

Pre-Construction Energy Sustainability Statement (Condition 17)

At:

81a/81 Whinbush Road,
Hitchin,
Hertfordshire,
SG5 1PZ

For:

Viva Property Group Limited

Private and Confidential

Ref: 5551 23 15 12 Rpt 03 Rev A TI BB

Sevenoaks Environmental Consultancy Ltd,
145a Hastings Road, Pembury, Kent, TN2 4JU
Tel: 01892 822999



Association of Geotechnical &
Geoenvironmental Specialists



Sevenoaks
Environmental
Consultancy Ltd

Contents

1.	Executive Summary.....	3
2.	Introduction	4
2.1.	Overview of the proposed development.....	4
3.	Policies and Drivers	5
3.1.	National and International Policy	5
3.2.	Local Policy: North Hertfordshire District Council	6
4.	Energy hierarchy	6
5.	Energy efficient design measures (" <i>be lean</i> ").....	7
6.	Energy efficient systems (" <i>be clean</i> ")	8
6.1.	Combined heat and power	8
6.2.	District heating networks.....	8
7.	Low and zero carbon energy sources (" <i>be green</i> ").....	9
7.1.	Photovoltaics.....	9
7.2.	Heat Pumps.....	9
7.3.	Solar thermal.....	10
7.4.	Wind turbines	10
7.5.	Biomass	10
7.6.	Proposed low and zero carbon energy sources.....	11
8.	Results: Calculated CO ₂ savings	12
9.	Appendix A: ADL1 2021 BREL Reports.	13

1. Executive Summary

This Energy Statement has been prepared by Energytest in support of a full planning application for demolition of an existing outbuilding and construction of eight flats at 81a Whinbush Road, Hitchen, SG5 1PZ.

The design has been developed to address the Environment and Climate Strategy requirements of North Hertfordshire District Council. Results have been calculated using Government approved SAP 10 software.

A base case has been developed, against which potential savings can be assessed. For this development the base case is the notional building developed for the Building Regulations (2021) assessment and is quantified in terms of CO₂ emissions as the Target Emission Rate (TER) for each dwelling.

This proposed development features improved insulation standards when compared against the compliance requirements of Approved Document L1 2021 of the Building Regulations. In addition, this proposed development will incorporate a mechanical and electrical specification that surpasses the requirements of Approved Document L1 2021.

Having minimised energy consumption in the first instance, the potential for remaining energy demands to be met via a decentralised energy source has been considered. It is evident this proposed development is neither within the coverage of an existing district heating network, nor is there an expectation that a district heating network will be developed at this site in the near future.

Due to its size, this development is not suitable for combined heat and power.

An assessment has been carried out to determine the potential for renewable energy systems to reduce CO₂ emissions further. In order to meet the expectations of the Strategic Policy it is proposed that there will be an installation of an air source heat pump to serve all of the heating and Domestic Hot Water demand within each plot.

The total reduction in emissions resulting from energy efficiency measures and the installation of renewable technology is 73.4% compared to the regulated emissions from a building designed to just meet Building Regulations (2021) Part L1.

2. Introduction

Energy use in buildings is a significant contributor to global CO₂ emissions and global warming. Designing energy efficient buildings and incorporating low and zero carbon energy generation is a vital part of ensuring this development incorporates sustainability as a core part of its design.

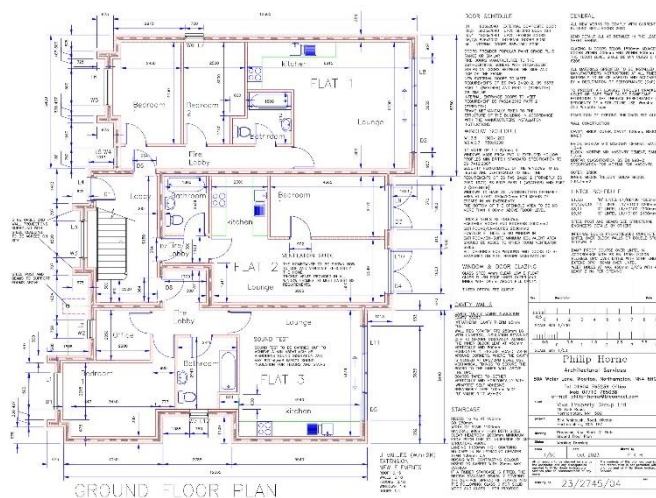
The purpose of the report is to assist evaluating parties to understand the energy consumption and performance of the proposed development and consider its performance against the “lean, clean, green” performance standard.

The proposed development will also be designed to fully comply with Approved Document L1 2021, which came into effect on 15 June 2022.

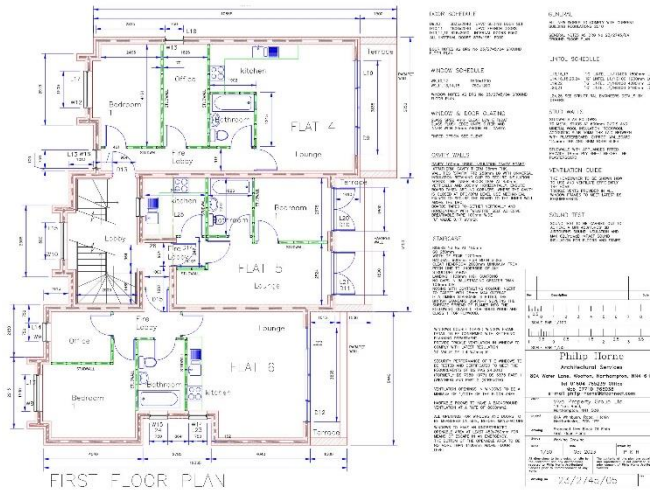
2.1. Overview of the proposed development

The proposed development consists of the construction of a single block of eight flats.

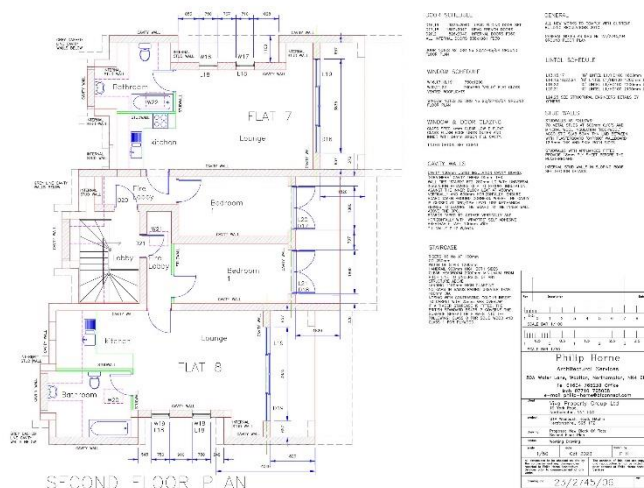
Proposed ground floor:



Proposed first floor:



Proposed second floor:



3. Policies and Drivers

3.1. National and International Policy

The Climate Change Act (2008) sets a legally binding target for reducing UK carbon dioxide (CO₂) emissions to zero by 2050. It also provides for a Committee on Climate Change, which sets out carbon budgets binding on the Government for 5 year periods.

The National Planning Policy Framework (NPPF) 2021, reflects the requirements of the Climate Change Act 2008 in paragraphs 153 and 155 as follows:

"Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support

appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure.”

“New development should be planned for in ways that:

- a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and
- b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.”

“To help increase the use and supply of renewable and low carbon energy and heat, plans should:

- a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);
- b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and

identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.”

3.2. Local Policy: North Hertfordshire District Council

Sustainability is key to North Hertfordshire District Council planning policy and should be considered with every planning application.

4. Energy hierarchy

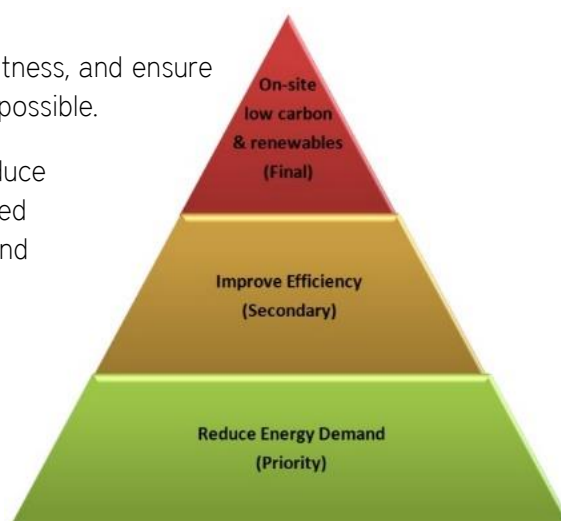
In line with best practice the proposed energy strategy for this development will follow the principals of the energy hierarchy.

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

- 1) Be lean – use less energy: Optimise the building fabric, glazing, and structure to minimise energy consumption in the first

instance by using low U-values and good air tightness, and ensure that active systems run as energy efficiently as possible.

- 2) Be clean – supply energy efficiently: Further reduce carbon emissions through the use of decentralised energy where feasible, such as combined heat and power (CHP).
- 3) Be green – use renewable energy: When the above design elements have been reasonably exhausted, supply energy through renewable sources where practical.



5. Energy efficient design measures (“be lean”)

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

The proposed development will achieve compliance with Approved Document L1 of the Building Regulations (2021) without reliance on the contribution of renewable technology¹.

The following energy-efficient design measures are proposed:

	Proposed development	L1 2021 requirements
Ground floor U-value (W/m ² K)	0.15	0.18
Exposed/semi exposed floor U-value (W/m ² K)	0.15	0.18
External wall U-value (W/m ² K)	0.18	0.26
Roofs U-value (W/m ² K)	0.11/0.12/0.15	0.16
Window and fully glazed door U-value (W/m ² K)	1.20	1.60
External door U-value (W/m ² K)	1.20	1.60
Air permeability	5 m ³ /h.m ²	8 m ³ /h.m ²
Thermal bridging	Y=0.06-014	Y=0.15

Having reduced energy demand through improvements to the fabric, this development shall seek to reduce energy consumption further through the specification of mechanical and

¹ Under Approved Document L1 2021, the notional dwelling specification that is used to calculate the TER includes on-site renewable generation from PV. For the purpose of estimating savings from “Be Lean” measures only, the DER calculation for this stage of the energy hierarchy includes PV savings matched to the notional dwelling.

electrical systems with efficiencies that surpass the requirements of Approved Document L1 2021:

	Proposed development	L1 2021 requirements
Lighting efficacy	80 lm/W	75 lm/W
Heating controls	Time and temperature zone controls	Time and temperature zone controls.

6. Energy efficient systems (“be clean”)

6.1. Combined heat and power

Combined heat and power (CHP) systems use relatively cheap and clean fuels (such as natural gas) to generate heat and electricity on site. A typical CHP system uses combustion of natural gas to drive a turbine that produces electricity. The heat generated is captured and used to produce hot water.

As losses are minimised the carbon footprint of the energy generated is very low. However this is dependent on there being sufficient year-round local heat demand to fully utilise the heat generated by the CHP plant. An example would be developments of at least 500 dwellings, universities or hospitals.

Due to its size, this development is not suitable for combined heat and power.

6.2. District heating networks

In a district heating network heat is supplied from one or more central energy centres to multiple buildings within the network. Supply to multiple buildings guarantees high year-round local heat demand which in turn allows the use of low carbon technologies within the energy centre, such as combined heat and power systems. Large plant and aggregated demand allows systems within the energy centre to run more efficiently.

Hot water is distributed within the network via highly insulated pipes. To connect to the network individual boilers are replaced with separately metered heat exchangers.

Due to the fact this proposed development is neither within the coverage of an existing district heating network, nor is it within an area designated as having potential for a future network, district heating can be discounted as a viable option.

7. Low and zero carbon energy sources (*"be green"*)

7.1. Photovoltaics

Solar photovoltaics (PV) capture the sun's energy using photovoltaic cells. The cells convert sunlight into electricity, which can be utilised on site or transferred into the National Grid. PV cells are made from layers of semi-conducting material, usually silicon. When light shines on the cell it creates an electric field across the layers. The stronger the sunshine, the more electricity is produced. Groups of cells are mounted together in panels or modules that can be mounted on a roof.

The power of a PV cell is measured in kilowatts peak (kWp). This is the rate at which the cell generates energy at peak performance in full direct sunlight.

Photovoltaics offer high CO₂ savings, are simple to install and suitable for most buildings. The only limiting factor for PV is the availability of suitable roof space.

7.2. Heat Pumps

Heat pumps collect low temperature heat from renewable sources (such as the air or ground) and concentrate the heat to a usable temperature via a reverse refrigeration cycle. Useable heat is transferred to the dwelling via a heat exchanger and can be used for low temperature central heating and domestic hot water, though an immersion top-up may be required for DHW.

Heat pumps have some impact on the environment as they generally use grid supplied electricity to run the pumps. It is common for heat pumps to have a coefficient of performance of three, meaning that for every 1kWh of electricity used, over 3kWh of heat can be generated. The renewable component of the output is therefore taken as the difference between the output energy and the input energy, in this scenario the heat pump will be deemed to have delivered 2kWh of renewable energy.

Ground source heat pumps require external horizontal ground loops, or as is more likely in built-up environments, vertical loops fed into bore holes. The application of ground source heat pumps is therefore constrained by site ground conditions and available space.

Air source heat pumps have a slightly lower seasonal efficiency than ground source heat pumps, but require less space. Noise and space considerations should be assessed when determining an appropriate site for external condensing units.

7.3. Solar thermal

Solar thermal systems, use free heat from the sun to warm domestic hot water. A conventional boiler or immersion heater can be used to make the water hotter, or to provide hot water when solar energy is unavailable.

Solar thermal systems are most appropriate for buildings with high year-round domestic hot water demand.

Although a typical solar thermal system will be able to meet half the annual domestic hot water demand for a dwelling, many will use electricity to run pumps within the system.

7.4. Wind turbines

Wind turbines use blades to catch the wind. When the wind blows, the blades are forced round, driving a turbine which generates electricity. The stronger the wind, the more electricity produced.

There are two types of domestic-sized wind turbine: Pole mounted and building mounted. Pole mounted turbines are free standing and are erected in a suitably exposed position, and are often about 5kW to 6kW in size. Building mounted turbines are smaller and can be installed on the roof of a home where there is a suitable wind resource. Often these are around 1kW to 2kW in size.

Large scale turbines, in exposed locations offer one of the best financial returns of all renewable energy systems as the payback of the system increases dramatically with the size of the turbine. However small-scale systems offer much lower levels of performance and recent studies have questioned the viability and output from such systems, particularly in urban environments.

7.5. Biomass

Biomass heating systems, burn wood pellets, chips or logs to provide warmth in a single room or to power central heating and hot water boilers. The carbon dioxide emitted when wood is burned is the same amount that was absorbed over the months and years that the plant was growing. The process is sustainable as long as new plants continue to grow in place of those used for fuel. There are some carbon emissions caused by the cultivation, manufacture and transportation of the fuel, but as long as the fuel is sourced locally, these are much lower than the emissions from fossil fuels.

When specifying biomass heating systems is important to consider the potential technical issues surrounding delivery and storage of fuel.

Although the CO₂ savings from biomass are substantial, the high levels of NO_x emissions can make biomass systems unsuitable for urban environments.

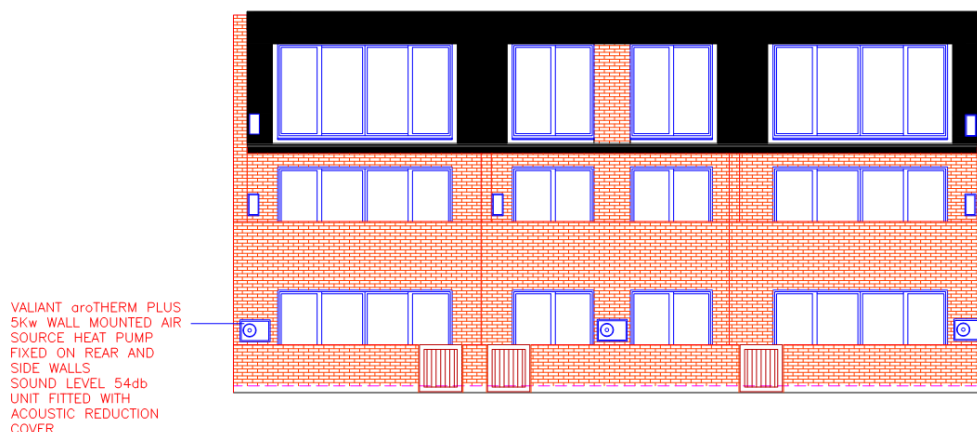
7.6. Proposed low and zero carbon energy sources

With carbon emissions within the building(s) already reduced through an enhanced fabric and energy efficient systems, it is proposed that further reduction will be achieved through installation of **air source heat pumps** to serve all of the heating and Domestic Hot Water requirements within each plot.

Illustration of proposed heat pump units:



Elevation drawing showing location of external condenser units:



8. Results: Calculated CO₂ savings

Table 1: Carbon Dioxide Emissions for domestic buildings

	Carbon dioxide emissions for domestic buildings (Tonnes CO ₂ per annum)
	Regulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	6.4
After energy demand reduction	6.4
After energy demand reduction and renewable energy	1.7

Table 2: Regulated carbon dioxide savings for domestic buildings

	Regulated domestic carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Savings from energy demand reduction	0.0	0.03
Savings from renewable energy	4.4	73.40
Cumulative on-site savings	4.4	73.43

9. Appendix A: ADL1 2021 BREL Reports.

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 15 Dec 2023 14:22:32

Project Information			
Assessed By	Jonathan Southworth	Building Type	Flat, End-terrace
OCDEA Registration	EES/019725	Assessment Date	2023-12-15

Dwelling Details			
Assessment Type	As designed	Total Floor Area	61 m ²
Site Reference	7090-1	Plot Reference	HP
Address	81a Plot 1 Whinbush Road, Hitchen, SG5 1PZ		

Client Details	
Name	Client
Company	Company
Address	Address, Town, AA11 1AA

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate			
Fuel for main heating system	Electricity		
Target carbon dioxide emission rate	14.43 kgCO ₂ /m ²		
Dwelling carbon dioxide emission rate	3.78 kgCO ₂ /m ²		OK
1b Target primary energy rate and dwelling primary energy			
Target primary energy	76.21 kWh _{PE} /m ²		
Dwelling primary energy	39.66 kWh _{PE} /m ²		OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency			
Target fabric energy efficiency	40.2 kWh/m ²		
Dwelling fabric energy efficiency	39.0 kWh/m ²		OK

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m ² K]	Dwelling average U-Value [W/m ² K]	Element with highest individual U-Value	
External walls	0.26	0.18	Walls (1) (0.18)	OK
Party walls	0.2	0	Party Wall (1) (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	0.15	Heatloss Floor 1 (0.15)	OK
Roofs	0.16	0.12	Roof (1) (0.12)	OK
Windows, doors, and roof windows	1.6	1.23	Opening (1.4)	OK
Rooflights	2.2	N/A	N/A	N/A

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	Net area [m ²]	U-Value [W/m ² K]
Exposed wall: Walls (1)	45.356	0.18
Exposed wall: Walls (2)	2.43	0.18
Party wall: Party Wall (1)	21.5	0 (!)
Ground floor: Heatloss Floor 1, Heatloss Floor 1	61.47	0.15
Exposed roof: Roof (1)	7.69	0.12

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
Opening, DTC	1.89	South	N/A	1.4
Opening, window	1.8	West	0.7	1.2
Opening, window	0.9	West	0.7	1.2
Opening, window	8.064	East	0.7	1.2
Opening, window	0.9	North	0.7	1.2

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part 1 - Main Dwelling: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E2: Other lintels (including other steel lintels)	Calculated by person with suitable expertise	0.006 (!)	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E3: Sill	Calculated by person with suitable expertise	0.016 (!)	
External wall	E4: Jamb	Calculated by person with suitable expertise	0.018 (!)	
External wall	E5: Ground floor (normal)	Calculated by person with suitable expertise	0.06	
External wall	E7: Party floor between dwellings (in blocks of flats)	Calculated by person with suitable expertise	0.028 (!)	
External wall	E24: Eaves (insulation at ceiling level - inverted)	Calculated by person with suitable expertise	0.08	
External wall	E14: Flat roof	Calculated by person with suitable expertise	0.08	noti
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.043	
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	-0.073	
Party wall	P1: Ground floor	SAP table default	0.32	
Party wall	P3: Intermediate floor between dwellings (in blocks of flats)	SAP table default	0 (!)	
External wall	E25: Staggered party wall between dwellings	SAP table default	0.24	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))			
Maximum permitted air permeability at 50Pa	8 m ³ /hm ²		
Dwelling air permeability at 50Pa	5 m ³ /hm ² , Design value		OK
Air permeability test certificate reference			

4 Space heating	
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	317.6%
Emitter type	Radiators
Flow temperature	35°C
System type	Heat Pump
Manufacturer	Vaillant Group UK Ltd
Model	aroTHERM 5kW
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: Cylinder	
Capacity	180 litres
Declared heat loss	1.6 kWh/day
Primary pipework insulated	Yes
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls	
Main heating 1 - type: Time and temperature zone control by arrangement of plumbing and electrical services	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: Cylinder thermostat and HW separately timed	
Manufacturer	
Model	

7 Lighting		
Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	95 lm/W	OK
External lights control	N/A	
8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	N/A	
Specific fan power	N/A	N/A
Minimum permitted heat recovery efficiency	N/A	
Heat recovery efficiency	N/A	N/A
Manufacturer/Model		
Commissioning		
9 Local generation		
N/A		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		
12 Declarations		
a. Assessor Declaration		
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed:	Assessor ID:	
Name:	Date:	
b. Client Declaration		
N/A		

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 15 Dec 2023 14:23:47

Project Information			
Assessed By	Jonathan Southworth	Building Type	Flat, Mid-terrace
OCDEA Registration	EES/019725	Assessment Date	2023-12-15

Dwelling Details			
Assessment Type	As designed	Total Floor Area	43 m ²
Site Reference	7090-2	Plot Reference	HP
Address	81a Plot 2 Whinbush Road, Hitchen, SG5 1PZ		

Client Details	
Name	Client
Company	Company
Address	Address, Town, AA11 1AA

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate			
Fuel for main heating system	Electricity		
Target carbon dioxide emission rate	15.69 kgCO ₂ /m ²		
Dwelling carbon dioxide emission rate	4.33 kgCO ₂ /m ²		OK
1b Target primary energy rate and dwelling primary energy			
Target primary energy	83.34 kWh _{PE} /m ²		
Dwelling primary energy	45.55 kWh _{PE} /m ²		OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency			
Target fabric energy efficiency	36.1 kWh/m ²		
Dwelling fabric energy efficiency	41.6 kWh/m ²		FAIL

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m ² K]	Dwelling average U-Value [W/m ² K]	Element with highest individual U-Value	
External walls	0.26	0.18	Walls (1) (0.18)	OK
Party walls	0.2	0	Party Wall (1) (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	0.15	Heatloss Floor 1 (0.15)	OK
Roofs	0.16	0.13	Roof (2) (0.15)	OK
Windows, doors, and roof windows	1.6	1.24	Opening (1.4)	OK
Rooflights	2.2	N/A	N/A	N/A

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	Net area [m ²]	U-Value [W/m ² K]
Exposed wall: Walls (1)	7.18	0.18
Exposed wall: Walls (2)	6.61	0.18
Party wall: Party Wall (1)	44.45	0 (!)
Ground floor: Heatloss Floor 1, Heatloss Floor 1	42.85	0.15
Exposed roof: Roof (1)	7.66	0.12
Exposed roof: Roof (2)	1.62	0.15

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
Opening, DTC	1.89	West	N/A	1.4
Opening, window	3.78	East	0.7	1.2
Opening, window	3.78	East	0.7	1.2

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part 1 - Main Dwelling: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E7: Party floor between dwellings (in blocks of flats)	Calculated by person with suitable expertise	0.028 (!)	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E24: Eaves (insulation at ceiling level - inverted)	Calculated by person with suitable expertise	0.08	
External wall	E14: Flat roof	Calculated by person with suitable expertise	0.08	noti
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.043	
Party wall	P1: Ground floor	SAP table default	0.32	
Party wall	P3: Intermediate floor between dwellings (in blocks of flats)	SAP table default	0 (!)	
External wall	E2: Other lintels (including other steel lintels)	Calculated by person with suitable expertise	0.06	
External wall	E3: Sill	Calculated by person with suitable expertise	0.016 (!)	
External wall	E4: Jamb	Calculated by person with suitable expertise	0.018 (!)	
External wall	E5: Ground floor (normal)	Calculated by person with suitable expertise	0.06	
External wall	E18: Party wall between dwellings	Calculated by person with suitable expertise	0.039 (!)	
External wall	E25: Staggered party wall between dwellings	SAP table default	0.24	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))			
Maximum permitted air permeability at 50Pa	8 m ³ /hm ²		
Dwelling air permeability at 50Pa	5 m ³ /hm ² , Design value		OK
Air permeability test certificate reference			

4 Space heating	
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	317.0%
Emitter type	Radiators
Flow temperature	35°C
System type	Heat Pump
Manufacturer	Vaillant Group UK Ltd
Model	aroTHERM 5kW
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: Cylinder	
Capacity	180 litres
Declared heat loss	1.6 kWh/day
Primary pipework insulated	Yes
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls	
Main heating 1 - type: Time and temperature zone control by arrangement of plumbing and electrical services	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: Cylinder thermostat and HW separately timed	
Manufacturer	
Model	

7 Lighting		
Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	95 lm/W	OK
External lights control	N/A	
8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	N/A	
Specific fan power	N/A	N/A
Minimum permitted heat recovery efficiency	N/A	
Heat recovery efficiency	N/A	N/A
Manufacturer/Model		
Commissioning		
9 Local generation		
N/A		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		
12 Declarations		
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This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed:	Assessor ID:	
Name:	Date:	
b. Client Declaration		
N/A		

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 15 Dec 2023 14:24:17

Project Information			
Assessed By	Jonathan Southworth	Building Type	Flat, End-terrace
OCDEA Registration	EES/019725	Assessment Date	2023-12-15

Dwelling Details			
Assessment Type	As designed	Total Floor Area	58 m ²
Site Reference	7090-3	Plot Reference	HP
Address	81a Plot 3 Whinbush Road, Hitchen, SG5 1PZ		

Client Details	
Name	Client
Company	Company
Address	Address, Town, AA11 1AA

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate			
Fuel for main heating system	Electricity		
Target carbon dioxide emission rate	15.53 kgCO ₂ /m ²		
Dwelling carbon dioxide emission rate	3.97 kgCO ₂ /m ²		OK
1b Target primary energy rate and dwelling primary energy			
Target primary energy	82.17 kWh _{PE} /m ²		
Dwelling primary energy	41.63 kWh _{PE} /m ²		OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency			
Target fabric energy efficiency	43.9 kWh/m ²		
Dwelling fabric energy efficiency	41.7 kWh/m ²		OK

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m ² K]	Dwelling average U-Value [W/m ² K]	Element with highest individual U-Value	
External walls	0.26	0.18	Walls (1) (0.18)	OK
Party walls	0.2	0	Party Wall (1) (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	0.15	Heatloss Floor 1 (0.15)	OK
Roofs	0.16	0.12	Roof (1) (0.12)	OK
Windows, doors, and roof windows	1.6	1.23	Opening (1.4)	OK
Rooflights	2.2	N/A	N/A	N/A

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	Net area [m ²]	U-Value [W/m ² K]
Exposed wall: Walls (1)	50.596	0.18
Exposed wall: Walls (2)	8.62	0.18
Party wall: Party Wall (1)	22.94	0 (!)
Ground floor: Heatloss Floor 1, Heatloss Floor 1	58.05	0.15
Exposed roof: Roof (1)	7.66	0.12

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
Opening, DTC	1.89	West	N/A	1.4
Opening, window	1.8	West	0.7	1.2
Opening, window	0.9	West	0.7	1.2
Opening, window	8.064	East	0.7	1.2
Opening, window	0.9	South	0.7	1.2

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part 1 - Main Dwelling: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E2: Other lintels (including other steel lintels)	Calculated by person with suitable expertise	0.006 (!)	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E3: Sill	Calculated by person with suitable expertise	0.016 (!)	
External wall	E4: Jamb	Calculated by person with suitable expertise	0.018 (!)	
External wall	E5: Ground floor (normal)	Calculated by person with suitable expertise	0.06	
External wall	E7: Party floor between dwellings (in blocks of flats)	Calculated by person with suitable expertise	0.028 (!)	
External wall	E24: Eaves (insulation at ceiling level - inverted)	Calculated by person with suitable expertise	0.08	
External wall	E14: Flat roof	Calculated by person with suitable expertise	0.08	noti
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.043	
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	-0.073	
Party wall	P1: Ground floor	SAP table default	0.32	
Party wall	P3: Intermediate floor between dwellings (in blocks of flats)	SAP table default	0 (!)	
External wall	E25: Staggered party wall between dwellings	SAP table default	0.24	
External wall	E18: Party wall between dwellings	Calculated by person with suitable expertise	0.043	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))				
Maximum permitted air permeability at 50Pa		8 m ³ /hm ²		
Dwelling air permeability at 50Pa		5 m ³ /hm ² , Design value		OK
Air permeability test certificate reference				

4 Space heating	
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	317.4%
Emitter type	Radiators
Flow temperature	35°C
System type	Heat Pump
Manufacturer	Vaillant Group UK Ltd
Model	aroTHERM 5kW
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: Cylinder	
Capacity	180 litres
Declared heat loss	1.6 kWh/day
Primary pipework insulated	Yes
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls	
Main heating 1 - type: Time and temperature zone control by arrangement of plumbing and electrical services	
Function	
Ecodesign class	
Manufacturer	
Model	

Water heating - type: Cylinder thermostat and HW separately timed		
Manufacturer		
Model		
7 Lighting		
Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	95 lm/W	OK
External lights control	N/A	
8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	N/A	
Specific fan power	N/A	N/A
Minimum permitted heat recovery efficiency	N/A	
Heat recovery efficiency	N/A	N/A
Manufacturer/Model		
Commissioning		
9 Local generation		
N/A		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		
12 Declarations		
a. Assessor Declaration		
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed:	Assessor ID:	
Name:	Date:	
b. Client Declaration		
N/A		

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 15 Dec 2023 14:24:48

Project Information			
Assessed By	Jonathan Southworth	Building Type	Flat, End-terrace
OCDEA Registration	EES/019725	Assessment Date	2023-12-15

Dwelling Details			
Assessment Type	As designed	Total Floor Area	54 m ²
Site Reference	7090-4	Plot Reference	HP
Address	81a Plot 4 Whinbush Road, Hitchen, SG5 1PZ		

Client Details	
Name	Client
Company	Company
Address	Address, Town, AA11 1AA

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate			
Fuel for main heating system	Electricity		
Target carbon dioxide emission rate	14.76 kgCO ₂ /m ²		
Dwelling carbon dioxide emission rate	3.7 kgCO ₂ /m ²		OK
1b Target primary energy rate and dwelling primary energy			
Target primary energy	78.05 kWh _{PE} /m ²		
Dwelling primary energy	39.06 kWh _{PE} /m ²		OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency			
Target fabric energy efficiency	37.9 kWh/m ²		
Dwelling fabric energy efficiency	34.0 kWh/m ²		OK

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m ² K]	Dwelling average U-Value [W/m ² K]	Element with highest individual U-Value	
External walls	0.26	0.18	Walls (1) (0.18)	OK
Party walls	0.2	0	Party Wall (1) (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	N/A	N/A	N/A
Roofs	0.16	0.12	Roof (1) (0.12)	OK
Windows, doors, and roof windows	1.6	1.23	Opening (1.4)	OK
Rooflights	2.2	N/A	N/A	N/A

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))			
Name	Net area [m ²]	U-Value [W/m ² K]	
Exposed wall: Walls (1)	41.786	0.18	
Exposed wall: Walls (2)	2.43	0.18	
Party wall: Party Wall (1)	17.93	0 (!)	
Exposed roof: Roof (1)	12.61	0.12	
Exposed roof: Roof (2)	3.75	0.11	

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
Opening, DTC	1.89	South	N/A	1.4
Opening, window	1.8	West	0.7	1.2
Opening, window	0.9	West	0.7	1.2
Opening, window	8.064	East	0.7	1.2
Opening, window	0.9	North	0.7	1.2

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part 1 - Main Dwelling: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E2: Other lintels (including other steel lintels)	Calculated by person with suitable expertise	0.006 (!)	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E3: Sill	Calculated by person with suitable expertise	0.016 (!)	
External wall	E4: Jamb	Calculated by person with suitable expertise	0.018 (!)	
External wall	E7: Party floor between dwellings (in blocks of flats)	Calculated by person with suitable expertise	0.028 (!)	
External wall	E24: Eaves (insulation at ceiling level - inverted)	Calculated by person with suitable expertise	0.08	
External wall	E14: Flat roof	Calculated by person with suitable expertise	0.08	noti
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.043	
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	-0.073	
Party wall	P3: Intermediate floor between dwellings (in blocks of flats)	SAP table default	0 (!)	
External wall	E25: Staggered party wall between dwellings	SAP table default	0.24	
External wall	E10: Eaves (insulation at ceiling level)	Calculated by person with suitable expertise	0.056	
External wall	E12: Gable (insulation at ceiling level)	Calculated by person with suitable expertise	0.062	
Party wall	P8: Exposed floor (inverted)	SAP table default	0.48	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))				
Maximum permitted air permeability at 50Pa		8 m ³ /hm ²		
Dwelling air permeability at 50Pa		5 m ³ /hm ² , Design value		OK
Air permeability test certificate reference				

4 Space heating	
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	318.2%
Emitter type	Radiators
Flow temperature	35°C
System type	Heat Pump
Manufacturer	Vaillant Group UK Ltd
Model	aroTHERM 5kW
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: Cylinder	
Capacity	180 litres
Declared heat loss	1.6 kWh/day
Primary pipework insulated	Yes
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls	
Main heating 1 - type: Time and temperature zone control by arrangement of plumbing and electrical services	
Function	
Ecodesign class	
Manufacturer	
Model	

Water heating - type: Cylinder thermostat and HW separately timed		
Manufacturer		
Model		
7 Lighting		
Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	95 lm/W	OK
External lights control	N/A	
8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	N/A	
Specific fan power	N/A	N/A
Minimum permitted heat recovery efficiency	N/A	
Heat recovery efficiency	N/A	N/A
Manufacturer/Model		
Commissioning		
9 Local generation		
N/A		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		
12 Declarations		
a. Assessor Declaration		
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed:	Assessor ID:	
Name:	Date:	
b. Client Declaration		
N/A		

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 15 Dec 2023 14:25:14

Project Information			
Assessed By	Jonathan Southworth	Building Type	Flat, Mid-terrace
OCDEA Registration	EES/019725	Assessment Date	2023-12-15

Dwelling Details			
Assessment Type	As designed	Total Floor Area	35 m ²
Site Reference	7090-5	Plot Reference	HP
Address	81a Plot 5 Whinbush Road, Hitchen, SG5 1PZ		

Client Details	
Name	Client
Company	Company
Address	Address, Town, AA11 1AA

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate			
Fuel for main heating system	Electricity		
Target carbon dioxide emission rate	17.18 kgCO ₂ /m ²		
Dwelling carbon dioxide emission rate	4.47 kgCO ₂ /m ²		OK
1b Target primary energy rate and dwelling primary energy			
Target primary energy	91.57 kWh _{PE} /m ²		
Dwelling primary energy	47.35 kWh _{PE} /m ²		OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency			
Target fabric energy efficiency	33.2 kWh/m ²		
Dwelling fabric energy efficiency	32.1 kWh/m ²		OK

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m ² K]	Dwelling average U-Value [W/m ² K]	Element with highest individual U-Value	
External walls	0.26	0.18	Walls (1) (0.18)	OK
Party walls	0.2	0	Party Wall (1) (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	N/A	N/A	N/A
Roofs	0.16	0.12	Roof (1) (0.12)	OK
Windows, doors, and roof windows	1.6	1.24	Opening (1.4)	OK
Rooflights	2.2	N/A	N/A	N/A

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	Net area [m ²]	U-Value [W/m ² K]
Exposed wall: Walls (1)	7.18	0.18
Exposed wall: Walls (2)	12.44	0.18
Party wall: Party Wall (1)	31.46	0 (!)
Exposed roof: Roof (1)	8.87	0.12

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
Opening, DTC	1.89	West	N/A	1.4
Opening, window	3.78	East	0.7	1.2
Opening, window	3.78	East	0.7	1.2

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part 1 - Main Dwelling: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E2: Other lintels (including other steel lintels)	Calculated by person with suitable expertise	0.019 (!)	
External wall	E3: Sill	Calculated by person with suitable expertise	0.016 (!)	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E4: Jamb	Calculated by person with suitable expertise	0.017 (!)	
External wall	E7: Party floor between dwellings (in blocks of flats)	Calculated by person with suitable expertise	0.029 (!)	
External wall	E24: Eaves (insulation at ceiling level - inverted)	Calculated by person with suitable expertise	0.08	
External wall	E14: Flat roof	Calculated by person with suitable expertise	0.048	
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.043	
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	-0.073	
External wall	E25: Staggered party wall between dwellings	SAP table default	0.24	
Party wall	P3: Intermediate floor between dwellings (in blocks of flats)	SAP table default	0 (!)	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))

Maximum permitted air permeability at 50Pa	8 m ³ /hm ²	
Dwelling air permeability at 50Pa	5 m ³ /hm ² , Design value	OK
Air permeability test certificate reference		

4 Space heating

+ Space heating	
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	300.2%
Emitter type	Radiators
Flow temperature	35°C
System type	Heat Pump
Manufacturer	Vaillant Group UK Ltd
Model	aroTHERM 5kW
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water

Cylinder/store - type: Cylinder	
Capacity	180 litres
Declared heat loss	1.6 kWh/day
Primary pipework insulated	Yes
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls

Main heating 1 - type: Time and temperature zone control by arrangement of plumbing and electrical services	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: Cylinder thermostat and HW separately timed	
Manufacturer	
Model	

7 Lighting

Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	95 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	N/A	
Specific fan power	N/A	N/A
Minimum permitted heat recovery efficiency	N/A	
Heat recovery efficiency	N/A	N/A
Manufacturer/Model		
Commissioning		
9 Local generation		
N/A		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		
12 Declarations		
a. Assessor Declaration		
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed: Name:	Assessor ID: Date:	
b. Client Declaration		
N/A		

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 15 Dec 2023 14:25:54

Project Information			
Assessed By	Jonathan Southworth	Building Type	Flat, End-terrace
OCDEA Registration	EES/019725	Assessment Date	2023-12-15

Dwelling Details			
Assessment Type	As designed	Total Floor Area	49 m ²
Site Reference	7090-6	Plot Reference	HP
Address	81a Plot 6 Whinbush Road, Hitchen, SG5 1PZ		

Client Details	
Name	Client
Company	Company
Address	Address, Town, AA11 1AA

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate

Fuel for main heating system	Electricity
Target carbon dioxide emission rate	15.71 kgCO ₂ /m ²
Dwelling carbon dioxide emission rate	3.97 kgCO ₂ /m ² OK

1b Target primary energy rate and dwelling primary energy

Target primary energy	83.25 kWh _{PE} /m ²
Dwelling primary energy	41.87 kWh _{PE} /m ² OK

1c Target fabric energy efficiency and dwelling fabric energy efficiency

Target fabric energy efficiency	39.3 kWh/m ²
Dwelling fabric energy efficiency	37.3 kWh/m ² OK

2a Fabric U-values

Element	Maximum permitted average U-Value [W/m ² K]	Dwelling average U-Value [W/m ² K]	Element with highest individual U-Value	
External walls	0.26	0.18	Walls (1) (0.18)	OK
Party walls	0.2	0	Party Wall (1) (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	N/A	N/A	N/A
Roofs	0.16	0.12	Roof (1) (0.12)	OK
Windows, doors, and roof windows	1.6	1.23	Opening (1.4)	OK
Rooflights	2.2	N/A	N/A	N/A

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))

Name	Net area [m ²]	U-Value [W/m ² K]
Exposed wall: Walls (1)	46.116	0.18
Exposed wall: Walls (2)	9.17	0.18
Party wall: Party Wall (1)	14.98	0 (!)
Exposed roof: Roof (1)	8.87	0.12
Exposed roof: Roof (2)	2.37	0.11

2c Openings (better than typically expected values are flagged with a subsequent (!))

Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
Opening, DTC	1.89	West	N/A	1.4
Opening, window	1.8	West	0.7	1.2
Opening, window	0.9	West	0.7	1.2
Opening, window	8.064	East	0.7	1.2
Opening, window	0.9	South	0.7	1.2
Opening, window	0.9	South	0.7	1.2

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))

Building part 1 - Main Dwelling: Thermal bridging calculated from linear thermal transmittances for each junction

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E7: Party floor between dwellings (in blocks of flats)	Calculated by person with suitable expertise	0.028 (!)	
External wall	E24: Eaves (insulation at ceiling level - inverted)	Calculated by person with suitable expertise	0.08	
External wall	E14: Flat roof	Calculated by person with suitable expertise	0.08	noti
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.043	
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	-0.073	
Party wall	P3: Intermediate floor between dwellings (in blocks of flats)	SAP table default	0 (!)	
External wall	E25: Staggered party wall between dwellings	SAP table default	0.24	
External wall	E10: Eaves (insulation at ceiling level)	Calculated by person with suitable expertise	0.056	
External wall	E12: Gable (insulation at ceiling level)	Calculated by person with suitable expertise	0.062	
Party wall	P8: Exposed floor (inverted)	SAP table default	0.48	
External wall	E2: Other lintels (including other steel lintels)	Calculated by person with suitable expertise	0.006 (!)	
External wall	E3: Sill	Calculated by person with suitable expertise	0.016 (!)	
External wall	E4: Jamb	Calculated by person with suitable expertise	0.018 (!)	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))

Maximum permitted air permeability at 50Pa	8 m ³ /hm ²	
Dwelling air permeability at 50Pa	5 m ³ /hm ² , Design value	OK
Air permeability test certificate reference		

4 Space heating

Main heating system 1: Heat pump with radiators or underfloor heating - Electricity

Efficiency	318.2%
Emitter type	Radiators
Flow temperature	35°C
System type	Heat Pump
Manufacturer	Vaillant Group UK Ltd
Model	aroTHERM 5kW
Commissioning	

Secondary heating system: N/A

Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water

Cylinder/store - type: Cylinder

Capacity	180 litres
Declared heat loss	1.6 kWh/day
Primary pipework insulated	Yes
Manufacturer	
Model	
Commissioning	

Waste water heat recovery system 1 - type: N/A

Efficiency	
Manufacturer	
Model	

6 Controls

Main heating 1 - type: Time and temperature zone control by arrangement of plumbing and electrical services

Function	
Ecodesign class	
Manufacturer	
Model	

Water heating - type: Cylinder thermostat and HW separately timed		
Manufacturer		
Model		
7 Lighting		
Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	95 lm/W	OK
External lights control	N/A	
8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	N/A	
Specific fan power	N/A	N/A
Minimum permitted heat recovery efficiency	N/A	
Heat recovery efficiency	N/A	N/A
Manufacturer/Model		
Commissioning		
9 Local generation		
N/A		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		
12 Declarations		
a. Assessor Declaration		
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed:	Assessor ID:	
Name:	Date:	
b. Client Declaration		
N/A		

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 15 Dec 2023 14:26:19

Project Information			
Assessed By	Jonathan Southworth	Building Type	Flat, End-terrace
OCDEA Registration	EES/019725	Assessment Date	2023-12-15

Dwelling Details			
Assessment Type	As designed	Total Floor Area	54 m ²
Site Reference	7090-7	Plot Reference	HP
Address	81a Plot 7 Whinbush Road, Hitchen, SG5 1PZ		

Client Details	
Name	Client
Company	Company
Address	Address, Town, AA11 1AA

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate			
Fuel for main heating system	Electricity		
Target carbon dioxide emission rate	15.8 kgCO ₂ /m ²		
Dwelling carbon dioxide emission rate	4.23 kgCO ₂ /m ²		OK
1b Target primary energy rate and dwelling primary energy			
Target primary energy	83.67 kWh _{PE} /m ²		
Dwelling primary energy	44.38 kWh _{PE} /m ²		OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency			
Target fabric energy efficiency	42.7 kWh/m ²		
Dwelling fabric energy efficiency	44.8 kWh/m ²		FAIL

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m ² K]	Dwelling average U-Value [W/m ² K]	Element with highest individual U-Value	
External walls	0.26	0.18	Walls (1) (0.18)	OK
Party walls	0.2	0	Party Wall (1) (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	0.15	Heatloss Floor 1 (0.15)	OK
Roofs	0.16	0.13	Roof (2) (0.16)	OK
Windows, doors, and roof windows	1.6	1.22	Opening (1.4)	OK
Rooflights	2.2	1.2	Opening, South (1.2)	OK

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	Net area [m ²]	U-Value [W/m ² K]
Exposed wall: Walls (1)	28.736	0.18
Exposed wall: Walls (2)	3.8	0.18
Exposed wall: Walls (3)	7.33	0.18
Party wall: Party Wall (1)	16.1	0 (!)
Party floor: Heatloss Floor 1, Heatloss Floor 1	2.53	0.15
Exposed roof: Roof (1)	42.43	0.12
Exposed roof: Roof (2)	18	0.16

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
Opening, DTC	1.89	West	N/A	1.4
Opening, window	3.78	East	0.7	1.2
Opening, window	8.064	East	0.7	1.2
Opening, window	0.9	North	0.7	1.2
Opening, window	0.9	North	0.7	1.2
Opening, rooflight	0.64	South	0.7	1.2

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))	
Building part 1 - Main Dwelling: Thermal bridging calculated from linear thermal transmittances for each junction	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E20: Exposed floor (normal)	SAP table default	0.32	
External wall	E7: Party floor between dwellings (in blocks of flats)	Calculated by person with suitable expertise	0.029 (!)	
External wall	E24: Eaves (insulation at ceiling level - inverted)	Calculated by person with suitable expertise	0.08	
External wall	E11: Eaves (insulation at rafter level)	Calculated by person with suitable expertise	0.04	not
External wall	E13: Gable (insulation at rafter level)	Calculated by person with suitable expertise	0.08	npt
External wall	E14: Flat roof	Calculated by person with suitable expertise	0.08	not
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.09	not
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	-0.09	not
External wall	E18: Party wall between dwellings	Calculated by person with suitable expertise	0.039 (!)	
External wall	E25: Staggered party wall between dwellings	Calculated by person with suitable expertise	0.06	not
Party wall	P3: Intermediate floor between dwellings (in blocks of flats)	SAP table default	0 (!)	
Party wall	P4: Roof (insulation at ceiling level)	SAP table default	0.48	
Roof	R4: Ridge (vaulted ceiling)	SAP table default	0.12	
Roof	R5: Ridge (inverted)	SAP table default	0.12	
Roof	R6: Flat ceiling	SAP table default	0.12	
Roof	R7: Flat ceiling (inverted)	SAP table default	0.12	
External wall	E2: Other lintels (including other steel lintels)	Calculated by person with suitable expertise	0.006 (!)	
External wall	E3: Sill	Calculated by person with suitable expertise	0.016 (!)	
External wall	E4: Jamb	Calculated by person with suitable expertise	0.018 (!)	
Roof	R11: Upstands or kerbs of rooflights	SAP table default	0.24	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))

Maximum permitted air permeability at 50Pa	8 m ³ /hm ²	
Dwelling air permeability at 50Pa	5 m ³ /hm ² , Design value	OK
Air permeability test certificate reference		

4 Space heating

Main heating system 1: Heat pump with radiators or underfloor heating - Electricity

Efficiency	317.7%
Emitter type	Radiators
Flow temperature	35°C
System type	Heat Pump
Manufacturer	Vaillant Group UK Ltd
Model	aroTHERM 5kW
Commissioning	

Secondary heating system: N/A

Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water

Cylinder/store - type: Cylinder

Capacity	180 litres
Declared heat loss	1.6 kWh/day
Primary pipework insulated	Yes
Manufacturer	
Model	
Commissioning	

Waste water heat recovery system 1 - type: N/A		
Efficiency		
Manufacturer		
Model		
6 Controls		
Main heating 1 - type: Time and temperature zone control by arrangement of plumbing and electrical services		
Function		
Ecodesign class		
Manufacturer		
Model		
Water heating - type: Cylinder thermostat and HW separately timed		
Manufacturer		
Model		
7 Lighting		
Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	95 lm/W	OK
External lights control	N/A	
8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	N/A	
Specific fan power	N/A	N/A
Minimum permitted heat recovery efficiency	N/A	
Heat recovery efficiency	N/A	N/A
Manufacturer/Model		
Commissioning		
9 Local generation		
N/A		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		
12 Declarations		
a. Assessor Declaration		
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed:	Assessor ID:	
Name:	Date:	
b. Client Declaration		
N/A		

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 15 Dec 2023 14:26:44

Project Information			
Assessed By	Jonathan Southworth	Building Type	Flat, End-terrace
OCDEA Registration	EES/019725	Assessment Date	2023-12-15

Dwelling Details			
Assessment Type	As designed	Total Floor Area	53 m ²
Site Reference	7090-8	Plot Reference	HP
Address	81a Plot 8 Whinbush Road, Hitchen, SG5 1PZ		

Client Details	
Name	Client
Company	Company
Address	Address, Town, AA11 1AA

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate			
Fuel for main heating system	Electricity		
Target carbon dioxide emission rate	16.08 kgCO ₂ /m ²		
Dwelling carbon dioxide emission rate	4.31 kgCO ₂ /m ²		OK

1b Target primary energy rate and dwelling primary energy			
Target primary energy	85.16 kWh _{PE} /m ²		
Dwelling primary energy	45.24 kWh _{PE} /m ²		OK

1c Target fabric energy efficiency and dwelling fabric energy efficiency			
Target fabric energy efficiency	43.5 kWh/m ²		
Dwelling fabric energy efficiency	46.0 kWh/m ²		FAIL

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m ² K]	Dwelling average U-Value [W/m ² K]	Element with highest individual U-Value	
External walls	0.26	0.18	Walls (1) (0.18)	OK
Party walls	0.2	0	Party Wall (1) (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	0.15	Heatloss Floor 1 (0.15)	OK
Roofs	0.16	0.13	Roof (2) (0.16)	OK
Windows, doors, and roof windows	1.6	1.22	Opening (1.4)	OK
Rooflights	2.2	1.2	Opening, South (1.2)	OK

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	Net area [m ²]	U-Value [W/m ² K]
Exposed wall: Walls (1)	27.986	0.18
Exposed wall: Walls (2)	12.18	0.18
Exposed wall: Walls (3)	6.79	0.18
Party wall: Party Wall (1)	16.11	0 (!)
Party floor: Heatloss Floor 1, Heatloss Floor 1	4.08	0.15
Exposed roof: Roof (1)	44.02	0.12
Exposed roof: Roof (2)	15.72	0.16

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
Opening, DTC	1.89	West	N/A	1.4
Opening, window	3.78	East	0.7	1.2
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Opening, Rooflight	0.64	South	0.7	1.2
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External wall	E14: Flat roof	Calculated by person with suitable expertise	0.08	not
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.09	not
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	-0.09	not
External wall	E18: Party wall between dwellings	Calculated by person with suitable expertise	0.039 (!)	
External wall	E25: Staggered party wall between dwellings	Calculated by person with suitable expertise	0.06	not
Party wall	P2: Intermediate floor within a dwelling	SAP table default	0 (!)	
Party wall	P4: Roof (insulation at ceiling level)	SAP table default	0.48	
Roof	R4: Ridge (vaulted ceiling)	SAP table default	0.12	
Roof	R5: Ridge (inverted)	SAP table default	0.12	
Roof	R6: Flat ceiling	SAP table default	0.12	
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Roof	R11: Upstands or kerbs of rooflights	SAP table default	0.24	

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Commissioning	

Secondary heating system: N/A

Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water

Cylinder/store - type: Cylinder

Capacity	180 litres
Declared heat loss	1.6 kWh/day
Primary pipework insulated	Yes
Manufacturer	
Model	
Commissioning	

Waste water heat recovery system 1 - type: N/A		
Efficiency		
Manufacturer		
Model		
6 Controls		
Main heating 1 - type: Time and temperature zone control by arrangement of plumbing and electrical services		
Function		
Ecodesign class		
Manufacturer		
Model		
Water heating - type: Cylinder thermostat and HW separately timed		
Manufacturer		
Model		
7 Lighting		
Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	95 lm/W	OK
External lights control	N/A	
8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	N/A	
Specific fan power	N/A	N/A
Minimum permitted heat recovery efficiency	N/A	
Heat recovery efficiency	N/A	N/A
Manufacturer/Model		
Commissioning		
9 Local generation		
N/A		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		
12 Declarations		
a. Assessor Declaration		
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed:	Assessor ID:	
Name:	Date:	
b. Client Declaration		
N/A		