

Energy Statement
Report to Discharge Condition 8 of Application No: AB/88/19/PL

Land at Electricity Sub Station, Ford Road, Arundel, BN18 9DX

Oakford Homes

Report No: DC-ES-OH-AL-22-01

Report Date: February 2022



CONTENTS

1. ASSESSMENT INFORMATION	2
2. EXECUTIVE SUMMARY	3
3. INTRODUCTION	5
5. DEVELOPMENT APPROACH	7
6. ENERGY CALCULATIONS (BASELINE)	8
6.2 Calculation of Baseline Energy and CO ₂ Emissions	9
6.3 Energy And CO ₂ Demand (Baseline)	9
7. PASSIVE DESIGN AND ENERGY EFFICIENT MEASURES (BE LEAN)	10
7.1 Passive design	10
7.2 Building Fabric	10
7.3 Fabric Energy Efficiency (FEE)	11
7.4 Energy And CO ₂ Demand (Be Lean)	11
8. SUPPLY ENERGY EFFICIENTLY (BE CLEAN)	12
9. RENEWABLES OR LZC TECHNOLOGY (BE GREEN)	13
9.1 Air Source Heat Pumps (ASHP)	13
9.2 KERS MEV Indoor Heat Pump	14
9.3 Energy And CO ₂ Demand (Be Green)	15
10. CONCLUSIONS	16
11. APPENDICES	18
11.1 Appendix A: Energy and CO ₂ Performance Type By Type	19
11.2 Appendix B: Renewable Energy Options	21
11.3 Appendix C: KERS MEV Specification Sheet	23
11.4 Appendix D: SAP Output Sheets	24

LIST OF TABLES

TABLE 1: ENERGY SAVED THROUGH RENEWABLE ENERGY SOURCES	3
TABLE 2: ENERGY USAGE AND SAVINGS	3
TABLE 3: CARBON EMISSIONS BUILDING REGULATION'S (TER) COMPARISON	3
TABLE 4: RESIDENTIAL FEE PERFORMANCE	4
TABLE 5: CARBON CONVERSION FACTORS	7
TABLE 6: RESIDENTIAL MIX	8
TABLE 7: BASELINE DESIGN SPECIFICATION 2013	9
TABLE 8: PREDICTED CARBON EMISSIONS: PART L1A 2013 BASELINE UNIT (TER)	9
TABLE 9: PROPOSED U-VALUES	10
TABLE 10: RESIDENTIAL FEE PERFORMANCE	11
TABLE 11: PREDICTED ENERGY DEMAND AND CARBON EMISSIONS: BE LEAN	11
TABLE 12: CO ₂ SAVINGS: BE LEAN	11
TABLE 13: PREDICTED ENERGY DEMAND AND CARBON EMISSIONS: BE GREEN	15
TABLE 14: CO ₂ AND ENERGY SAVINGS: BE GREEN COMPARED AGAINST GAS BASELINE	15
TABLE 15: CO ₂ AND ENERGY SAVINGS: BE GREEN COMPARED AGAINST BUILDING REGULATION TER	15
TABLE 16: PROPOSED ENERGY STRATEGY	16
TABLE 17: CARBON EMISSIONS BUILDING REGULATION'S (TER) COMPARISON	16
TABLE 18: ENERGY USAGE AND SAVINGS	16
TABLE 19: RESIDENTIAL FEE PERFORMANCE	17

LIST OF FIGURES

FIGURE 1: SITE PLAN	5
FIGURE 2: EXAMPLE DIAGRAM OF ASHP SYSTEM	13
FIGURE 3: DIAGRAM OF KERS MEV SYSTEM	14
FIGURE 4: GRAPH OF ENERGY DEMAND AND SAVINGS	17

1. ASSESSMENT INFORMATION

Project Name	Arundel
Project Address	Land at Electricity Sub Station, Ford Road, Arundel, BN18 9DX
Developer	Oakford Homes
Developer Address	Hednor Court Farm, Sheepcote Lane, Hednor, Bucks, SL1 8PE
Architect	Pope Priestley Architects
Architect's Address	Unit 15, Vicarage Farm Business Park, Winchester Road, Fair Oak, Hampshire, SO50 7HD
Project Description	38 No. residential apartments (9 No. 1-bed units & 29 No. 2-bed units) along with access, off-street parking, amenity space & enhancements to the local footpath network.

	Author	Date	Email Address
Produced by	MH	08/02/22	
Reviewed by			

Issue Number	Author	Date	Reason
01	MH	08/02/22	Initial Issue
02			
03			

This document has been prepared for Oakford Homes only and solely for the purposes expressly defined herein. We owe no duty of care to any third parties in respect of its content. Therefore, unless expressly agreed by us in signed writing, we hereby exclude all liability to third parties, including liability for negligence, save only for liabilities that cannot be so excluded by operation of applicable law. The consequences of climate change and the effects of future changes in climatic conditions cannot be accurately predicted. This report has been based solely on the specific design assumptions and criteria stated herein

2. EXECUTIVE SUMMARY

This report considers the predicted energy and CO₂ demand for the proposed development at the Land at Electricity Sub Station, Ford Road, Arundel, BN18 9DX which is located in Arun District Council.

The proposed site will be built under Part L 2013 (with 2016 amendments) of the Building Regulations and in line with Arun District Council's condition 8 of planning permission AB/88/19/PL which requires at least 10% of the predicted energy usage through renewable energy sources.

The development will reduce regulated energy and CO₂ emissions by integrating a range of passive design and energy efficiency measures throughout the building. These measures include improving building fabric standards beyond the requirements of Part L of the Building Regulations. These measures enable the proposed scheme to go beyond Target Emission Rates (TER) and Target Fabric Energy Efficiency (TFEE) minimum standards via energy efficiency measures alone.

Following reduction of the energy demand through fabric and energy efficiency improvements, Air Source Heat Pumps (ASHP) technology has been proposed via the KERS MEV system to supply hot water to the dwellings. This measure accounts for an energy saving of 49,398 kWh p.a., which equates to 27.04% of the total predicted energy demand (182,652 kWh/p.a.). This exceeds the 10% requirement from Arun District Council within condition 8 of planning permission AB/88/19/PL.

Table 1: Energy Saved Through Renewable Energy Sources

Element	Energy – Regulated (kWh p.a.)
Total Predicted Energy Demand (Be Lean)	182,652
Energy Demand After Renewables (Be Green)	133,254
Saving	49,398
Percentage of Total Predicted Energy Demand Saved Through Renewable Energy Sources	27.04%

Table 2: Energy Usage and Savings

Element	Energy – Regulated (kWh p.a.)	Total Accumulated Energy Savings (kWh p.a.)	Accumulated Total % Saving
Gas Baseline	206,582	0	0.00
Be Lean	182,652	23,930	11.58
Be Clean	182,652	23,930	11.58
Be Green	133,254	73,328	35.50

Building Regulations assessment of the TER allows a fuel factor for use of electricity and therefore the baseline carbon emissions are different than for a gas heated dwelling. The following table shows the carbon savings against a TER and demonstrates compliance with Building Regulations requirements.

Table 3: Carbon Emissions Building Regulation's (TER) comparison

Element	CO ₂ – Regulated (kgCO ₂ p.a./a)
Building Regulations Baseline (TER)	71,128
After 'Be Green'	69,158
Saving	1,970
Improvement	2.77%

The proposed strategy initially reduced energy demand through fabric and energy efficiency measures. The overall Part L Fabric Energy Efficiency (FEE) performance is reviewed for the 'Be Lean' position and then compared to the baseline stage of the energy hierarchy. The improvement is shown to be 12.04% as demonstrated in the table below.

Table 4: Residential FEE Performance

Element	Target Fabric Energy Efficiency (TFEE) kWh/m ² /year	Dwelling Fabric Energy Efficiency (DFEE) kWh/m ² /year	Improvement (%)
Development Total	47.49	41.77	12.04

Summary

The proposed energy strategy achieves and meets the following requirements:

- Includes improved optimal building fabric improvements, energy efficient design of building services.
- Complies with Part L 2013 building regulations (with 2016 amendments) and shows a 2.77% carbon saving over a Building Regulations baseline (TER).
- Regulated energy demand is reduced by 35.50% when compared to a gas baseline.
- Utilises renewable technology through the KERS MEV heat pumps reduce the total energy demand by 27.04%. This exceeds the 10% requirement from Arun District Council within condition 8 of planning permission AB/88/19/PL.
- Exceeds the TFE minimum reduction requirements by 12.04%.

3. INTRODUCTION

This document has been prepared by Abbey Consultants (Southern) Ltd, a specialist environmental and energy consultancy on behalf of Oakford Homes.

The following report establishes a baseline assessment of the energy demands and associated CO₂ emissions for the development. The energy hierarchy approach of Be Lean, Be Clean and Be Green is then followed to ensure the maximum viable reductions in energy and regulated CO₂ emissions is achieved.

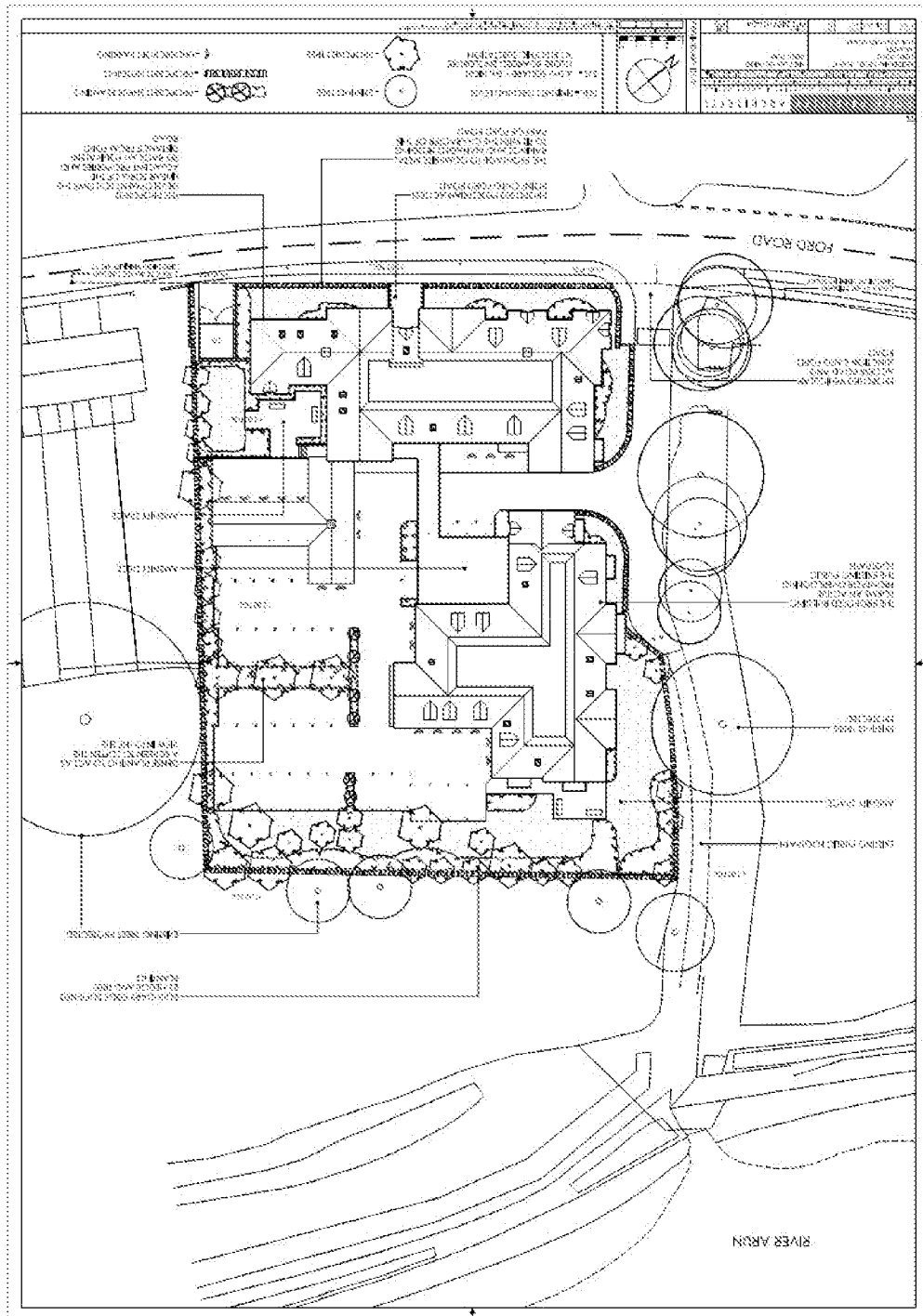
The proposed development is described as:

38 No. residential apartments (9 No. 1-bed units & 29 No. 2-bed units) along with access, off-street parking, amenity space & enhancements to the local footpath network.

The report takes into consideration the layout, use and requirements for the development to recommend a strategy that integrates the most suitable technologies available that are commercially viable, whilst also adhering to the requirements of Arun District Council's planning condition 8 (planning permission AB/88/19/PL).

Figure 1 presents the proposed site layout.

Figure 1: Site Plan



4. PLANNING CONDITION

The following report sets out the intentions of Oakford Homes, with regards to energy, in order to discharge Arun District Council's condition 8 of planning permission AB/88/19/PL.

The condition reads as below:

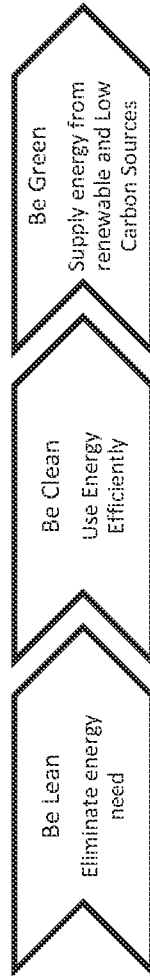
Condition 8

Details of the photo-voltaics (PVs) to be installed shall be in accordance with the submitted details and provide at least 10% of the predicted energy usage through renewable energy sources. The approved details shall be installed prior to occupation of the respective unit and be maintained thereafter.

Reason: To ensure that renewable energy resources are implanted on the site, in accordance with Policy ECC SP2 of the Arun Local Plan.

5. DEVELOPMENT APPROACH

The proposed energy strategy follows the established and widely accepted Energy Hierarchy of eliminate energy need (Be Lean), Use energy efficiently (Be Clean) and supply energy from renewable and low carbon sources (Be Green) to enable the maximum viable reductions in regulated and total CO₂ emissions over the baseline.



The proposed energy supply solutions aim to match energy profiles of the development ensuring effective use. The proposed solutions consider viability and flexibility of the scheme from both a technical and economic point of view by identifying best combination of energy efficiency measures as well as decentralised and renewable energy supply solutions.

Using these principles, Oakford Homes will deliver the following objectives:

- Comply with the relevant regulatory requirements.
- Ensure that a reduction in CO₂ beyond Part L 2013 standards is achieved across the site through fabric and energy efficiency measures.
- To propose to reduce energy consumption and carbon dioxide emissions further through the use of on-site renewable or low and zero carbon technologies (LZC).

5.1 CARBON CONVERSION FACTORS

The report has been prepared using current SAP 2012 Building Regulation carbon conversion factors as detailed in the table below.

Table 5: Carbon conversion factors

Fuel Type	SAP 2012 CO ₂ Conversion Factors (kg/kWh)
Natural Gas	0.216
Grid Electricity	0.519

6. ENERGY CALCULATIONS (BASELINE)

A baseline total energy demand has been established for the proposed development. Reductions in demand due to energy conservation measures are considered and form the basis of the energy strategy which follows.

Floor plans for the development have been used in conjunction with proposed building specifications to prepare the sample SAP calculations.

SAP calculations have been carried out to Approved Document Part L1A 2013. The relevant energy loads have been collated from the full SAP calculation sheets and entered into a spread sheet that can be found in the appendices, which calculates the total energy and CO₂ demand.

Regulated Energy Demand is calculated from the energy associated with space heating, hot water and fixed electrical demands (for lights, fans and pumps).

Unregulated energy is the annual electrical energy demand from appliances and would be calculated using the methodology as suggested by SAP2012. SAP calculations are extended to allow for CO₂ emissions associated with appliances and cooking, and to allow for site-wide electricity generation technologies.

Total Energy Demand for the development is calculated from the regulated energy demand figures given above and an additional energy demand associated with unregulated energy.

Energy savings are measured in terms of a reduction in CO₂ emissions and kWh, which are calculated from their association with a particular fuel source. CO₂ Conversion Factors have been taken from Table 2, Building Regulations Part L1A 2013.

6.1 SAP CALCULATIONS

The regulated CO₂ emissions baseline has been established using a Part L1A 2013 Target Emission Rate (TER) of all the dwellings.

The following table provides the mix used to determine the baseline energy and CO₂ demand for the residential units.

Table 6: Residential Mix

Unit Reference	No. of Units
1 BED EXP FLOOR	2
2 BED EXP FLOOR	2
G1 2 Bed 2 Bath Enclosed	2
G3 2 Bed 2 Bath	2
G4 2 Bed 2 Bath	2
G5 1 Bed 1 Bath	1
G9 2 Bed 2 Bath	3
1 BED MID FLOOR	2
2 BED MID FLOOR	2
G1 2 Bed 2 Bath Enclosed	2
G3 2 Bed 2 Bath	2
G4 2 Bed 2 Bath	2
G5 1 Bed 1 Bath	1
G9 2 Bed 2 Bath	3
1 BED TOP FLOOR	1
2 BED TOP FLOOR	4
S6 2 Bed 2 Bath	4
1 BED EXP FLOOR	1
TOTAL:	38

6.2 CALCULATION OF BASELINE ENERGY AND CO₂ EMISSIONS

Thermal insulation levels and air tightness standards for the baseline case are assumed to just meet the requirements Part L1A 2013 of Building Regulations. The baseline specification as determined by SAP12 is detailed in the table below.

Table 7: Baseline design specification 2013

Element	Baseline Design Specification
Ground Floor	0.13 W/m ² K
Exposed Floor	0.13 W/m ² K
External Wall	0.18 W/m ² K
Party Wall	0.00 W/m ² K
Roof – insulated at ceiling	0.13 W/m ² K
Roof – insulated at slope	0.13 W/m ² K
Roof – flat	0.13 W/m ² K
Glazing U-Value	1.40 W/m ² K
Door U-Value	1.2 W/m ² K
Design Air Permeability	5.00
Space Heating	Mains Gas 88.6% efficient
Heating Controls	Heating System controls
Domestic Hot water	Mains Gas
Ventilation	Natural ventilation with intermittent fans
Low Energy Lighting	100%
Thermal Bridging	Appendix R values

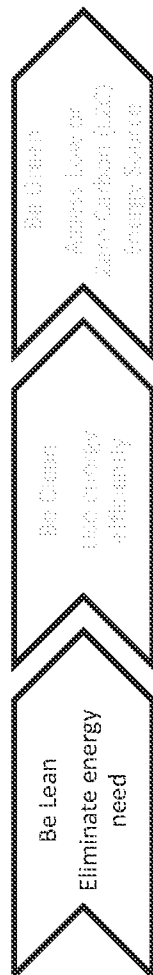
6.3 ENERGY AND CO₂ DEMAND (BASELINE)

Using the specification detailed and the outputs from SAP for the sample units, the baseline energy and carbon figures for the development are detailed in the table below.

Table 8: Predicted Carbon Emissions: Part L1A 2013 Baseline Unit (TER)

Element Part L1A 2013	Space Heating Demand	Hot Water demand	Pumps and fans	Lighting	Totals
Energy: Baseline (kWh p.a.)	104,973	85,133	2,850	13,626	206,582
CO ₂ Associated with total Energy Demand (kgCO ₂ p.a./a)	22,674	18,389	1,479	7,072	49,614

7. PASSIVE DESIGN AND ENERGY EFFICIENT MEASURES (BE LEAN)



In accordance with the Energy Hierarchy, the energy demands of the development should be reduced as much as practically viable. The desire is to achieve Part L 2013 Building Regulations compliance before low carbon or renewable measures are introduced.

A range of measures to reduce CO₂ emissions and increase resilience to climate change are proposed in the building design including good building fabric standards as well as energy efficient M&E systems and lighting.

7.1 PASSIVE DESIGN

The development will incorporate a range of passive design measures and energy efficient building fabric that will reduce the demand for space heating, ventilation, and artificial lighting.

Passive design utilises daylight, solar energy and shading to illuminate, heat and shade where necessary and ventilate/cool the buildings, thus requiring less (mechanical) energy to achieve the performance standards for the health and wellbeing of the occupants.

Openable windows are proposed but are not essential to provide a fresh air supply.

Natural ventilation has been considered but is judged to be inappropriate due to the high energy efficiency requirements and the CO₂ reduction target. Therefore, mechanical extract ventilation (MEV) has been specified as a more suitable approach to extract air from the dwellings.

The ventilation strategy will be reviewed again and developed as the design progresses to ensure compliance with all the relevant regulations and standards. It is assumed, in this scenario, that all windows can still be opened (albeit intermittently) for purge ventilation.

The proposed glazed areas have been designed to maximise daylight and optimise solar gains. This is enhanced by the linear south facing front elevations of the dwellings. The glazing specification has been reviewed to ensure that they provide a balance between solar control and solar gain.

7.2 BUILDING FABRIC

To reduce demand for space heating, emphasis has been placed on providing a very high standard of fabric efficiency and reducing heat loss through the building envelope. Approved Document Part L1A 2013 sets out the limiting fabric parameters for each of the building elements. Each stated value represents the area-weighted average U-value. The following table details the proposed U-values to be used in the described exposed element within the fabric of the development.

To further minimise heat loss through the building envelope, air leakage will be made a priority. The airtightness of the dwelling will be set to a level of 4.65 m³/h/m² and will utilise mechanical extract ventilation to ensure the airtightness of the dwellings can be kept low, without compromising on the necessity for good ventilation.

Table 9: Proposed U-Values

Element	Baseline Design Specification	Maximum Allowable SAP 2012	Proposed Design Stage Specification
Ground Floor	0.13 W/m ² K	0.25 W/m ² K	0.15 W/m ² K
Exposed Floor	0.13 W/m ² K	0.25 W/m ² K	0.15 W/m ² K
External Wall	0.18 W/m ² K	0.30 W/m ² K	0.27 W/m ² K
Communal Wall	0.18 W/m ² K	0.30 W/m ² K	0.25 W/m ² K
Party Wall	0.00 W/m ² K	0.20 W/m ² K	0.00 W/m ² K
Roof – insulated at ceiling	0.13 W/m ² K	0.20 W/m ² K	0.11 W/m ² K
Roof – insulated at slope	0.13 W/m ² K	0.20 W/m ² K	0.15 W/m ² K
Roof – flat	0.13 W/m ² K	0.20 W/m ² K	0.13 W/m ² K
Glazing U-Value	1.40 W/m ² K	2.00 W/m ² K	U = 1.30 W/m ² K G = 0.63
Door U-Value	1.20 W/m ² K	2.00 W/m ² K	1.50 W/m ² K
Design Air Permeability (DAP)	5.00	10.00	4.65

7.3 FABRIC ENERGY EFFICIENCY (FEE)

Using the specification detailed previously the overall Part L Fabric Energy Efficiency (FEE) performance has been reviewed for the 'Be Lean' position and compared to the baseline stage of the energy hierarchy. The results are shown in the following table.

Table 10: Residential FEE Performance

Element	Target Fabric Energy Efficiency (TFEE) kWh/m ² /year	Dwelling Fabric Energy Efficiency (DFEE) kWh/m ² /year	Improvement (%)
Development Total	47.49	41.77	12.04

7.4 ENERGY AND CO₂ DEMAND (BE LEAN)

Using the specification detailed and the outputs from SAP, the 'Be Lean' energy and carbon figures for the development are detailed in the table below, and an improvement can be seen when compared to the baseline figures outlined in the previous section.

Table 11: Predicted Energy Demand and Carbon Emissions: Be Lean

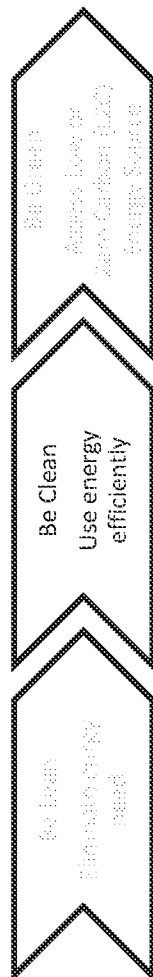
Element	Space Heating Demand	Hot Water demand	Pumps and fans	Lighting	Totals
Energy: Be Lean (kWh p.a.)	98,589	65,774	4,663	13,626	182,652
CO ₂ Associated with total Energy Demand (kgCO ₂ p.a./a)	21,295	14,207	2,420	7,072	44,994

A summary of the energy savings at the 'Be Lean' stage can be found in table below.

Table 12: CO₂ Savings: Be Lean

Element	Energy - Regulated (kWh p.a.)
Gas Baseline	206,582
After 'Be Lean'	182,652
Saving	23,930
Improvement	11.58%

8. SUPPLY ENERGY EFFICIENTLY (BE CLEAN)



Combined Heat and Power (CHP)

Decentralised energy refers to energy that is generated off the main grid. This may include micro-renewables, heating and cooling. It can also refer to energy from waste plants, combined heat and power, district heating and cooling, as well as geothermal, biomass or solar energy. Decentralised Energy schemes can serve a single building or a whole community, even being built out across entire cities.

The heat source for the communal heating system should be selected in accordance with the following heating hierarchy:

1. Connect to local or existing planned heat networks.
 - a. Use zero-emission or local secondary heat sources (in conjunction with heat pump, if required).
 - b. Use low-emission combined heat and power (CHP) (only where there is a case for CHP to enable the delivery of an area-wide heat network).
 - c. Use ultra-low NOx gas boilers.
2. CHP and ultra-low NOx gas boiler communal or district heating systems should be designed to ensure that they meet the requirements of national and local planning policy.
3. Where a heat network is planned but not yet in existence the development should be designed for connection at a later date.

There are many benefits of decentralised heat generation and Combined Heat and Power (CHP) in terms of cost and CO₂ emissions savings. However, technology such as this is more significant for larger developments, ideally complemented with some non-residential use of heat and electricity. The proposed development size of 38 dwellings is at the very low end of what the industry tends to view as viable for such systems. The development is for

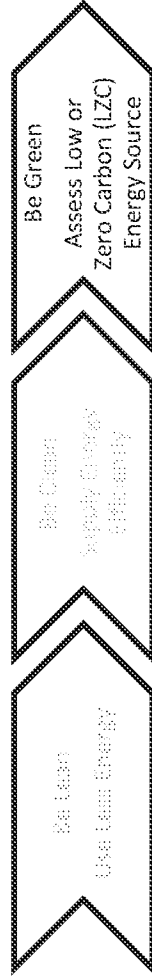
residential only and this will result in 'peaky' thermal demands with little anchor load to enable efficient operation of gas fired CHP. This option also risks the potential to increase costs to residents.

The site is neither sufficiently dense nor large enough to warrant investment from 3rd party managing agents or Energy Supply Companies (ESCs). The proposed development would need to be run by an independent agent/company and there would be very little if any interest among existing ESCs in servicing such a small-scale system. Even if it was possible, the cost of managing fuel procurement, customer billing, operation and maintenance would lead to disproportionately and unnecessary high service charges to residents compared to the provision of heat from individual gas boilers.

Based on the anticipated timescale of the proposed development and the predicted trajectory of the national electricity grid decarbonisation, the development of a district heat network powered by fossil fuels is also not considered to be the most carbon efficient approach.

The incorporation of a gas fired combined heat and power (CHP) network will lock the development into relatively carbon intensive gas-fired heating and hot water technology, and will not facilitate the transition to less carbon intensive solutions.

9. RENEWABLES OR LZC TECHNOLOGY (BE GREEN)



The following low and zero carbon technologies have been considered for this scheme:

- Air Source Heat Pump (ASHP)
- Photovoltaic Panels (PV)
- Ground Source Heat Pump (GSHP)
- Wind Turbines
- Biomass Boiler
- Solar Thermal

The assessment has shown that individual Air Source Heat Pumps (ASHPs) are considered to be the most suitable renewable energy options for this development.

All other renewable energy technology options are summarised in the appendices and have been deemed as not appropriate for this development.

9.1 AIR SOURCE HEAT PUMPS (ASHP)

Air at any temperature above absolute zero contains some energy. An air source heat pump transfers some of this energy as heat from one place to another, for example, between the outside and inside of a building. This can provide space heating and hot water. A system can be designed to transfer heat in either direction, to heat or cool the interior of the building in winter and summer respectively. For simplicity, the description below focuses on use for interior heating.

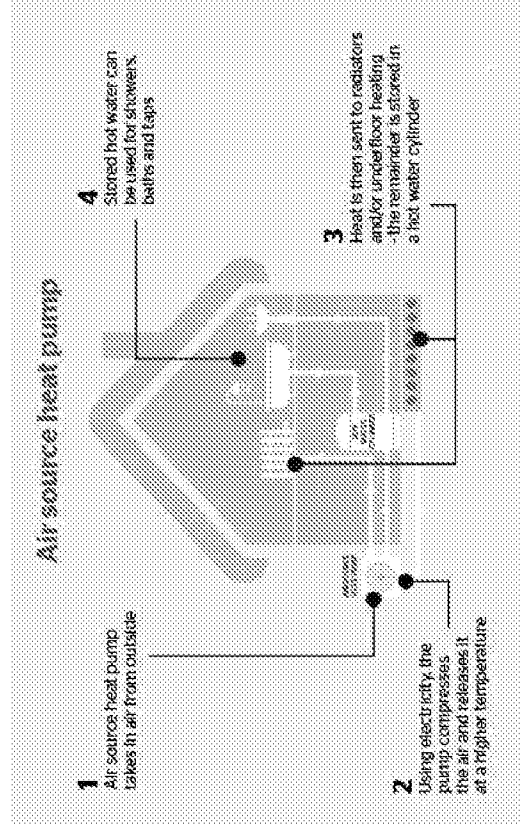
The technology is similar to a refrigerator/freezer or air conditioning unit. The different effect is due to the physical location of the different system components. Just as the pipes on the back of a refrigerator become warm as the interior cools, so an ASHP warms the inside of a building whilst cooling the outside air.

The main components of an ASHP are:

- An outdoor heat exchanger coil, which extracts heat from ambient air.
- An indoor heat exchanger coil, which transfers the heat into hot air ducts, an indoor heating system such as water-filled radiators or underfloor circuits and a domestic hot water tank.

The figure below demonstrates the typical operation of an ASHP system used to supply space heating and hot water to a property.

Figure 2: Example diagram of ASHP System



Some of the key advantages of ASHPs are listed below:

- ASHPs save carbon emissions. Unlike burning oil, gas, LPG or biomass, a heat pump produces no carbon emissions on-site (and no carbon emissions at all, if a renewable energy source is used to power them).
- They save space. There are no fuel storage requirements.
- They require less maintenance than combustion based heating systems.
- Heat pumps can provide cooling in summer, as well as heating in winter.
- There is no combustion involved and no direct emission of harmful gases.

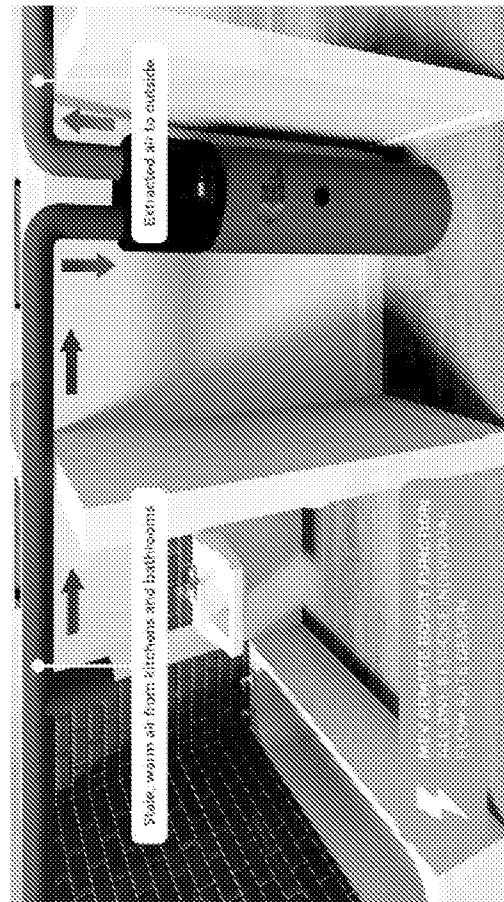
9.2 KERS MEV INDOOR HEAT PUMP

The eco-friendly KERS MEV indoor heat pump is a combined hot water, heat recovery and MEV system with storage cylinder. It converts waste heat energy from bathrooms and kitchens to low cost, renewable energy.

Some of the benefits of the KERS MEV system are listed below:

- Provides both hot water and ventilation.
- High efficiency – for every 1kW input, up to 4.5kW output.
- Heaterless design – achieves 65°C without the need for immersion.
- Removes condensation and humidity.
- No external condenser required.
- Compact design to reduce space loss.
- Easily serviceable with bespoke design and no requirement for removal of ductwork.
- Weekly legionella program.

Figure 3: Diagram of KERS MEV system



The use of the KERS MEV is proposed for this development to efficiently supply the dwellings with ventilation and hot water. The space heating for the dwellings will be supplied through the use of electric panel heaters.

Although the electric panel heaters and KERS MEV will require electricity to operate, this electricity can eventually be generated solely through renewable sources. Therefore, there is less dependence on fossil fuels and this will future proof the homes against the ongoing decarbonisation of the electricity grid.

A product specification sheet for the KERS MEV has been included within the appendices.

The design of this system will be further developed during the detailed design stage.

9.3 ENERGY AND CO₂ DEMAND (BE GREEN)

Using the specification detailed and the outputs from the SAP calculations, the 'Be Green' energy and carbon figures for the development are detailed in the table below, and an improvement can be seen when compared to the previous stages of the energy hierarchy.

Table 13: Predicted Energy Demand and Carbon Emissions: Be Green

Element	Space Heating Demand	Hot Water demand	Pumps and fans	Lighting	Totals
Energy: Be Lean (kWh p.a.)	92,478	20,343	6,807	13,626	133,254
CO ₂ Associated with total Energy Demand (kgCO ₂ p.a./a)	47,996	10,558	3,533	7,072	69,159

A summary of the energy savings at the 'Be Green' stage can be found in the table below.

Table 14: CO₂ and Energy Savings: Be Green compared against Gas baseline

Element	Energy - Regulated (kWh p.a.)
After 'Be Lean'	182,652
After 'Be Green'	133,254
Saving	49,398
Improvement	27.04%

The energy saving identified in the table above is due to the inclusion of the ASHP technology. This saving equates to 27.04% of the total predicted energy demand (at 'Be

Lean'), which is in excess of the minimum 10% requirement of Arun District Council's condition 8.

Building Regulations assessment of the TER allows a fuel factor for use of electricity and therefore the baseline carbon emissions are different than for a gas heated dwelling. The following table shows the 'Be Green' carbon savings against a Building Regulations TER.

Table 15: CO₂ and Energy Savings: Be Green compared against Building Regulation TER

Element	CO ₂ - Regulated (kgCO ₂ p.a./a)
Building Regulations Baseline (TER)	71,128
After 'Be Green'	69,158
Saving	1,970
Improvement	2.77%

10. CONCLUSIONS

The energy strategy has followed the accepted Energy Hierarchy Be Lean, Be Clean and Be Green. The energy strategy proposed for the development can be summarised as below.

Total energy demand savings are also expressed after each stage of the energy hierarchy for the development. The introduction of ASHP technology at the 'Be Green' stage see's a saving of 49,398 kWh/p.a. which represents a 27.07% saving in the total predicted energy demand (182,652 kWh/p.a.). This exceeds the 10% requirement from Arun District Council within condition 8 of planning permission AB/88/19/PL.

Table 16: Proposed Energy Strategy

Element	Strategy
Passive	Optimised design to enable controlled solar gain and improved direct and indirect natural lighting
Fabric	Building fabric U values have been enhanced over and above those detailed with Part L1A 2013
Heating	Electric panel heaters
Hot Water	KERS MEV indoor heat pump (refer to appendices for product specification sheet)
Ventilation	Mechanical extract ventilation (KERS MEV) Low design air permeability (DAP)
Lighting	Energy efficient LED Lighting where applicable

10.1 TOTAL RESIDENTIAL CO₂ AND ENERGY SAVINGS

Building Regulations assessment of the TER allows a fuel factor for use of electricity and therefore the baseline carbon emissions are different than for a gas heated dwelling. The following table shows the carbon savings against a TER.

Table 17: Carbon Emissions Building Regulation's (TER) comparison

Element	CO ₂ – Regulated (kgCO ₂ p.a./a)
Building Regulations Baseline (TER)	71,128
After 'Be Green'	69,158
Saving	1,970
Improvement	2.77%

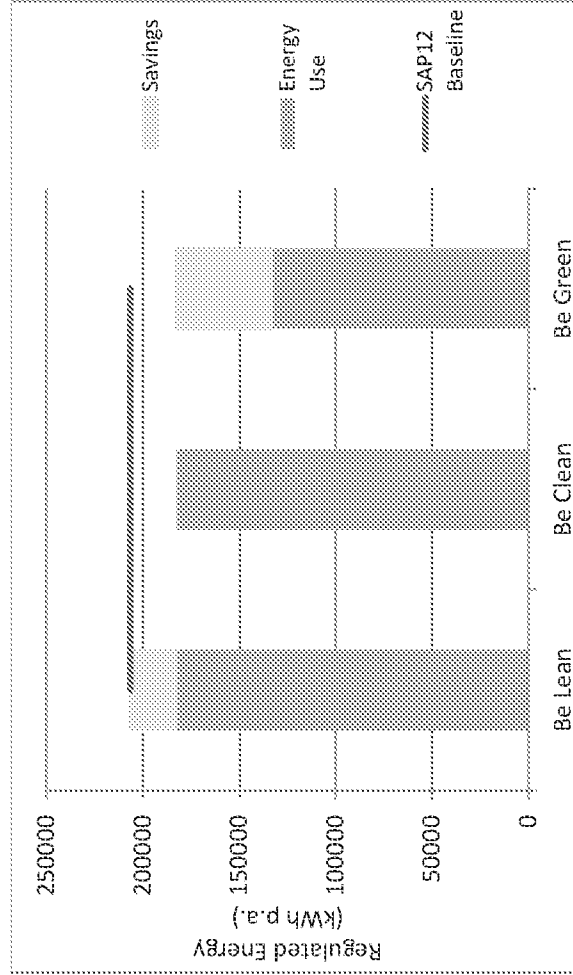
The summary of the overall reduction in residential energy after each stage of the energy hierarchy is summarised in the table below.

Table 18: Energy Usage and Savings

Element	Energy – Regulated (kWh p.a.)	Total Accumulated Energy Savings (kWh p.a.)	Accumulated Total % Saving
Gas Baseline	206,582	0	0.00
Be Lean	182,652	23,930	11.58
Be Clean	182,652	23,930	11.58
Be Green	133,254	73,328	35.50

The overall reduction in energy usage to the residential units can be illustrated graphically as below.

Figure 4: Graph of Energy Demand and Savings



The proposed strategy has first reduced energy demand through fabric and energy efficiency measures. The overall Part L Fabric Energy Efficiency (FEE) performance has been reviewed for the 'be lean' position and compared to the baseline stage of the energy hierarchy. The improvement has been shown to be 12.04%.

Table 19: Residential FEE Performance

Element	Target Fabric Energy Efficiency (TFEE) kWh/m ² /year	Dwelling Fabric Energy Efficiency (DFEE) kWh/m ² /year	Improvement (%)
Development Total	47.49	41.77	12.04

Summary

The proposed energy strategy achieves and meets the following requirements:

- Includes improved optimal building fabric improvements, energy efficient design of building services.
- Complies with Part L 2013 building regulations (with 2016 amendments) and shows a 2.77% carbon saving over a Building Regulations baseline (TER).
- Regulated energy demand is reduced by 35.50% when compared to a gas baseline.
- Utilises renewable technology through the KERS MEV heat pump reduce the total energy demand by 27.04%. This exceeds the 10% requirement from Arun District Council within condition 8 of planning permission AB/88/19/PL.
- Exceeds the TFEF minimum reduction requirements by 12.04%.

11. APPENDICES

The following pages detail:

- The calculated energy and CO₂ outputs on a type by type basis
- Review of options for renewable energy generation
- Details on the KERS MEV system
- SAP output sheets

11.1.1 APPENDIX A: ENERGY AND CO₂ PERFORMANCE TYPE BY TYPE

Energy	Include Unregulated Energy			No	Building Regs Version		2013	Predicted Energy Demand				
	Dwelling Name	TFA	No of Types		Main Heating Fuel Requirement (DER)	Secondary Main Heating Fuel Requirement (DER)		Secondary Heating Fuel Requirement (DER)	Water Fuel Requirement (DER)	Electricity Pumps Fans Requirement (DER)	Electricity Lighting Requirement (DER)	Unit Total
Type	1 BED EXP FLOOR	Flat	50.1	2	1933			471	125	276	2805	5611
	2 BED EXP FLOOR	Flat	81.87	2	2622			568	186	398	3773	7547
	G1 2 Bed 2 Bath Enclosed	Flat	69.49	2	3035			536	184	361	4116	8233
		Flat	79.94	2	3025			563	208	357	4152	8304
	G4 2 Bed 2 Bath	Flat	70.71	2	2814			539	187	368	3909	7817
	G5 1 Bed 1 Bath	Flat	50.23	1	2397			471	142	271	3281	3281
	G9 2 Bed 2 Bath	Flat	72.1	3	2930			543	190	357	4020	12061
	1 BED MID FLOOR	Flat	50.1	2	1117			471	125	276	1989	3979
	2 BED MID FLOOR	Flat	81.87	2	1849			568	186	398	3000	6000
	G1 2 Bed 2 Bath Enclosed	Flat	69.49	2	2203			536	184	369	3292	6584
		Flat	79.94	2	2001			563	208	357	3128	6256
	G4 2 Bed 2 Bath	Flat	70.71	2	1896			539	187	368	2991	5981
	G5 1 Bed 1 Bath	Flat	50.23	1	1469			471	142	271	2353	2353
	G9 2 Bed 2 Bath	Flat	72.1	3	1920			543	190	357	3011	9033
	1 BED TOP FLOOR	Flat	54.45	1	2439			486	134	302	3361	3361
	2 BED TOP FLOOR	Flat	70.86	4	2828			540	165	397	3930	15718
S6 2 Bed 2 Bath	Flat	86.64	4	3280			577	220	420	4497	17989	
S1 1 Bed 1 Bath	Flat	53.14	1	2200			481	149	315	3145	3145	
Totals			38	41,958	-	-	9,466	3,111	6,219	60,754	133,253	



CO2	Include Unregulated Energy			No	Building Regs Version			2013	Predicted CO2 Demand			
	Dwelling Name	TfA	No of Types		Secondary Main Heating Fuel Requirement (DER)	Secondary Heating Fuel Requirement (DER)	Water Fuel Requirement (DER)		Electricity Pumps/Fans Requirement (DER)	Electricity Lighting Requirement (DER)	Unit Total	Development Total
1 BED EXP FLOOR	Flat	50.1	2	1003			244		65	143	1456	2912
2 BED EXP FLOOR	Flat	81.87	2	1361			295		96	207	1958	3917
G1 2 Bed 2 Bath Enclosed	Flat	69.49	2	1575			278		96	187	2136	4273
G3 2 Bed 2 Bath	Flat	79.94	2	1570			292		108	185	2155	4310
G4 2 Bed 2 Bath	Flat	70.71	2	1461			280		97	191	2029	4057
G5 1 Bed 1 Bath	Flat	50.23	1	1244			244		73	141	1703	1703
G9 2 Bed 2 Bath	Flat	72.1	3	1521			282		99	185	2087	6260
1 BED MID FLOOR	Flat	50.1	2	580			244		65	143	1032	2065
2 BED MID FLOOR	Flat	81.87	2	960			295		96	207	1557	3114
G1 2 Bed 2 Bath Enclosed	Flat	69.49	2	1143			278		96	192	1709	3417
G3 2 Bed 2 Bath	Flat	79.94	2	1038			292		108	185	1623	3247
G4 2 Bed 2 Bath	Flat	70.71	2	984			280		97	191	1552	3104
G5 1 Bed 1 Bath	Flat	50.23	1	763			244		73	141	1221	1221
G9 2 Bed 2 Bath	Flat	72.1	3	997			282		99	185	1563	4688
1 BED TOP FLOOR	Flat	54.45	1	1266			252		69	157	1744	1744
2 BED TOP FLOOR	Flat	70.86	4	1468			280		86	206	2039	8158
S6 2 Bed 2 Bath	Flat	86.64	4	1702			300		114	218	2334	9336
S1 1 Bed 1 Bath	Flat	53.14	1	1142			250		78	163	1632	1632
Totals			38	21,776			4,913		1,615	3,228	31,531	69,158

11.2 APPENDIX B: RENEWABLE ENERGY OPTIONS

The following alternative options to supply low carbon and renewable energy generation have been explored and discounted based on the following reasons:

Wind Turbines

Wind turbines come in a variety of sizes and shapes. Turbines of 1 kW can be installed to single house and large-scale turbines of 1-2 MW can be installed on a development to generate electricity to multiple dwellings and other buildings. In both instances the electricity generated can be used on site or exported to the grid. Vertical- or horizontal-axis turbines are available.

A roof-mounted 1 kW micro wind system costs up to £3,000. A 2.5 kW pole-mounted system costs between £9,900 and £19,000. A 6 kW pole-mounted system costs between £21,000 and £30,000 (taken from the Energy Saving Trust, TBC by supplier)

- Local average wind speed is a determining factor. A minimum average wind speed of 6 m/s is required.
- Noise considerations can be an issue dependent on density and build-up of the surrounding area.
- Buildings in the immediate area can disrupt wind speed and reduce performance of the system.
- Planning permission will be required along with suitable space to site the turbine, whether ground installed or roof mounted.

Wind turbines have been discounted due to concerns over reliable wind resources. The use of wind turbines is likely to present aesthetic as well as nuisance issues.

Biomass Boilers

Providing a heating system fuelled by plant-based materials such as wood, crops or food waste. Biomass boilers generate heat for space heating and domestic hot water through the combustion of biofuels, such as woodchip, wood pellets or potentially biofuel or bio diesel. Biomass is considered to be virtually zero carbon. They can be used on an individual scale or for multiple dwellings as part of a district-heating network. A back-up heat source should be provided as consistent delivery of fuel is necessary for continued operation.

Biomass is considered a technically-viable option for this development scheme as there are no apparent physical constraints on site in terms of installing biomass boilers or storing a sufficient supply.

- There are, however, concerns regarding a sustainable supply of biomass to the site.
- The capital installation cost would also be high which leads us to the conclusion that biomass would not be a commercially-viable option for this development scheme.

Ground Source Heat Pumps (GSHP)

Ground Source Heat Pumps (GSHPs) operate on the same principle as an Air Source Heat Pump (ASHP) in that they extract heat from a source (in this instance the ground) and compress this energy to increase temperature for space heating and hot water. Pipework is installed into the ground, either through coils or in bore holes and piles, circulating a mix of water and antifreeze to extract energy from the ground, where the year-round temperature is relatively consistent (approx. 10°C at 4 metres depth). This leads to a reliable source of heat for the building.

Again, an electrically powered pump circulates the liquid and powers the compressor, however annual efficiencies for GSHPs tend to be higher than those of ASHPs.

Discounted on the grounds of costs and available space. Incompatible with individual gas boilers and blocks of apartments.



Solar Thermal

Solar Thermal generates domestic hot water from the sun's radiation. Glycol circulates within either flat plate or evacuated tube panels, absorbing heat from the sun, and transferring this energy to a water cylinder. A well designed solar thermal system will account for 50-60% of a dwelling's annual hot water demand. Sizing the system to meet a higher demand will lead to excess heat generation in the summer months and overheating of the system.

Unsuitable for blocks of flats and low carbon reduction efficiency compared to photovoltaic systems. Solar hot water systems for flattened blocks are only suitable where a central boiler plant room is provided to accommodate a central thermal store.

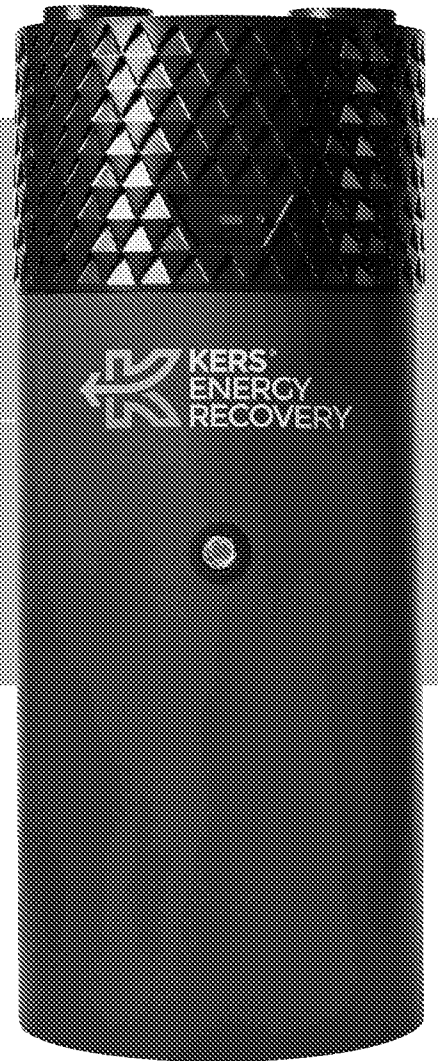
Solar Photovoltaics (PV)

Solar Photovoltaics convert solar radiation into electricity which can be used on site or exported to the national grid.

KERS INDOOR HEAT PUMP MEV

**Hot Water - Heat Recovery
Mechanical Extract Ventilation**

The eco-friendly KERS MEV indoor heat pump is a combined hot water, heat recovery and MEV system with storage cylinder. It converts waste heat energy from bathrooms and kitchens to low cost, renewable hot water.



**LOW CARBON
RENEWABLE ENERGY**

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.51
Printed on 09 February 2022 at 14:48:55

Project Information

Assessed By: Matt Fitzpatrick (STRO003572)

Building Type: Flat

Dwelling Details

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.1m²

Site Reference : Arundel

Plot Reference: 1 BED EXP FLOOR

Address : 1 BED EXP FLOOR, Ford Road, Arundel, TBC

Client Details

Name: Oakford Homes

Address : Hedsor Court Farm, Sheepcote Lane, Hedsor, SL1 8PE

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER) 29.88 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 29.06 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 49.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 46.1 kWh/m² OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.27 (max. 0.30)	0.27 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	OK
Roof	(no roof)		
Openings	1.37 (max. 2.00)	1.50 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.65 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main Heating system: Boiler systems with radiators or underfloor heating - electric
Direct acting electric boiler

Main Heating system 2: Heat pumps with radiators or underfloor heating - electric
KERS Energy Recovery KERS MVHR-W230

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	Measured cylinder loss: 1.31 kWh/day	
	Permitted by DBSCG: 2.21 kWh/day	OK
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls	TTZC by plumbing and electrical services	OK
Space heating controls 2:	Not applicable (boiler provides DHW only)	OK
Hot water controls:	No cylinder thermostat	Fail

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system		
Specific fan power:	0.5	
Maximum	0.7	OK

9 Summer time temperature

Overheating risk (South East England):	Not significant	OK
--	-----------------	----

Based on:

Overshading:	Average or unknown
Windows facing: North East	4.32m ²
Ventilation rate:	4.00
Blinds/curtains:	Dark-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Party Walls U-value	0 W/m ² K
---------------------	----------------------

SAP Input

Property Details: 1 BED EXP FLOOR

Address: 1 BED EXP FLOOR, Ford Road, Arundel, TBC
Located in: England
Region: South East England
UPRN:
Date of assessment: 12 August 2021
Date of certificate: 09 February 2022
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Calculated 248.37
Water use <= 125 litres/person/day: True
PCDF Version: 490

Property Description

Dwelling type: Flat
Detachment:
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 50.1 m² 2.4 m
Living area: 24.58 m² (fraction 0.491)
Front of dwelling faces: North

Opening Types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
Front Door	Manufacturer	Solid			PVC-U
1	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
Front Door	mm	0.7	0	1.5	2.1	1
1	16mm or more	0.7	0.63	1.3	4.32	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Front Door		Communal Wall		0	0
1		Brick Wall	North East	0	0

Overshading: Average or unknown

Opening Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
Brick Wall	27.16	4.32	22.84	0.27	0	False	93.78
Communal Wall	4.87	2.1	2.77	0.25	0.4	False	93.78
Exposed Floor	50.1			0.15			75
Internal Elements							
Stud Partitions	91.61						9
Party Elements							
Party Wall	35.97						110
Party Ceiling	50.1						30

Thermal bridges

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0939
Length **Psi-value**
 3.4 0.05 E2 Other lintels (including other steel lintels)

SAP Input

	1.2	0.02	E3	Sill
	11.4	0.016	E4	Jamb
	0	0.094	E5	Ground floor (normal)
	10.35	0.32	E20	Exposed floor (normal)
	13.36	0.033	E7	Party floor between dwellings (in blocks of flats)
[Approved]	2.99	0.02	E9	Balcony between dwellings, wall insulation continuous
	0	0.04	E14	Flat roof
	0	0.28	E15	Flat roof with parapet
	2.4	0.051	E16	Corner (normal)
	0	-0.07	E17	Corner (inverted internal area greater than external area)
	4.8	0.029	E18	Party wall between dwellings
	7.2	0.12	E25	Staggered party wall between dwellings
	0	0.16	P1	Ground floor
	14.98	0	P3	Intermediate floor between dwellings (in blocks of flats)
	15	0.16	P7	Exposed floor (normal)
	0	0.1	P4	Roof (insulation at ceiling level)

Ventilation:

Pressure test: Yes (As designed)
 Ventilation: Centralised whole house extract
 Number of wet rooms: Kitchen + 2
 Ductwork: , Rigid
 Approved Installation Scheme: True
 Number of chimneys: 0
 Number of open flues: 0
 Number of fans: 0
 Number of passive stacks: 0
 Number of sides sheltered: 2
 Pressure test: 4.65

Main heating system:

Main heating system: Boiler systems with radiators or underfloor heating
 Electric boilers
 Fuel: Electricity
 Info Source: SAP Tables
 SAP Table: 191
 Direct acting electric boiler
 Underfloor heating, pipes in screed above insulation
 Fraction of main heat: 1
 Central heating pump : 2013 or later
 Design flow temperature: Design flow temperature >45°C
 Boiler interlock: Yes
 Delayed start

Main heating Control:

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical services
 Control code: 2110

Secondary Main heating system:

Secondary Main heating system: Heat pumps with radiators or underfloor heating
 Electric heat pumps
 Fuel: Electricity
 Info Source: Boiler Database
 Database: (rev 490, product index 104956, SEDBUK 100%):
 Band name: KERS Energy Recovery
 Model: KERS MVHR-W230
 Model qualifier:
 (provides DHW all year)

SAP Input

Secondary Main heating Control:

Secondary Main heating Control: Not applicable (boiler provides DHW only)
Control code: 2100

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating: From second main heating system
Water code: 914
Fuel :Electricity
Hot water cylinder
Cylinder volume: 196 litres
Cylinder insulation: Measured loss, 1.312kWh/day
Primary pipework insulation: False
Cylinderstat: False
Cylinder in heated space: False
Immersion: Single
Solar panel: False

Others:

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.51
Printed on 09 February 2022 at 14:48:52

Project Information

Assessed By: Matt Fitzpatrick (STRO003572)

Building Type: Flat

Dwelling Details

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.1m²

Site Reference : Arundel

Plot Reference: 1 BED MID FLOOR

Address : 1 BED MID FLOOR, Ford Road, Arundel, TBC

Client Details

Name: Oakford Homes

Address : Hedsor Court Farm, Sheepcote Lane, Hedsor, SL1 8PE

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)

25.06 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

20.61 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

32.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

30.1 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.27 (max. 0.30)

0.27 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.37 (max. 2.00)

1.50 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.65 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Boiler systems with radiators or underfloor heating - electric
Direct acting electric boiler

Main Heating system 2:

Heat pumps with radiators or underfloor heating - electric
KERS Energy Recovery KERS MVHR-W230

Secondary heating system:

None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	Measured cylinder loss: 1.31 kWh/day	
	Permitted by DBSCG: 2.21 kWh/day	OK
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls	TTZC by plumbing and electrical services	OK
Space heating controls 2:	Not applicable (boiler provides DHW only)	OK
Hot water controls:	No cylinder thermostat	Fail

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system		
Specific fan power:	0.5	
Maximum	0.7	OK

9 Summer time temperature

Overheating risk (South East England):	Not significant	OK
--	-----------------	----

Based on:

Overshading:	Average or unknown
Windows facing: North East	4.32m ²
Ventilation rate:	4.00
Blinds/curtains:	Dark-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Party Walls U-value	0 W/m ² K
---------------------	----------------------

SAP Input

Property Details: 1 BED MID FLOOR

Address: 1 BED MID FLOOR, Ford Road, Arundel, TBC
Located in: England
Region: South East England
UPRN:
Date of assessment: 12 August 2021
Date of certificate: 09 February 2022
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Calculated 216.48
Water use <= 125 litres/person/day: True
PCDF Version: 490

Property Description

Dwelling type: Flat
Detachment:
Year Completed: 2021
Floor Location: Floor 0
Floor area: 50.1 m²
Storey height: 2.4 m
Living area: 24.58 m² (fraction 0.491)
Front of dwelling faces: North

Opening Types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
Front Door	Manufacturer	Solid			PVC-U
1	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
Front Door	mm	0.7	0	1.5	2.1	1
1	16mm or more	0.7	0.63	1.3	4.32	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Front Door		Communal Wall		0	0
1		Brick Wall	North East	0	0

Overshading: Average or unknown

Climate Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
Brick Wall	27.16	4.32	22.84	0.27	0	False	93.78
Communal Wall	4.87	2.1	2.77	0.25	0.4	False	150
Internal Elements							
Stud Partitions	91.61						9
Party Elements							
Party Wall	35.97						110
Party Ceiling	50.1						30
Party Floor	50.1						40

Thermal Bridges

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0732
Length **Psi-value**
 3.4 0.05 E2 Other lintels (including other steel lintels)

SAP Input

[Approved]	1.2	0.02	E3	Sill
	11.4	0.016	E4	Jamb
	0	0.094	E5	Ground floor (normal)
	0	0.32	E20	Exposed floor (normal)
	23.71	0.033	E7	Party floor between dwellings (in blocks of flats)
	2.99	0.02	E9	Balcony between dwellings, wall insulation continuous
	0	0.04	E14	Flat roof
	0	0.28	E15	Flat roof with parapet
	2.4	0.051	E16	Corner (normal)
	0	-0.07	E17	Corner (inverted internal area greater than external area)
	4.8	0.029	E18	Party wall between dwellings
	7.2	0.12	E25	Staggered party wall between dwellings
	0	0.16	P1	Ground floor
	29.98	0	P3	Intermediate floor between dwellings (in blocks of flats)
	0	0.16	P7	Exposed floor (normal)
	0	0.1	P4	Roof (insulation at ceiling level)

Ventilation:

Pressure test: Yes (As designed)
 Ventilation: Centralised whole house extract
 Number of wet rooms: Kitchen + 2
 Ductwork: , Rigid
 Approved Installation Scheme: True
 Number of chimneys: 0
 Number of open flues: 0
 Number of fans: 0
 Number of passive stacks: 0
 Number of sides sheltered: 2
 Pressure test: 4.65

Main heating system:

Main heating system: Boiler systems with radiators or underfloor heating
 Electric boilers
 Fuel: Electricity
 Info Source: SAP Tables
 SAP Table: 191
 Direct acting electric boiler
 Underfloor heating, pipes in screed above insulation
 Fraction of main heat: 1
 Central heating pump : 2013 or later
 Design flow temperature: Design flow temperature >45°C
 Boiler interlock: Yes
 Delayed start

Main heating Control:

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical services
 Control code: 2110

Secondary Main heating system:

Secondary Main heating system: Heat pumps with radiators or underfloor heating
 Electric heat pumps
 Fuel: Electricity
 Info Source: Boiler Database
 Database: (rev 490, product index 104956, SEDBUK 100%):
 Band name: KERS Energy Recovery
 Model: KERS MVHR-W230
 Model qualifier:
 (provides DHW all year)

SAP Input

Secondary Main heating Control:

Secondary Main heating Control: Not applicable (boiler provides DHW only)
Control code: 2100

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating: From second main heating system
Water code: 914
Fuel :Electricity
Hot water cylinder
Cylinder volume: 196 litres
Cylinder insulation: Measured loss, 1.312kWh/day
Primary pipework insulation: False
Cylinderstat: False
Cylinder in heated space: False
Immersion: Single
Solar panel: False

Others:

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.51
Printed on 09 February 2022 at 14:48:49

Project Information

Assessed By: Matt Fitzpatrick (STRO003572)

Building Type: Flat

Dwelling Details

NEW DWELLING DESIGN STAGE

Total Floor Area: 54.45m²

Site Reference : Arundel

Plot Reference: 1 BED TOP FLOOR

Address : 1 BED TOP FLOOR, Ford Road, Arundel, TBC

Client Details

Name: Oakford Homes

Address : Hedsor Court Farm, Sheepcote Lane, Hedsor, SL1 8PE

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)

34.1 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

32.03 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

65.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

51.6 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.25 (max. 0.30)

0.27 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

0.13 (max. 0.20)

0.13 (max. 0.35)

OK

Openings

1.37 (max. 2.00)

1.50 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.65 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Boiler systems with radiators or underfloor heating - electric
Direct acting electric boiler

Main Heating system 2:

Heat pumps with radiators or underfloor heating - electric
KERS Energy Recovery KERS MVHR-W230

Secondary heating system:

None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	Measured cylinder loss: 1.31 kWh/day	
	Permitted by DBSCG: 2.21 kWh/day	OK
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls	TTZC by plumbing and electrical services	OK
Space heating controls 2:	Not applicable (boiler provides DHW only)	OK
Hot water controls:	No cylinder thermostat	Fail

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system		
Specific fan power:	0.5	
Maximum	0.7	OK

9 Summer time temperature

Overheating risk (South East England):	Not significant	OK
--	-----------------	----

Based on:

Overshading:	Average or unknown
Windows facing: North East	4.32m ²
Ventilation rate:	4.00
Blinds/curtains:	Dark-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Party Walls U-value	0 W/m ² K
---------------------	----------------------

SAP Input

Property Details: 1 BED TOP FLOOR

Address: 1 BED TOP FLOOR, Ford Road, Arundel, TBC
Located in: England
Region: South East England
UPRN:
Date of assessment: 12 August 2021
Date of certificate: 09 February 2022
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Calculated 230.38
Water use <= 125 litres/person/day: True
PCDF Version: 490

Property Description

Dwelling type: Flat
Detachment:
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 54.45 m² 2.4 m
Living area: 29.48 m² (fraction 0.541)
Front of dwelling faces: North

Opening Types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
Front Door	Manufacturer	Solid			PVC-U
1	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
Front Door	mm	0.7	0	1.5	2.1	1
1	16mm or more	0.7	0.63	1.3	4.32	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Front Door		Communal Wall		0	0
1		Brick Wall	North East	0	0

Overshading: Average or unknown

Climate Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
Brick Wall	35.73	4.32	31.41	0.27	0	False	93.78
Communal Wall	21.39	2.1	19.29	0.25	0.4	False	93.78
Flat Roof	54.45	0	54.45	0.13	0		9
Internal Elements							
Stud Partitions	86.74						9
Party Elements							
Party Wall	24.61						110
Party Floor	54.45						70

Thermal Bridges

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.083
Length **Psi-value**
 3.4 0.05 E2 Other lintels (including other steel lintels)

SAP Input

[Approved]	1.2	0.02	E3	Sill
	11.4	0.016	E4	Jamb
	0	0.094	E5	Ground floor (normal)
	0	0.32	E20	Exposed floor (normal)
	23.8	0.033	E7	Party floor between dwellings (in blocks of flats)
	0	0.02	E9	Balcony between dwellings, wall insulation continuous
	0	0.04	E14	Flat roof
	23.8	0.28	E15	Flat roof with parapet
	4.8	0.051	E16	Corner (normal)
	4.8	-0.07	E17	Corner (inverted internal area greater than external area)
	7.2	0.029	E18	Party wall between dwellings
	2.4	0.12	E25	Staggered party wall between dwellings
	0	0.16	P1	Ground floor
	10.25	0	P3	Intermediate floor between dwellings (in blocks of flats)
	0	0.16	P7	Exposed floor (normal)
	10.25	0.1	P4	Roof (insulation at ceiling level)

Ventilation:

Pressure test: Yes (As designed)
 Ventilation: Centralised whole house extract
 Number of wet rooms: Kitchen + 2
 Ductwork: , Rigid
 Approved Installation Scheme: True
 Number of chimneys: 0
 Number of open flues: 0
 Number of fans: 0
 Number of passive stacks: 0
 Number of sides sheltered: 2
 Pressure test: 4.65

Main heating system:

Main heating system: Boiler systems with radiators or underfloor heating
 Electric boilers
 Fuel: Electricity
 Info Source: SAP Tables
 SAP Table: 191
 Direct acting electric boiler
 Underfloor heating, pipes in screed above insulation
 Fraction of main heat: 1
 Central heating pump : 2013 or later
 Design flow temperature: Design flow temperature >45°C
 Boiler interlock: Yes
 Delayed start

Main heating Control:

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical services
 Control code: 2110

Secondary Main heating system:

Secondary Main heating system: Heat pumps with radiators or underfloor heating
 Electric heat pumps
 Fuel: Electricity
 Info Source: Boiler Database
 Database: (rev 490, product index 104956, SEDBUK 100%):
 Band name: KERS Energy Recovery
 Model: KERS MVHR-W230
 Model qualifier:
 (provides DHW all year)

SAP Input

Secondary Main heating Control:

Secondary Main heating Control: Not applicable (boiler provides DHW only)
Control code: 2100

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating: From second main heating system
Water code: 914
Fuel :Electricity
Hot water cylinder
Cylinder volume: 196 litres
Cylinder insulation: Measured loss, 1.312kWh/day
Primary pipework insulation: False
Cylinderstat: False
Cylinder in heated space: False
Immersion: Single
Solar panel: False

Others:

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.51
Printed on 09 February 2022 at 14:48:55

Project Information

Assessed By: Matt Fitzpatrick (STRO003572)

Building Type: Flat

Dwelling Details

NEW DWELLING DESIGN STAGE

Total Floor Area: 81.87m²

Site Reference : Arundel

Plot Reference: 2 BED EXP FLOOR

Address : 2 BED EXP FLOOR, Ford Road, Arundel, TBC

Client Details

Name: Oakford Homes

Address : Hedsor Court Farm, Sheepcote Lane, Hedsor, SL1 8PE

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)

24.8 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

23.92 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

45.3 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

39.0 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.27 (max. 0.30)

0.27 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

0.09 (max. 0.25)

0.09 (max. 0.70)

OK

Roof

(no roof)

Openings

1.34 (max. 2.00)

1.50 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.65 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Boiler systems with radiators or underfloor heating - electric
Direct acting electric boiler

Main Heating system 2:

Heat pumps with radiators or underfloor heating - electric
KERS Energy Recovery KERS MVHR-W230

Secondary heating system:

None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	Measured cylinder loss: 1.31 kWh/day	
	Permitted by DBSCG: 2.21 kWh/day	OK
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls	TTZC by plumbing and electrical services	OK
Space heating controls 2:	Not applicable (boiler provides DHW only)	OK
Hot water controls:	No cylinder thermostat	Fail

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system		
Specific fan power:	0.5	
Maximum	0.7	OK

9 Summer time temperature

Overheating risk (South East England):	Not significant	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	6.47m²	
Windows facing: South East	2.52m²	
Ventilation rate:	4.00	
Blinds/curtains:	Dark-coloured curtain or roller blind	
	Closed 100% of daylight hours	

10 Key features

Party Walls U-value	0 W/m²K
Floors U-value	0.09 W/m²K

SAP Input

Property Details: 2 BED EXP FLOOR

Address: 2 BED EXP FLOOR, Ford Road, Arundel, TBC
Located in: England
Region: South East England
UPRN:
Date of assessment: 12 August 2021
Date of certificate: 09 February 2022
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Calculated 199.67
Water use <= 125 litres/person/day: True
PCDF Version: 490

Property Description

Dwelling type: Flat
Detachment:
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 81.87 m² 2.4 m
Living area: 28.91 m² (fraction 0.353)
Front of dwelling faces: North

Opening types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
Front Door	Manufacturer	Solid			PVC-U
1	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	
2	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
Front Door	mm	0.7	0	1.5	2.1	1
1	16mm or more	0.7	0.63	1.3	6.47	1
2	16mm or more	0.7	0.63	1.3	2.52	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Front Door		Communal Wall		0	0
1		Brick Wall	North East	0	0
2		Brick Wall	South East	0	0

Overshading: Average or unknown

Climate Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
Brick Wall	48.89	8.99	39.9	0.27	0	False	93.78
Communal Wall	3.85	2.1	1.75	0.25	0.4	False	93.78
Exposed Floor	50.1			0.09			75
Internal Elements							
Stud Partitions	150.78						9
Party Elements							
Party Wall	44.28						110
Party Ceiling	81.87						30

Thermal Bridge

SAP Input

Thermal bridges:

User-defined (individual PSI-values) Y-Value = 0.1134

Length	Psi-value		
6.76	0.05	E2	Other lintels (including other steel lintels)
4.56	0.02	E3	Sill
16.8	0.016	E4	Jamb
0	0.094	E5	Ground floor (normal)
18.97	0.32	E20	Exposed floor (normal)
21.99	0.033	E7	Party floor between dwellings (in blocks of flats)
[Approved] 2.99	0.02	E9	Balcony between dwellings, wall insulation continuous
0	0.04	E14	Flat roof
0	0.28	E15	Flat roof with parapet
9.6	0.051	E16	Corner (normal)
4.8	-0.07	E17	Corner (inverted internal area greater than external area)
4.8	0.029	E18	Party wall between dwellings
7.2	0.12	E25	Staggered party wall between dwellings
0	0.16	P1	Ground floor
18.45	0	P3	Intermediate floor between dwellings (in blocks of flats)
18.45	0.16	P7	Exposed floor (normal)
0	0.1	P4	Roof (insulation at ceiling level)

Ventilation:

Pressure test: Yes (As designed)
 Ventilation: Centralised whole house extract
 Number of wet rooms: Kitchen + 2
 Ductwork: , Rigid
 Approved Installation Scheme: True
 Number of chimneys: 0
 Number of open flues: 0
 Number of fans: 0
 Number of passive stacks: 0
 Number of sides sheltered: 2
 Pressure test: 4.65

Main heating system:

Main heating system: Boiler systems with radiators or underfloor heating
 Electric boilers
 Fuel: Electricity
 Info Source: SAP Tables
 SAP Table: 191
 Direct acting electric boiler
 Underfloor heating, pipes in screed above insulation
 Fraction of main heat: 1
 Central heating pump : 2013 or later
 Design flow temperature: Design flow temperature >45°C
 Boiler interlock: Yes
 Delayed start

Main heating Control:

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical services
 Control code: 2110

Secondary Main heating system:

Secondary Main heating system: Heat pumps with radiators or underfloor heating
 Electric heat pumps
 Fuel: Electricity
 Info Source: Boiler Database
 Database: (rev 490, product index 104956, SEDBUK 100%):
 Band name: KERS Energy Recovery
 Model: KERS MVHR-W230
 Model qualifier:
 (provides DHW all year)

SAP Input

Secondary Main heating Control:

Secondary Main heating Control: Not applicable (boiler provides DHW only)
Control code: 2100

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating: From second main heating system
Water code: 914
Fuel :Electricity
Hot water cylinder
Cylinder volume: 196 litres
Cylinder insulation: Measured loss, 1.312kWh/day
Primary pipework insulation: False
Cylinderstat: False
Cylinder in heated space: False
Immersion: Single
Solar panel: False

Others:

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.51
Printed on 09 February 2022 at 14:48:52

Project Information

Assessed By: Matt Fitzpatrick (STRO003572)

Building Type: Flat

Dwelling Details

NEW DWELLING DESIGN STAGE

Total Floor Area: 81.87m²

Site Reference : Arundel

Plot Reference: 2 BED MID FLOOR

Address : 2 BED MID FLOOR, Ford Road, Arundel, TBC

Client Details

Name: Oakford Homes

Address : Hedsor Court Farm, Sheepcote Lane, Hedsor, SL1 8PE

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)

21.2 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

19.02 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

33.3 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

29.8 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.27 (max. 0.30)

0.27 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

(no roof)

Openings

1.34 (max. 2.00)

1.50 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.65 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Boiler systems with radiators or underfloor heating - electric
Direct acting electric boiler

Main Heating system 2:

Heat pumps with radiators or underfloor heating - electric
KERS Energy Recovery KERS MVHR-W230

Secondary heating system:

None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	Measured cylinder loss: 1.31 kWh/day	
	Permitted by DBSCG: 2.21 kWh/day	OK
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls	TTZC by plumbing and electrical services	OK
Space heating controls 2:	Not applicable (boiler provides DHW only)	OK
Hot water controls:	No cylinder thermostat	Fail

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system		
Specific fan power:	0.5	
Maximum	0.7	OK

9 Summer time temperature

Overheating risk (South East England):	Not significant	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: North East	6.47m²	
Windows facing: South East	2.52m²	
Ventilation rate:	4.00	
Blinds/curtains:	Dark-coloured curtain or roller blind	
	Closed 100% of daylight hours	

10 Key features

Party Walls U-value	0 W/m²K
---------------------	---------

SAP Input

Property Details: 2 BED MID FLOOR

Address: 2 BED MID FLOOR, Ford Road, Arundel, TBC
Located in: England
Region: South East England
UPRN:
Date of assessment: 12 August 2021
Date of certificate: 09 February 2022
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Calculated 223.78
Water use <= 125 litres/person/day: True
PCDF Version: 490

Property Description

Dwelling type: Flat
Detachment:
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 81.87 m² 2.4 m
Living area: 28.91 m² (fraction 0.353)
Front of dwelling faces: North

Opening types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
Front Door	Manufacturer	Solid			PVC-U
1	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	
2	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
Front Door	mm	0.7	0	1.5	2.1	1
1	16mm or more	0.7	0.63	1.3	6.47	1
2	16mm or more	0.7	0.63	1.3	2.52	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Front Door		Communal Wall		0	0
1		Brick Wall	North East	0	0
2		Brick Wall	South East	0	0

Overshading: Average or unknown

Climate Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
Brick Wall	48.89	8.99	39.9	0.27	0	False	93.78
Communal Wall	3.85	2.1	1.75	0.25	0.4	False	93.78
Internal Elements							
Stud Partitions	150.78						9
Party Elements							
Party Wall	44.28						110
Party Ceiling	81.87						30
Party Floor	81.87						70

Thermal Bridge

SAP Input

Thermal bridges:

User-defined (individual PSI-values) Y-Value = 0.0619

Length	Psi-value		
6.76	0.05	E2	Other lintels (including other steel lintels)
4.56	0.02	E3	Sill
16.8	0.016	E4	Jamb
0	0.094	E5	Ground floor (normal)
0	0.32	E20	Exposed floor (normal)
40.95	0.033	E7	Party floor between dwellings (in blocks of flats)
[Approved] 2.99	0.02	E9	Balcony between dwellings, wall insulation continuous
0	0.04	E14	Flat roof
0	0.28	E15	Flat roof with parapet
9.6	0.051	E16	Corner (normal)
4.8	-0.07	E17	Corner (inverted internal area greater than external area)
4.8	0.029	E18	Party wall between dwellings
7.2	0.12	E25	Staggered party wall between dwellings
0	0.16	P1	Ground floor
36.9	0	P3	Intermediate floor between dwellings (in blocks of flats)
0	0.16	P7	Exposed floor (normal)
0	0.1	P4	Roof (insulation at ceiling level)

Ventilation:

Pressure test: Yes (As designed)
 Ventilation: Centralised whole house extract
 Number of wet rooms: Kitchen + 2
 Ductwork: , Rigid
 Approved Installation Scheme: True
 Number of chimneys: 0
 Number of open flues: 0
 Number of fans: 0
 Number of passive stacks: 0
 Number of sides sheltered: 2
 Pressure test: 4.65

Main heating system:

Main heating system: Boiler systems with radiators or underfloor heating
 Electric boilers
 Fuel: Electricity
 Info Source: SAP Tables
 SAP Table: 191
 Direct acting electric boiler
 Underfloor heating, pipes in screed above insulation
 Fraction of main heat: 1
 Central heating pump : 2013 or later
 Design flow temperature: Design flow temperature >45°C
 Boiler interlock: Yes
 Delayed start

Main heating Control:

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical services
 Control code: 2110

Secondary Main heating system:

Secondary Main heating system: Heat pumps with radiators or underfloor heating
 Electric heat pumps
 Fuel: Electricity
 Info Source: Boiler Database
 Database: (rev 490, product index 104956, SEDBUK 100%)
 Band name: KERS Energy Recovery
 Model: KERS MVHR-W230
 Model qualifier:
 (provides DHW all year)

SAP Input

Secondary Main heating Control:

Secondary Main heating Control: Not applicable (boiler provides DHW only)
Control code: 2100

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating: From second main heating system
Water code: 914
Fuel :Electricity
Hot water cylinder
Cylinder volume: 196 litres
Cylinder insulation: Measured loss, 1.312kWh/day
Primary pipework insulation: False
Cylinderstat: False
Cylinder in heated space: False
Immersion: Single
Solar panel: False

Others:

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.51
Printed on 09 February 2022 at 14:48:49

Project Information

Assessed By: Matt Fitzpatrick (STRO003572)

Building Type: Flat

Dwelling Details

NEW DWELLING DESIGN STAGE

Total Floor Area: 70.86m²

Site Reference : Arundel

Plot Reference: 2 BED TOP FLOOR

Address : 2 BED TOP FLOOR, Ford Road, Arundel, TBC

Client Details

Name: Oakford Homes

Address : Hedsor Court Farm, Sheepcote Lane, Hedsor, SL1 8PE

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)

30.48 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

28.78 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

59.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

47.1 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.26 (max. 0.30)

0.27 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

0.13 (max. 0.20)

0.13 (max. 0.35)

OK

Openings

1.37 (max. 2.00)

1.50 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.65 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Boiler systems with radiators or underfloor heating - electric
Direct acting electric boiler

Main Heating system 2:

Heat pumps with radiators or underfloor heating - electric
KERS Energy Recovery KERS MVHR-W230

Secondary heating system:

None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	Measured cylinder loss: 1.31 kWh/day	
	Permitted by DBSCG: 2.21 kWh/day	OK
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls	TTZC by plumbing and electrical services	OK
Space heating controls 2:	Not applicable (boiler provides DHW only)	OK
Hot water controls:	No cylinder thermostat	Fail

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system		
Specific fan power:	0.5	
Maximum	0.7	OK

9 Summer time temperature

Overheating risk (South East England):	Not significant	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: South East	2.15m²	
Windows facing: South West	2.15m²	
Ventilation rate:	4.00	
Blinds/curtains:	Dark-coloured curtain or roller blind	
	Closed 100% of daylight hours	

10 Key features

Party Walls U-value	0 W/m²K
---------------------	---------

SAP Input

Property Details: 2 BED TOP FLOOR

Address: 2 BED TOP FLOOR, Ford Road, Arundel, TBC
Located in: England
Region: South East England
UPRN:
Date of assessment: 12 August 2021
Date of certificate: 09 February 2022
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Calculated 240.29
Water use <= 125 litres/person/day: True
PCDF Version: 490

Property Description

Dwelling type: Flat
Detachment:
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 70.86 m² 2.4 m
Living area: 28.45 m² (fraction 0.401)
Front of dwelling faces: North

Opening Types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
Front Door	Manufacturer	Solid			PVC-U
1	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	
2	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
Front Door	mm	0.7	0	1.5	2.1	1
1	16mm or more	0.7	0.63	1.3	2.15	1
2	16mm or more	0.7	0.63	1.3	2.15	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Front Door		Communal Wall		0	0
1		Brick Wall	South East	0	0
2		Brick Wall	South West	0	0

Overshading: Average or unknown

Climate Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
Brick Wall	45.59	4.3	41.29	0.27	0	False	93.78
Communal Wall	23.22	2.1	21.12	0.25	0.4	False	93.78
Flat Roof	70.86	0	70.86	0.13	0		9
Internal Elements							
Stud Partitions	118.68						9
Party Elements							
Party Wall	40.98						110
Party Floor	70.86						70

Thermal Bridge

SAP Input

Thermal bridges:

User-defined (individual PSI-values) Y-Value = 0.0807

Length	Psi-value		
5.09	0.05	E2	Other lintels (including other steel lintels)
4.09	0.02	E3	Sill
12.6	0.016	E4	Jamb
0	0.094	E5	Ground floor (normal)
0	0.32	E20	Exposed floor (normal)
28.67	0.033	E7	Party floor between dwellings (in blocks of flats)
[Approved] 0	0.02	E9	Balcony between dwellings, wall insulation continuous
0	0.04	E14	Flat roof
28.67	0.28	E15	Flat roof with parapet
14.4	0.051	E16	Corner (normal)
16.8	-0.07	E17	Corner (inverted internal area greater than external area)
7.2	0.029	E18	Party wall between dwellings
2.4	0.12	E25	Staggered party wall between dwellings
0	0.16	P1	Ground floor
17.08	0	P3	Intermediate floor between dwellings (in blocks of flats)
0	0.16	P7	Exposed floor (normal)
17.08	0.1	P4	Roof (insulation at ceiling level)

Ventilation:

Pressure test: Yes (As designed)
 Ventilation: Centralised whole house extract
 Number of wet rooms: Kitchen + 2
 Ductwork: , Rigid
 Approved Installation Scheme: True
 Number of chimneys: 0
 Number of open flues: 0
 Number of fans: 0
 Number of passive stacks: 0
 Number of sides sheltered: 2
 Pressure test: 4.65

Main heating system:

Main heating system: Boiler systems with radiators or underfloor heating
 Electric boilers
 Fuel: Electricity
 Info Source: SAP Tables
 SAP Table: 191
 Direct acting electric boiler
 Underfloor heating, pipes in screed above insulation
 Fraction of main heat: 1
 Central heating pump : 2013 or later
 Design flow temperature: Design flow temperature >45°C
 Boiler interlock: Yes
 Delayed start

Main heating Control:

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical services
 Control code: 2110

Secondary Main heating system:

Secondary Main heating system: Heat pumps with radiators or underfloor heating
 Electric heat pumps
 Fuel: Electricity
 Info Source: Boiler Database
 Database: (rev 490, product index 104956, SEDBUK 100%)
 Band name: KERS Energy Recovery
 Model: KERS MVHR-W230
 Model qualifier:
 (provides DHW all year)

SAP Input

Secondary Main heating Control:

Secondary Main heating Control: Not applicable (boiler provides DHW only)
Control code: 2100

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating: From second main heating system
Water code: 914
Fuel :Electricity
Hot water cylinder
Cylinder volume: 196 litres
Cylinder insulation: Measured loss, 1.312kWh/day
Primary pipework insulation: False
Cylinderstat: False
Cylinder in heated space: False
Immersion: Single
Solar panel: False

Others:

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.51
Printed on 09 February 2022 at 14:48:54

Project Information

Assessed By: Matt Fitzpatrick (STRO003572)

Building Type: Flat

Dwelling Details

NEW DWELLING DESIGN STAGE

Total Floor Area: 69.49m²

Site Reference : Arundel

Plot Reference: G1 2 Bed 2 Bath Enclosed

Address : G1 2 Bed 2 Bath Enclosed, Ford Road, Arundel, TBA

Client Details

Name: Oakford Homes

Address : Hedsor Court Farm, Sheepcote Lane, Hedsor, SL1 8PE

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)

28.92 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

30.74 kg/m²

Fail

Excess emissions = 1.82 kg/m² (6.3 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

54.7 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

50.0 kWh/m²

OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.27 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	OK
Roof	(no roof)		
Openings	1.35 (max. 2.00)	1.50 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.65 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main Heating system: Boiler systems with radiators or underfloor heating - electric
Direct acting electric boiler

Main Heating system 2: Heat pumps with radiators or underfloor heating - electric
KERS Energy Recovery KERS MVHR-W230

Regulations Compliance Report

Secondary heating system: None

5 Cylinder insulation

Hot water Storage:	Measured cylinder loss: 1.31 kWh/day	
	Permitted by DBSCG: 2.21 kWh/day	OK
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls	TTZC by plumbing and electrical services	OK
Space heating controls 2:	Not applicable (boiler provides DHW only)	OK
Hot water controls:	No cylinder thermostat	Fail

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system		
Specific fan power:	0.5	
Maximum	0.7	OK

9 Summer time temperature

Overheating risk (Thames valley):	Not significant	OK
-----------------------------------	-----------------	----

Based on:

Overshading:	Average or unknown
Windows facing: North West	6.53m ²
Ventilation rate:	4.00
Blinds/curtains:	Dark-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Party Walls U-value	0 W/m ² K
---------------------	----------------------

SAP Input

Property Details: G1 2 Bed 2 Bath Enclosed

Address: G1 2 Bed 2 Bath Enclosed, Ford Road, Arundel, TBA
Located in: England
Region: Thames valley
UPRN: 000000
Date of assessment: 10 December 2021
Date of certificate: 09 February 2022
Assessment type: New dwelling design stage
Transaction type: Marketed sale
Tenure type: Owner-occupied
Related party disclosure: No related party
Thermal Mass Parameter: Calculated 212
Water use <= 125 litres/person/day: True
PCDF Version: 490

Property Description

Dwelling type: Flat
Detachment:
Year Completed: 2022
Floor Location: **Floor area:** **Storey height:**
 Floor 0 69.49 m² 2.6 m
Living area: 28.34 m² (fraction 0.408)
Front of dwelling faces: North

Opening Types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
External Door 2	Manufacturer	Solid			Wood
1	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	PVC-U

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
External Door 2	mm	0.7	0.63	1.5	2.15	1
1	16mm or more	0.7	0.63	1.3	6.53	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
External Door 2		Communal Wall	North	0	0
1		Brick	North West	0	0

Overshading: Average or unknown

Opening Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
Communal Wall	43.97	2.15	41.82	0.25	0.4	False	93.78
Brick	25.69	6.53	19.16	0.27	0	False	93.78
Exposed	50.1			0.15			75
Internal Elements							
Int Part	128.65						9
Party Elements							
Party Wall	18.3						110
PC	69.49						30

Thermal bridges

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0957
Length **Psi-value**
 4.78 0.05 E2 Other lintels (including other steel lintels)

SAP Input

	2.25	0.02	E3	Sill
	14.4	0.016	E4	Jamb
	0	0.094	E5	Ground floor (normal)
	26.79	0.033	E7	Party floor between dwellings (in blocks of flats)
	2.6	0.051	E16	Corner (normal)
	7.8	0.029	E18	Party wall between dwellings
	26.79	0.32	E20	Exposed floor (normal)
[Approved]	0	0.02	E9	Balcony between dwellings, wall insulation continuous
	0	0.04	E14	Flat roof
	0	0.28	E15	Flat roof with parapet
	0	-0.07	E17	Corner (inverted – internal area greater than external area)
	0	0.12	E25	Staggered party wall between dwellings c
	7.04	0.16	P1	Ground floor
	7.04	0	P3	Intermediate floor between dwellings (in blocks of flats)
	0	0.16	P7	Exposed floor (normal)
	0	0.1	P4	Roof (insulation at ceiling level)

Ventilation

Pressure test: Yes (As designed)
 Ventilation: Centralised whole house extract
 Number of wet rooms: Kitchen + 2
 Ductwork: , Rigid
 Approved Installation Scheme: False
 Number of chimneys: 0
 Number of open flues: 0
 Number of fans: 0
 Number of passive stacks: 0
 Number of sides sheltered: 2
 Pressure test: 4.65

Main heating system

Main heating system: Boiler systems with radiators or underfloor heating
 Electric boilers
 Fuel: Electricity
 Info Source: SAP Tables
 SAP Table: 191
 Direct acting electric boiler
 Underfloor heating, pipes in screed above insulation
 Fraction of main heat: 1
 Central heating pump : 2013 or later
 Design flow temperature: Design flow temperature >45°C
 Boiler interlock: Yes
 Delayed start

Main heating Control

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical services
 Control code: 2110

Secondary Main heating systems

Secondary Main heating system: Heat pumps with radiators or underfloor heating
 Electric heat pumps
 Fuel: Electricity
 Info Source: Boiler Database
 Database: (rev 490, product index 104956, SEDBUK 100%)
 Band name: KERS Energy Recovery
 Model: KERS MVHR-W230
 Model qualifier:
 (provides DHW all year)

SAP Input

Secondary Main heating Control:

Secondary Main heating Control: Not applicable (boiler provides DHW only)
Control code: 2100

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating: From second main heating system
Water code: 914
Fuel :Electricity
Hot water cylinder
Cylinder volume: 196 litres
Cylinder insulation: Measured loss, 1.312kWh/day
Primary pipework insulation: False
Cylinderstat: False
Cylinder in heated space: False
Immersion: Single
Solar panel: False

Options:

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.51
Printed on 09 February 2022 at 14:48:54

Project Information

Assessed By: Matt Fitzpatrick (STRO003572)

Building Type: Flat

Dwelling Details

NEW DWELLING DESIGN STAGE

Total Floor Area: 79.94m²

Site Reference : Arundel

Plot Reference: G3 2 Bed 2 Bath

Address : G3 2 Bed 2 Bath, Ford Road, Arundel, TBA

Client Details

Name: Oakford Homes

Address : Hedsor Court Farm, Sheepcote Lane, Hedsor, SL1 8PE

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)

25.81 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

26.96 kg/m²

Fail

Excess emissions = 1.15 kg/m² (4.5 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

49.3 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

45.6 kWh/m²

OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.27 (max. 0.30)	0.27 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	OK
Roof	(no roof)		
Openings	1.33 (max. 2.00)	1.50 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.65 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main Heating system: Boiler systems with radiators or underfloor heating - electric
Direct acting electric boiler

Main Heating system 2: Heat pumps with radiators or underfloor heating - electric
KERS Energy Recovery KERS MVHR-W230

Regulations Compliance Report

Secondary heating system: None

5 Cylinder insulation

Hot water Storage:	Measured cylinder loss: 1.31 kWh/day	
	Permitted by DBSCG: 2.21 kWh/day	OK
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls	TTZC by plumbing and electrical services	OK
Space heating controls 2:	Not applicable (boiler provides DHW only)	OK
Hot water controls:	No cylinder thermostat	Fail

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system		
Specific fan power:	0.5	
Maximum	0.7	OK

9 Summer time temperature

Overheating risk (Thames valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: South East	8.44m ²
Windows facing: South West	5.06m ²
Ventilation rate:	4.00
Blinds/curtains:	Dark-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Party Walls U-value	0 W/m ² K
---------------------	----------------------

SAP Input

Property Details: G3 2 Bed 2 Bath

Address: G3 2 Bed 2 Bath, Ford Road, Arundel, TBA
Located in: England
Region: Thames valley
UPRN: 000000
Date of assessment: 10 December 2021
Date of certificate: 09 February 2022
Assessment type: New dwelling design stage
Transaction type: Marketed sale
Tenure type: Owner-occupied
Related party disclosure: No related party
Thermal Mass Parameter: Calculated 212.83
Water use <= 125 litres/person/day: True
PCDF Version: 490

Property Description

Dwelling type: Flat
Detachment:
Year Completed: 2022
Floor Location: **Floor area:** **Storey height:**
 Floor 0 79.94 m² 2.6 m
Living area: 31.12 m² (fraction 0.389)
Front of dwelling faces: North

Opening types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
External Door 2	Manufacturer	Solid			Wood
1	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	PVC-U
2	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	PVC-U

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
External Door 2	mm	0.7	0.63	1.5	2.15	1
1	16mm or more	0.7	0.63	1.3	8.44	1
2	16mm or more	0.7	0.63	1.3	5.06	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
External Door 2		Communal Wall	North	0	0
1		Brick	South East	0	0
2		Brick	South West	0	0

Overshading: Average or unknown

Climate Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
Brick	66.53	13.5	53.03	0.27	0	False	93.78
Communal Wall	6.84	2.15	4.69	0.25	0.4	False	93.78
Exposed	50.1			0.15			75
Internal Elements							
Int Part	156.94						9
Party Elements							
Party Wall	36.66						110
PC	79.94						30

Thermal Bridge

SAP Input

Thermal bridges:

User-defined (individual PSI-values) Y-Value = 0.1158

Length	Psi-value		
10.02	0.05	E2	Other lintels (including other steel lintels)
9	0.02	E3	Sill
28.2	0.016	E4	Jamb
0	0.094	E5	Ground floor (normal)
28.22	0.033	E7	Party floor between dwellings (in blocks of flats)
15.6	0.051	E16	Corner (normal)
7.8	-0.07	E17	Corner (inverted – internal area greater than external area)
2.6	0.029	E18	Party wall between dwellings
5.2	0.12	E25	Staggered party wall between dwellings c
28.22	0.32	E20	Exposed floor (normal)
[Approved] 0	0.02	E9	Balcony between dwellings, wall insulation continuous
0	0.04	E14	Flat roof
0	0.28	E15	Flat roof with parapet
14.1	0.16	P1	Ground floor
14.1	0	P3	Intermediate floor between dwellings (in blocks of flats)
0	0.16	P7	Exposed floor (normal)
0	0.1	P4	Roof (insulation at ceiling level)

Ventilation:

Pressure test: Yes (As designed)
 Ventilation: Centralised whole house extract
 Number of wet rooms: Kitchen + 2
 Ductwork: , Rigid
 Approved Installation Scheme: False
 Number of chimneys: 0
 Number of open flues: 0
 Number of fans: 0
 Number of passive stacks: 0
 Number of sides sheltered: 2
 Pressure test: 4.65

Main heating system:

Main heating system: Boiler systems with radiators or underfloor heating
 Electric boilers
 Fuel: Electricity
 Info Source: SAP Tables
 SAP Table: 191
 Direct acting electric boiler
 Underfloor heating, pipes in screed above insulation
 Fraction of main heat: 1
 Central heating pump : 2013 or later
 Design flow temperature: Design flow temperature >45°C
 Boiler interlock: Yes
 Delayed start

Main heating Control:

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical services
 Control code: 2110

Secondary Main heating system:

Secondary Main heating system: Heat pumps with radiators or underfloor heating
 Electric heat pumps
 Fuel: Electricity
 Info Source: Boiler Database
 Database: (rev 490, product index 104956, SEDBUK 100%)
 Band name: KERS Energy Recovery
 Model: KERS MVHR-W230
 Model qualifier:
 (provides DHW all year)

SAP Input

Secondary Main heating Control:

Secondary Main heating Control: Not applicable (boiler provides DHW only)
Control code: 2100

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating: From second main heating system
Water code: 914
Fuel :Electricity
Hot water cylinder
Cylinder volume: 196 litres
Cylinder insulation: Measured loss, 1.312kWh/day
Primary pipework insulation: False
Cylinderstat: False
Cylinder in heated space: False
Immersion: Single
Solar panel: False

Options:

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.51
Printed on 09 February 2022 at 14:48:53

Project Information

Assessed By: Matt Fitzpatrick (STRO003572)

Building Type: Flat

Dwelling Details

NEW DWELLING DESIGN STAGE

Total Floor Area: 70.71m²

Site Reference : Arundel

Plot Reference: G4 2 Bed 2 Bath

Address : G4 2 Bed 2 Bath, Ford Road, Arundel, TBA

Client Details

Name: Oakford Homes

Address : Hedsor Court Farm, Sheepcote Lane, Hedsor, SL1 8PE

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER) 27.51 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 28.69 kg/m² Fail

Excess emissions = 1.18 kg/m² (4.3 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 50.3 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 47.3 kWh/m² OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.25 (max. 0.30)	0.27 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	OK
Roof	(no roof)		
Openings	1.35 (max. 2.00)	1.50 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.65 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main Heating system: Boiler systems with radiators or underfloor heating - electric
Direct acting electric boiler

Main Heating system 2: Heat pumps with radiators or underfloor heating - electric
KERS Energy Recovery KERS MVHR-W230

Regulations Compliance Report

Secondary heating system: None

5 Cylinder insulation

Hot water Storage:	Measured cylinder loss: 1.31 kWh/day	
	Permitted by DBSCG: 2.21 kWh/day	OK
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls	TTZC by plumbing and electrical services	OK
Space heating controls 2:	Not applicable (boiler provides DHW only)	OK
Hot water controls:	No cylinder thermostat	Fail

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system		
Specific fan power:	0.5	
Maximum	0.7	OK

9 Summer time temperature

Overheating risk (Thames valley):	Not significant	OK
-----------------------------------	-----------------	----

Based on:

Overshading:	Average or unknown
Windows facing: South East	6.49m ²
Ventilation rate:	4.00
Blinds/curtains:	Dark-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Party Walls U-value	0 W/m ² K
---------------------	----------------------

SAP Input

Property Details: G4 2 Bed 2 Bath

Address: G4 2 Bed 2 Bath, Ford Road, Arundel, TBA
Located in: England
Region: Thames valley
UPRN: 000000
Date of assessment: 10 December 2021
Date of certificate: 09 February 2022
Assessment type: New dwelling design stage
Transaction type: Marketed sale
Tenure type: Owner-occupied
Related party disclosure: No related party
Thermal Mass Parameter: Calculated 244.88
Water use <= 125 litres/person/day: True
PCDF Version: 490

Property Description

Dwelling type: Flat
Detachment:
Year Completed: 2022
Floor Location: **Floor area:** **Storey height:**
 Floor 0 70.71 m² 2.6 m
Living area: 28.36 m² (fraction 0.401)
Front of dwelling faces: North

Opening Types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
External Door 2	Manufacturer	Solid			Wood
1	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	PVC-U

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
External Door 2	mm	0.7	0.63	1.5	2.15	1
1	16mm or more	0.7	0.63	1.3	6.49	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
External Door 2		Communal Wall	North	0	0
1		Brick	South East	0	0

Overshading: Average or unknown

Opening Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
<u>External Elements</u>							
Brick	39.81	6.49	33.32	0.27	0	False	93.78
Communal Wall	28.37	2.15	26.22	0.25	0.4	False	93.78
Exposed	50.1			0.15			110
<u>Internal Elements</u>							
Int Part	146.02						9
<u>Party Elements</u>							
Party Wall	25.32						110
PC	70.71						30

Thermal bridges

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.1015
Length **Psi-value**
 5.35 0.05 E2 Other lintels (including other steel lintels)

SAP Input

	4.32	0.02	E3	Sill
	13.2	0.016	E4	Jamb
	0	0.094	E5	Ground floor (normal)
	26.22	0.033	E7	Party floor between dwellings (in blocks of flats)
	5.2	0.051	E16	Corner (normal)
	2.6	-0.07	E17	Corner (inverted – internal area greater than external area)
	7.8	0.029	E18	Party wall between dwellings
	2.6	0.12	E25	Staggered party wall between dwellings c
	26.22	0.32	E20	Exposed floor (normal)
[Approved]	0	0.02	E9	Balcony between dwellings, wall insulation continuous
	0	0.04	E14	Flat roof
	0	0.28	E15	Flat roof with parapet
	9.74	0.16	P1	Ground floor
	9.74	0	P3	Intermediate floor between dwellings (in blocks of flats)
	0	0.16	P7	Exposed floor (normal)
	0	0.1	P4	Roof (insulation at ceiling level)

Ventilation:

Pressure test: Yes (As designed)
 Ventilation: Centralised whole house extract
 Number of wet rooms: Kitchen + 2
 Ductwork: , Rigid
 Approved Installation Scheme: False
 Number of chimneys: 0
 Number of open flues: 0
 Number of fans: 0
 Number of passive stacks: 0
 Number of sides sheltered: 2
 Pressure test: 4.65

Main heating system:

Main heating system: Boiler systems with radiators or underfloor heating
 Electric boilers
 Fuel: Electricity
 Info Source: SAP Tables
 SAP Table: 191
 Direct acting electric boiler
 Underfloor heating, pipes in screed above insulation
 Fraction of main heat: 1
 Central heating pump : 2013 or later
 Design flow temperature: Design flow temperature >45°C
 Boiler interlock: Yes
 Delayed start

Main heating Control:

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical services
 Control code: 2110

Secondary Main heating systems:

Secondary Main heating system: Heat pumps with radiators or underfloor heating
 Electric heat pumps
 Fuel: Electricity
 Info Source: Boiler Database
 Database: (rev 490, product index 104956, SEDBUK 100%)
 Band name: KERS Energy Recovery
 Model: KERS MVHR-W230
 Model qualifier:
 (provides DHW all year)

SAP Input

Secondary Main heating Control:

Secondary Main heating Control: Not applicable (boiler provides DHW only)
Control code: 2100

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating: From second main heating system
Water code: 914
Fuel :Electricity
Hot water cylinder
Cylinder volume: 196 litres
Cylinder insulation: Measured loss, 1.312kWh/day
Primary pipework insulation: False
Cylinderstat: False
Cylinder in heated space: False
Immersion: Single
Solar panel: False

Options:

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.51
Printed on 09 February 2022 at 14:48:53

Project Information

Assessed By: Matt Fitzpatrick (STRO003572)

Building Type: Flat

Dwelling Details

NEW DWELLING DESIGN STAGE

Total Floor Area: 50.23m²

Site Reference : Arundel

Plot Reference: G5 1 Bed 1 Bath

Address : G5 1 Bed 1 Bath, Ford Road, Arundel, TBA

Client Details

Name: Oakford Homes

Address : Hedsor Court Farm, Sheepcote Lane, Hedsor, SL1 8PE

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)

32.3 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

33.90 kg/m²

Fail

Excess emissions = 1.6 kg/m² (5 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

57.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

55.4 kWh/m²

OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.26 (max. 0.30)	0.27 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	OK
Roof	(no roof)		
Openings	1.36 (max. 2.00)	1.50 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.65 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main Heating system: Boiler systems with radiators or underfloor heating - electric
Direct acting electric boiler

Main Heating system 2: Heat pumps with radiators or underfloor heating - electric
KERS Energy Recovery KERS MVHR-W230

Regulations Compliance Report

Secondary heating system: None

5 Cylinder insulation

Hot water Storage:	Measured cylinder loss: 1.31 kWh/day	
	Permitted by DBSCG: 2.21 kWh/day	OK
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls	TTZC by plumbing and electrical services	OK
Space heating controls 2:	Not applicable (boiler provides DHW only)	OK
Hot water controls:	No cylinder thermostat	Fail

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system		
Specific fan power:	0.5	
Maximum	0.7	OK

9 Summer time temperature

Overheating risk (Thames valley):	Not significant	OK
-----------------------------------	-----------------	----

Based on:

Overshading:	Average or unknown
Windows facing: South East	4.8m ²
Ventilation rate:	4.00
Blinds/curtains:	Dark-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Party Walls U-value	0 W/m ² K
---------------------	----------------------

SAP Input

Property Details: G5 1 Bed 1 Bath

Address: G5 1 Bed 1 Bath, Ford Road, Arundel, TBA
Located in: England
Region: Thames valley
UPRN: 000000
Date of assessment: 10 December 2021
Date of certificate: 09 February 2022
Assessment type: New dwelling design stage
Transaction type: Marketed sale
Tenure type: Owner-occupied
Related party disclosure: No related party
Thermal Mass Parameter: Calculated 285.55
Water use <= 125 litres/person/day: True
PCDF Version: 490

Property Description

Dwelling type: Flat
Detachment:
Year Completed: 2022
Floor Location: **Floor area:** **Storey height:**
 Floor 0 50.23 m² 2.6 m
Living area: 23.01 m² (fraction 0.458)
Front of dwelling faces: North

Opening Types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
External Door 2	Manufacturer	Solid			Wood
1	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	PVC-U

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
External Door 2	mm	0.7	0.63	1.5	2.15	1
1	16mm or more	0.7	0.63	1.3	4.8	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
External Door 2		Communal Wall	North	0	0
1		Brick	South East	0	0

Overshading: Average or unknown

Opening Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
<u>External Elements</u>							
Brick	41.5	4.8	36.7	0.27	0	False	93.78
Communal Wall	18.46	2.15	16.31	0.25	0.4	False	93.78
Exposed	50.1			0.15			110
<u>Internal Elements</u>							
Int Part	93.13						9
<u>Party Elements</u>							
Party Wall	13.78						110
PC	50.23						30

Thermal Bridges

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0928
Length **Psi-value**
 4.22 0.05 E2 Other lintels (including other steel lintels)

SAP Input

	3.2	0.02	E3	Sill
	10.2	0.016	E4	Jamb
	0	0.094	E5	Ground floor (normal)
	23.06	0.033	E7	Party floor between dwellings (in blocks of flats)
	7.8	0.051	E16	Corner (normal)
	2.6	0.029	E18	Party wall between dwellings
	2.6	0.12	E25	Staggered party wall between dwellings c
	23.06	0.32	E20	Exposed floor (normal)
[Approved]	0	0.02	E9	Balcony between dwellings, wall insulation continuous
	0	0.04	E14	Flat roof
	0	0.28	E15	Flat roof with parapet
	0	-0.07	E17	Corner (inverted – internal area greater than external area)
	5.3	0.16	P1	Ground floor
	5.3	0	P3	Intermediate floor between dwellings (in blocks of flats)
	0	0.16	P7	Exposed floor (normal)
	0	0.1	P4	Roof (insulation at ceiling level)

Ventilation

Pressure test:	Yes (As designed)
Ventilation:	Centralised whole house extract
	Number of wet rooms: Kitchen + 2
	Ductwork: , Rigid
	Approved Installation Scheme: False
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of passive stacks:	0
Number of sides sheltered:	2
Pressure test:	4.65

Main heating system

Main heating system:	Boiler systems with radiators or underfloor heating
	Electric boilers
	Fuel: Electricity
	Info Source: SAP Tables
	SAP Table: 191
	Direct acting electric boiler
	Underfloor heating, pipes in screed above insulation
	Fraction of main heat: 1
	Central heating pump : 2013 or later
	Design flow temperature: Design flow temperature >45°C
	Boiler interlock: Yes
	Delayed start

Main heating Control

Main heating Control:	Time and temperature zone control by suitable arrangement of plumbing and electrical services
	Control code: 2110

Secondary Main heating systems

Secondary Main heating system:	Heat pumps with radiators or underfloor heating
	Electric heat pumps
	Fuel: Electricity
	Info Source: Boiler Database
	Database: (rev 490, product index 104956, SEDBUK 100%):
	Band name: KERS Energy Recovery
	Model: KERS MVHR-W230
	Model qualifier:
	(provides DHW all year)

SAP Input

Secondary Main heating Control:

Secondary Main heating Control: Not applicable (boiler provides DHW only)
Control code: 2100

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating: From second main heating system
Water code: 914
Fuel :Electricity
Hot water cylinder
Cylinder volume: 196 litres
Cylinder insulation: Measured loss, 1.312kWh/day
Primary pipework insulation: False
Cylinderstat: False
Cylinder in heated space: False
Immersion: Single
Solar panel: False

Options:

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.51
Printed on 09 February 2022 at 14:48:53

Project Information

Assessed By: Matt Fitzpatrick (STRO003572)

Building Type: Flat

Dwelling Details

NEW DWELLING DESIGN STAGE

Total Floor Area: 72.1m²

Site Reference : Arundel

Plot Reference: G9 2 Bed 2 Bath

Address : G9 2 Bed 2 Bath, Ford Road, Arundel, TBA

Client Details

Name: Oakford Homes

Address : Hedsor Court Farm, Sheepcote Lane, Hedsor, SL1 8PE

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER) 27.46 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 28.94 kg/m² Fail

Excess emissions = 1.48 kg/m² (5.4 %)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 51.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 48.1 kWh/m² OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.27 (max. 0.30)	0.27 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	OK
Roof	(no roof)		
Openings	1.34 (max. 2.00)	1.50 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	4.65 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main Heating system: Boiler systems with radiators or underfloor heating - electric
Direct acting electric boiler

Main Heating system 2: Heat pumps with radiators or underfloor heating - electric
KERS Energy Recovery KERS MVHR-W230

Regulations Compliance Report

Secondary heating system: None

5 Cylinder insulation

Hot water Storage:	Measured cylinder loss: 1.31 kWh/day	
	Permitted by DBSCG: 2.21 kWh/day	OK
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls	TTZC by plumbing and electrical services	OK
Space heating controls 2:	Not applicable (boiler provides DHW only)	OK
Hot water controls:	No cylinder thermostat	Fail

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system		
Specific fan power:	0.5	
Maximum	0.7	OK

9 Summer time temperature

Overheating risk (Thames valley):	Not significant	OK
-----------------------------------	-----------------	----

Based on:

Overshading:	Average or unknown
Windows facing: North West	3.38m ²
Windows facing: North East	3.15m ²
Windows facing: South East	1.69m ²
Ventilation rate:	4.00
Blinds/curtains:	Dark-coloured curtain or roller blind
	Closed 100% of daylight hours

10 Key features

Party Walls U-value	0 W/m ² K
---------------------	----------------------

SAP Input

Property Details: G9 2 Bed 2 Bath

Address: G9 2 Bed 2 Bath, Ford Road, Arundel, TBA
Located in: England
Region: Thames valley
UPRN: 000000
Date of assessment: 10 December 2021
Date of certificate: 09 February 2022
Assessment type: New dwelling design stage
Transaction type: Marketed sale
Tenure type: Owner-occupied
Related party disclosure: No related party
Thermal Mass Parameter: Calculated 253.02
Water use <= 125 litres/person/day: True
PCDF Version: 490

Property Description

Dwelling type: Flat
Detachment:
Year Completed: 2022
Floor Location: **Floor area:** **Storey height:**
 Floor 0 72.1 m² 2.6 m
Living area: 27.76 m² (fraction 0.385)
Front of dwelling faces: North

Opening Types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
External Door 2	Manufacturer	Solid			Wood
1	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	PVC-U
2	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	PVC-U
3	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	PVC-U

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
External Door 2	mm	0.7	0.63	1.5	2.15	1
1	16mm or more	0.7	0.63	1.3	3.38	1
2	16mm or more	0.7	0.63	1.3	3.15	1
3	16mm or more	0.7	0.63	1.3	1.69	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
External Door 2		Communal Wall	North	0	0
1		Brick	North West	0	0
2		Brick	North East	0	0
3		Brick	South East	0	0

Overshading: Average or unknown

Opaque Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
Brick	48.1	8.22	39.88	0.27	0	False	93.78
Communal Wall	7.83	2.15	5.68	0.25	0.4	False	93.78
Exposed	50.1			0.15			110
Internal Elements							
Int Part	156.16						9
Party Elements							
Party Wall	44.46						110

SAP Input

PC

72.1

30

Thermal bridges:

Thermal bridges:	User-defined (individual PSI-values) Y-Value = 0.111			
	Length	Psi-value		
	5.9	0.05	E2	Other lintels (including other steel lintels)
	3.38	0.02	E3	Sill
	17.4	0.016	E4	Jamb
	0	0.094	E5	Ground floor (normal)
	21.51	0.033	E7	Party floor between dwellings (in blocks of flats)
	5.2	0.051	E16	Corner (normal)
	7.8	0.029	E18	Party wall between dwellings
	2.6	0.12	E25	Staggered party wall between dwellings c
	21.51	0.32	E20	Exposed floor (normal)
[Approved]	0	0.02	E9	Balcony between dwellings, wall insulation continuous
	0	0.04	E14	Flat roof
	0	0.28	E15	Flat roof with parapet
	0	-0.07	E17	Corner (inverted – internal area greater than external area)
	17.1	0.16	P1	Ground floor
	17.1	0	P3	Intermediate floor between dwellings (in blocks of flats)
	0	0.16	P7	Exposed floor (normal)
	0	0.1	P4	Roof (insulation at ceiling level)

Ventilation:

Pressure test:	Yes (As designed)
Ventilation:	Centralised whole house extract
	Number of wet rooms: Kitchen + 2
	Ductwork: , Rigid
	Approved Installation Scheme: False
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of passive stacks:	0
Number of sides sheltered:	2
Pressure test:	4.65

Main heating system:

Main heating system:	Boiler systems with radiators or underfloor heating
	Electric boilers
	Fuel: Electricity
	Info Source: SAP Tables
	SAP Table: 191
	Direct acting electric boiler
	Underfloor heating, pipes in screed above insulation
	Fraction of main heat: 1
	Central heating pump : 2013 or later
	Design flow temperature: Design flow temperature >45°C
	Boiler interlock: Yes
	Delayed start

Main heating Control:

Main heating Control:	Time and temperature zone control by suitable arrangement of plumbing and electrical services
	Control code: 2110

Secondary Main heating system:

Secondary Main heating system:	Heat pumps with radiators or underfloor heating
	Electric heat pumps
	Fuel: Electricity
	Info Source: Boiler Database

SAP Input

Database: (rev 490, product index 104956, SEDBUK 100%):
 Band name: KERS Energy Recovery
 Model: KERS MVHR-W230
 Model qualifier:
 (provides DHW all year)

Secondary Main heating Control:

Secondary Main heating Control: Not applicable (boiler provides DHW only)
 Control code: 2100

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating: From second main heating system
 Water code: 914
 Fuel :Electricity
 Hot water cylinder
 Cylinder volume: 196 litres
 Cylinder insulation: Measured loss, 1.312kWh/day
 Primary pipework insulation: False
 Cylinderstat: False
 Cylinder in heated space: False
 Immersion: Single
 Solar panel: False

Other:

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.51
Printed on 09 February 2022 at 14:48:48

Project Information

Assessed By: Matt Fitzpatrick (STRO003572)

Building Type: Flat

Dwelling Details

NEW DWELLING DESIGN STAGE

Total Floor Area: 53.14m²

Site Reference : Arundel

Plot Reference: S1 1 Bed 1 Bath

Address : S1 1 Bed 1 Bath, Ford Road, Arundel, TBA

Client Details

Name: Oakford Homes

Address : Hedsor Court Farm, Sheepcote Lane, Hedsor, SL1 8PE

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)

31.41 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

30.71 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

54.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

48.3 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.24 (max. 0.30)

0.25 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

0.12 (max. 0.20)

0.15 (max. 0.35)

OK

Openings

1.39 (max. 2.00)

1.50 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.65 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Boiler systems with radiators or underfloor heating - electric
Direct acting electric boiler

Main Heating system 2:

Heat pumps with radiators or underfloor heating - electric
KERS Energy Recovery KERS MVHR-W230

Secondary heating system:

None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	Measured cylinder loss: 1.31 kWh/day	
	Permitted by DBSCG: 2.21 kWh/day	OK
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls	TTZC by plumbing and electrical services	OK
Space heating controls 2:	Not applicable (boiler provides DHW only)	OK
Hot water controls:	No cylinder thermostat	Fail

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system		
Specific fan power:	0.5	
Maximum	0.7	OK

9 Summer time temperature

Overheating risk (Thames valley):	Not significant	OK
-----------------------------------	-----------------	----

Based on:

Overshading:	Average or unknown
Windows facing: North West	2.88m ²
Ventilation rate:	4.00
Blinds/curtains:	Dark-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Thermal bridging	0.031 W/m ² K
Roofs U-value	0.11 W/m ² K
Party Walls U-value	0 W/m ² K

SAP Input

Property Details: S1 1 Bed 1 Bath

Address: S1 1 Bed 1 Bath, Ford Road, Arundel, TBA
Located in: England
Region: Thames valley
UPRN: 000000
Date of assessment: 10 December 2021
Date of certificate: 09 February 2022
Assessment type: New dwelling design stage
Transaction type: Marketed sale
Tenure type: Owner-occupied
Related party disclosure: No related party
Thermal Mass Parameter: Calculated 195.64
Water use <= 125 litres/person/day: True
PCDF Version: 490

Property Description

Dwelling type: Flat
Detachment:
Year Completed: 2022
Floor Location: **Floor area:** **Storey height:**
 Floor 0 53.14 m² 2.63 m
Living area: 27.81 m² (fraction 0.523)
Front of dwelling faces: North

Opening Types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
External Door 2	Manufacturer	Solid			Wood
1	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	PVC-U

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
External Door 2	mm	0.7	0.63	1.5	2.15	1
1	16mm or more	0.7	0.63	1.3	2.88	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
External Door 2		Communal Wall	North	0	0
1		Dormer Cheek	North West	0	0

Overshading: Average or unknown

Opening Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
Communal Wall	39.72	2.15	37.57	0.25	0.4	False	93.78
Timber Stud Wall	19.47	0	19.47	0.25	0	False	18
Dormer Cheek	4	2.88	1.12	0.25	0	False	18
Main Ceiling	43.64	0	43.64	0.11	0		9
Sloping Ceiling	11.79	0	11.79	0.15	0		9
Dormer Roof	4	0	4	0.15	0		9
Internal Elements							
Int Part	78.17						9
Party Elements							
Party Wall	14.04						110
PF	53.14						70

Thermal Bridge

SAP Input

Thermal bridges:

User-defined (individual PSI-values) Y-Value = 0.0313

Length	Psi-value		
3.42	0.05	E2	Other lintels (including other steel lintels)
2.4	0.02	E3	Sill
9	0.016	E4	Jamb
28.11	0.033	E7	Party floor between dwellings (in blocks of flats)
9.79	0.08	E10	Eaves (insulation at ceiling level)
7.65	0.04	E11	Eaves (insulation at rafter level)
4.53	0.07	E12	Gable (insulation at ceiling level)
1.26	0.08	E13	Gable (insulation at rafter level)
2.66	0.04	E14	Flat roof
15.75	0.051	E16	Corner (normal)
10.5	-0.07	E17	Corner (inverted – internal area greater than external area)
5.25	0.029	E18	Party wall between dwellings
5.35	0	P3	Intermediate floor between dwellings (in blocks of flats)
5.35	0.1	P4	Roof (insulation at ceiling level)
1.03	0.04	R7	Flat ceiling (inverted)
2.29	0.06	R8	Roof wall (rafter)

Ventilation:

Pressure test: Yes (As designed)
 Ventilation: Centralised whole house extract
 Number of wet rooms: Kitchen + 2
 Ductwork: , Rigid
 Approved Installation Scheme: False
 Number of chimneys: 0
 Number of open flues: 0
 Number of fans: 0
 Number of passive stacks: 0
 Number of sides sheltered: 2
 Pressure test: 4.65

Main heating system:

Main heating system: Boiler systems with radiators or underfloor heating
 Electric boilers
 Fuel: Electricity
 Info Source: SAP Tables
 SAP Table: 191
 Direct acting electric boiler
 Underfloor heating, pipes in screed above insulation
 Fraction of main heat: 1
 Central heating pump : 2013 or later
 Design flow temperature: Design flow temperature >45°C
 Boiler interlock: Yes
 Delayed start

Main heating Control:

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical services
 Control code: 2110

Secondary Main heating system:

Secondary Main heating system: Heat pumps with radiators or underfloor heating
 Electric heat pumps
 Fuel: Electricity
 Info Source: Boiler Database
 Database: (rev 490, product index 104956, SEDBUK 100%)
 Band name: KERS Energy Recovery
 Model: KERS MVHR-W230
 Model qualifier:
 (provides DHW all year)

SAP Input

Secondary Main heating Control:

Secondary Main heating Control: Not applicable (boiler provides DHW only)
Control code: 2100

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating: From second main heating system
Water code: 914
Fuel :Electricity
Hot water cylinder
Cylinder volume: 196 litres
Cylinder insulation: Measured loss, 1.312kWh/day
Primary pipework insulation: False
Cylinderstat: False
Cylinder in heated space: False
Immersion: Single
Solar panel: False

Options:

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

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.51
Printed on 09 February 2022 at 14:48:49

Project Information

Assessed By: Matt Fitzpatrick (STRO003572)

Building Type: Flat

Dwelling Details

NEW DWELLING DESIGN STAGE

Total Floor Area: 86.64m²

Site Reference : Arundel

Plot Reference: S6 2 Bed 2 Bath

Address : S6 2 Bed 2 Bath, Ford Road, Arundel, TBA

Client Details

Name: Oakford Homes

Address : Hedsor Court Farm, Sheepcote Lane, Hedsor, SL1 8PE

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER)

27.17 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

26.94 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)

54.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE)

44.3 kWh/m²

OK

2 Fabric U-values

Element

Average

Highest

External wall

0.21 (max. 0.30)

0.27 (max. 0.70)

OK

Party wall

0.00 (max. 0.20)

-

OK

Floor

(no floor)

Roof

0.13 (max. 0.20)

0.15 (max. 0.35)

OK

Openings

1.34 (max. 2.00)

1.50 (max. 3.30)

OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals

4.65 (design value)

Maximum

10.0

OK

4 Heating efficiency

Main Heating system:

Boiler systems with radiators or underfloor heating - electric
Direct acting electric boiler

Main Heating system 2:

Heat pumps with radiators or underfloor heating - electric
KERS Energy Recovery KERS MVHR-W230

Secondary heating system:

None

Regulations Compliance Report

5 Cylinder insulation

Hot water Storage:	Measured cylinder loss: 1.31 kWh/day	
	Permitted by DBSCG: 2.21 kWh/day	OK
Primary pipework insulated:	No primary pipework	

6 Controls

Space heating controls	TTZC by plumbing and electrical services	OK
Space heating controls 2:	Not applicable (boiler provides DHW only)	OK
Hot water controls:	No cylinder thermostat	Fail

7 Low energy lights

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

8 Mechanical ventilation

Continuous extract system		
Specific fan power:	0.5	
Maximum	0.7	OK

9 Summer time temperature

Overheating risk (Thames valley):	Slight	OK
-----------------------------------	--------	----

Based on:

Overshading:	Average or unknown
Windows facing: North East	3.24m²
Windows facing: North West	2.88m²
Windows facing: South East	2.88m²
Ventilation rate:	4.00
Blinds/curtains:	Dark-coloured curtain or roller blind Closed 100% of daylight hours

10 Key features

Roofs U-value	0.11 W/m²K
Party Walls U-value	0 W/m²K

SAP Input

Property Details: S6 2 Bed 2 Bath

Address: S6 2 Bed 2 Bath, Ford Road, Arundel, TBA
Located in: England
Region: Thames valley
UPRN: 000000
Date of assessment: 10 December 2021
Date of certificate: 09 February 2022
Assessment type: New dwelling design stage
Transaction type: Marketed sale
Tenure type: Owner-occupied
Related party disclosure: No related party
Thermal Mass Parameter: Calculated 155.63
Water use <= 125 litres/person/day: True
PCDF Version: 490

Property description

Dwelling type: Flat
Detachment:
Year Completed: 2022
Floor Location: **Floor area:** **Storey height:**
 Floor 0 86.64 m² 2.57 m
 Living area: 38.61 m² (fraction 0.446)
 Front of dwelling faces: North

Opening types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
External Door 2	Manufacturer	Solid			Wood
1	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	PVC-U
2	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	PVC-U
3	Manufacturer	Windows	low-E, En = 0.1, soft coat	No	PVC-U

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
External Door 2	mm	0.7	0.63	1.5	2.15	1
1	16mm or more	0.7	0.63	1.3	3.24	1
2	16mm or more	0.7	0.63	1.3	2.88	1
3	16mm or more	0.7	0.63	1.3	2.88	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
External Door 2		Communal Wall	North	0	0
1		Brick	North East	0	0
2		Dormer Cheek	North West	0	0
3		Dormer Cheek	South East	0	0

Overshading: Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
<u>External Elements</u>							
Timber Stud Wall	52.47	0	52.47	0.2	0	False	18
Communal Wall	13.92	2.15	11.77	0.25	0.4	False	93.78
Brick	9.61	3.24	6.37	0.27	0	False	93.78
Dormer Cheek	8	5.76	2.24	0.25	0	False	18
Main Ceiling	58.81	0	58.81	0.11	0		9
Sloping Ceiling	34.31	0	34.31	0.15	0		9
Dormer Roof	3.32	0	3.32	0.15	0		9

SAP Input

Internal Elements

Int Part	134.87	9
Party Elements		
Party Wall	24.1	110
PF	86.64	70

Thermal bridges:

Thermal bridges:	User-defined (individual PSI-values) Y-Value = 0.0408		
	Length	Psi-value	
	8.23	0.05	E2 Other lintels (including other steel lintels)
	7.2	0.02	E3 Sill
	19.2	0.016	E4 Jamb
	44.14	0.033	E7 Party floor between dwellings (in blocks of flats)
	24.03	0.04	E11 Eaves (insulation at rafter level)
	6.35	0.07	E12 Gable (insulation at ceiling level)
	3.68	0.08	E13 Gable (insulation at rafter level)
	10.64	0.04	E14 Flat roof
	30.83	0.051	E16 Corner (normal)
	23.12	-0.07	E17 Corner (inverted -- internal area greater than external area)
	5.14	0.029	E18 Party wall between dwellings
	9.38	0	P3 Intermediate floor between dwellings (in blocks of flats)
	9.38	0.1	P4 Roof (insulation at ceiling level)
	0	0.16	P1
	0	0.16	P7
	32.97	0.04	R7 Flat ceiling (inverted)
	9.16	0.06	R8 Roof wall (rafter)

Ventilation:

Pressure test:	Yes (As designed)
Ventilation:	Centralised whole house extract
	Number of wet rooms: Kitchen + 2
	Ductwork: , Rigid
	Approved Installation Scheme: False
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of passive stacks:	0
Number of sides sheltered:	2
Pressure test:	4.65

Main heating system:

Main heating system:	Boiler systems with radiators or underfloor heating
	Electric boilers
	Fuel: Electricity
	Info Source: SAP Tables
	SAP Table: 191
	Direct acting electric boiler
	Underfloor heating, pipes in screed above insulation
	Fraction of main heat: 1
	Central heating pump : 2013 or later
	Design flow temperature: Design flow temperature >45°C
	Boiler interlock: Yes
	Delayed start

Main heating Control:

Main heating Control:	Time and temperature zone control by suitable arrangement of plumbing and electrical services
	Control code: 2110

SAP Input

Secondary Main heating system

Secondary Main heating system: Heat pumps with radiators or underfloor heating
 Electric heat pumps
 Fuel: Electricity
 Info Source: Boiler Database
 Database: (rev 490, product index 104956, SEDBUK 100%):
 Band name: KERS Energy Recovery
 Model: KERS MVHR-W230
 Model qualifier:
 (provides DHW all year)

Secondary Main heating Control

Secondary Main heating Control: Not applicable (boiler provides DHW only)
 Control code: 2100

Secondary heating system

Secondary heating system: None

Water heating

Water heating: From second main heating system
 Water code: 914
 Fuel :Electricity
 Hot water cylinder
 Cylinder volume: 196 litres
 Cylinder insulation: Measured loss, 1.312kWh/day
 Primary pipework insulation: False
 Cylinderstat: False
 Cylinder in heated space: False
 Immersion: Single
 Solar panel: False

Options

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