Energy and Sustainability Statement

Charlton Brown Architecture & Interiors

26 Rosslyn Hill
London Borough of Camden
NW3 1PA

SRE

Version	Revision	Date	Author	Reviewer	Project Manager
1	A	28.10.2022	Yin Mui Tang	Aniruth Ragunathan	Yin Mui Tang
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The figures within this report may be based on indicative modelling and an assumed specification outlined within the relevant sections. Therefore, this modelling may not represent the as built emission or energy use of the Proposed Development and further modelling may need to be undertaken at detailed design stage to confirm precise performance figures. Please contact SRE should you have any questions, or should you wish further modelling to be undertaken post planning.

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Executive Summary

This Energy and Sustainability Statement has been written to demonstrate the measures incorporated into the design of the Proposed Development at 26 Rosslyn Hill, London Borough of Camden. The scheme will deliver lower energy and water use, lower carbon emissions and lower operational costs than a 2021 Building Regulations compliant design.

The Proposed Development is a five-bedroom family house consisting of a new build house behind a retained front façade over four storeys including the lower ground, upper ground, first and second floors, as well as a front and rear gardens.

The site is located within the Hampstead Conservation Area, with the Proposed Development located on the north-east side of Rosslyn Hill. The Proposed Development is set back from the street front and abuts the Grade II listed Building of the Former Hampstead Police Station on its south-east side.

The energy strategy has been developed by following the GLA Energy Hierarchy of Lean, Clean, Green and Seen along with local policy guidance. The chosen energy strategy is in line with the carbon aspirations set in the New London Plan and local planning policy. This includes Lean passive and active design measures and Green LZC technologies to achieve a 60% improvement through energy efficiency measures and an overall >50% improvement over Baseline CO_2 emissions on site over a Building Regulations 2021 Part L V1 compliant design.

In addition to the measures outlined within this report, a Whole Life Carbon Assessment (WLCA) has also been undertaken on the Proposed Development to determine the whole life carbon impact of the proposal. Full results are shown within the supporting Whole Life Carbon Assessment report.

Proposed Energy Strategy

Passive and active design measures will be incorporated into the design of the Proposed Development. Waste water heat recovery units will be connected to all showers and baths, and a 4.8 kWp PV system will be installed with an export capable meter and PV diverter. This scheme has been able to achieve a 60% improvement in CO_2 emissions compared to a 2021 Building Regulations compliant scheme. The proposed energy strategy for the Proposed Development is summarised below:

Proposed Energy Strategy:

- Enhanced building fabric in line with LETI guidance
- High efficiency LED Lighting
- MVHR ventilation
- High efficiency ASHPs supplying heating and hot water
- 4.8 kWp Roof mounted PV

Site-Wide	CO_2 emissions (t/yr)	Improvement over baseline (%)
Baseline	4.3	
Lean	4.1	6
Clean	4.1	6
Green	1.7	60

Table 1 - Summary of the CO_2 emissions and improvement over Baseline from GLA carbon emissions reporting spreadsheet

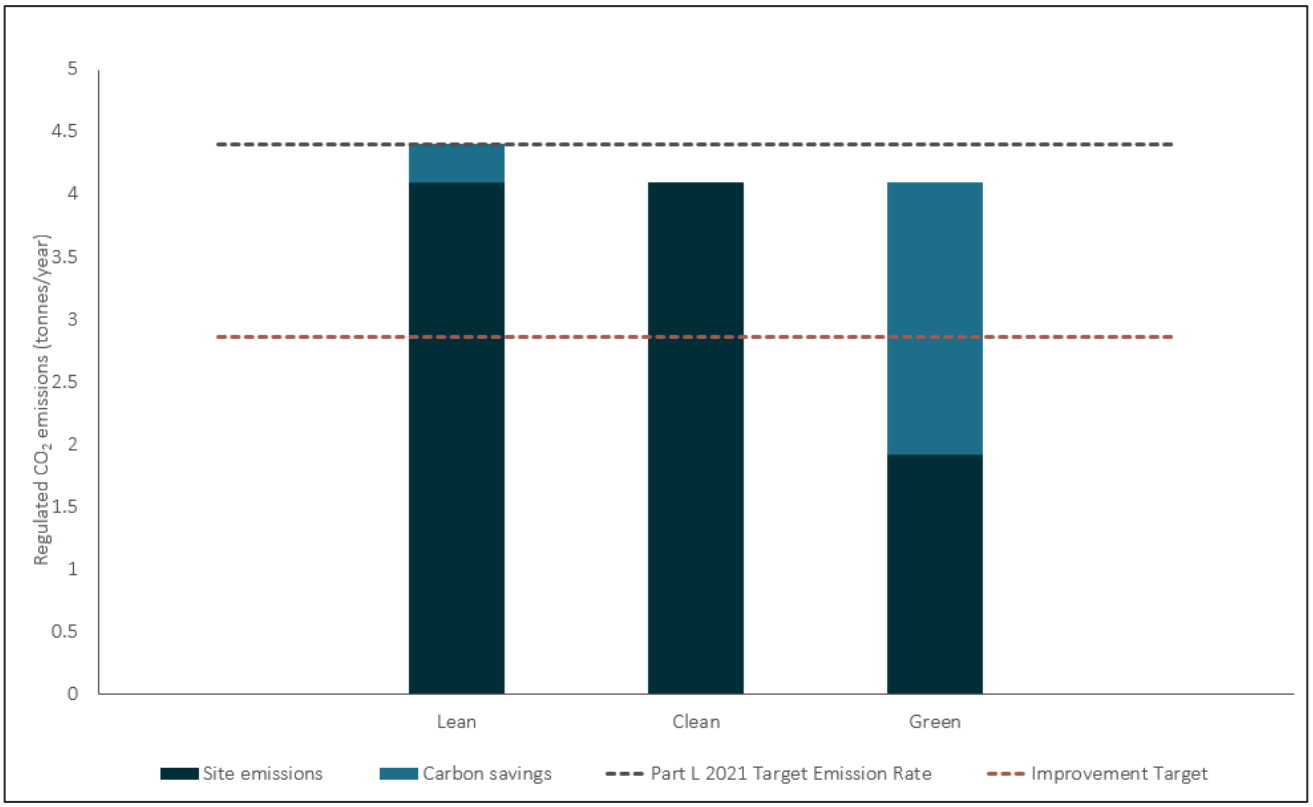


Figure 1 - Summary of regulated carbon dioxide savings for the Proposed Development

Introduction

1.0 Introduction

This Energy and Sustainability Statement has been written by SRE Ltd on behalf of Charlton Brown Architecture & Interiors (the Client) to demonstrate the measures incorporated into the design of 26 Rosslyn Hill, London Borough of Camden (the Proposed Development). The development will deliver lower energy and water use, lower carbon emissions and lower operational costs than a 2021 Building Regulations Compliant design.

The statement compares the predicted actual building energy requirement with a Building Regulations compliant design, outlines passive and active design measures, and assesses the suitability of low and zero carbon (LZC) technologies specific to this site to address the relevant planning policy requirements.

The statement analyses how the Proposed Development will integrate with its surrounding environment within the context of sustainability to ensure it benefits the surrounding area socially, environmentally, and economically.

The Proposed Development is a five-bedroom family house consisting of a new build house behind a retained front façade over four storeys including the lower ground, upper ground, first and second floors, as well as a small front garden. The 4-storey development will constitute a total GIA of 526 m^2. As part of the development external terrace space and associated ancillary facilities such as plant room and bin store are also included.

The site is located within the Hampstead Conservation Area, with the Proposed Development located on the north-east side of Rosslyn Hill. The Proposed Development is set back from the street front and abuts the Grade II listed Building of the former Hampstead Police Station on its south-east side.

Figure 2 illustrates the front and rear elevations of the Proposed Development. A site plan of the Proposed Development has been included in Appendix A.

Figure 2 – Front Elevation of the Proposed Development (Charlton Brown Architecture & Interiors)

Figure 3 – Front and Rear Elevations of the Proposed Development (Charlton Brown Architecture & Interiors)

The below table lists out the relevant policy requirements applicable to the Proposed Development.

Planning Policy	Requirement
London Borough of Camden Local Plan	<u>Policy CC1: Climate Change Mitigation</u> The Council will require all development to minimise the effects of climate change and encourage all developments to meet the highest feasible environmental standards that are financially viable during construction and occupation. We will: a) promote zero carbon development and require all development to reduce carbon dioxide emissions through following the steps in the energy hierarchy; b) require all major development to demonstrate how London Plan targets for carbon dioxide emissions have been met; c) ensure that the location of development and mix of land uses minimise the need to travel by car and help to support decentralised energy networks; d) support and encourage sensitive energy efficiency improvements to existing buildings; e) require all proposals that involve substantial demolition to demonstrate that it is not possible to retain and improve the existing building; and f) expect all developments to optimise resource efficiency. For decentralised energy networks, we will promote decentralised energy by:

Planning Policy	Requirement
	g) working with local organisations and developers to implement decentralised energy networks in the parts of Camden most likely to support them; h) protecting existing decentralised energy networks (e.g. at Gower Street, Bloomsbury, King's Cross, Gospel Oak and Somers Town) and safeguarding potential network routes; and i) requiring all major developments to assess the feasibility of connecting to an existing decentralised energy network, or where this is not possible establishing a new network. To ensure that the Council can monitor the effectiveness of renewable and low carbon technologies, major developments will be required to install appropriate monitoring equipment. Developments of five or more dwellings and/or more than 500 sqm of any gross internal floorspace are expected to achieve a 20% reduction in carbon dioxide emissions from on-site renewable energy generation (which can include sources of site related decentralised renewable energy), unless it can be demonstrated that such provision is not feasible. The 20% reduction should be calculated from the regulated CO_2 emissions of the development after all proposed energy efficiency measures and any CO_2 reduction from non-renewable decentralised energy (e.g. CHP) have been incorporated.
	Policy CC2: Adapting to climate change a) The Council will require development to be resilient to climate change. All development should adopt appropriate climate change adaptation measures such as: the protection of existing green spaces and promoting new appropriate green infrastructure; b) not increasing, and wherever possible reducing, surface water runoff through increasing permeable surfaces and use of Sustainable Drainage Systems; c) incorporating bio-diverse roofs, combination green and blue roofs and green walls where appropriate; and d) measures to reduce the impact of urban and dwelling overheating, including application of the cooling hierarchy. Any development involving 5 or more residential units or 500 sqm or more of any additional floorspace is required to demonstrate the above in a Sustainability Statement. Sustainable design and construction measures The Council will promote and measure sustainable design and construction by: e) ensuring development schemes demonstrate how adaptation measures and sustainable development principles have been incorporated into the design and proposed implementation; f) encourage new build residential development to use the Home Quality Mark and Passivhaus design standards; g) encouraging conversions and extensions of 500 sqm of residential floorspace or above or five or more dwellings to achieve "excellent" in BREEAM domestic refurbishment; and expecting non-domestic developments of 500 sqm of floorspace or above to achieve "excellent" in

Planning Policy	Requirement
	BREEAM assessments and encouraging zero carbon in new development from 2019.
Camden Planning Guidance – Energy Efficiency and Adaption (March 2019)	General Guidance from the London Borough of Camden on the preparation of Energy Statements for Planning, the requirements needing to be met, and the information required to be displayed.
The New London Plan (2021)	Policy SI 2: Minimising Greenhouse Gas Emissions A minimum on-site reduction of 35% with at least 10% through energy efficiency measures alone. If the zero-carbon cannot be met onsite, a shortfall should be provided either through a cash lieu contribution to the borough or off-site provided that an alternative proposal is identified, and delivery is certain.
	Policy SI 4: Managing Heat Risk Limit internal heat gain through the cooling hierarchy
	Policy SI 5: Water Infrastructure Minimise the use of mains water in line with the optional requirement of the Building Regulations (residential development), achieving mains water consumption of 105 litres or less per head per day (excluding allowance of up to five litres for external water consumption)

Table 2 - Summary of local planning policy requirements

In addition to the policy requirements outlined in Table 2 above, the GLA Energy Assessment Guidance 2021 references an additional benchmark improvement for residential developments to strive to achieve above the minimum 35% onsite carbon reduction over Part L 2021.

Building Type	Minimum onsite improvement over Part L 2021	Benchmark improvement over Part L 2021
Residential	35%	50%

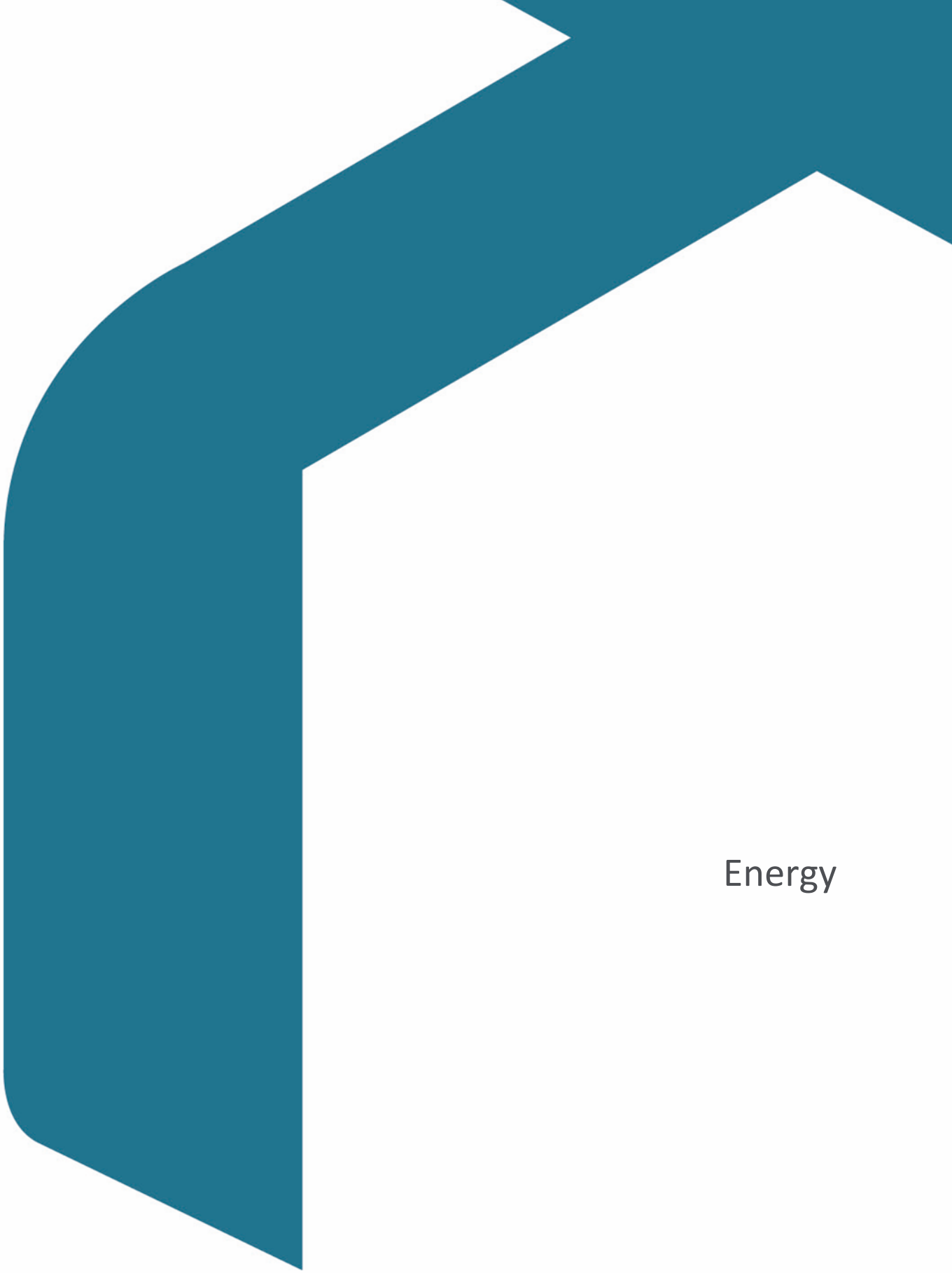
Table 3 – GLA Percentage improvement benchmark for residential developments[1]

In accordance with the Camden Planning Guidance – Energy Efficiency and Adaption (March 2019) document, the Proposed Development is deemed to be a 'medium' sized residential new-build as the floor area exceeds 500m^2. Hence, the Proposed Development will strive to achieve the emissions reductions in line with those outlined within the London Plan, as follows:

- An improvement over Building Regulations 2021 by 10% from energy efficiency measures alone (Lean)
- An improvement over Building Regulations 2021 by 50% overall
- Carbon offset of >20% from Low/Zero Carbon technologies

[1] https://www.london.gov.uk/sites/default/files/gla_energy_assessment_guidance_june_2022_0.pdf

- Reduced internal water use in line with the requirement of <105l/p/d
- Application of the cooling hierarchy
- General sustainability measures – incl. use of sustainable construction techniques and materials, sustainable travel options, inclusive design, site management and procurement procedures etc.



Energy

2.0 Energy

2.1 Method

The energy strategy design follows national policy guidance[2] and seeks to be:

Lean

minimise the overall environmental impact and energy use through energy efficiency measures

Clean

ensure that energy systems on-site (heat & power) are efficient & produce minimal CO_2 emissions

Green

Implement suitable technologies to provide renewable and emission free energy sources

Seen

incorporate monitoring through SMART metering and accessible displays

The CO_2 Conversion Factors have been taken from the new Building Regulations 2021 which are based on standard yearly figures taken from the Government SAP Guidance[3] and outlined below in Table 4. Although within the SAP10 modelling, the CO_2 conversion factor for electricity vary over the course of the year due to the changing mix of inputs to the electricity grid, i.e. increased PV generation in the summer months.

	CO_2 Conversion Factor ($kgCO_2/kWh$)
Electricity (mains)	0.136
Electricity (offset)	-0.136
Gas (mains)	0.210

Table 4 - CO_2 conversion factors by energy source

The energy modelling for the Proposed Development has been carried out using the new SAP 10 software in accordance with Building Regulations 2021 Part L V1.

The Target Emission Rate (TER) from the Green scenario is taken as the Baseline and is the exact size and shape of the Proposed Development but is based on notional U-values and heating specifications outlined in Approved Document L[4].

The Baseline represents the minimum compliance level in terms of Target Emissions Rate (TER) and Target Fabric Energy Efficiency (TFEE) of the Proposed Development, with all improvements measured from this level.

[2]The London Plan https://www.london.gov.uk/what-we-do/planning/london-plan/new-london-plan

[3] The Government Standard Assessment Procedure for Energy Rating of Dwellings Version 10.2 (Table 12, Pg 182): https://files.bregroup.com/SAP/SAP%2010.2%20-%2017-12-2021.pdf

[4] https://www.london.gov.uk/sites/default/files/gla_energy_assessment_guidance_june_2022_0.pdf

2.2 Unregulated Energy

The unregulated energy use within a development is the energy used within the Proposed Development which has not been accounted for within Building Regulations compliance modelling. This includes auxiliary equipment such as computers, device charging, cooking etc which is based on occupant behaviour. A summary of assumed unregulated energy use and related CO_2 emission is given below.

	Energy use (kWh/yr)
Unregulated energy	7,205

Table 5 – Unregulated energy use

2.3 LEAN – Demand Reduction

The Lean scenario can achieve a 6% reduction in CO_2 emissions using passive and active design measures over a 2021 Building Regulations Baseline scenario. It is important to note whilst the Proposed Development is targeting a new build standard, a significant portion of the existing fabric is retained and enhanced to preserve the characteristics of the front façade due to its location in a conservation area.

Therefore although the improvement from Lean is shy from the 10% improvement outlined in the London Plan, energy efficiency measures have been maximised where possible through an airtight fabric, the provision of good U-values for the new build elements in line with LETI guidance, the installation of high efficiency low energy lighting throughout, MVHR system for ventilation, and WWHR system to all shower/baths. In addition, thermal bridging psi-values have been proposed in accordance with the Local Authority Building Control (LABC) approved scheme or will be independently assessed to meet notional-equivalent psi-values. This is further discussed in the following sections.

Energy Hierarchy	CO_2 emissions (t/yr)	Improvement (%)	Fabric Energy Efficiency (FEE) (kWh/m^2/yr)	Improvement (%)
Baseline	4.3		42.75	
Lean	4.1	6	42.5	0.61

Table 6 - Lean CO_2 emissions and improvement over Baseline

Please see Appendix D for the Energy-Use Intensity (EUI) and space heating demand of the Proposed Development.

2.3.1 Passive Design Measures

Passive design measures have been enhanced where possible throughout the site to maximise building efficiency within the confines of the site constraints and capital costs. The Proposed Development has been massed and positioned within the site to maximise the usable space, both for the internal and the external space uses. The Proposed Development is positioned with a Northeast-Southwest orientation to maximise natural light and positive solar gains, with majority of the building having a northeast-southwest orientation, and majority of the glazing present on these façades.

There is provision of natural ventilation to be provided through openable windows which will enable purge ventilation to the dwellings thus help in balancing the overheating risks. All glazed areas of the building will have elements of shading provided by the building form and internal curtains or blinds to minimise the risk of

overheating. External shutters are also fitted to the Lower Ground Living/Kitchen/Dining room, and horizontal overhangs fitted to the Southeast and Southwest façades. Solar gains will be further controlled through Low E glazing and a low glazing g-value. The Proposed Development will have a glazing percentage (window to wall) of 13.52%.

The Proposed Development is anticipated to have a medium thermal mass as the construction is load bearing masonry. A medium thermal mass will balance providing high energy efficiency during winter months and limiting overheating during the summer months. The building will be very well insulated through all external elements with a low infiltration rate. As the Proposed Development is located in a conservation area, the front façade walls will be retained and internally insulated, and the existing single glazing will be replaced with triple glazing whilst retaining the existing casement window characteristic. All other building elements will be new with proposed U-values in line with LETI guidance. The proposed U-values will exceed Building Regulations Part L V1 minimum fabric requirements and are provided within Table 7, with further details outlined in the specification sheet in Appendix B.

Thermal bridging will be considered further at detailed design stage however the thermal bridges will either follow a non-government approved scheme or be independently assessed such that the final psi-values achieve or exceed the target values based on notional specifications as specified in Appendix B.

Element	Proposed (U-value)
External Walls (New)	0.15
External Walls (Existing Upgraded)	0.27
Ground Floor	0.10
Roof	0.10
Windows and Glazed Doors	0.80 (g-value=0.5)
Windows and Glazed Doors (Front Façade)	1.0 (g-value=0.5)
Solid Door	1.20
Air Tightness @ 50 N/m^2	4 (m^3/hr/m^2)
Thermal Bridge	Non-government approved scheme or Independently Assessed.

Table 7 – Proposed fabric energy efficiencies

The high-quality design of the Proposed Development will reduce the energy demand of the building, thus reducing the operational cost to the building occupants.

2.3.2 Active Design Measures

The Proposed Development will utilise 100% low energy/LED lighting in excess of Building Regulation requirements. External lighting, where installed, will also be energy efficient, and will be positioned to avoid excessive light pollution and be supported by PIR/daylight sensor and/or time controls to reduce operation times and subsequent energy use and emissions.

As part of the 'Lean' scenario, high efficiency individual gas boilers have been proposed to provide space heating and hot water, controlled by a time and temperature zone control. This will reduce the heat demand and wastage by allowing only specific areas to be heated when occupied.

In modern air-tight buildings, careful consideration needs to be given to the specification of ventilation systems to ensure moisture is removed from the building and ensure ventilation standards are met and a healthy standard of internal air is maintained.

Mechanical Ventilation with Heat Recovery (MVHR) is specified to all occupied spaces and wet rooms to provide continuous air changes with minimal heat loss. MVHR removes the warm, damp air from kitchen and bathroom spaces and passes this over a heat exchanger whereby incoming fresh air is prewarmed, before being distributed to the habitable spaces of the dwelling.

A summer bypass is also to be specified whereby the heat exchanger is bypassed at times of high temperatures to provide fresh air directly to the habitable rooms. This, in conjunction with natural ventilation through window openings, will minimise the risk of overheating during times of high temperatures.

Waste water heat recovery (WWHR) is to be provided to all showers/baths in the Proposed Development. This system recovers heat that would otherwise be lost down the drain as waste water from a shower or bath through a simple heat exchanger. This heat is then used to pre-warm the mains water entering the dwelling and supplying either the shower heat and/or the hot water heating source.

Details of the systems used in the modelling are specified within the specification sheet in Appendix B.

2.3.3 Cooling

The cooling hierarchy has been used to ensure that passive building design principles has been optimised to reduce the cooling load for the Proposed Development. For rooms where overheating cannot be mitigated by using only passive measures, active cooling using an 'A' energy rated system equivalent to that with a minimum SEER of 5.10 has been modelled and proposed. This will be provided to the drawing room, guest room, office, reception, and flexi room within the dwelling.

Cooling Hierarchy	Potential Design Measures
Reducing the amount of heat entering the building in summer	Low E glass with solar control and internal blinds are to be provided to minimize solar gain. All walls are to be well insulated with a high level of air tightness to reduce heat entering the building.
Minimising internal heat generation through energy efficient design	All primary pipework to be insulated, therefore low system losses. High specification hot water cylinder installed with low heat loss. Low energy lighting throughout.
Use of thermal mass and high ceilings to manage the heat within the building	Thermal mass is anticipated to be medium.
Passive Ventilation	Openable windows will be provided to all rooms.
Mechanical Ventilation	Mechanical Ventilation with Heat Recovery is proposed for all occupied spaces and wet rooms within the dwelling, with the ability to run at high flow rates in dwellings with restricted window openings. Automatic summer bypass also specified.

Table 8 - Design measures following the cooling hierarchy

A full overheating assessment has been carried out in accordance with Part O1 and CIBSE TM59 requirements, results which show that with the proposed measures, the assessed units comply with Part O1 and CIBSE TM59 requirements.

2.4 CLEAN – Heating Infrastructure

The provision of communal heating and hot water has been explored as part of the energy strategy and energy modelling, and has been deemed unfeasible for this scheme. Furthermore, since there are currently no proposals for a district network nearby, there will be no further improvements using 'Clean' measures above the 'Lean' scenario.

Energy Hierarchy	CO_2 emissions (t/yr)	Improvement (%)
Clean	4.1	
Baseline	4.3	6

Table 9 - Clean CO_2 emissions and improvement over Baseline

District Heat Networks

The Proposed Development is within an area of low heat density and is not located near to any existing heat networks. While the area could benefit from the installation of a district-wide network, there is not yet one installed or planned.

Community Heating

Community heating systems utilise a communal plant to provide heating and hot water. As the Proposed Development consists of a single dwelling, a communal heating system will not be suitable for a development of this scale.

2.5 GREEN – Low Carbon and Renewable Energy

The addition of 'Green' technologies can provide a significant reduction in CO_2 emissions and enable the Proposed Development to exceed the minimum target of 35% improvement and the benchmark improvement target of 50% over Baseline emissions in line with the London Plan.

High efficiency ASHPs have been proposed to provide heating and hot water to the Proposed Development, replacing the gas boilers proposed at the 'Lean' stage. In addition to that, a 4.8 kWp rooftop PV system has also been proposed to provide additional CO_2 offset on site. Through the use of individual ASHPs for hot water in conjunction with PV, this provides a 70.7% improvement over the Lean scenario, exceeding the local plan's requirement of 20% offset from low/zero carbon technologies. The Proposed Development achieves a total of 60% improvement over the baseline, surpassing the 50% offset outlined in the London Plan.

Energy Hierarchy	CO_2 emissions (t/yr)	Improvement (%)
Green	1.7	
Lean/Clean	4.1	58

Table 10 - Green CO_2 emissions and improvement over Lean/Clean

Energy Hierarchy	CO_2 emissions (t/yr)	Improvement (%)
Green	1.7	
Baseline	4.3	60

Table 11 – Green CO_2 emissions and improvement over Baseline

2.5.1 Air Source Heat Pumps

All Heat Pump systems consume electricity to operate - the Coefficient of Performance (CoP) of the system is the ratio of electrical energy consumed, to heat energy emitted. Generally, a CoP of 3 or 4 can be achieved, meaning 3 or 4 units of thermal energy are produced for each unit of electricity consumed.

Heat pumps will only deliver low grade heat (up to ~50°C) efficiently, and therefore HP systems alone are generally relatively inefficient in providing hot water, as this requires additional electrical input (immersion or increased compressor use).

ASHPs tend to generate some noise and therefore will be located in a concealed acoustic enclosure at the rear of the property in the garden. This will prevent both visual impact and noise disturbances to the building's occupants and neighbours. Specifications of the proposed ASHP used for modelling has been specified in the SAP summary sheet in Appendix B. The final ASHP chosen for installation will comply with the minimum standards outlined in the Enhanced Capital Allowances (ECA) product criteria and other relevant issues as outlined in the Microgeneration Certification Heat Pump Product Certification Requirements documents[5].

ASHPs have been considered and proposed as a 'Green' LZC technology for the Proposed Development to provide heating and hot water.

2.5.2 Photovoltaics

Photovoltaic (PV) panels convert energy from daylight into direct (DC) electrical current. These are generally roof mounted and provide electrical generation which can either be utilised directly on-site (or nearby) by ASHPs, lighting and other electrical equipment, stored in batteries, or exported back to the National Grid.

The installation of PV could be used to offset electrical demand within the Proposed Development. The PV array would be connected into the electrical system via an inverter or series of inverters, depending on system size and setup.

Noise will not be an issue – A PV system does not feature moving parts and is silent during operation.

The current proposal is to install 4.8 kWp PV southeast-facing at a 30-degree pitch. This will allow enough space to ensure there is enough spacing between panels for maintenance and to prevent panels from shading each other, as well as providing sufficient spacing for rooftop plant.

Proposed Array (kWp)	Approximate no. Panels @300W	Active Area (m^2)	Pitch (degrees)	Orientation
4.8	16	24.96	30	Southeast

Table 12 - Proposed PV Array Summary

[5] http://www.microgenerationcertification.org

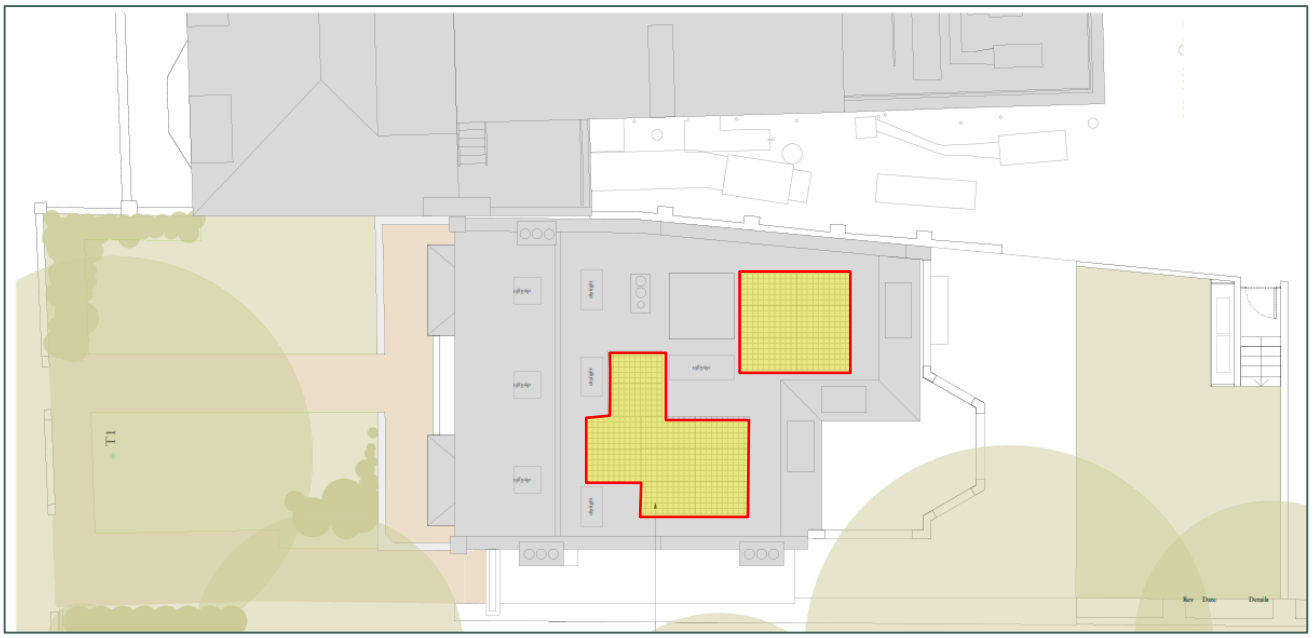


Figure 4 – Roof Plan of Proposed Development showing roof space available for PV

2.5.3 Energy Storage

Although it is believed that the PV generation will not exceed usage at the site, a 13.5kWh battery storage is proposed for the development linked to the installed rooftop PV panels, which will enable building occupants to use this energy at any required time. Battery storage can also draw power from the grid and use this at times of peak demand. This means building occupants can ultimately save money since grid energy can be stored at certain times of the day when it is cheaper.

2.6 SEEN – In-use monitoring

It is recommended that the Proposed Development will be supplied with Smart Meters (where available from the utility supplier) and a building energy management system (BEMS) along with associated internal energy displays. This will further improve energy efficiency by allowing building occupants to observe their energy use in 'real time' and manage it more effectively.

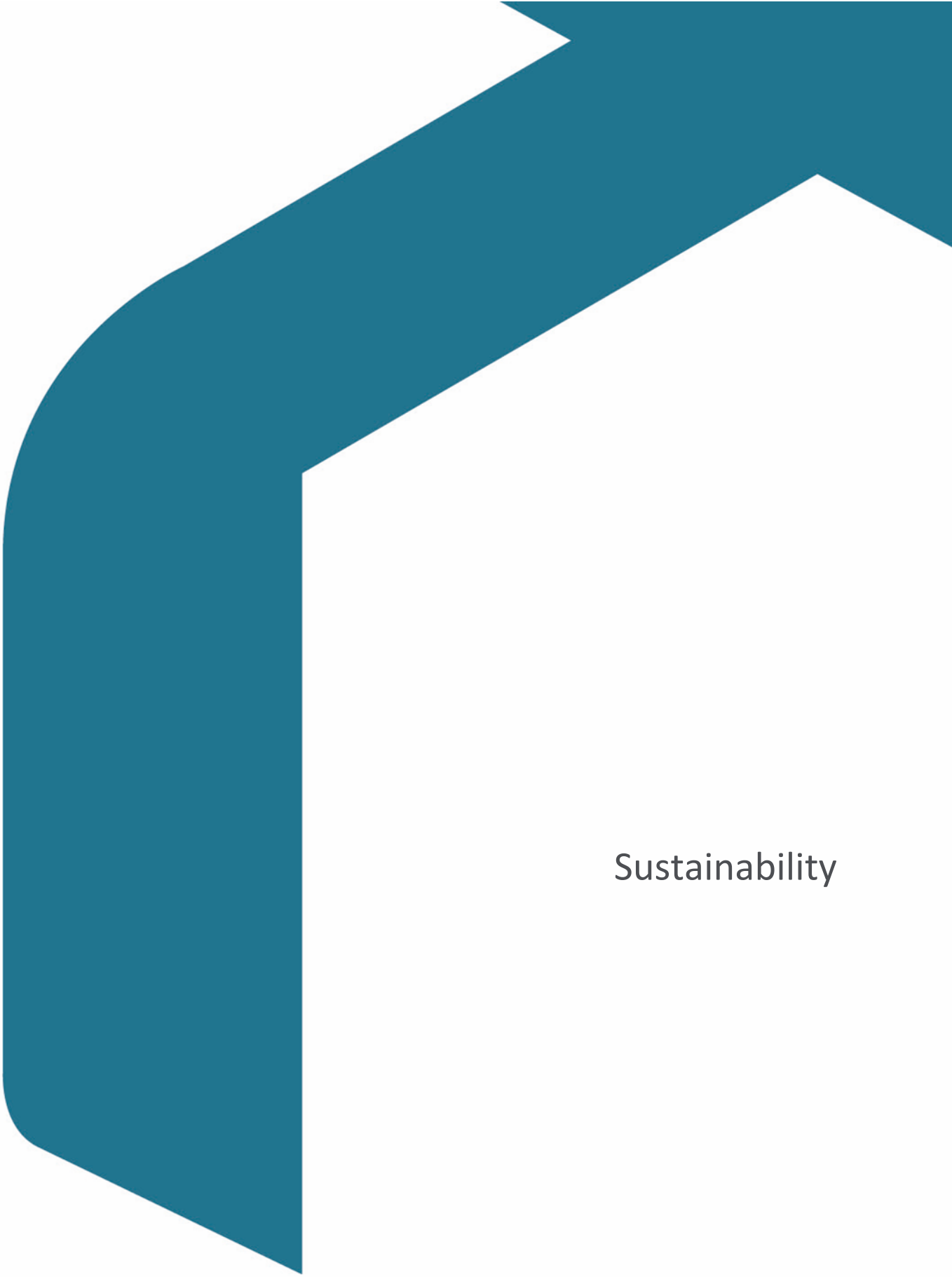
2.7 Conclusions

The Proposed Development has considered energy efficiency at every stage of the design, and as a result will deliver passive and active energy demand reduction measures to provide robust and long-lasting CO_2 emissions reductions. This includes the installation of high efficacy LED lighting, MVHR system for ventilation and WWHR system to all shower/baths. Waste water heat recovery units will also be connected to all showers and baths in the Proposed Development.

High efficiency individual ASHPs have been proposed for this site to provide heating and hot water. Through the use of ASHPs and proposal of a 4.8kWp PV system, in addition to the 'Lean' measures proposed, the calculations undertaken demonstrate that the Proposed Development will successfully exceed Building Regulations 2021 Part L V1 and achieve a 58% CO_2 emissions offset from low/zero carbon technologies and 60% CO_2 emissions reduction on site overall, in excess of the local plan and London Plan carbon reduction aspirations of >20% from low/zero carbon technologies and >50% offset overall. The result is a high performing, sustainable dwelling.

Site-Wide	CO_2 emissions (t/yr)	Improvement over baseline (%)
Baseline	4.3	
Lean	4.1	6
Clean	4.1	6
Green	1.7	60

Table 13 - Summary of the Proposed Development's CO_2 emissions and improvement over Baseline



Sustainability

3.0 Sustainability

The World Commission on Environment and Development (WCED) report: Our Common Future, describes Sustainable Development as development that:

"meets the needs of the present without compromising the ability of future generations to meet their own needs."

3.1 Pollution

Air

The Proposed Development will aim to limit its contribution to local air pollution by installing ASHPs to provide heating and hot water, in addition to the installation of PV. The ASHPs will emit no onsite NO_X emissions but will consume grid electricity (when not consuming electricity generated by the PV). As the NOx emissions resulting from the production of electricity decreases at the national scale, the resulting theoretical emissions from the Proposed Development will do also. Furthermore, the use of PV panels will decrease the import of electricity from the national grid and replace it with PV generated electricity which produces no emissions during operation.

The Proposed Development is located within a medium to high NOx emissions area as defined by the UK NOx emissions map, see Figure 5. Internal pollution levels will be reduced through the use of MVHR with filtered intakes.

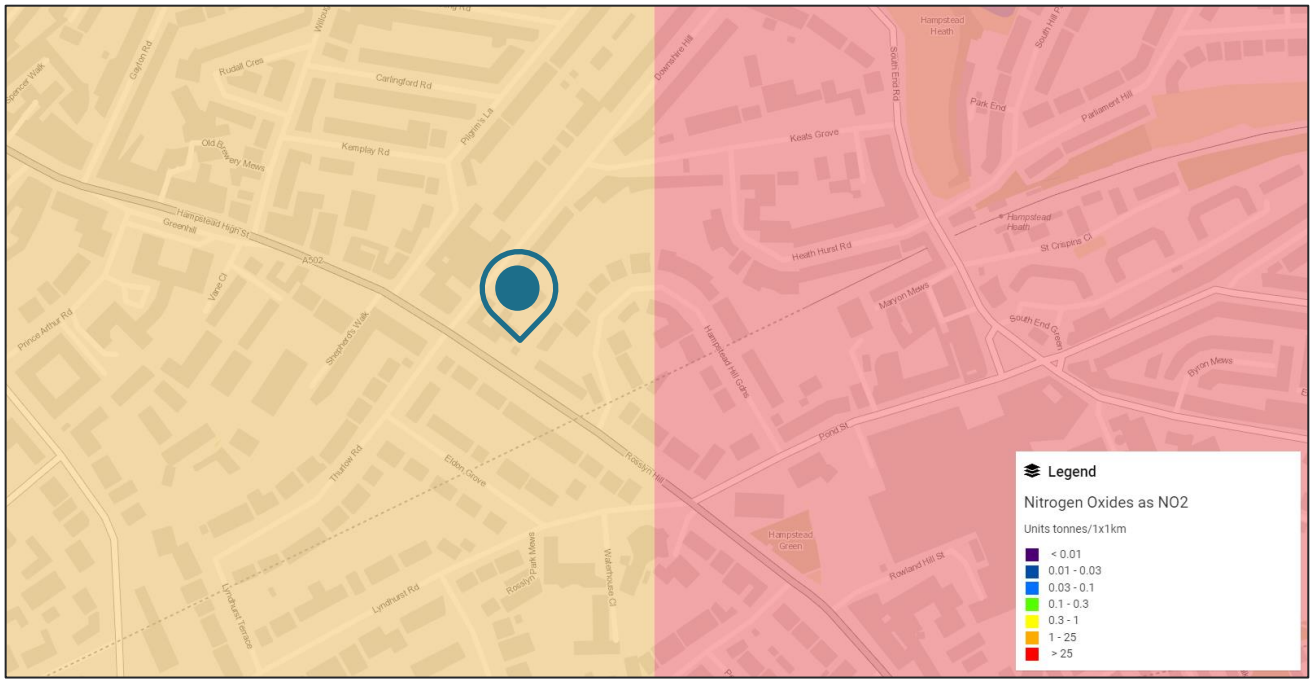


Figure 5 - UK Air Pollution Map showing pollution from Nitrogen Oxides as NO2 (https://naei.beis.gov.uk/emissionsapp/)

Noise

Acoustic enclosures are recommended for the ASHP units to avoid disturbance to residents within the Proposed Development and surrounding buildings. Furthermore, the Proposed Development will be a highly insulated building with excellent air-tightness which should limit any noise from inside the building.

Light

The design and layout of the site for practical use has been considered while trying to maximise internal daylight levels. All spaces occupied by residents have glazing to provide natural daylight, and light-coloured curtains or roller blinds will be provided to enable glare control and privacy.

Light pollution will be minimised where possible through the careful specification and positioning of external lighting around the Proposed Development, ensuring minimal light pollution from the site. Special attention will be given to security lighting (where fitted) to ensure it is appropriately focused and controlled.

All external space lighting will be provided through low energy fittings, with security lighting being PIR and daylight/timer controlled.

3.2 Flood Risk

As can be seen in the figures below, the site of the Proposed Development is at very low risk of flooding from rivers and seas, as well as from surface water.

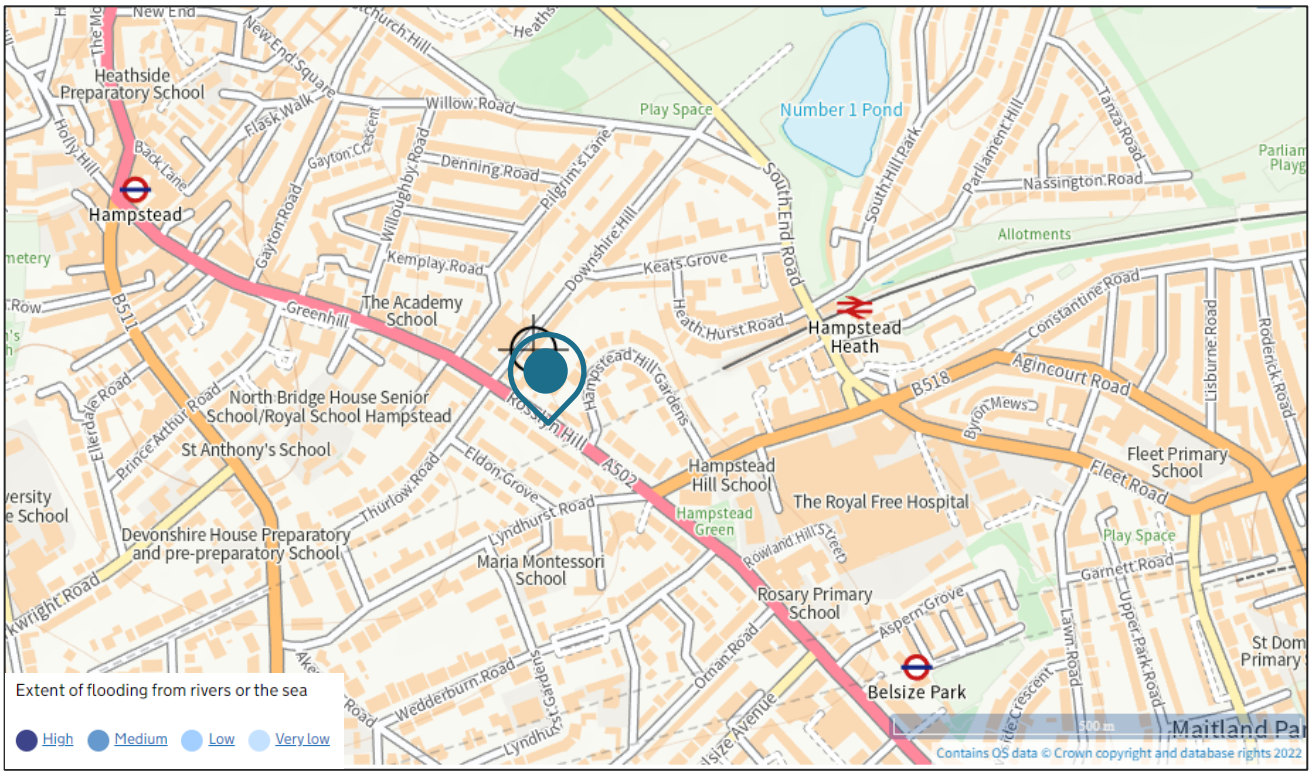


Figure 6 - Flood map showing risk of flooding from rivers or the sea (https://flood-warning-information.service.gov.uk/long-term-flood-risk/map)

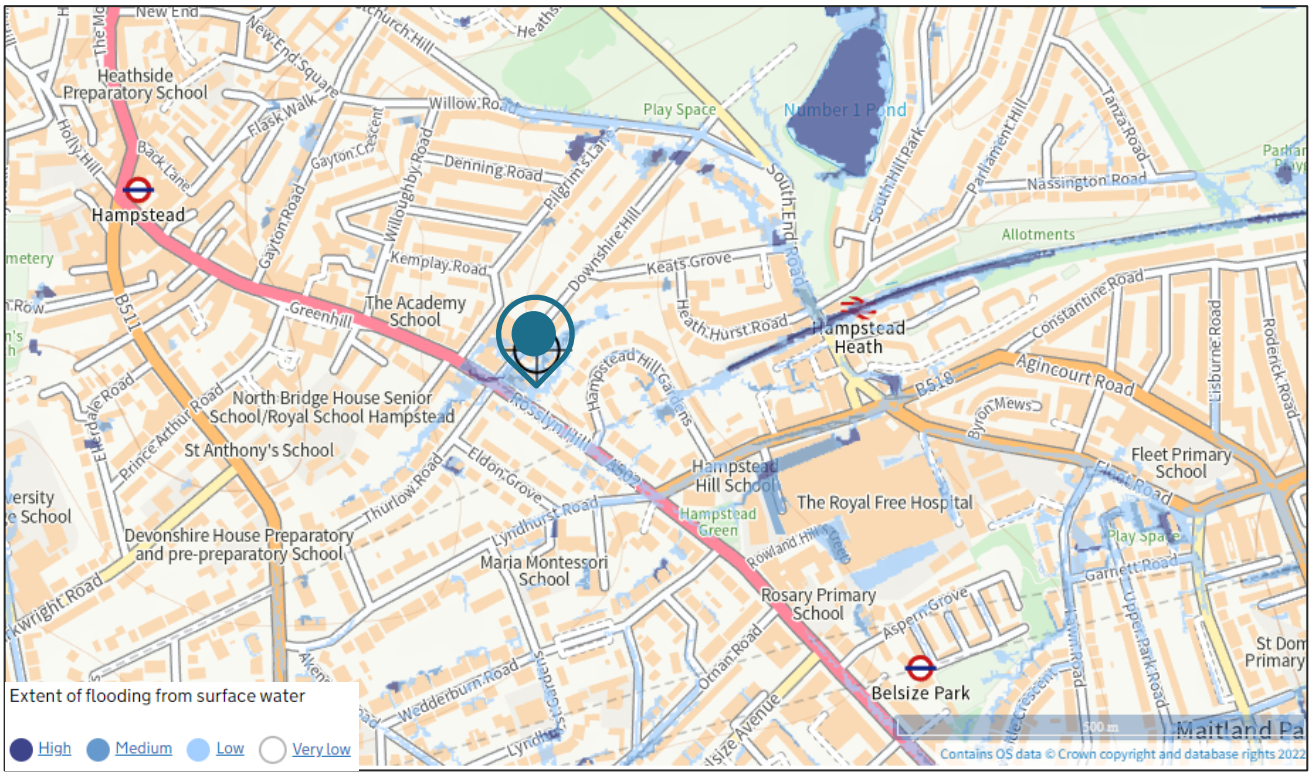


Figure 7 - Flood map showing risk of flooding from surface water (https://flood-warning-information.service.gov.uk/long-term-flood-risk/map)

3.3 Transport

Public Transport

The nearest train station to the site is Hampstead Heath station which is a 7-minute walk away northeast of the site, which provides overground services and links to wider areas of Greater London.

There are a number of bus stops on Rosslyn Hill Road, the nearest which is Pilgrim's Lane a 2-minute walk away, providing services operated by Transport for London towards Golders Green, Paddington, South Hampstead, and City of London.

Cycle Storage

The Proposed Development will provide a secure cycle store on site, located on the lower ground floor which can be easily accessible for residents via the service access. This will be suitably secure, covered and lit to encourage the use of bicycles to travel for shorter, local journeys within the area.

3.4 Biodiversity

Biodiversity is generally considered to be the variety of life forms within a certain ecosystem. The rear yard will a permeable surface, therefore a fully-fledged garden. The front garden, which consists of some flowerbeds and hedges, will be retained. Bat and bird houses are proposed in the oak tree in the front garden, in efforts to add to overall site biodiversity, and that of the surrounding environment.

3.5 Resource efficiency

Construction Phase Waste Management

The Proposed Development will aim to minimise the waste produced from the site during the construction phase through a mix of site policies and effective and efficient design and construction processes.

A comprehensive Construction Management Plan will be implemented from the outset of site works and will follow the principles of the waste hierarchy. Targets have been set in relation to volume of construction waste and diversion from landfill, with performance monitored by the Contractor to ensure exceedance of these levels is achieved.

The construction waste generated as part of the redevelopment will be segregated and monitored as per best practice, with suitable materials being recycled as part of this process, either to be reused on site or introduced back into the supply chain through recycling by a Licensed Contractor, therefore minimising the amount of waste being disposed of in landfill sites.

Reusing materials on site will reduce the embodied energy of the development through the reuse of the energy that exists in that material. Transportation of new material to the site will be reduced, thus reducing the CO_2 emissions associated with transportation and material manufacture.

Where waste will need to be disposed of, this will be done in line with the Waste Hierarchy, with as much as practicable being recycled, and the remainder being dealt with through a specialist waste recycling contractor. Nominal construction waste should be sent to landfill or for incineration unless this is unavoidable due to the materials found on the existing site.

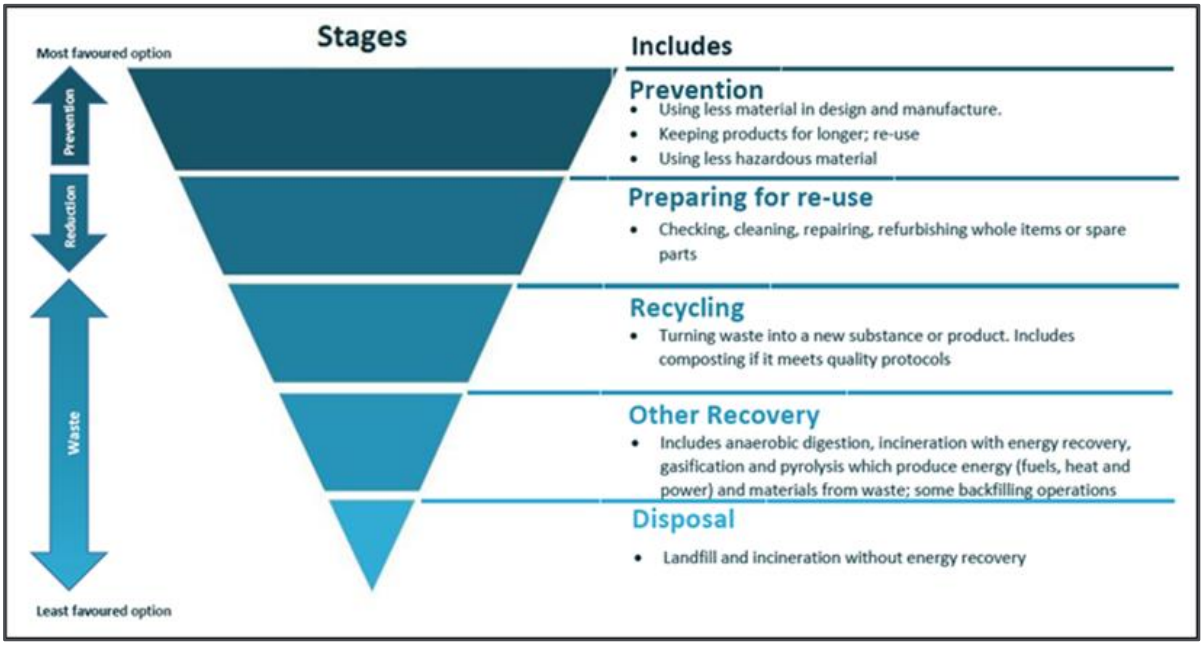


Figure 8 - The waste hierarchy

Resource Management

Policies will be put in place for management of site impacts such as air and water pollution in line with industry best practice. Monitoring and reporting on carbon emissions and water use from site related activities will take place in line with national benchmarks.

It is recommended that the overall management of the construction waste be monitored through the Considerate Constructors Scheme as part of Best Practice Site Management.

Materials

The Proposed Development will use high quality, low impact materials in order to minimise the overall impact on the environment as far as possible. The development will support a whole life-cycle approach to reduce associated carbon emissions.

At this stage, the form of construction is anticipated to be traditional load bearing masonry.

The Proposed Development aims for reclaimed bricks to be used within the new external walls, thereby reducing the associated embodied carbon and environmental impact. A full whole life carbon assessment has been carried out by SRE to assess the whole life carbon impact of the proposed design, with a separate report provided.

All timber materials will be sourced from FSC and/or PEFC sources and all other materials sourced from suppliers who have an accredited Environmental Management System (EMS) (ISO14001, BS8555 or BES6001) for the extraction and process stages of the material manufacturing, ensuring that any environmental impact caused by the building materials is analysed and mitigated where possible.

All timber and timber-based products used on-site will be legally sourced with appropriate Chain of Custody certification to confirm this.

As standard industry best-practice, all insulation on the site will have an Ozone Depletion Potential (ODP) of zero, and a Global Warming Potential (GWP) of <5, further minimising the Proposed Developments effect on global Climate Change.

Water

Areas of the Greater London have been declared areas of 'serious water stress'. Water is a vital resource and efficient usage should be encouraged in all new buildings. The Proposed Development aims to significantly reduce mains water use through a combination of efficiency measures, including the use of fittings with a low capacity or flow restrictors to reduce water use and PIR sensors linked to water shut-offs valves to reduce the chances of water waste.

The specification outlined below is indicative of one which will meet these requirements of <105 litres/person/day:

- WCs: 4.00 litre effective flush volume
- Hand wash basin taps: 4.50 litres/min
- Kitchenette taps: 5.00 litres/min
- Showers: 6.00 litres/min
- Baths: 140 litres
- Domestic sized dishwashers (if installed) 12.00 litres/cycle
- Domestic sized washing machines (if installed) 40.00 litres/use

Sustainability Summary

Through a considered approach to sustainability through all aspects of the scheme's design and conception, the Proposed Development significantly reduces its overall impact on both the local and global environment.

Cycle storage is provided to enhance the potential for sustainable transportation.

Through the selection of sustainable materials and the implementation of best practice construction techniques and management, impacts from the construction stage are also to be minimised.

The design will restrict water use to 105 litres/person/day in line with Planning Policy Guidance.

Overall, the Proposed Development has aimed to minimise its impact on the environment at both construction and operational phases and will provide sustainable residential dwellings which respond positively to surroundings, and local and regional policy.

Appendix A – Site Plan

Appendix B – SAP specification sheet

26 Rosslyn Hill

s																						Results		
	Option	No. Storeys	External Wall (Existing)	External wall (New)	Partition Wall	Ground Floor	Exposed Floor	Flat Roof	Pitched Roof	External Door	Windows/ Glazed Doors	Roof window	Heat Pump	Delayed Start Thermostat	Secondary Heating	HW Cylinder	Renewables (PV)	Renewables (Area)	Battery Storage	WWHR	Mechanical Ventilation	Targeted Air-Permeability	DER/TER	DFEE/TFEE	DPER/TPER
	Type	Floor	U Value	U Value	U Value	U Value	U Value	U Value	U Value	U Value	U Value	U Value	Make	Y/N	Y/N	(litres)	(kWp)	m^2	kWh	Y/N	Type	m3/hr/m2	%	%	%
	Semi-detached House	4	0.27	0.15	0	0.10	0.12	0.10	0.10	1.20	0.8-1.0	0.80	ASHP- Make TBC	Y	N	570.00	4.8	24.96	13.50	Y	MVHR	3	60.00	0.61	14.17

	Element	Proposed U Values	Description
Envelope	External Wall 1 (Existing Façade)	0.27	440mm Existing Brickwork, 120mm Schneider Multitherm 110 (0.04 conductivity), 9mm Lime Hemp Plaster Ty-Mawr, 3mm Superfine Finish Plaster Ty-Mawr
	External Wall 3 (New Cavity Wall)	0.15	102.5mm brickwork. 185mm DriTherm Cavity Slab 32 (0.032 conductivity), 140mm Hnason Fenlite Background Solid Concrete Block, 15mm Wet Plaster
	Ground Floor	0.10	20mm Stone Finish, 4mm Schluter Ditra Mat, 6mm Levelling Compound, 30mm screed, VCL Visqueen, 180mm Xtratherm Polyeurethane Thin, 20mm Cavity Drain Membrane Delta MS20, waterproof slurry and antilime coating, 325mm waterproofing RCm 50mm Concrete binding and permeable geotextile
	Exposed Floor	0.12	To meet required U-value
	Flat Roof 1 (Upper GF & Second Floor Terrace)	0.10	15mm stone tiles, 25mm pedestals, waterproof membrane, 130mm Xtratherm FR/ALU insulation, 18mm WBP plywood, 225mm joists with 120mm Xtratherm XT/PR between joists, airtight membranem 50mm suspended gypsum MF ceiling system with 12.5mm plasterboard, 2.5mm skim
	Flat Roof 2	0.10	Waterproof membrane, 150mm Xtratherm FR/ALU insulation, 18mm WBP plywood, 225mm timber joists with 100mm Xtratherm XT/PR insulation between joists, airtight membrane, 50mm suspended Gypsum MF Ceiling system with 12.5mm plasterboard, 2.5mm skim
	Pitched Roof	0.10.	Slates, 2x15mm treated battens, breather membrane, 125mm Xtratherm XT/PR insulation, 200mm timber joists with 100mm Xtratherm XT/PR insulation between joists, airitght membrane, 50mm suspended Gypsum MF Ceiling system with 12.5mm plasterboards, 2.5mm skim
	Windows/Glazed Doors - Front Façade	1.00	Whole window U-value, Triple glazed low e - g value 0.5
	Windows/Glazed Doors	0.80	Whole window U-value, Triple glazed low e - g value 0.5
	Roof Window	0.80	Whole roof window U-value, Triple glazed low e, g-value of 0.5
	External Solid Door	1.20	Whole door U-value
Air Leakage	Air Pressure Test	-	Blower Door method- aimed value 3 m3/hr/m2
Details	Thermal Bridge Detailing	-	Thermal Bridge psi values assumed using Non-government approved scheme (refer to thermal bridging summary sheet)
Space Heating & Cooling	Heating System	-	ASHP (air-to-water) system
	Heating Controls	-	Time and Temperature Zone Control
	Heating Emitters	-	UF heating
	Secondary Heating	-	n/a
	Cooling	-	Yes - Cooling to Office, Reception, Flexi Room, Guest Room, Drawing Room, Energy Class A cooling system (TBC)
Domestic Hot Water	Domestic HW system	-	From Main Heating (ASHP) - with instantaneous WWHR (Recoup Easyfit + modelled) fitted to alls showers (TBC)
	HW Storage Cylinder	-	570L with 2.44kWh/day standing loss (TBC)
	Shower Type	-	From Main Heating, 7 no. showers each with 6.63litres/min flow rate

Other systems	Mechanical Ventilation	-	MVHR - Nuaire MRXBOXAB- ECO3 (TBC)
	Lighting	-	118 no. lights, assumed each rated at 40W and 3600lm to achieve 90lm/W efficacy
	Tariff	-	Standard Electricity Tariff - Assumed by SRE
	Meter	-	Smart Meter fitted - Assumed by SRE
	Renewables/LZC	Y	4.8kWp PV, southeast-facing mounted at 30 degree pitch
	Battery Storage	Y	13.5kWh Tesla Powerall 2 (assumed)
	Export Capable Meter	Y	-
	PV Diverter	Y	-
	Connected to dwelling's electricity meter	Y	-
	Notes	-	

	Sign Off of details	Name	PP M Maclean	Date	26.10.2022	On behalf of the contractor/client:	Name	Name
		Sign	(on behalf of SRE)				Sign	

Appendix C – Thermal Bridging Summary

Cavity Wall

Bridge Type		Psi value (W/mK)	Reference
E1	Steel lintels	0.281	https://www.labc.co.uk/sites/default/files/construction_details_general_downloads/e2mcff7_certificate_0.pdf
E3	Sill	0.020	https://www.labc.co.uk/sites/default/files/construction_details_general_downloads/e3mcff2_certificate_0.pdf
E4	Jamb	0.016	https://www.labc.co.uk/sites/default/files/construction_details_general_downloads/e4mcff2_certificate_0.pdf
E5	Ground Floor	0.097	https://www.labc.co.uk/sites/default/files/construction_details_general_downloads/e5mcff14_certificate_0.pdf
E20	Exposed floor (normal)	0.320	Independently assessed - based on default values from notional Building Regulation standards (assessed psi values to meet or exceed these values)
E14	Flat Roof	0.080	Independently assessed - based on default values from notional Building Regulation standards (assessed psi values to meet or exceed these values)
E6	Intermediate floor within a dwelling	0.000	https://www.labc.co.uk/sites/default/files/construction_details_general_downloads/e6mcff2_certificate_1.pdf
E8	Balcony within a dwelling, wall insulation continuous	0.000	Table K1 - Default
E11	Eaves (insulation at rafter level)	0.007	https://www.labc.co.uk/sites/default/files/construction_details_general_downloads/e11mcff2_certificate.pdf
E13	Gable (insulation at rafter level)	0.075	https://www.labc.co.uk/sites/default/files/construction_details_general_downloads/e13mcff2_certificate_0.pdf
E14	Flat Roof	0.08	Table K1 - Default
E16	Corner (normal)	0.051	https://www.labc.co.uk/sites/default/files/construction_details_general_downloads/e16mcff2_certificate.pdf
E17	Corner (inverted)	-0.075	https://www.labc.co.uk/sites/default/files/construction_details_general_downloads/e17mcff4_certificate_0.pdf
E25	Staggered party wall between dwellings	0.06	Independently assessed - based on default values from notional Building Regulation standards (assessed psi values to meet or exceed these values)

Bridge Type		Psi value (W/mK)	Reference
P1	Party Wall - Ground Floor	0.08	Independently assessed - based on default values from notional Building Regulation standards (assessed psi values to meet or exceed these values)
P2	Party Wall - Intermediate floor within a dwelling	0.00	Table K1 - Default
R1	Head of a roof window	0.08	Table K1 - Default
R2	Sill of a roof window	0.06	Table K1 - Default
R3	Jamb of a roof window	0.08	Table K1 - Default
R7	Flat ceiling (inverted)	0.04	Table K1 - Default

Solid Wall

Bridge Type		Psi value (W/mK)	Reference
E1	Steel lintels	0.050	Independently assessed - based on default values from notional Building Regulation standards (assessed psi values to meet or exceed these values)
E3	Sill	0.050	Independently assessed - based on default values from notional Building Regulation standards (assessed psi values to meet or exceed these values)
E4	Jamb	0.050	Independently assessed - based on default values from notional Building Regulation standards (assessed psi values to meet or exceed these values)
E5	Ground Floor	0.160	Independently assessed - based on default values from notional Building Regulation standards (assessed psi values to meet or exceed these values)
E20	Exposed floor (normal)	0.320	Independently assessed - based on default values from notional Building Regulation standards (assessed psi values to meet or exceed these values)
E14	Flat Roof	0.080	Independently assessed - based on default values from notional Building Regulation standards (assessed psi values to meet or exceed these values)
E6	Intermediate floor within a dwelling	0.000	https://www.labc.co.uk/sites/default/files/construction_details_general_downloads/e6mcff2_certificate_1.pdf
E8	Balcony within a dwelling, wall insulation continuous	0.000	Table K1 - Default
E16	Corner (normal)	0.090	Independently assessed - based on default values from notional Building Regulation standards (assessed psi values to meet or exceed these values)
E17	Corner (inverted)	-0.090	Independently assessed - based on default values from notional Building Regulation standards (assessed psi values to meet or exceed these values)
E25	Staggered party wall between dwellings	0.06	Independently assessed - based on default values from notional Building Regulation standards (assessed psi values to meet or exceed these values)
P1	Party Wall - Ground Floor	0.08	Independently assessed - based on default values from notional Building Regulation standards (assessed psi values to meet or exceed these values)

Bridge Type		Psi value (W/mK)	Reference
P2	Party Wall - Intermediate floor within a dwelling	0.00	Table K1 - Default
R1	Head of a roof window	0.08	Table K1 - Default
R2	Sill of a roof window	0.06	Table K1 - Default
R3	Jamb of a roof window	0.08	Table K1 - Default
R7	Flat ceiling (inverted)	0.04	Table K1 - Default
E1	Steel lintels	0.050	Independently assessed - based on default values from notional Building Regulation standards (assessed psi values to meet or exceed these values)
E3	Sill	0.050	Independently assessed - based on default values from notional Building Regulation standards (assessed psi values to meet or exceed these values)
E4	Jamb	0.050	Independently assessed - based on default values from notional Building Regulation standards (assessed psi values to meet or exceed these values)

Appendix D – GLA Table and Energy Use Intensity (EUI)

Residential predicted energy use

Building type	GIA	EUI & space heating demand (kWh/year)									Has the following energy use been included?		Results		Table 4 of the guidance comparison		Methodology used		
		Space heating demand	Annual Electricity Use	Annual Gas Use	Annual Oil Use	Annual Biomass Use	Annual District Htg Use	Annual District Clg Use	Elec Generation, Gross	Solar Thermal Generation	Regulated	Unregulated	EUI (kWh/m²/year) (excluding renewable energy)	Space heating demand (kWh/m²/year) (excluding renewable energy)	EUI value from Table 4 of the guidance (kWh/m²/year) (excluding renewable energy)	Space heating demand from Table 4 of the guidance (kWh/m²/year) (excluding renewable energy)	Software	Operational energy use assessment	notes (if expected performance differs from the Table 4 values in the guidance or other software used)
					if applicable	if applicable	if applicable	if applicable	if applicable	if applicable									
Dwelling (total)	538.14	9505.8086	14781.7021						-3300		Yes	No	27.46813487	17.66419259	35	15	Part L1 - SAP 10.2	none	
Landlord Circulation (in Residential Blocks)																			

Residential

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for residential buildings

	Carbon Dioxide Emissions for residential buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	4.3	
After energy demand reduction (be lean)	4.1	
After heat network connection (be clean)	4.0	
After renewable energy (be green)	1.7	

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for residential buildings

	Regulated residential carbon dioxide savings	
	onnes CO_2 per annur	(%)
Be lean: savings from energy demand reduction	0.3	6%
Be clean: savings from heat network	0.1	2%
Be green: savings from renewable energy	2.3	52%
Cumulative on site savings	**2.6**	**60%**
Annual savings from off-set payment	1.7	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**52**	-
Cash in-lieu contribution (£)	**4,951**	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the

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