

Planet

CONSULT



Baseline

36.76 tCO₂ a

Be Lean

24.53 tCO₂ a

Be Clean

Be Green -40.65% CO₂

Proposed - 22.09 tCO₂ a

client -

PHPM Properties Ltd

site -

Durham Road, Bognor Regis

title -

Energy & Sustainability Strategy

date -

28.10.21

Revision

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Executive Summary

The following provides an overview of the Energy and Sustainability Strategy for the proposed development at Durban Road, Bognor Regis.

Development Description

The proposals are for the construction of twenty-four new build residential units, arranged over four floors. Covered car parking and cycle storage is provided at ground floor level within the building footprint. The schedule of accommodation can be seen in Table 01.

Table 01: Proposed development accommodation [GIA]		
Residential	2No. Studios	74 Sq.m
	11No. 1 Beds	590 Sq.m
	11No. 2 Beds	873 Sq.m

Policy & Standards Review

National Policy - Building Regulations

- Parts F, G, and L

National Policy – NPPF

- Chapter 2. Achieving sustainable development
- Chapter 14. Meeting the challenge of climate change, flooding, and coastal change

Local Policy – Arun District Council

- SD SP1 – Sustainable Development
- ECC SP1 Adapting to Climate Change
- ECC SP2 Energy & Climate Change Mitigation
- ECC DM1 Renewable Energy

See Appendices 01 – 03 inclusive

Energy strategy summary

Be Lean

The development will achieve a 24.53% reduction in CO₂ emissions beyond the Part L1A baseline assessment, prior to consideration of Low or Zero Carbon Technologies [LZC]. These have been achieved through a fabric first approach and incorporation of passive design features.

24.53% Reduction in CO₂ Emissions

Be Clean

The availability of district heating networks has been assessed as part of this energy strategy, but no opportunities have been identified.

24.53% Cumulative Reduction in CO₂ Emissions [0% Reduction]

Be Green

The use of LZCs and renewable energy systems has been reviewed, and the following systems have been identified as the most suitable for the development:

- Photovoltaics {PV}

40.69% Cumulative Reduction in CO₂ Emissions

Be Seen

It is important to understand how the development is performing to ensure the targets set out in this Energy Strategy are achieved and maintained.

All residential units will be fitting with smart meters, or, if smart meters are not available through the utility supplier energy display devices, in visible locations such as hallways or kitchens.

Managing heat risk

To minimise the risk of summer over heating is important to ensure that homes are adaptable to climate change and remain comfortable for the occupants. The cooling hierarchy has been used to ensure passive building design has been optimised to reduce the cooling load for the proposed development.

Renewable energy generation

Arun District Council requires a minimum 10% of on-site energy be produced through renewable or low carbon energy generation. Energy demand and generation calculations are given in Table 03.

Table 03: Renewable energy generation - Residential	
	kWh/Yr
Total energy demand	142,372
Photovoltaics energy generation	37,021
Total energy from renewables	26%

Introduction

The Arun District Plan requires all developments to be designed with climate change and sustainability in mind. Developments are also required to ensure a minimum of 10% of regulated energy is developed on site through renewable or low and zero carbon technology. This Energy & Sustainability Strategy sets out how this will be achieved in line with all National, Regional and Local Policies.

Prepared on behalf of PHPM Properties Ltd, in support of the proposed development at Durban Road, Bognor Regis; this strategy formalises how the proposals will reduce carbon emissions from regulated and unregulated energy, minimise internal overheating, and future proof the development to ensure it can achieve Net Zero Carbon emissions by 2050.

The Development

The proposed development is for the construction of 24No. new build residential apartments arranged over three stories, at the junction of Durban Road and Ash Grove in Bognor Regis. The schedule of accommodation is shown in Table 04, and the site location is shown opposite.

Table 04: Proposed development accommodation [GIA]		
Residential	2No. Studios	74 Sq.m
	11No. 1 Beds	590 Sq.m
	11No. 2 Beds	873 Sq.m

Objectives

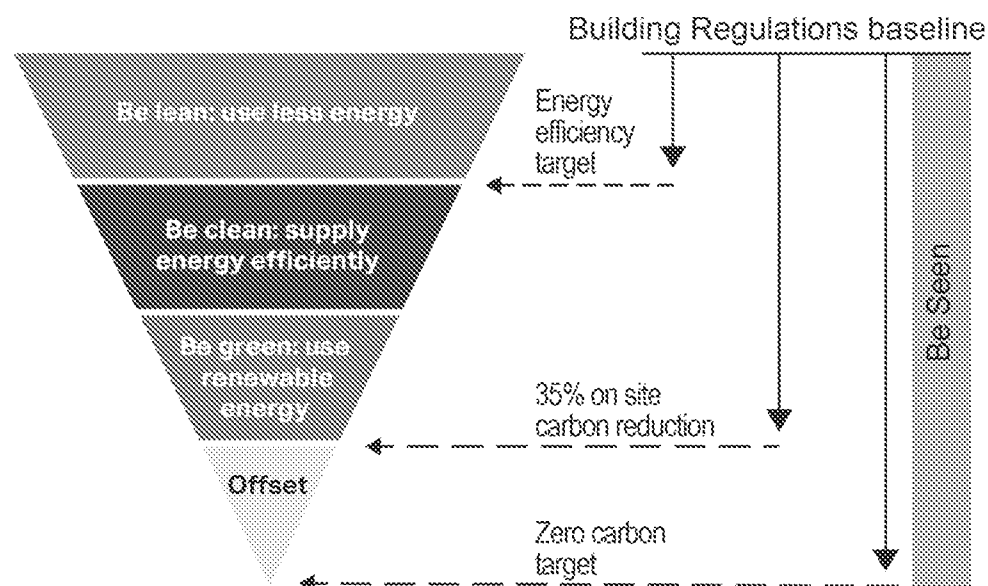
The objectives for this report are to demonstrate how the development responds to national and local planning sustainability policies, and how CO₂ emissions from the development and its associated plant will be minimised in accordance with national building regulations requirements.

Energy hierarchy

The London Plan 2021

- Be Lean: Use less energy and manage demand during operation.
- Be Clean: Exploit local energy resources [such as secondary heat] and supply energy efficiently and cleanly.
- Be Green: Maximise opportunities for renewable energy producing, storing, and using renewable energy on-site.
- Be Seen: Monitor, verify, and report on energy performance

The purpose of the Energy Hierarchy is to demonstrate that climate change mitigation measures are a fundamental part of the development's design philosophy.



Methodology

As there is no National Guidance for the preparation of Energy Strategies, this document has been prepared in line with the DRAFT Energy Planning GLA Guidance on the preparation of Energy Assessments [GLA, 04.20].

All calculations are based on drawings and information provided for planning approval. The results provide an initial assessment of the design ensuring planning policy requirements can be met.

The assessment has followed the Standard Assessment Procedure for the Energy Rating of Dwellings [SAP], using the current SAP 2012 version.

Planning policy

National Policy – NPPF

The NPPF sets out the Government’s planning policies for England and how these should be applied. It provides a framework within which Local Authorities can prepare local development plans. The framework sets out a presumption in favour of sustainable development, promoting high standards of design that reduce carbon emissions and support renewable and low carbon technologies.

Local Policy – Arun District Council

Arun District Council’s latest Local Plan 2011-2031 contains various planning policies that cover sustainable development, and how projects are expected to tackle climate change through their design and construction. The relevant policies considered as part of this study are listed below, more detailed information on each policy can be found in Appendices 03.

- SD SP1 – Sustainable Development
- ECC SP1 Adapting to Climate Change
- ECC SP2 Energy & Climate Change Mitigation
- ECC DM1 Renewable Energy

Baseline assessment

To accurately measure the improvements over Part L 2013, we first need to establish the Dwelling Emission Rating [DER] for the proposed development. To do this, the proposed development is modelled in full compliance with UK Building Regulations using BRE approved SAP software. This sets the Target Emission Rating [TER] for the notional development that is then used to inform the minimum requirements of the DER for the proposed development.

To complete the assessment, it is necessary to prepare a base specification that will ensure the development meets the minimum standards set in Part L 2013.

Tables 05 and 06 show the standards used for the baseline calculation and the estimated carbon dioxide emissions, respectively.

Table 05: Notional building minimum standards

u-Values [W/m ² K]	Flat Roofs	0.16
	Walls	0.20
	Party Walls	Full fill
	Common ways	Full fill & conditioned
	Floors	0.16
	Windows	1.4
	External Doors	1.4
g-Value	Glazing	0.63 Argon filled Low E
Air permeability [m ³ /hr.m ²]	Building fabric	5
Thermal bridging		Accredited details
Ventilation		Natural
Heating	Direct acting, electrical panel heaters, with programmable thermostat	
Hot water	Electrical heat pump system: 200l Dimplex EDL200	
Lighting	75% Energy efficient lighting	
Renewables	Not considered at this stage	

Table 06: Notional building carbon emissions

Notional baseline TER	25.19	t.CO ₂ /m ²
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Be Lean

Use less energy and manage demand during operation.

The first stage of the energy hierarchy focuses on reducing CO₂ through energy efficiency measures alone.

Orientation & Natural Light

Every effort has been made to optimise the orientation of the development to maximise access to natural light, whilst minimising potential for overheating. By optimising orientation and fenestration details internal daylight levels have been maximised, reducing artificial lighting demand throughout the development.

Thermal Envelope

A fabric first approach has been adopted for the development to minimise energy consumption through passive design measures.

The building fabric [walls, floors, and roofs] has been designed to exceed the minimum requirements of Building Regulations Part L.

Thermal Bridging

30% of heat loss can occur through thermal bridging through the building fabric. By adopting accredited construction details throughout the development further improvements in energy efficiency and emissions reductions will be achieved.

Air Permeability [Airtightness]

All new buildings are required to have air permeability tests on completion to confirm heat losses through uncontrolled ventilation [draughts]. To build on the higher standards of thermal efficiency in the building fabric, a target air permeability rate of 4m³/hr.m² has been specified.

Ventilation

To ensure a high standard of internal air quality throughout the development, mechanical ventilation with heat recovery [MVHR] will be installed. These systems extract warm, stale air and reusing the extracted warmth to temper a constant supply of fresh air to all habitable spaces, thus reducing space heating / cooling demand. Summer bypass will be used to prevent the heat being returned to the building during the summer months.

Fenestration

Windows and external doors are designed to meet the minimum requirements of Building Regulations Part L.

The size and orientation of glazed elements has been optimised to provide all interior space with a high standard of daylight to reduce reliance on artificial lighting. This optimised approach also maximises solar gains during the winter months, whilst minimizing overheating during the summer.

Domestic hot water [DHW]

Water efficient fixtures and fittings will be used throughout the development to reduce the energy required to provide the necessary hot water. Water consumption itself will be reduced through the installation of low volume, dual flush toilets, and flow reducers to taps and showers. Further information for the water consumption is provided in the water use calculation.

Heating

For the purposes of the 'Be Lean' phase of the report the heating and hot water is assumed to be provided by individual gas boilers. Further investigations into suitable heating systems are explored in the 'Be Green' phase of the report.

Lighting

Low energy, LED lighting will be used throughout the development to minimise the energy requirement for the artificial lighting systems. External and communal area lighting will be linked to daylight or motion sensors to prevent unnecessary use.

Managing heat risk

Using the cooling hierarchy to inform the design internal heat gains will be minimised using fully insulated pipework to all fixed services, solar shading from cantilevered balconies will reduce the amount of heat entering the building whilst maximising daylight. Further reduction in heat penetration is managed through use of an efficient fabric with medium thermal mass. MVHR with summer bypass will provide balanced ventilation throughout the year.

Be Lean – Summary

The proposed minimum standards for the development are set out in Table 07 opposite, and the reduction in CO₂ emissions following the implementation of these measures is set out in Table 08.

The 'Be Lean' stage delivers a 24.53% reduction in CO₂ emissions beyond the baseline notional development.

In addition to minimizing energy consumption across the development, the strategy outlined in the 'Be Lean' phase will deliver a thermally efficient, comfortable development with high levels of natural daylight, and low instances of overheating.

Table 07: Proposed building minimum standards		
u-Values [W/m ² K]	Flat Roofs	0.16
	Walls	0.18
	Party Walls	Full fill
	Common ways	Full fill & conditioned
	Floors	0.16
	Windows	1.4
	External Doors	1.4
g-Value	Glazing	0.63 Argon filled Low E
Air permeability [m ³ /hr.m ²]	Building fabric	4
Thermal bridging	Accredited construction details	
Ventilation	MVHR [System 4] : Nuaire Eco 2	
Heating	Direct acting, electrical panel heaters, with programmable thermostat	
Hot water	Electrical heat pump system: 200l Dimplex EDL200	
Lighting	100% Energy efficient lighting	
Renewables	Not considered at this stage	

Table 08: DER Improvements		
Notional baseline TER	38.76	t.CO ₂ /m ²
Proposed dwelling DER	29.25	t.CO ₂ /m ²
Percentage reduction	24.53%	

Be Clean

Exploit local energy resources [such as secondary heat] and supply energy efficiently and cleanly.

Be Clean investigates the possibility of connecting the application site to a heating or cooling network, and installation of a communal heating and cooling systems within the development to further reduce carbon emissions.

Due to the decarbonization of the electricity grid Combined Heat and Power systems [CHP] will not be considered as the use of these systems will create a net increase in carbon emissions.

District energy systems

There are no existing or planned Heat Networks within the vicinity of the development site.

Communal heating systems

Community heating involves distributing space and water heating services throughout the development from a central plant, making use of higher efficiencies available from larger systems.

Due to the scale of the development, it is not viable to use a communal heating system.

Be Clean – Summary

Further reductions in emissions are unachievable through the Be Clean method, so the total reduction through the first two stages of the Energy Hierarchy remains as calculated at the Be Lean phase.

Table 09: DER Improvements		
Notional baseline TER	38.76	t.CO ₂ /m ²
Proposed dwelling DER	29.25	t.CO ₂ /m ²
Percentage reduction	24.53%	

Be Green

Maximise opportunities for renewable energy by producing, storing, and using renewable energy on-site.

Be Green encourages the incorporation of Low and Zero Carbon [LZC] technologies in a development to reduce site dependency on grid services and lower CO₂ emissions. A feasibility study was undertaken to assess the suitability of each technology for the development, the study is provided in tabulated form below.

Photovoltaics [PV]	
PVs generate electricity from sunlight. PV systems require accessible roof space for the system to be installed and function correctly.	
Suitability	
The design, orientation, and location of the proposal lend itself to the installation of photovoltaic panels on the third floor, flat roof. A 14kWp system, comprising 40No. 350W panels is proposed, with the final layout subject to detailed design to minimise overshadowing from the lift motor room and low-level parapet. The energy generated will be distributed throughout the development on a floor area weighted contribution.	

Ground source heat pump [GSHP]	
GSHPs extract heat [or coolth] from the ground. Systems can be installed horizontally in the ground over a large area, or vertically in boreholes. A heat exchanger is used to convert the extracted heat for use in heating and DHW.	
Suitability	
As the decarbonisation of the grid continues GSHP technology will offer further opportunities for CO ₂ reductions. Whilst GSHP systems are being more commonly used in communal heating systems it is not considered feasible on this project due to site constraints. Furthermore, communal heating was not considered financially viable due to the size of the development.	

Energy storage	
Energy storage allows for energy created on site to be captured and stored for use later, this would be achieved through the installation of an accumulator or battery system. Typically, these systems are paired with photovoltaics to maximise on-site energy use before electricity is exported back to the grid.	
Suitability	
To support the Photovoltaic installation and maximise the amount of generated energy that can be used on site, it is proposed to install a 27kWh battery storage system in the basement plant. This will further reduce energy bills as stored energy can be used out of daylight hours. Energy will be shared out to apartments on a floor area. The energy generated will be distributed throughout the development on a floor area weighted contribution.	

Ground source heat pump [GSHP]	
GSHPs extract heat [or coolth] from the ground. Systems can be installed horizontally in the ground over a large area, or vertically in boreholes. A heat exchanger is used to convert the extracted heat for use in heating and DHW.	
Suitability	
As the decarbonisation of the grid continues GSHP technology will offer further opportunities for CO ₂ reductions. Whilst GSHP systems are being more commonly used in communal heating systems it is not considered feasible on this project due to site constraints. Furthermore, communal heating was not considered financially viable due to the size of the development.	

Solar thermal [hot water]	
Solar thermal collectors provide hot water by utilizing the energy present in sunlight to heat a collector; this is then transferred to a circulating fluid and used to heat hot water.	
Suitability To create a suitable solar thermal array for an apartment block, a single array would be required for each individual apartment. In addition to the space requirement, this would also require extensive insulated pipework to connect each apartment to an array. For this reason, it was not deemed suitable for this project as the benefits of a large Photovoltaic array outweigh the benefits of solar thermal.	

Air source heat pump [ASHP]	
ASHPs utilise the temperature difference between external and internal spaces. A heat exchanger is used to convert the extracted heat for use in heating and DHW.	
Suitability As the decarbonisation of the grid continues ASHP technology will offer further opportunities for CO ² reductions. To incorporate ASHPs into the development the project would require either individual units for each flat, or a communal heating system. As individual units would need to be located on the external façade this was not considered appropriate. Communal heating was not considered financially viable due to the size of the development.	

Biomass boiler	
Biomass boilers use a carbon neutral fuel source, such as wood pellets, to generate heat for hot water and heating. These systems require a significant space for both the boilers and storage of the fuel.	
Suitability Whilst Biomass boilers are considered a LZC technology they require extensive space for boilers and storage of the fuel, all of which needs to be readily accessible for maintenance and deliveries. As they rely on burning fuel to create heat energy there can also be adverse impacts on surrounding air quality. For these reasons, a Biomass boiler was not considered appropriate for this development.	

Small scale wind turbines	
Whilst small scale wind turbines can produce a high degree of energy, this is dependent on a consistent flow of air which makes them difficult to design into most developments.	
Suitability Due to the overly complex requirements for a wind turbine installation to run efficiently, and potential impact of reverberation and noise on the occupants this technology is not considered appropriate for the development	

Be Green – Summary

The most appropriate Low or Zero Carbon Technologies [LZC] for the development are listed below. The reduction in CO₂ emissions following the implementation of these measures is set out in Table 11 opposite.

The 'Be Green' stage delivers a 40.69% reduction in CO₂ emissions beyond the baseline notional development.

Photovoltaics [PV]

A 14kWp photovoltaic system will be installed at roof level. The energy generated will be distributed throughout the development on a floor area weighted contribution. The SAP assessment DER worksheets have been reviewed and sample assessments have confirmed that a predicted 26% of the sites regulated energy demand and cut annual carbon emissions by 15.77kg/CO₂/Yr. Refer to Table 10 for more information.

Table 10: DER Improvements	
	kWh / Yr
Space heating demand	76,069
Water heating demand	34,053
Aux demand	11,237
Lighting demand	21,014
Total energy demand	142,372
Total energy generated	37,021
Percentage generated	26%

Energy storage

A 27kW battery storage array will be installed on the landlord's supply in the plant room to retain unused electricity generated by the PV installation prior to it being discharged to the grid. The retained energy will be re-distributed throughout the development on a floor area weighted contribution.

Table 11: Proposed building minimum standards

u-Values [W/m ² K]	Flat Roofs	0.16
	Walls	0.18
	Party Walls	Full fill
	Common ways	Full fill & conditioned
	Floors	0.16
	Windows	1.4
	External Doors	1.4
g-Value	Glazing	0.63 Argon filled Low E
Air permeability [m ³ /hr.m ²]	Building fabric	4
Thermal bridging	Accredited construction details	
Ventilation	MVHR [System 4]: Nuaire Eco 2	
Heating	Direct acting, electrical panel heaters, with programmable thermostat	
Hot water	Electrical heat pump system: 200l Dimplex EDL200	
Lighting	100% Energy efficient lighting	
Renewables	14kWp 30° pitch, south facing - 40No. 350W Panels. Distributed to all flats in proportion to floor area	

Table 12: DER Improvements

Notional baseline TER	38.76	t.CO ₂ /m ²
Proposed dwelling DER	22.97	t.CO ₂ /m ²
Percentage reduction	40.69%	

Be Seen

Monitor, verify, and report on energy performance

It is important to understand how the development is performing to ensure the targets set out in this Energy Strategy are achieved and maintained.

All residential units will be fitting with smart meters, or, if smart meters are not available through the utility supplier energy display devices, in visible locations such as hallways or kitchens.

Sustainable design considerations

Energy efficient design is only a small part of creating a sustainable development, this section of the report outlines other considerations that have been made to ensure the proposed development will be constructed to the highest standards of sustainable living.

Water efficiency

Minimising water consumption is set out in Approved Document G of the Building Regulations and requires a minimum water efficiency of 125l per person, per day. The proposed development will achieve an efficiency of 110l per person, per day using highly efficient fixtures and fittings, in line with planning policy WDM1. The relevant flow rates and usages are outlined in Table 12 below.

Table 12: DER Improvements		
Room	Fitting Type	Flow Rate
Kitchen	Taps	4l per minute
	Dishwasher	1l per place setting
	Washing machine	6.5l per kg dry load
Bathroom	WC	Dual flush 4 / 2.6l
	Taps	4l per minute
	Shower	8l per minute
	Bath	200l to overflow

Energy efficient white goods

Where installed, white goods will meet the following specifications and energy efficiency ratings under the EU Energy Efficiency Labelling Scheme:

- Fridge freezers, fridges, and freezers – A+ Rating
- Washing machines and dishwashers – A+ Rating
- Tumble dryers and washer dryers – B Rating
- Hobs and ovens – A+ Rating

Lighting

High quality lighting design is an important and desirable feature for the home, and is a basic function that contributes to comfortable, healthy living. All areas of the development will have intuitive, controllable lighting. The lighting design will ensure the requirements of the CIBSE Internal Lighting Guide & SSL Lighting Guide set out in Table 13 are met.

Table 12: Internal Lighting Standards	
Room	Lux Level
Entrance lobby	150
Kitchen	500
Living space	200
Bathrooms	200
Bedrooms	100

Ecology

To enhance site ecology and biodiversity an extensive green roof has been incorporated into the flat roof at third floor level. Green roofs are an important consideration when tackling the heat island effect, surface water run-off and biodiversity.

Sustainable material selection & sourcing

To further the developments sustainable credentials, it will be important to consider the embodied energy and source of specified products. To ensure the highest standards of sustainability are achieved, materials that score highly in the BRE Green Guide for Building Specification will be chosen over those with lesser ratings. It is anticipated that most materials will achieve an A or A+ rating.

All timber products will be sourced from FSC or PEFC sources, all non-timber products will be purchased from suppliers / manufacturers with an accredited Environmental Management System [BES6001, ISO14001 or BS8555] for the extraction and manufacturing of the proposed materials.

To further reduce greenhouse gas emissions associated with the development, all insulation used in the building fabric and services installations shall have a Global Warming Potential [GWP] of less than 5.

Transport strategy

Pedestrians and Cyclists

The site has good access for pedestrians and cyclists, secure cycle storage for 24 bikes is provided within building envelope at ground floor, with level access throughout. Local public transport is readily accessible with bus stops within 500m of the site on Oak Grove and Durban Road, and Bognor Regis train station is within 1500m that has direct trains to London Victoria and Portsmouth.

Car parking

20 active electric vehicle charging spaces are provided within the undercroft parking area to ensure the site is future proofed for the wider adoption of electric vehicles.

Refuse and Recycling

Communal refuse and recycling

A secure, ventilated refuse and recycling store is provided within the building envelope for all residents, with level access throughout. Sufficient space has been provided to ensure ease of operation and volume of storage in line with Local Authority requirements.

Construction impact

The chosen contractor will ensure the site is registered under the Considerate Contractor's Scheme [CSS], that has been designed to encourage environmentally and socially considerate ways of working, to reduce adverse impacts arising from the construction phase.

During construction control measures will be put in place to minimise noise and dust pollution from the site on the neighbouring areas. Minimising dust pollution will ensure roads are kept clean and clear of debris from the site. The management systems will comprise procedures and working methods that are approved by the development team together with commercial agreements to ensure compliance.

Additional measures will be adopted to minimise the impact on the local area during construction, including the limiting of air and water pollution in accordance with best practices.

Appendices 01 – Building Regulations

Part F Means of Ventilation

F1(1). There shall be adequate means of ventilation provided for people in the building.

(2). Fixed systems for mechanical ventilation and any associated controls must be commissioned by testing and adjusting as necessary to secure that the objective referred to in sub-paragraph (1) is met.

Limits on application

Requirement F1 does not apply to a building or space within a building:

- a. into which people do not normally go; or
- b. which is used solely for storage; or
- c. which is a garage used solely in connection with a single dwelling

Part G Water Efficiency

G2. Reasonable provision must be made by the installation of fittings and fixed appliances that use water efficiently for the prevention of undue consumption of water.

Water efficiency of new dwellings

36. (1) The potential consumption of wholesome water by persons occupying a new dwelling must not exceed the requirement in paragraph (2).

(2) The requirement referred to in paragraph (1) is either—

- a) 125 litres per person per day; or
- (b) in a case to which paragraph (3) applies, the optional requirement of 110 litres per person per day, as measured in either case in accordance with a methodology approved by the Secretary of State.

(3) This paragraph applies where the planning permission under which the building work is carried out—

- a) specifies the optional requirement in paragraph (2)(b); and
- (b) makes it a condition that that requirement must be complied with.

(4) In this Part, “new dwelling” does not include a dwelling that is formed by a material change of use of a building within the meaning of regulation 5(g)

Part L Conservation of fuel and power

L1. Reasonable provision shall be made for the conservation of fuel and power in buildings by:

- (a) limiting heat gains and losses
 - (i) through thermal elements and other parts of the building fabric; and
 - (ii) from pipes, ducts and vessels used for space heating, space cooling and hot water services;
- (b) providing fixed building services which—
 - (i) are energy efficient;
 - (ii) have effective controls; and
 - (iii) are commissioned by testing and adjusting as necessary to ensure they use no more fuel and power than is reasonable in the circumstances.

Appendices 02 - NPPF

Chapter 2 – Sustainable development

10. So that sustainable development is pursued in a positive way, at the heart of the Framework is a presumption in favour of sustainable development

11. Plans and decisions should apply a presumption in favour of sustainable development.

For plan-making this means that:

a) all plans should promote a sustainable pattern of development that seeks to: meet the development needs of their area; align growth and infrastructure; improve the environment; mitigate climate change (including by making effective use of land in urban areas) and adapt to its effects;

b) strategic policies should, as a minimum, provide for objectively assessed needs for housing and other uses, as well as any needs that cannot be met within neighbouring areas⁶, unless:

i. the application of policies in this Framework that protect areas or assets of particular importance provides a strong reason for restricting the overall scale, type, or distribution of development in the plan area⁷; or

ii. any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole.

For decision-taking this means:

c) approving development proposals that accord with an up-to-date development plan without delay; or

d) where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date⁸, granting permission unless:

i. the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed⁷; or

ii. any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole

Chapter 14 – Meeting the challenge of climate change flooding and coastal change

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

153. 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 temperatures⁵³.

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.

154. 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.

157. In determining planning applications, local planning authorities should expect new development to:

a) comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and

b) take account of landform, layout, building orientation, massing, and landscaping to minimise energy consumption.

Appendices 03 – Arun District Council

Policy SD SP1 – Sustainable development

When considering development proposals the Council will take a positive approach that reflects the presumption in favour of sustainable development contained in the National Planning Policy Framework. It will work pro-actively with applicants to jointly find solutions which mean that proposals can be approved wherever possible and to secure development that will contribute to the social, economic, and environmental conditions south of the National Park through to the coast and throughout its settlements (both coastal and inland).

This presumption will not be applicable where development requires an Appropriate Assessment or where consideration of the need for one is being undertaken.

Policy ECC SP1 – Adapting to climate change

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

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

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

Policy ECC SP2 – Energy and climate change mitigation

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

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

All major developments(47) must produce 10% of the total predicted energy requirements from renewable or low carbon energy generation on site, unless it can be demonstrated that this is unviable. Energy efficiency measures will be taken into consideration when the total predicted energy requirements are calculated. The Council will consider ‘allowable solutions’ where it is clearly demonstrated that the provision of on site renewable or low carbon energy generation is unviable or not feasible.

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

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

Site constraints;

Technical viability;

Financial viability; and Delivery of additional benefits.

Policy W DM1 – Water supply and quality

1. Water supply

Development will be permitted where:

- a. Sufficient water supplies can be provided prior to occupation to serve the development and;
- b. Provision of a water supply is not considered detrimental to existing abstractions, river flows, water quality, fisheries, amenity, or nature conservation.

To ensure that all new development of two dwellings or more are water efficient and reduce pressure on water abstraction sites, it must include measures that meet the optional standards of 110 l/person/day.

2. Water quality

To ensure good water quality in the District, all major developments must:

- a. Illustrate, where necessary, how they have contributed to the protection and enhancement of waterbodies identified by the South East River Basin Management Plan objectives; and
- b. Demonstrate, where it will materially increase foul and/or surface water discharges, adequate drainage capacity exists or can be provided as part of the development. Where adequate capacity does not exist, there will be a requirement that facilities are adequately upgraded prior to the completion and occupation of development. In sewered areas, there will be a general presumption against the use of non mains foul water drainage.

3. Lidsey Wastewater Treatment Works Catchment Area

Major development within this area must also be accompanied by a full Drainage Impact Assessment which must take account of surface water disposal and foul water disposal.

Although minor developments are unlikely to raise significant flood risk due to the cumulative impact all development within this area must also be accompanied by a Drainage Impact Assessment that must take account of both the individual and cumulative impact upon foul water disposal; flood storage capacity and surface water drainage or flood flows within the Lidsey Wastewater Treatment Works Catchment Area. Where surface water and foul water drainage systems are approved as part of the consideration of a planning application, conditions may be imposed upon the permission relating to dates for implementation or other detailed technical requirements. In order to discharge conditions, the developer will be required to submit a statement from a suitably qualified and experienced engineer that the measures have been adequately and satisfactorily implemented.

Policy W DM3 – Sustainable Urban Drainage Systems

To increase the levels of water capture and storage and improve water quality, all development must identify opportunities to incorporate a range of Sustainable Urban Drainage Systems (SUDS), appropriate to the size of development, at an early stage of the design process.

Proposals for both major and minor development proposals must incorporate SUDS within the private areas of the development in order to provide source control features to the overall SUDS design. These features include:

- Green roofs
- Permeable driveways and parking
- Soakaways

Water harvesting and storage features including water butts

Proposals for major development must also integrate SUDS within public open spaces and roads, reflecting discussion with the appropriate bodies. SUDS must therefore be integrated into the overall design of a development and must:

- a. Contribute positively to the appearance of the area, integrating access to allow maintenance of existing watercourses and the system.
- b. Effectively manage water (including its quality)
- c. Accommodate and enhance biodiversity by making connections to existing Green Infrastructure assets and
- d. Provide amenity for local residents (ensuring a safe environment)
- e. Retain the existing drainage network of the site and the wider area,
- f. Be maintained in perpetuity, supported through a Maintenance and Management Plan/Regime, including its financing, agreed with the Local Planning Authority.

In order to ensure that SUDS discharge water from the development at the same or lesser rate, as prior to construction, developers must:

- f. Follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations and the SUDS manual produced by CIRIA.
- g. Undertake up to six months groundwater monitoring within the winter period.
- h. Undertake winter percolation testing in accordance with BRE365.
- i. The proposed drainage system must be designed to ensure that there is no flooding on a 1 in 30 year storm event.
- j. The design must also take account of the 1 in 100 year storm event plus 30% allowance for climate change, on stored volumes, to ensure that there is no flooding of properties or the public highway or inundation of the foul sewerage system. Any excess flows must be contained within the site boundary, and within designated storage areas.

In order to ensure that SUDS discharge water from the development at the same or lesser rate, as prior to construction, developers must:

- f. Follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations and the SUDS manual produced by CIRIA.
- g. Undertake up to six months groundwater monitoring within the winter period.
- h. Undertake winter percolation testing in accordance with BRE365.
- i. The proposed drainage system must be designed to ensure that there is no flooding on a 1 in 30 year storm event.
- j. The design must also take account of the 1 in 100 year storm event plus 30% allowance for climate change, on stored volumes, to ensure that there is no flooding of properties or the public highway or inundation of the foul sewerage system. Any excess flows must be contained within the site boundary, and within designated storage areas.

Appendices 04 – SAP Calculations

Baseline

Baseline SAP calculation to meet minimum requirement of the Building Regulations Part L1A and establish annual carbon emissions for the notional and the baseline TER for use in the Energy Hierarchy calculations on the proposed development.

Be Lean

SAP calculations used to establish the reduction in carbon emissions over the baseline assessment that the proposed development will achieve through passive design measures only.

Be Clean

SAP calculations used to establish the reduction in carbon emissions over the baseline assessment that the proposed development will achieve through passive design measures, and the use of clean energy in the form of district or communal heat networks.

Be Green

SAP calculations used to establish the reduction in carbon emissions over the baseline assessment that the proposed development will achieve through passive design measures, and the use of clean energy in the form of district or communal heat networks, and the use of renewable or LZC technologies.

SAP Input

Property Details Plot 2 - BASILINE

Address: Plot 2
Located in: England
Region: South East England
UPRN:
Date of assessment: 23 October 2021
Date of certificate: 28 October 2021
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium
Water use <= 125 litres/ person/ day: True
PCDF Version: 484

Property description

Dwelling type: Flat
Detachment:
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 67.1 m² 3 m
Living area: 21 m² (fraction 0.313)
Front of dwelling faces: West

Opening types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
U2 W003	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W004	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W005	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W006	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W007	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W008	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 D002	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
U2 W003	16mm or more	0.8	0.63	1.4	1.92	1
U2 W004	16mm or more	0.8	0.63	1.4	1.92	1
U2 W005	16mm or more	0.8	0.63	1.4	2.43	1
U2 W006	16mm or more	0.8	0.63	1.4	2.43	1
U2 W007	16mm or more	0.8	0.63	1.4	2.43	1
U2 W008	16mm or more	0.8	0.68	1.4	4.74	1
U2 D002	16mm or more	0.8	0.63	1.4	2.21	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
U2 W003		External walls	West	1.475	1.305
U2 W004		External walls	West	1.475	1.305
U2 W005		External walls	South West	1.1	2.205
U2 W006		External walls	South West	1.1	2.205
U2 W007		External walls	South	1.1	2.205
U2 W008		External walls	South	2.15	2.205
U2 D002		External walls	West	1	2.205

Overshading: Average or unknown

Opening Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
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SAP Input

External Elements

External walls	55.5	18.08	37.42	0.2	0	False	N/A
Wall onto bin store	9	0	9	0.2	0.68	False	N/A
Ground floor	67.1			0.16			N/A

Internal Elements

Party Elements

Wall onto Common way	42.6						N/A
Party ceiling	67.1						N/A

Thermal bridges:

Thermal bridges:	User-defined (individual PSI-values) Y-Value = 0.0738					
		Length	Psi-value			
[Approved]	9.4	0.3	E2	Other lintels (including other steel lintels)		
[Approved]	9.4	0.04	E3	Sill		
[Approved]	27.27	0.05	E4	Jamb		
[Approved]	18.5	0.16	E5	Ground floor (normal)		
[Approved]	18.5	0.07	E7	Party floor between dwellings (in blocks of flats)		
[Approved]	9	0.09	E16	Corner (normal)		
[Approved]	6	0.06	E18	Party wall between dwellings		
[Approved]	3	-0.09	E17	Corner (inverted internal area greater than external area)		

Ventilation

Pressure test:	Yes (As designed)
Ventilation:	Natural ventilation (extract fans)
Number of chimneys:	0
Number of open flues:	0
Number of fans:	2
Number of passive stacks:	0
Number of sides sheltered:	2
Pressure test:	5

Main heating system:

Main heating system:	Room heaters
	Electric (direct acting) room heaters
	Fuel: Electricity
	Info Source: SAP Tables
	SAP Table: 691
	Panel, convactor or radiant heaters

Fraction of main heat: 1

Main heating Control:

Main heating Control:	Programmer and room thermostats
	Control code: 2605

Secondary Main heating system

Secondary Main heating system:	Heat pumps with radiators or underfloor heating
	Electric heat pumps
	Fuel: Electricity
	Info Source: Boiler Database
	Database: (rev 484, product index 190006, SEDBUK 100%):
	Band name: Dimplex
	Model: EDL200UK-630
	Model qualifier:
	(provides DHW all year)

Secondary Main heating Control:

Secondary Main heating Control:	Not applicable (boiler provides DHW only)
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SAP Input

Control code: 2100

Secondary heating system

Secondary heating system: None

Water heating

Water heating: From second main heating system
Water code: 914
Fuel :Electricity
Hot water cylinder
Cylinder volume: 201 litres
Cylinder insulation: Measured loss, 1.61kWh/day
Primary pipework insulation: False
Cylinderstat: False
Cylinder in heated space: False
Solar panel: False

Others

Electricity tariff: Standard Tariff
In Smoke Control Area: Unknown
Conservatory: No conservatory
Low energy lights: 75%
Terrain type: Low rise urban / suburban
EPC language: English
Wind turbine: No
Photovoltaics: None
Assess Zero Carbon Home: No

SAP Input

Property Details Plot 7 - BASILINE

Address: Plot 7
Located in: England
Region: South East England
UPRN:
Date of assessment: 23 October 2021
Date of certificate: 28 October 2021
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium
Water use <= 125 litres/ person/ day: True
PCDF Version: 484

Property description

Dwelling type: Flat
Detachment:
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 37.1 m² 3 m
Living area: 24 m² (fraction 0.647)
Front of dwelling faces: West

Opening types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
U7 D006	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U7 W020	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
U7 D006	16mm or more	0.8	0.63	1.4	6.66	1
U7 W020	16mm or more	0.8	0.63	1.4	1.92	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
U7 D006		External walls	East	3.05	2.185
U7 W020		External walls	East	1.475	1.305

Overshading: Average or unknown

Opaque Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
External walls	19.5	8.58	10.92	0.2	0	False	N/A
Internal Elements							
Party Elements							
Wall onto Common way	13.2						N/A
Party walls	42						N/A
Party ceiling	37.1						N/A
Party floor	37.1						N/A

Thermal Bridges

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.4624

	Length	Psi-value	
[Approved]	4.525	0.3	E2 Other lintels (including other steel lintels)

SAP Input

[Approved]	4.525	0.04	E3	Sill
[Approved]	6.98	0.05	E4	Jamb
[Approved]	6.7	0.07	E7	Party floor between dwellings (in blocks of flats)
[Approved]	6	0.06	E18	Party wall between dwellings
	6.3	1	E23	Balcony within or between dwellings, balcony support penetrates wall

Ventilation

Pressure test: Yes (As designed)
 Ventilation: Natural ventilation (extract fans)
 Number of chimneys: 0
 Number of open flues: 0
 Number of fans: 2
 Number of passive stacks: 0
 Number of sides sheltered: 3
 Pressure test: 5

Main heating system:

Main heating system: Room heaters
 Electric (direct acting) room heaters
 Fuel: Electricity
 Info Source: SAP Tables
 SAP Table: 691
 Panel, convector or radiant heaters

Fraction of main heat: 1

Main heating Control:

Main heating Control: Programmer and room thermostats
 Control code: 2605

Secondary Main heating system:

Secondary Main heating system: Heat pumps with radiators or underfloor heating
 Electric heat pumps
 Fuel: Electricity
 Info Source: Boiler Database
 Database: (rev 484, product index 190006, SEDBUK 100%):
 Band name: Dimplex
 Model: EDL200UK-630
 Model qualifier:
 (provides DHW all year)

Secondary Main heating Control:

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

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating: From second main heating system
 Water code: 914
 Fuel :Electricity
 Hot water cylinder
 Cylinder volume: 201 litres
 Cylinder insulation: Measured loss, 1.61kWh/day
 Primary pipework insulation: False
 Cylinderstat: False
 Cylinder in heated space: False
 Solar panel: False

SAP Input

Client

Electricity tariff:	Standard Tariff
In Smoke Control Area:	Unknown
Conservatory:	No conservatory
Low energy lights:	75%
Terrain type:	Low rise urban / suburban
EPC language:	English
Wind turbine:	No
Photovoltaics:	None
Assess Zero Carbon Home:	No

SAP Input

Property Details Plot 22 - BASELINE

Address: Plot 22
Located in: England
Region: South East England
UPRN:
Date of assessment: 23 October 2021
Date of certificate: 28 October 2021
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium
Water use <= 125 litres/ person/ day: True
PCDF Version: 484

Property description

Dwelling type: Flat
Detachment:
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 90.5 m² 3 m
Living area: 31.9 m² (fraction 0.352)
Front of dwelling faces: West

Opening types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
U22 D024	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W073	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W059	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W060	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W062	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W063	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
U22 D024	16mm or more	0.8	0.63	1.4	7.33	1
U22 W073	16mm or more	0.8	0.63	1.4	1.19	1
U22 W059	16mm or more	0.8	0.63	1.4	2.44	1
U22 W060	16mm or more	0.8	0.63	1.4	2.44	1
U22 W062	16mm or more	0.8	0.63	1.4	1.99	1
U22 W063	16mm or more	0.8	0.63	1.4	1.99	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
U22 D024		External walls	North West	3.33	2.2
U22 W073		External walls	West	0.91	1.305
U22 W059		External walls	West	1.81	1.35
U22 W060		External walls	North	1.81	1.35
U22 W062		External walls	East	1.475	1.35
U22 W063		External walls	East	1.475	1.35

Overshading: Average or unknown

Opaque Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
<u>External Elements</u>							
External walls	85.5	17.38	68.12	0.2	0	False	N/A

SAP Input

Flat roof	90.5	0	90.5	0.16	0	N/A
Internal Elements						
Party Elements						
Wall onto Common way	25.5					N/A
Party walls	34.8					N/A
Party floor	90.5					N/A

Thermal bridges

Thermal bridges:	User-defined (individual PSI-values) Y-Value = 0.0829				
	Length	Psi-value			
[Approved]	12.62	0.3	E2	Other lintels (including other steel lintels)	
[Approved]	12.62	0.04	E3	Sill	
[Approved]	20.06	0.05	E4	Jamb	
[Approved]	28.5	0.07	E7	Party floor between dwellings (in blocks of flats)	
[Approved]	3	0.09	E16	Corner (normal)	
	11.9	0.56	E15	Flat roof with parapet	
[Approved]	6	0.06	E18	Party wall between dwellings	

Ventilation

Pressure test:	Yes (As designed)
Ventilation:	Natural ventilation (extract fans)
Number of chimneys:	0
Number of open flues:	0
Number of fans:	2
Number of passive stacks:	0
Number of sides sheltered:	2
Pressure test:	5

Main heating system

Main heating system:	Room heaters
	Electric (direct acting) room heaters
	Fuel: Electricity
	Info Source: SAP Tables
	SAP Table: 691
	Panel, convector or radiant heaters

Fraction of main heat: 1

Main heating Control

Main heating Control:	Programmer and room thermostats
	Control code: 2605

Secondary Main heating system

Secondary Main heating system:	Heat pumps with radiators or underfloor heating
	Electric heat pumps
	Fuel: Electricity
	Info Source: Boiler Database
	Database: (rev 484, product index 190006, SEDBUK 100%):
	Band name: Dimplex
	Model: EDL200UK-630
	Model qualifier:
	(provides DHW all year)

Secondary Main heating Control

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

Secondary heating system

Secondary heating system:	None
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SAP Input

Water heating:

Water heating: From second main heating system
Water code: 914
Fuel :Electricity
Hot water cylinder
Cylinder volume: 201 litres
Cylinder insulation: Measured loss, 1.61kWh/day
Primary pipework insulation: False
Cylinderstat: False
Cylinder in heated space: False
Solar panel: False

Other:

Electricity tariff: Standard Tariff
In Smoke Control Area: Unknown
Conservatory: No conservatory
Low energy lights: 75%
Terrain type: Low rise urban / suburban
EPC language: English
Wind turbine: No
Photovoltaics: None
Assess Zero Carbon Home: No

Block Compliance WorkSheet: Baseline

User Details

Assessor Name: Giles Murgatroyd
Software Name: Stroma FSAP

Stroma Number: STRO014966
Software Version: Version: 1.0.5.50

Calculation Details

Dwelling	DER	TER	DFEE	TFEE	TFA
Plot 2 - BASELINE	26.36	26.8	44.9	49.4	67.1
Plot 3 - BASELINE	23.68	27.21	37.4	42.2	50.5
Plot 4 - BASELINE	20.52	22.56	31.5	32.1	62
Plot 7 - BASELINE	27.34	29.01	42.7	37.1	37.1
Plot 11 - BASELINE	20.23	20.43	34.4	34.1	86.1
Plot 13 - BASELINE	23.98	24.69	38.3	39.4	62
Plot 16 - BASELINE	27.34	29.01	42.7	37.1	37.1
Plot 20 - BASELINE	26.07	23.76	45.6	45.2	86.1
Plot 22 - BASELINE	31.29	27.79	54.9	59.2	90.5

Calculation Summary

Total Floor Area	578.50
Average TER	25.19
Average DER	25.19
Average DFEE	41.93
Average TFEE	42.90
Compliance	Pass
% Improvement DER TER	0
% Improvement DFEE TFEE	2.26

SAP Input

Property Details Plot 2 - BE LEAN

Address: Plot 2
Located in: England
Region: South East England
UPRN:
Date of assessment: 23 October 2021
Date of certificate: 28 October 2021
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium
Water use <= 125 litres/ person/ day: True
PCDF Version: 484

Property description

Dwelling type: Flat
Detachment:
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 67.1 m² 3 m
Living area: 21 m² (fraction 0.313)
Front of dwelling faces: West

Opening types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
U2 W003	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W004	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W005	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W006	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W007	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W008	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 D002	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
U2 W003	16mm or more	0.8	0.63	1.4	1.92	1
U2 W004	16mm or more	0.8	0.63	1.4	1.92	1
U2 W005	16mm or more	0.8	0.63	1.4	2.43	1
U2 W006	16mm or more	0.8	0.63	1.4	2.43	1
U2 W007	16mm or more	0.8	0.63	1.4	2.43	1
U2 W008	16mm or more	0.8	0.68	1.4	4.74	1
U2 D002	16mm or more	0.8	0.63	1.4	2.21	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
U2 W003		External walls	West	1.475	1.305
U2 W004		External walls	West	1.475	1.305
U2 W005		External walls	South West	1.1	2.205
U2 W006		External walls	South West	1.1	2.205
U2 W007		External walls	South	1.1	2.205
U2 W008		External walls	South	2.15	2.205
U2 D002		External walls	West	1	2.205

Overshading: Average or unknown

Opening Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
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SAP Input

External Elements

External walls	55.5	18.08	37.42	0.18	0	False	N/A
Wall onto bin store	9	0	9	0.18	0.68	False	N/A
Ground floor	67.1			0.16			N/A

Internal Elements

Party Elements

Wall onto Common way	42.6						N/A
Party ceiling	67.1						N/A

Thermal bridges:

Thermal bridges:	User-defined (individual PSI-values) Y-Value = 0.0738					
		Length	Psi-value			
[Approved]	9.4	0.3	E2	Other lintels (including other steel lintels)		
[Approved]	9.4	0.04	E3	Sill		
[Approved]	27.27	0.05	E4	Jamb		
[Approved]	18.5	0.16	E5	Ground floor (normal)		
[Approved]	18.5	0.07	E7	Party floor between dwellings (in blocks of flats)		
[Approved]	9	0.09	E16	Corner (normal)		
[Approved]	6	0.06	E18	Party wall between dwellings		
[Approved]	3	-0.09	E17	Corner (inverted internal area greater than external area)		

Ventilation

Pressure test:	Yes (As designed)
Ventilation:	Balanced with heat recovery
	Number of wet rooms: Kitchen + 1
	Ductwork: Insulation, rigid
	Approved Installation Scheme: True
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of passive stacks:	0
Number of sides sheltered:	2
Pressure test:	4

Main heating system:

Main heating system:	Room heaters
	Electric (direct acting) room heaters
	Fuel: Electricity
	Info Source: SAP Tables
	SAP Table: 691
	Panel, convactor or radiant heaters

Fraction of main heat: 1

Main heating Control:

Main heating Control:	Programmer and room thermostats
	Control code: 2605

Secondary Main heating system:

Secondary Main heating system:	Heat pumps with radiators or underfloor heating
	Electric heat pumps
	Fuel: Electricity
	Info Source: Boiler Database
	Database: (rev 484, product index 190006, SEDBUK 100%):
	Band name: Dimplex
	Model: EDL200UK-630
	Model qualifier:
	(provides DHW all year)

SAP Input

Secondary Main heating Control

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

Secondary heating system

Secondary heating system: None

Water heating

Water heating: From second main heating system
Water code: 914
Fuel :Electricity
Hot water cylinder
Cylinder volume: 201 litres
Cylinder insulation: Measured loss, 1.61kWh/day
Primary pipework insulation: False
Cylinderstat: False
Cylinder in heated space: False
Solar panel: False

Others

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

SAP Input

Property Details Plot 7 - BE LEAN

Address: Plot 7
Located in: England
Region: South East England
UPRN:
Date of assessment: 23 October 2021
Date of certificate: 28 October 2021
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium
Water use <= 125 litres/ person/ day: True
PCDF Version: 484

Property description

Dwelling type: Flat
Detachment:
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 37.1 m² 3 m
Living area: 24 m² (fraction 0.647)
Front of dwelling faces: West

Opening types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
U7 D006	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U7 W020	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
U7 D006	16mm or more	0.8	0.63	1.4	6.66	1
U7 W020	16mm or more	0.8	0.63	1.4	1.92	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
U7 D006		External walls	East	3.05	2.185
U7 W020		External walls	East	1.475	1.305

Overshading: Average or unknown

Opaque Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
<u>External Elements</u>							
External walls	19.5	8.58	10.92	0.18	0	False	N/A
<u>Internal Elements</u>							
<u>Party Elements</u>							
Wall onto Common way	13.2						N/A
Party walls	42						N/A
Party ceiling	37.1						N/A
Party floor	37.1						N/A

Thermal Bridges

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.4624

	Length	Psi-value	
[Approved]	4.525	0.3	E2 Other lintels (including other steel lintels)

SAP Input

[Approved]	4.525	0.04	E3	Sill
[Approved]	6.98	0.05	E4	Jamb
[Approved]	6.7	0.07	E7	Party floor between dwellings (in blocks of flats)
[Approved]	6	0.06	E18	Party wall between dwellings
	6.3	1	E23	Balcony within or between dwellings, balcony support penetrates wall

Ventilation

Pressure test: Yes (As designed)

Ventilation: Balanced with heat recovery
 Number of wet rooms: Kitchen + 1
 Ductwork: Insulation, rigid
 Approved Installation Scheme: True

Number of chimneys: 0
 Number of open flues: 0
 Number of fans: 0
 Number of passive stacks: 0
 Number of sides sheltered: 3
 Pressure test: 4

Main heating system

Main heating system: Room heaters
 Electric (direct acting) room heaters
 Fuel: Electricity
 Info Source: SAP Tables
 SAP Table: 691
 Panel, convector or radiant heaters

Fraction of main heat: 1

Main heating Control

Main heating Control: Programmer and room thermostats
 Control code: 2605

Secondary Main heating system

Secondary Main heating system: Heat pumps with radiators or underfloor heating
 Electric heat pumps
 Fuel: Electricity
 Info Source: Boiler Database
 Database: (rev 484, product index 190006, SEDBUK 100%):
 Band name: Dimplex
 Model: EDL200UK-630
 Model qualifier:
 (provides DHW all year)

Secondary Main heating Control

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

Secondary heating system

Secondary heating system: None

Water heating

Water heating: From second main heating system
 Water code: 914
 Fuel :Electricity
 Hot water cylinder
 Cylinder volume: 201 litres
 Cylinder insulation: Measured loss, 1.61kWh/day
 Primary pipework insulation: False

SAP Input

Cylinderstat: False
Cylinder in heated space: False
Solar panel: False

Others

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

SAP Input

Property Details Plot 22 - SE LEAN

Address: Plot 22
Located in: England
Region: South East England
UPRN:
Date of assessment: 23 October 2021
Date of certificate: 28 October 2021
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium
Water use <= 125 litres/ person/ day: True
PCDF Version: 484

Property description

Dwelling type: Flat
Detachment:
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 90.5 m² 3 m
Living area: 31.9 m² (fraction 0.352)
Front of dwelling faces: West

Opening types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
U22 D024	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W073	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W059	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W060	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W062	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W063	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
U22 D024	16mm or more	0.8	0.63	1.4	7.33	1
U22 W073	16mm or more	0.8	0.63	1.4	1.19	1
U22 W059	16mm or more	0.8	0.63	1.4	2.44	1
U22 W060	16mm or more	0.8	0.63	1.4	2.44	1
U22 W062	16mm or more	0.8	0.63	1.4	1.99	1
U22 W063	16mm or more	0.8	0.63	1.4	1.99	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
U22 D024		External walls	North West	3.33	2.2
U22 W073		External walls	West	0.91	1.305
U22 W059		External walls	West	1.81	1.35
U22 W060		External walls	North	1.81	1.35
U22 W062		External walls	East	1.475	1.35
U22 W063		External walls	East	1.475	1.35

Overshading: Average or unknown

Opaque Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
<u>External Elements</u>							
External walls	85.5	17.38	68.12	0.18	0	False	N/A

SAP Input

Flat roof	90.5	0	90.5	0.16	0	N/A
Internal Elements						
Party Elements						
Wall onto Common way	25.5					N/A
Party walls	34.8					N/A
Party floor	90.5					N/A

Thermal bridges

Thermal bridges:	User-defined (individual PSI-values) Y-Value = 0.0829				
	Length	Psi-value			
[Approved]	12.62	0.3	E2	Other lintels (including other steel lintels)	
[Approved]	12.62	0.04	E3	Sill	
[Approved]	20.06	0.05	E4	Jamb	
[Approved]	28.5	0.07	E7	Party floor between dwellings (in blocks of flats)	
[Approved]	3	0.09	E16	Corner (normal)	
	11.9	0.56	E15	Flat roof with parapet	
[Approved]	6	0.06	E18	Party wall between dwellings	

Ventilation:

Pressure test:	Yes (As designed)
Ventilation:	Balanced with heat recovery
	Number of wet rooms: Kitchen + 1
	Ductwork: Insulation, rigid
	Approved Installation Scheme: True
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of passive stacks:	0
Number of sides sheltered:	2
Pressure test:	4

Main heating system:

Main heating system:	Room heaters
	Electric (direct acting) room heaters
	Fuel: Electricity
	Info Source: SAP Tables
	SAP Table: 691
	Panel, convactor or radiant heaters
	Fraction of main heat: 1

Main heating Control:

Main heating Control:	Programmer and room thermostats
	Control code: 2605

Secondary Main heating system

Secondary Main heating system:	Heat pumps with radiators or underfloor heating
	Electric heat pumps
	Fuel: Electricity
	Info Source: Boiler Database
	Database: (rev 484, product index 190006, SEDBUK 100%):
	Band name: Dimplex
	Model: EDL200UK-630
	Model qualifier:
	(provides DHW all year)

Secondary Main heating Control:

Secondary Main heating Control:	Not applicable (boiler provides DHW only)
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SAP Input

Control code: 2100

Secondary heating system

Secondary heating system: None

Water heating

Water heating: From second main heating system
 Water code: 914
 Fuel :Electricity
 Hot water cylinder
 Cylinder volume: 201 litres
 Cylinder insulation: Measured loss, 1.61kWh/day
 Primary pipework insulation: False
 Cylinderstat: False
 Cylinder in heated space: False
 Solar panel: False

Others

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

Block Compliance WorkSheet: Be Lean

User Details

Assessor Name: Giles Murgatroyd
Software Name: Stroma FSAP

Stroma Number: STRO014966
Software Version: Version: 1.0.5.50

Calculation Details

Dwelling	DER	TER	DFEE	TFEE	TFA
Plot 2 - BE LEAN	20.46	26.8	43.4	49.4	67.1
Plot 3 - BE LEAN	17.58	27.21	35.8	42.2	50.5
Plot 4 - BE LEAN	14.14	22.56	30.4	32.1	62
Plot 7 - BE LEAN	19.92	29.01	41.4	37.1	37.1
Plot 11 - BE LEAN	14.86	20.43	33.1	34.1	86.1
Plot 13 - BE LEAN	17.5	24.69	37.2	39.4	62
Plot 16 - BE LEAN	19.92	29.01	41.4	37.1	37.1
Plot 20 - BE LEAN	20.43	23.76	44.2	45.2	86.1
Plot 22 - BE LEAN	24.95	27.79	53.1	59.2	90.5

Calculation Summary

Total Floor Area	578.50
Average TER	25.19
Average DER	19.01
Average DFEE	40.53
Average TFEE	42.90
Compliance	Pass
% Improvement DER TER	24.53
% Improvement DFEE TFEE	5.52

SAP Input

Property Details Plot 2 - BE CLEAN

Address: Plot 2
Located in: England
Region: South East England
UPRN:
Date of assessment: 23 October 2021
Date of certificate: 28 October 2021
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium
Water use <= 125 litres/ person/ day: True
PCDF Version: 484

Property description

Dwelling type: Flat
Detachment:
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 67.1 m² 3 m
Living area: 21 m² (fraction 0.313)
Front of dwelling faces: West

Opening types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
U2 W003	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W004	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W005	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W006	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W007	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W008	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 D002	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
U2 W003	16mm or more	0.8	0.63	1.4	1.92	1
U2 W004	16mm or more	0.8	0.63	1.4	1.92	1
U2 W005	16mm or more	0.8	0.63	1.4	2.43	1
U2 W006	16mm or more	0.8	0.63	1.4	2.43	1
U2 W007	16mm or more	0.8	0.63	1.4	2.43	1
U2 W008	16mm or more	0.8	0.68	1.4	4.74	1
U2 D002	16mm or more	0.8	0.63	1.4	2.21	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
U2 W003		External walls	West	1.475	1.305
U2 W004		External walls	West	1.475	1.305
U2 W005		External walls	South West	1.1	2.205
U2 W006		External walls	South West	1.1	2.205
U2 W007		External walls	South	1.1	2.205
U2 W008		External walls	South	2.15	2.205
U2 D002		External walls	West	1	2.205

Overshading: Average or unknown

Opening Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
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SAP Input

External Elements

External walls	55.5	18.08	37.42	0.18	0	False	N/A
Wall onto bin store	9	0	9	0.18	0.68	False	N/A
Ground floor	67.1			0.16			N/A

Internal Elements

Party Elements

Wall onto Common way	42.6						N/A
Party ceiling	67.1						N/A

Thermal bridges:

Thermal bridges:	User-defined (individual PSI-values) Y-Value = 0.0738					
		Length	Psi-value			
[Approved]	9.4	0.3	E2	Other lintels (including other steel lintels)		
[Approved]	9.4	0.04	E3	Sill		
[Approved]	27.27	0.05	E4	Jamb		
[Approved]	18.5	0.16	E5	Ground floor (normal)		
[Approved]	18.5	0.07	E7	Party floor between dwellings (in blocks of flats)		
[Approved]	9	0.09	E16	Corner (normal)		
[Approved]	6	0.06	E18	Party wall between dwellings		
[Approved]	3	-0.09	E17	Corner (inverted internal area greater than external area)		

Ventilation

Pressure test:	Yes (As designed)
Ventilation:	Balanced with heat recovery
	Number of wet rooms: Kitchen + 1
	Ductwork: Insulation, rigid
	Approved Installation Scheme: True
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of passive stacks:	0
Number of sides sheltered:	2
Pressure test:	4

Main heating system:

Main heating system:	Room heaters
	Electric (direct acting) room heaters
	Fuel: Electricity
	Info Source: SAP Tables
	SAP Table: 691
	Panel, convactor or radiant heaters

Fraction of main heat: 1

Main heating Control:

Main heating Control:	Programmer and room thermostats
	Control code: 2605

Secondary Main heating system:

Secondary Main heating system:	Heat pumps with radiators or underfloor heating
	Electric heat pumps
	Fuel: Electricity
	Info Source: Boiler Database
	Database: (rev 484, product index 190006, SEDBUK 100%):
	Band name: Dimplex
	Model: EDL200UK-630
	Model qualifier:
	(provides DHW all year)

SAP Input

Secondary Main heating Control

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

Secondary heating system

Secondary heating system: None

Water heating

Water heating: From second main heating system
Water code: 914
Fuel :Electricity
Hot water cylinder
Cylinder volume: 201 litres
Cylinder insulation: Measured loss, 1.61kWh/day
Primary pipework insulation: False
Cylinderstat: False
Cylinder in heated space: False
Solar panel: False

Others

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

SAP Input

Property Details Plot 7 - BE CLEAN

Address: Plot 7
Located in: England
Region: South East England
UPRN:
Date of assessment: 23 October 2021
Date of certificate: 28 October 2021
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium
Water use <= 125 litres/ person/ day: True
PCDF Version: 484

Property description

Dwelling type: Flat
Detachment:
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 37.1 m² 3 m
Living area: 24 m² (fraction 0.647)
Front of dwelling faces: West

Opening types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
U7 D006	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U7 W020	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
U7 D006	16mm or more	0.8	0.63	1.4	6.66	1
U7 W020	16mm or more	0.8	0.63	1.4	1.92	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
U7 D006		External walls	East	3.05	2.185
U7 W020		External walls	East	1.475	1.305

Overshading: Average or unknown

Opaque Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
External walls	19.5	8.58	10.92	0.18	0	False	N/A
Internal Elements							
Party Elements							
Wall onto Common way	13.2						N/A
Party walls	42						N/A
Party ceiling	37.1						N/A
Party floor	37.1						N/A

Thermal Bridges

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.4624

	Length	Psi-value	
[Approved]	4.525	0.3	E2 Other lintels (including other steel lintels)

SAP Input

[Approved]	4.525	0.04	E3	Sill
[Approved]	6.98	0.05	E4	Jamb
[Approved]	6.7	0.07	E7	Party floor between dwellings (in blocks of flats)
[Approved]	6	0.06	E18	Party wall between dwellings
	6.3	1	E23	Balcony within or between dwellings, balcony support penetrates wall

Ventilation

Pressure test: Yes (As designed)

Ventilation: Balanced with heat recovery

Number of wet rooms: Kitchen + 1

Ductwork: Insulation, rigid

Approved Installation Scheme: True

Number of chimneys: 0

Number of open flues: 0

Number of fans: 0

Number of passive stacks: 0

Number of sides sheltered: 3

Pressure test: 4

Main heating system

Main heating system: Room heaters

Electric (direct acting) room heaters

Fuel: Electricity

Info Source: SAP Tables

SAP Table: 691

Panel, convector or radiant heaters

Fraction of main heat: 1

Main heating Control

Main heating Control: Programmer and room thermostats

Control code: 2605

Secondary Main heating system

Secondary Main heating system: Heat pumps with radiators or underfloor heating

Electric heat pumps

Fuel: Electricity

Info Source: Boiler Database

Database: (rev 484, product index 190006, SEDBUK 100%):

Band name: Dimplex

Model: EDL200UK-630

Model qualifier:

(provides DHW all year)

Secondary Main heating Control

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

Control code: 2100

Secondary heating system

Secondary heating system: None

Water heating

Water heating: From second main heating system

Water code: 914

Fuel :Electricity

Hot water cylinder

Cylinder volume: 201 litres

Cylinder insulation: Measured loss, 1.61kWh/day

Primary pipework insulation: False

SAP Input

Cylinderstat: False
Cylinder in heated space: False
Solar panel: False

Others

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

SAP Input

Property Details Plot 22 - SE, CLEAN

Address: Plot 22
Located in: England
Region: South East England
UPRN:
Date of assessment: 23 October 2021
Date of certificate: 28 October 2021
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium
Water use <= 125 litres/ person/ day: True
PCDF Version: 484

Property description

Dwelling type: Flat
Detachment:
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 90.5 m² 3 m
Living area: 31.9 m² (fraction 0.352)
Front of dwelling faces: West

Opening types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
U22 D024	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W073	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W059	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W060	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W062	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W063	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
U22 D024	16mm or more	0.8	0.63	1.4	7.33	1
U22 W073	16mm or more	0.8	0.63	1.4	1.19	1
U22 W059	16mm or more	0.8	0.63	1.4	2.44	1
U22 W060	16mm or more	0.8	0.63	1.4	2.44	1
U22 W062	16mm or more	0.8	0.63	1.4	1.99	1
U22 W063	16mm or more	0.8	0.63	1.4	1.99	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
U22 D024		External walls	North West	3.33	2.2
U22 W073		External walls	West	0.91	1.305
U22 W059		External walls	West	1.81	1.35
U22 W060		External walls	North	1.81	1.35
U22 W062		External walls	East	1.475	1.35
U22 W063		External walls	East	1.475	1.35

Overshading: Average or unknown

Opaque Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
<u>External Elements</u>							
External walls	85.5	17.38	68.12	0.18	0	False	N/A

SAP Input

Flat roof	90.5	0	90.5	0.16	0	N/A
Internal Elements						
Party Elements						
Wall onto Common way	25.5					N/A
Party walls	34.8					N/A
Party floor	90.5					N/A

Thermal bridges

Thermal bridges:	User-defined (individual PSI-values) Y-Value = 0.0829				
	Length	Psi-value			
[Approved]	12.62	0.3	E2	Other lintels (including other steel lintels)	
[Approved]	12.62	0.04	E3	Sill	
[Approved]	20.06	0.05	E4	Jamb	
[Approved]	28.5	0.07	E7	Party floor between dwellings (in blocks of flats)	
[Approved]	3	0.09	E16	Corner (normal)	
	11.9	0.56	E15	Flat roof with parapet	
[Approved]	6	0.06	E18	Party wall between dwellings	

Ventilation:

Pressure test:	Yes (As designed)
Ventilation:	Balanced with heat recovery
	Number of wet rooms: Kitchen + 1
	Ductwork: Insulation, rigid
	Approved Installation Scheme: True
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of passive stacks:	0
Number of sides sheltered:	2
Pressure test:	4

Main heating system:

Main heating system:	Room heaters
	Electric (direct acting) room heaters
	Fuel: Electricity
	Info Source: SAP Tables
	SAP Table: 691
	Panel, convector or radiant heaters
	Fraction of main heat: 1

Main heating Control:

Main heating Control:	Programmer and room thermostats
	Control code: 2605

Secondary Main heating system

Secondary Main heating system:	Heat pumps with radiators or underfloor heating
	Electric heat pumps
	Fuel: Electricity
	Info Source: Boiler Database
	Database: (rev 484, product index 190006, SEDBUK 100%):
	Band name: Dimplex
	Model: EDL200UK-630
	Model qualifier:
	(provides DHW all year)

Secondary Main heating Control:

Secondary Main heating Control:	Not applicable (boiler provides DHW only)
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SAP Input

Control code: 2100

Secondary heating system

Secondary heating system: None

Water heating

Water heating: From second main heating system
 Water code: 914
 Fuel :Electricity
 Hot water cylinder
 Cylinder volume: 201 litres
 Cylinder insulation: Measured loss, 1.61kWh/day
 Primary pipework insulation: False
 Cylinderstat: False
 Cylinder in heated space: False
 Solar panel: False

Others

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

Block Compliance WorkSheet: Be Clean

User Details

Assessor Name: Giles Murgatroyd
Software Name: Stroma FSAP

Stroma Number: STRO014966
Software Version: Version: 1.0.5.50

Calculation Details

Dwelling	DER	TER	DFEE	TFEE	TFA
Plot 2 - BE CLEAN	20.46	26.8	43.4	49.4	67.1
Plot 3 - BE CLEAN	17.58	27.21	35.8	42.2	50.5
Plot 4 - BE CLEAN	14.14	22.56	30.4	32.1	62
Plot 7 - BE CLEAN	19.92	29.01	41.4	37.1	37.1
Plot 11 - BE CLEAN	14.86	20.43	33.1	34.1	86.1
Plot 13 - BE CLEAN	17.5	24.69	37.2	39.4	62
Plot 16 - BE CLEAN	19.92	29.01	41.4	37.1	37.1
Plot 20 - BE CLEAN	20.43	23.76	44.2	45.2	86.1
Plot 22 - BE CLEAN	24.95	27.79	53.1	59.2	90.5

Calculation Summary

Total Floor Area	578.50
Average TER	25.19
Average DER	19.01
Average DFEE	40.53
Average TFEE	42.90
Compliance	Pass
% Improvement DER TER	24.53
% Improvement DFEE TFEE	5.52

SAP Input

Property Details Plot 2 - BE GREEN

Address: Plot 2
Located in: England
Region: South East England
UPRN:
Date of assessment: 23 October 2021
Date of certificate: 28 October 2021
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium
Water use <= 125 litres/ person/ day: True
PCDF Version: 484

Property description

Dwelling type: Flat
Detachment:
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 67.1 m² 3 m
Living area: 21 m² (fraction 0.313)
Front of dwelling faces: West

Opening types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
U2 W003	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W004	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W005	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W006	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W007	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 W008	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U2 D002	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
U2 W003	16mm or more	0.8	0.63	1.4	1.92	1
U2 W004	16mm or more	0.8	0.63	1.4	1.92	1
U2 W005	16mm or more	0.8	0.63	1.4	2.43	1
U2 W006	16mm or more	0.8	0.63	1.4	2.43	1
U2 W007	16mm or more	0.8	0.63	1.4	2.43	1
U2 W008	16mm or more	0.8	0.68	1.4	4.74	1
U2 D002	16mm or more	0.8	0.63	1.4	2.21	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
U2 W003		External walls	West	1.475	1.305
U2 W004		External walls	West	1.475	1.305
U2 W005		External walls	South West	1.1	2.205
U2 W006		External walls	South West	1.1	2.205
U2 W007		External walls	South	1.1	2.205
U2 W008		External walls	South	2.15	2.205
U2 D002		External walls	West	1	2.205

Overshading: Average or unknown

Opening Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
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SAP Input

External Elements

External walls	55.5	18.08	37.42	0.18	0	False	N/A
Wall onto bin store	9	0	9	0.18	0.68	False	N/A
Ground floor	67.1			0.16			N/A

Internal Elements

Party Elements

Wall onto Common way	42.6						N/A
Party ceiling	67.1						N/A

Thermal bridges:

Thermal bridges:	User-defined (individual PSI-values) Y-Value = 0.0738					
		Length	Psi-value			
[Approved]	9.4	0.3	E2	Other lintels (including other steel lintels)		
[Approved]	9.4	0.04	E3	Sill		
[Approved]	27.27	0.05	E4	Jamb		
[Approved]	18.5	0.16	E5	Ground floor (normal)		
[Approved]	18.5	0.07	E7	Party floor between dwellings (in blocks of flats)		
[Approved]	9	0.09	E16	Corner (normal)		
[Approved]	6	0.06	E18	Party wall between dwellings		
[Approved]	3	-0.09	E17	Corner (inverted internal area greater than external area)		

Ventilation

Pressure test:	Yes (As designed)
Ventilation:	Balanced with heat recovery
	Number of wet rooms: Kitchen + 1
	Ductwork: Insulation, rigid
	Approved Installation Scheme: True
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of passive stacks:	0
Number of sides sheltered:	2
Pressure test:	4

Main heating system:

Main heating system:	Room heaters
	Electric (direct acting) room heaters
	Fuel: Electricity
	Info Source: SAP Tables
	SAP Table: 691
	Panel, convactor or radiant heaters

Fraction of main heat: 1

Main heating Control:

Main heating Control:	Programmer and room thermostats
	Control code: 2605

Secondary Main heating system:

Secondary Main heating system:	Heat pumps with radiators or underfloor heating
	Electric heat pumps
	Fuel: Electricity
	Info Source: Boiler Database
	Database: (rev 484, product index 190006, SEDBUK 100%):
	Band name: Dimplex
	Model: EDL200UK-630
	Model qualifier:
	(provides DHW all year)

SAP Input

Secondary Main heating Control

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

Secondary heating system

Secondary heating system: None

Water heating

Water heating: From second main heating system
Water code: 914
Fuel :Electricity
Hot water cylinder
Cylinder volume: 201 litres
Cylinder insulation: Measured loss, 1.61kWh/day
Primary pipework insulation: False
Cylinderstat: False
Cylinder in heated space: False
Solar panel: False

Others

Electricity tariff: Standard Tariff
In Smoke Control Area: Unknown
Conservatory: No conservatory
Low energy lights: 100%
Terrain type: Low rise urban / suburban
EPC language: English
Wind turbine: No
Photovoltaics: Photovoltaic 1
Installed Peak power: 0.61
Tilt of collector: 30°
Overshading: None or very little
Collector Orientation: South
Assess Zero Carbon Home: No

SAP Input

Property Details Plot 7 - BE GREEN

Address: Plot 7
Located in: England
Region: South East England
UPRN:
Date of assessment: 23 October 2021
Date of certificate: 28 October 2021
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium
Water use <= 125 litres/ person/ day: True
PCDF Version: 484

Property description

Dwelling type: Flat
Detachment:
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 37.1 m² 3 m
Living area: 24 m² (fraction 0.647)
Front of dwelling faces: West

Opening types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
U7 D006	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U7 W020	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
U7 D006	16mm or more	0.8	0.63	1.4	6.66	1
U7 W020	16mm or more	0.8	0.63	1.4	1.92	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
U7 D006		External walls	East	3.05	2.185
U7 W020		External walls	East	1.475	1.305

Overshading: Average or unknown

Opaque Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Elements							
External walls	19.5	8.58	10.92	0.18	0	False	N/A
Internal Elements							
Party Elements							
Wall onto Common way	13.2						N/A
Party walls	42						N/A
Party ceiling	37.1						N/A
Party floor	37.1						N/A

Thermal Bridges

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.4624

	Length	Psi-value	
[Approved]	4.525	0.3	E2 Other lintels (including other steel lintels)

SAP Input

[Approved]	4.525	0.04	E3	Sill
[Approved]	6.98	0.05	E4	Jamb
[Approved]	6.7	0.07	E7	Party floor between dwellings (in blocks of flats)
[Approved]	6	0.06	E18	Party wall between dwellings
	6.3	1	E23	Balcony within or between dwellings, balcony support penetrates wall

Ventilation

Pressure test: Yes (As designed)

Ventilation: Balanced with heat recovery

Number of wet rooms: Kitchen + 1

Ductwork: Insulation, rigid

Approved Installation Scheme: True

Number of chimneys: 0

Number of open flues: 0

Number of fans: 0

Number of passive stacks: 0

Number of sides sheltered: 3

Pressure test: 4

Main heating system

Main heating system: Room heaters

Electric (direct acting) room heaters

Fuel: Electricity

Info Source: SAP Tables

SAP Table: 691

Panel, convector or radiant heaters

Fraction of main heat: 1

Main heating Control

Main heating Control: Programmer and room thermostats

Control code: 2605

Secondary Main heating system

Secondary Main heating system: Heat pumps with radiators or underfloor heating

Electric heat pumps

Fuel: Electricity

Info Source: Boiler Database

Database: (rev 484, product index 190006, SEDBUK 100%):

Band name: Dimplex

Model: EDL200UK-630

Model qualifier:

(provides DHW all year)

Secondary Main heating Control

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

Control code: 2100

Secondary heating system

Secondary heating system: None

Water heating

Water heating: From second main heating system

Water code: 914

Fuel :Electricity

Hot water cylinder

Cylinder volume: 201 litres

Cylinder insulation: Measured loss, 1.61kWh/day

Primary pipework insulation: False

SAP Input

Cylinderstat: False
Cylinder in heated space: False
Solar panel: False

Others

Electricity tariff:	Standard Tariff
In Smoke Control Area:	Unknown
Conservatory:	No conservatory
Low energy lights:	100%
Terrain type:	Low rise urban / suburban
EPC language:	English
Wind turbine:	No
Photovoltaics:	<u>Photovoltaic 1</u> Installed Peak power: 0.34 Tilt of collector: 30° Overshading: None or very little Collector Orientation: South
Assess Zero Carbon Home:	No

SAP Input

Property Details Plot 22 - SE GREEN

Address: Plot 22
Located in: England
Region: South East England
UPRN:
Date of assessment: 23 October 2021
Date of certificate: 28 October 2021
Assessment type: New dwelling design stage
Transaction type: New dwelling
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium
Water use <= 125 litres/ person/ day: True
PCDF Version: 484

Property description

Dwelling type: Flat
Detachment:
Year Completed: 2021
Floor Location: **Floor area:** **Storey height:**
 Floor 0 90.5 m² 3 m
Living area: 31.9 m² (fraction 0.352)
Front of dwelling faces: West

Opening types

Name:	Source:	Type:	Glazing:	Argon:	Frame:
U22 D024	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W073	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W059	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W060	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W062	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break
U22 W063	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Metal, thermal break

Name:	Gap:	Frame Factor:	g-value:	U-value:	Area:	No. of Openings:
U22 D024	16mm or more	0.8	0.63	1.4	7.33	1
U22 W073	16mm or more	0.8	0.63	1.4	1.19	1
U22 W059	16mm or more	0.8	0.63	1.4	2.44	1
U22 W060	16mm or more	0.8	0.63	1.4	2.44	1
U22 W062	16mm or more	0.8	0.63	1.4	1.99	1
U22 W063	16mm or more	0.8	0.63	1.4	1.99	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
U22 D024		External walls	North West	3.33	2.2
U22 W073		External walls	West	0.91	1.305
U22 W059		External walls	West	1.81	1.35
U22 W060		External walls	North	1.81	1.35
U22 W062		External walls	East	1.475	1.35
U22 W063		External walls	East	1.475	1.35

Overshading: Average or unknown

Opaque Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
<u>External Elements</u>							
External walls	85.5	17.38	68.12	0.18	0	False	N/A

SAP Input

Flat roof	90.5	0	90.5	0.16	0	N/A
Internal Elements						
Party Elements						
Wall onto Common way	25.5					N/A
Party walls	34.8					N/A
Party floor	90.5					N/A

Thermal bridges

Thermal bridges:	User-defined (individual PSI-values) Y-Value = 0.0829				
	Length	Psi-value			
[Approved]	12.62	0.3	E2	Other lintels (including other steel lintels)	
[Approved]	12.62	0.04	E3	Sill	
[Approved]	20.06	0.05	E4	Jamb	
[Approved]	28.5	0.07	E7	Party floor between dwellings (in blocks of flats)	
[Approved]	3	0.09	E16	Corner (normal)	
	11.9	0.56	E15	Flat roof with parapet	
[Approved]	6	0.06	E18	Party wall between dwellings	

Ventilation:

Pressure test:	Yes (As designed)
Ventilation:	Balanced with heat recovery
	Number of wet rooms: Kitchen + 1
	Ductwork: Insulation, rigid
	Approved Installation Scheme: True
Number of chimneys:	0
Number of open flues:	0
Number of fans:	0
Number of passive stacks:	0
Number of sides sheltered:	2
Pressure test:	4

Main heating system:

Main heating system:	Room heaters
	Electric (direct acting) room heaters
	Fuel: Electricity
	Info Source: SAP Tables
	SAP Table: 691
	Panel, convactor or radiant heaters
	Fraction of main heat: 1

Main heating Control:

Main heating Control:	Programmer and room thermostats
	Control code: 2605

Secondary Main heating system

Secondary Main heating system:	Heat pumps with radiators or underfloor heating
	Electric heat pumps
	Fuel: Electricity
	Info Source: Boiler Database
	Database: (rev 484, product index 190006, SEDBUK 100%):
	Band name: Dimplex
	Model: EDL200UK-630
	Model qualifier:
	(provides DHW all year)

Secondary Main heating Control:

Secondary Main heating Control:	Not applicable (boiler provides DHW only)
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SAP Input

Control code: 2100

Secondary heating system

Secondary heating system: None

Water heating

Water heating: From second main heating system
 Water code: 914
 Fuel :Electricity
 Hot water cylinder
 Cylinder volume: 201 litres
 Cylinder insulation: Measured loss, 1.61kWh/day
 Primary pipework insulation: False
 Cylinderstat: False
 Cylinder in heated space: False
 Solar panel: False

Others

Electricity tariff: Standard Tariff
 In Smoke Control Area: Unknown
 Conservatory: No conservatory
 Low energy lights: 100%
 Terrain type: Low rise urban / suburban
 EPC language: English
 Wind turbine: No
 Photovoltaics: Photovoltaic 1
 Installed Peak power: 0.82
 Tilt of collector: 30°
 Overshading: None or very little
 Collector Orientation: South
 Assess Zero Carbon Home: No

Block Compliance WorkSheet: Be Green

User Details

Assessor Name: Giles Murgatroyd
Software Name: Stroma FSAP

Stroma Number: STRO014966
Software Version: Version: 1.0.5.50

Calculation Details

Dwelling	DER	TER	DFEE	TFEE	TFA
Plot 2 - BE GREEN	16.39	26.8	43.4	49.4	67.1
Plot 3 - BE GREEN	13.49	27.21	35.8	42.2	50.5
Plot 4 - BE GREEN	10.09	22.56	30.4	32.1	62
Plot 7 - BE GREEN	15.81	29.01	41.4	37.1	37.1
Plot 11 - BE GREEN	10.8	20.43	33.1	34.1	86.1
Plot 13 - BE GREEN	13.45	24.69	37.2	39.4	62
Plot 16 - BE GREEN	15.81	29.01	41.4	37.1	37.1
Plot 20 - BE GREEN	16.37	23.76	44.2	45.2	86.1
Plot 22 - BE GREEN	20.89	27.79	53.1	59.2	90.5

Calculation Summary

Total Floor Area	578.50
Average TER	25.19
Average DER	14.94
Average DFEE	40.53
Average TFEE	42.90
Compliance	Pass
% Improvement DER TER	40.69
% Improvement DFEE TFEE	5.52