WEBB YATES ENGINEERS

Energy Statement

J4414 Headley Way

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REVISION HISTORY

Revision	Status	Date	Author	Reviewer	Approver
00	S4	19/06/2023	OC	AE	ES

1. EXECUTIVE SUMMARY

This report develops the energy strategy for the proposed development in 153 Headley Way Oxford OX3 7SS, a redevelopment consisting of demolition of the existing dwelling and erection of 2no. buildings to create flats, private amenity space and associated landscaping.

The total gross area of the development is proposed at 324 m^2 GIA residential and including 1 house and 3 no. flats.

The guidance and policies used in formulating this report are listed below and the resulting findings are compliant with content of each;

- Oxford Local Plan 2036 adopted 8th June 2020;
- Sustainable Design and Construction 2016 SPD;
- CIBSE Technical Manuals and Guide;

The energy strategy proposed meets the Building Regulations Part L1A requirements and is aimed to achieve the best outcoming in terms of sustainability and energy efficiency.

The target set in the Oxford Policy RE1 report is met and exceeded as demonstrated within the body of this report.

SAP2012 software in line with Part L Volume 01 2021 edition have been utilized to calculate the energy and CO_2 emissions rating of the development and to make recommendations for the performance of the services.

CO2 EMISSIONS (TonnesCO2/year)			
	TOT REGULATED EMISSIONS (Tonnes CO2/year)	CO2 savings (Tonnes CO2/year)	PERCENTAGE SAVING (%)
PART L 2013 BASELINE	4.09		
BE GREEN	1.44	2.65	64.74%

Table 1 Summary of CO2 emissions SAP10

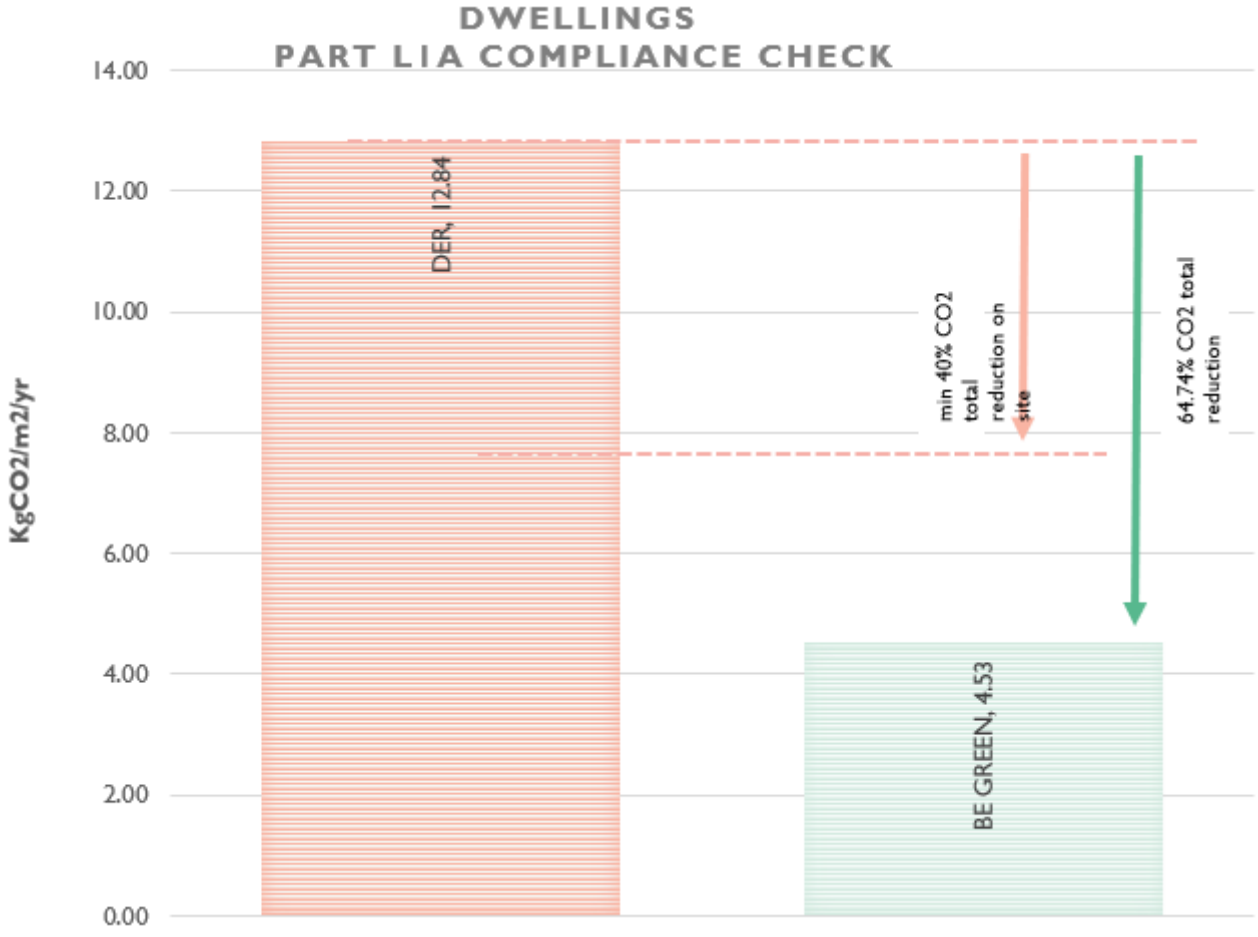


Figure 2 Part L compliance check

As seen from the results below, the proposed design is fully compliant with Building Regulations with a lower fabric energy efficiency, dwelling emission rate and primary energy rate than that of the notional building.

House FSAP Compliance Results:

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*9.59 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	3.74 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*49.9 kWh_{PE}/m^2*	
Dwelling primary energy	39.2 kWh_{PE}/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*33.4 kWh/m^2*	
Dwelling fabric energy efficiency	31.6 kWh/m^2	OK

Ground Floor Flat FSAP Compliance Results:

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*13.42 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	4.67 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*70.81 kWh_{PE}/m^2*	
Dwelling primary energy	49.13 kWh_{PE}/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*37.3 kWh/m^2*	
Dwelling fabric energy efficiency	36.1 kWh/m^2	OK

First Floor Flat FSAP Compliance Results:

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*16.4 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	5.41 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*86.8 kWh_{PE}/m^2*	
Dwelling primary energy	56.65 kWh_{PE}/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*50.9 kWh/m^2*	
Dwelling fabric energy efficiency	47.3 kWh/m^2	OK

Second Floor Flat FSAP Compliance Results:

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*13.69 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	4.72 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*72.12 kWh_{PE}/m^2*	
Dwelling primary energy	49.57 kWh_{PE}/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*39.5 kWh/m^2*	
Dwelling fabric energy efficiency	36.8 kWh/m^2	OK

2. INTRODUCTION

This report sets out the energy strategy for the proposed development of a two-storey house and three one-storey flats and gives guidance on what fabric performance needs to be achieved in order to meet Building Regulations Part L compliance, along with measures in order to mitigate the risk of summertime overheating. In developing this strategy local and regional planning policies have been addressed.

153 Headley Way is a development which consists of three single storey flats and a double storey house located in Oxford.

The format of this report follows the Local Plan to ensure that energy needs are met in the most efficient way.

The energy consumption of the development has been assessed in line with the Local policy and the CO_2 emission savings have been estimated with SAP10 software by Stroma.

This report identifies the proposed energy strategy to meet Building Regulations Part L requirements and the Oxford Local Plan Policy RE1. The proposed Sustainability Principles and Engineering Concepts incorporate the requirements and guidelines of the relevant British Standards, CIBSE Guides and DfE Building Bulletins.

3. PLANNING POLICY BACKGROUND

The main planning documents which constitute the statutory development plan for Oxford Local Plan and form the basis on which decisions will be made for the proposed development are:

- Oxford Local Plan 2036 adopted 8th June 2020;
- Sustainable Design and Construction 2016 SPD;
- CIBSE Technical Manuals and Guide;

The main planning documents which constitute the statutory development plan and form the basis on which decisions will be made for the proposed development are outlined below.

Building Regulation Compliance

Building Regulations apply to all developments, and are in place to ensure buildings meet health, safety, welfare, convenience, and sustainability standards: they focus on the technical aspects of designing and constructing a building.

The proposed development of Headley Way will be fully compliant with all revisions of the Building Regulations relevant to MEPH design. The most relevant document is the Part L Approved Document: Part L 2021 Volume 1: Conservation of Fuel and Power in Dwellings.

The development is required to comply with paragraph L1 of Schedule in accordance with Part L. To achieve this, the proposed design for each dwelling will need to demonstrate that it is achieving a lower fabric energy efficiency, building emission rate, and primary energy rate than the notional building. Thermal elements will need to achieve the following minimum fabric performance.

Table 4.1 Limiting U-values for new fabric elements and air permeability in new dwellings

Element type	Maximum U-value[1] W/(m²·K)
All roof types[2]	0.16
Wall[2]	0.26
Floor	0.18
Party wall	0.20
Swimming pool basin[3]	0.25
Window[4][5]	1.6
Rooflight[4][7]	2.2
Doors (including glazed doors)	1.6
Air permeability	8.0m³/(h·m²) @ 50Pa 1.57m³/(h·m²) @ 4Pa

Compliance at the design stage is demonstrated by calculating and comparing the CO_2 emissions rate for each dwelling of the proposed development, known as the Dwelling Emissions Rate (DER), and an equivalent notional building of the same geometry but with a set of benchmark performance characteristics as specified in the 2010 NCM modelling guide,

known as the Target Emissions Rate (TER). NCM methodologies using SAP software were employed to demonstrate compliance with these regulations.

In addition to the requirement for the BER to be lower than the TER of the notional building, each dwelling needs to achieve a lower dwelling fabric energy efficiency (DFEE) than the notional target fabric energy efficiency (TFEE) and lower primary energy rate than that of the notional.

3.2. Oxford Local Plan 2036 Planning Policy

The Council encourages development to be designed with high environmental standards and to minimise carbon emissions on-site, as detailed in the Policies.

3.2.1. Policy RE1: Sustainable design and construction

Planning permission will only be granted where it can be demonstrated that the following sustainable design and construction principles have been incorporated, where relevant:

a) Maximising energy efficiency and the use of low carbon energy;

b) Conserving water and maximising water efficiency

c) Using recycled and recyclable materials and sourcing them responsibly;

d) Minimising waste and maximising recycling during construction and operation;

e) Minimising flood risk including flood resilient construction;

f) Being flexible and adaptable to future occupier needs; and

g) Incorporating measures to enhance biodiversity value

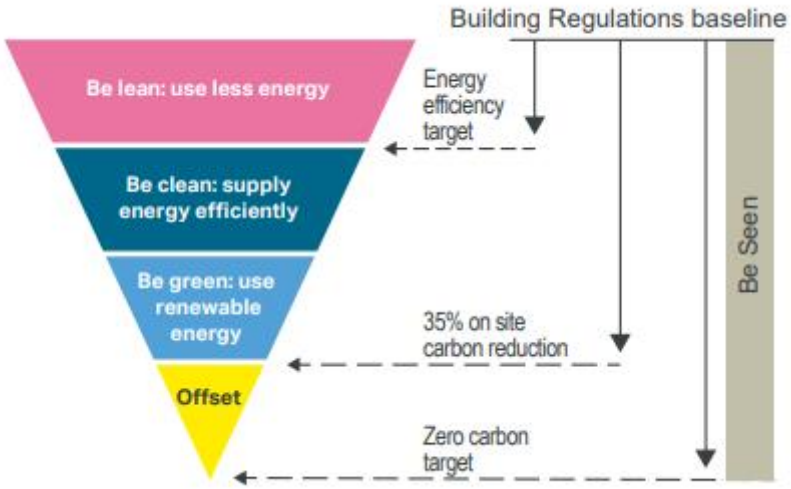
An Energy Statement will be submitted to demonstrate compliance with this policy for new-build residential developments (other than householder applications) and new-build non-residential schemes over 1,000m2 The Energy Statement will include details as to how the policy will be complied with and monitored.

Planning permission will only be granted for development proposals for new build residential dwelling houses or 1,000m2 or more of C2 (including student accommodation), C4 HMO or Sui Generis HMO floorspace which achieve at least a 40% reduction in carbon emissions from a 2013 Building Regulations (or future equivalent legislation) compliant base case This reduction is to be secured through on-site renewable energy and other low carbon technologies (this would broadly be equivalent to 25% of all energy used) and/ or energy efficiency measures

The City Council will encourage the development of city wide heat networks If a heat network exists in close proximity to a scheme it is expected to connect to it and this will count towards the development's carbon reduction requirements Evidence will be required to demonstrate why connection to the network is not possible.

Proposals for new residential developments are to meet the higher water efficiency standards within the 2013 Building Regulations (or equivalent future legislation) Part G2 water consumption target of 110 litres per person per day

It is encouraged to take account of the energy hierarchy when identifying the measures taken to reduce carbon emissions and to adopt a fabric first approach.



4. ENVIRONMENTAL DESIGN STRATEGY

It is proposed to use a number of energy efficiency measures to reduce the energy demand of the development. As a good basis of design, the development has been designed in line with the energy hierarchy of Be Lean, Be Clean, Be Green and Be Seen.

4.1. Be Lean

The first step of the energy hierarchy is to reduce energy use through both passive and active lean design measures. A number of sustainable design and construction methods have been incorporated into the design of the building which comply with the requirement to reduce energy demand. These include:

High Performance Building Envelope

Element	Building Regulation Part L Limit U-Value [W/m^{2}K]	Proposed U-Value [W/m^{2}K] Design
External Wall	0.26	0.17
Floor	0.18	0.17
Roof	0.16	0.13
Glazing	1.60	0.91 (G value: 0.3)

Enhanced Air Tightness and Good Detailing

As a new dwelling, good detailing shall be achieved in order to avoid the creation of thermal bridges in the fabric and meeting points of elements such as between walls and floors and ceilings. The development shall achieve a minimum airtightness of 1.5m^3/hm^2 at 50Pa.

Limit Overheating

The dwellings have been designed with the Part L compliant minimum U/g-values or improved in order to mitigate overheating. The building has been modelled and assessed in to achieve TM59 Overheating compliance. Openable windows/areas will be a part of the strategy to mitigate overheating to ensure a comfortable indoor environment in summer months, as there is no mechanical cooling specified or required, based upon the result of the assessments carried out.

Daylight

The maximisation of daylight is one of the most important environmental factors for buildings. Artificial lighting contributes up to 25% of the energy costs of a typical building, despite operation largely within daylight hours. Anecdotal evidence also suggests that the provision of good levels of natural light can contribute to enhanced health and well-being. The design shall maximise daylight while limiting solar gains during summer months.

Ventilation

Passive design - The building will be naturally ventilated. The spaces will be cross-ventilated, with opening windows on opposite facades.

Dedicated extract systems will be provided to the toiles, bathrooms and en-suites, discharging to outside above roof level, routed as shown on the architectural and mechanical services drawings.

There is no need for mechanical cooling, as per the results of the TM59 overheating assessment.

Efficient Systems

Use of efficient systems and equipment with suitable time and temperature controls which have been appropriately commissioned such that the systems can be operated efficiently.

Minimization of lengths and diameters of 'dead legs'. Efficient components i.e. fans, pumps, refrigeration equipment have been appropriately sized to have no more capacity for demand and standby than is required for the task to operate at their optimum levels.

Insulation of pipework, ductwork and hot water systems have been selected to be in line with the future highest standards.

Minimising Water Usage

The design shall incorporate water saving strategies, such as low flush toilets, and non-concussive spray taps in order to keep the maximum water usage to 110 litres/person per day (in accordance with Section 4.7 of the Oxford Local Plan 2036). Water consumption will be monitored. Other features shall include mains leak detection and sanitary shut-off.

Energy Efficient Lighting and Appliances

Provision of the required lighting levels whilst minimizing energy consumption by appropriate specification of light fittings and effective control of lighting systems by:

- Specifying 100% of the fixed internal light fittings as dedicated energy efficient fixtures.
- Having suitable energy consumption metering.
- Ensuring systems have been appropriately commissioned.
- Using lighting systems which are efficient and make use of daylight where possible/practical.
- Provision of low output or energy efficient external lighting.

- Avoiding the use of external lighting when communal spaces are unoccupied or during the day by means PIR, daylight sensors and time controls.

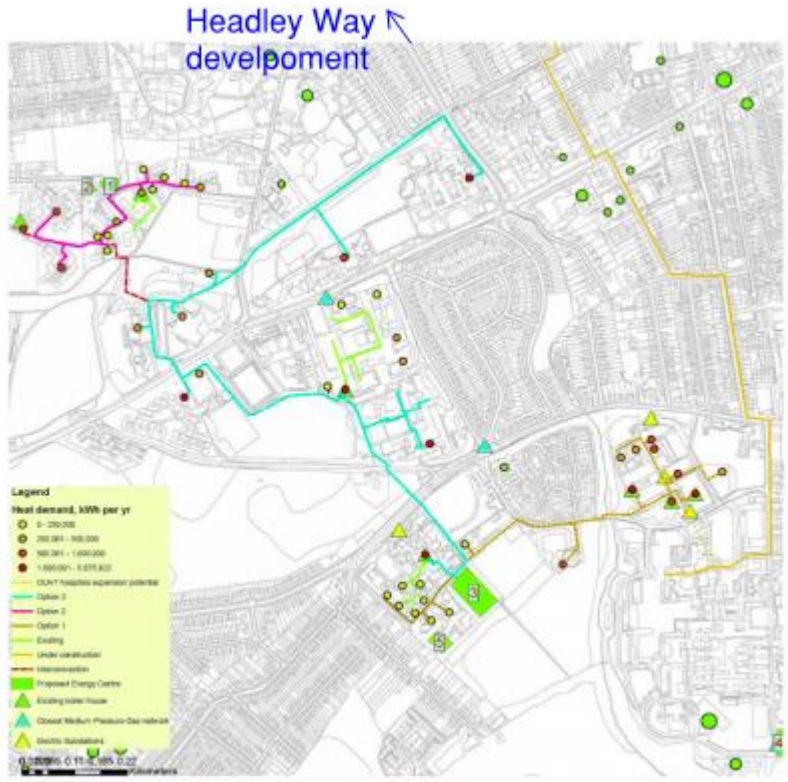
A lighting efficacy of average 95 lumens per circuit watt has been used as the design standard. This will be achieved including LED lighting sources throughout.

4.2. Be Clean

A number of low energy methods of supply have been investigated, to provide the heating and power as efficiently as possible. The following technologies have been considered for further analysis for the building.

New Community heat network / Connection to Existing Low Carbon Heating Infrastructure

The map below indicates the proposed heat network map of Headington. This development does not fall within the areas served by any of the 3 the proposed options for the Headington heat network.



Overview of all three network options proposed together with proposed energy centre locations

Due to the lack of proximity of any existing or Planned heat networks, a connection won't be possible.

4.3. Be Green

The final reductions in energy consumption and related carbon emissions should be through the use of on-site renewable energy sources in the bid to reach as large carbon reductions as possible. The proposed building will be utilising an air source heat pump (ASHP) system for heating and hot water.

4.4. Be Seen

Sufficient information about the building, the fixed building services and their maintenance requirements will be provided to the users so that the building can be operated in such a manner as to use no more fuel and power than is reasonable in the circumstances. The systems provided within the development will allow for monitoring to ensure they are run at optimum performance. Energy consumption and performance of the proposed design is to be monitored.

A home user guide will be provided to each dwelling to inform residents of the most efficient way in which to operate their home and to encourage more sustainable ways of living. Information of the EU Energy Efficiency Rating Scheme will be provided to each dwelling.

5. LOW AND ZERO CARBON TECHNOLOGIES

The following section provides a feasibility analysis of Low or Zero Carbon (LZC) technologies for use at Headley Way. There are various options when it comes to LZC technology, but a combination of project constraints rules the majority of these out. The constraints are:

- Capital expenditure
- Return on Investment
- Carbon savings potential
- Clean energy output potential
- Spatial requirements
- Operation and maintenance requirements
- Planning requirements

Out of the technologies considered the following were discounted immediately for this site:

- Hydroelectric: there are no suitable water courses or hydroelectric plants near the site.
- Hydrogen: generation and storage are still in the experimental stage at this scale and no systems are currently commercially available.
- Biomass: It is proposed to utilise an all-electric MEP strategy. This technology has therefore been discounted.
- CHP: as above.
- Biomass CHP: as above.
- Wind Turbines: wind turbine technology is not suitable due to the visual impact it may have

The feasibility study therefore reviewed the use of the following technologies to offset CO_2 emissions:

- Air Source Heat Pumps
- Ground Source Heat Pumps
- Photovoltaics
- Solar Thermal Panels

The following types of green/renewable energy technologies have been selected in order to maximise on-site renewable energy generation:

- Air Source Heat Pump

5.1. Feasibility of Selected Technologies

Air Source Heat Pump and Detailed information

High efficiency air source heat pumps providing heating and hot water are proposed; this allows a lower flow temperature than a conventional boiler system. The heating controls will incorporate external temperature compensation allowing fast response to external temperature change, which saves energy by reducing the need for sudden demands of duty.

A Air Source Heat Pump (ASHP) is a system that extracts heat from the air, upgrades it to a higher temperature and releases it where required for use for space and water heating. Most systems are 'closed loop' and comprise of plastic piping and connected to a heat pump. A water or water-antifreeze mixture is passed around the looped pipe where it absorbs heat from the ground. The fluid flows into an electrically powered

The ASHP uses the air as a heat sink and transfers the heat in the external space into the heating system. The temperature of the Low Temperature Hot Water (LTHW) providing the heating also affects the COP of the units, with the ideal flow and return temperatures being 45°C/40°C.

On the basis of economic and technical application ASHP are considered appropriate for the project and may also be used for compliance with the Be Green criteria.

The end-users will be supplied with regular information to control and operate the system e.g. at point of occupancy and maintenance visits.

The performance of the heat pump system will need to be monitored postconstruction to ensure it is achieving the expected performance approved during planning as will be specified in the Mechanical Specifications.

Distribution

The heating system will be designed to be as efficient as possible, with an inverter driven pump to adjust the pumping power required dependent on the heating demand.

The building maintenance personnel will be supplied with regular information to control and operate the system e.g. at point of occupancy and maintenance visits.

The difference of temperature will be minimised to ensure the system runs efficiently.

The performance of the heat pump system will be monitored postconstruction to ensure that the heat pumps will be achieving the expected performance approved during planning.

5.2. Feasibility study of the discarded technologies

Ground Source Heat Pump and Detailed information

High efficiency ground source heat pumps which provide heat and hot water allows a lower flow temperature than a conventional boiler system. The heating controls will incorporate external temperature compensation allowing fast response to external temperature change, which saves energy by reducing the need for sudden demands of duty.

A Ground Source Heat Pump (GSHP) is a system that extracts heat from the ground, upgrades it to a higher temperature and releases it where required for use for space and water heating. Most systems are 'closed loop' and comprise of plastic piping buried in the ground and connected to a heat pump. A water or water-antifreeze mixture is passed around the looped pipe where it absorbs heat from the ground. The fluid flows into an electrically powered heat pump, comprising a compressor and a pair of heat exchangers before discharging back to the underground loop. Pipes can either be buried in trenches, usually in a slinky arrangement to reduce the amount of surface area that is required, or in a borehole, in a vertical loop system. Vertical loop systems require less surface space but are considerably more expensive.

The GSHP uses the ground as a heat sink and transfers the heat in the external space into the heating system. The temperature of the Low Temperature Hot Water (LTHW) providing the heating also affects the COP of the units, with the ideal flow and return temperatures being 45°C/40°C.

On the basis of economic and technical application GSHP are considered appropriate for the project and may also be used for compliance with the Be Green criteria.

The end-users will be supplied with regular information to control and operate the system e.g. at point of occupancy and maintenance visits.

The performance of the heat pump system will need to be monitored postconstruction to ensure it is achieving the expected performance approved during planning as will be specified in the Mechanical Specifications.

Solar Photovoltaic (PV) Panels and Detailed information

Photovoltaic (PV) Panels are a renewable technology which will decrease the amount of electricity from the grid used in the building, particularly during the summer months when the solar irradiance is at its peak. Panels can be integrated within the building roof or stand alone; most efficient when south facing and angled at 30° from the horizontal. Such panels would reduce carbon emissions from the electrical uses within the building. As results from energy model demonstrates, significant improvement over Part L is achieved via the use of ASHP. Therefore, there is no requirement for PV.

Solar Thermal Systems

Similarly to PV panels, solar thermal panels can either be integrated into the sloped roof structure. Either flat plate or evacuated tube type panels could be used. The solar thermal panels will be used to heat water which can be used for the domestic hot water supply to the dwellings. As results from energy model demonstrates, significant improvement over Part L is achieved via the use of ASHP. Therefore there is no requirement for solar thermal panels.

6. COOLING HIERARCHY

The development has been designed in line with the cooling hierarchy providing a good basis of design in order to ensure a comfortable internal environment in summer months. The following measures have been taken at each stage of the hierarchy in order to reduce the demand for cooling.

Minimising Internal Heat Gains

Stage one of the Cooling Hierarchy is to minimise internal heat generation through energy efficient design.

Heat distribution infrastructure will be designed to minimise pipe lengths. This will be achieved at coordination stage, ensuring pipework is well insulated and that pipe configurations minimise heat loss. Good daylighting and high efficiency light fittings with occupancy control will also help to reduce excess heat gains from artificial lighting. Low energy lighting has been specified with occupancy controls to be provided for the luminaires.

Reducing Heat Entering the Building

The design of the façade will help to limit solar gains in the summer.

Passive Ventilation

Openable windows will allow sufficient natural cross ventilation during occupied hours, and when acoustic requirements allow, to prevent overheating.

Mechanical Ventilation

Individual mechanical extract ventilation will be provided for all kitchen and wet room areas within each property.

Active Cooling

No mechanical cooling is currently proposed.

7. ENERGY ASSESSMENT

An energy assessment has been carried out to demonstrate how the targets for regulated CO2 emissions reduction over and above 2021 Building Regulations will be met. The energy assessment has also been carried in order to provide guidance on what minimum fabric performance needs to be achieved in order to meet Building Regulations Part L compliance.

As part of planning policy, the following criteria apply:

- The development should minimise carbon emissions to as high a degree possible

For the purpose of the energy assessment, the energy demand has been calculated using the approved SAP software.

See Appendix A for full SAP results.

7.1. Part L Requirements

As a new build, the house and flats conform to new dwelling Part L requirements. The proposed constructions will need to achieve the following minimum U-values.

Table 4.1 Limiting U-values for new fabric elements and air permeability in new dwellings

Element type	Maximum U-value[1] W/(m²·K)
All roof types[2]	0.16
Wall[2]	0.26
Floor	0.18
Party wall	0.20
Swimming pool basin[3]	0.25
Window[4][5]	1.6
Rooflight[6][7]	2.2
Doors (including glazed doors)	1.6
Air permeability	8.0m³/(h·m²) @ 50Pa 1.57m³/(h·m²) @ 4Pa

Compliance at the design stage is demonstrated by calculating the CO2 emissions rate for the dwellings of the proposed development, known as the Building Emissions Rate (BER), which is compared to an equivalent notional building of the same geometry but with a set of benchmark performance characteristics as specified in the 2010 NCM modelling guide, known as the Target Emissions Rate (TER). Compliance is achieved when the BER is lower than TER.

In addition to the requirement for the BER to be lower than the TER of the notional building, each dwelling needs to achieve a lower dwelling fabric energy efficiency (DFEE) than the notional target fabric energy efficiency (TFEE) and lower primary energy rate than that of the notional.

The target U-values and air permeability rate given in the following section have been selected in order to meet these three criteria stipulated by Part L.

7.2. SAP Model Input

The following fabric U-values have been assigned in order to meet dwelling fabric energy efficiency (DFEE) compliance. An airtightness of 1.5 m3m2h at 50Pa has been modelled. As can be seen these U-values are in line with those indicated on architectural detail drawings.

Element	Proposed U-Value [W/m²K] Design
External Wall	0.17
Floor	0.17
Roof	0.13
Glazing	0.91 (G value: 0.3)

Heating and hot water is provided via an ASHP system with a COP of 2.5. The lighting has been assumed to have a minimum luminous efficacy of 95lm/W. A PV installation is not currently proposed for the development.

SAP results demonstrated that the carbon dioxide emission rate, dwelling primary energy rate and dwelling fabric efficiency rate meet the minimum target rates required for the two-storey house and the single storey flats, therefore achieving compliance and coming within compliance of that outlined by policy RE1 of the Oxford Local Plan where maximising energy efficiency is required.

Fabric Energy Efficiency

Following the energy efficiency measures, the total Part L fabric efficiency is reported in the following table.

Demand (kWh/m²)	Target TFEE (kWh/m²/yr)	Dwelling DFEE (kWh/m²/yr)
Domestic Energy Efficiency	**39.47**	37.20

As seen from the tables below, the proposed design is fully compliant with Building Regulations with a lower fabric energy efficiency, dwelling emission rate and primary energy rate than that of the notional building

House FSAP Compliance Results:

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*9.59 kgCO_2/m^2*	
Dwelling carbon dioxide emission rate	3.74 kgCO_2/m^2	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*49.9 kWh$_{PE}$/m^2*	
Dwelling primary energy	39.2 kWh$_{PE}$/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*33.4 kWh/m^2*	
Dwelling fabric energy efficiency	31.6 kWh/m^2	OK

Ground Floor Flat FSAP Compliance Results:

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*13.42 kgCO_2/m^2*	
Dwelling carbon dioxide emission rate	4.67 kgCO_2/m^2	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*70.81 kWh$_{PE}$/m^2*	
Dwelling primary energy	49.13 kWh$_{PE}$/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*37.3 kWh/m^2*	
Dwelling fabric energy efficiency	36.1 kWh/m^2	OK

First Floor Flat FSAP Compliance Results:

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*16.4 kgCO_2/m^2*	
Dwelling carbon dioxide emission rate	5.41 kgCO_2/m^2	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*86.8 kWh$_{PE}$/m^2*	
Dwelling primary energy	56.65 kWh$_{PE}$/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*50.9 kWh/m^2*	
Dwelling fabric energy efficiency	47.3 kWh/m^2	OK

Second Floor Flat FSAP Compliance Results:

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*13.69 kgCO_2/m^2*	
Dwelling carbon dioxide emission rate	4.72 kgCO_2/m^2	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*72.12 kWh$_{PE}$/m^2*	
Dwelling primary energy	49.57 kWh$_{PE}$/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*39.5 kWh/m^2*	
Dwelling fabric energy efficiency	36.8 kWh/m^2	OK

7.2. Unregulated Domestic energy consumption and emission

For information purposed the unregulated energy consumption and emission have been predicted and calculated on the basis of the information shown in this paragraph.

A separate calculation has been undertaken for the unregulated energy demand for the electrical equipment. The energy uses have been estimated by the methods and average values described in CIBSE Guide F and TM54: Evaluating operational energy performance of buildings at the design stage. The table below shows the electrical equipment that

is used in the residential development. The number of items of equipment has been estimated through dialogue with the prospective occupants. The power consumption of the equipment has been taken from the CIBSE Guide F 2012, paragraph 12.2. The installed capacity (nameplate rating) does not give an accurate estimate of energy use, so the 'average power consumption' as well as 'sleep mode' consumption have been used for the calculation.

The usage hours of the electrical equipment depend on the operating hours. The number of hours per day takes into account the intermittent usage and the variation of the operation from hour to hour and day to day. Instead of use a diversity factor multiplied by the power consumption, is going to be used an estimated number of hours. Overnight and weekend energy use can contribute significantly to small power energy and has been included. The equation below explains the calculation of the energy consumption.

Annual energy consumption (kWh) =

Number of equipment × {[average power consumption during operation × annual hours of operation] + [sleep mode consumption × (8760 - hours of operation)]}

EQUIPMENT	QUANTITY INSTALLED	AVERAGE POWER DEMAND	SLEEP-MODE POWER DEMAND	HOURS OF OPERATION/DAY	TOTAL HOURS/YEAR	ENERGY CONSUMPTION
		(W)	(W)	hours/day	hours/year	(kWh)
laptops	12	40	4	5	1300	653.84
screens	8	60	10	3	780	454.20
multifunction devices	6	135	60	2	728	1,071.60
miscellaneous	6	15		8	2912	262.08
microwave	6	800		0.5	182	873.60
fridge	6	130	20	24	8760	6,832.80
cooking equipment	6	850		2	730	3,723.00
					TOT (kWh)	**13,871.12**
					SAP10.2 CO2 emissions	**1.93**

8. OVERHEATING RISK ANALYSIS

The development's design was tested in order to gauge its capabilities of mitigating overheating risk during summer months. **CIBSE TM59: Design methodology for the assessment of overheating risk in homes** was used to assess to assess this. In accordance with TM59 the following criteria need to be met.

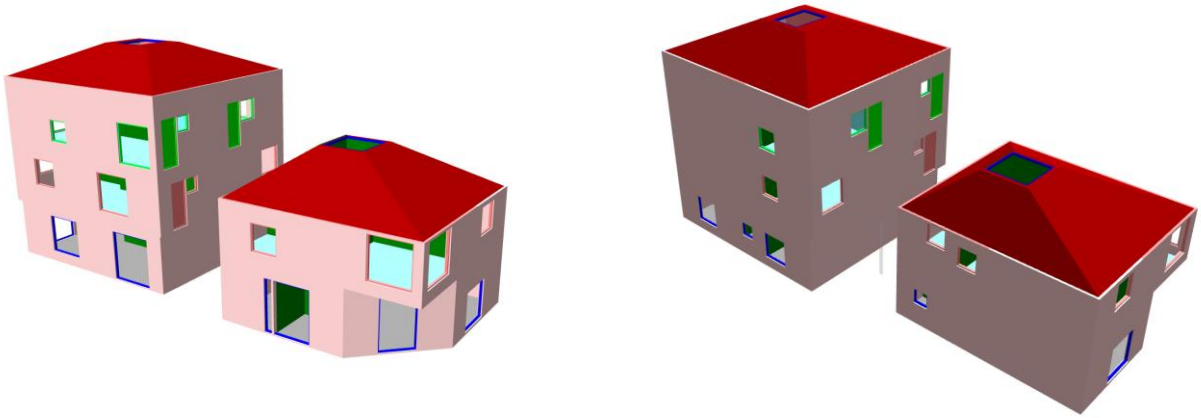
1) The number of hours during which delta T of indoor air temperature to outdoor is greater than or equal to one degree (K) during the period of May to September shall not exceed 3% of occupied hours.

2) For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from

   10pm to 7am shall not exceed 26˚C for more than 1% of annual hours

In accordance with CIBSE TM59, compliance needs to be achieved for DSY1 2020 50th percentile high emissions scenario. The weather file for London Heathrow, simulating a suburban environment was used for selected for testing.

A dynamic energy model of the property in order to test its summer overheating performance was created in TAS. The model takes into account the massing, orientation and external shading elements of the building.



Glazing is set to have a g-value of 0.3. Windows openings were modelled based on architectural elevations, with window apertures set at 85% and 51.5%, based on the manufacturers (VELFAC) quotation sheet for window sets. Window opening schedules have been modelled in accordance with guidance from TM59 and Building Regulations Part O: Overheating. Ground Floor windows and first and second floor flats which have windows near doors have been modelled as closed at night-time due to perceived security risk. Initial tests indicate that Ground Floor Bedrooms will require some degree of secure opening to allow for night-time ventilation.

U-values were assigned based on requirements to meet Part L compliance as previously discussed.

Element	Proposed U-Value [W/m^{2}K] Design
External Wall	0.17
Floor	0.17
Roof	0.13
Glazing	0.91 (g-value: 0.3)

A summary of testing can be seen below. Living areas need to achieve 59 hours or below to achieve Criterion 1 and bedrooms need to achieve 110 hours or below. Additionally, bedrooms need to achieve 32 hours or below to be compliant with Criterion 2.

As per the Domestic TM59 calculations, the results have been illustrated with three iterative scenarios in order for the dwellings to pass the TM59 overheating criteria.

A baseline model was created with the building as designed, with U/g-values as specified. As indicated in the results table, the First Floor House Bedrooms and Ground Floor Flat Bedrooms were failing Criterion 2, as well as the Ground Floor Flat Living/Dining/Kitchen which was failing Criterion 1 In order to mitigate this, a second iteration with a solar transmittance g-value of 0.3 was used across all glazing. This allowed for all rooms but Ground Floor Flats Bedroom 1 & 2 to meet the overheating criteria. A third iteration where a secure opening panel with a free openable area of 0.4m2 in the Ground Floor Flat Bedrooms was conducted, which demonstrated that TM59 Compliance can be achieved.

The results demonstrate that the house and three flats are capable of achieving full TM59 compliance via passive measures with adjustments to the g-value and the addition of a secure openable panel for the Ground Floor Flat Bedroom and would therefore not require the use of mechanical cooling. All potential risks of overheating can be mitigated through the means stated above.

	Baseline			g-value 0.3			Openable area 0.4m²		
Zone Name	Criterion 1: #Hours Exceeding Comfort Range	Criterion 2: Number of Night Hours Exceeding 26 °C for Bedrooms.	Result	Criterion 1: #Hours Exceeding Comfort Range	Criterion 2: Number of Night Hours Exceeding 26 °C for Bedrooms.	Result	Criterion 1: #Hours Exceeding Comfort Range	Criterion 2: Number of Night Hours Exceeding 26 °C for Bedrooms.	Result
First Floor - Flats Bedroom 1	36	13	Pass	20	10	Pass	19	10	Pass
First Floor - Flats Bedroom 2	28	14	Pass	19	10	Pass	19	10	Pass
First Floor - Flats Living/Dining/Kitchen	55	N/A	Pass	22	N/A	Pass	21	N/A	Pass
First Floor - House Bedroom 1	42	63	Fail	24	31	Pass	24	31	Pass
First Floor - House Bedroom 2	73	66	Fail	37	27	Pass	37	27	Pass
First Floor - House Bedroom 3	52	31	Pass	27	22	Pass	27	22	Pass
G Floor - Flats Bedroom 1	34	211	Fail	20	109	Fail	19	28	Pass
G Floor - Flats Bedroom 2	33	196	Fail	19	102	Fail	19	26	Pass
G Floor - Flats Living/Dining/Kitchen	84	N/A	Fail	39	N/A	Pass	34	N/A	Pass
Ground Floor - House Kitchen	20	N/A	Pass	18	N/A	Pass	18	N/A	Pass
Ground Floor - House Living/Dining	26	N/A	Pass	18	N/A	Pass	18	N/A	Pass
Ground Floor - House Study/Dining	39	N/A	Pass	27	N/A	Pass	27	N/A	Pass
Second Floor - Flats Bedroom 1	22	12	Pass	17	10	Pass	17	10	Pass
Second Floor - Flats Bedroom 2	24	12	Pass	19	8	Pass	19	8	Pass
Second Floor - Flats Living/Dining/Kitchen	56	N/A	Pass	24	N/A	Pass	24	N/A	Pass

9. CONCLUSION

In line with the Local Plan, Planning Policy, and the project Planning conditions, this energy statement has been produced to set out the energy efficiency and renewable energy strategy for the proposed development and to illustrate savings in terms of CO2 emissions.

High efficiency fabrics, heat pumps to provide heating and hot water and passive measures are proposed for the residential development in order to reduce the CO2 emissions against the Target.

The baseline emissions for the development have been assessed in accordance with Part L of the Building Regulations for the emissions at 4.09 Tonnes CO2/year (SAP 10.2 carbon emissions factors).

When applying proposed construction details and U-Values to all thermal elements, high levels of energy efficient lighting and a low air permeability rating and through efficient heating and DHW delivery, the measures equate to a decrease in CO2 emissions of 64.74% over the Part L 2021 baseline or 2.65 tonnes CO2/year savings (SAP 10.2). This is in compliance with the OCC Planning policy of min 40% carbon reduction over the Part L 2021 baseline.

The total carbon emissions of the development are 1.44 tonnes CO2/year with a total of 64.74% CO2 reductions over the baseline.

House FSAP Compliance Results:

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*9.59 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	3.74 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*49.9 kWh_{PE}/m^2*	
Dwelling primary energy	39.2 kWh_{PE}/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*33.4 kWh/m^2*	
Dwelling fabric energy efficiency	31.6 kWh/m^2	OK

Ground Floor Flat FSAP Compliance Results:

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*13.42 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	4.67 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*70.81 kWh_{PE}/m^2*	
Dwelling primary energy	49.13 kWh_{PE}/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*37.3 kWh/m^2*	
Dwelling fabric energy efficiency	36.1 kWh/m^2	OK

First Floor Flat FSAP Compliance Results:

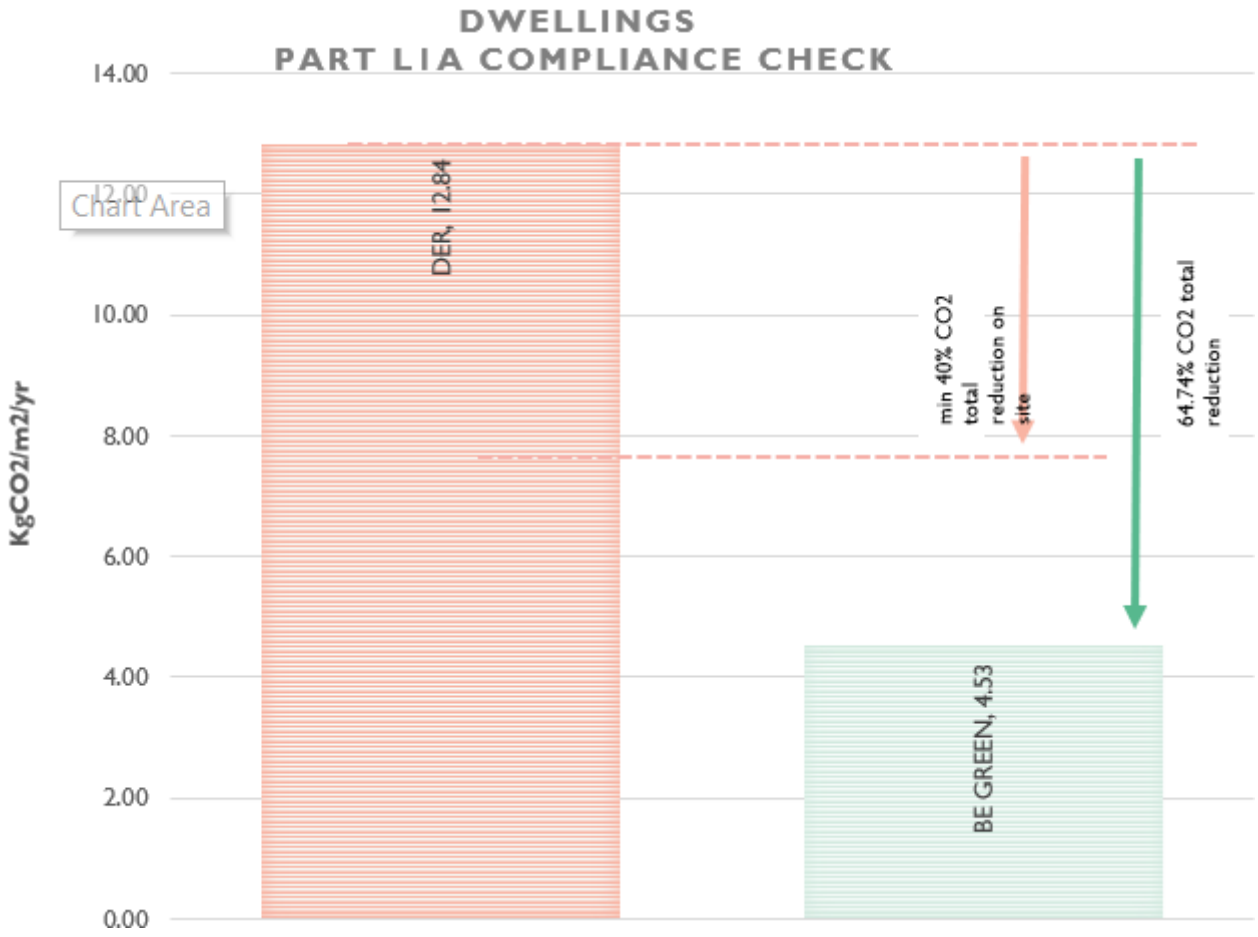
1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*16.4 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	5.41 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*86.8 kWh_{PE}/m^2*	
Dwelling primary energy	56.65 kWh_{PE}/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*50.9 kWh/m^2*	
Dwelling fabric energy efficiency	47.3 kWh/m^2	OK

Second Floor Flat FSAP Compliance Results:

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*13.69 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	4.72 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*72.12 kWh_{PE}/m^2*	
Dwelling primary energy	49.57 kWh_{PE}/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*39.5 kWh/m^2*	
Dwelling fabric energy efficiency	36.8 kWh/m^2	OK

CO2 EMISSIONS (kgCO2/m2/year)			
	TOT REGULATED EMISSIONS (kgCO2/m2/year)	CO2 savings (kgCO2/m2/year)	PERCENTAGE SAVING (%)
TER	12.84		
BE GREEN	4.53	8.31	64.74%

CO2 EMISSIONS (TonnesCO2/year)			
	TOT REGULATED EMISSIONS (Tonnes CO2/year)	CO2 savings (Tonnes CO2/year)	PERCENTAGE SAVING (%)
PART L 2013 BASELINE	4.09		
BE GREEN	1.44	2.65	64.74%



The assessments carried out for the proposed development at Headley Way have demonstrated full TM59 Compliance with the recommendations within this report.

APPENDIX A – SAP REPORT

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Stroma SAP 10.2 SAP 10 program, 10.2

Date: Thu 08 Jun 2023 11:56:47

Project Information			
Assessed By	Webb Yates Engineers	Building Type	House, Detached
OCDEA Registration	STRO037816	Assessment Date	2023-06-08

Dwelling Details			
Assessment Type	As designed	Total Floor Area	108 m^2
Site Reference	Headley Way House	Plot Reference	House
Address	142 Headley Way, OXFORD, OX3 7SZ		

Client Details	
Name	Not Provided
Company	Not Provided
Address	Not Provided, Not Provided, WF10 5QU

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

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*9.59 kgCO_2/m^2*	
Dwelling carbon dioxide emission rate	3.74 kgCO_2/m^2	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*49.9 kWh$_{PE}/m^2$*	
Dwelling primary energy	39.2 kWh$_{PE}/m^2$	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*33.4 kWh/m^2*	
Dwelling fabric energy efficiency	31.6 kWh/m^2	OK

2a Fabric U-values				
Element	***Maximum permitted average U-Value [W/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**Element with highest individual U-Value**	
External walls	*0.26*	0.17	Ground Floor EXT Walls (0.17)	OK
Party walls	*0.2*	N/A	N/A	**N/A**
Curtain walls	*1.6*	N/A	N/A	**N/A**
Floors	*0.18*	0.17	Ground Floor (0.17)	OK
Roofs	*0.16*	0.13	EXT Roof (0.13)	OK
Windows, doors, and roof windows	*1.6*	0.91	1 (0.91)	OK
Rooflights	*2.2*	N/A	N/A	**N/A**

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	**Net area [m^2]**	**U-Value [W/m^2K]**
Exposed wall: Ground Floor EXT Walls	72.37	0.17
Exposed wall: First Floor EXT Walls	54.11	0.17
Ground floor: Ground Floor	51.4	0.17
Exposed roof: EXT Roof	64.9	0.13

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	**Area [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
1, Doors	2.3	South	0.9	0.91 **(!)**
2, Doors	3.68	South	0.9	0.91 **(!)**
3, Windows (1)	0.36	North	0.9	0.91 **(!)**
4, Windows (1)	0.81	West	0.9	0.91 **(!)**
5, Windows (1)	0.81	North	0.9	0.91 **(!)**
6, Windows (1)	0.81	North	0.9	0.91 **(!)**
7, Windows (1)	1.44	South	0.9	0.91 **(!)**
8, Windows (1)	2.89	South	0.9	0.91 **(!)**
9, Windows (1)	1.44	East	0.9	0.91 **(!)**
9, Roof windows (1)	5.5	North	0.9	0.91 **(!)**

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))
Building part **1 - Main Dwelling**: SAP default y-value (0.2 W/m^{2}K) used for thermal bridging

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	*8 m^3/hm^2*	
Dwelling air permeability at 50Pa	1.5 m^3/hm^2, Design value **(!)**	OK
Air permeability test certificate reference	Not Provided	

4 Space heating	
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	250.0%
Emitter type	Both radiators and underfloor
Flow temperature	
System type	
Manufacturer	
Model	
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: Cylinder	
Capacity	210 litres
Declared heat loss	N/A
Primary pipework insulated	No
Manufacturer	
Model	P-WM060VAA
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls	
Main heating 1 - type: Programmer, TRVs, and bypass	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: N/A	
Manufacturer	
Model	

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

8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	*N/A*	
Specific fan power	N/A	**N/A**
Minimum permitted heat recovery efficiency	*N/A*	
Heat recovery efficiency	N/A	**N/A**
Manufacturer/Model		
Commissioning		

9 Local generation
N/A

10 Heat networks
N/A

11 Supporting documentary evidence
N/A

12 Declarations

a. Assessor Declaration

This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.	

Signed:	Assessor ID:
Name:	Date:

b. Client Declaration

N/A

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Stroma SAP 10.2 SAP 10 program, 10.2

Date: Thu 08 Jun 2023 11:59:41

Project Information			
Assessed By	Webb Yates Engineers	Building Type	Flat, Detached
OCDEA Registration	STRO037816	Assessment Date	2023-06-08

Dwelling Details			
Assessment Type	As designed	Total Floor Area	70 m^2
Site Reference	Headley Way First Floor Flat	Plot Reference	First Floor Flat
Address	142 Headley Way, OXFORD, OX3 7SZ		

Client Details	
Name	Not Provided
Company	Not Provided
Address	Not Provided, Not Provided, WF10 5QU

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

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*16.4 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	5.41 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*86.8 kWh_{PE}/m^2*	
Dwelling primary energy	56.65 kWh_{PE}/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*50.9 kWh/m^2*	
Dwelling fabric energy efficiency	47.3 kWh/m^2	OK

2a Fabric U-values				
Element	***Maximum permitted average U-Value [W/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**Element with highest individual U-Value**	
External walls	*0.26*	0.17	Ground Floor EXT Walls (0.17)	OK
Party walls	*0.2*	N/A	N/A	**N/A**
Curtain walls	*1.6*	N/A	N/A	**N/A**
Floors	*0.18*	N/A	N/A	**N/A**
Roofs	*0.16*	N/A	N/A	**N/A**
Windows, doors, and roof windows	*1.6*	0.96	1 (1.2)	OK
Rooflights	*2.2*	N/A	N/A	**N/A**

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	**Net area [m^2]**	**U-Value [W/m^2K]**
Exposed wall: Ground Floor EXT Walls	94.08	0.17
Exposed wall: First Floor EXT Walls	81.84	0.17
Exposed wall: Second Floor EXT Walls	60.48	0.17
Exposed roof: Exposed Roof	0	0 **(!)**

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	**Area [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
1, Doors	2.3	East	N/A	1.2
2, Windows (1)	1.44	West	0.9	0.91 **(!)**
3, Windows (1)	1.44	West	0.9	0.91 **(!)**
4, Windows (1)	0.81	North	0.9	0.91 **(!)**
5, Windows (1)	2.89	South	0.9	0.91 **(!)**
6, Windows (1)	1.44	South	0.9	0.91 **(!)**
7, Windows (1)	0.48	East	0.9	0.91 **(!)**
8, Windows (1)	1.44	East	0.9	0.91 **(!)**

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))
Building part **1 - Main Dwelling**: SAP default y-value (0.2 W/m^2K) used for thermal bridging

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	*8 m^3/hm^2*	
Dwelling air permeability at 50Pa	1.5 m^3/hm^2, Design value **(!)**	OK
Air permeability test certificate reference	Not Provided	

4 Space heating	
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	250.0%
Emitter type	Both radiators and underfloor
Flow temperature	
System type	
Manufacturer	
Model	
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: Cylinder	
Capacity	150 litres
Declared heat loss	N/A
Primary pipework insulated	No
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls		
Main heating 1 - type: Programmer, TRVs, and bypass		
Function		
Ecodesign class		
Manufacturer		
Model		
Water heating - type: N/A		
Manufacturer		
Model		

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

8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	*N/A*	
Specific fan power	N/A	**N/A**
Minimum permitted heat recovery efficiency	*N/A*	
Heat recovery efficiency	N/A	**N/A**
Manufacturer/Model		
Commissioning		

9 Local generation
N/A

10 Heat networks
N/A

11 Supporting documentary evidence
N/A

12 Declarations

a. Assessor Declaration

This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.	

Signed:	Assessor ID:
Name:	Date:

b. Client Declaration

N/A

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Stroma SAP 10.2 SAP 10 program, 10.2

Date: Thu 08 Jun 2023 12:00:03

Project Information			
Assessed By	Webb Yates Engineers	Building Type	Flat, Detached
OCDEA Registration	STRO037816	Assessment Date	2023-06-08

Dwelling Details			
Assessment Type	As designed	Total Floor Area	70 m^2
Site Reference	Headley Way Second Floor Flat	Plot Reference	Flat
Address	142 Headley Way, OXFORD, OX3 7SZ		

Client Details	
Name	Not Provided
Company	Not Provided
Address	Not Provided, Not Provided, WF10 5QU

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

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*13.69 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	4.72 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*72.12 kWh_{PE}/m^2*	
Dwelling primary energy	49.57 kWh_{PE}/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*39.5 kWh/m^2*	
Dwelling fabric energy efficiency	36.8 kWh/m^2	OK

2a Fabric U-values				
Element	***Maximum permitted average U-Value [W/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**Element with highest individual U-Value**	
External walls	*0.26*	0.17	Second Floor EXT Walls (0.17)	OK
Party walls	*0.2*	N/A	N/A	**N/A**
Curtain walls	*1.6*	N/A	N/A	**N/A**
Floors	*0.18*	N/A	N/A	**N/A**
Roofs	*0.16*	0.13	EXT Roof (0.13)	OK
Windows, doors, and roof windows	*1.6*	0.95	1 (1.2)	OK
Rooflights	*2.2*	N/A	N/A	**N/A**

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	**Net area [m^2]**	**U-Value [W/m^2K]**
Exposed wall: Second Floor EXT Walls	47.59	0.17
Exposed roof: EXT Roof	84.3	0.13

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	**Area [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
1, Doors	2.3	East	N/A	1.2
2, Windows (1)	0.48	East	0.9	0.91 **(!)**
3, Windows (1)	0.99	East	0.9	0.91 **(!)**
4, Windows (1)	1.8	East	0.9	0.91 **(!)**
5, Windows (1)	2.89	East	0.9	0.91 **(!)**
6, Windows (1)	0.9	East	0.9	0.91 **(!)**
7, Windows (1)	0.64	South	0.9	0.91 **(!)**
8, Windows (1)	2.89	South	0.9	0.91 **(!)**
9, Roof windows (1)	2.3	North	0.9	0.91 **(!)**

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))
Building part **1 - Main Dwelling**: SAP default y-value (0.2 W/m^2K) used for thermal bridging

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	*8 m^3/hm^2*	
Dwelling air permeability at 50Pa	1.5 m^3/hm^2, Design value **(!)**	OK
Air permeability test certificate reference	Not Provided	

4 Space heating	
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	250.0%
Emitter type	Both radiators and underfloor
Flow temperature	
System type	
Manufacturer	
Model	
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: Cylinder	
Capacity	150 litres
Declared heat loss	N/A
Primary pipework insulated	No
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls		
Main heating 1 - type: Programmer, TRVs, and bypass		
Function		
Ecodesign class		
Manufacturer		
Model		
Water heating - type: N/A		
Manufacturer		
Model		

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

8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	*N/A*	
Specific fan power	N/A	**N/A**
Minimum permitted heat recovery efficiency	*N/A*	
Heat recovery efficiency	N/A	**N/A**
Manufacturer/Model		
Commissioning		

9 Local generation
N/A

10 Heat networks
N/A

11 Supporting documentary evidence
N/A

12 Declarations

a. Assessor Declaration

This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.	

Signed:	Assessor ID:
Name:	Date:

b. Client Declaration

N/A

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Stroma SAP 10.2 SAP 10 program, 10.2

Date: Thu 08 Jun 2023 11:58:58

Project Information			
Assessed By	Webb Yates Engineers	Building Type	Flat, Detached
OCDEA Registration	STRO037816	Assessment Date	2023-06-08

Dwelling Details			
Assessment Type	As designed	Total Floor Area	70 m^2
Site Reference	Headley Way Ground Floor Flat	Plot Reference	Flat
Address	142 Headley Way, OXFORD, OX3 7SZ		

Client Details	
Name	Not Provided
Company	Not Provided
Address	Not Provided, Not Provided, WF10 5QU

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

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*13.42 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	4.67 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*70.81 kWh_{PE}/m^2*	
Dwelling primary energy	49.13 kWh_{PE}/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*37.3 kWh/m^2*	
Dwelling fabric energy efficiency	36.1 kWh/m^2	OK

2a Fabric U-values				
Element	***Maximum permitted average U-Value [W/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**Element with highest individual U-Value**	
External walls	*0.26*	0.17	Ground Floor EXT Walls (0.17)	OK
Party walls	*0.2*	N/A	N/A	**N/A**
Curtain walls	*1.6*	N/A	N/A	**N/A**
Floors	*0.18*	0.17	Ground Floor (0.17)	OK
Roofs	*0.16*	N/A	N/A	**N/A**
Windows, doors, and roof windows	*1.6*	0.97	1 (1.2)	OK
Rooflights	*2.2*	N/A	N/A	**N/A**

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	**Net area [m^2]**	**U-Value [W/m^2K]**
Exposed wall: Ground Floor EXT Walls	82.2	0.17
Ground floor: Ground Floor	70.2	0.17
Exposed roof: Exposed Roof	0	0 **(!)**

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	**Area [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
1, Doors	2.3	South	N/A	1.2
2, Windows (1)	2.89	South	0.9	0.91 **(!)**
3, Windows (1)	1.44	North	0.9	0.91 **(!)**
4, Windows (1)	0.36	North	0.9	0.91 **(!)**
5, Windows (1)	1.44	North	0.9	0.91 **(!)**
6, Windows (1)	3.45	West	0.9	0.91 **(!)**

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))
Building part **1 - Main Dwelling**: SAP default y-value (0.2 W/m^2K) used for thermal bridging

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	*8 m^3/hm^2*	
Dwelling air permeability at 50Pa	1.5 m^3/hm^2, Design value **(!)**	OK
Air permeability test certificate reference	Not Provided	

4 Space heating	
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	250.0%
Emitter type	Both radiators and underfloor
Flow temperature	
System type	
Manufacturer	
Model	
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: Cylinder	
Capacity	150 litres
Declared heat loss	N/A
Primary pipework insulated	No
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls		
Main heating 1 - type: Programmer, TRVs, and bypass		
Function		
Ecodesign class		
Manufacturer		
Model		
Water heating - type: N/A		
Manufacturer		
Model		

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

8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	*N/A*	
Specific fan power	N/A	**N/A**
Minimum permitted heat recovery efficiency	*N/A*	
Heat recovery efficiency	N/A	**N/A**
Manufacturer/Model		
Commissioning		

9 Local generation
N/A

10 Heat networks
N/A

11 Supporting documentary evidence
N/A

12 Declarations

a. Assessor Declaration

This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.	

Signed:	Assessor ID:
Name:	Date:

b. Client Declaration

N/A