

—
10 FEBRUARY 2021
REVISION 1

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CERTIFICATE NUMBER 5745

ISO 9001, OHSAS 18001

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EXECUTIVE SUMMARY

This report details an Energy and Sustainability Assessment for the proposed development at The Former Shrublands Nursey, Roundstone Lane, Angmering BN16 4AT. The site is situated on the land formerly occupied by The Former Shrublands Nursey and is currently occupied by a number of vacant yards and associated existing nursery buildings, which are of poor thermal efficiency. The proposed development consists of:

Demolition of existing buildings and erection of 40no. residential dwellings including 12no. (30%) affordable units and associated landscaping, road layout, parking and provision of Public Open Space and access onto Roundstone Lane.

NATIONAL AND LOCAL PLANNING POLICY

The development has been shown to meet the energy consumption and CO₂ emissions requirements. These include the national Building Regulations Part L requirements, and the Arun Local Plan requirements.

Arun District Council requires major developments to produce at least 10% of the total predicted energy requirements from renewable or low carbon energy generation on site, in addition to energy efficiency measures.

A full review of the building energy consumption and energy generation has been conducted. The report provides a summary of the dwelling emissions rate (DER) for the residential units, compared with the Building Regulations target emissions rate (TER), demonstrating the reduction in site CO₂ emissions achieved. In line with best practice and the Arun Local Plan guidance, the proposed energy strategy for this development has followed the principals of the energy hierarchy – Be Lean, Be Clean, Be Green.

The Assessment provides evidence to demonstrate compliance with the Building Regulations Part L, along with the BRE Water Efficiency Calculator to demonstrate compliance with the Building Regulations Part G.

The Assessment demonstrates that the development meets the requirements of Policy ECC SP2 by producing at least 10% of the energy requirements of the development from renewable energy (Solar Photovoltaic).



Figure 1: Aerial view – The Former Shrublands Nursey, Roundstone Lane, Angmering (source: Google Earth)



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1 INTRODUCTION

.01 PURPOSE OF THE ASSESSMENT

MCA Consulting Engineers Ltd has been commissioned by Sigma Homes, to prepare an Energy and Sustainability Assessment in support of the proposed development at The Former Shrublands Nursey, Roundstone Lane, Angmering.

This Assessment demonstrates how the development meets the requirements of national, regional, and local planning policy and guidance in relation to energy and carbon emissions and provides evidence to confirm that the development exceeds the required standards.

The key objectives of the Energy and Sustainability Assessment are to:

- examine and comprehend the key energy efficiency themes and associated standards within the national, regional, and local planning policy and guidance.
- assess the performance of the development proposals in achieving the energy standards.
- identify any opportunities and appropriate actions required to ensure sustainability is delivered at the detailed design stage.

.02 PROPOSAL

It is proposed to seek planning permission for the redevelopment of the site to provide a residential development, comprising a 40no. new residential units.

The site is situated on the land formerly occupied by The Former Shrublands Nursey and is currently occupied by a number of vacant yards and associated warehouse/nursery buildings.

The proposed development consists of 40no. residential dwellings (including 30% affordable housing) and access onto Roundstone Lane. The dwelling mix includes 4no. flats, 4no. detached houses and 32no. semi-detached / terraced houses. The proposed buildings have all been designed with consideration to energy efficiency, and consideration has been given to local generation of energy from renewable and low carbon sources.

.03 PREAMBLE

The document has been arranged to a format that is consistent with the approach detailed in the Arun Local Plan (July 2018).

.04 NATIONAL POLICIES

.01 NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

The Government has developed a planning system with which to help create sustainable development and communities. This system plays a key role in delivering the Government's objectives on sustainable development and comprises a number of different policy documents, each tackling a different sustainability issue. The system encourages a proactive process, which promotes environmental protection, economic growth and ensures a better quality of life for all.

The UK Government published its sustainable development strategy entitled "A better quality of life: A strategy for sustainable development in the UK" in 1999. This sets out four main objectives for sustainable development in the UK:

- Social progress that recognises the needs of everyone
- Effective protection of the environment
- Prudent use of natural resources
- Maintenance of stable high levels of economic growth and employment.



The most relevant national planning policy guidance on sustainability is set out in The National Planning Policy Framework - 2019. The NPPF identifies a set of 17 core land-use planning principles, one of which is:

The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.

.02 REGIONAL AND LOCAL POLICIES

.01 ARUN LOCAL PLAN 2011-2031

Adopted July 2018

Policy ECC SP1 - Adapting to climate change

The Council will support development which is located and appropriately designed to adapt to impacts arising from climate change such as the increased probability of tidal and fluvial flooding; water stress; health impacts as a result of extreme temperatures and a decline in the quality of habitats and richness of biodiversity.

In order to achieve this, development must be designed to take account of the following issues:

- a. Location (in relation to flood risk and vulnerability to coastal erosion);*
- b. Water efficiency;*
- c. Shade, cooling, ventilation, solar gain;*
- d. Connectivity to the green infrastructure network;*
- e. Layout and massing;*
- f. Resilience of buildings and building materials to extreme weather events; and*
- g. Capacity of drainage systems and incorporation of Sustainable urban Drainage Systems (SuDS)*

Policy ECC SP2 - Energy and climate change mitigation

All new residential and commercial development (including conversions, extensions and changes of use) will be expected to be energy efficient and to demonstrate how they will:

- a. Achieve energy efficiency measures that reflect the current standards applicable at the time of submission;*
- b. Use design and layout to promote energy efficiency; and*
- c. Incorporate decentralised, renewable and low carbon energy supply systems, for example small scale renewable energy systems such as solar panels.*

All major developments must produce 10% of the total predicted energy requirements from renewable or low carbon energy generation on site, unless it can be demonstrated that this is unviable. Energy efficiency measures will be taken into consideration when the total predicted energy requirements are calculated. The Council will consider 'allowable solutions' where it is clearly demonstrated that the provision of on site renewable or low carbon energy generation is unviable or not feasible.

Where planning permission is required to retrofit energy efficiency measures into existing development, schemes will be permitted, subject to the Design and Built Heritage policies.



In assessing the achievement of these standards the Council will consider:

- *Site constraints;*
- *Technical viability;*
- *Financial viability; and*
- *Delivery of additional benefits.*

.02 SUMMARY OF ARUN LOCAL PLAN

Policy ECC SP2 sets out the requirement for the development to demonstrate that it has minimised on-site carbon dioxide (CO2) emissions by using less energy through maximising energy efficiency, supplying energy efficiently using low carbon and communal heating systems (where feasible), and using on-site renewable sources of energy.

The development is also expected to maximise efficient use of resources (Policy ECC SP1), and will aim to achieve water use of 110 litres/person/day in accordance with the optional standard of the Approved Document “G”. Finally, the risks associated with future climate change should be planned for as part of the layout of the scheme and design of its buildings, including the resilience of buildings and building materials to extreme weather events.

The residential development is not required to meet zero carbon, as the government does not intend to proceed with the zero carbon “Allowable Solutions” carbon offsetting scheme, or the proposed 2016 increase in on-site energy efficiency standards, but will keep energy efficiency standards under review, recognising that existing measures to increase energy efficiency of new buildings should be allowed time to become established.” as set out in the 2015 government publication ‘Fixing the Foundations: Creating a more prosperous nation’.

.03 OTHER

.01 FUTURE HOMES CONSULTATION

The government is nearing the end of its “Future Homes” consultation, which includes an uplift to Part L of the Building Regulations. This uplift is the first step in achieving the Future Homes Standards.

The residential development is not required to meet zero carbon, as the government does not intend to proceed with the zero carbon “Allowable Solutions” carbon offsetting scheme, or the proposed 2016 increase in on-site energy efficiency standards, but will keep energy efficiency standards under review, recognising that existing measures to increase energy efficiency of new buildings should be allowed time to become established.” as set out in the 2015 government publication ‘Fixing the Foundations: Creating a more prosperous nation’.

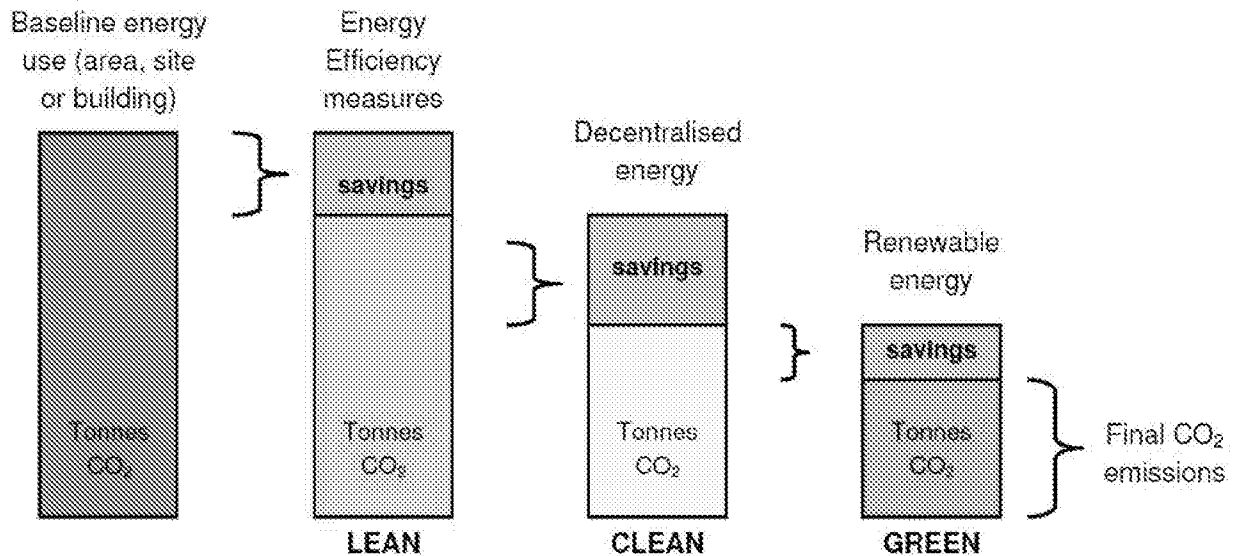


2 ENERGY STRATEGY

.01 ENERGY HIERARCHY

In line with best practice, the proposed energy strategy for this development will follow the principles of the energy hierarchy.

The energy hierarchy has three priorities, seeking to reduce energy use before meeting remaining demand by the cleanest means possible:



.02 BE LEAN (USE LESS ENERGY)

Optimise the building fabric, glazing, and structure to minimise energy consumption in the first instance by using low U-values and good air tightness, and ensuring that building services systems run as energy-efficiently as possible.

.01 FABRIC ENERGY EFFICIENCY

Enhancing the thermal performance of the building envelope helps to future-proof the structure and also yields the greatest CO₂ savings. Adding renewable technology will then yield maximum carbon reductions with lower long-term costs for the developer.

The proposed development will achieve compliance with Approved Document L1A of the Building Regulations (2013) without reliance on the contribution of renewable technologies.

The following energy-efficient design measures are proposed:

DOMESTIC (RESIDENTIAL)

	VALUE PROPOSED FOR THIS DEVELOPMENT	BUILDING REGULATIONS L1A REQUIREMENT
1. EXTERNAL WALLS	0.18 (W/m ² K)	0.30 (W/m ² K)
2. EXPOSED ROOF	0.10 (W/m ² K)	0.20 (W/m ² K)
3. EXPOSED FLOOR	0.10 (W/m ² K)	0.25 (W/m ² K)
4. OPENINGS	1.20 (W/m ² K)	2.00 (W/m ² K)
5. PARTY WALLS	0.00 (W/m ² K)	0.20 (W/m ² K)
6. AIR PERMEABILITY	4.0 m ³ /(h.m ²)	10 m ³ /(h.m ²)
7. THERMAL BRIDGING	Accredited Construction Details	Default Y=0.15
8. SOLAR SHADING	Sunlight/shading: Average Windows fully open	ADL1A Criterion 3: Overheating risk identified as slight

.02 BUILDING SERVICES SYSTEMS

Having reduced energy demand through improvements to the fabric, this development shall seek to reduce energy consumption further through the specification of mechanical and electrical systems with efficiencies that surpass the requirements of the Domestic Building Services Compliance Guide.



DOMESTIC (RESIDENTIAL)

	VALUE PROPOSED FOR THIS DEVELOPMENT	BUILDING REGULATIONS L1A REQUIREMENT
1. LIGHTING: LOW ENERGY	100%	75%
2. HEATING: NATURAL GAS BOILERS	Natural Gas Boilers SAP Efficiency $\geq 89.6\%$ Wet system with radiators, flow temp $>45^{\circ}\text{C}$.	Natural Gas Boilers SAP Efficiency $> 88\%$
3. HOT WATER: FROM MAIN SYSTEM	DHW storage volumes: 150L – flats 200L – houses	N/A
4. HEATING CONTROLS	Time and temp zone control (at least two zones). Weather compensator.	Programmer, thermostat and thermostatic radiator valves. (Time & temp zone control required for TFA $>150\text{sqm}$)
5. VENTILATION	Natural Ventilation with Decentralised MEV (Kitchen & Wet Rooms) Greenwood Unity CV3 or similar	N/A

.03 BE CLEAN (SUPPLY ENERGY EFFICIENTLY)

Further reduce carbon emissions through the use of decentralised energy, where feasible.

.01 CONNECTION TO A HEAT NETWORK

Reference has been made to the West Sussex Sustainable Energy Study (2009) and it has been ascertained that the development is below the density threshold for consideration for a CHP district heating scheme (Minimum density of 50 dwellings/hectare). It is not currently feasible to connect to a District Heat Network (DHN), as there are no known existing heat networks in the local area, however future connection may be possible. This would entail replacement of the proposed boilers with a Thermal Interface Unit.

.02 COMBINED HEAT AND POWER

Combined heat and power (CHP), also called co-generation, is a de-centralised method of producing electricity from a fuel and ‘capturing’ the heat generated for use in buildings. The plant is essentially a small-scale electrical power station. The production and transportation of electricity via the National Grid is very inefficient, with over 65% of the energy produced at the power station being lost to the atmosphere and through transportation.

Consequently, CHP can demonstrate significant CO₂ savings and, although not classed as renewable energy (depending on the fuel), the technology is low carbon.

For a CHP plant to be economically viable it needs to operate for as much of the time as possible (usually deemed to be in excess of 16 hours per day) and the size of the units are therefore usually based upon the hot water load of the buildings, with additional boilers being used to meet the peak space heating demand.

The feasibility of a gas-fired CHP for the site has been considered, however, in this case the base load and dwelling density (30 dwellings/hectare) are insufficient to make CHP feasible. CHP is therefore not considered to be feasible or desirable for this project, due to the scale and density of the development.



.04 BE GREEN (USE LOW AND ZERO CARBON TECHNOLOGY)

When the above design elements have been reasonably exhausted, and supply energy is generated by low and zero carbon (LZC) technology.

.01 LOW AND ZERO CARBON TECHNOLOGY – OPTIONS CONSIDERED

.01 BIOMASS

The spatial limitations of the site may be prohibitive to the storage and delivery of sufficient biomass fuel. Due to the suburban location, deliveries of biomass fuel may be unnecessarily disruptive, for example during adverse weather conditions.

The use of biomass as a fuel source has been considered but because these types of systems suffer from higher levels of emissions, particularly NO_x and particulates, their incorporation would have a significantly detrimental impact on local air quality. Whilst there are currently no designated Air Quality Management Areas (AQMA's) in the whole of Arun District, airborne pollution is a concern within certain regions of the District, in particular near to the A259 and A27. Consequently, it has been decided not to pursue this type of installation.

.02 HEAT PUMPS

High-efficiency air-source heat pumps have been considered for all areas of the development, including the residential houses and flats. This may be a feasible option, however the efficiency of air-source heat pumps has been known to decrease during extreme cold weather, often requiring top-up heating.

.03 SOLAR PHOTOVOLTAIC (PV)

The available roof area of each dwelling should be suitable for the installation of solar panels, on both the houses and the roof of the apartments. A fabric-first approach has been adopted, in order to meet the requirements of the Building Regulations Part L, without requiring any renewable energy.

The requirements of policy ECC SP2 (10% of energy requirements from renewable energy) can be met by installing 16 kW of solar PV across the development. This equates to 64 no. 250W solar PV panels.

Each solar panel measures 1650 x 1000mm, and should be mounted on suitably pitched roofs (circa 30-45 degree pitch) at an orientation between south-east and south-west (135° to 215°). East and west orientations (90° to 270°) can also be suitable for solar PV, however may require an increase in installed capacity in order to meet the site requirements.



3 CARBON DIOXIDE EMISSIONS

.01 BASELINE CARBON DIOXIDE EMISSIONS

The information contained within this section of the Assessment is consistent with the general guidance and advice set out in the Arun Local Plan.

.02 CARBON DIOXIDE EMISSIONS REDUCTION – SAP2012 CARBON FACTORS

.01 DOMESTIC (RESIDENTIAL)

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for domestic buildings		
	Carbon dioxide emissions for domestic buildings (Tonnes CO₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	66.1	66.3
After energy demand reduction	65.0	66.3
After heat network/CHP	65.0	66.3
After renewable energy	58.4	66.3

Table 2: Regulated carbon dioxide savings from each stage of the Energy Hierarchy for domestic buildings		
	Regulated domestic carbon dioxide savings	
	(Tonnes CO₂ per annum)	(%)
Savings from energy demand reduction	1.0	1.5%
Savings from heat network/CHP	0.0	0.0%
Savings from renewable energy	6.6	10.0%
Cumulative on site savings	7.6	11.5%



.03 CARBON DIOXIDE EMISSIONS REDUCTION – SUMMARY

In terms of aligning with the objectives of the Arun Local Plan – Policy ECC SP2, a site-wide regulated carbon emissions reduction of 11.5% has been achieved. The reduction has been calculated according to SAP2012 carbon factors in accordance with current Building Regulations.

It should be noted that an offset payment is not required, as the development is not required to meet a zero-carbon standard.

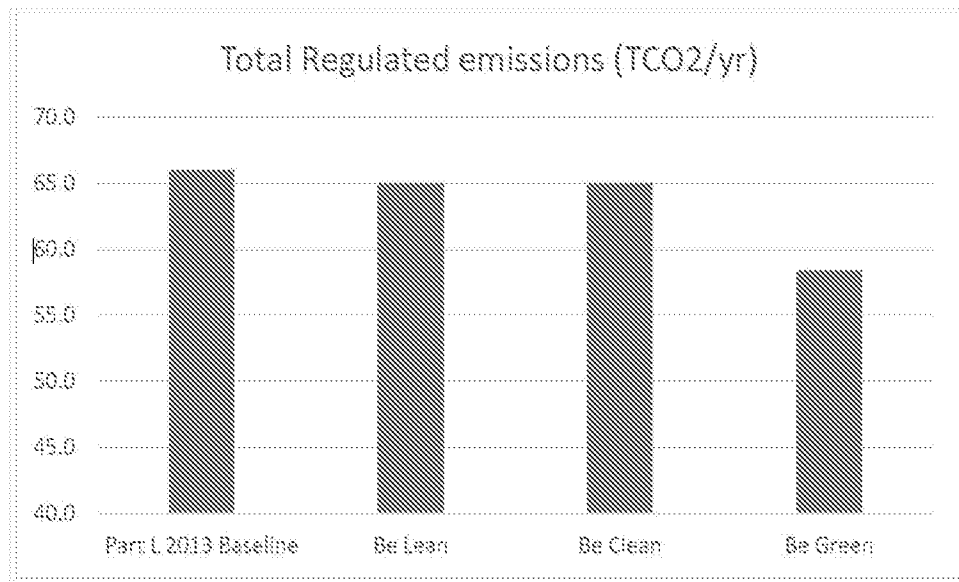


Figure 3: Total Regulated Site Emissions

4 CONCLUSION

This report details an Energy and Sustainability Assessment for the proposed development at The Former Shrublands Nursey, Roundstone Lane, Angmering BN16 4AT. The site is situated on the land formerly occupied by The Former Shrublands Nursey, and is currently occupied by a number of vacant yards and associated warehouse/nursery buildings, which are of poor thermal efficiency. The proposed development consists of:

Demolition of existing buildings at The Former Shrublands Nursey and erection of 40 no. residential dwellings (including 30% affordable housing) and access onto Roundstone Lane.

NATIONAL AND LOCAL PLANNING POLICY

The development has been shown to meet the energy consumption and CO2 emissions requirements. These include the national Building Regulations Part L requirements, and the Arun Local Plan requirements.

Arun District Council requires major developments to produce at least 10% of the total predicted energy requirements from renewable or low carbon energy generation on site, in addition to energy efficiency measures.

A full review of the building energy consumption and energy generation has been conducted. The report provides a summary of the dwelling emissions rate (DER) for the residential units, compared with the Building Regulations target emissions rate (TER), demonstrating the reduction in site CO2 emissions achieved. In line with best practice and the Arun Local Plan guidance, the proposed energy strategy for this development has followed the principals of the energy hierarchy – Be Lean, Be Clean, Be Green.

The Assessment provides evidence to demonstrate compliance with the Building Regulations Part L, along with the BRE Water Efficiency Calculator to demonstrate compliance with the Building Regulations Part G (optional standard targeted).

The Assessment demonstrates that the development meets the requirements of Policy ECC SP2 by producing at least 10% of the energy requirements of the development from renewable energy (solar PV).

The following U-values are proposed for the different parts of the development:

	VALUE PROPOSED FOR THE DOMESTIC DEVELOPMENT	BUILDING REGULATIONS L1A REQUIREMENT
1. EXTERNAL WALLS	0.18 (W/m ² K)	0.30 (W/m ² K)
2. EXPOSED ROOF	0.10 (W/m ² K)	0.20 (W/m ² K)
3. EXPOSED FLOOR	0.10 (W/m ² K)	0.25 (W/m ² K)
4. OPENINGS	1.20 (W/m ² K)	2.00 (W/m ² K)
5. AIR PERMEABILITY	4.0 m ³ /(h.m ²)	10 m ³ /(h.m ²)

The proposed heating system is a natural gas boiler for each residential unit. The systems will provide both heating and hot water. A domestic hot water cylinder will be installed in each property, with the capacity of the cylinder varying according to the proposed occupancy of the property.

Decentralised mechanical extract fans will be provided in bathrooms and kitchens, whilst windows will be openable providing ventilation and mitigation against summer overheating.

Further to the measures noted in this document, the site will also be provided with electric vehicle charging outlets, in accordance with other submission documentation, which will further reduce the carbon impact of the development.



5 APPENDIX 1 SAP (BUILDING REGULATIONS COMPLIANCE REPORTS)



BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Design SAP
elmhurst energy

Property Reference	Plot 09	Issued on Date	10/02/2021
Assessment Reference	001	Prop Type Ref	3B5P
Property	Roundstone Lane, Angmering, BN16 4AT		
SAP Rating	85 B	DER	16.10
Environmental	86 B	TER	16.42
CO ₂ Emissions (t/year)	1.37	% DER<TER	1.97
General Requirements Compliance	Pass	DFEE	44.14
		TFEE	50.32
		% DFEE<TFEE	12.28
Assessor Details	Mr. Chris Collier, Keeping Blue Ltd, T		Assessor ID
Client	T176-0001		

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	16.42	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	16.10	kgCO ₂ /m ²	Pass
	-0.32 (-1.9%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	50.32	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	44.14	kWh/m ² /yr	
	-6.2 (-12.3%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.10 (max. 0.25)	0.10 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Design SAP
elmhurst energy

Main heating system

Boiler system with radiators or underfloor - Mains gas

Pass

Data from database

Ideal Logic Heat 30

Efficiency: 89.6% SEDBUK2009

Minimum: 88.0%

Secondary heating system

None

5 Cylinder insulation

Hot water storage

Nominal cylinder loss: 1.74 kWh/day

Pass

Permitted by DBSCG 2.24

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Continuous extract system (decentralised)

Specific fan power

0.1600 0.1200

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (South East England)

Not significant

Pass

Based on:

Overshading

Average

Windows facing North

6.78 m², No overhang

Windows facing East

2.95 m², No overhang

Windows facing South

6.56 m², No overhang

Windows facing West

0.87 m², No overhang

Air change rate

8.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

Pass

Regs Region: England

Elmhurst Energy Systems

SAP2012 Calculator (Design

System) version 4.14r16

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

10 Key features

Party wall U-value	0.00	W/m ² K
Roof U-value	0.10	W/m ² K
Floor U-value	0.10	W/m ² K

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

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Design SAP
elmhurst energy

Property Reference	Plot 15				Issued on Date	10/02/2021	
Assessment Reference	001				Prop Type Ref	2B4P	
Property	Roundstone Lane, Angmering, BN16 4AT						
SAP Rating	84 B		DER	17.83		TER	18.13
Environmental	86 B		% DER<TER	1.65			
CO ₂ Emissions (t/year)	1.16		DFEE	45.67		TFEE	52.08
General Requirements Compliance	Pass		% DFEE<TFEE	12.30			
Assessor Details	Mr. Chris Collier, Keeping Blue Ltd, Tel: [REDACTED]				Assessor ID	T176-0001	
Client	[REDACTED]						

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	18.13	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	17.83	kgCO ₂ /m ²	Pass
	-0.30 (-1.7%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	52.08	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	45.67	kWh/m ² /yr	
	-6.4 (-12.3%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.10 (max. 0.25)	0.10 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Design SAP
elmhurst energy

Main heating system

Boiler system with radiators or underfloor - Mains gas
Data from database
Ideal Logic Heat 30

Pass

Efficiency: 89.6% SEDBUK2009
Minimum: 88.0%

Secondary heating system

None

5 Cylinder insulation

Hot water storage

Nominal cylinder loss: 1.74 kWh/day
Permitted by DBSCG 2.24

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

8 Mechanical ventilation

Continuous extract system (decentralised)

Specific fan power

0.1600 0.1200

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (South East England)

Not significant

Pass

Based on:

Overshading

Average

Windows facing North

8.00 m², No overhang

Windows facing East

1.57 m², No overhang

Windows facing South

4.70 m², No overhang

Air change rate

8.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

Pass

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

10 Key features

Party wall U-value	0.00	W/m ² K
Roof U-value	0.10	W/m ² K
Floor U-value	0.10	W/m ² K

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

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Design SAP
elmhurst energy

Property Reference	Plot 19	Issued on Date	10/02/2021
Assessment Reference	001	Prop Type Ref	4B7P
Property	Roundstone Lane, Angmering, BN16 4AT		
SAP Rating	85 B	DER	15.71
Environmental	86 B	TER	16.15
CO ₂ Emissions (t/year)	1.69	% DER<TER	2.71
General Requirements Compliance	Pass	DfEE	49.11
		TfEE	57.01
		% DfEE<TfEE	13.85
Assessor Details	Mr. Chris Collier, Keeping Blue Ltd, T		Assessor ID
			T176-0001
Client			

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TfEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	16.15	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	15.71	kgCO ₂ /m ²	Pass
	-0.44 (-2.7%)	kgCO ₂ /m ²	

1b TfEE and DfEE

Target Fabric Energy Efficiency (TfEE)	57.01	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DfEE)	49.11	kWh/m ² /yr	
	-7.9 (-13.9%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.10 (max. 0.25)	0.10 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Design SAP
elmhurst energy

Main heating system

Boiler system with radiators or underfloor - Mains gas

Pass

Data from database

Ideal Logic Heat 30

Efficiency: 89.6% SEDBUK2009

Minimum: 88.0%

Secondary heating system

None

5 Cylinder insulation

Hot water storage

Nominal cylinder loss: 1.74 kWh/day

Pass

Permitted by DBSCG 2.24

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Continuous extract system (decentralised)

Specific fan power

0.1600 0.1200

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (South East England)

Not significant

Pass

Based on:

Overshading

Average

Windows facing North

4.45 m², No overhang

Windows facing East

10.79 m², No overhang

Windows facing South

0.96 m², No overhang

Windows facing West

18.01 m², No overhang

Air change rate

8.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

Pass

Regs Region: England

Elmhurst Energy Systems

SAP2012 Calculator (Design

System) version 4.14r16

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

10 Key features

Party wall U-value	0.00	W/m ² K
Roof U-value	0.10	W/m ² K
Floor U-value	0.10	W/m ² K

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

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Design SAP
elmhurst energy

Property Reference	Plot 29				Issued on Date	10/02/2021	
Assessment Reference	001				Prop Type Ref	1B2P	
Property	Roundstone Lane, Angmering, BN16 4AT						
SAP Rating	83 B		DER	19.73		TER	20.33
Environmental	87 B		% DER<TER	2.93			
CO ₂ Emissions (t/year)	0.86		DFEE	44.61		TFEE	52.76
General Requirements Compliance	Pass		% DFEE<TFEE	15.46			
Assessor Details	Mr. Chris Collier, Keeping Blue Ltd.				Assessor ID	T176-0001	
Client							

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	20.33	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	19.73	kgCO ₂ /m ²	Pass
	-0.60 (-3.0%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	52.76	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	44.61	kWh/m ² /yr	
	-8.2 (-15.5%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.10 (max. 0.25)	0.10 (max. 0.70)	Pass
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Boiler system with radiators or underfloor - Mains gas Data from database Ideal Logic Heat 30 Efficiency: 89.6% SEDBUK2009 Minimum: 83.0%	Pass
---------------------	---	------

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Design SAP
elmhurst energy

Secondary heating system

None

5 Cylinder insulation

Hot water storage

Nominal cylinder loss: 1.43 kWh/day
Permitted by DB5CG 1.89

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Time and temperature zone control

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

Boiler interlock

Yes

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Continuous extract system (decentralised)

Specific fan power

0.1600 0.1200

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (South East England)

Not significant

Pass

Based on:

Overshading

Average

Windows facing North

1.63 m², No overhang

Windows facing West

8.18 m², No overhang

Air change rate

8.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type

U-value

Filled Cavity with Edge Sealing

0.00

W/m²K

Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

4.00 (design value)

Maximum

10.0

Pass

10 Key features

Party wall U-value

0.00

W/m²K

Floor U-value

0.10

W/m²K

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

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Design SAP
elmhurst energy

Property Reference	Plot 35	Issued on Date	10/02/2021
Assessment Reference	001	Prop Type Ref	2B4P
Property	Roundstone Lane, Angmering, BN16 4AT		
SAP Rating	84 B	DER	16.96
Environmental	86 B	TER	16.96
CO ₂ Emissions (t/year)	1.28	% DER<TER	-0.02
General Requirements Compliance	Pass	DFEE	44.17
		TFEE	49.74
		% DFEE<TFEE	11.20
Assessor Details	Mr. Chris Collier, Keeping Blue Ltd, Te		Assessor ID
Client			T176-0001

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Mains gas		
Fuel factor	1.00 (mains gas)		
Target Carbon Dioxide Emission Rate (TER)	16.96	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	16.96	kgCO ₂ /m ²	Pass
	0.00 (0.0%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	49.74	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	44.17	kWh/m ² /yr	
	-5.5 (-11.1%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.18 (max. 0.30)	0.18 (max. 0.70)	Pass
Party wall	0.00 (max. 0.20)	-	Pass
Floor	0.10 (max. 0.25)	0.10 (max. 0.70)	Pass
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	Pass
Openings	1.20 (max. 2.00)	1.20 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

Design SAP
elmhurst energy

Main heating system	Boiler system with radiators or underfloor - Mains gas Data from database Ideal Logic Heat 30 Efficiency: 89.6% SEDBUK2009 Minimum: 88.0%	Pass
Secondary heating system	None	
5 Cylinder insulation		
Hot water storage	Nominal cylinder loss: 1.74 kWh/day Permitted by DBSCG 2.24	Pass
Primary pipework insulated	Yes	Pass
6 Controls		
Space heating controls	Time and temperature zone control	Pass
Hot water controls	Cylinderstat	Pass
	Independent timer for DHW	Pass
Boiler interlock	Yes	Pass
7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100 %	
Minimum	75 %	Pass
8 Mechanical ventilation		
Continuous extract system (decentralised)		
Specific fan power	0.1600 0.1200	
Maximum	0.7	Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (South East England)	Not significant	Pass
Based on:		
Overshading	Average	
Windows facing North	1.81 m ² , No overhang	
Windows facing East	4.70 m ² , No overhang	
Windows facing West	7.59 m ² , No overhang	
Air change rate	8.00 ach	
Blinds/curtains	None	

Criterion 4 – Building performance consistent with DER and DFEE rate

Party Walls

Type	U-value	
Filled Cavity with Edge Sealing	0.00	W/m ² K Pass

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals	4.00 (design value)	
Maximum	10.0	Pass

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)

10 Key features

Party wall U-value	0.00	W/m ² K
Roof U-value	0.10	W/m ² K
Floor U-value	0.10	W/m ² K

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

6 APPENDIX 2 BRE WATER EFFICIENCY CALCULATOR



J ob no:
Date:
Assessor name:
Registration no:
Development name:

Water Efficiency Calculator

Water Efficiency Calculator (Basic Calculator)

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WATER EFFICIENCY CALCULATOR FOR NEW DWELLINGS - (BASIC CALCULATOR)																			
Installation Type	Unit of measure	Is a dual or single flush WC specified?		Is a dual or single flush WC specified?		Is a dual or single flush WC specified?		Is a dual or single flush WC specified?		Is a dual or single flush WC specified?		Is a dual or single flush WC specified?		Is a dual or single flush WC specified?		Is a dual or single flush WC specified?		Is a dual or single flush WC specified?	
		Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day
WC	Full flush volume	4	5.84	4	5.84	4	5.84	4	5.84	4	5.84	4	5.84	4	5.84	4	5.84	4	5.84
	Part flush volume	2.6	7.70	2.6	7.70	2.6	7.70	2.6	7.70	2.6	7.70	2.6	7.70	2.6	7.70	2.6	7.70	2.6	7.70
Taps (excluding kitchen and external taps)	Flow rate (litres / minute)	6	11.06	6	11.06	6	11.06	6	11.06	6	11.06	6	11.06	6	11.06	6	11.06	6	11.06
	Are both a Bath & Shower Present?	Bath & Shower	Bath & Shower	Bath & Shower	Bath & Shower	Bath & Shower	Bath & Shower	Bath & Shower	Bath & Shower	Bath & Shower	Bath & Shower	Bath & Shower	Bath & Shower	Bath & Shower	Bath & Shower	Bath & Shower	Bath & Shower	Bath & Shower	Bath & Shower
Bath	Capacity to overflow	150	16.50	150	16.50	150	16.50	150	16.50	150	16.50	150	16.50	150	16.50	150	16.50	150	16.50
	Flow rate (litres / minute)	9	39.33	9	39.33	9	39.33	9	39.33	9	39.33	9	39.33	9	39.33	9	39.33	9	39.33
Kitchen sink taps	Flow rate (litres / minute)	6	13.00	6	13.00	6	13.00	6	13.00	6	13.00	6	13.00	6	13.00	6	13.00	6	13.00
	Has a washing machine been specified?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Washing Machine	Litres / kg	7.2	17.16	7.2	17.16	7.2	17.16	7.2	17.16	7.2	17.16	7.2	17.16	7.2	17.16	7.2	17.16	7.2	17.16
	Has a dishwasher been specified?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Dishwasher	Litres / place setting	1.22	4.50	1.22	4.50	1.22	4.50	1.22	4.50	1.22	4.50	1.22	4.50	1.22	4.50	1.22	4.50	1.22	4.50
	Has a waste disposal unit been specified?	No	0.00	No	0.00	No	0.00	No	0.00	No	0.00	No	0.00	No	0.00	No	0.00	No	0.00
Water Softener	Litres / person / day		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
	Calculated Use		115.1		115.1		115.1		115.1		115.1		115.1		115.1		115.1		115.1
Code for Sustainable Homes	Normalisation factor		0.91		0.91		0.91		0.91		0.91		0.91		0.91		0.91		0.91
	Total Consumption		104.7		104.7		104.7		104.7		104.7		104.7		104.7		104.7		104.7
Building Regulations 17.K	Mandatory level		Level 2.0		Level 2.0		Level 2.0		Level 2.0		Level 2.0		Level 2.0		Level 2.0		Level 2.0		Level 2.0
	External use		5.0		5.0		5.0		5.0		5.0		5.0		5.0		5.0		5.0
Total Consumption 17.K	Total Consumption		109.7		109.7		109.7		109.7		109.7		109.7		109.7		109.7		109.7
	17.K Compliance?		17.K		17.K		17.K		17.K		17.K		17.K		17.K		17.K		17.K