47a Lower Mortlake Road, Richmond

Energy and Sustainability Strategy

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Version 03

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JAWSustainability

Contents

1 Introduction

This report summarises the proposed sustainable strategy for development at 47a Lower Mortlake Road in order to meet the sustainability requirements of the London Borough of Richmond upon Thames and the London Plan. The site is located in the London Borough of Richmond upon Thames. The proposed development consists of a co living scheme with 16 units across a part 2, part 3 storey development, as well as shared communal space on the lower ground floor. The ground floor layout is shown in Figure 1-1.

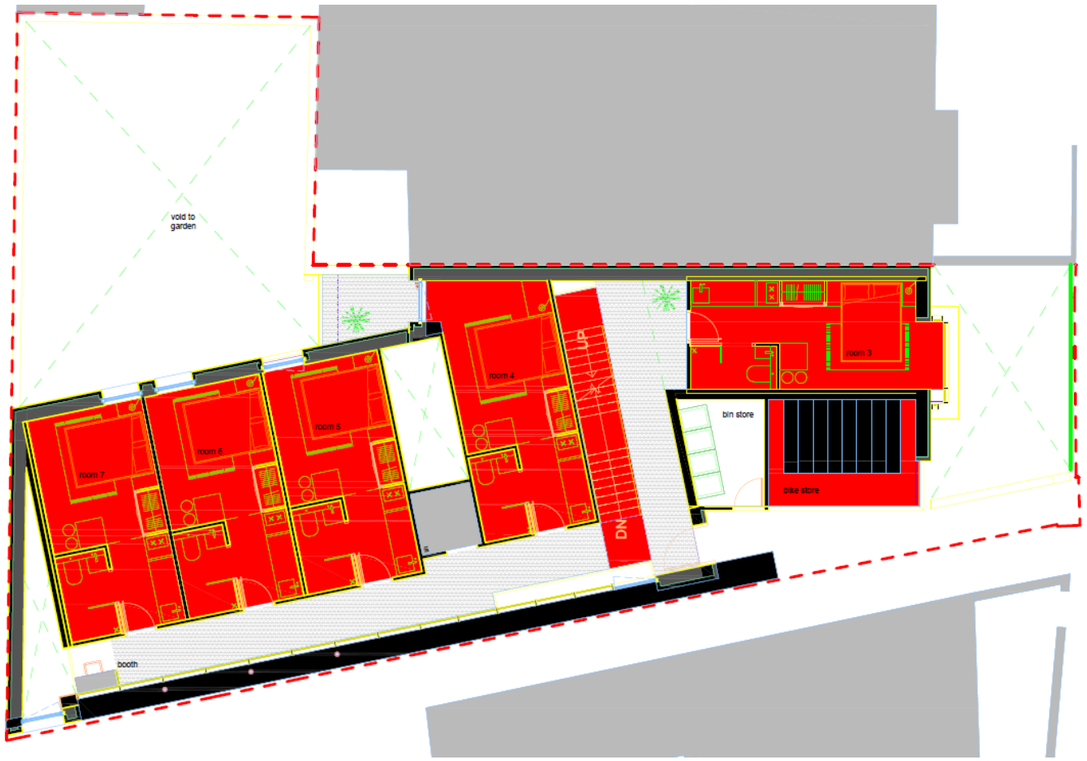

Figure 1-1 – Ground floor layout

2 Policy

The following policies from the London Plan and the London Borough of Richmond upon Thames Local Plan have been identified as having requirements most relevant to the sustainability strategy of the development.

2.1 The London Plan

Policy 5.2: Minimising Carbon Dioxide Emissions

Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:

- Be lean: use less energy
- Be clean: supply energy efficiently
- Be green: use renewable energy

As the scheme is not classed as a major residential development, further requirements of Policy 5.2 do not apply

Policy 5.3 Sustainable Design and Construction Strategic

Development proposals should demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process.

Policy 5.6 Decentralised Energy in Development Proposals

Development proposals should evaluate the feasibility of Combined Heat and Power (CHP) systems, and where a new CHP system is appropriate also examine opportunities to extend the system beyond the site boundary to adjacent sites.

Potential opportunities to meet the first priority in this hierarchy are outlined in the London Heat Map tool. Where future network opportunities are identified, proposals should be designed to connect to these networks.

Policy 5.7 Renewable Energy

Within the framework of the energy hierarchy, major development proposals should provide a reduction in expected carbon dioxide emissions through the use of on-site renewable energy generation, where feasible.

2.2 London Borough of Richmond upon Thames Local Plan

Policy LP 20 Climate Change Adaption

The Council will promote and encourage development to be fully resilient to the future impacts of climate change in order to minimise vulnerability of people and property.

New development, in their layout, design, construction, materials, landscaping and operation, should minimise the effects of overheating as well as minimise energy consumption in accordance with the following cooling hierarchy:

1. minimise internal heat generation through energy efficient design
2. reduce the amount of heat entering a building in summer through shading, reducing solar reflectance, fenestration, insulation and green roofs and walls
3. manage the heat within the building through exposed internal thermal mass and high ceilings
4. passive ventilation
5. mechanical ventilation
6. active cooling systems (ensuring they are the lowest carbon options).

Opportunities to adapt existing buildings, places and spaces to the likely effects of climate change should be maximised and will be supported.

Policy LP 22 Sustainable Design and Construction

Developments will be required to achieve the highest standards of sustainable design and construction to mitigate the likely effects of climate change. Applicants will be required to complete the following:

1. Development of 1 dwelling unit or more, or 100sqm or more of non-residential floor space (including extensions) will be required to complete the Sustainable Construction Checklist SPD. A completed Checklist has to be submitted as part of the planning application.
2. Development that results in a new residential dwelling, including conversions, change of use, and extensions that result in a new dwelling unit, will be required to incorporate water conservation measures to achieve maximum water consumption of 110 litres per person per day for homes (including an allowance of 5 litres or less per person per day for external water consumption).
3. New non-residential buildings over 100sqm will be required to meet BREEAM 'Excellent' standard.
4. Proposals for change of use to residential will be required to meet BREEAM Domestic Refurbishment 'Excellent' standard (where feasible).

Reducing Carbon Dioxide Emissions

Developers are required to incorporate measures to improve energy conservation and efficiency as well as contributions to renewable and low carbon energy generation. Proposed developments are required to meet the following minimum reductions in carbon dioxide emissions:

1. All new major residential developments (10 units or more) should achieve zero carbon standards in line with London Plan policy.
2. All other new residential buildings should achieve a 35% reduction.
3. All non-residential buildings over 100sqm should achieve a 35% reduction. From 2019 all major non-residential buildings should achieve zero carbon standards in line with London Plan policy.

Targets are expressed as a percentage improvement over the target emission rate (TER) based on Part L of the 2013 Building Regulations.

This should be achieved by following the Energy Hierarchy:

1. Be lean: use less energy
2. Be clean: supply energy efficiently
3. Be green: use renewable energy

Decentralised Energy Networks

The Council requires developments to contribute towards the Mayor of London target of 25% of heat and power to be generated through localised decentralised energy (DE) systems by 2025. The following will be required:

1. All new development will be required to connect to existing DE networks where feasible. This also applies where a DE network is planned and expected to be operational within 5 years of the development being completed.
2. Development proposals of 50 units or more, or new non-residential development of 1000sqm or more, will need to provide an assessment of the provision of on-site decentralised energy (DE) networks and combined heat and power (CHP).
3. Where feasible, new development of 50 units or more, or new non-residential development of 1000sqm or more, as well as schemes for the Proposal Sites identified in this Plan, will need to provide on-site DE and CHP; this is particularly necessary within the clusters identified for DE opportunities in the borough-wide Heat Mapping Study. Where on-site provision is not feasible, provision should be made for future connection to a local DE network should one become available.

Applicants are required to consider the installation of low, or preferably ultra-low, NOx boilers to reduce the amount of NOx emitted in the borough.

Local opportunities to contribute towards decentralised energy supply from renewable and low-carbon technologies will be encouraged where appropriate.

3 Energy Strategy

An energy strategy has been developed following the energy hierarchy 'Be Lean, Be Clean, Be Green'. Energy calculations using Building Regulations approved and accredited software have been undertaken at each stage to calculate the savings associated with the measures incorporated.

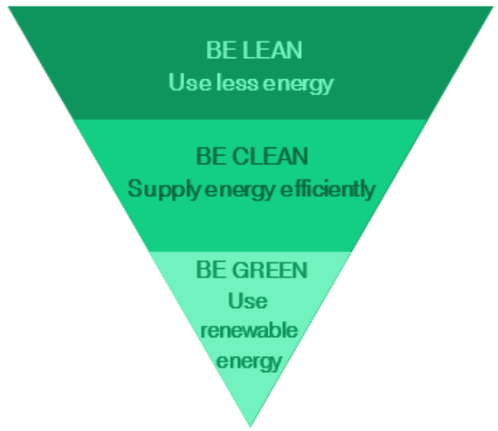

Figure 3-1 The Energy Hierarchy

The energy consumption and carbon emission figures within this report have been calculated using the approved Standard Assessment Procedure for the Energy Rating of Dwellings (SAP). Energy figures for the communal area have been calculated using the VE compliance modules within IES.

3.1 Energy Targets

There are 16 co-living units and a shared communal space, which are classed as a minor residential development, with a target of a 35% reduction over Part L 2013 target emission rate, in line with the requirements of the Richmond upon Thames Local Plan. Table 3-1 below details the energy and carbon breakdown of the Part L target emission rate.

	Gas (kWh/yr)			Gas CO2 (kg/yr)	Electricity (kWh/yr)						Electricity CO2 (kg/yr)	Total Energy	Total CO2
	Space Heating	Hot Water	Total		Space Heating	HW	Cooling	Pumps & Fans	Lighting	Total			
Co-living units	18,835	24,243	**43,078**	**9,305**	0	0	0	1,344	2,044	**3,388**	**1,759**	**46,467**	**11,064**
Communal space	6,646	2,383	**9,029**	**1,950**	0	0	0	189	2,230	**2,420**	**1,256**	**11,448**	**3,206**
Total	25,481	26,626	**52,107**	**11,255**	0	0	0	1,533	4,274	**5,808**	**3,015**	**57,915**	**14,270**

Table 3-1 Target regulated energy demand and carbon emissions per energy source

3.2 Be Lean

As part of the Be Lean approach, passive design measures have been considered throughout the pre-planning stage to reduce initial energy demand.

Solar Gain Control and Daylight

Solar gains are a passive form of heating from the sun's radiation and are beneficial to a building during winter months as they provide an effective source of heat and reduce internal heating requirements. However, during summer months, they must be controlled in order to mitigate the risk of overheating. They can be controlled through glazing and shading design in order to allow low level winter sun to enter the building and to limit access to high level summer sun.

The glazing strategy design has carefully considered orientation and window size in order to maximise daylight while controlling excessive solar gains. Glazing will incorporate low emissivity coatings to limit overheating without compromising light transmittance.

Overheating

The impact of solar gains has been analysed as part of the SAP calculations, taking into account the ventilation strategies and the residential development has a medium risk of overheating, when measured against the Part L1A criteria.

Windows are specified to incorporate low emissivity coatings to limit overheating while ensuring adequate daylight.

Building Fabric

Designing an efficient thermal envelope will greatly reduce the need for space heating and cooling as heat transmittance through the thermal elements is reduced.

Low air permeability rates will also reduce heating and cooling energy demand by reducing the volume of air that can penetrate the building.

As part of a 'fabric first' approach, the building fabric has been carefully considered and specified to meet or exceed current Building Regulations minimum requirements, as detailed in Table 3-2 below.

Fabric Component	Specification
External Walls	0.13 W/m^{2}K
Walls to corridors	0.18 W/m^{2}K
Flat Roof	0.12 W/m^{2}K
Pitched Roof	0.12 W/m^{2}K
Ground Floor	0.12 W/m^{2}K
Residential Party Walls	Fully filled cavity with edge sealing
Windows	1.2 W/m^{2}K, G=0.63
External Doors	1 W/m^{2}K
Air Tightness	4 m^3/m^2/h
Thermal Bridging	Default

Table 3-2 Proposed Be Lean passive design measures

With regards to party walls, to reach the required standards, these must be fully filled. Partially filled cavities will not comply.

Building Services

Individual systems have been identified as being the most appropriate for the site. These have been specified to maximise efficiency therefore reducing energy used to deliver services.

Table 3-3 shows the proposed services strategy and energy efficiency measures for the development.

Services Component	Residential Specification	Communal Specification
Space Heating	Communal Gas Boiler, 95% efficient, UF/H	Communal Gas Boiler, 95% efficient
Hot Water	Communal Gas Boiler, 95% efficient	Communal Gas Boiler, 95% efficient
Cooling	-	-
Heating Controls	Individual room charging linked to use of community heating, programmer and TRVs	-
Ventilation	Operable windows	Operable windows
Lighting & Controls	100% low energy lighting	80 lm/W, LOR > 0.9

Table 3-3 Proposed energy efficient design measures

3.3 Be Clean

As part of the Be Clean approach, the use of energy efficient equipment, heat networks and community heating have been considered.

District Energy Systems

With reference to the London Heat Map, there are no potential heat networks running in the vicinity of the site. Due to the lower energy requirements in the area, it is unlikely there will be a heat network here in the future.

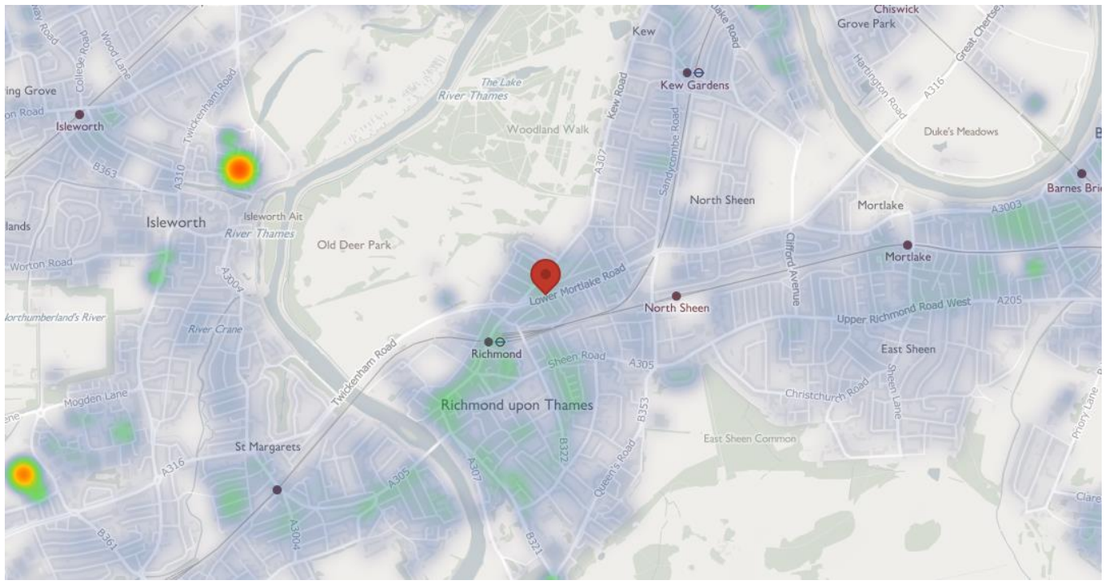

Figure 3-2 London Heat Map – Black dot demonstrates the development

Community Heating

Efficient systems for energy delivery have also been investigated. At the scale of this development, Community Heat and Power (CHP) systems are not viable. CHP requires a high base energy demand load in order to operate efficiently. It is usually more suited to hotel or hospital schemes which have a high hot water demand, or very large residential schemes incorporating hundreds of units.

Delivery of heating on site has been investigated, and a communal boiler was selected to serve the whole development. This has been accounted for in the Be Lean section of this report.

3.4 Be Green

At the Be Green stage, renewable technologies are investigated. Table 3-6 considers the feasibility of renewable energy technologies for the scheme.

LZC Technologies	Description	Noise	Visual impact	Internal Space	External Space	Capital Cost	Maintenance	Feasibility	
Solar Thermal Collectors 	Solar thermal collectors can be used to provide hot water using the irradiation from the sun. They can generally provide approx. 50% of the hot water demand	🟢	🟡	🟢	🟡	🔴	🟡	There are areas of flat roof that can incorporate solar technologies. However, carbon savings are quite low and it is quite a high cost technology.	✗
Solar Photovoltaic Panels 	Solar PV panels generate electricity from the sun's energy. They should be installed within 90° of due south ideally at a 30° angle. The electricity can be used to supply the landlords load.	🟢	🟡	🟢	🟡	🟡	🟡	There are areas of flat roof that can incorporate solar technologies. Solar PV is ideal for making carbon savings while being a simple technology.	✓
Biomass Heating 	Solid, liquid or gaseous fuels derived from plant material can provide boiler heat for space and water heating A biomass boiler would supplement a standard gas heating system so some of the cost may be offset through money saved on using smaller traditional boilers reliability of fuel access/supply can be a problem	🟡	🟢	🔴	🟡	🔴	🔴	Biomass is not considered feasible for this development due to issues with fuel storage, access for delivery vehicles and local NO_x emissions.	✗

Wind Turbines 	Vertical and horizontal axis wind turbines enable electricity to be generated using the power within the wind Not suitable for urban environments due to low wind conditions and obstructions	🔴	🔴	🟢	🔴	🔴	🟡	This development is in an urban environment and so a wind turbine will not generate a significant amount of energy.	×
Ground Source Heat Pumps (GSHP) 	Utilising horizontal loops or vertical boreholes, GSHP make use of the grounds almost constant temperature to provide heating and/or cooling using a heat exchanger connected to a space/water heating delivery system Optimum efficiency with underfloor heating systems	🟡	🟢	🟡	🟡	🔴	🟡	GSHP are not a feasible technology for the site since there is a limited external space available for installation of boreholes.	×
Air Source Heat Pumps (ASHP) 	Air Source Heat Pumps extract latent energy from the external air in a manner similar to ground source heat pumps Optimum efficiency with underfloor heating systems	🟡	🟡	🟡	🟡	🟡	🟡	The use of individual ASHP is technically feasible, however there is limited roof space that will already be taken up by Solar PV	×

Table 3-4 Feasibility of LZC technologies for the development

PV System

The feasibility study has identified solar PV as the most appropriate technology for the site. There are 2 sections of flat roof above the top floor which would be suitable for the location of Solar Photovoltaic. Other sections of flat roof are likely to suffer from overshadowing, which may make PV uneconomical in these locations. The areas of flat roof suitable are highlighted in Figure 3-6 in red

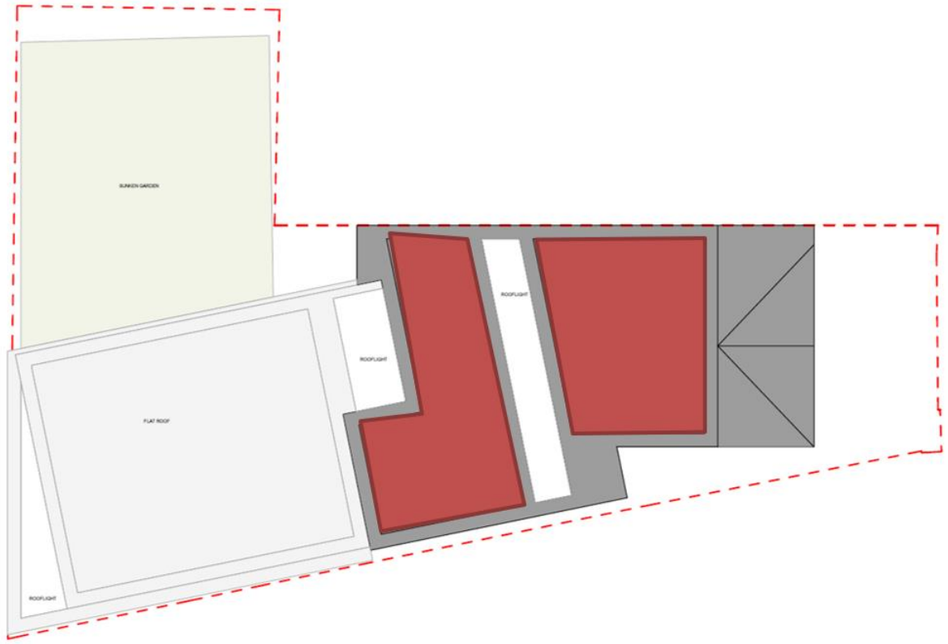

Figure 3-3 – Suitable section of the development roof for Solar PV

The following system is proposed, which is the estimated maximum sized system that could fit on suitable sections of flat roof of the development, subject to access & exclusion zone requirements.

- Peak Power – 4 kWp
- Orientation / Angle of elevation – South / 30°
- Panel specification – Min 18% efficiency
- Approx. number of panels / Area required – 14 panels / 51.2 m2 (assuming a panel spacing of 1.65m x 2.25m)

3.5 Energy and Carbon Savings

Energy Use

The breakdown of carbon and energy use has been identified for the site. Table 3-5 shows the breakdown of carbon and energy use once the strategies proposed in this report are incorporated.

	Gas (kWh/yr)			Gas CO2 (kg/yr)	Electricity (kWh/yr)							Electricity CO2 (kg/yr)	Total Energy	Total CO2
	Space Heating	Hot Water	Total		SH	HW	C	Pumps & Fans	Lighting	PV	Total			
Co-living	15,738	26,360	**42,098**	**9,093**	0	0	0	0	1,938	-3,434	**1,938**	**1,006**	**44,035**	**10,099**
Communal	3,393	2,403	**5,796**	**1,252**	0	0	0	401	1,502	0	**1,903**	**988**	**7,699**	**2,240**
Total	19,131	28,763	**47,894**	**10,345**	0	0	0	401	3,440	-3,434	**407**	**211**	**48,301**	**10,556**

Table 3-5 Estimated regulated energy demand and carbon emissions per energy source

Carbon Saving

Table 3-6 and Figure 3-4 demonstrate the percentage improvement over the notional baseline levels for the development. A 26% reduction in emissions has been achieved across the site.

	Total		
	CO_2 Emissions (tonnes /annum)	CO_2 Savings (tonnes /annum)	% Saving
Building Regulations 2013 Baseline	14.27		
Be Lean (after demand reduction)	12.34	1.93	14%
Be Clean (after efficiency measures)	12.34	0.00	0%
Be Green (after renewable energy)	10.56	1.78	12%
Total Cumulative Savings		3.71	26%

Table 3-6 improvements over Part L

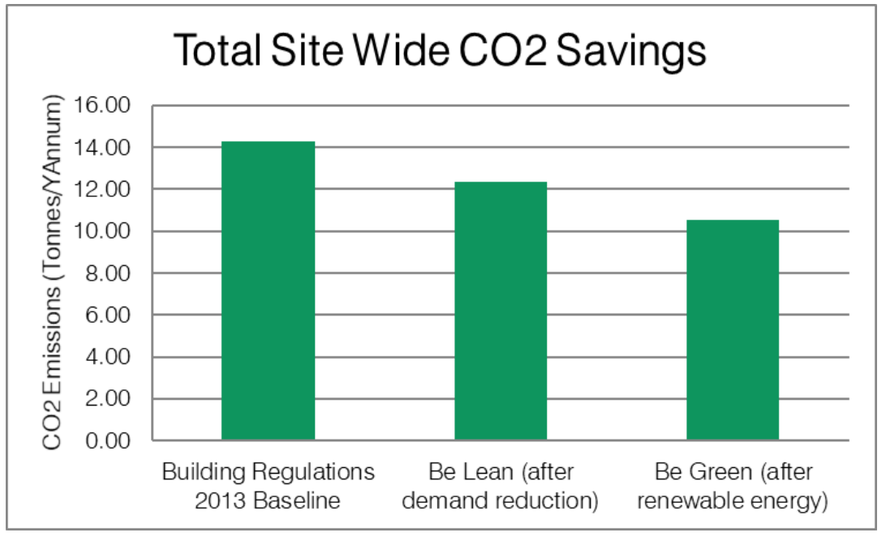

Figure 3-4 Site Wide Improvement over Building Regulations Part L 2013

Carbon Offset Payment

The measures identified above will be used to achieve a 26% reduction in Carbon Dioxide emissions. The remaining emission reduction to meet the 35% reduction required by Richmond upon Thames can be made up through an offset payment. This calculation is detailed in Table 3-7.

	Shortfall on 35% reduction		
	Carbon emissions (tonnes / annum)	30 year carbon emissions	Offset payment (£60/tonne)
Emissions	1.28	38	
Offset			£2,306

Table 3-7 Carbon offset payment

4 Sustainability

4.1 Water efficiency

Water fittings will be specified with the following or similar flow rates to meet the target water consumption of 105 l/p/day:

- Wash basin taps – 6.5 l/min
- Showers – 7.5 l/min
- Bath – 120l to overflow
- Dishwasher - 1.2 l/place setting
- Washing machine - 9 l/kg load
- WC – 6/4 litre dual flush
- Kitchen taps – 6.5 l/min

4.2 Materials

Insulating materials will be specified to maximise thermal performance whilst still paying attention to the environmental impact of the materials used. The use of low embodied energy products will be further investigated.

Responsible sourcing will also be pursued. All timber used on site during the construction phase and within the building will be from legal sources. Where possible, FSC or equivalent timber will be used. Sourcing of other materials will include products where the manufacturer employs an environmental management system such as ISO 14001 or BES 6001. Where possible, materials will be sourced locally.

Non-toxic materials will be used wherever possible, including the specification of products with low VOC content in line with European testing standards.

All the building elements will achieve high ratings on the BRE Green Guide to Specification. Materials will be specified to have a low embodied energy, considering whole life cycle analysis.

4.3 Waste Management and Construction

Construction site waste will be managed in such a way to reduce the amount of waste produced as much as possible, and the waste hierarchy will be followed.

Household waste will be recycled through the local authority collection scheme. Each unit will be provided with its own separate waste and recycling bins. The development will have refuse stores integrated on the ground floor in two locations, which will provide separate bins for waste and recycling.

4.4 Nature Conservation and Biodiversity

The site was previously a vacant yard so is not considered to be of ecological value. Measures will be taken during construction to minimise impact on ecology by timing works appropriately and following best practice guidance. The garden spaces will incorporate native planting where possible.

4.5 Climate Change Adaptation

Tackling Increased Temperature and Drought

The impact of solar gain has been incorporated into the SAP analysis for compliance with Part L and the risk of solar overheating has been concluded to be medium for the development. Windows will incorporate low emissivity coatings to reduce solar gain.

Flooding

The peak and volume of surface water run-off rates will not be increased due to the development, as the site is existing hard standing so the impermeable area will not increase. The site is in flood zone 1 so the building is not at risk of flooding. The roof will incorporate a blue roof systems to provide attenuation of rainfall.

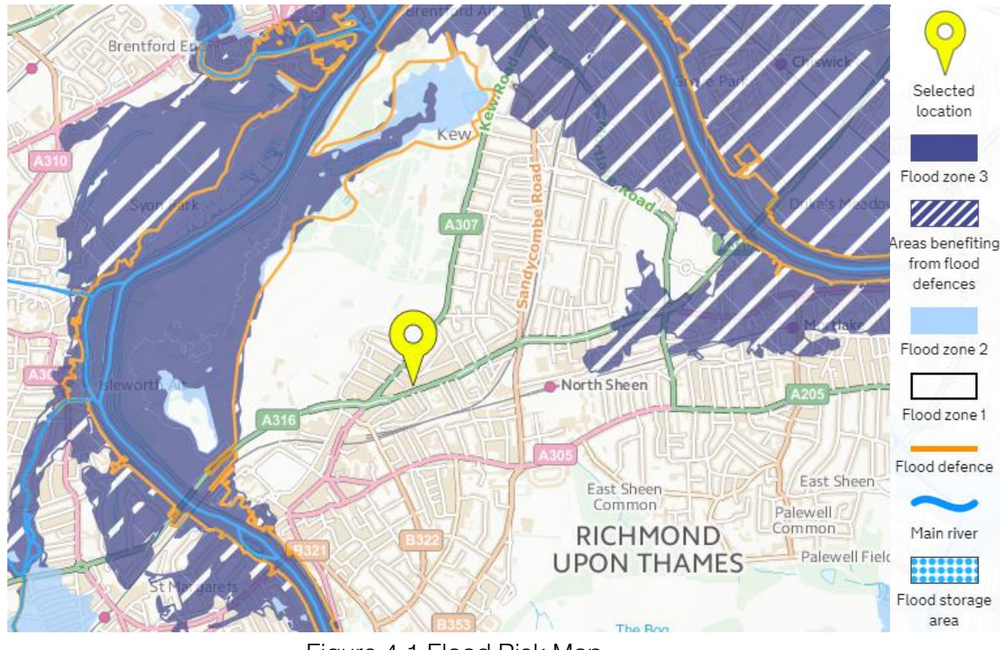

Figure 4-1 Flood Risk Map

4.6 Pollution Management

Air Quality

The construction site will be managed in such a way that the environmental impact is minimised. This includes following best practice policies for dust pollution by using dust sheets, covering skips and damping down where appropriate.

Plant and machinery

All plant and equipment installed in the development will be appropriately sized and selected for efficiency in order to reduce greenhouse gas emissions and have a low NO_x emission value. All equipment will be frequently maintained to ensure it continues to run efficiently and cleanly.

Insulating materials and heating systems will be specified to keep pollutants to a minimum. Insulation will have a low Global Warming Potential.

Noise

The dwellings will comply with Building Regulations Part E, providing a good level of sound insulation. All windows are to be specified as high efficiency double glazing to minimise the transmission of noise between the property and surrounding area.

Light Pollution

External lighting will be adequately controlled to ensure that it does not run unnecessarily. The proposed development is in a highly urbanised location, and therefore will not significantly contribute to increasing the effects of light pollution.

5 Conclusion

This report summarises the proposed sustainable strategy for development at 47a Lower Mortlake Road in order to meet the sustainability requirements of the London Borough of Richmond upon Thames and the London Plan. The proposed development consists of a co living scheme with 16 units across a part 2, part 3 storey development, as well as shared communal space on the lower ground floor.

As required by the London Plan and the Richmond upon Thames local plan, the development follows the energy hierarchy, incorporating passive design measures, energy efficient equipment and renewable energy.

The development employs an efficient building fabric, including well insulated walls and highly efficient glazing, efficient systems and PV Panels are specified to maximise carbon savings for the site, resulting in a 26% improvement over Part L for the building. The development will further achieve a 35% reduction through an offset payment in line with the London Plan guidance.

Measures have been incorporated to ensure that sustainability is considered throughout the construction and design process.

The figures within this report are based on preliminary analysis only and further detailed studies will be required at the detailed design stage before specifying any of the proposed systems.