



Morley Hill

Energy Statement

December 2023

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**DOCUMENT CONTROL SHEET**

<b>Report Reference</b>	PP2273/MH/NR/202312-NR
<b>Issue Purpose</b>	Planning Condition 8
<b>Client</b>	J & L Build Ltd
<b>Author</b>	Neil Rothern
<b>Approved By</b>	Ryan Thrower
<b>Date of Issue</b>	13 <sup>th</sup> December 2023

**DISCLAIMER**

This report has been produced to support a Planning Application and is not to be used 'For Construction', for Building Control compliance or for submission against a Planning Condition.

This report is based on drawings and specifications provided along with information assumed by NRG Consulting for the purposes of compliance. Any budget costs or plant sizing contained within this document are estimated unless otherwise specified and are to be taken as guideline only.

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## 1. EXECUTIVE SUMMARY

- 1.1 NRG Consulting have been appointed to undertake an Energy Statement on a proposed development at **45 Morley Hill, Enfield, EN2 0BL**

The proposed development is for:

*Sub-division of site and conversion of single-family dwelling house into 2 dwelling houses, involving partial demolition and part single, part 2 storey rear extension, 2 storey front extension, 2 rear dormers and front roof lights.*

- 1.2 The site benefits from Planning Permission (ref: 23/02619/FUL) from Enfield Council.
- 1.3 The purpose of this report is to discharge Planning Condition 8 which states:

8 Prior to the commencement of above ground works, an Energy Statement confirming the CO<sub>2</sub>/yr (using SAP 10) reduction over Part L of Building Regulations (2021) shall be submitted to and approved in writing by the Local Planning Authority. The Energy Statement shall follow the GLA's Energy Assessment Guidance, the 'be lean, be clean, be green' reduction hierarchy set out in the London Plan (2021) and aspire to achieve a 35% reduction over Part L of Building Regulations (2021). This should include a detailed feasibility analysis of renewable energy technologies, including assessment of heat pumps as a feasible option for the building.

The renewable energy technologies included in the Energy Statement shall be incorporated into the development and installed in accordance with the recommendations of Energy Statement prior to first occupation of the development.

- 1.4 The Planning Condition is based on the requirements of Core Policy 20 from The Enfield Plan Core Strategy 2010-2025 which states:

### CORE POLICY 20

#### SUSTAINABLE ENERGY USE AND ENERGY INFRASTRUCTURE

The Council will require all new developments, and where possible via a retrofitting process in existing developments to address the causes and impacts of climate change by: minimising energy use; supplying energy efficiently; and using energy generated from renewable sources in line with London Plan and national policy.

The Council will support appropriate measures to mitigate and adapt to the impacts of climate change and will reduce emissions of carbon dioxide as part of development proposals, in line with the London Plan.

The Council will set local standards and targets, based on an understanding of local potential and opportunities for renewable or low carbon energy and existing or planned decentralised energy infrastructure. Where opportunities are identified, development will be required to contribute towards realising these opportunities subject to the Council and its partners undertaking further work that is required to explore the feasibility and development potential of projects or strategies in order to take them forward.

The Council, working with its partners, will seek to ensure that Enfield's future energy infrastructure needs are managed effectively by ensuring that the necessary infrastructure is in place to accommodate the levels of growth anticipated within the Borough.

- 1.5 Energy calculations have been undertaken against the requirements of Part L 2021 to calculate the savings in carbon dioxide and via renewable energy. These targets have been achieved via;

#### Energy Efficiency Measures

- High levels of thermal insulation to achieve U-Values lower than the Part L 2021 notional building specification.
- The installation of LED Lighting with high luminous efficacy
- Air Permeability targets of 5 m<sup>3</sup>/(hm<sup>2</sup>)

**Renewable Energy Measures**

- Air Source Heat Pumps

1.6 This report illustrates how the design of the proposed development has been developed to incorporate energy efficient features and renewable energy and low-carbon provision to achieve in excess of a 67% CO<sub>2</sub> reduction against the Part L 2021 baseline.

1.7 Section 5 highlights *Water Efficiency* of less than 110ltrs/person/day in-line with Part G of the Building Regulations methodology.

1.8 Overall, through the provision of Air Source Heat Pumps and high levels of energy efficiency low U-Values, the scheme is highly sustainable and low carbon and exceeds the requirements of Planning Condition 8.

	CO <sub>2</sub> Emissions (Tonnes per Annum)	
	Regulated	
<b>Baseline: Part L 2021 of the Building Regulations (TER)</b>	<b>2.4</b>	
<b>Be Lean: Energy Demand Reduction</b>	<b>2.8</b>	
<b>Be Clean: Supply Energy Efficiently</b>	<b>2.8</b>	
<b>Be Green: Renewable Energy (DER)</b>	<b>0.78</b>	
<b>Regulated CO<sub>2</sub> Savings at 'Be Green' over Part L 2021</b>	<b>67.32%</b>	
<b>Table: Carbon Emissions Table</b>		

## 2. ENERGY CALCULATIONS - “Be Lean”

2.1 In order to estimate the residential CO<sub>2</sub> emissions for the site SAP Calculations have been carried out by a licensed and accredited Energy Assessor using SAP 10.

2.2 The baseline CO<sub>2</sub> emissions covered by Part L 2021 of the Building Regulations will be expressed as the Target Emissions Rate (TER). This covers regulated carbon emissions from:

- Heating
- Cooling
- Hot Water
- Lighting
- Auxiliary (Pumps and Fans)

### 2.3 Passive Design

Passive design measures utilised by the architect in the concept and development of the scheme’s design include:

- High levels of insulation proposed in excess of the Part L 2021 notional values.
- Through good design and careful construction, air infiltration will be minimised and thus a low Air Permeability target has been sought.
- Optimising site layout to reduce energy demand.
- Provision of cross-ventilation.
- Thermal Bridging has been reviewed a scheme suitable to the insulation being used will be followed: [www.recognisedconstructiondetails.co.uk](http://www.recognisedconstructiondetails.co.uk)

ELEMENT	PART L1a LIMITING FABRIC PARAMETERS	PROPOSED U-VALUES (W/m <sup>2</sup> K)
<i>Walls</i>		
External Walls	0.26 W/m <sup>2</sup> K	<b>0.18 W/m<sup>2</sup>K</b>
Dormer Walls	0.26 W/m <sup>2</sup> K	<b>0.18 W/m<sup>2</sup>K</b>
Existing External Wall upgraded	0.30 W/m <sup>2</sup> K	<b>0.18 W/m<sup>2</sup>K</b>
<i>Floors</i>		
Ground Floor	0.18 W/m <sup>2</sup> K	<b>0.10 W/m<sup>2</sup>K</b>
<i>Roof</i>		
Roof insulated at flat ceiling	0.16 W/m <sup>2</sup> K	<b>0.13 W/m<sup>2</sup>K</b>
Roof, Insulated at sloping ceiling	0.16 W/m <sup>2</sup> K	<b>0.14 W/m<sup>2</sup>K</b>
Flat Roof	0.16 W/m <sup>2</sup> K	<b>0.13 W/m<sup>2</sup>K</b>
<i>Openings</i>		
Doors	1.6 W/m <sup>2</sup> K	<b>1.3 W/m<sup>2</sup>K</b>
Windows	1.6 W/m <sup>2</sup> K	<b>1.2 W/m<sup>2</sup>K</b>
Rooflights	1.6 W/m <sup>2</sup> K	<b>1.3 W/m<sup>2</sup>K</b>
<i>Air Permeability</i>		
<b>5 m<sup>3</sup>/(hm<sup>2</sup>) @50Pa</b>		
<i>Table: Proposed Fabric Specification</i>		

## 2.4 Active Design

The development will incorporate efficient building services to limit carbon emissions, including:

- Time and Temperature Zone Control
- LED Lighting

ELEMENT	PROPOSED DETAILS
Ventilation	<b>System 1 – Ventilation (Natural)</b>
<i>Heating – Be Lean</i>	<b>Gas Boiler – 89.5% Efficient</b>
Heating – Actual Proposed	<b>ASHP (Illustrative model only selected for this stage)</b>
Heating Controls	<b>Time and Temperature Zone Control</b>
Hot Water	<b>180ltr Hot Water Cylinder (Illustrative size only at this stage)</b>
Lighting	<b>Minimum of 85 lm/W</b>
Emitters	<b>Radiators</b>
Cooling	<b>No</b>
<b>Table: Proposed Mechanical and Electrical Specification</b>	

## Lighting

In-line with bettering the minimum allowable figure within Part L 201, all residential light fittings should be Light Emitting Diodes (LEDs) with a luminous efficiency per circuit watt of at least 85 lumens/Watt.

## Overheating

This development will be Part O of the Building Regulations compliant and has been designed to avoid Overheating with the early stages of the cooling hierarchy prioritised. The features of this scheme that will mitigate the risk of overheating are:

- Openable Windows
- Individual Heating meaning no communal heat distribution.

A full assessment for Part O of the Building Regulations will be undertaken prior to commencement on-site.

## Decentralised Energy (*Be Clean*)

In the context of the London Plan, decentralised energy refers to low- and zero-carbon power and/or heat generated and delivered within London. This includes microgeneration, on-site energy networks, through to large-scale heat networks.

The scheme is for two houses and in an area of very low heat density.

Based on the:

- Renewable heating selected for the scheme,
- Scheme location
- Size of scheme,
- High on-site carbon reduction that will increase further with National Grid decarbonisation.

No connection to an existing or future district heat network is proposed.

### 3. Renewable Technologies

3.1 Renewable Energy is typically defined as:

“Energy derived from a source that is continually replenished, such as wind, wave, solar, hydroelectric and energy from plant material, but not fossil fuels or nuclear energy. Although not strictly renewable, geothermal energy is generally included.”

3.2 Based on recent legislation such as the Clean Air Act as well as the location of the proposed development, the following technologies have been discounted:

- Wind Turbines
- Biomass
- Hydropower / Wave Technology
- Biogas / Biofuel

3.3 The feasibility of remaining renewable and low carbon technologies is highlighted in the table opposite

3.4 Following a review of the available technologies, the following have been integrated into the scheme:

- Air Source Heat Pump (Individual)

FEASIBILITY						
Technology	Considerations					Overall Preference
	Cost	Noise	Land Use	Tariffs	CO <sub>2</sub> Offset	
<b>Photovoltaic Panels (PV)</b>	There is currently an increased capital cost of PV installation due to supply-chain issues and shipping costs which offsets the decreased payback period for the technology following the rise in pence/kWh cost in 2022.  The CO <sub>2</sub> offset of PV in Part L 2021 is 73.8% less than Part L 2013 therefore carbon savings for the technology are greatly diminished.  Due to the rooflights and roof dormers there would be insufficient room for a suitably sized PV system.					<b>No</b>
<b>Heat Pumps (Air)</b>	Heat Pumps are powered by grid electricity and therefore are zero-NOx. They also work to reduce energy bills for the end-user over that of standard electric heating. As the dwelling will also be heated by a VRF system, this will provide heating and cooling at maximum efficiency					<b>Yes</b>
<b>Ground Source Heat Pumps (GSHP)</b>	GSHPs are like ASHPs but operate at slightly higher efficiencies due to drawing heat from the ground, a source that is warmer than the outside air, especially in Winter. However, the technology is more expensive than Air Source and requires either significant horizontal space for a <i>slinky</i> style system or deep boreholes as part of a vertical system. As this is not proposed here, ASHPs are more suited to the scheme.					<b>No</b>
<b>Solar Thermal</b>	Solar Thermal technologies would only assist with the Hot Water demand for the properties, which is very limited due to the size of the dwellings. The water cylinder for a solar thermal system would also be much larger and require more cupboard space. This would therefore reduce usable floor area.					<b>No</b>
<b>Table:</b> Renewable Energy Feasibility						

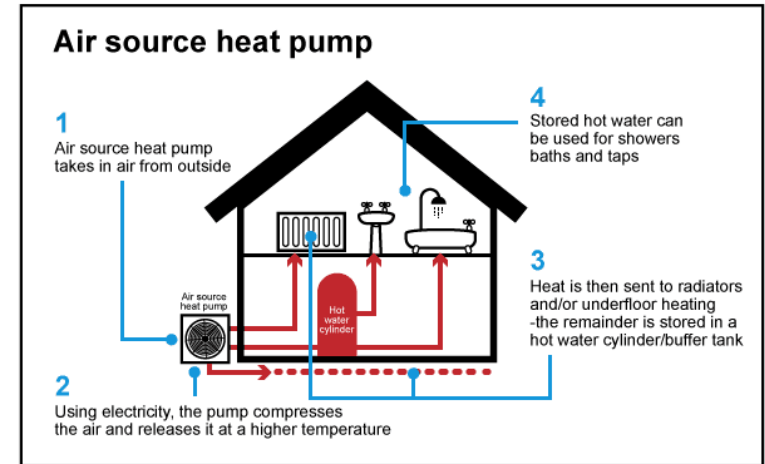
**ASHP Details**

3.5 An Air Source Heat Pump has been proposed to be the lead source in providing the heating and hot water for the dwelling. The technology has been chosen because:

- It is a highly efficient system (300%+) and will provide both the space heating and hot water for each proposed dwelling.
- Requires less capital cost, space, and is simpler to install than Ground Source Heat Pumps.
- It is simple to install when compared to other renewable technologies.

3.6 At this early stage, an indicative Air Source Heat Pump has been modelled for the purpose of Part L compliance based on the estimated size.

A final make & model will be supplied during M&E design at RIBA Stage 3 / 4.



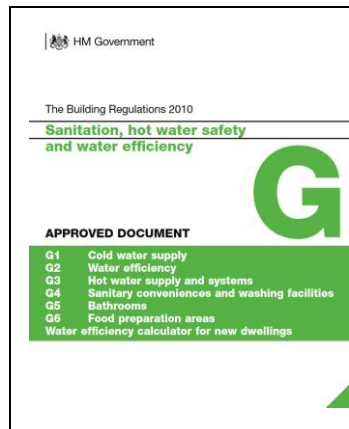
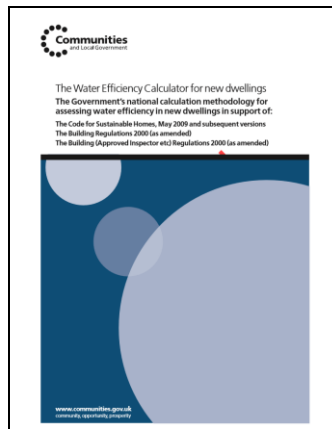
ASHP System Details	
Number of Heat Pumps	2 (1 per property)
Size of Heat Pumps	Circa 5-7 kW
Make and Model	Vaillant Arotherm (for SAP modelling illustration purposes)
SCOP	TBC depending on model but in excess of 3 (300%)
<i>Table: Proposed ASHP Specification</i>	





**5. WATER EFFICIENCY**

- 5.1 All developments must incorporate water conservation measures to limit the consumption to 105 litres per person per day in line with the Local Plan.
- 5.2 This target is the same as the optional target included within Part G of the Building Regulations which encourages the efficient use of potable water. The specification proposed has been produced using the calculation methodology used to assess compliance against the water performance targets in Building Regulations 17.K and is based on the Government’s “The Water Efficiency Calculator for new dwellings – September 2009” (withdrawn in June 2016).
- 5.3 The current guidance and calculation methodology can now be found within *Approved Document G - Sanitation, hot water safety and water efficiency* (2015 edition with 2016 amendments):  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/504207/BR\\_PDF\\_AD\\_G\\_2015\\_with\\_2016\\_amendments.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/504207/BR_PDF_AD_G_2015_with_2016_amendments.pdf)
- 5.4 The proposed specification for the scheme can be found on the right-hand side of the page showing compliance. For the Dishwashers and Washing Machines, default consumption figures have been us



**PROPOSED SANITARYWARE SPECIFICATION**

ELEMENT	SPECIFICATION	UNIT OF MEASUREMENT
WC	<b>6/3 dual flush</b>	<i>Litres per Flush</i>
Basin Taps	<b>5</b>	<i>Litres per Minute</i>
Kitchen Sink Taps	<b>9</b>	<i>Litres per Minute</i>
Shower	<b>8</b>	<i>Litres per Minute</i>
Bath	<b>155</b>	<i>Capacity to Overflow</i>
Washing Machine	<b>8.17</b>	<i>Litres per Kilo (Dry)</i>
Dishwasher	<b>1.25</b>	<i>Litres per Place Setting</i>
<b>Total Consumption (Litres / Person / Day)</b>		<b>104.7</b>

*Table : Proposed Water Consumption (litres/person/day)*

## 6. CONCLUSION

6.1 A full energy strategy in-line with the energy hierarchy has been undertaken and this document illustrates a reduction in CO<sub>2</sub> emissions over the baseline of Part L 2021 via:

### Energy Efficient Measures (*Be Lean*)

- High levels of thermal insulation to achieve U-Values lower than the Part L 2021 notional building specification.
- Air Permeability target of 5 m<sup>3</sup>/(hm<sup>2</sup>) @50Pa

### Renewable and Low Carbon Technologies (*Be Green*)

- Air Source Heat Pumps will be installed.

6.2 When the above measures are combined, the site will achieve a CO<sub>2</sub> reduction of 67.32% from renewable energy. A final carbon emission reduction table is shown on the opposite side of the page illustrating the saving.

6.3 The proposed site construction, specification, CO<sub>2</sub> savings and renewable contribution exceed the required figures, therefore Planning Condition 8 can be discharged on the basis of this report.

	CO <sub>2</sub> Emissions (Tonnes per Annum)	
	Regulated	
<b>Baseline: Part L 2021 of the Building Regulations (TER)</b>	<b>2.4</b>	
<b>Be Lean: Energy Demand Reduction</b>	<b>2.8</b>	
<b>Be Clean: Supply Energy Efficiently</b>	<b>2.8</b>	
<b>Be Green: Renewable Energy (DER)</b>	<b>0.78</b>	
<b>Regulated CO<sub>2</sub> Savings at 'Be Green' over Part L 2021</b>	<b>67.32%</b>	

**Table: Carbon Emissions Table**

# Appendix 1



PROJECT: MORLEY HILL

Plots	Floor Area	Target Emissions (TER) <i>Part L Baseline</i>	Total TER	Dwelling Emissions (DER) <i>Be Lean</i>	Total DER <i>Be Lean</i>	DER <i>Be Green</i>	Total DER <i>Be Green</i>
	m <sup>2</sup>	kg/CO <sub>2</sub> /m <sup>2</sup> /year	kg/CO <sub>2</sub> /year	kg/CO <sub>2</sub> /m <sup>2</sup> /year	kg/CO <sub>2</sub> /year	kg/CO <sub>2</sub> /m <sup>2</sup> /year	kg/CO <sub>2</sub> /year
1	114	10.96	1,249	12.63	1,440	3.50	399
2	121	9.34	1,130	11.24	1,360	3.13	379
<u>Total Site Area (m<sup>2</sup>):</u>		235	2,380		2,800		778

RESULTS

Baseline Emissions - Total Site	2,380	kg/CO <sub>2</sub> /year
<i>Be Lean</i> Emissions - Total Site	2,800	kg/CO <sub>2</sub> /year
Unregulated Energy - Total Site	987	kg/CO <sub>2</sub> /year

OVERALL RESULTS

Final CO <sub>2</sub> Emissions at <i>Be Green</i>	778	kg/CO <sub>2</sub> /year
CO <sub>2</sub> Savings at <i>Be Green</i>	67.32	%

# Appendix 2



# Building Regulations England Part L (BREL) Compliance Report

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

Date: Wed 13 Dec 2023 20:45:35

Project Information			
Assessed By	Neil Rothon	Building Type	House, End-terrace
OCDEA Registration	EES/022150	Assessment Date	2023-12-13

Dwelling Details			
Assessment Type	As designed	Total Floor Area	114 m <sup>2</sup>
Site Reference	House 1	Plot Reference	Be Lean
Address	House 1 45 Morley Hill, Enfield, EN2 0BL		

Client Details	
Name	example
Company	example
Address	TBC, TBC, TBC, TBC

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	Mains gas	
Target carbon dioxide emission rate	10.96 kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling carbon dioxide emission rate	12.63 kgCO <sub>2</sub> /m <sup>2</sup>	FAIL
1b Target primary energy rate and dwelling primary energy		
Target primary energy	57.25 kWh <sub>PE</sub> /m <sup>2</sup>	
Dwelling primary energy	70.48 kWh <sub>PE</sub> /m <sup>2</sup>	FAIL
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	39.3 kWh/m <sup>2</sup>	
Dwelling fabric energy efficiency	36.3 kWh/m <sup>2</sup>	OK

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m <sup>2</sup> K]	Dwelling average U-Value [W/m <sup>2</sup> 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	0.11	Heatloss Floor 1 (0.11)	OK
Roofs	0.16	0.14	Roof (2) (0.14)	OK
Windows, doors, and roof windows	1.6	1.23	d1 (1.3)	OK
Rooflights	2.2	1.3	Opening, West (1.3)	OK

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	Net area [m <sup>2</sup> ]	U-Value [W/m <sup>2</sup> K]
Exposed wall: Walls (1)	83.7285	0.18
Exposed wall: Walls (2)	9.19	0.18
Exposed wall: Walls (3)	0.6835	0.18
Party wall: Party Wall (1)	66.43	0 (!)
Ground floor: Heatloss Floor 1, Heatloss Floor 1	51.72	0.11
Exposed roof: Roof (1)	11.29	0.13
Exposed roof: Roof (2)	21.1073	0.14
Exposed roof: Roof (3)	12.46	0.14
Exposed roof: Roof (4)	10.57	0.13
Exposed roof: Roof (5)	1.15	0.13

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m <sup>2</sup> ]	Orientation	Frame factor	U-Value [W/m <sup>2</sup> K]
d1, Front Door	2.1	West	N/A	1.3
West windows, Windows Sash	1.4763	West	0.7	1.2
West windows, Windows Sash	1.365	West	0.7	1.2
West windows, Windows Sash	1.05	West	0.7	1.2
east windows, Windows Sash	3.234	East	0.7	1.2
east windows, Windows Sash	1.428	East	0.7	1.2
east windows, Windows Sash	1.428	East	0.7	1.2

Name	Area [m <sup>2</sup> ]	Orientation	Frame factor	U-Value [W/m <sup>2</sup> K]
east windows, Windows Sash	0.735	East	0.7	1.2
sw, Windows Sash	1.0101	South West	0.7	1.2
nw, Windows Sash	1.0101	North West	0.7	1.2
byfolds, byfolds	5.565	North	0.7	1.3
dormer, Windows Sash	1.2665	East	0.7	1.2
north windows, Windows Sash	0.63	North	0.7	1.2
Opening, Rooflight	0.7227	West	0.7	1.3

### 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	0.024 (!)	rcd
External wall	E3: Sill	Calculated by person with suitable expertise	0.022 (!)	rcd
External wall	E4: Jamb	Calculated by person with suitable expertise	0.017 (!)	rcd
Roof	R11: Upstands or kerbs of rooflights	SAP table default	0.24	df
External wall	E5: Ground floor (normal)	Calculated by person with suitable expertise	0.084	rcd
External wall	E6: Intermediate floor within a dwelling	Calculated by person with suitable expertise	0.001 (!)	rcd ff
External wall	E6: Intermediate floor within a dwelling	Calculated by person with suitable expertise	0.001 (!)	rcd 2f
External wall	E14: Flat roof	SAP table default	0.16	df
Party wall	P4: Roof (insulation at ceiling level)	Calculated by person with suitable expertise	0.101	rcd
Party wall	P5: Roof (insulation at rafter level)	Calculated by person with suitable expertise	0.046	rcd
Party wall	P1: Ground floor	Calculated by person with suitable expertise	0.103	rcd
Party wall	P2: Intermediate floor within a dwelling	SAP table default	0 (!)	df
External wall	E24: Eaves (insulation at ceiling level - inverted)	SAP table default	0.15	df
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.046	rcd
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	-0.088	rcd
External wall	E18: Party wall between dwellings	Calculated by person with suitable expertise	0.038 (!)	rcd
External wall	E16: Corner (normal)	SAP table default	0.18	dormers
External wall	E10: Eaves (insulation at ceiling level)	Calculated by person with suitable expertise	0 (!)	rcd bay window
External wall	E11: Eaves (insulation at rafter level)	Calculated by person with suitable expertise	0.018 (!)	rcd main
External wall	E13: Gable (insulation at rafter level)	Calculated by person with suitable expertise	0.05	rcd main gable
External wall	E10: Eaves (insulation at ceiling level)	Calculated by person with suitable expertise	0.06	rcd
External wall	E12: Gable (insulation at ceiling level)	Calculated by person with suitable expertise	0.056	rcd
Roof	R6: Flat ceiling	SAP table default	0.12	df
Roof	R7: Flat ceiling (inverted)	SAP table default	0.12	dormer
Roof	R9: Roof to wall (flat ceiling)	SAP table default	0.32	dormer

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

Maximum permitted air permeability at 50Pa	8 m <sup>3</sup> /hm <sup>2</sup>	
Dwelling air permeability at 50Pa	3 m <sup>3</sup> /hm <sup>2</sup> , Design value (!)	OK
Air permeability test certificate reference		

4 Space heating		
<b>Main heating system 1:</b> Boiler with radiators or underfloor heating - Mains gas		
Efficiency	89.5%	
Emitter type	Radiators	
Flow temperature	55°C	
System type	tbc	
Manufacturer	tbc	
Model	tbcv	
Commissioning		
<b>Secondary heating system:</b> N/A		
Fuel	N/A	
Efficiency	N/A	
Commissioning		
5 Hot water		
<b>Cylinder/store</b> - type: N/A		
Capacity	N/A	
Declared heat loss	N/A	
Primary pipework insulated	N/A	
Manufacturer		
Model		
Commissioning		
<b>Waste water heat recovery system 1</b> - type: N/A		
Efficiency		
Manufacturer		
Model		
6 Controls		
<b>Main heating 1</b> - type: Time and temperature zone control by arrangement of plumbing and electrical services		
Function		
Ecodesign class		
Manufacturer		
Model		
<b>Water heating</b> - type: Cylinder thermostat and HW separately timed		
Manufacturer		
Model		
7 Lighting		
<i>Minimum permitted light source efficacy</i>	75 lm/W	
Lowest light source efficacy	85 lm/W	OK
External lights control	N/A	
8 Mechanical ventilation		
<b>System type:</b> N/A		
<i>Maximum permitted specific fan power</i>	N/A	
Specific fan power	N/A	N/A
<i>Minimum permitted heat recovery efficiency</i>	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: Wed 13 Dec 2023 20:45:35

Project Information			
Assessed By	Neil Rothon	Building Type	House, Mid-terrace
OCDEA Registration	EES/022150	Assessment Date	2023-12-13

Dwelling Details			
Assessment Type	As designed	Total Floor Area	121 m <sup>2</sup>
Site Reference	House 2	Plot Reference	Be Lean
Address	House 1 45 Morley Hill, Enfield, EN2 0BL		

Client Details	
Name	example
Company	example
Address	TBC, TBC, TBC, TBC

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	Mains gas	
Target carbon dioxide emission rate	9.34 kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling carbon dioxide emission rate	11.24 kgCO <sub>2</sub> /m <sup>2</sup>	FAIL
1b Target primary energy rate and dwelling primary energy		
Target primary energy	48.67 kWh <sub>PE</sub> /m <sup>2</sup>	
Dwelling primary energy	63.07 kWh <sub>PE</sub> /m <sup>2</sup>	FAIL
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	33.7 kWh/m <sup>2</sup>	
Dwelling fabric energy efficiency	30.7 kWh/m <sup>2</sup>	OK

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m <sup>2</sup> K]	Dwelling average U-Value [W/m <sup>2</sup> 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	0.1	Heatloss Floor 1 (0.1)	OK
Roofs	0.16	0.14	Roof (2) (0.14)	OK
Windows, doors, and roof windows	1.6	1.25	d1 (1.3)	OK
Rooflights	2.2	1.3	Opening, West (1.3)	OK

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	Net area [m <sup>2</sup> ]	U-Value [W/m <sup>2</sup> K]
Exposed wall: Walls (1)	49.8455	0.18
Exposed wall: Walls (2)	0.6835	0.18
Party wall: Party Wall (1)	113.37	0 (!)
Ground floor: Heatloss Floor 1, Heatloss Floor 1	58.9	0.1 (!)
Exposed roof: Roof (1)	11.29	0.13
Exposed roof: Roof (2)	21.1073	0.14
Exposed roof: Roof (3)	12.46	0.14
Exposed roof: Roof (4)	17.75	0.13
Exposed roof: Roof (5)	1.15	0.13

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m <sup>2</sup> ]	Orientation	Frame factor	U-Value [W/m <sup>2</sup> K]
d1, Front Door	2.1	West	N/A	1.3
West windows, Windows Sash	1.4763	West	0.7	1.2
West windows, Windows Sash	1.365	West	0.7	1.2
West windows, Windows Sash	1.05	West	0.7	1.2
east windows, Windows Sash	1.428	East	0.7	1.2
east windows, Windows Sash	0.735	East	0.7	1.2
sw, Windows Sash	1.0101	South West	0.7	1.2
nw, Windows Sash	1.0101	North West	0.7	1.2

Name	Area [m <sup>2</sup> ]	Orientation	Frame factor	U-Value [W/m <sup>2</sup> K]
byfolds, byfolds	6.3	East	0.7	1.3
dormer, Windows Sash	1.2665	East	0.7	1.2
Opening, Rooflight	0.7227	West	0.7	1.3

### 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	0.024 (!)	rcd
External wall	E3: Sill	Calculated by person with suitable expertise	0.022 (!)	rcd
External wall	E4: Jamb	Calculated by person with suitable expertise	0.017 (!)	rcd
Roof	R11: Upstands or kerbs of rooflights	SAP table default	0.24	df
External wall	E5: Ground floor (normal)	Calculated by person with suitable expertise	0.084	rcd
External wall	E6: Intermediate floor within a dwelling	Calculated by person with suitable expertise	0.001 (!)	rcd ff
External wall	E14: Flat roof	SAP table default	0.16	df
Party wall	P4: Roof (insulation at ceiling level)	Calculated by person with suitable expertise	0.101	rcd
Party wall	P5: Roof (insulation at rafter level)	Calculated by person with suitable expertise	0.046	rcd
Party wall	P1: Ground floor	Calculated by person with suitable expertise	0.103	rcd
Party wall	P2: Intermediate floor within a dwelling	SAP table default	0 (!)	df
External wall	E24: Eaves (insulation at ceiling level - inverted)	SAP table default	0.15	df
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.046	rcd
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	-0.088	rcd
External wall	E18: Party wall between dwellings	Calculated by person with suitable expertise	0.038 (!)	rcd
External wall	E16: Corner (normal)	SAP table default	0.18	dormers
External wall	E10: Eaves (insulation at ceiling level)	Calculated by person with suitable expertise	0 (!)	rcd bay window
External wall	E11: Eaves (insulation at rafter level)	Calculated by person with suitable expertise	0.018 (!)	rcd main
External wall	E10: Eaves (insulation at ceiling level)	Calculated by person with suitable expertise	0.06	rcd
External wall	E12: Gable (insulation at ceiling level)	Calculated by person with suitable expertise	0.056	rcd
Roof	R6: Flat ceiling	SAP table default	0.12	df
Roof	R7: Flat ceiling (inverted)	SAP table default	0.12	dormer
Roof	R9: Roof to wall (flat ceiling)	SAP table default	0.32	dormer

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

Maximum permitted air permeability at 50Pa	8 m <sup>3</sup> /hm <sup>2</sup>	
Dwelling air permeability at 50Pa	3 m <sup>3</sup> /hm <sup>2</sup> , Design value (!)	OK
Air permeability test certificate reference		

### 4 Space heating

Main heating system 1: Boiler with radiators or underfloor heating - Mains gas

Efficiency	89.5%
Emitter type	Radiators
Flow temperature	55°C
System type	
Manufacturer	tbc
Model	tbc
Commissioning	

<b>Secondary heating system:</b> N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

**5 Hot water**

<b>Cylinder/store</b> - type: N/A	
Capacity	N/A
Declared heat loss	N/A
Primary pipework insulated	N/A
Manufacturer	
Model	
Commissioning	
<b>Waste water heat recovery system 1</b> - type: N/A	
Efficiency	
Manufacturer	
Model	

**6 Controls**

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

**7 Lighting**

<i>Minimum permitted light source efficacy</i>	75 lm/W	
Lowest light source efficacy	85 lm/W	OK
External lights control	N/A	

**8 Mechanical ventilation**

<b>System type:</b> N/A		
<i>Maximum permitted specific fan power</i>	N/A	
Specific fan power	N/A	N/A
<i>Minimum permitted heat recovery efficiency</i>	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**

<b>a. Assessor Declaration</b>	
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>b. Client Declaration</b>
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N/A
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# Appendix 3



# Building Regulations England Part L (BREL) Compliance Report

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

Date: Wed 13 Dec 2023 20:45:35

Project Information			
Assessed By	Neil Rothon	Building Type	House, End-terrace
OCDEA Registration	EES/022150	Assessment Date	2023-12-13

Dwelling Details			
Assessment Type	As designed	Total Floor Area	114 m <sup>2</sup>
Site Reference	House 1	Plot Reference	Be Green
Address	House 1 45 Morley Hill, Enfield, EN2 0BL		

Client Details	
Name	example
Company	example
Address	TBC, TBC, TBC, TBC

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	10.68 kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling carbon dioxide emission rate	3.5 kgCO <sub>2</sub> /m <sup>2</sup>	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	55.74 kWh <sub>PE</sub> /m <sup>2</sup>	
Dwelling primary energy	36.28 kWh <sub>PE</sub> /m <sup>2</sup>	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	39.3 kWh/m <sup>2</sup>	
Dwelling fabric energy efficiency	36.3 kWh/m <sup>2</sup>	OK

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m <sup>2</sup> K]	Dwelling average U-Value [W/m <sup>2</sup> 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	0.11	Heatloss Floor 1 (0.11)	OK
Roofs	0.16	0.14	Roof (2) (0.14)	OK
Windows, doors, and roof windows	1.6	1.23	d1 (1.3)	OK
Rooflights	2.2	1.3	Opening, West (1.3)	OK

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	Net area [m <sup>2</sup> ]	U-Value [W/m <sup>2</sup> K]
Exposed wall: Walls (1)	83.7285	0.18
Exposed wall: Walls (2)	9.19	0.18
Exposed wall: Walls (3)	0.6835	0.18
Party wall: Party Wall (1)	66.43	0 (!)
Ground floor: Heatloss Floor 1, Heatloss Floor 1	51.72	0.11
Exposed roof: Roof (1)	11.29	0.13
Exposed roof: Roof (2)	21.1073	0.14
Exposed roof: Roof (3)	12.46	0.14
Exposed roof: Roof (4)	10.57	0.13
Exposed roof: Roof (5)	1.15	0.13

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m <sup>2</sup> ]	Orientation	Frame factor	U-Value [W/m <sup>2</sup> K]
d1, Front Door	2.1	West	N/A	1.3
West windows, Windows Sash	1.4763	West	0.7	1.2
West windows, Windows Sash	1.365	West	0.7	1.2
West windows, Windows Sash	1.05	West	0.7	1.2
east windows, Windows Sash	3.234	East	0.7	1.2
east windows, Windows Sash	1.428	East	0.7	1.2
east windows, Windows Sash	1.428	East	0.7	1.2

Name	Area [m <sup>2</sup> ]	Orientation	Frame factor	U-Value [W/m <sup>2</sup> K]
east windows, Windows Sash	0.735	East	0.7	1.2
sw, Windows Sash	1.0101	South West	0.7	1.2
nw, Windows Sash	1.0101	North West	0.7	1.2
byfolds, byfolds	5.565	North	0.7	1.3
dormer, Windows Sash	1.2665	East	0.7	1.2
north windows, Windows Sash	0.63	North	0.7	1.2
Opening, Rooflight	0.7227	West	0.7	1.3

### 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	0.024 (!)	rcd
External wall	E3: Sill	Calculated by person with suitable expertise	0.022 (!)	rcd
External wall	E4: Jamb	Calculated by person with suitable expertise	0.017 (!)	rcd
Roof	R11: Upstands or kerbs of rooflights	SAP table default	0.24	df
External wall	E5: Ground floor (normal)	Calculated by person with suitable expertise	0.084	rcd
External wall	E6: Intermediate floor within a dwelling	Calculated by person with suitable expertise	0.001 (!)	rcd ff
External wall	E6: Intermediate floor within a dwelling	Calculated by person with suitable expertise	0.001 (!)	rcd 2f
External wall	E14: Flat roof	SAP table default	0.16	df
Party wall	P4: Roof (insulation at ceiling level)	Calculated by person with suitable expertise	0.101	rcd
Party wall	P5: Roof (insulation at rafter level)	Calculated by person with suitable expertise	0.046	rcd
Party wall	P1: Ground floor	Calculated by person with suitable expertise	0.103	rcd
Party wall	P2: Intermediate floor within a dwelling	SAP table default	0 (!)	df
External wall	E24: Eaves (insulation at ceiling level - inverted)	SAP table default	0.15	df
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.046	rcd
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	-0.088	rcd
External wall	E18: Party wall between dwellings	Calculated by person with suitable expertise	0.038 (!)	rcd
External wall	E16: Corner (normal)	SAP table default	0.18	dormers
External wall	E10: Eaves (insulation at ceiling level)	Calculated by person with suitable expertise	0 (!)	rcd bay window
External wall	E11: Eaves (insulation at rafter level)	Calculated by person with suitable expertise	0.018 (!)	rcd main
External wall	E13: Gable (insulation at rafter level)	Calculated by person with suitable expertise	0.05	rcd main gable
External wall	E10: Eaves (insulation at ceiling level)	Calculated by person with suitable expertise	0.06	rcd
External wall	E12: Gable (insulation at ceiling level)	Calculated by person with suitable expertise	0.056	rcd
Roof	R6: Flat ceiling	SAP table default	0.12	df
Roof	R7: Flat ceiling (inverted)	SAP table default	0.12	dormer
Roof	R9: Roof to wall (flat ceiling)	SAP table default	0.32	dormer

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

Maximum permitted air permeability at 50Pa	8 m <sup>3</sup> /hm <sup>2</sup>	
Dwelling air permeability at 50Pa	3 m <sup>3</sup> /hm <sup>2</sup> , Design value (!)	OK
Air permeability test certificate reference		



4 Space heating		
<b>Main heating system 1:</b> Heat pump with radiators or underfloor heating - Electricity		
Efficiency	237.7%	
Emitter type	Radiators	
Flow temperature	55°C	
System type	Heat Pump	
Manufacturer	Vaillant Group UK Ltd	
Model	aroTHERM 7kW	
Commissioning		
<b>Secondary heating system:</b> N/A		
Fuel	N/A	
Efficiency	N/A	
Commissioning		
5 Hot water		
<b>Cylinder/store</b> - type: Cylinder		
Capacity	180 litres	
Declared heat loss	1.4 kWh/day	
Primary pipework insulated	Yes	
Manufacturer		
Model		
Commissioning		
<b>Waste water heat recovery system 1</b> - type: N/A		
Efficiency		
Manufacturer		
Model		
6 Controls		
<b>Main heating 1</b> - type: Time and temperature zone control by arrangement of plumbing and electrical services		
Function		
Ecodesign class		
Manufacturer		
Model		
<b>Water heating</b> - type: Cylinder thermostat and HW separately timed		
Manufacturer		
Model		
7 Lighting		
<i>Minimum permitted light source efficacy</i>	75 lm/W	
Lowest light source efficacy	85 lm/W	OK
External lights control	N/A	
8 Mechanical ventilation		
<b>System type:</b> N/A		
<i>Maximum permitted specific fan power</i>	N/A	
Specific fan power	N/A	N/A
<i>Minimum permitted heat recovery efficiency</i>	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: Wed 13 Dec 2023 20:45:35

Project Information			
Assessed By	Neil Rothon	Building Type	House, Mid-terrace
OCDEA Registration	EES/022150	Assessment Date	2023-12-13

Dwelling Details			
Assessment Type	As designed	Total Floor Area	121 m <sup>2</sup>
Site Reference	House 2	Plot Reference	Be Green
Address	House 1 45 Morley Hill, Enfield, EN2 0BL		

Client Details	
Name	example
Company	example
Address	TBC, TBC, TBC, TBC

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	9.07 kgCO <sub>2</sub> /m <sup>2</sup>	
Dwelling carbon dioxide emission rate	3.13 kgCO <sub>2</sub> /m <sup>2</sup>	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	47.21 kWh <sub>PE</sub> /m <sup>2</sup>	
Dwelling primary energy	32.49 kWh <sub>PE</sub> /m <sup>2</sup>	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	33.7 kWh/m <sup>2</sup>	
Dwelling fabric energy efficiency	30.7 kWh/m <sup>2</sup>	OK

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m <sup>2</sup> K]	Dwelling average U-Value [W/m <sup>2</sup> 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	0.1	Heatloss Floor 1 (0.1)	OK
Roofs	0.16	0.14	Roof (2) (0.14)	OK
Windows, doors, and roof windows	1.6	1.25	d1 (1.3)	OK
Rooflights	2.2	1.3	Opening, West (1.3)	OK

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	Net area [m <sup>2</sup> ]	U-Value [W/m <sup>2</sup> K]
Exposed wall: Walls (1)	49.8455	0.18
Exposed wall: Walls (2)	0.6835	0.18
Party wall: Party Wall (1)	113.37	0 (!)
Ground floor: Heatloss Floor 1, Heatloss Floor 1	58.9	0.1 (!)
Exposed roof: Roof (1)	11.29	0.13
Exposed roof: Roof (2)	21.1073	0.14
Exposed roof: Roof (3)	12.46	0.14
Exposed roof: Roof (4)	17.75	0.13
Exposed roof: Roof (5)	1.15	0.13

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m <sup>2</sup> ]	Orientation	Frame factor	U-Value [W/m <sup>2</sup> K]
d1, Front Door	2.1	West	N/A	1.3
West windows, Windows Sash	1.4763	West	0.7	1.2
West windows, Windows Sash	1.365	West	0.7	1.2
West windows, Windows Sash	1.05	West	0.7	1.2
east windows, Windows Sash	1.428	East	0.7	1.2
east windows, Windows Sash	0.735	East	0.7	1.2
sw, Windows Sash	1.0101	South West	0.7	1.2
nw, Windows Sash	1.0101	North West	0.7	1.2

Name	Area [m <sup>2</sup> ]	Orientation	Frame factor	U-Value [W/m <sup>2</sup> K]
byfolds, byfolds	6.3	East	0.7	1.3
dormer, Windows Sash	1.2665	East	0.7	1.2
Opening, Rooflight	0.7227	West	0.7	1.3

### 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	0.024 (!)	rcd
External wall	E3: Sill	Calculated by person with suitable expertise	0.022 (!)	rcd
External wall	E4: Jamb	Calculated by person with suitable expertise	0.017 (!)	rcd
Roof	R11: Upstands or kerbs of rooflights	SAP table default	0.24	df
External wall	E5: Ground floor (normal)	Calculated by person with suitable expertise	0.084	rcd
External wall	E6: Intermediate floor within a dwelling	Calculated by person with suitable expertise	0.001 (!)	rcd ff
External wall	E14: Flat roof	SAP table default	0.16	df
Party wall	P4: Roof (insulation at ceiling level)	Calculated by person with suitable expertise	0.101	rcd
Party wall	P5: Roof (insulation at rafter level)	Calculated by person with suitable expertise	0.046	rcd
Party wall	P1: Ground floor	Calculated by person with suitable expertise	0.103	rcd
Party wall	P2: Intermediate floor within a dwelling	SAP table default	0 (!)	df
External wall	E24: Eaves (insulation at ceiling level - inverted)	SAP table default	0.15	df
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.046	rcd
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	-0.088	rcd
External wall	E18: Party wall between dwellings	Calculated by person with suitable expertise	0.038 (!)	rcd
External wall	E16: Corner (normal)	SAP table default	0.18	dormers
External wall	E10: Eaves (insulation at ceiling level)	Calculated by person with suitable expertise	0 (!)	rcd bay window
External wall	E11: Eaves (insulation at rafter level)	Calculated by person with suitable expertise	0.018 (!)	rcd main
External wall	E10: Eaves (insulation at ceiling level)	Calculated by person with suitable expertise	0.06	rcd
External wall	E12: Gable (insulation at ceiling level)	Calculated by person with suitable expertise	0.056	rcd
Roof	R6: Flat ceiling	SAP table default	0.12	df
Roof	R7: Flat ceiling (inverted)	SAP table default	0.12	dormer
Roof	R9: Roof to wall (flat ceiling)	SAP table default	0.32	dormer

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

Maximum permitted air permeability at 50Pa	8 m <sup>3</sup> /hm <sup>2</sup>	
Dwelling air permeability at 50Pa	3 m <sup>3</sup> /hm <sup>2</sup> , Design value (!)	OK
Air permeability test certificate reference		

### 4 Space heating

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

Efficiency	236.5%
Emitter type	Radiators
Flow temperature	55°C
System type	Heat Pump
Manufacturer	Vaillant Group UK Ltd
Model	aroTHERM 7kW
Commissioning	

<b>Secondary heating system:</b> N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

### 5 Hot water

<b>Cylinder/store</b> - type: Cylinder	
Capacity	180 litres
Declared heat loss	1.4 kWh/day
Primary pipework insulated	Yes
Manufacturer	
Model	
Commissioning	
<b>Waste water heat recovery system 1</b> - type: N/A	
Efficiency	
Manufacturer	
Model	

### 6 Controls

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

### 7 Lighting

<i>Minimum permitted light source efficacy</i>	75 lm/W	
Lowest light source efficacy	85 lm/W	OK
External lights control	N/A	

### 8 Mechanical ventilation

<b>System type:</b> N/A		
<i>Maximum permitted specific fan power</i>	N/A	
Specific fan power	N/A	N/A
<i>Minimum permitted heat recovery efficiency</i>	N/A	
Heat recovery efficiency	N/A	N/A
Manufacturer/Model		
Commissioning		

### 9 Local generation

N/A
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### 10 Heat networks

N/A
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### 11 Supporting documentary evidence

N/A
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### 12 Declarations

<b>a. Assessor Declaration</b>	
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>b. Client Declaration</b>
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N/A
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