Energy and Sustainability Statement

Martin Robeson Planning Practice

13 Kemplay Road
London Borough of Camden
NW3 1TA

SRE

Version	Revision	Date	Author	Reviewer	Project Manager
1	A	25.08.2023	Findlay Matheson	Sophie Hopwood	Findlay Matheson

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 13 Kemplay Road, London Borough of Camden. The 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, in line with local policy requirements.

The Proposed Development involves the demolition of an existing residence and construction of a new four-bedroom family house with a greater floor area. The Proposed Development will match the height of the adjoining neighbouring residence, spanning 4 storeys, including a heated basement and room-in-roof space, with a total gross internal area (GIA) of 243m^2. Additionally, the Proposed Development will maintain the style and character of the surrounding area.

The energy strategy has been developed by following the Greater London Authority (GLA) Energy Hierarchy of Lean, Clean, Green and Seen along with local policy guidance. While the Proposed Development is minor and 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 energy strategy still meets and exceeds said targets. This is achieved through strategies necessary to meet key fabric efficiency requirements along with low and zero carbon (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. Active design measures have also been incorporated utilising low energy light fixtures and a Mechanical Ventilation with Heat Recovery (MVHR) system to provide sufficient levels of ventilation and to reduce the risk of overheating. Further measures classed under the Green strategy include heating through use of an Air Source Heat Pump (ASHP). Further to this, renewable energy generation produced by a photovoltaic (PV) system with an export capable meter is proposed which can offset a high proportion of residual carbon emissions onsite. The proposed energy strategy for the Proposed Development is summarised below:

- High performance building fabric with a low infiltration rate
- High efficiency light-emitting diode (LED) lighting
- Mixed mode ventilation through operable windows and an MVHR system
- High efficiency ASHP supplying space heating and hot water
- Low water consumption fixtures
- 1.0 kWp roof mounted photovoltaic (PV) array.

Lean passive and active design measures along with LZC technologies allow the Proposed Development to achieve a 70% improvement over Baseline CO_2e emissions over a Building Regulations 2021 Part L V1 compliant design with a 14% improvement through Lean strategies, as shown in Table 1.

Site-Wide	CO_2e emissions (t/yr)	Strategy Improvement (%)	Improvement over Baseline (%)
Baseline	2.14		
Lean	1.83	14.49	14.49
Clean	1.83	0.00	14.49
Green	0.64	55.61	70.09

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 CO_2e offset shown in light blue.

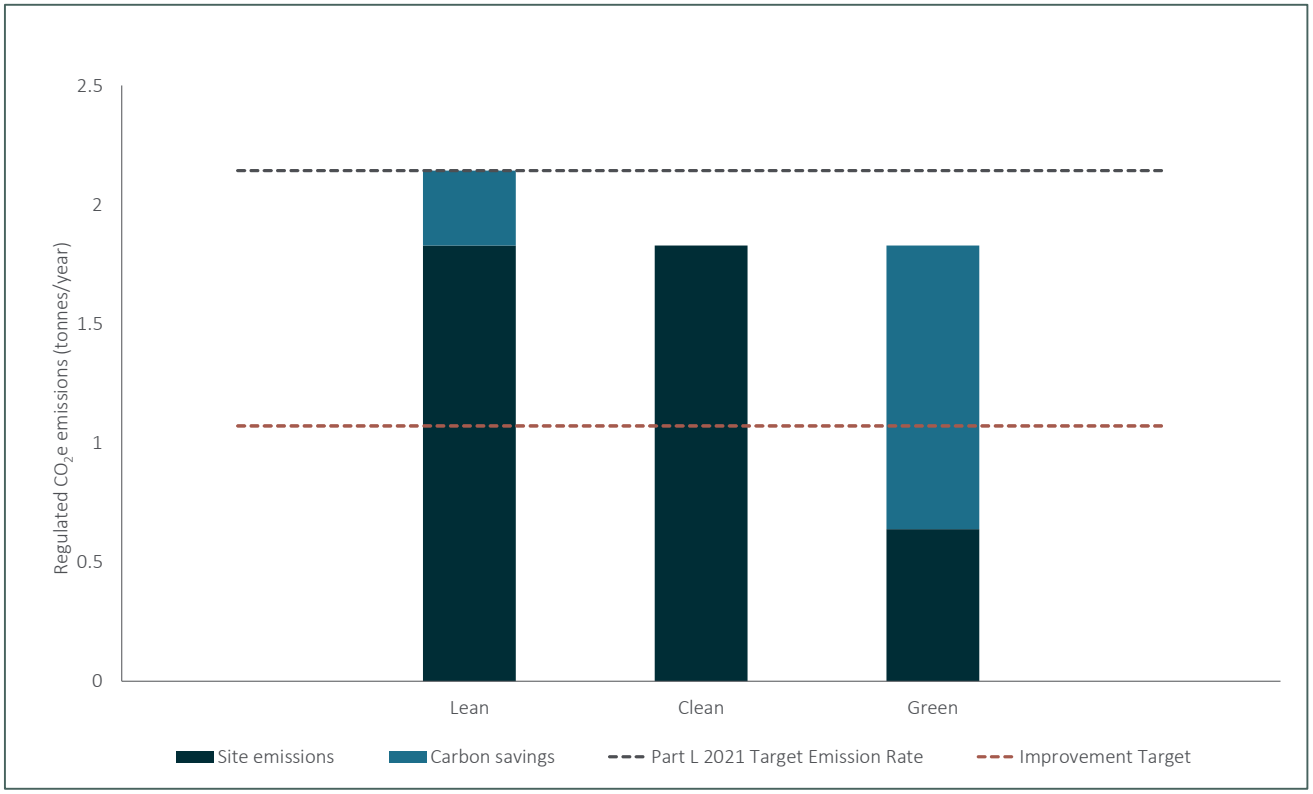


Figure 1 – Summary of regulated carbon dioxide (CO_2e) savings for the Proposed Development

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

- Through exclusively Lean strategies, the Proposed Development shows improvement over *Part L1 2021* by 14.49% exceeding the 10% improvement outlined in the *London Plan*.
- A net improvement of 70.09% is achieved after application of Green strategies exceeding the 50% the GLA Energy Assessment Guidance benchmark.
- A 55.61% improvement is attained through LZC technologies exceeding the 20% in alignment with London Borough of Camden Local Plan 2017.
- The cooling hierarchy is utilised and successfully implemented providing design mitigation against overheating.

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 ASHP technology.
- 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 Martin Robeson Planning Practice (the Client) to demonstrate the measures incorporated into the design of 13 Kemplay 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 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. This involves the demolition of an existing residence and construction of a new four-bedroom family house. Through this process, the Proposed Development shall match the height of the adjoining neighbouring house while additionally maintaining the style and character of area as seen in Figure 2.

Figure 2 – Street-facing elevation of the proposed development (Charlton Brown Architecture & Interiors)

The Proposed Development shall include a heated basement and room-in-roof space resulting in a total of four storeys with a gross internal area (GIA) of 243m². The Proposed Development shall include a small front and rear garden space aligned with the character of the area. The site is located on the corner of Kemplay Road and Pilgrim's Place near the Rosslyn Hill Chapel. Further architectural details including the site plan, floor plans and elevations can be found in Appendix A.

1.2 Planning Policies

Table 2 lists out the policy requirements.

Planning Policy	Requirement
London Borough of Camden Local Plan 2017	<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: 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

Planning Policy	Requirement
	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.
	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.
	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

Planning Policy	Requirement
	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) document 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:

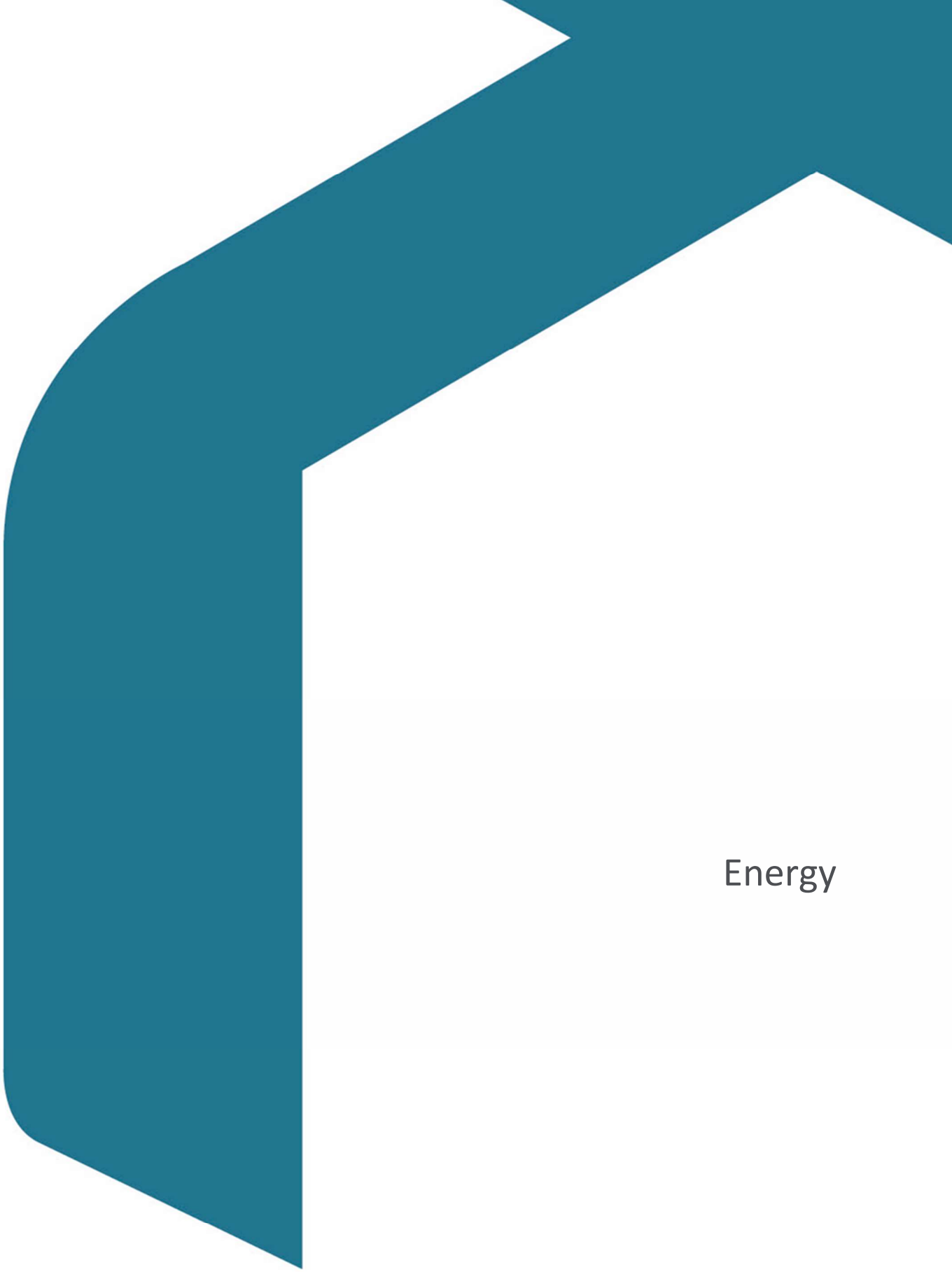
- Policy CC2 points b) to d) adaptation measures to climate change
- Air Quality Assessment per Policy SI 1
- A requisite 35% improvement over Part L1 2021 per Policy SI 2 with 10% being through Lean measures
- Application of the cooling hierarchy as per Policy SI 4
- A 50%+ on-site carbon reduction 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 redevelopment. 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 redevelopment project, the Proposed Development will strive to achieve the superior emissions reductions in line with those outlined for a larger 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:

- An improvement over Part L1 2021 by 10% from Lean energy efficiency measures alone
- An improvement over Part L1 2021 by 50% overall
- Carbon offset of >20% from LZC technologies
- Application of the cooling hierarchy
- Employ technologies and design systems to minimise 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.

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 SAP 10.2. 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.

2.2 LEAN – Demand Reduction

The Lean scenario can achieve a 14.49% 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

[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.

for minor developments, this meets and exceeds the 10% improvement required for major developments as outlined in the London Plan.

Energy Hierarchy	CO_2e emissions (t/yr)	Improvement (%)
Baseline	2.14	
Lean	1.83	14.49

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 site constraints and capital costs. The Proposed Development will be positioned within the site to maximise both the internal and external usable space while maintaining sensitive consideration for the area's aesthetic. The Proposed Development is designed in such a way maximising natural light. This is done utilising extensive glazing across the South façade and implementing lightwells to ensure natural light reaches the basement spaces.

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. Working in tandem with this, the Proposed Development shall have a relatively low level of air permeability ($3m^3/hr/m^2$ at 50 Pa as measured by a blower door test) which will further help mitigate heat losses through the envelope improving performance through the winter months. These proposed thermal conductance (U-) values, as seen in Table 5, exceed Building Regulations Part L V1 minimum fabric requirements and are largely similar or improve upon those of the notional building outlined in SAP 10.2. Further detail of the proposed specification is shown in Appendix B.

Element	Proposed U-value (W/m^2K)
External Walls (typical)	0.14
Basement Surface Bed	0.14
Roof (typical)	0.13
Windows and Glazed Doors	1.20 (g-value=0.40)
Roof lights	1.50 (g-value=0.40)
Solid Door	1.20
Air Tightness @ 50 N/m^2	3.00 ($m^3/hr/m^2$)

Table 5 – Proposed fabric energy efficiencies

Thermal bridges have been preliminarily proposed to be based on previously approved construction details (ACDs), notional values and advised values guided by similar constructions SRE has assessed. These shall be

further considered at detailed design stage and, where deemed necessary, shall be independently assessed such that the final psi-values achieve or exceed the target values as specified in Appendix C.

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 in accordance with the energy technology list (ETL) guidance of at least 100 lm/W. 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.

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. This also provides active benefits with regards to overheating. The MVHR has been modelled as a Nuaire MRXBOXAB-ECO2B rigid duct system with 25mm ducting insulation located in accordance with level 1 duct installation specification.

The Lean scenario includes a regular, condensing gas boiler outputting heat via radiators and provides domestic hot water (DHW). The efficiency and control of this system aligns with the notional building specification. This has been utilised indicatively as the main heating solution in Lean scenario as the intended solution for the Proposed Development is classed as a Green technology with further details in Section 2.4.

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 with solar control 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	A high mass structure is present but is contained behind a layer of insulation. While this will not offer notable massing benefits in diurnal cycles, it can be expected to provide massing benefits (albeit relatively minor) against seasonal spikes due to seasonal lag.
Passive Ventilation	Operable windows will be provided to all rooms.
Mechanical Ventilation	MVHR is proposed for all occupied spaces and wet rooms.

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. As such, there will be no further improvements using Clean measures above the Lean scenario as shown in Table 7.

Energy Hierarchy	CO_2e emissions (t/yr)	Improvement (%)	Improvement over Baseline (%)
Lean	1.83		14.49
Clean	1.83	0.00	14.49

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 exceed the 'residential major development' benchmark improvement target of 50% over Baseline emissions as outlined by the GLA Energy Assessment Guidance. Green strategies employed in the Proposed Development include a high efficiency air source heat pump (ASHP), use of PV systems and efficient water fixtures. Cumulatively, these LZC technologies achieve a 55.61% improvement over the Clean scenario and a net 70.09% improvement over the Baseline as seen in Table 8. This surpasses both the 50% overall improvement over Part L1 2021 and the 20% carbon offset from LZC technologies outlined in Section 1.3.

Energy Hierarchy	CO_2e emissions (t/yr)	Improvement (%)	Improvement over Baseline (%)
Clean	1.83		14.49
Green	0.64	55.61	70.09

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.

HP 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.

ASHPs tend to generate some noise and therefore will be located in a concealed acoustic enclosure at the rear of the property. 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.

2.4.2 Photovoltaics (PV)

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 is proposed in order to offset electrical demand within the Proposed Development with any excess being fed back into the electrical grid. The PV array would be connected into the electrical system via an inverter.

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 1.0 kWp PV system that is south-facing at a 30-degree pitch as detailed in Table 9. This will ensure there is enough spacing between panels for maintenance while also not impacting on the aesthetic appearance of the property nor encompassing the entire roof space. Space provision on the roof space is more than sufficient as seen in Figure 3.

Proposed Array (kWp)	Approximate no. Panels @350W	Active Area (m^2)	Pitch (^{o})	Orientation
1.0	3	6.0	30	South

Table 9 – Proposed PV Array Summary

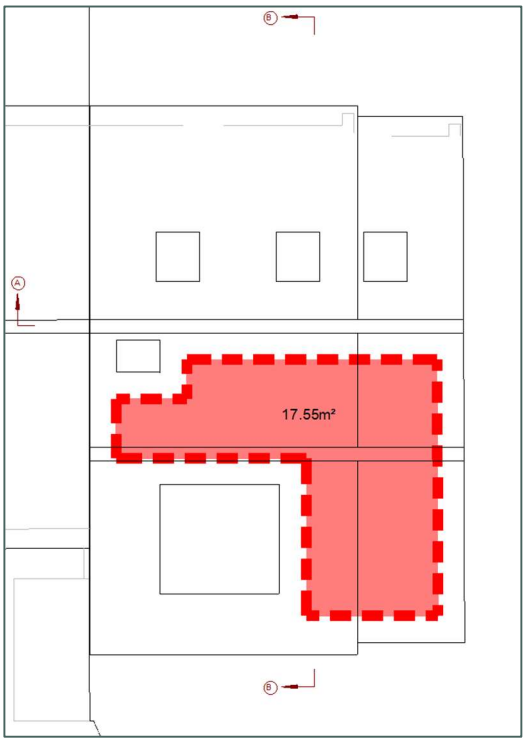


Figure 3 – Roof Plan of Proposed Development showing roof space available for PV (Charleton Brown)

2.4.3 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 10 and Figure 4 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 with a low infiltration rate
- High efficiency LED lighting
- Mixed mode ventilation through operable windows and an MVHR system
- High efficiency ASHP supplying space heating and hot water
- Low water consumption fixtures
- 1.0 kWp roof mounted PV array.

Site-Wide	CO_2e emissions (t/yr)	Strategy Improvement (%)	Improvement over Baseline (%)
Baseline	2.14		
Lean	1.83	14.49	14.49
Clean	1.83	0.00	14.49
Green	0.64	55.61	70.09

Table 10 – Summary of the Proposed Development's CO_2e emissions and improvement over Baseline

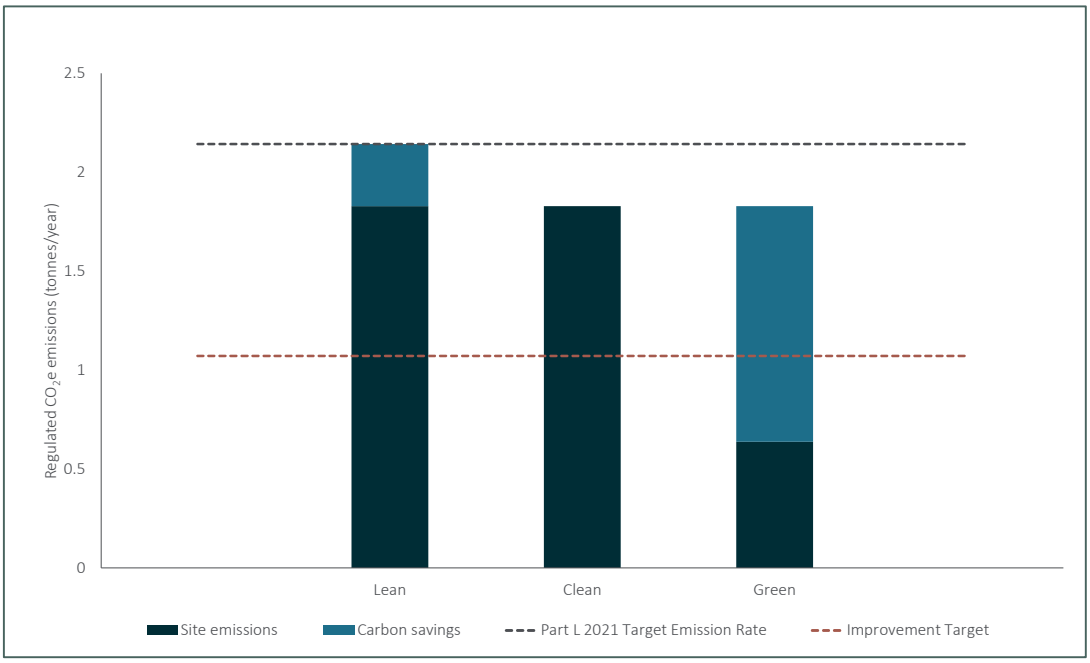


Figure 4 – Summary of regulated carbon dioxide savings for the Proposed Development

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:

- Improvement over Part L1 2021 by 14.49%, exceeding the 10% improvement outlined in the London Plan.
- A site-wide improvement of 70.09% is achieved exceeding the 50% GLA benchmark.
- An improvement of 55.61% 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.

Mitigation measures have been considered within the design of the Proposed Development, using highly efficient LZC technologies, including an ASHP for space heating and DHW, as well as a rooftop PV system. Please refer to the Energy Section of this report for the proposed energy strategy.

This scheme will be adapted to deal the with more extreme weather conditions – heavier rainfall, hotter & drier summers, and milder winters. To avoid material damage and degradation, suitable materials which allow expansion and contraction will be chosen, accommodating the ever-changing weather conditions.

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 medium-high NO_x emissions area as defined by the UK NO_x emissions map shown in Figure 5. Internal pollution levels will be reduced through the use of MVHR with filtered intakes.

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

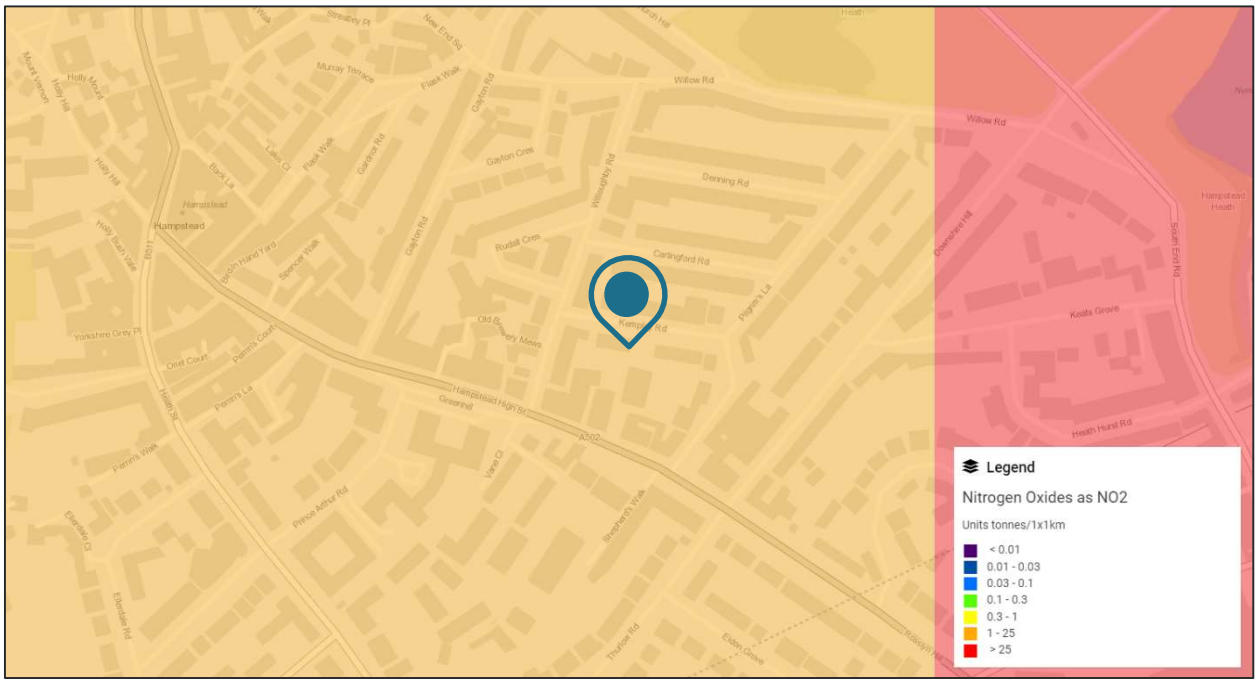


Figure 5 – UK Air Pollution Map showing pollution from Nitrogen Oxides as NO_2 (https://naei.beis.gov.uk/emissionsapp/)

The Proposed Development will aim to limit its contribution to local air pollution by installing an ASHP to provide heating and DHW, in addition to the installation of PV. The ASHP will emit no onsite NO_x emissions but will consume grid electricity (when not consuming electricity generated by the PV). As the NO_x 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.

3.2.2 Noise and Vibration

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

3.3 Flood Risk

As can be seen in Figure 6 and Figure 7, the site of the Proposed Development is at very low risk of flooding from rivers and seas, as well as from surface water.

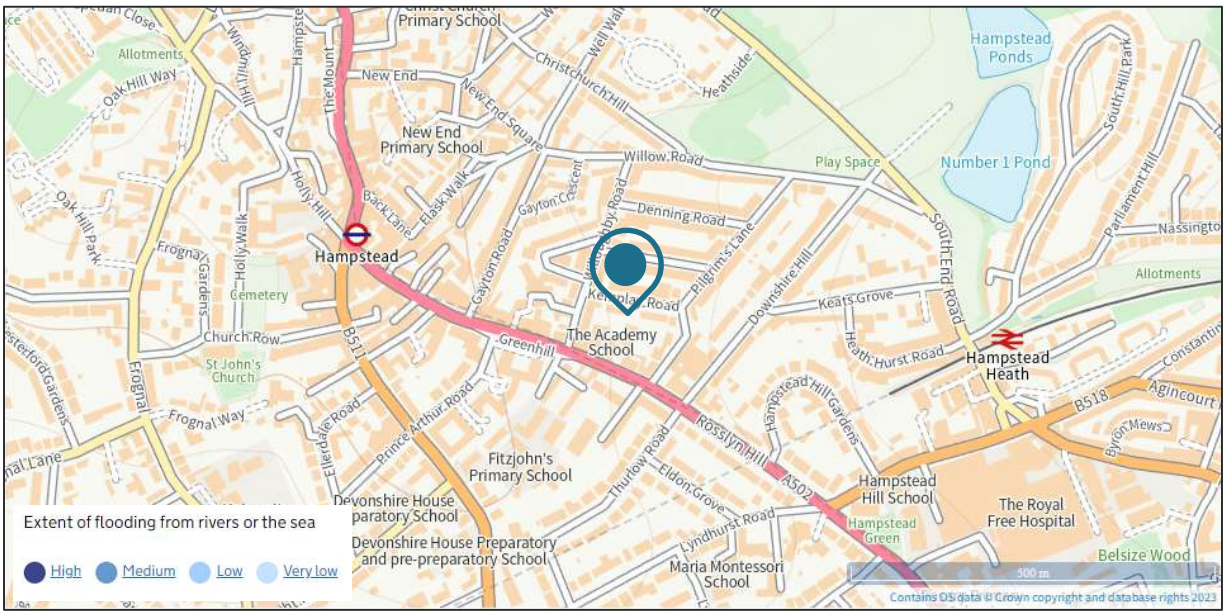


Figure 6 - Flood map showing risk of flooding from rivers or the sea (https://flood-warning-information.service.gov.uk/long-term-flood-risk/map)

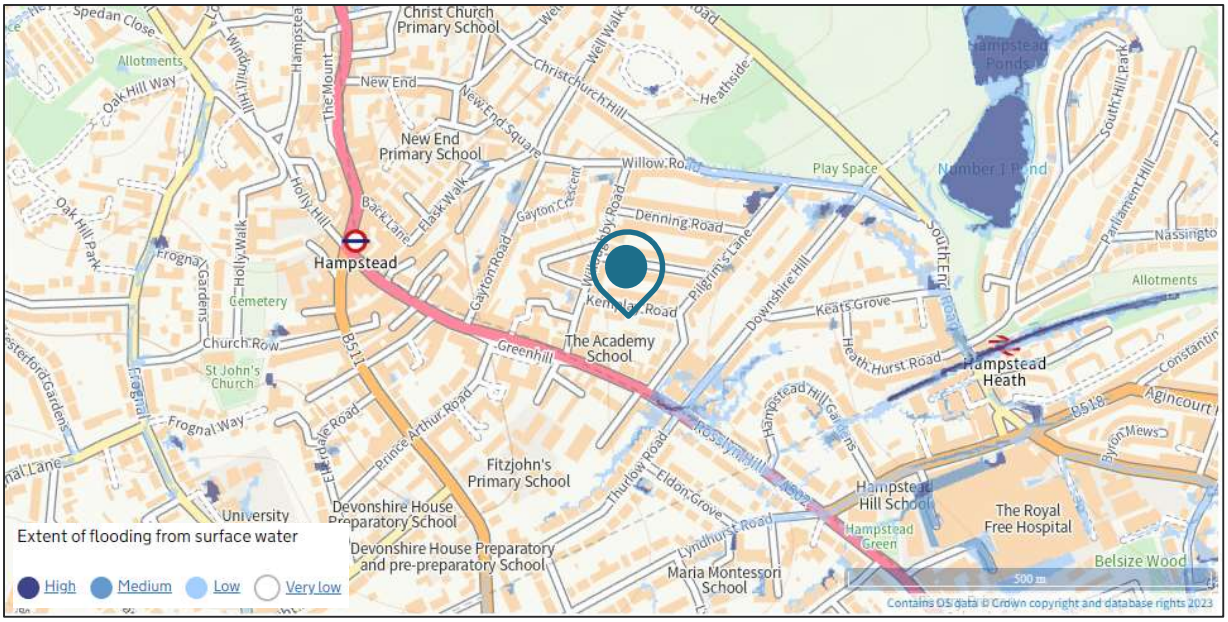


Figure 7 - Flood map showing risk of flooding from surface water (https://flood-warning-information.service.gov.uk/long-term-flood-risk/map)

The Proposed Development is a redevelopment project and will have a relatively negligible change of footprint compared to what exists on site. Additionally, it is to be noted that the risk of flooding is classed as very low for both flooding cases. For these reasons, 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 has multiple bus stops in the surrounding area, with several on Pilgrim's Place, a 3-minute walk to the South of the site with services to Paddington, Golders Green, South Hampstead and St Bartholomew's Hospital. The nearest underground station is Hampstead tube station (the Northern Line), a 7-minute walk to the West.

3.4.2 Cycle Storage

The Proposed Development has allowed space for 1 no. cycle parking located near the entrance to the site. This will be suitably secure 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 Enterprise, located 5-minutes walk to the west at 77 Hampstead High Street. 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.

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

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 8.

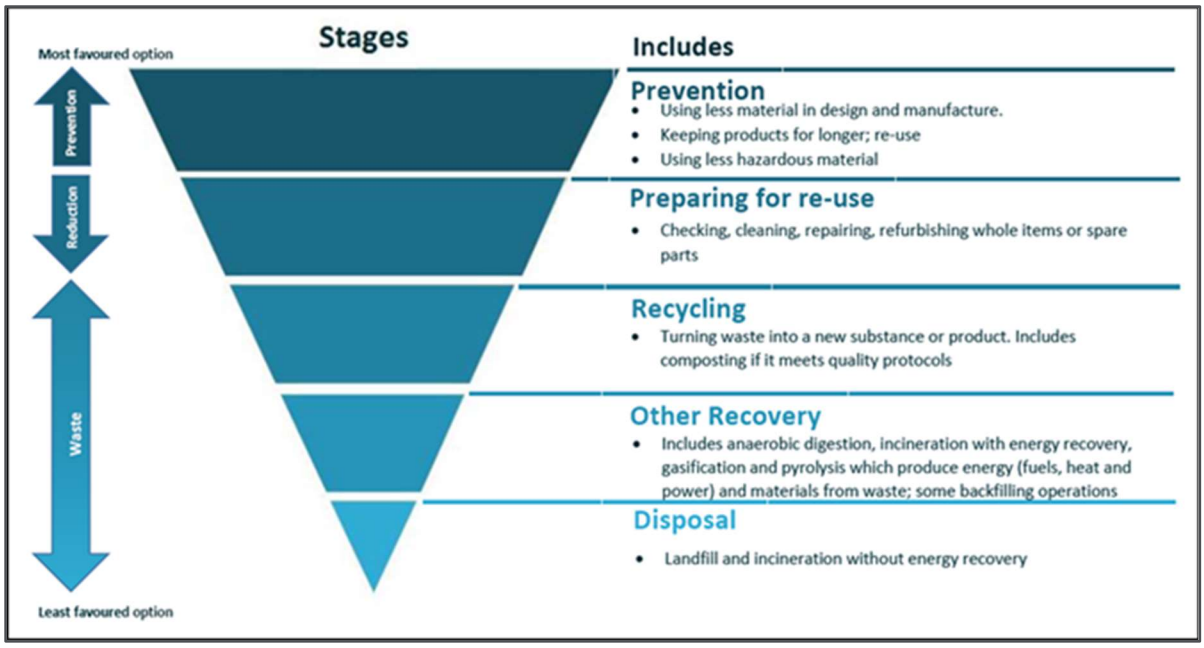


Figure 8 – The waste hierarchy

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.

Where excavation is necessary to be performed in construction of the basement, any requisite inert displaced earth shall be utilised through garden spaces and plant beds. Surplus to this shall be repurposed for agricultural use and beneficial use through green spaces in the nearby area. Any encountered root structures excavated are to be recycled appropriately. Through these measures, the Proposed Development shall meet or exceed the 95% target requirement for excavation waste as set out in the London Plan.

The Proposed Development has also been designed to adequately store divided dry recyclable waste materials generated by the occupants through use as required by the London Plan. This waste shall be recycled in accordance with the local authority collection scheme.

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 is proposed 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.

Responsible sourcing of materials will also be used. New timber used throughout the construction phase and within the Proposed Development will be soured 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:

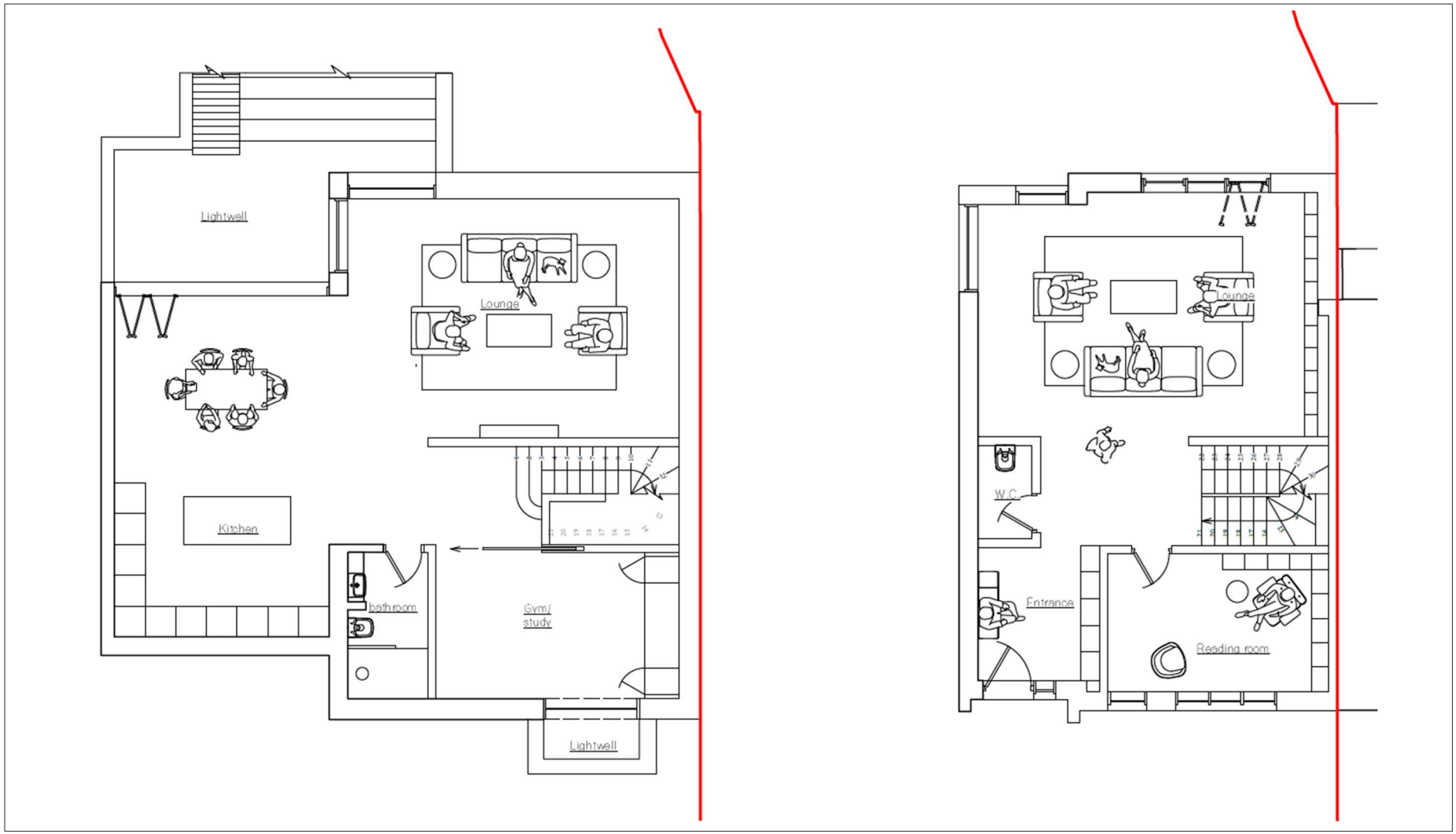
- Mitigating air pollution contributions through ASHP technology and solar PV.
- The Proposed Development is at very low risk of flooding from surface water and rivers and will not exacerbate this for the site or immediate surrounding area.
- Proposed Development will not detrimentally affect the ecology of the area.
- Waste targets of 95% reuse/recycling/recovery for construction and demolition, and 95% beneficial use for excavation are to be met through adoption of the waste hierarchy.
- 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

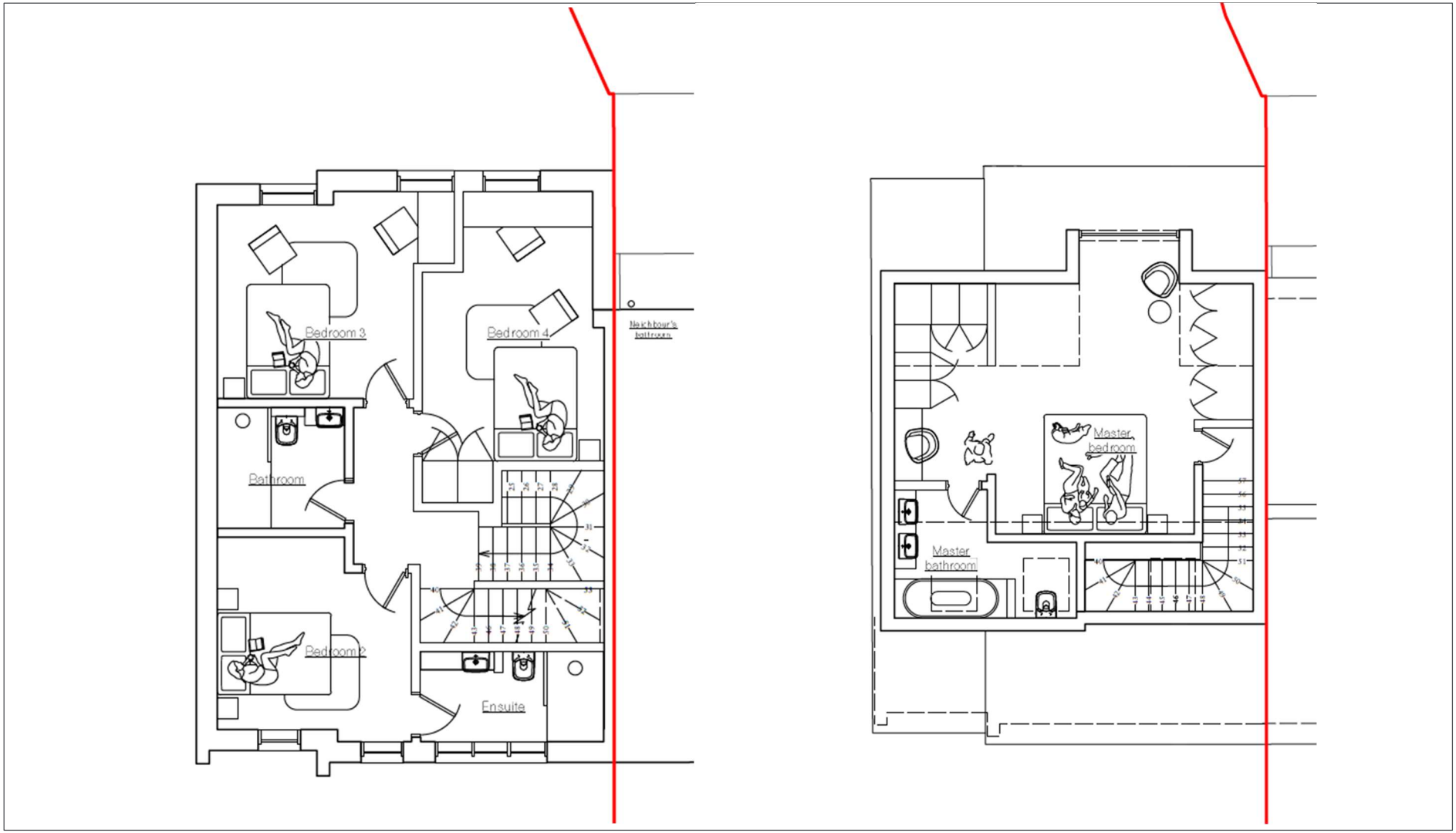
Appendix A – Proposed Plans

Site Plan

Basement (left) and Ground Floor (right) Plans



First (left) and Room-in-Roof Floor (right) Plans



Street Scene Elevation

Appendix B – SAP Specification Sheet

Kemplay Road

BRegs LV1 2021 | **Revision B**

Dwelling	Windows	Roof Windows	Typical Wall Strategy	Typical External Wall Thickness (min)	External Walls	Basement Walls	Room-in-Roof Dwarf Walls	Sloped & Flat Room-in-Roof Roof	Plane Roof	Basement Roof	Basement Floor	Primary Heating	Renewables	Air Permeability	HW Cylinder	Ventilation Strategy	DER vs TER improvement	DFEE vs TFEE improvement	DPER vs TPER improvement
Type	U Value / G Value	U Value / G Value	Description	(mm)	U Value	U Value	U Value	U Value	U Value	U Value	U Value	Type	Type / kWP	$m^3/hr/m^2$	(litres)	Type	%	%	%
End Terrace	1.20 / 0.40 [1]	1.50 / 0.40 [1]	Low-mass [2]	340	0.14	0.14	0.13	0.13	0.13	0.11	0.11	Air Source Heat Pump	PV / 1.00	3	250	MVHR	70.26	0.37	38.59

1: Double glazing unit.
2: This utilises a 10mm residual cavity in conjunction with polypropylene fleece-faced insulation. While this is accepted by NHBC in most applications, confirmation this is covered by insurance should always be verified.

Element	U Values	Description
Basement External Walls	0.14 [3]	100mm concrete prefab/cast in situ outer leaf, >10mm residual cavity, 90mm polypropylene fleece-faced phenolic insulation (0.019 - e.g. Kingspan K106), 100mm dense blockwork, 37.5mm plasterboard faced phenolic insulation (0.019 e.g. Kingspan K118). (Per Kingspan calculation).
External Walls	0.14 [3]	102.5mm brick outer leaf, >10mm residual cavity, 90mm polypropylene fleece-faced phenolic insulation (0.019 - e.g. Kingspan K106), 100mm dense blockwork, 37.5mm plasterboard faced phenolic insulation (0.019 e.g. Kingspan K118). (Per Kingspan calculation).
Room-in-Roof Dwarf Walls	0.13	Finish/structure, >50mm unventilated roof cavity, 150mm phenolic insulation (0.019 - e.g. Kingspan K107) between 600mm c/c 47mm wide timber studs, 37.5mm plasterboard finished phenolic insulation (0.019 - e.g. Kingspan K118). (Per Kingspan calculation).
Sloped & Flat Room-in-Roof Roof	0.13	Finish and sarking/battens, 75mm phenolic insulation (0.019 - e.g. Kingspan K107) over rafter, 75mm phenolic insulation (0.019 - e.g. Kingspan K107) between timber rafters (assumed 47mm at 600mm c/c), unventilated cavity, 12.5mm plasterboard (Per Kingspan calculation).
Basement Roof	0.11	Damp proof membrane, 140mm phenolic insulation board (0.019 - e.g. Kingspan K103), 150mm concrete slab, >25mm unventilated cavity, 12.5mm plasterboard. (Variant of Kingspan calculation).
Basement Floor	0.11	Damp proof membrane, 150mm concrete slab, 140mm phenolic insulation board (0.019 - e.g. Kingspan K103), 65mm screed. (Per Kingspan calculation).
Windows	1.20	Double glazed (Low E Soft coated 0.1 with argon gas) with U-value of 1.20, G-value of 0.40 and frame factor of 0.70.
Roof Windows and Rooflights	1.50	Double glazed (Low E Soft coated 0.1 with argon gas) with U-value of 1.50 (if assessed at an incline or U=1.20 if assessed vertically[4]), G-value of 0.40 and frame factor of 0.70.
Half Glazed Door	1.20	Double glazed (Low E Soft coated 0.1 with argon gas) with U-value of 1.20 and G-value of 0.40 and frame factor of 0.70.
Internal Walls	-	Timber frame construction - Plasterboard on timber.
Thermal Bridge Details	-	Previously accredited construction detail bridge values used in several standard constructions. Values from previous ACDs and similar calculated bridges also used. Notional values used through remaining bridges.
Mechanical Ventilation	-	Balanced whole-house mechanical ventilation system with heat recovery (rigid ducting). Modelled as Nuaire MRXBOXAB-ECO2 or equivalent for calculation purposes.
Air Pressure Test	-	Blower door test 3 $m^3/hr/m^2$
Lighting	-	Low energy light fixtures throughout (LED/CFL) - 12W per fixture at 100 lm/W (per Energy technology list).
Main Heating	-	Air source heat pump modelled as Mitsubishi ECODAN 8.5kW or equivalent with pump located in heated space.
Heat Emitter	-	Underfloor heating throughout.
Heating Controls	-	Time and temperature zone control by arrangement.
Water Heating	-	Provisioned by main heating system with cold water supply from mains with cylinder volume 250L and heat loss of 1.78 kW/day. (per Gledhill specification).
Baths and Showers	-	1 bath and 4 showers (6L/min flow rate).
Active Cooling System	-	No A/C specified.
Electrical Tariff and Meter	-	Standard electricity tariff with smart meter tracking.
Renewables	-	PV consisting of 3x350W panels outputting 1kWp requiring circa $6m^2$ connected to an export capable meter.

3: 10mm residual cavity in conjunction with polypropylene fleece-faced insulation is accepted by NHBC except in cases of fair-faced masonry applications in high exposure areas. In spite of this, confirmation this is covered by insurance should always be verified.
4: A roof window U-value of 1.5W/m.K is representative of the unit performance assessed in an inclined position. If assessment was performed in a vertical position, this is equivalent to a performance of 1.2W/m.K as per SAP 10.2 Table 6e Note 1.

Sign Off of details	Name	(PP) M Maclean	Date	23.08.2023	On behalf of the contractor/client:	Name	
	Sign	(on behalf of SRE)				Sign	

Appendix C – Thermal Bridging Summary

Kemplay Road		
Bridge Type	**Psi Value**	**Reference**
E2 Other Lintel	0.052	Advised by SRE. Modelling and analysis of the bridge is advised.
E3 Sill	0.052	Advised by SRE. Modelling and analysis of the bridge is advised.
E4 Jamb	0.058	Advised by SRE. Modelling and analysis of the bridge is advised. NB: This is doubled at double jamb interface.
E5 Ground floor (normal)	0.160	Based upon former ACDs.
E6 Intermediate floor within a dwelling	0.000	SAP 10 notional value. Modelling and analysis of the bridge is advised.
E10 Eaves (insulation at ceiling level)	0.060	Based upon former ACDs.
E13 Gable (insulation at rafter level)	0.040	Based upon former ACDs.
E14 Flat roof	0.080	SAP 10 notional value. Modelling and analysis of the bridge is advised.
E16 Corner (normal)	0.090	Above ground and basement in addition to room-in-roof timber construction wall corners. Based upon former ACDs.
E17 Corner (inverted – internal area greater than external area)	0.000	Above ground and basement in addition to room-in-roof timber construction wall corner (inverted). SAP Table K1 Default used.
E18 Party wall between dwellings	0.060	Typical case. Based upon former ACDs.
E18 Party wall between dwellings	0.090	Basement and Room-in-roof. Based upon former ACD value with conservative factor applied.
E22 Basement floor	0.070	SAP 10 notional value. Modelling and analysis of the bridge is advised.
E25 Staggered party wall between dwellings	0.060	SAP 10 notional value. Modelling and analysis of the bridge is advised.
P2 Party wall - Intermediate floor within a dwelling	0.000	Table K1 default used.
R1 Head of Roof Window	0.080	SAP 10 notional value. Modelling and analysis of the bridge is advised.
R2 Sill of Roof Window	0.060	SAP 10 notional value. Modelling and analysis of the bridge is advised.
R3 Jamb of Roof Window	0.080	SAP 10 notional value. Modelling and analysis of the bridge is advised.
R4 Ridge (vaulted ceiling)	0.080	SAP 10 notional value. Modelling and analysis of the bridge is advised.
R7 Flat ceiling (inverted)	0.040	SAP 10 notional value. Modelling and analysis of the bridge is advised.
R8 Roof to wall (rafter)	0.060	SAP 10 notional value. Modelling and analysis of the bridge is advised.
R9 Roof to wall (flat ceiling)	0.040	SAP 10 notional value. Modelling and analysis of the bridge is advised.
R11 Upstands or kerbs of rooflights	0.080	SAP 10 notional value. Modelling and analysis of the bridge is advised.

Sign Off of details	Name	PP M Maclean	Date	23.08.2023	On behalf of the contractor/client:	Name	Date
	Sign	(on behalf of SRE)				Sign	

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