C80 solutions
Straightforward Building Compliance

23 RAVENSHAW STREET

LONDON

NW16 1NP

ENERGY & SUSTAINABILITY STATEMENT

FOR

MR CHRIS TAYLOR

March 2020

Project no. 10628

C80 solutions
Straightforward Building Compliance

23 RAVENSHAW STREET

LONDON

NW16 1NP

ENERGY & SUSTAINABILITY ASSESSMENT

HOWARD FAIRBAIRN MHK

REVISION	DATE	PREPARED BY	REVIEWED BY	COMMENTS
0	03/03/2020	Tracey Walsh	M Heptonstall	For Comment

The current report provides a brief overview of the wide range of opportunities for renewable energy and is not intended as detailed design advice. As such data and information should only be treated as INDICATIVE at this stage of the process. Further investigation can be undertaken when more accurate and detailed information is required on specific measures.

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1.0 Introduction

1.1 About C80 Solutions Ltd

C80 Solutions are independent Sustainability and Energy Consultants providing carbon reduction solutions to help the UK achieve its carbon emission reduction target of 80% by 2050 - as set out in the Government's Climate Change Act 2008.

Our range of affordable but comprehensive solutions for the construction industry are broken down into two sectors; i) Building Compliance and ii) Consultancy.

Building Compliance:

Our Building Compliance services include; Code for Sustainable Homes Assessments, SAP Calculations, On Construction Energy Performance Certificates, Water Efficiency Calculations, SBEM Calculations, Commercial EPCs, BREEAM assessments and Air Tightness Testing.

Consultancy:

Our experience and exposure to building compliance combined with previous experience and IEMA accredited training means we have built up a vast amount of knowledge which enables us to provide our clients with invaluable advice. Our Consultancy services include; Renewable Energy Feasibility Reports, Energy Statements for planning, Sustainability Statements and Building Compliance Advisory Reports.

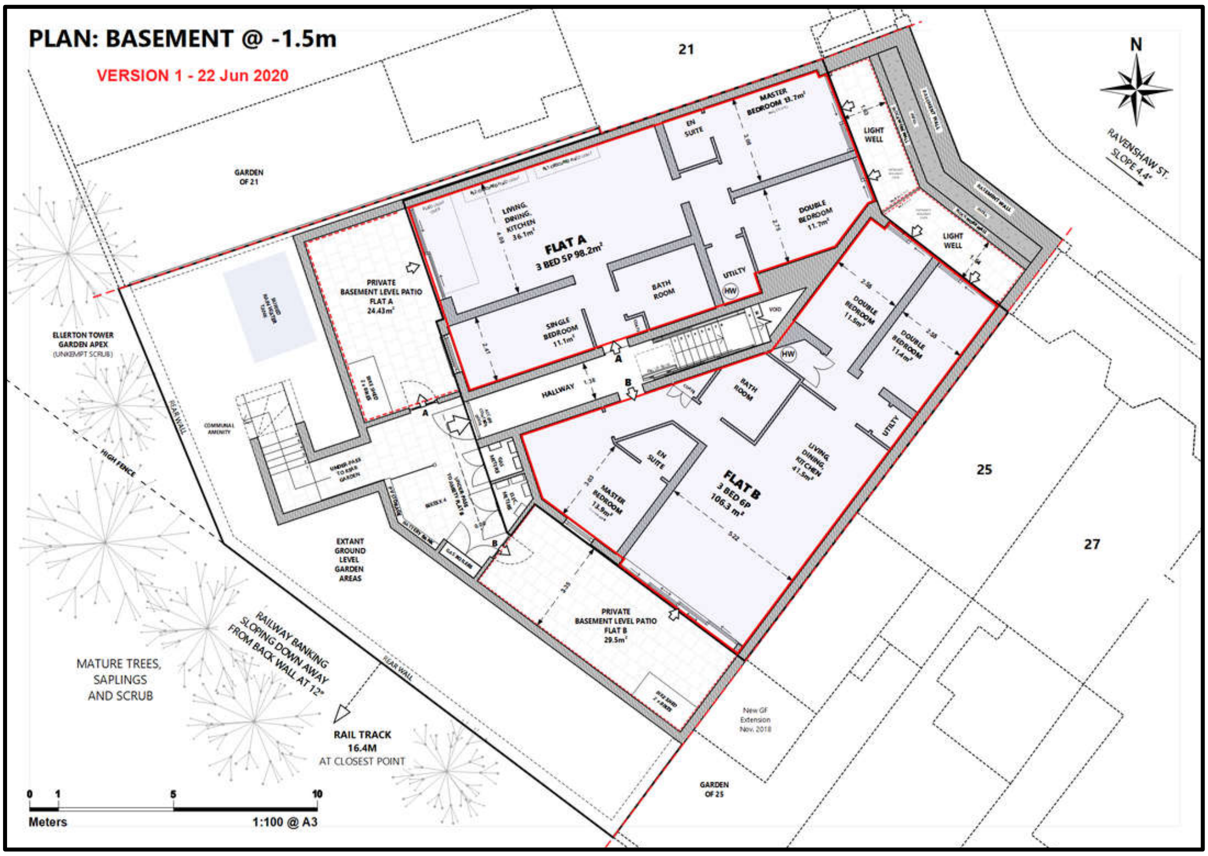
1.2 Introduction to Developments

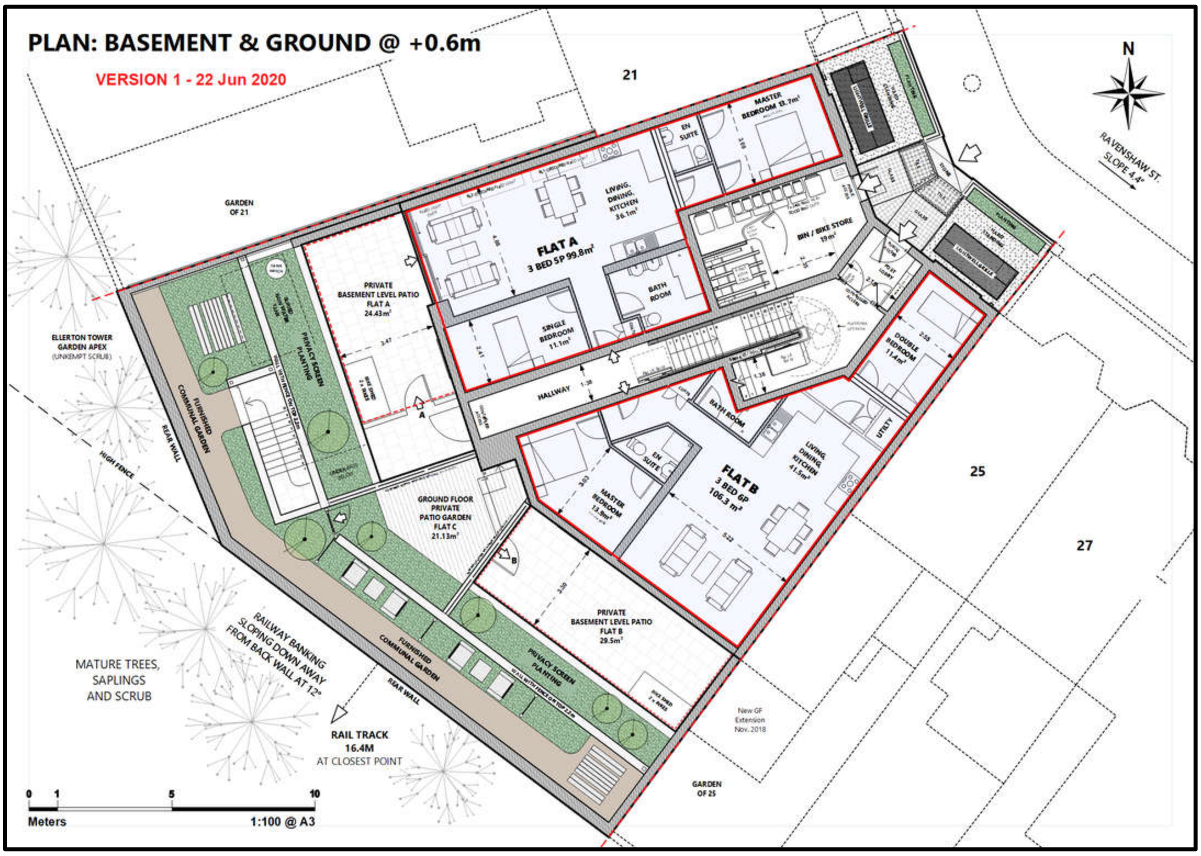
C80 Solutions have been instructed to prepare an Energy Statement by Mr Chris Taylor for the proposed new build residential development at 23 Ravenshaw Street, London, NW6 1NP.

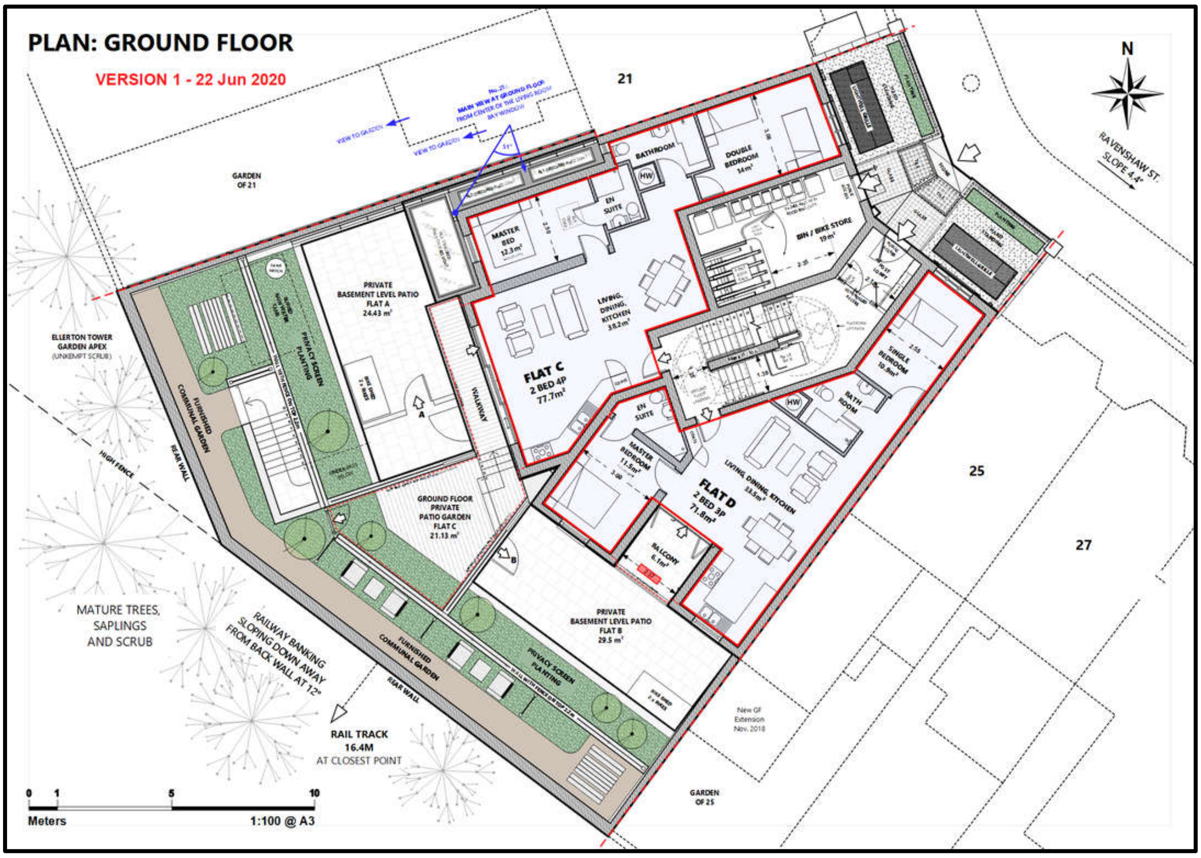
The project anticipates the provision of 3no 2 bed, 4no 3 bed flats, over a 4-storey property.

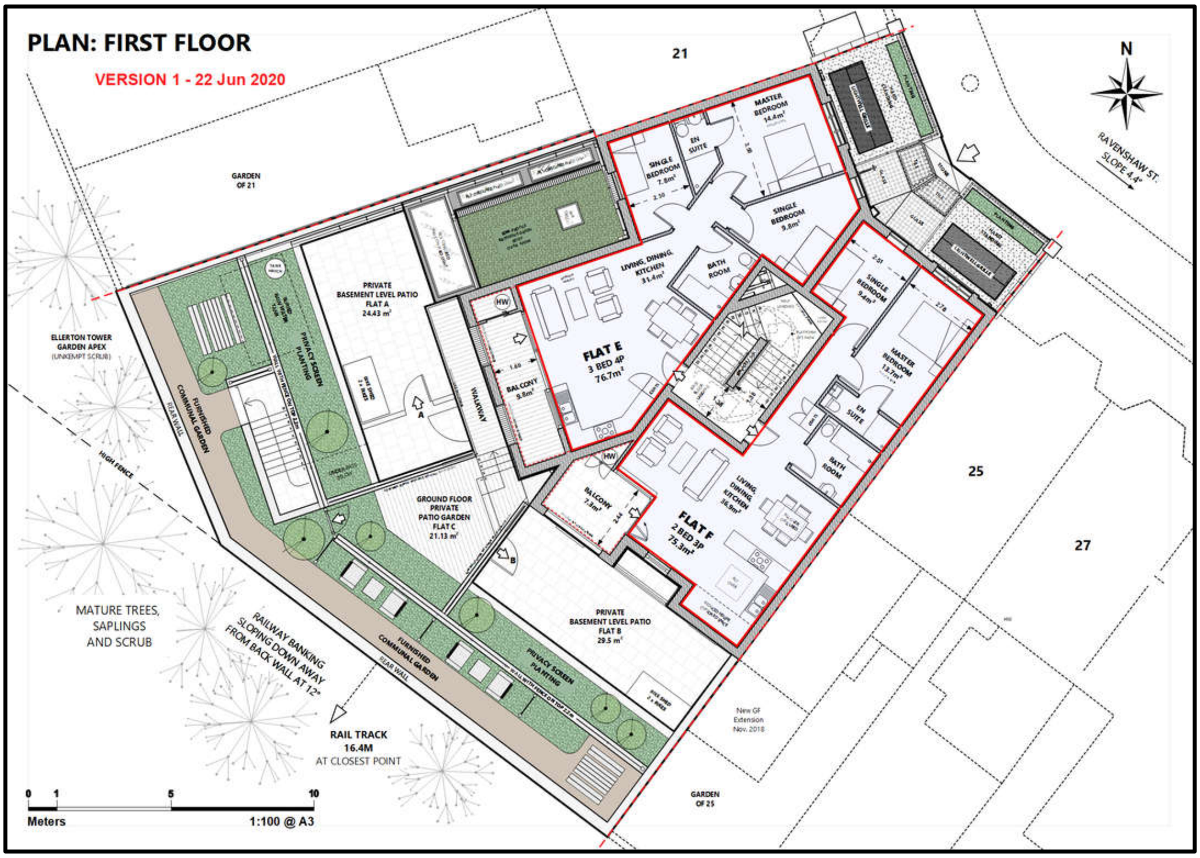
The site is located in a predominantly residential area of Camden.

The plan of the proposed development can be seen in Figures 1-10 below.


PLAN: BASEMENT @ -1.5m
VERSION 1 - 22 Jun 2020
21
N
RAVENSHAW ST. SLOPE 4.4°
GARDEN OF 21
LIGHT WELL
MASTER BEDROOM 13.7m²
EN SUITE
DOUBLE BEDROOM 11.7m²
LIVING, DINING, KITCHEN 36.1m²
FLAT A 3 BED 5P 98.2m²
BATH ROOM
UTILITY
PRIVATE BASEMENT LEVEL PATIO FLAT A 24.43m²
SINGLE BEDROOM 11.1m²
DOUBLE BEDROOM 11.5m²
DOUBLE BEDROOM 11.4m²
HALLWAY
BATH ROOM
ELLERTON TOWER GARDEN APEX (UNKEMPT SCRUB)
COMMUNAL AMENITY
HIGH FENCE
EN SUITE
MASTER BEDROOM 13.9m²
FLAT B 3 BED 6P 106.3 m²
LIVING, DINING, KITCHEN 41.5m²
UTILITY
25
27
EXTANT GROUND LEVEL GARDEN AREAS
PRIVATE BASEMENT LEVEL PATIO FLAT B 29.5m²
RAILWAY BANKING SLOPING DOWN AWAY FROM BACK WALL AT 12°
MATURE TREES, SAPLINGS AND SCRUB
REAR WALL
RAIL TRACK 16.4M AT CLOSEST POINT
New GF Extension Nov. 2018
GARDEN OF 25
0 1 5 10
Meters
1:100 @ A3


PLAN: BASEMENT & GROUND @ +0.6m
VERSION 1 - 22 Jun 2020
21
N
RAVENSHAW ST. SLOPE 4.4°
GARDEN OF 21
MASTER BEDROOM 13.7m²
EN SUITE
LIVING, DINING, KITCHEN 36.1m²
FLAT A 3 BED 5P 99.8m²
BATH ROOM
BIN / BIKE STORE 19m²
PRIVATE BASEMENT LEVEL PATIO FLAT A 24.43m²
SINGLE BEDROOM 11.1m²
DOUBLE BEDROOM 11.4m²
HALLWAY
BATH ROOM
ELLERTON TOWER GARDEN APEX (UNKEMPT SCRUB)
PRIVACY SCREEN PLANTING
FURNISHED COMMUNAL GARDEN
HIGH FENCE
REAR WALL
GROUND FLOOR PRIVATE PATIO GARDEN FLAT C 21.13m²
EN SUITE
MASTER BEDROOM 13.9m²
FLAT B 3 BED 6P 106.3 m²
LIVING, DINING, KITCHEN 41.5m²
UTILITY
25
27
PRIVATE BASEMENT LEVEL PATIO FLAT B 29.5m²
RAILWAY BANKING SLOPING DOWN AWAY FROM BACK WALL AT 12°
MATURE TREES, SAPLINGS AND SCRUB
RAIL TRACK 16.4M AT CLOSEST POINT
New GF Extension Nov. 2018
GARDEN OF 25
0 1 5 10
Meters
1:100 @ A3


PLAN: GROUND FLOOR
VERSION 1 - 22 Jun 2020
21
25
27
FLAT C
2 BED 4P
77.7m²
FLAT D
2 BED 3P
71.8m²
MATURE TREES,
SAPLINGS
AND SCRUB
RAIL TRACK
16.4M
AT CLOSEST POINT
Meters
1:100 @ A3


PLAN: FIRST FLOOR
VERSION 1 - 22 Jun 2020
21
25
27
FLAT E
3 BED 4P
76.7m²
FLAT F
2 BED 3P
75.3m²
MATURE TREES,
SAPLINGS
AND SCRUB
RAIL TRACK
16.4M
AT CLOSEST POINT
Meters
1:100 @ A3

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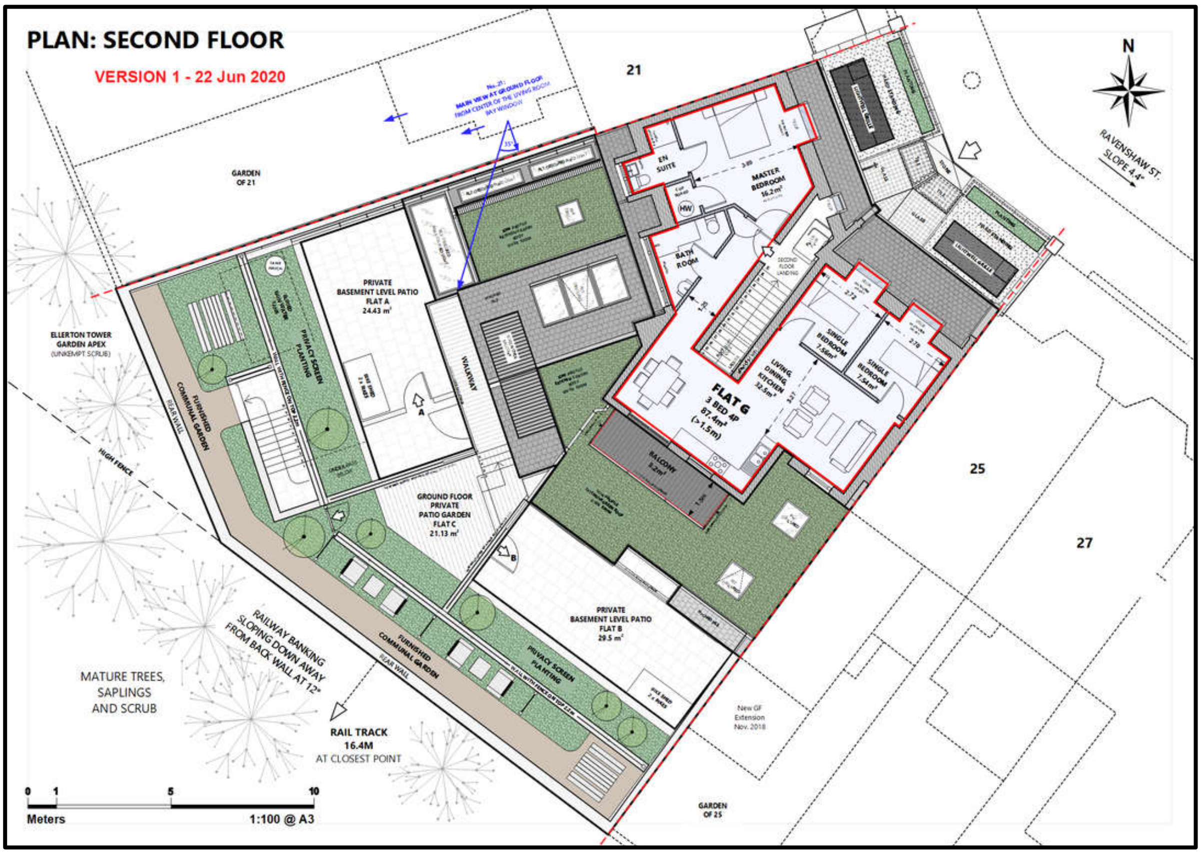
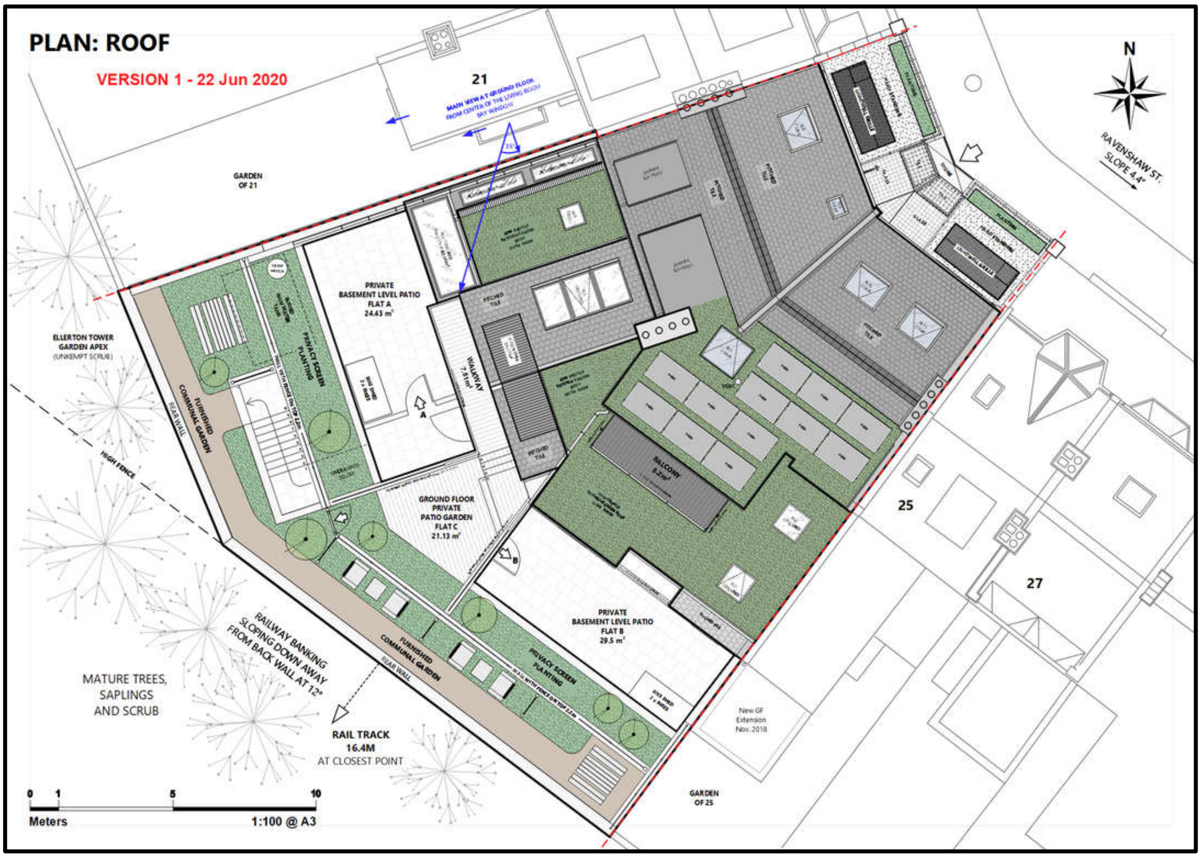




Figures 6-9: Elevation plans

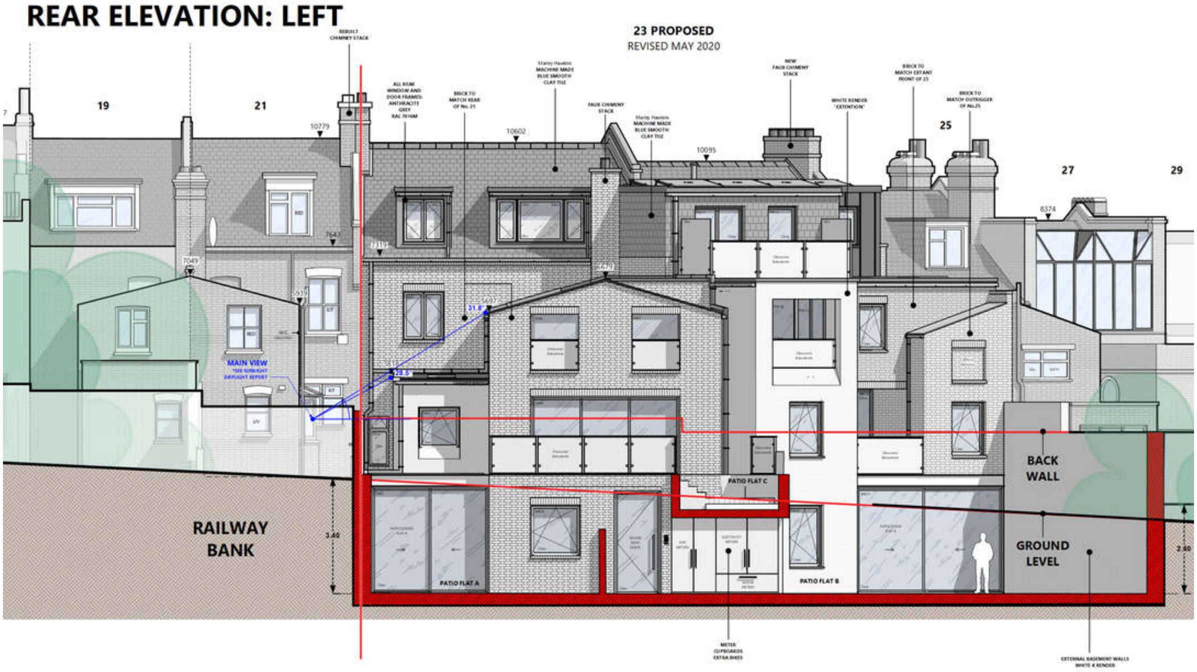
FRONT ELEVATION: RIGHT

FRONT VIEW, FACE ON TO R/H SIDE

FRONT ELEVATION: LEFT

FRONT VIEW, FACE ON TO L/H SIDE

REAR ELEVATION: LEFT



REAR ELEVATION: RIGHT

REAR VIEW, FACE ON TO R/H SIDE

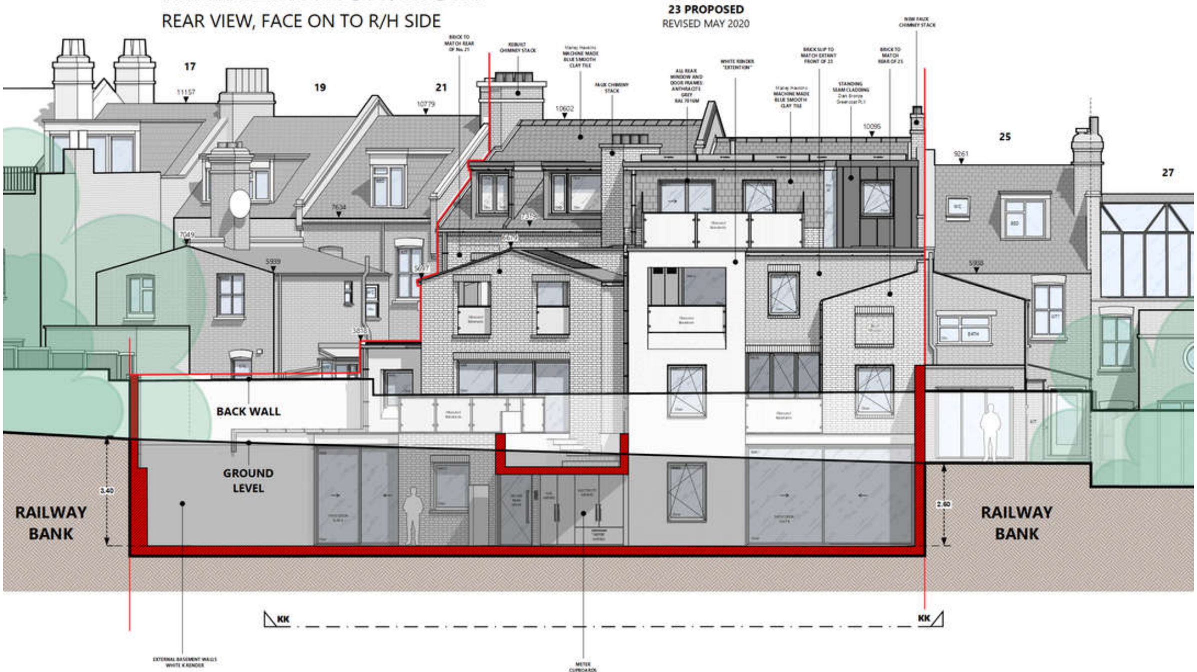
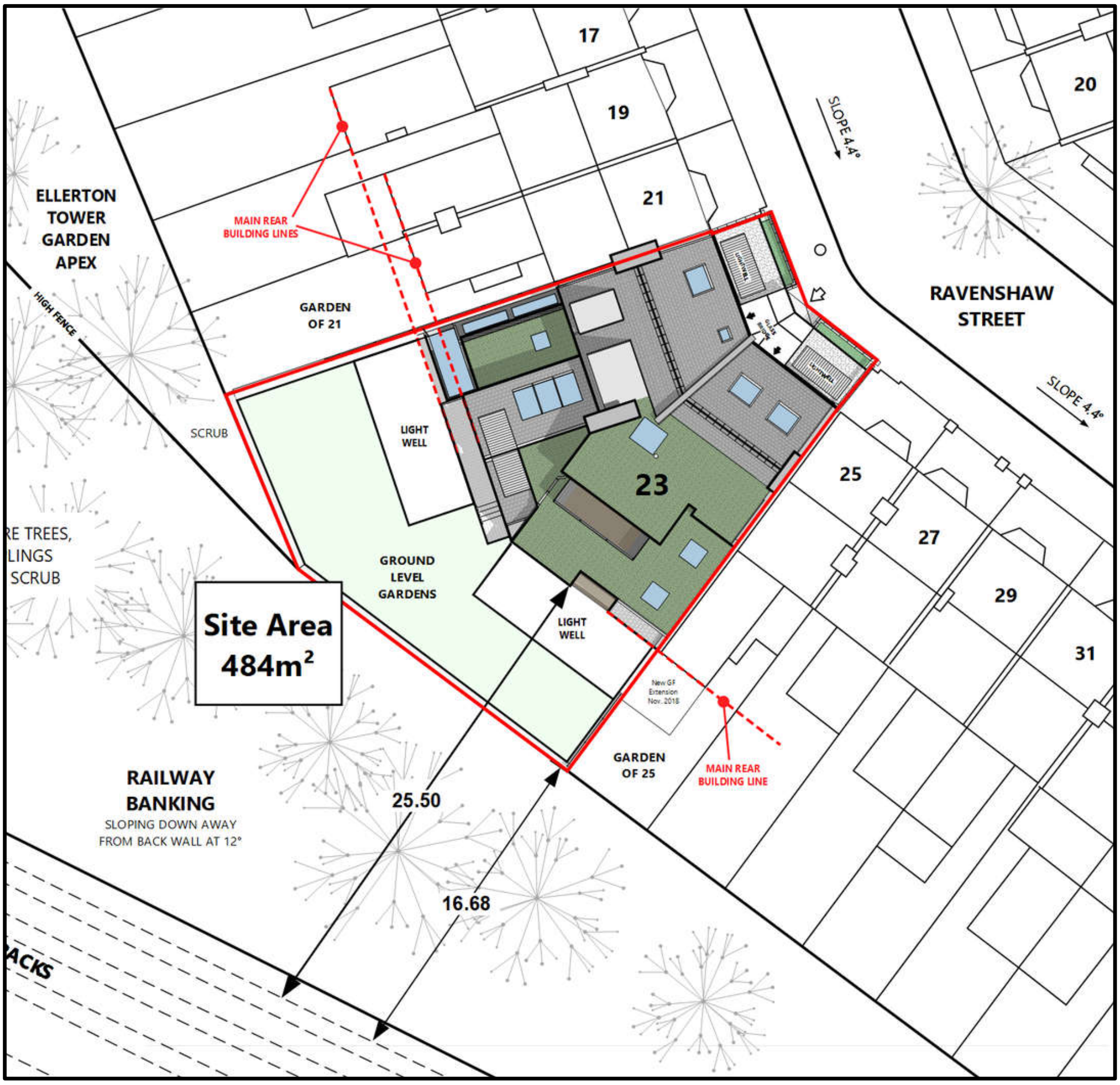


Figure 10: Site plan



This statement will demonstrate how the predicted CO2 emissions of the proposed development will be reduced by at least 20% compared with a typical 2013 Building Regulations Part L compliant building, as required by London Borough of Camden Council.

1.3 Planning Policy

Policy 5.2 of the London Plan - Minimising Carbon Dioxide Emissions

Planning decisions

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

1 Be lean: use less energy

2 Be clean: supply energy efficiently

3 Be green: use renewable energy

B The Mayor will work with boroughs and developers to ensure that major developments meet the following targets for carbon dioxide emissions reduction in buildings. These targets are expressed as minimum improvements over the Target Emission Rate (TER) outlined in the national Building Regulations leading to zero carbon residential buildings from 2016 and zero carbon non-domestic buildings from 2019.

Residential buildings:

Year Improvement on 2010 Building Regulations

2010 – 2013 25 per cent

2014 – 2016 35 per cent

2016 – 2036 Zero carbon

C Major development proposals should include a detailed energy assessment to demonstrate how the targets for carbon dioxide emissions reduction outlined above are to be met within the framework of the energy hierarchy.

D As a minimum, energy assessments should include the following details:

1. Calculation of the energy demand and carbon dioxide emissions covered by Building Regulations and, separately, the energy demand and carbon dioxide emissions from any other part of the development, including plant or equipment

that are not covered by the Building Regulations at each stage of the energy hierarchy

2. Proposals to reduce carbon dioxide emissions through the energy efficient design of the site, buildings and services

3. Proposals to further reduce carbon dioxide emissions through the use of decentralised energy where feasible, such as district heating and cooling and combined heat and power (CHP)

4. Proposals to further reduce carbon dioxide emissions through the use of on-site renewable energy technologies.

5. The carbon dioxide reduction targets should be met on-site. Where it is clearly demonstrated that the specific targets cannot be fully achieved on-site, any shortfall may be provided off-site or through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings elsewhere.

London Borough of Camden Core Strategy Policy CS13: 'Tackling climate change through promoting higher environmental standards'

Reducing the effects of and adapting to climate change
The Council will require all development to take measures to minimise the effects of, and adapt to, climate change and encourage all development to meet the highest feasible environmental standards that are financially viable during construction and occupation by:
a) ensuring patterns of land use that minimise the need to travel by car and help support local energy networks;
b) promoting the efficient use of land and buildings;
c) minimising carbon emissions from the redevelopment, construction and occupation of buildings by implementing, in order, all of the elements of the following energy hierarchy:
- ensuring developments use less energy,
- making use of energy from efficient sources, such as the King's Cross, Gower Street, Bloomsbury and proposed Euston Road decentralised energy networks;
- generating renewable energy on-site; and
d) ensuring buildings and spaces are designed to cope with, and minimise the effects of, climate change.
The Council will have regard to the cost of installing measures to tackle climate change as well as the cumulative future costs of delaying reductions in carbon dioxide emissions.

Local energy generation
The Council will promote local energy generation and networks by:

e) working with our partners and developers to implement local energy networks in the parts of Camden most likely to support them, i.e. in the vicinity of: - housing estates with community heating or the potential for community heating and other uses with large heating loads; - the growth areas of King's Cross, Euston; Tottenham Court Road; West Hampstead

Interchange and Holborn; - schools to be redeveloped as part of Building Schools for the Future programme; - existing or approved combined heat and power/local energy networks (see Map 4); and other locations where land ownership would facilitate their implementation.

f) protecting existing local energy networks where possible (e.g. at Gower Street and Bloomsbury) and safeguarding potential network routes (e.g. Euston Road);

Camden's carbon reduction measures

The Council will take a lead in tackling climate change by:
j) taking measures to reduce its own carbon emissions;
k) trialling new energy efficient technologies, where feasible; and
l) raising awareness on mitigation and adaptation measures.

1.4 Methodology

The methodology that has been applied in this report is as follows:

1. Prepare baseline energy calculations for the site based on a Part L 2013 compliant construction specification designed for the development.

2. From the baseline energy calculations, the predicted energy demand for the development in kWh/year and the predicted CO_2 emissions in $kgCO_2$/year for the site can be established.

3. Multiplying the site wide predicted CO_2 emissions figure by 20% will provide the CO_2 reduction target required.

4. Apply energy efficient design principles (improved fabric spec) in order to reduce the energy demand and CO_2 emissions of the site. Prepare energy calculations using the improved fabric specification.

5. From these improved calculations, the reduced energy demand for the development in kWh/year and the predicted CO_2 emissions in $kgCO_2$/year for the site can be established.

6. Carry out a renewable energy feasibility study to ascertain which LZC technologies would be suitable for the development.

Establish the sizing of suitable renewable technologies to ensure the 20% CO_2 emission reduction target is met.

2.0 Predicted Annual Carbon Emissions

Baseline SAP 2012 calculations were prepared based on the construction specification shown in table 1 below.

Aspect		New Build
	External Walls	0.18
	Dormer Walls	0.18
	Communal Walls	0.18
	Rafters Insulation	0.15
	Flat Roof	0.15
	Joist Insulation	0.15
	Ground & exposed floors	0.15
	Windows (All)	1.4
	Communal Doors	1.3
	Rooflights	1.3
	Thermal Bridging	NA
Ventilation	**Airtightness $m3/(hr.m^2)$**	5
Heating	**Heating**	Community gas heating system
	Hot Water	As Per Heating
	Controls	Time & Temperature Zone Control
Low energy lighting		100%
Ventilation		Heat recovery MV system
Renewables / LZC	**None**	N/A

Table 1: Part L compliant construction specifications

The conducted SAP calculations have shown the proposed development will generate **9,928 kgCO2/year**. In order to satisfy the planning policies on CO2 reduction, the developer is committed to reduce predicted site wide CO2 emissions by 20%.

Therefore, since the development's predicted CO2 emissions is 9,928 kgCO2/yr, this would equate to a reduction target of **1,986 kgCO2/yr**. In other words, providing the total site emissions comes to equal to or less than **7,942 kgCO2/yr** (9,928-1,986) is achieved once improvements have been made to the calculations, this would prove that the 20% reduction target has been met.

3.0 Predicted Annual Energy Demand

Based on using the specification outlined in table 1 above, this would create a total predicted energy demand for the development of **41,728 kWh/year**. The breakdown of this predicted energy demand can be seen in table 2 below. The figures quoted have been derived from the Design Stage SAP 2012 Calculations for the development.

			Total Predicted Energy Requirement (kWh/yr)			
			Space Heating	Water Heating	Lighting, Pumps, Fans	Total Predicted Energy Requirement (kWh/yr)
Plot	No.	Units	Gas	Gas	Electric	
Flat A	1	kWh/yr	4,188	2,498	479	7,165
Flat B	1	kWh/yr	3,966	2,403	433	6,802
Flat C	1	kWh/yr	2,480	2,344	415	5,239
Flat D	1	kWh/yr	2,258	2,282	408	4,948
Flat E	1	kWh/yr	2,366	2,316	425	5,107
Flat F	1	kWh/yr	2,509	2,319	429	5,257
Flat G	1	kWh/yr	4,423	2,355	431	7,209
Total			**22,191**	**16,517**	**3,020**	**41,728**

Table 2: Baseline Predicated Annual Energy Demand

4.0 Reducing Carbon Emissions through Energy Reduction

The Energy Hierarchy sets out the most effective way to reduce a dwelling's CO_2 emissions. Firstly by reducing energy demand, then by using energy efficiently and lastly by incorporating LZC/Renewable technologies.

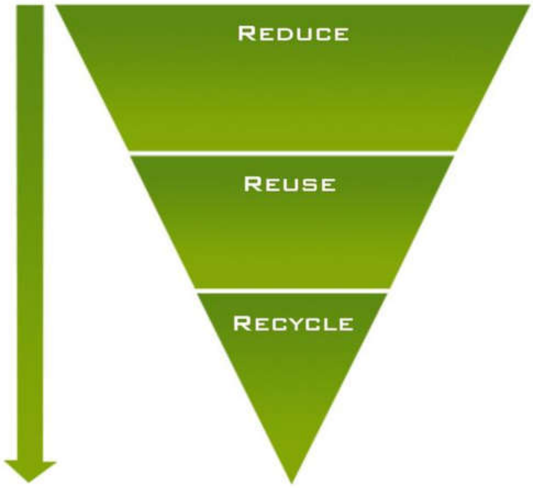


Figure 3: The Energy Hierarchy

Reducing the need for energy usage in the dwelling's design:

The first and most cost beneficial action is to reduce the amount of energy needed by the occupants of the dwelling whilst still maintaining or even improving the comfort conditions. A lot can be achieved through passive design, improving the dwelling's external fabric and following principles to reduce air infiltration.

The developer is attempting to reduce the energy demand and CO2 emissions of the development by making the following fabric and energy efficiency improvements to their standard Part L 2013 building specification:

Energy reduction strategies include:

- Adopting enhanced fabric specifications
- Installing high efficiency gas boiler
- Incorporating energy-efficient lighting: 100% of all new lighting to be energy efficient
- Adopting principles of airtight construction
- All new windows will be double -glazed
- Passive Solar Design – Solar gain, solar shading, thermal mass
- Natural / Passive Ventilation strategy

5.0 Feasibility Study of Renewable Technologies

This section will assess the technical viability of the following renewable energy technologies for the site in order to rule out unfeasible options:

- Mast mounted wind turbines
- Roof mounted wind turbines
- Solar PV (Photovoltaic) Panels
- Solar Thermal Panels
- ASHP (Air Source Heat Pump)
- GSHP (Ground Source Heat Pump)
- Biomass
- CHP

The following observations have been made with regard to the technical feasibility of integrating renewable energy technologies into this development.

Renewable Technology	Feasible	Reasons
Mast Mounted Wind Turbine	No	There is no sufficient open land for a mast mounted wind turbine to be installed on site.
		The site is situated in a densely populated area. Surrounding properties aren't far enough away to be unaffected by turbine noise, reflected light and shadow flicker.
		The site area is surrounded by buildings and other obstructions that could cause uneven and turbulent wind patterns. Turbulent air conditions may reduce lifespan of components.
		Currently the BWEA suggests a large wind turbine to be viable where wind speed is 7m/s or above. According to the NOABL database the average wind speeds for the site is: 4.8 m/s at 10m, 5.6 m/s at 25m and 6.2 m/s at 45m height for the property postcode (NW6 1NP). Therefore, the wind speeds are not sufficient for a mast mounted wind turbine to be viable.
Roof Mounted Wind Turbine	No	The site area is surrounded by buildings and other structures that could cause uneven and turbulent wind patterns. Turbulent air conditions may reduce lifespan of components.
		Roof mounted wind turbines are not yet a proven technology and a number of technical problems have been identified by manufacturers which are being investigated to rectify these issues. Vibration that can be transmitted to the building structure. Noise from a turbine may cause irritation to

		occupants of the dwelling and adjacent buildings. Noise may also adversely affect ventilation strategy.
		Currently the BWEA suggests a large wind turbine to be viable where wind speed is 7m/s or above. According to the NOABL database the average wind speeds for the site is: 4.8 m/s at 10m, 5.6 m/s at 25m and 6.2 m/s at 45m height for the property postcode (NW6 1NP). Therefore, the wind speeds are not sufficient for a roof mounted wind turbine to be viable
Solar PV (Photovoltaic) Panels/Tiles	Yes	The proposed development has sufficient flat roof area for solar panels accommodation.
		Most of the roofs should be free from overshadowing for most of the day from other buildings, structures or trees.
		The site is located in the region with high level of global horizontal irradiation (1,000-1050 kWh/m2/year)
Solar Thermal Collectors	No	The proposed development has sufficient flat roof area that can accommodate solar thermal panels.
		Most of the roofs should be free from overshadowing for most of the day from other buildings, structures or trees.
		The site is located in the region with high level of global horizontal irradiation (1,000-1050 kWh/m2/year)
		Solar thermal collectors would be compatible with the planned heating system.
		There will be a year round hot water demand.
		In practical domestic solar hot water systems, the solar hot water system is usually run in conjunction with, rather than instead of, a backup conventional boiler and as a result the carbon intensity of the combined system is high relative to other renewables. Moreover the high efficiency of modern condensing boilers, which can convert over 90% of means that the carbon intensity of these heat sources is relatively low at 200-300 gCO2/kWhth. As a result domestic solar water heating systems are a relatively expensive way of mitigating carbon emissions when they replace heat from efficient modern boilers. For this reason they are not recommended.
ASHP (Air Source Heat Pump)	No	The proposed development has been designed to accommodate the space for a hot water cylinder.

		The building is suitable for a low-grade heat distribution system (e.g. underfloor water system, oversized radiators).
		Condenser units can be noisy and also blow out colder air to the immediate environment causing nuisance to the residents.
		An external ASHP will have to be installed close to the bedrooms, causing noise issues.
		There are reported performance issues with this technology. During the heating season the outside air temperature is often less than the ground temperature. This lower temperature has the effect of reducing the COP. For an air-to-water heat pump the standard specifies test conditions of 7oC outdoor air temperature (source temperature). At external air temperatures lower than this, the COP will fall, as will the heating output of the heat pump. Depending on the application this reduction may be significant, such as during a cold winter morning when building pre-heat is needed.
GSHP (Ground Source Heat Pump)	No	It may be possible to drill a limited number of vertical or horizontal boreholes for GSHP on the site.
		It is possible for developments to accommodate a low-grade heat distribution system (e.g. underfloor water system, oversized radiators).
		The site and neighbourhood contain mature trees. Drilling boreholes on the site create the risk of damaging their roots.
		There is not sufficient space inside all the proposed dwellings for the heat pump equipment.
Biomass Boiler	No	There is an established fuel supply chain for the area.
		There isn’t sufficient space for a delivery vehicle (vehicular access to fuel storage, turning circle etc)
		There isn't sufficient space in the proposed buildings for a wood-fuel boiler and associated auxiliary equipment.
		There isn't sufficient space for fuel storage to allow a reasonable number of deliveries.
		Biomass systems are management intensive (fuel sourcing, transport, storage) and require adequate expertise from users.
CHP	No	Given the proposed building use there won’t be a high demand for heat for most of the year, therefore CHP won’t be suitable.

		A CHP unit only generates economic and environmental savings when it is running at least 4,500 hours per year. This equates to an average heat demand of about 17 hours a day for five days a week throughout the year. The proposed development energy and heat demand profile does not match this requirement.
		CHP is typically utilized on buildings with high electricity and heating demand for most of the year such as local authority buildings, leisure centres, universities, hotels, and district heating schemes where CHP is used to provide electricity, space and water heating.
		CHP should be considered wherever there is demand for electricity and an appropriate demand for heat in the near vicinity.

Table 4: Feasibility Study of Renewable Technologies

Based on the feasibility study in table 4 above, the following technologies have been identified as being feasible for the proposed development:

- Photovoltaic Panels

6.0 Improvements to Provide 20% CO_2 Reduction

Prior to the addition of any renewable energy, the developer has focused on the fabric of the property and heating improvements and looked at ways in which to improve this, which are as follows:

- **Glazing** **1.2 W/m2K**

The improvements shown above would ensure a reduction in CO2 emissions of 244 kgCO2/year.

The developer is also proposing to install solar photovoltaic panels onto the roof of the building:

- **4 kWp PV installation** across the site to ensure that the target of 20% CO2 emissions reduction is met.

According to SAP results, installation of **4 kWp PV** will generate a further 1,774 kgCO2/year.

Also, installation of 4 kWp PV and the improvements shown above will generate a further 6,970 KWh/year.

Therefore, the installation of **4 kWp of solar PV** and the proposed fabric and heating improvements will allow the development to achieve a minimum 20% reduction in the total CO2 emissions over Building Regulations 2013. This achievement therefore satisfies the requirements of the London Plan and Camden Local Council.

Table 5 below shows the percentage reduction in CO2 emissions following the proposed heating and fabric improvements.

	Associated Total CO_2 ($kgCO_2$/yr)
Baseline (2)	9,928
With fabric & heating improvements	9,684
With PV installation	7,910
Reduction in CO2 (1)	2,018
% Reduction (1) / (2) x 100	**20.3%**

Table 5: Percentage Reduction in Carbon Emissions following the above improvements

7.0 Sustainability Assessment

The Sustainability Assessment demonstrates how the proposed development meet the sustainability criteria set by the London Borough of Camden Council, as specified in the Camden Core Strategy 2010 and Camden Development Policies 2010.

The assessment is divided into the following key sections:

♣ Energy Efficiency

♣ Decentralised Energy Networks and Combined Heat and Power

♣ Renewable energy

♣ Water Efficiency

♣ Sustainable Use of Materials

♣ Brown Roofs, Green Roofs and Green Walls

♣ Flooding

♣ Adapting to Climate Change

♣ Biodiversity

♣ Local Food Growing

7.1 Energy Efficiency Key Requirements:

♣ All developments are to be designed to reduce carbon dioxide emissions by being as energy efficient as is feasible and viable.

♣ Energy strategies are to be designed following the steps set out by the energy hierarchy.

♣ Developments involving 5 or more dwellings and/or 500 sm (gross internal) floorspace or more are required to submit the energy statement which demonstrates how carbon dioxide emissions will be reduced in line with the energy hierarchy.

Compliance:

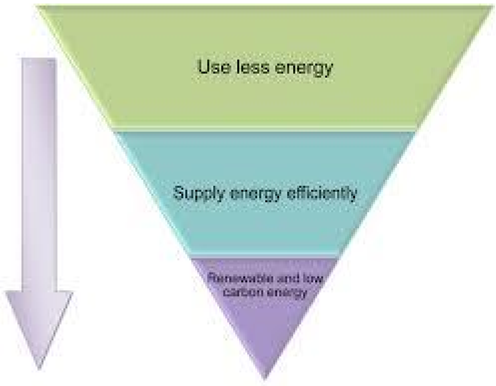
As advised by the Camden Council, the following hierarchy was applied in the building design:

1. Use less energy

2. Supply energy efficiently

3. Use renewable energy

Figure 4: The Energy Hierarchy



7.1.1 Use Less Energy

The proposed building has been designed to reduce the amount of energy needed by the occupants of the dwelling whilst still maintaining or even improving the comfort conditions. These effects will be achieved by:

- Incorporating systems into design that can make the most of the natural occurring energy

- Ensuring high thermal performance of the building

- Incorporating energy efficient mechanical systems

- Introducing complementary energy-saving measures.

A. Natural systems

The proposed development has been designed to make the most of the sunlight/daylight and thus reduce the energy used for artificial lighting and heating:

♣ Window openings are sized and positioned to ensure the absolute maximum distribution of light possible. All the larger windows and patio doors, servicing living rooms, dining rooms and study rooms, are on the South-West elevation. While North East facing windows and pitched roof Velux windows service bedrooms and the entrance hallways. Roof light s are also strategically incorporated to bring additional daylight into the flats wherever possible. As a result, living rooms, dining rooms and study rooms will have an average daylight factor of at least 1.5%, while kitchens of at least 2%.

♣ Light wells will allow sunlight to enter the basement flats reducing the reliance on artificial lighting and heating. Similarly, the skylight on the roof of the staircase and the large rear entrance glass door will help reduce the need for artificial lighting in the circulation areas.

♣ The balconies are situated on the south side of the building. The balustrades are to be made of frosted glass to allow the sunlight to get through.

♣ The internal layout of the proposed building was designed to make to best use of daylight. The rooms utilised less frequently and requiring less light (bathroom, wc, stairs) are located in the core of the building, while rooms requiring daylight, such as sitting room and bedrooms have all glazed areas to maximise the use of daylight.

♣ The development will incorporate solar technologies: solar PVS with onsite battery storage. Part covered balconies to flats D, E and F which will prevent overheating of the flats and the reliance on artificial cooling. Flat G on the top floor will use Solar Control Glass in all SW facing windows to mitigate against overheating and glare from low winter sun.

♣ The south side of the building will also benefit from some natural overshadowing from nearby trees.

♣ The building will feature high performance double glazing: Overall 1.2 W/m2k.

♣ Incorporating elements of natural ventilation, such as opening bi-fold balcony doors.

B. Thermal performance

The thermal performance of the building will be enhanced by:

Applying efficient thermal insulation - a high level of insulation is the most effective way to ensure new buildings are energy efficient. Therefore, the building's floors, walls, party walls and flat roofs will be equipped with 100mm Celotex insulation.

Adopting principles of airtight construction and minimising air leakage. While the basement with be chiefly poured concrete, the 1st, 2nd, and 3rd floors of the building will be constructed of lightweight thin joint block-work with a brick outer leaf with double glazed windows throughout.

The developer aims to take specific approaches to minimise air leakage:

- Block-work - care will be taken to make sure all structural movement joints are suitably sealed and that all mortar joints are fully pointed.

- Windows and door frames - care will be taken to make sure that all jambs, sills and heads are sealed at the cavity and the inside surfaces of plaster are sealed, in order to ensure continuity of the specified air barrier to the inside face of the wall construction and not simply the external face of the building.

- Dry lining - the dry lining will be sealed at both top and bottom to the floor slab. Care will be taken to ensure service outlets such-as sockets or data outlets in the dry lining are well sealed.

- Solid ceiling will be applied in order to minimise air leakage.

Using high thermal mass building materials for construction – materials with a high thermal mass e.g. concrete absorb and retain heat produced by the sun. The basement level of the building will constitute all solid concrete construction.

The above ground structure will be made of thin joint block-work and brick outer leaf. A heavy masonry building acts as a heat store reducing the seasonal temperature fluctuations experienced in lighter-weight constructions. This reduces the need for secondary heating and cooling equipment which has been shown to significantly reduce the CO_2 emissions of a dwelling over its nominal lifetime.

C. Mechanical systems

The building will be equipped with high efficiency mechanical systems, such as:

♣ Community boilers (mains gas) linked to water underfloor heating.

♣ High efficiency mechanical ventilation heat recovery will be used on each flat.

♣ Solar PVs – 12 x 400w panels will be installed on the roof of the building.

D. Other energy efficient measures & technology

Other measures technologies include aimed at reducing energy consumption include:

- Energy-efficient lighting: 100% of all new lighting to be energy efficient (100% LED) will be installed across the building.

- Boilers controls: Programmer, Room thermostat and TRVs.

- Energy efficient appliances (A-or AA rated fridges and freezers or fridge-freezers, washing machines).

- Electric induction hobs – electric ovens will be installed in all kitchens along with electric induction hobs, which transfer the heat directly to the pan, rather than the whole cooking area and therefore help save energy.

- Each flat will be equipped with an energy display device for electric and primary heat source to control energy usage.

- To conserve energy, each apartment will have its own mechanical heat recovery unit.

- Provision of drying space: all flats will have either private garden or private balconies to minimise the use of energy driven dryers.

7.2 Decentralised Energy Networks and Combined Heat and Power

Key Requirements:

♣ Where feasible and viable your development will be required to connect to a decentralised energy network or include CHP.

Compliance:

The nearest operating decentralised energy network, Royal Free Hospital, is too far away from the development to make the connection feasible. Similarly, the nearest potential DE network at Swiss Cottage is not located close enough to make the connection viable.

The option of installing CHP technology has turned out not to be viable either (see Energy Assessment for more details).

The developer believes the most suitable solution in this situation is to install a gas-fired community heating system.

7.3 Renewable Energy

Key Requirements:

♣ Developments are to target a 20% reduction in carbon dioxide emissions from onsite renewable energy technologies.

Compliance:

To meet this requirement, the developer aims to install 9.6 kWp of PV panels on the roof of the building.

7.4 Water Efficiency

Key Requirements:

♣ The Council expects all developments to be designed to be water efficient by minimising water use and maximising the re-use of water

♣ The Council will require buildings with gardens or landscaped areas that require regular maintenance to be fitted with water butts

Compliance:

In order to ensure efficient water management, the following water efficiency measures will be installed on site:

- Dual flush toilets
- Self-closing taps

- Water saver shower-head with restrictors.

- Water-efficient white goods.

To enable water re-use an underground 7,500L rainwater tank will be installed in the garden. The collected water will be fed to header tanks for W.C. flushing. The rear garden will be planted with contain native vegetation adapted to local climate conditions and relying on natural rainfall. No water-intensive plant schemes are planned for the site.

7.5 Sustainable Use of Materials

Key Requirements:

♣ Reduce waste by firstly re-using your building, where this is not possible you should implement the waste hierarchy.

♣ All developments should aim for at least 10% of the total value of materials used to be derived from recycled and reused sources.

♣ Source your materials responsibly and ensure they are safe to health.

Compliance:

In line with the waste hierarchy, during the demolition phase, the developer is committed to take the following approach:

1. Prioritise on site reuse of demolition materials

2. Recycle materials on site, then off site

3. Disposal to landfill

Likewise, during the construction phase, the following approach will be taken:

1. The use of reclaimed materials

2. The use of materials with high levels of recycled content

3. The use of new materials

The site is currently occupied by a 3-storey house which will be demolished to give space for a new development. The bricks from the deconstructed house will be salvaged and collected by a local licensed waste management company to be sent for recycling. Other materials will be segregated into categories (timber waste, metal waste, concrete waste and general waste) to facilitate re-use/recycling process.

The Site Waste Management Plan will be produced for the site before the demolition work starts. The Plan will provide a framework for managing waste in line with the hierarchy by identifying types and quantities of materials for re-use/recycling.

The waste arising from new construction will be minimal due to economical use of construction materials (e.g. length of timber is right size and doesn't need cutting) and carefully planned deliveries to the site in order to avoid oversupply. The construction site will be supplied with labelled waste skips.

The developer is committed to source materials for the new construction in a sustainable manner:

The main material used for construction will be Thomas Armstrong AIRTEC concrete blocks (or equivalent) joined with mortar AIRTEC blocks consist of over 90% recycled raw materials. They are ISO 14001:2004 Environmental Management certified (cert No. 09/E001), ISO 9001:2008 Quality Assured (cer no. 06/Q006) and British Board of Agrément certified (BBA cert no. 06/4309). Airtec external or internal walls achieve A to A+ ratings in the BRE Green Guide to Specification ratings system. The blocks can be cut, shaped and so any damaged blocks can be reused to minimise waste.

The external brick leaf will use brick ISO 14001:2004 Environmental Management certified (cert No. CP E00044), ISO 9001:2008 Quality Assured (cer no. CP 00213) and British Board of Agrément certified (BBA cert no. 14/5114) and BS OHSAS 18001: 2007 certified (Cert no. CP OHS 00017).

Cavity wall insulation will be provided by a 100mm layer of high performance Celotex slab insulation (or equivalent).

Flat roof areas will be covered with Permaroof (or equivalent) EPDM rubber cover, manufactured in an ISO 9001 and ISO 14001 certified UK-based facility.

All timber used for construction will be certified by Forest Stewardship Council (FSC) or by The Programme for the Endorsement of Forest Certification (PEFC). The developer is aimed to source certified timber locally (within 35 miles from the site) to reduce energy costs and related CO_2 emissions associated with transport.

No products containing Volatile Organic Compounds (VOCs) will be used on site.

7.6 Brown Roofs, Green Roofs and Green Walls

Key Requirements:

♣ The Council will expect all developments to incorporate brown roofs, green roofs and green walls unless it is demonstrated this is not possible or appropriate

♣ The appropriate roof or wall will depend on the development, the location and other specific factors

♣ Specific information needs to be submitted with applications for green/brown roofs and walls

Compliance:

The developer will install extensive sedum gardens on available flat EPDM roof areas.

The extant dwelling has 98.3m2 of fully permeable garden area and 34.4m2 semipermeable garden paving. The application proposed 99.07m2 of fully permeable garden area and extensive rainwater collection measures covering much of the rest of the site.

Additionally, the developer is committed to introduce a green wall of approx. 97m2, planted along the back garden wall of the development, of native climbing species, such as: Honeysuckle (Lonicera periclymenum), Clematis (Clematis vitalba), Jasmin (Jasmin sp.), and Ivy (Hedera helix). The species will be planted into the ground and supported by a dedicated trellis structures.

7.7 Flooding Key Requirements:

♣ All developments are required to prevent or mitigate against flooding

♣ All developments are expected to manage drainage and surface water

♣ All developments are expected to manage drainage and surface water on-site or as close to the site as possible, using Sustainable Drainage Systems (SUDS)

Compliance:

In order to prevent the risk of flooding, the developer will implement Sustainable Urban Drainage Systems (SUDS), following the recommended by the Council hierarchy:

1. Use infiltration techniques

2. Collect and store rainwater in ponds or open water features for gradual release

3. Collect and store rainwater in tanks or sealed water feature for gradual release

4. Discharge water direct to a watercourse

5. Discharge rainwater to a surface water sewer/drain

6. Discharge water to the combined sewer

The ground under the building is solid clay and therefore there is very little possibility of water being able to soak away into the soil; therefore, installation of permeable paving is not considered as feasible. Instead, the reduction in water run-off will be achieved though vegetation in the garden area, green wall along the garden perimeter and installation of a rainwater harvesting tank. Additionally, the developer will install extensive sedum garden on the roof of the building. Brown roofs slow down the rate of the water run-off, helping to reduce the risk of flooding.

An F-Line 7,500 litre underground garden rainwater harvesting system tank (or equivalent) will be installed on site, accessible for maintenance, buried in the rear communal garden (see Figure 15). The collected water will be fed to header tanks for W.C. flushing and garden/green wall irrigation.

By intercepting and slowing precipitation hitting the ground, vegetation in the garden along with a green wall will reduce the volume and rate of storm-water runoff by around 76%.

7.8 Adapting to Climate Change

Key Requirements:

♣ All development is expected to consider the impact of climate change and be designed to cope with the anticipated conditions

♣ All development should consider how it can be occupied in the future when the weather will be different Compliance: Adaptation to warmer temperatures:

♣ Native plants and vegetation will be introduced to the development to take advantage of their cooling evaporative effect. The green wall made of native climbing species will be installed on site. Additionally, climbing species will be introduced alongside the rear garden perimeter.

♣ The building will incorporate carefully selected and designed shading measures to prevent the overheating of the building and the reliance on artificial cooling. This includes inset balconies on the south side of the building and Solar Control glazing on the 2nd floor rear windows.

♣ Sedum gardens will be installed on the roof of the building. Green roofs are known to reduce the temperature in urban environments. Insulation: construction materials are selected to prevent penetration of heat. The building's floors, walls, party walls and flat roofs will be equipped with 100mm Celotex insulation. Thermal materials: materials with high thermal storage and capacity were selected to absorb heat during hot periods, which can be then dissipate during colder periods. The foundations and the basement level are to be made of reinforced/mass concrete and the above ground level construction of aerated blocks (thin joint construction). Adaptation to heavy rainfalls:

♣ SUDS, being largely impractical in the site due to the heavy clay underneath the site are not being implemented. Instead, intensive rainwater harvesting system is being put in place. That, coupled with almost no reduction in the site's garden area will result in rainwater run-off reduction of approx. 76%.

♣ Incorporation water efficient fixtures and fittings: dual flush toilets, self-closing taps, water saver shower-head with restrictors, and water-efficient white goods.

♣ Collecting and reusing rainwater: an underground 7,500 Litre Tank will be installed in the garden area. The collected water will be fed to header tanks for W.C. flushing.

♣ Sedum installed on the roof of the building will slow down the rate of water run-off, helping to reduce the risk of flooding.

Adaptation to changing ground conditions:

♣ Strong retaining walls made of reinforce concrete designed to prevent erosion

♣ Extensive use of vegetation on site (green walls, garden) will counteract the erosion processes.

7.9 Biodiversity

Key Requirements:

Proposals should demonstrate:

♣ How biodiversity considerations have been incorporated into the development.

♣ If any mitigation measures will be included; and

♣ What positive measures for enhancing biodiversity are planned.

Compliance:

The developer commissioned a Preliminary Ecological Appraisal, which concluded the site represents very limited value in terms of biodiversity.

The application site is predominantly buildings and hard-standing areas with small areas of amenity grasslands, ornamental planting, scattered trees and scrub and a small ornamental pond. No priority habitats have been identified on site. Short-mown, highly disturbed amenity grassland is considered as unsuitable to support rare or protected plant species. The scrub area represents negligible ecological value; so does the artificial ornamental pond.

However, the site and its surroundings provide potential habitat for a number of protected species, such as bats, nesting birds and reptiles. In order to protect wildlife during the construction phase, the developer is committed to implement the following measures:

♣ No removal of trees, or scrubs, or demolition of building and other structures that may be used by breeding birds will be undertaken between 1st March and 31 August inclusive, unless a competent ecologist has undertaken a detailed check for active birds' nests immediately prior to clearance/demolition and provided written confirmation that no birds will be harmed and/or that there are appropriate measures in place to protect bird interests on site.

♣ The site clearance will be conducted between March and September, during the active season for reptiles. Prior to clearance, the site will be searched for the potential presence of reptiles. If any reptiles are identified on site, a qualified ecologist will be called on site to implement protection measures.

♣ All excavations left overnight will be either covered, or provided with a ramp to enable easy escape for hedgehogs and other fauna and will be checked each morning before the works recommence.

♣ British Standards and National |Joint Utilities Group Guidelines (NJYG) will be followed all times during the construction phase to eliminate or minimise negative impacts on habitats adjacent to the site. This includes protection of root zones. In order to enhance the biodiversity value, the developer intends to implement the following measures:

♣ Swift (Apus apus) boxes will be installed under the eaves of the new building.

♣ Sparrow (Passer domesticus) terraces will be placed on the top of the wall to the rear of the Development.

♣ Native species, such as selfheal (Prunella vulgaris), comfrey (Symphytum officinale), primrose (Primula vulgaris), or loosestrife (Lysimachia spp.) will be introduced in the garden area, as they are of particular benefit to bumblebees, bees and butterflies.

♣ The replacement boundary wall adjacent to the West Hampstead Rail Sides SNCI will incorporate habitat bricks to provide shelter and hibernation opportunities for insects, amphibians and reptiles.

♣ A green wall will be incorporated into the development, made on
native wildlife attracting species, such as: honeysuckle (Lonicera periclymenem), Clematis (Clematis vitalba), jasmine (Jasminum sp.) and ivy (Hedera helix). The climbing species will be also incorporated alongside the garden perimeter.

7.10 Local Food Growing

Key Requirements:

♣ We encourage food to be grown wherever possible and suitable

♣ Rooftops and shared spaces such as gardens and parks provide opportunities for food growing

Compliance:

While, due to space limitation, no specific area of the garden has been dedicated for the growing of edible species of plants, three of the flats have patio gardens and the remainder have generous balcony areas, so that residents will be able to grow edible plants of their choice in containers should they wish to do so.