Energy and Sustainability Statement

Punch Partnerships (PML) Limited

For the site at:
Calthorpe Arms
252 Grays Inn Road
Bloomsbury
London Borough of Camden
WC1X 8JR

SRE

Version	Revision	Date	Author	Reviewer	Project Manager
1	B	19/10/2023	Joshua Handley	Findlay Matheson	Joshua Handley

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 Calthorpe Arms, 252 Grays Inn Road, London Borough of Camden. The Proposed Development is a change of use and extension to deliver three flats where there were formerly two. This statement will focus on the two flats (Flats 1 & 2). The Proposed Development will have a lower energy and water use, a far lower carbon dioxide equivalent (CO_2e) emission rate and the addition of several Low and Zero Carbon (LZC) Green technologies in line with a 2021 Building Regulations compliant design and local policy requirements.

The Proposed Development renovates and extends the residential area across the first and second floors while keeping the aesthetic of the Grade II listed building and minimising any damage to its heritage fabric. The Proposed Development will match the Bloomsbury area in looks and the extended roof will reach the height of the adjoining neighbouring residence. The third floor is not expanded in area ensuring the building retains its overall character.

The energy strategy has been developed by following the Greater London Authority (GLA) Energy Hierarchy of Lean, Clean, Green and Seen along with local Camden policy guidance. The Proposed Development is considered to be minor and thus does not require adherence to the surplus requirements for larger 'major residential developments' outlined in the *London Plan*, *GLA Energy Assessment Guidance* and local planning policy. The chosen strategies will seek to improve the existing property overall dramatically and where possible go above what is recommended for the Proposed Development while remaining within the budget and adhering to the heritage policy. This is achieved through strategies necessary to meet key fabric efficiency requirements along with LZC technologies with a relatively short-term payback period ensuring financial viability in both the long and short term.

Proposed Energy Strategy

A fabric-first approach has been taken maximising benefits gained through passive means. This includes a high-performance building envelope with low U-values throughout where improvements to the existing will allow as outlined within the Lean scenario. The Green scenario sees the two units providing space and water heating through the use of an Air Source Heat Pump (ASHP). Active design measures have also been incorporated throughout utilising low energy light fixtures and wastewater heat recovery (WWHR) systems to further reduce energy usage and associated carbon emissions.

The proposed energy strategy for the Proposed Development is summarised below:

- High performance building fabric
- High efficiency light-emitting diode (LED) lighting
- Wastewater heat recovery systems applied to each shower
- High efficiency ASHPs supplying space heating and hot water to the two units
- Low water consumption fixtures

Lean passive and active design measures along with LZC technologies allow the Proposed Development to achieve between 70-73% improvement over Baseline CO_2e emissions for a *Building Regulations 2021 Part L V1* compliant design across the 2 units. Improvements through each strategy alone can also be seen in Table 1.

Flat	Scenario	Average Unit CO_2e emissions (t/yr)	Improvement (%)	Average Improvement over Baseline (%)
Flat One	Baseline	1.35		
	Lean	1.22	9.65	9.65
	Clean	1.22	9.65	9.65
	Green	0.36	48.89	73.04
Flat Two	Baseline	1.45		
	Lean	1.38	4.71	4.71
	Clean	1.38	4.71	4.71
	Green	0.43	48.66	70.07

Table 1 – Summary of the CO_2e emissions and improvement over Baseline calculated per the GLA carbon emissions reporting spreadsheet

Figure 1 presents each stage of the Energy Hierarchy with the associated CO_2e offset shown in light blue.

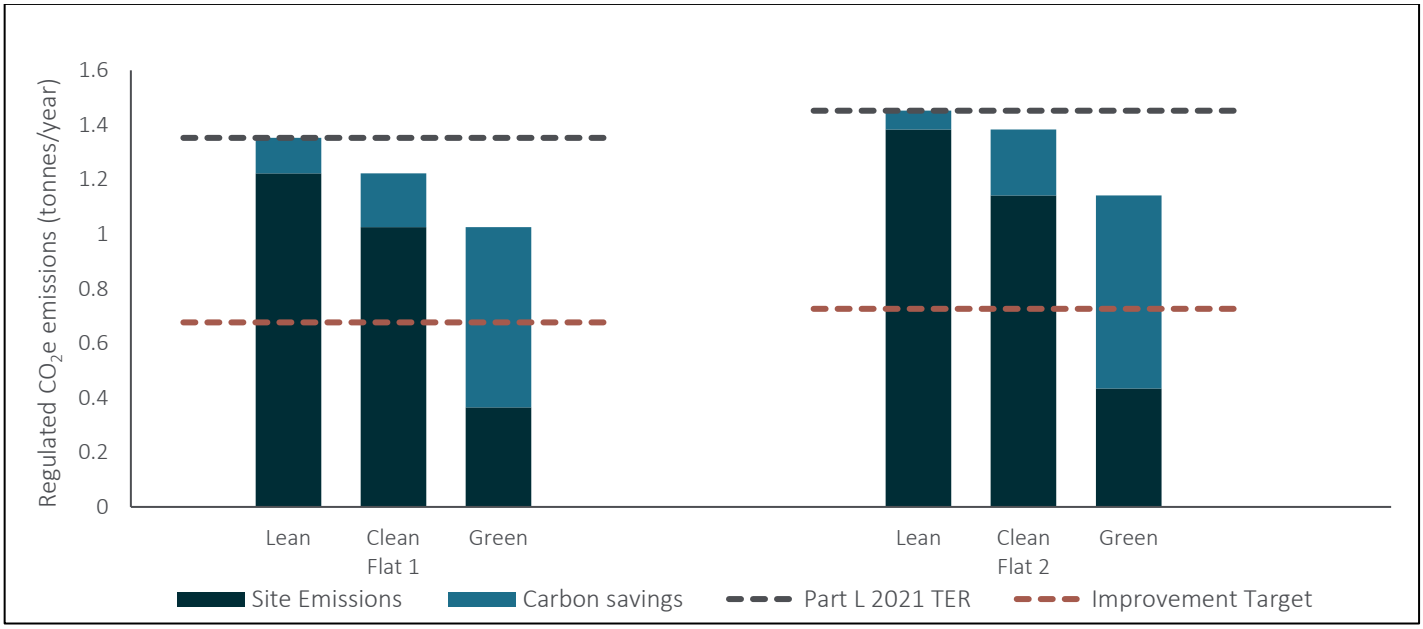


Figure 1 – Summary of regulated carbon dioxide (CO_2e) savings for the Proposed Development

Through adoption of the energy strategy, the Proposed Development meets and exceeds the targets defined through local policy as follows:

- Through exclusively Lean strategies, flat one shows improvement over *Part L1 2021* by 9.65% and flat two shows an improvement of 4.71%.
- After application of Green strategies, flat one shows an improvement of 73.04% and flat two shows an improvement of 70.07% both exceeding the 50% the *GLA Energy Assessment Guidance* benchmark.
- As seen in Table 1, the improvements from incorporating LZC technologies exceeds the 20% requirement in alignment with *London Borough of Camden Local Plan 2017*.
- The cooling hierarchy is utilised and successfully implemented providing design mitigation against overheating risk.

Proposed Sustainability Strategy

Through incorporation of sustainability principles, the Proposed Development adopts numerous good practices resulting in positive design and construction methodology. These measures ensure all policy requirements are met with the following notable proposed implementations:

- Air quality is highly prioritised aiding in mitigating any potential air pollution contributions at point of use through replacing existing gas boilers with ASHPs.
- The Proposed Development is at very low risk of flooding from surface water and rivers and will not exacerbate this for the site or immediate surrounding area.
- The Proposed Development will not detrimentally affect the ecology.
- Waste targets of 95% reuse/recycling/recovery for construction and demolition, and 95% beneficial use for excavation are to be met through adoption of the waste hierarchy and consideration through construction plans.
- Reduction of internal water use has been achieved through use of fittings with a low capacity or flow restrictors in line with the requirement of <105l/p/d.
- Implementation of sustainable construction techniques and materials, inclusive design, site management and procurement procedures.

Introduction

1.0 Introduction

This Energy and Sustainability Statement has been written by SRE Ltd on behalf of Cordage Group Limited on behalf of Punch Partnerships (PML) Limited (the Client) to demonstrate the measures incorporated into the design of Calthorpe Arms, 252 Grays Inn Road, London Borough of Camden (the Proposed Development). This Proposed Development will deliver lower energy and water use, lower global warming (GWP) carbon dioxide equivalent (CO_2e) 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 also 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.

1.1 Proposed Development

The Proposed Development is a minor scale redevelopment project located on the corner of Wren Road and Grays Inn Road, just across from St Andrews Park.

The Proposed Development is a change of use and new extension and will deliver two residential flats and one relocated tenant's flat, along with a bike shelter to encourage sustainable transport. Through this process, the Proposed Development expands the second floor to match the height of the adjoining neighbouring house while maintaining the style and character of the area as seen in Figure 2.

Figure 2 – Elevation of the Proposed Development (PLC Architects)

The Proposed Development is a minor sized residential development which extends the residential area across the second floor to provide an additional dwelling; while keeping the aesthetic of the heritage building and minimising any damage to its heritage fabric. The flats sit atop the existing pub, the Calthorpe Arms, and it will retain the manager's flat (Flat 3) on the 3rd floor.

The site plan and floor plans are included in Appendix A, and please see the submitted architectural drawings for further details.

1.2 Planning Policies

Table 2 below lists the relevant policy requirements from local planning documentation.

Planning Policy	Requirement
London Borough of Camden Local Plan 2017	Policy CC1: Climate Change Mitigation 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: 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_2e emissions of the development after all proposed energy efficiency measures and any CO_2e reduction from non-renewable decentralised energy (e.g. Combined Heat and Power (CHP)) have been incorporated.

Planning Policy	Requirement
London Borough of Camden Local Plan 2017	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 BREEAM assessments and encouraging zero carbon in new development from 2019.
The London Plan (2021)	Policy SI 1: Improving air quality Development proposals should not lead to further deterioration of existing poor air quality nor create any new areas that exceed air quality limits. Development proposals should be at least Air Quality Neutral and use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality in preference to post-design or retro-fitted mitigation measures. Major development proposals must be submitted with an Air Quality Assessment.

Planning Policy	Requirement
The London Plan (2021)	Policy SI 2: Minimising Greenhouse Gas Emissions A minimum on-site reduction of 35% over Building Regulation Part L for major developments (development of 10 or more dwellings or where the site area is >0.5 ha.). In the case of residential, this should be attained with 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 Developments proposals should minimise adverse impacts on the urban heat island effect. In the case of major developments, proposals should demonstrate through an energy strategy the reduction to the risk of overheating and reliance on air conditioning 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)
	Policy SI 7 Reducing waste and supporting the circular economy Resource conservation, waste reduction, increases in material re-use and recycling, and reductions in waste going for disposal by promoting a circular economy improving resource efficiency through extended lifetime, encourage waste minimisation and reuse, meet or exceed waste targets of 95% reuse/recycling/recovery for construction and demolition and 95% beneficial use for excavation and incorporate adequate and flexible storage space for separate recycling.
Greater London Authority (GLA) Energy Assessment Guidance June 2022	2.2. Net zero-carbon target Major developments are required to achieve a minimum 35% on-site carbon reduction over *Part L 2021*. Residential [major] developments are expected to be able to exceed this, and so an additional benchmark has been set that residential developments should be aiming to achieve 50%+.

Table 2 – Summary of local planning policy requirements

In accordance with the *Camden Planning Guidance – Energy Efficiency and Adaption (January 2021)* Table 1a, the Proposed Development is deemed to be a 'minor' sized residential new-build (as the floor area is under 500m^2) and a detailed energy statement is not explicitly required. Performance against carbon reduction targets is however still required following the detailed energy strategy. The Proposed Development is thus excluded from being required to demonstrate the following:

- Policy CC2 points b) to d) adaptation measures to climate change
- Air Quality Assessment per Policy SI 1
- A requisite 35% improvement over *Part L1 2021* per Policy SI 2 with 10% being through Lean measures
- Application of the cooling hierarchy as per Policy SI 4

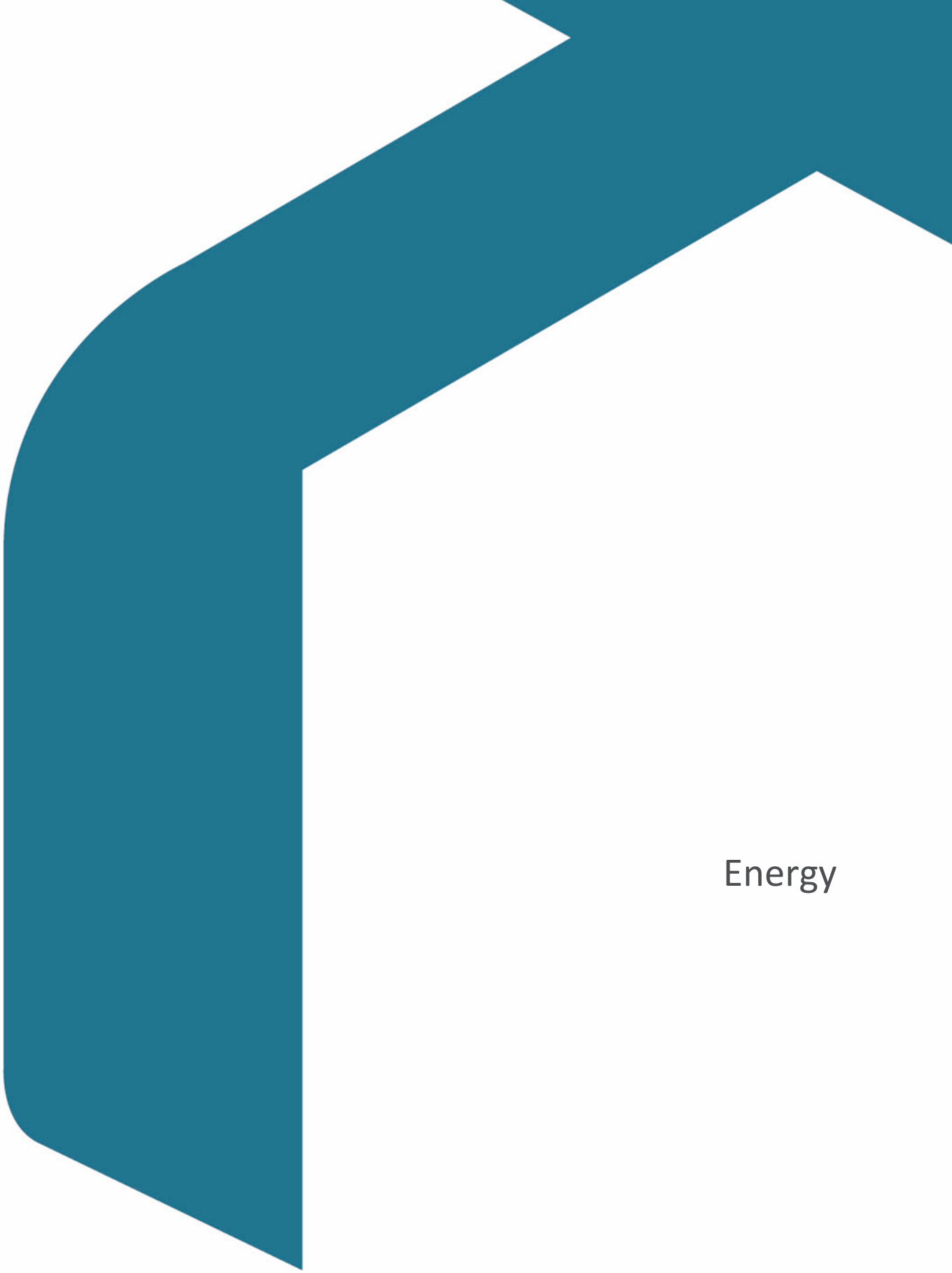
- A 50%+ on-site carbon reduction over *Part L 2021* per the *GLA Energy Assessment Guidance*.

In spite of this, such measures are recognised to be of high value to the local area and good practice in general, particularly for a change of use and upgraded scheme. Many of these have thus still been targeted in this design as they can be met incidentally while achieving essential fabric efficiency requirements.

1.3 Policy Targets

Being a material change of use and extension, the Proposed Development will strive to achieve the best emissions reductions it can with the given budget in line with those outlined for a minor scale development within the *London Plan*, *GLA Energy Assessment Guidance June 2022* and local policy in addition to the requisite sustainability requirements for the development. These are detailed as follows:

- Improvement over *Part L1 2021*
- Application of the cooling hierarchy
- Employ technologies and design systems to reduce contributions to poor air quality
- Assess the risk of flooding and, where appropriate, adopt necessary design mitigation measures
- Ensure a minimal impact on ecology taking into account proximity to Camden's green spaces and nature reserves
- Meet or exceed waste targets of 95% reuse/recycling/recovery for construction and demolition and 95% beneficial use for excavation
- Reduce internal water use in line with the requirement of <105l/p/d
- Implement any additional general sustainability measures – incl. use of sustainable construction techniques and materials, inclusive design, site management and procurement procedures



Energy

2.0 Energy

2.1 Method

The energy strategy design follows national policy guidance[1] 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_2e emissions

Green

Implement suitable technologies to provide renewable and emission free energy sources

Seen

Incorporate monitoring through SMART metering and accessible displays

The CO_2e Conversion Factors have been taken from the new *Building Regulations 2021* which are based on standard yearly figures taken from the Government *Standard Assessment Procedure* (SAP) Guidance[2] and outlined below in Table 3. Although within the *SAP10* modelling, the CO_2e 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 photovoltaic (PV) generation in the summer months.

	CO_2 Conversion Factor ($kgCO_2e/kWh$)
Electricity (mains)	0.136[3]
Electricity (offset)	-0.136[3]
Gas (mains)	0.210

Table 3 – CO_2e conversion factors by energy source

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

As a change of use development the Target Emission Rate (TER) is actually taken from the DER of the 'notional building' that is the exact size and shape of the Proposed Development. The U-Values are based on the notional values set out in the *Building Regulations part L1 (a)* and heating specifications are assumed to be existing, in line with *Part LV 1 (a)*. This notional baseline represents the minimum compliance in levels of TER and Target Fabric Energy Efficiency (TFEE) of the Proposed Development, with all proposed improvements measured against this baseline for comparative purposes in order to demonstrate the respective percentage improvement.

This is referred to as the Whole House Offset method in SAP to show Part L compliance.

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

[2] 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

[3] This value is not directly used, but rather represents the average of the month-to-month values used.

2.2 LEAN – Demand Reduction

The Lean scenario can achieve a reduction in CO_2e emissions using passive and active design measures over a *2021 Building Regulations* Baseline scenario as seen in Table 4. While there is no stipulated requirement for minor developments, through the use of Lean measures we can see a minor improvement over the baseline emissions..

	Scenario	CO2e emissions (t/yr)	Improvement (%)
Flat One	Baseline	1.35	
	Lean	1.22	9.65
Flat Two	Baseline	1.45	
	Lean	1.38	4.71

Table 4 – Lean CO_2e emissions and improvement over Baseline

2.2.1 Passive Design Measures

Passive design measures have been enhanced where possible throughout the site to maximise building efficiency within the confines of the existing site constraints and capital costs. The Proposed Development's position is defined by the existing building, but the internal usable space has been optimised while maintaining sensitive consideration for the building's listed status. The Proposed Development maximising natural light without impacting the external aesthetic by retaining the architectural language of the existing openings and designing the interior accordingly to allow for natural light to enter the flats.

While maximisation of natural light is important, overheating has also been considered. This is accounted for passively through the provision of natural ventilation via operable windows. This will enable natural ventilation controlled by the occupants through the warmer summer months, minimising the overheating risks. All glazed areas of the building will also have elements of shading in the form of internal curtains or blinds to aid in minimising the risk of overheating and glare. Finally, solar gains are to be further controlled through low emissivity (Low-E) coatings on the glazing limiting thermal overheating without heavily impacting light ingress.

The Proposed Development takes on a high-level fabric first approach. The proposed thermal conductance (U-values), as seen in Table 5, exceed *Building Regulations Part L V1* minimum fabric requirements for new and improved fabric in existing buildings which form the basis for the designed notional building outlined in *SAP 10.2*. Further detail of the proposed specification is shown in Appendix C.

Element	Proposed U-value (W/m²K)	Notional U-value (W/m²K)
External Walls (old)	0.23	0.30
External Walls (new)	0.18	0.18
Roof (old)	0.14	0.16
Roof (new)	0.13	0.15
Windows and Glazed Doors	1.40	1.40
Roof lights	1.40	2.20

Table 5 – Proposed fabric energy efficiencies

Non-standard construction details have been assumed therefore although thermal bridging will be considered during the detailed design and construction works the Psi values have not been assessed.

2.2.2 Active Design Measures

The Proposed Development will utilise 100% low energy/light emitting diode (LED) lighting in excess of Building Regulation requirements. These are proposed to be at least 85 lm/W efficacy. External lighting, where installed, shall also be energy efficient, and will be positioned to avoid excessive light pollution and be supported by passive infrared sensor (PIR), daylight sensors and/or time controls to reduce operation times and subsequent energy use and emissions.

As the Proposed Development does not intend to use mechanical ventilation with heat recovery, there will be passive ventilation throughout the Proposed Development's wet rooms in the form of intermittent extractor fans. There will also be operable windows throughout the dwellings to assist with natural ventilation.

The Lean scenario includes a regular, condensing gas boiler for each flat outputting heat via radiators and providing domestic hot water (DHW). The efficiency and control of this system aligns with the notional building specification within SAP10. This system has been utilised indicatively as the main heating solution in Lean scenario as per the GLA guidance and to highlight the Lean improvements over the baseline. The intended solutions for the Proposed Development are classed as Clean and Green technologies.

2.2.3 Cooling

The cooling hierarchy (Table 6) has been used to ensure that passive building design principles have been optimised to reduce the cooling load for the Proposed Development.

Cooling Hierarchy	Potential Design Measures
Reducing the amount of heat entering the building in summer	Low-E glass in non-listed new windows and internal blinds are to be provided to minimise solar gain.
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 LED lighting is specified throughout.
Use of thermal mass and high ceilings to manage the heat within the building	Some high mass structural elements are present internally within the building. External high mass walls are behind a layer of insulation due to improvement needs of the Proposed Development.

Cooling Hierarchy	Potential Design Measures
Passive Ventilation	Operable windows are present throughout, excluding some of the store rooms.
Mechanical Ventilation	Passive ventilation is already present for the Proposed Development.

Table 6 – Design measures following the cooling hierarchy

2.3 CLEAN – Heating Infrastructure

District heating networks have been investigated and there are no current or future planned networks in the relative vicinity of the site. There have been no Clean measures identified as plausible for the Proposed Development, as such in this particular case the Clean are identical to the Lean measures previously proposed.

Flat	Scenario	CO_2e emissions (t/yr)	Improvement (%)
Flat One	Lean	1.22	9.65
	Clean	1.22	9.65
Flat Two	Lean	1.38	4.71
	Clean	1.38	4.71

Table 7 – Clean CO_2e emissions and improvement over Lean

2.4 GREEN – Low Carbon and Renewable Energy

The addition of Green technologies can provide a significant reduction in CO_2e emissions. For a minor development such as this, there is not a requisite improvement over *Building Regulation Part L1 2021*, as discussed in Section 1.2. This Proposed Development nonetheless aims to implement Green technologies where possible. Green strategies employed in the Proposed Development include two high efficiency air source heat pumps (ASHP) used in the two dwellings, wastewater heat recovery (WWHR) systems, and efficient water fixtures.

Flat	Scenario	CO_2e emissions (t/yr)	Improvement (%)
Flat One	Clean	1.22	9.65
	Green	0.41	45.83
Flat Two	Clean	1.38	4.71
	Green	0.47	46.23

Table 8 – Green CO_2e emissions and improvement over Lean/Clean

2.4.1 Air Source Heat Pumps (ASHP)

All Heat Pump (HP) systems consume electricity to operate – the Coefficient of Performance (CoP) of the system is the ratio of electrical energy consumed to heat energy emitted. Typically, a CoP in the range of 3 – 4 can be achieved. This equates to the system producing in the range of 3 – 4 units of thermal energy for each unit of electricity consumed.

HPs typically deliver heat efficiently in the lower range (up to circa 50°C) due to their operation being a function of temperature differentials. Heating above this does incur a greater level of inefficiency as this requires additional electrical input (immersion or increased compressor use). This is minimised through heat provision by means of underfloor heating where lower temperatures are required for sufficient space heating however, for the Proposed Development, underfloor heating was not deemed possible and the radiators in the flats will used.

ASHPs tend to generate some noise and therefore this will be located in a concealed acoustic enclosure, either settled on the newly constructed roof of flat one or wall mounted to the side of flat three above flat one. This will prevent both visual impact and noise disturbances to the building's occupants and neighbours. Specification of the proposed ASHP used for modelling has been specified in the SAP summary sheet in Appendix C.

2.4.2 Optimisation of Hot Water Usage

Water consumption has been highlighted in the *London Plan* as an area for focus and optimisation. Flow limiters and low flow fixtures are thus proposed minimising hot water usage and, in turn, energy used through water heating. Additional measures to this include provision of over-bath shower roses providing users with a more efficient option for washing.

2.5 SEEN – In-use Monitoring

It is recommended that the Proposed Development will be supplied with Smart Meters (where available from the utility supplier) 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.

2.6 Conclusions

The Proposed Development has considered energy efficiency at every stage of the design as seen in Table 9 and Figure 3 and, as a result, will deliver passive and active energy demand reduction measures to provide robust and long-lasting CO_2e emissions reductions through the following:

- High performance building fabric within the limits of improving the existing structure
- High efficiency LED lighting
- Passive ventilation through operable windows and intermittent extract fans
- High efficiency ASHPs supplying space heating and hot water
- Low water consumption fixtures
- Wastewater heat recovery

Flat	Scenario	Average Unit CO_2e emissions (t/yr)	Improvement (%)	Average Improvement over Baseline (%)
Flat One	Baseline	1.35		
	Lean	1.22	9.65	9.65
	Clean	1.22	9.65	9.65
	Green	0.36	48.89	73.04
Flat Two	Baseline	1.45		
	Lean	1.38	4.71	4.71
	Clean	1.38	4.71	4.71
	Green	0.43	48.66	70.07

Table 9 – Summary of the Proposed Development's CO_2e emissions and improvement over Baseline

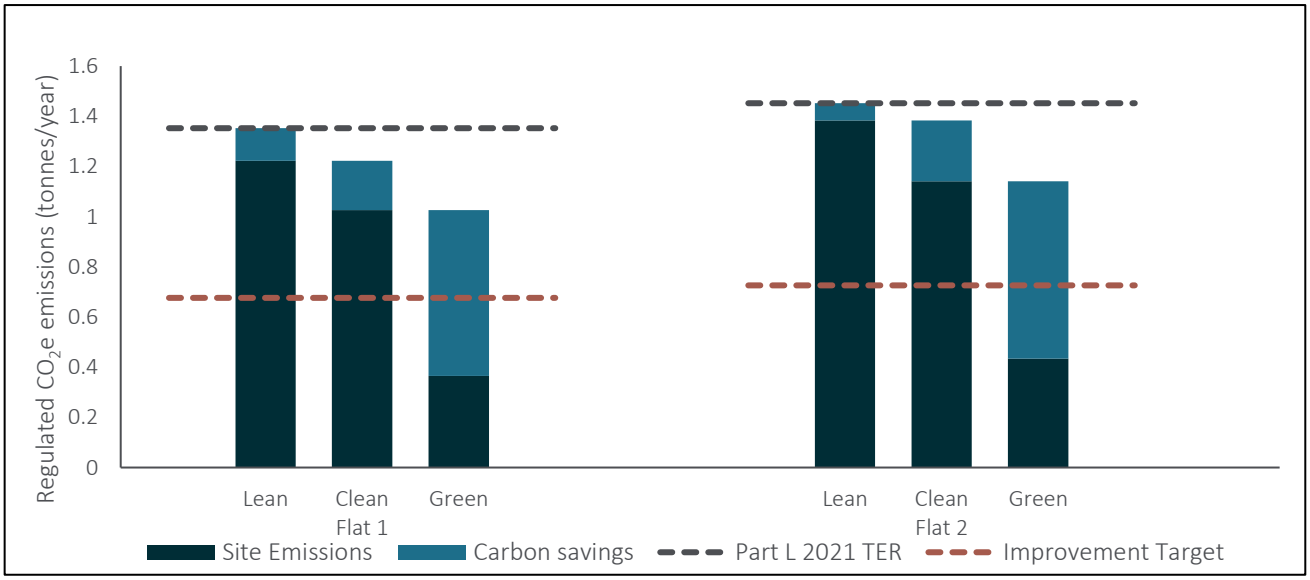


Figure 3 – Summary of regulated carbon dioxide savings for the Proposed Development

Through this design, all energy targets outlined in Section 1.3 exceed requirements stated in the *London Plan* and *London Borough of Camden Local Plan*. This is seen through the following:

- An average site-wide improvement of 70-72% is achieved exceeding the 50% GLA benchmark.
- An improvement of 45.78% using LZC technologies, in excess of 20% in alignment with *London Borough of Camden Local Plan 2017*.
- The cooling hierarchy was utilised providing design mitigation against overheating.

Sustainability

3.0 Sustainability

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

"Sustainable Development – meets the needs of the present without compromising the ability of future generations to meet their own needs." (World Commission on Environment and Development: Our Common Future[4]).

The planning system focuses on three objectives to achieve a sustainable development: economic, social, and environmental. These objectives mutually support each other and have been adapted in this statement to meet the objectives of the London Borough of Camden. The current Local Plan prioritises promoting developments that make the best use of resources, increases sustainability of local communities and are adaptable to climate change. Careful considerations have been taken to ensure the Proposed Development meets these expectations.

3.1 Climate Change

Since June 2019, the UK Official Development Assistance (ODA) has aligned with the Paris Agreement, being committed to limit global warming to 1.5°C in comparison to pre-industrial levels. However, the United Kingdom (UK) Met Office estimate this level will be exceeded within the next 5 years.

The UK built environment is one of the largest contributors to greenhouse gas emissions, contributing approximately 42% to the total share of UK emissions according to the UK Green Building Council[5]. This includes emissions produced as a result of the construction of infrastructure in addition to transport emissions.

As the development is taking a fabric first approach when it comes to sustainable measures, the Proposed Development will be adapted to deal the with more extreme weather conditions – heavier rainfall, hotter & drier summers, and milder winters. The Proposed Development is a grade II listed building, and for this reason materials used to accommodate the ever-changing weather conditions will be used where it is feasible to do so in order to not cause substantial harm to the listed building. This must all be done in accordance with the policies laid out in the *Camden Local Plan*.

3.2 Pollution

3.2.1 Air

In accordance with the *London Plan Policy SI 1*, air quality is of high significance. Examining the location of the Proposed Development, the site lies within a high NO_x emissions area as defined by the UK NO_x emissions map shown in Figure 4. Pollution levels will be reduced through the replacement of existing gas boiler systems with ASHPs, providing space and hot water heating for the flats.

[4] https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf
[5] https://www.ukgbc.org/climate-change-2/

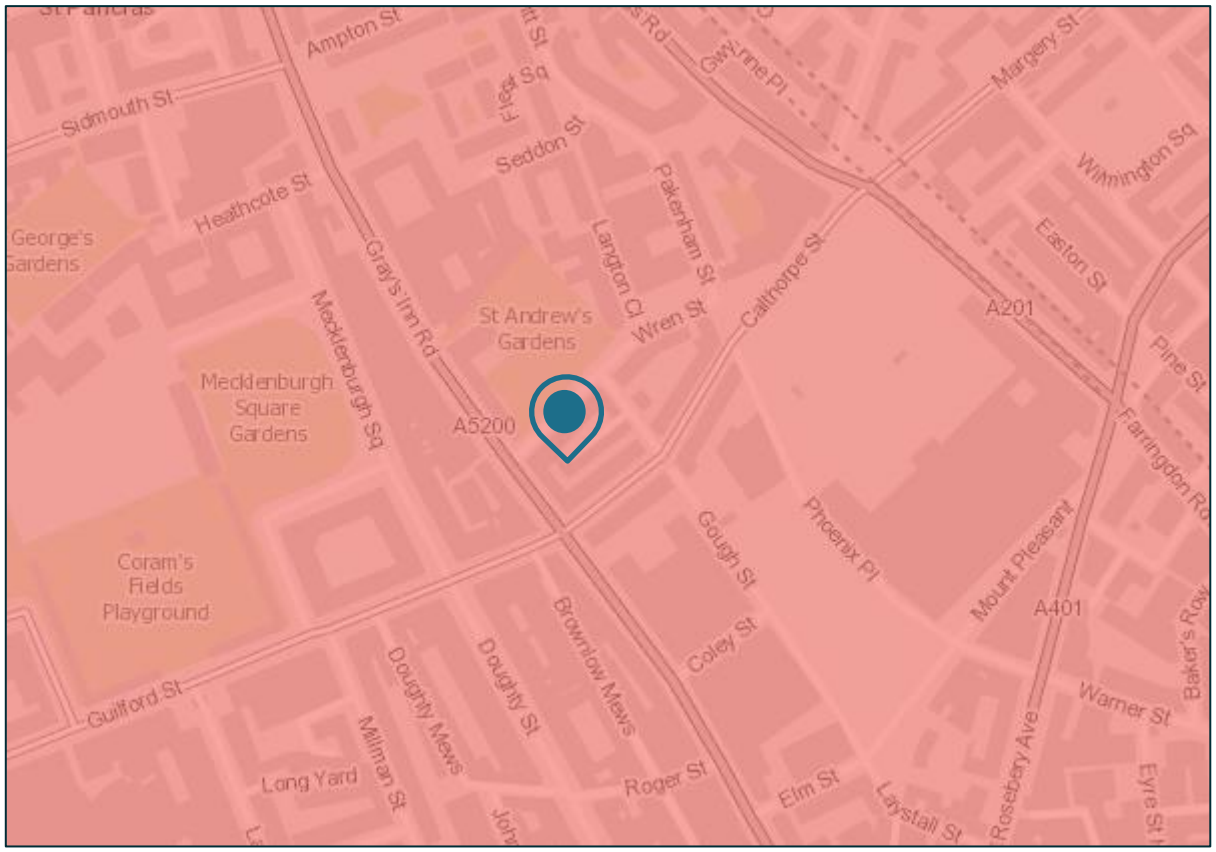


Figure 4 – UK Air Pollution Map showing pollution from Nitrogen Oxides as NO_2 (https://naei.beis.gov.uk/emissionsapp/)

While the Proposed Development lies within an area of high levels of emissions, the building will not have to undergo an Air Quality Assessment (AQA) as it is not a major development. Through the removal of gas boiler systems the Proposed Development will notably reduce its current contribution to of air pollution in the area. Air quality impact from construction shall also be considered and measures that will be put in place are mentioned in 3.2.2.

3.2.2 Noise and Vibration

The Proposed Development is intended to implement 2 no. ASHPs into the flats, with the ASHPs installed on the new flat roof/rear wall. While these devices do generate noise and vibration, acoustic shielding can be applied and there is unlikely to be any increase in noise from the current two residential floors. Furthermore, the Proposed Development will be a highly insulated building with double-glazed windows where feasible under the listed building limitations which should help to minimise any noise from inside the building.

During the construction phase, quiet equipment and machinery will be deployed wherever possible and monitored to ensure that its quality does not deteriorate. Additional measures including acoustic screening will be implemented if necessary. Construction traffic can also contribute to increased levels of noise pollution. Vehicles travelling to the site will be managed with this in mind, along with working hours and activities conducted on-site.

3.2.3 Light

The design and layout of the Proposed Development for practical use has been considered while trying to maximise internal daylight levels. All dwellings 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.

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

3.3 Flood Risk

As can be seen in Figure 5 and Figure 6, the site of the Proposed Development is at very low risk of flooding from rivers and seas, as well as from surface water.

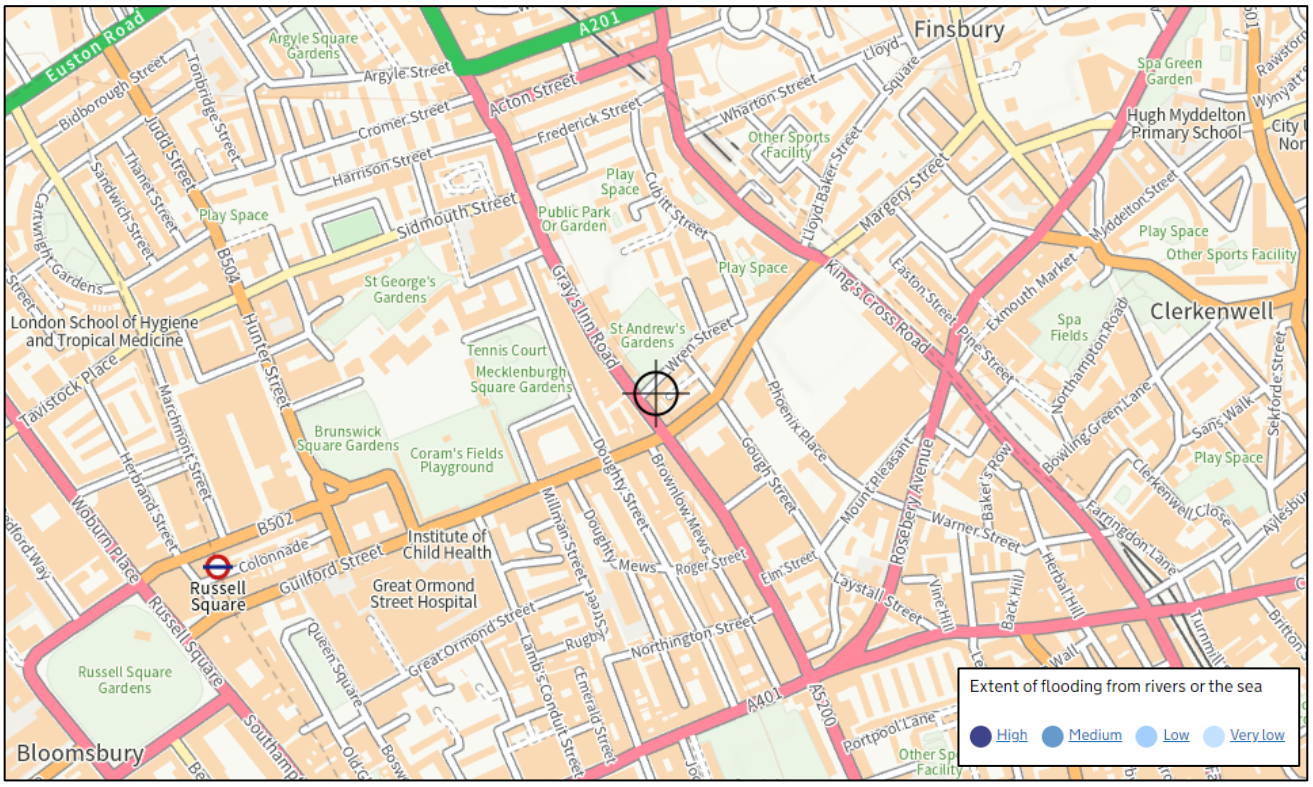


Figure 5 - Flood map showing risk of flooding from rivers or the sea (https://flood-warning-information.service.gov.uk/long-term-flood-risk/map)

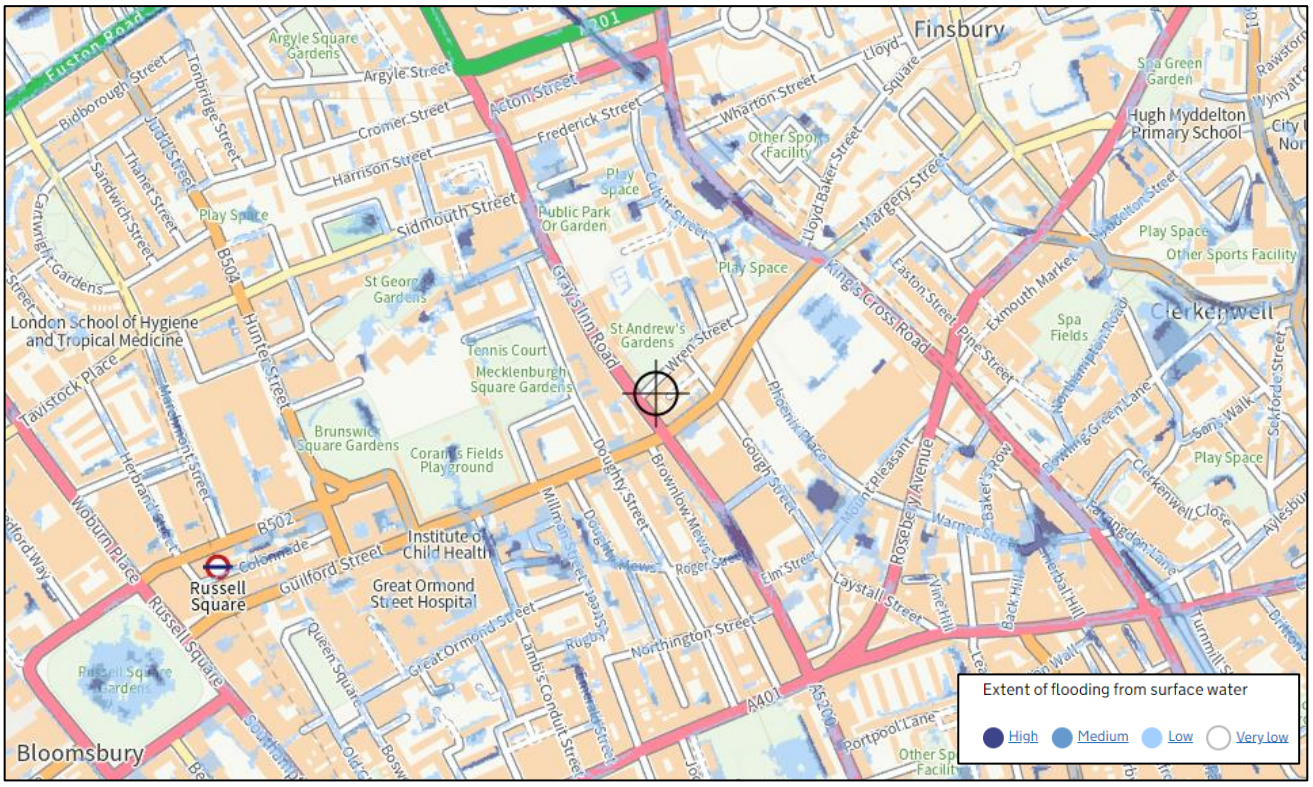


Figure 6 – Flood map showing risk of flooding from surface water (https://flood-warning-information.service.gov.uk/long-term-flood-risk/map)

The Proposed Development is a change of use project and its footprint will not be changing from the existing development on site. However, the risk of flooding is classed as very low for all types of flooding and the Proposed Development is considered to have little to no change in terms of contribution to flood risk.

3.4 Transport

Sustainable Transport – "Any efficient, safe and accessible means of transport with overall low impact on the environment, including walking and cycling, ultra-low and zero emission vehicles, car sharing and public transport." (National Planning Policy Framework 2021[6]).

The Proposed Development is located within a predominantly residential area with several public services within walking and cycling distance of the site. The Proposed Development has incorporated measures to promote the use of more sustainable means of transport and ensure that the future users of developments will be less reliant on private motor vehicles and support active and multimodal travel.

3.4.1 Public Transport

The Proposed Development is located in the Camden Borough close to King's Cross and St Pancras stations however, there are multiple opportunities for use of public transport in this area.

Buses: The closest bus stop is on Guilford Street, 23 meters away from the Proposed Development. The buses serving this stop are 17, 45, 46, 63 and 259.

Train system: Only ten minutes from the Proposed Development is the Euston Square tube station, which is on the Circle, Hammersmith & City and Metropolitan lines. Finally, fifteen minutes from the Proposed

[6] https://www.gov.uk/government/publications/national-planning-policy-framework--2

Development is the closest rail station at King's Cross St Pancras, it is a major transport hub that connects London with multiple other parts of the UK including Bristol.

Given the public transport links, it is highly likely that residents at the Proposed Location will have no need for private transport, ensuring their switch to a greener alternative.

3.4.2 Cycle Storage

The Proposed Development has allowed space for one cycle shelter, it is a FietsHanger Cycle Hanger that can store a number of bicycles. This will be suitably secure, covered and will encourage the use of a bicycle to travel for shorter, local journeys.

3.4.3 Car Parking

The Proposed Development will have no parking spaces. The restriction of on-site parking will promote the use of public transport and bicycles by residents and visitors.

3.4.4 Car Rental

There is a car rental service provided by Easirent Car Hire London, located a 2-minute walk to the south east at 175 Grays Inn Road. Proximity to a car-pooling service will allow residents access to cars without the need to own one.

3.5 Biodiversity

Biodiversity is generally considered to be the variety of life forms within a certain ecosystem. Given the redevelopment nature of the project and the urban context of the site, the result of the Proposed Development is deemed of negligible ecological impact.

Considering actions undertaken during construction, these shall be timed appropriately and follow best practice guidance. This will minimise ecological impact through the duration of construction works.

3.6 Resource Efficiency

3.6.1 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.

The Construction Management Plan followed through the duration of works shall adhere to the principles of the waste hierarchy as outlined in Figure 7.

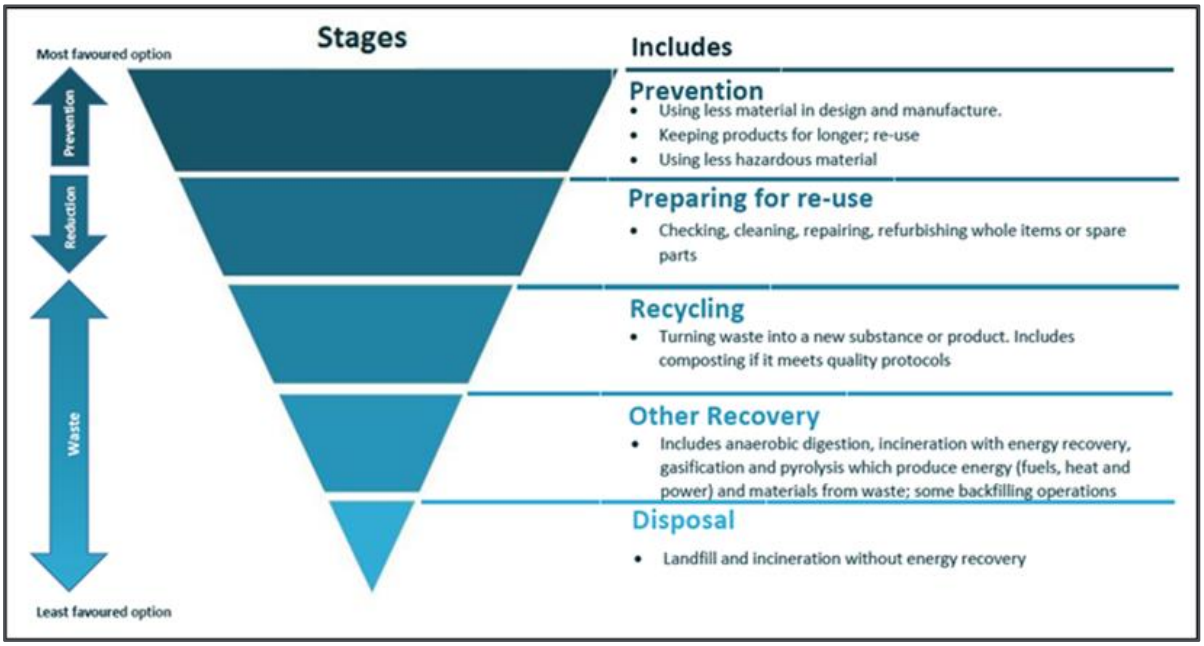


Figure 7 – The waste hierarchy

Preventative methods will be employed by considering retention of existing structural or material elements of the existing building subject to impact of the performance of the building. Where suitable, re-use methodologies shall be applied to material elements such as timber and roof finishes which have been deconstructed from the existing building during works (provided they meet all requisite performance targets). Where this is not possible or suitable (be it safety, thermal or other performance requirements), waste materials are to be recycled. The cumulative reused, recycled and recovered materials in the Proposed Development will meet or exceed the 95% target requirement for construction and demolition waste as set out in the *London Plan.*

3.6.2 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*.

3.6.3 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.

The primary form of construction for the external wall is proposed to be double-skin masonry to match existing externally in line with the necessary requirements set out by the *National Planning Policy Framework*, given the Proposed Development is Grade II listed. Furthermore, given that the Proposed Development lies within the Bloomsbury Conservation area, the extension to the Proposed Development must stay true to the local character of the area in order to not do harm to its character.

The Proposed Development aims for reclaimed bricks to be used within the new external walls, thereby reducing the associated embodied carbon and environmental impact.

Responsible sourcing of materials will also be used. New timber used throughout the construction phase, specifically in the roof and within the Proposed Development (the internal walls) will be sourced through legal sources with appropriate Chain of Custody certification to confirm this. These materials shall be Forest Stewardship Council (FSC) or equivalent.

Other materials will prioritise manufacturers employing environmental management systems including but not limited to *ISO 14001*, *BS 8555* or *BES 6001*. Wherever possible, materials are to be sourced locally. Low levels of volatile organic compounds (VOCs) shall be prioritised in material specification in accordance with European testing standards with non-toxic materials used wherever possible.

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.

3.6.4 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.

The specification outlined below is indicative of one which will meet these requirements of <105 litres/person/day and the Proposed Development will follow this or a similar equivalent:

- Water closets (WCs): 4.5/3.0 litre effective dual flush volume
- Hand wash basin taps: 5.0 litres/min
- Kitchenette taps: 5.0 litres/min
- Showers: 6.0 litres/min
- Baths: 160 litres
- Domestic sized dishwashers (if installed) 1.25 litres/place setting
- Domestic sized washing machines (if installed) 8.17 litres/kg dry load

3.7 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.

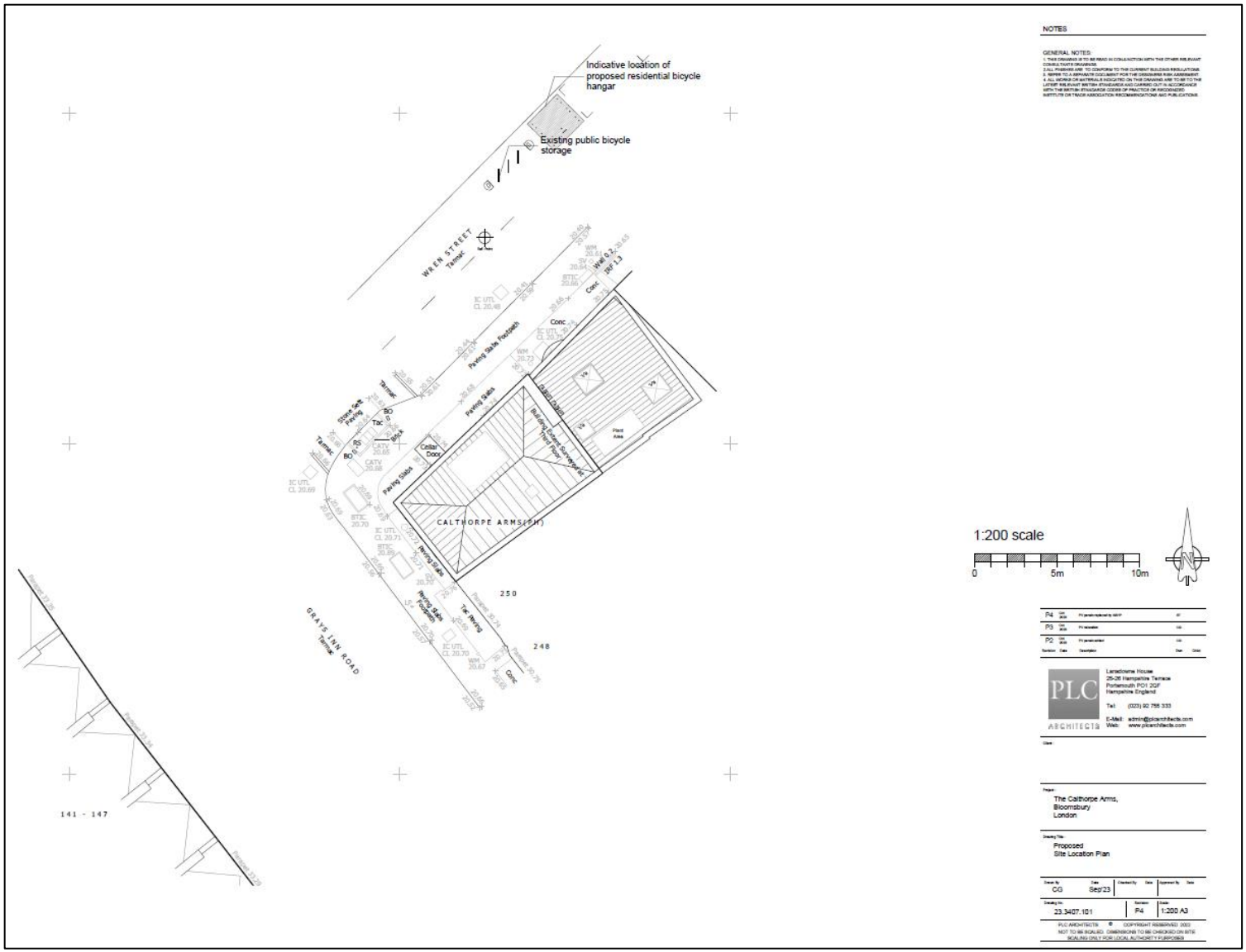
Overall, the Proposed Development has aimed to minimise its impact on the environment at both construction and operational phases and will provide a sustainable residential dwelling which responds positively to its surroundings, and local and regional policy.

The net result of the sustainability measures implemented meets and exceeds the targets set out by the local planning policy and *London Plan* through the following:

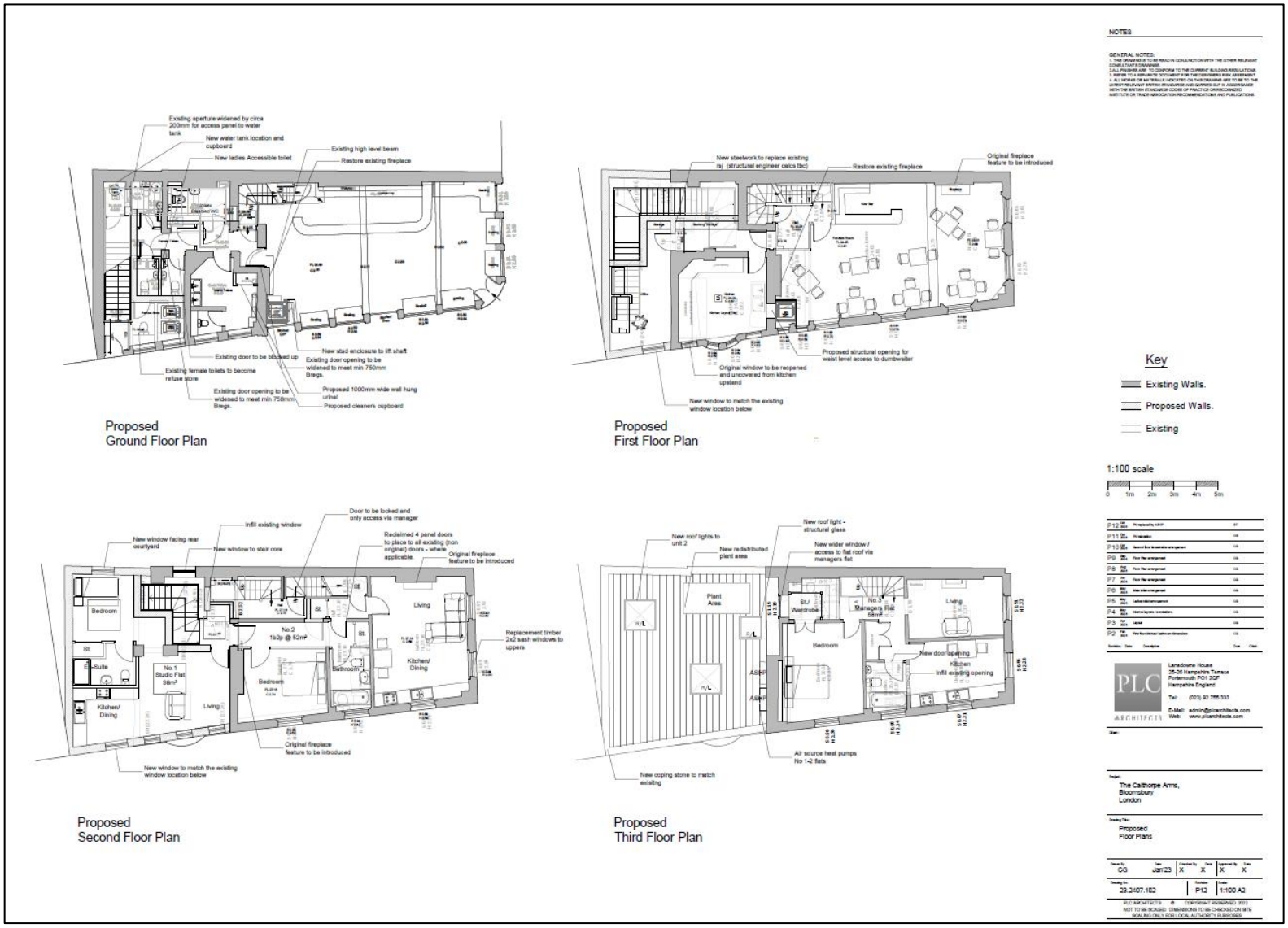
- Air pollution will be reduced through replacing gas boiler systems with ASHPs for DHW and space heating.
- The Proposed Development is at very low risk of flooding from surface water and rivers and will not exacerbate this for the site or immediate surrounding area.
- Proposed Development will not detrimentally affect the ecology of the area.
- Waste targets of 95% reuse/recycling/recovery for construction.
- Reducing internal water use through the use of fittings with a low capacity or flow restrictors in line with the requirement of <105l/p/d.
- Implementation of sustainable construction techniques and materials, inclusive design, site management and procurement procedures.

Appendices

Appendix A – Site Plan



Appendix B – Proposed Floor Plans



Appendix C – SAP Specification Sheet

Calthorpe Arms, Bloomsbury - Proposed Development

BRegs LV1 2021 | **Planning Authority: Camden Council** | Rev A

Option	Vertical Fenestration	Skylights	External Walls (Old)	External Walls (New)	Flat Roof (Old)	Flat Roof (New)	Mechanical Ventilation	Air-Permeability	Space and DHW Heating System	HW Cylinder	HW Cylinder Losses	Renewables (PV)	Renewables (Area)	EPC Rating	DER v TER Improvement	DPER vs TPER Improvement	DFEE vs TFEE Improvement
Type	U-Value	U-Value	U-Value	U-Value	U-Value	U-Value	Type	$m^3/hr/m^2$	Type	litres	kWh/day	kWp	m^2		%	%	%
Flat One (Studio)	1.40	1.40	N/A	0.18	N/A	0.13	Passive Ventilation	N/A	Combined: Air Source Heat Pump	150.00	1.92	N/A	N/A	72 C	73.04	49.18	3.77
Flat Two	1.40	N/A	0.23	N/A	N/A	N/A	Passive Ventilation	N/A	Combined: Air Source Heat Pump	150.00	1.92	N/A	N/A	72 C	70.07	43.68	0.69

Element	Modelled U-Value	Part L1 2021 Max U-Value	Description
External Walls (New) Wall Type 1	0.18	0.18	215-220mm block/brickwork, ≥25mm unventilated cavity, 50mm of phenolic insulation (0.019 W/m.K Kingspan K112 or equivalent to achieve equal performance) between 75mm deep timber studs, 62.5mm phenolic insulated core plasterboard with skim finish (0.019W/m.K - Kingspan K118 or equivalent to achieve equal performance).
External Walls (Old) Wall Type 2	0.23	0.30	215-220mm block/brickwork, 600mm c/c timber battens, 82.5mm phenolic insulation core plasterboard with skim finish (0.019W/m.K - Kingspan K118 or equivalent/superior insulation of thickness to achieve equal performance).
Internal Partitions Wall Type 3	N/A	N/A	Lightweight blockwork and timber walls. Older blockwork walls from original development kept in accordance with buildings heritage listing. New internal partitions to be made from timber and plasterboard.
Flat Roof Structure (New) Roof Type 1	0.13	0.15	External finish to architectural specification, ≥50mm well ventilated cavity, 125mm phenolic insulation (0.019 W/m.K - Kingspan K103 or equivalent to achieve equal performance), 50mm of phenolic insulation (0.019 W/m.K - Kingspan K103 or equivalent to achieve equal performance), Vapour Barrier, 12mm Plasterboard.
Flat Roof Structure (Old) Roof Type 2	0.14	0.16	To be improved to meet the U-Value specified.
External Vertical Fenestration Glazed Windows and Doors	1.40	1.40	Double glazed window, with low-E soft coating (U-value of 1.40W/m^2K with a centre of glass G-value of 0.45. Frame factor of 0.70 used indicatively).
External Horizontal Fenestration Skylights	1.40	2.20	Double glazed window, with low-E soft coating (U-value of 1.40W/m^2K with a centre of glass G-value of 0.45. Frame factor of 0.70 used indicatively).
Thermal Bridge Details	-	-	Non-standard construction details assumed therefore Psi values not assessed.
Ventilation System	-	-	Modelled as 2x intermittent extract fans per flat.
Air Permeability	-	-	Existing building therefore assumed no pressure test has been performed.
Lighting	-	-	Low energy LED lighting throughout. Modelled assuming 3.00W/m^2 lighting density with efficacy of 85 lm/W.
Main Heating Systems	-	-	Mitsubishi Electric Ecodan 5.0 kW Air Source Heat Pump (Combined space and DHW) - Modelled as per SAP database.
Main Heat Emitters	-	-	Radiators (wet system).
Main Heating Controls	-	-	Programmable and with room thermostat. TRVs.
Hot Water Usage	-	-	1 bath and 2 showers as per plans (net for development). Modelled with low flow fixtures indicated as 6.00ℓ/min.
Hot Water Cylinder	-	-	ASHP - 150ℓ.
Renewables	-	-	N/A
Overheating	-	-	Part O underheating compliance to be undertaken at detailed design stage.
Notes			

Sign Off details					On behalf of the contractor/client:			
	Name	PP M Maclean	Date	06.10.2023		Name		Date	
	Sign	(on behalf of SRE)				Sign			

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