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DATE
10 MARCH 2021

ENERGY AND SUSTAINABILITY PLAN

79 AVENUE ROAD, ST JOHN'S WOOD
LONDON NW8 6JD

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DOCUMENT STATUS

PROJECT
79 Avenue Road, St Johns Wood
London, NW8 6JD

PROJECT NO.
581

CLIENT
Owner Occupier
79 Avenue Road,
St Johns Wood,
London
NW8 6JD

IN CONJUNCTION WITH
RPS Group
KSR Architects
Mira A-Architecture & Engineering Ltd
Form SD

REVISION	STATUS	CHECKED	DATE
I3	For Information	Alan Harries	29.06.21
I2	For Information	Alan Harries	23.06.21
I1	For Information	Alan Harries	12.03.21
-	For Information	Alan Harries	10.03.21

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CONTENTS

EXECUTIVE SUMMARY

This energy and sustainability plan for 79 Avenue Road, London NW8 6JD, has been prepared by Integration Consultancy Limited following the planning conditions set out by the Borough of Camden in the Section 106 agreement dated 21 September 2020.

The energy and sustainability plan has been created to ensure that all energy and sustainability objectives can be met as set out in the planning submission document entitled Energy and Sustainability Statement and dated 27 January 2019. It also serves as a check point to ensure that the relevant energy and sustainability aspects of the Council's policy CC1 (Climate change Mitatgtion) and CC2 (Adapting to Climate Change) are followed.

The energy and sustainability plan covers the following aspects:

a) Energy Plan
The energy plan sets out how each of the energy related targets put forward in the Energy and Sustainability Statement will be achieved. A pre-implementation review of the plan has been carried out out in order to confirm that that the measures incorporated in the energy plan are achievable. This includes a full As Designed SAP calculation.

b) Sustainability Plan
The sustainability plans sets out aspects such as those related to water effciency, green roofs and surface water runoff. A pre-implementation review of the plan has been carried out out in order to confirm that that the measures incorporated in the sustainability plan are achievable. This includes a Part G water calculation to demonstrate how the scheme will meet the target of 105 litres/person/day plus 5 litres/person/day for external use.

c) Maintenance and Management
In the section details of maintenance and mainangement relative to energy and sustainability measure have been summarised.

d) Post Construction Energy and Sustainability Review
Arrangements for post-construction energy and sustainability review have been secured. This review aims to confirm that the measures incorporated in the energy and sustainability plan have been achieved in the development and will be maintainable in the development's future management and occupation. The section summarised the scope of this review.

e) Provision of Information to the Council
A communication plan has been created to identify means of ensuring the provision of key energy and sustainability information to the Council as well as provision of a mechanism for review and update as required from time to time.

Table 1 below summarises how the energy and sustainability plans for the proposed development correlates to energy and sustainability targets and the relevant policy aims.

Policy Requirements	Plan for 79 Avenue Road
1) Minimum on-site contribution of 35% improvement in carbon dioxide emissions over the Part L1A Target Emission Rate outlined in the national Building Regulations 2013 (London Plan/CC1) with the aim of achieving 45.4% below Part L as targeted in the Energy and Sustainability Statement.	Target of 45.4% met by specification of efficient building fabric, efficient systems (such as mechanical ventilation with heat recovery) and local renewable energy generation as described in the main body of the report.
2) 20% reduction of carbon dioxide emissions related to regulated energy use through on-site renewable energy generation where feasible. (London Plan/CC1)	Target met by specification of ground source heat pump and 4kWp of rooftop solar PV.
3) Provision to be able to connect to future heat network (CC1)	The scheme is not large enough to justify connecting to a current heat network and the proposed ground source heat pump system is a very low carbon heat source. However, measures to enable connection to a future local network infrastructure will include: - Safeguarding space for future heat exchanger. - Provision made in building fabric to allow pipes to be routed through from the outside at a later date. - Provison of domestic hot water isolation valves to facilitate the connection of the interfacing heat exchanger. - Provison of external buried pipework routes to be safeguared to a nearby road or similar where connection to the network would be made. - Provison of contact details for the developments energy system management for the purposes of engagement over future connection to a network.
4) Separate metering of all low and zero carbon technologies to allow for monitoring energy and CO2 (CC1)	Metering of PV generation; heating pump electrical consumption, heat pump heat generation and sub metering of house ventilation system, lights and pool energy use.
5) Water efficient target of105 l/p/d plus 5 l/p/d for external water use (CC3).	Target met by specifying water efficient systems. Rainwater harvesting as detailed in the main body of the report.
6) Incorporating bio-diverse roofs (CC2 c).	Green roof specified on lower level roofs as detailed in the main body of the report.
7) Reducing surface runoff water. (CC2 b)	Rain water harvesting proposed.
8) Reducing air pollution (CC4).	Use of ground source heat pump reduces gas combustion.

Table 1: Energy and sustainability targets / policy requirements and how they are are planned to be met by the scheme

1. INTRODUCTION

This energy and sustainability plan for 79 Avenue Road, London NW8 6JD, has been prepared by Integration Consultancy Limited following the planning conditions set out by the Borough of Camden in the Section 106 agreement dated 21 September 2020.

The energy and sustainability plan has been created to ensure that all energy and sustainability objectives can be met as set out in the planning submission document entitled Energy and Sustainability Statement and dated 27 January 2019. It also serves as a check point to ensure that the relevant energy and sustainability aspects of the Council's policy CC1 (Climate change Mitatgtion) and CC2 (Adapting to Climate Change) are followed.

1.1. THE DEVELOPMENT SITE

The site is located at 79 Avenue Road, St John's Wood, London. The proposed scheme involves the demolition of the existing residential dwelling and the redevelopment for a single residential dwelling with basement. The existing building has an EPC rating of F .

Figure 1: Aerial view of site

1.2. SCOPE OF ACTIVITIES

The energy and sustainability plan covers the following aspects:

a) Energy Plan
The energy plan sets out how each of the energy related targets put forward in the Energy and Sustainability Statement will be achieved. A pre-implementation review of the plan has been carried out out in order to confirm that that the measures incorporated in the energy plan are achievable. This includes a full As Designed SAP calculation.

b) Sustainability Plan
The sustainability plans sets out aspects such as those related to water effciency, green roofs and surface water runoff. A pre-implementation review of the plan has been carried out out in order to confirm that that the measures incorporated in the sustainability plan are achievable. This includes a Part G water calculation to demonstrate how the scheme will meet the target of 105 litres/person/day plus 5 litres/person/day for external use.

c) Maintenance and Management
In the section details of maintenance and mainangement relative to energy and sustainability measure have been summarised.

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Arrangements for post-construction energy and sustainability review have been secured. This review aims to confirm that the measures incorporated in the energy and sustainability plan have been achieved in the development and will be maintainable in the development's future management and occupation. The section summarised the scope of this review.

e) Provision of Information to the Council
A communication plan has been created to identify means of ensuring the provision of key energy and sustainability information to the Council as well as provision of a mechanism for review and update as required from time to time.

1.3. TARGETS AND SUMMARY OF BUILDING PERFORMANCE

Policy Requirements	Plan for 79 Avenue Road
1) Minimum on-site contribution of 35% improvement in carbon dioxide emissions over the Part L1A Target Emission Rate outlined in the national Building Regulations 2013 (London Plan/CC1) with the aim of achieving 45.4% below Part L as targeted in the Energy and Sustainability Statement.	Target of 45.4% met by specification of efficient building fabric, efficient systems (such as mechanical ventilation with heat recovery) and local renewable energy generation as described in the main body of the report.
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Table 2: Energy and sustainability targets / policy requirements and how they are are planned to be met by the scheme

The details of these proposals are given in the subsequent section.

2. ENERGY PLAN

2.1. BUILDING FABRIC – INSULATION, AIRTIGHTNESS AND THERMAL BRIDGING

The parameters relating to the performance of the buildings fabric are set out in the table below. These are the values used in the As Design SAP calculation.

They will be achieved by the contractor who will be under contractual obligation to follow the design and meet the performance specification and to demonstrate this through suitable documentation from manufacturers and testing (such as air-tightness tests).

Element	Enhanced Building Fabric Improvement for the proposed development	
	U Value (W/m^{2}K)	G Value
External Walls	0.13 (0.2 below ground)	-
Ground Floor	0.12	-
Roof	0.11	-
Sash Windows	1.2	0.5
All other Windows	1.0	0.4
External Doors	1.0	-
Air Tightness	3.0 m^3/m^2/h	
Thermal Bridging	Accredited details where possible. As a minimum sills, jambs and lintels, intermediate floors and corners.	

Table 3: Building Fabric Specification

2.2. ACTIVE BUILDING SERVICES SYSTEMS

Heating and hot water

All building services systems will be in accordance with the energy efficiency requirements of the Domestic Building Service Compliance Guide.

The property will be served by a ground source heat pump (GSHP) with a closed loop heat exchange network comprising a series of boreholes within the grounds of the property.

The heating and hot water distribution will be provided by the ground source heat pump system.

Mechanical Ventilation

All areas of the property will be mechanically ventilated via centralised supply and extract air handling plant incorporating heat recovery (MVHR). This removes the requirement for trickle vents in the façade and thus contributing to low air permeability rates.

Low energy fans have been selected to ensure a low specific fan power SFP and electrical consumption as shown in Table 4 below.

Lighting

Low energy fixed lighting, generally comprising LED fittings, will be installed throughout the property.

Solar PV

Solar PVs will be provided with an installed capicty of around 4 kW_P. The photovoltaic panels will be located on the main flat roof as shown in Appendix 3.

Element	Proposal
Space Heating	Ground source heat pump e.g. NIBE S1155-25 ground to water (winter efficiency 45.4%) supplying 100% of space heat via underfloor heating.
Heating Controls	Time and temperature zone control with weather compensation
Hot Water Storage	Ground source heat pump e.g. NIBE S1155-25 ground to water (winter efficiency 45.4%). Mains Gas (93.5% SEDBUK 2009). Cylinder loss 4kWh/d.
Ventilation	Mechanical Ventilation with Heat recovery (SFP 0.91, efficiency 86%)
Lighting	100% low energy
Lighting Control	Yes
Solar Photovoltaics	4 kW_P of rooftop solar

Table 4: Active Building Services and Renewable Energy

2.3. ENERGY DEMAND & CO2 EMISSION SUMMARY

The energy demand and overall CO_2 emissions data for the building is reproduced below. Non-regulated energy data are provided for guidance.

As shown in the tables below, the propsoed scheme meets the target of 45.4% below part L requirements.

Energy Use	Energy Demand (kWh /year)
Space Heating	12994
Water Heating	5,181
Pumps and Fans	8,281
Lighting	2,215
PV	-3,293
Non-Regulated Electricity (cooking and applicances)	14,140
Total (regulated only)	25,378
Total (regulated + non-regulated)	39,518

Table 5: Design Stage Energy Demand for Proposed Building

	Carbon dioxide emissions for dwellings (Tonnes CO_2 per annum)
	Regulated
Baseline: Part L 2013 (Building Regulations) Compliance	21.74
Proposed scheme	11.59
Total cumulative on-site savings	10.15 (46.6% below)

Table 6: Overall dwelling regulated CO2 emissions

2.4. PROVISION TO CONNECT TO FUTURE HEAT NETWORK

The scheme is not large enough to justify connecting to a current heat network and the proposed ground source heat pump system is a very low carbon heat source. However, measures to enable connection to a future local network infrastructure will include:

- Safeguarding space for future heat exchanger.
- Provision made in building fabric to allow pipes to be routed through from the outside at a later date.
- Provison of domestic hot water isolation valves to facilitate the connection of the interfacing heat exchanger.
- Provison of external buried pipework routes to be safeguared to a nearby road or similar where connection to the network would be made.
- Provison of contact details for the developments energy system management for the purposes of engagement over future connection to a network.

These activities reference the “CIBSE heat network code of practice for the UK”.

2.5. ENERGY METERING AND BMS

The dwelling will benefit from energy monitoring of all electricity, gas as well as sub metering for:

- Solar PV generation
- Heat metering for the ground-source heat pump.
- Heating pump electrical consumption,
- House ventilation system
- Lighting system
- Pool energy

A building management system (BMS) will assist in the monitoring of energy use.

3. SUSTAINABILITY PLAN

3.1. WATER EFFICIENCY AND RAINWATER HARVESTING

Water efficient devices
The water consumption target for the project is a maximum internal water use of 105 litres / person / day with an additional 5 litres / person / day for external water use.

To achieve this target water consuming appliances will to meet the following standard:

- WCs – 4 / 2.6 litre dual flush
- Showers - 8 litres per minute
- Baths - 170 litres to overflow
- Kitchen taps - 6 litres per minute
- Basin taps – 5 litres per minute
- Washing Machines – 8.17 litres per kg dry load
- Dishwashers – 1.25 litre per place setting

Rain water harvesting
Rainwater from the main roof will be collected and reused via a rainwater harvesting system. This recycled rainwater can then be used for irrigation of the extensive grounds and external bib taps.

Water Efficiency Calculation
The Water Efficiency Calculation, based on building regulation Part G (2015), is given in Appendix 2. This shows the plan outlined above allows the scheme to meet the required target.

3.2. GREEN ROOF

The site currently comprises landscaped gardens comprising lawns, shrubs trees and hard standing covering an area of approximately 3,220m^2.

Green roof areas will be provided on the property as shown below. This will be an extensive low maintenance type.

Figure 2: Plan view showing the location of the green roof areas.

4. MAINTENANCE AND MANAGEMENT

The maintenance strategy has been set out below in order to ensure the development continues to perform over the long term.

Simple, low-maintenance technology has been one of the focuses of the design process and this has resulted in the selection of low maintenance systems such as LED lighting, Solar PV and ground-source heat pumps.

Sustainability Aspect	Maintenance
Buidling Fabric	Low maintenance requirement
Windows	Regular cleaning to ensure maximised solar gains in winter.
Mechanical ventilation with heat recovery	Regular (e.g. annual) filter cleaning/replacement and inspection as per manufacturer guidance.
LED Lighting	Like for like replacement when fittings fail. LED can last 50,000h (i.e. almost 35 years if use for around 4 hours a day).
Solar PV	Selection of high quality PV panels will long (25 year) warrenties such as Sunpower and LG should help reduce maintenance requirement. Cleaning as per manufacters guidelines (approximately once a year) to ensure energy production is optimal. On-going system monitoring through metering and comparison against energy benchmark of 3300kWh/a +/10%. System performance can decreases by around <1% per year through unavoidable light induced panel degradation. Inverter maintenance or replacement can be expected after ten years of operation.
Ground-source Heat Pump	Typically annual site inspections (as per manaufacturer/installer specifications). Workmanship and equipment warrenties should be obtained. Heat pump systems typically come with a warranty of two to three years. Workmanship warranties for heat pumps can last up to 10 years. Many manufacturers offer optional warranty extensions.
Gas boiler	Annual service from registered service engineer.
Green roof	An extensive green roof will need only minimal maintenance to ensure that. A minimum of two inspections a year will ensure that any unwanted species do not become established and that the outlets are maintained.
Rainwater harvesting	Annual cleaning to remove leaves and debris from guttering and pipe intake.
Building Management System (BMS)	Annual BMS engineer visit. Auto alarm / fault reporting and montoring as part of service enginnering contract.

Table 7: Maintenance Strategy

5. POST CONSTRUCTION REVIEW

An post construction energy and sustainability review wil be carried out on completion.

This review aims to confirm that the measures incorporated in this report have been achieved and will be maintainable in the building's future management and occupation.

The scope of this report is set out below.

Scope of the Review

The review will produce a written summary report comprising photographs and documentation confirming that the measures incorporated in the plan have been achieved.

The report will include a description of the assessment, the methodology adopted, assumptions and the findings of the studies, as well as an identification of any areas requiring mitigation, if applicable.

It will included aspects such as Part G water calculation submitted to building control and the final "As Built" SAP calculation from an independent SAP assessor as well as solar PV installation documentation.

Each component of the study will be reported individually including the relevant technical commentary and a summary of the main messages arising from the review.

6. COMMUNICATION

A communication plan has been created to identify means of ensuring the provision of key energy and sustainability information to the Council as well as provision of a mechanism for review and update as required from time to time.

The main on-going performance aspects involve the active systems. Therefore it is proposed that the owner/occupier maintain an ennergy and sustainability communications file to provide a home for key documentation related to active system performance as summarised in the table below. This will provide a mechanism for the review of the on-going long-term performance of the development by the Council.

This will include meter readings report from the BMS. In addition, energy bills provide a convenient summary of annual energy use and can also be kept in file.

Energy bills and submetering data can be compared against the estimated energy demand set out in Table 5 which includes an allowance for non-regulated energy use originating from appliances and cooking.

Design Aspect	Sustainability Communication Documentation
Solar PV	Solar PV “generation meter” readings.
Ground-source Heat Pump	Heat metering readings and heat pump electricity sub meter readings.
Building Performance	Energy submetering report from BMS and overall energy use from energy bills.

Table 8: Energy and sustainability communication file

7. SUMMARY

The energy and sustainability plan concludes that all objectives as set out in the energy and sustainability statement dated 27 January 2020 can be met.

Table 1 below summarises how the energy and sustainability plans for the proposed development correlates to energy and sustainability targets and the relevant policy aims.

A post construction review has been secured in order to confirm, via photograph and document evidence, that the completed scheme has fulfilled its targets.

Policy Requirements	**Plan for 79 Avenue Road**
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Table 9: Energy and sustainability targets / policy requirements and how they are are planned to be met by the scheme

APPENDIX 1 - POLICY CONTEXT

THE LONDON PLAN – CHAPTER 5: LONDON'S RESPONSE TO CLIMATE CHANGE

Regional policy in London is controlled by The Greater London Authority, and is set out in The London Plan. The Plan sets out policy and guidance in the London context and identifies a number of main objectives related to improving London as a workplace and living place.

The concept of sustainable development runs through the London Plan and all its policies with reference to topics including Places, People, Economy, Response to climate change, Transport, and Living places and spaces. Chapter 5 of the London Plan sets out a range of policies in relation to climate change, including climate change mitigation and adaptation, waste, aggregates, contaminated land and hazardous substances.

Key policies within the London Plan which are applicable to the proposed development and addressed in this report are:

POLICY 5.2 -MINIMISING CARBON DIOXIDE EMISSIONS

Planning Decisions

A Development proposals 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:

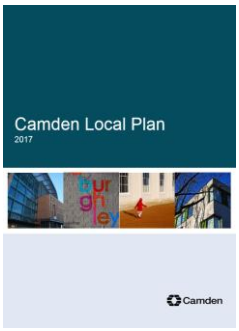
Year	Improvement on 2010 Building Regulations
2010 – 2013	25 per cent
2013 – 2016	40 per cent *
2016 – 2031	Zero carbon

* equivalent to a minimum improvement of 35% beyond the 2013 edition of Part L.

Other key policies within the London Plan which are applicable to the proposed development and addressed in this report are:

- 5.3 - Sustainable Design & Construction
- 5.6 - Decentralised Energy In Development Proposals
- 5.7 - Renewable Energy
- 5.8 – Innovative Energy Technologies
- 5.9 - Overheating & Cooling
- 5.11 - Green Roofs & Development Site Environs
- 5.13 – Sustainable Drainage
- 5.15 - Water Use & Supplies

CAMDEN LOCAL POLICY



Policy CC1 - Climate change mitigation

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.

8.6 The Council's Sustainability Plan 'Green Action for Change' commits the Council to seek low and where possible **zero carbon buildings**

8.11 The Council will expect developments of five or more dwellings and/or more than 500 sqm of any gross internal floorspace to achieve a **20% reduction in carbon dioxide emissions from on-site renewable** energy generation (which can include sources of site related decentralised renewable energy), unless it can be demonstrated that such provision is not feasible. This is in line with stage three of the energy hierarchy 'Be green'. The 20% reduction should be calculated from the regulated CO2 emissions of the development after all proposed energy efficiency measures and any CO2 reduction from non-renewable decentralised energy (e.g. CHP) have been incorporated

8.28 Monitoring. The **installation of monitoring equipment in all major developments** will provide important information showing actual energy performance and will aid the Council's and developers' understanding of the effectiveness of measures implemented in the borough. Such data would also inform the Council as to whether policy requirements are being met. Monitoring shall include any renewable or low carbon technology that contributes to meeting London Plan Policy 5.2.

Policy CC2 - Adapting to climate change

The Council will require development to be resilient to climate change.

All development should adopt appropriate climate change adaptation measures such as:

a. 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.

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

h. 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.

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Local Plan Policy CC1 requires all major developments to assess the feasibility of connecting to an existing decentralised energy network.

Policy CC3 - Water and flooding

We will require development to:

a. incorporate water efficiency measures;

b. avoid harm to the water environment and improve water quality;

c. consider the impact of development in areas at risk of flooding (including drainage);

d. incorporate flood resilient measures in areas prone to flooding;

e. utilise Sustainable Drainage Systems (SuDS) in line with the drainage hierarchy to achieve a greenfield run-off rate where feasible; and

f. not locate vulnerable development in flood-prone areas.

8.55. Residential developments will be expected to meet the requirement of 110 litres per person per day (including 5 litres for external water use).

Policy CC4 Air quality

The Council will ensure that the impact of development on air quality is mitigated and ensure that exposure to poor air quality is reduced in the borough

8.83 A development can affect air quality in three significant ways:

• emissions from construction and demolition;

• emissions from the combustion of fuel for energy within the building; and

• emissions from transport to and from the building.

Policy CC5 Waste

We will:

a. aim to reduce the amount of waste produced in the borough and increase recycling and the reuse of materials to meet the London Plan targets of 50% of household waste recycled/composted by 2020 and aspiring to achieve 60% by 2031;

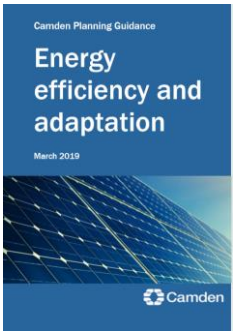
b. deal with North London's waste by working with our partner boroughs in North London to produce a Waste Plan, which will ensure that sufficient land is allocated to manage the amount of waste apportioned to the area in the London Plan;

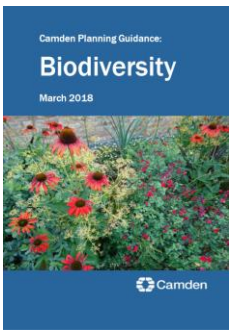
c. safeguard Camden's existing waste site at Regis Road unless a suitable compensatory waste site is provided that replaces the maximum throughput achievable at the existing site; and

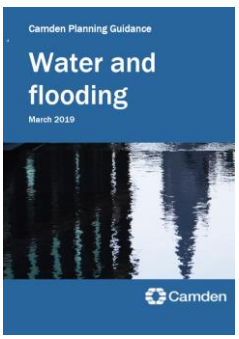
d. make sure that developments include facilities for the storage and collection of waste and recycling.

8.98 Waste Management Plan. To ensure an integrated approach to waste management and the highest possible reuse and recycling rates, the Council will encourage the submission of a site waste management plan prior to construction. For further details please refer to our supplementary planning document Camden Planning Guidance on sustainability

Camden have also developed a series of guidance documents e.g.







SUMMARY OF KEY POLICY

1. **Low Carbon Emissions**. For major schemes, 'Zero Carbon' residential. 35% improvement in regulated CO_2 emissions over the Target Emission Rate (TER) outlined in the national Building Regulations 2013 for both residential and commercial areas.
2. **Renewable Energy**. Major development proposals should incorporate renewable energy technology. A 20% contribution to the annual energy demand of the entire scheme should be targeted where feasible.
3. **Low Water Use.** Residential development should be designed so that mains water consumption would meet a target of 105 litres or less per head per day, excluding an allowance of 5 litres or less per head per day for external water use.

APPENDIX 2 – WATER CALCULATION

Water Efficiency Calculator for New Dwellings

Project No. - Project Name	**581 - 79 Avenue Road**	**Calculation:**	
Building Regulations Application Ref.		**No. Bedrooms:**	8
Date	**05/03/2021**	**No. of People:**	8

Appliance / Useage Details

Taps (excl. kitchen taps)

Tap Fitting Type	Flow Rate (litres/min)	Quantity	Total per Fitting type
Bathroom basin	5.00	15	75.00
			0.00
			0.00
Total No. of Fittings	(No.)		15
Total Flow	(l/s)		75.00
Maximum Flow	(l/s)		5.00
Average Flow	(l/s)		5.00
Weighted Average Flow	(l/s)		3.50
Flow for Calculation	(l/s)		**5.00**

Baths

Bath Type	Capacity to Overflow	Quantity	Total per Fitting type
main bath	0.00	0	0.00
ensuite bath	170.00	6	1020.00
			0.00
Total No. of Fittings	(No.)		6
Total Capacity	(l)		1020.00
Maximum Capacity	(l)		170.00
Average Capacity	(l)		170.00
Weighted Average Capacity	(l)		119.00
Capacity for Calculation	(l)		**170.00**

Dishwashers

Dishwasher Type	litres per Place Setting	Quantity	Total per Fitting type
dishwasher	1.25	3	3.75
			0.00
Total No. of Fittings	(No.)		3
Total Consumption	(l/s)		3.75
Maximum Consumption	(l/s)		1.25
Average Consumption	(l/s)		1.25
Weighted Average Consumption	(l/s)		0.88
Consumption for Calculation	(l/s)		**1.25**

Kitchen Taps

Tap Fitting Type	Flow Rate (litres/min)	Quantity	Total per Fitting type
kitchen sink	6.00	4	24.00
			0.00
Total No. of Fittings	(No.)		4
Total Flow	(l/s)		24.00
Maximum Flow	(l/s)		6.00
Average Flow	(l/s)		6.00
Weighted Average Flow	(l/s)		4.20
Flow for Calculation	(l/s)		**6.00**

Showers

Shower Fitting Type	Flow Rate (litres/min)	Quantity	Total per Fitting type
separate shower	8.00	12	96.00
shower above bath	8.00	0	0.00
			0.00
Total No. of Fittings	(No.)		12
Total Flow	(l/s)		96.00
Maximum Flow	(l/s)		8.00
Average Flow	(l/s)		8.00
Weighted Average Flow	(l/s)		5.60
Flow for Calculation	(l/s)		**8.00**

WCs

WC Type	Full Flush Volume	Part Flush Volume	Quantity
standard WC	4.00	2.6	14
Total No. of Fittings			14
Average effective flushing volume			3

Washing Machines

Washing Machine Type	litres per Kg Dry Load	Quantity	Total per Fitting type
washing machine	8.17	2	16.34
			0.00
Total No. of Fittings (No.)	(No.)		2
Total Consumption (l)	(l/s)		16.34
Maximum Consumption (l)	(l/s)		8.17
Average Consumption (l/s)	(l/s)		8.17
Weighted Average Consumption (l)	(l/s)		5.72
Consumption for Calculation (l/s)	(l/s)		**8.17**

Other Fittings

Waste Disposal Y/N		N
Water Softener Regeneration Consumption >4% (l/p/day)		

Use of Grey Water & Harvested Rainwater

Total Grey water from WHB taps	(litres)	75.84
Total Availble Grey Water Supply	(litres)	505.12
Possible Demand	(litres)	245.53
Grey/Rainwater Installed Capacity	(litres)	
Figure for Calculation	(l/person/day)	0.00

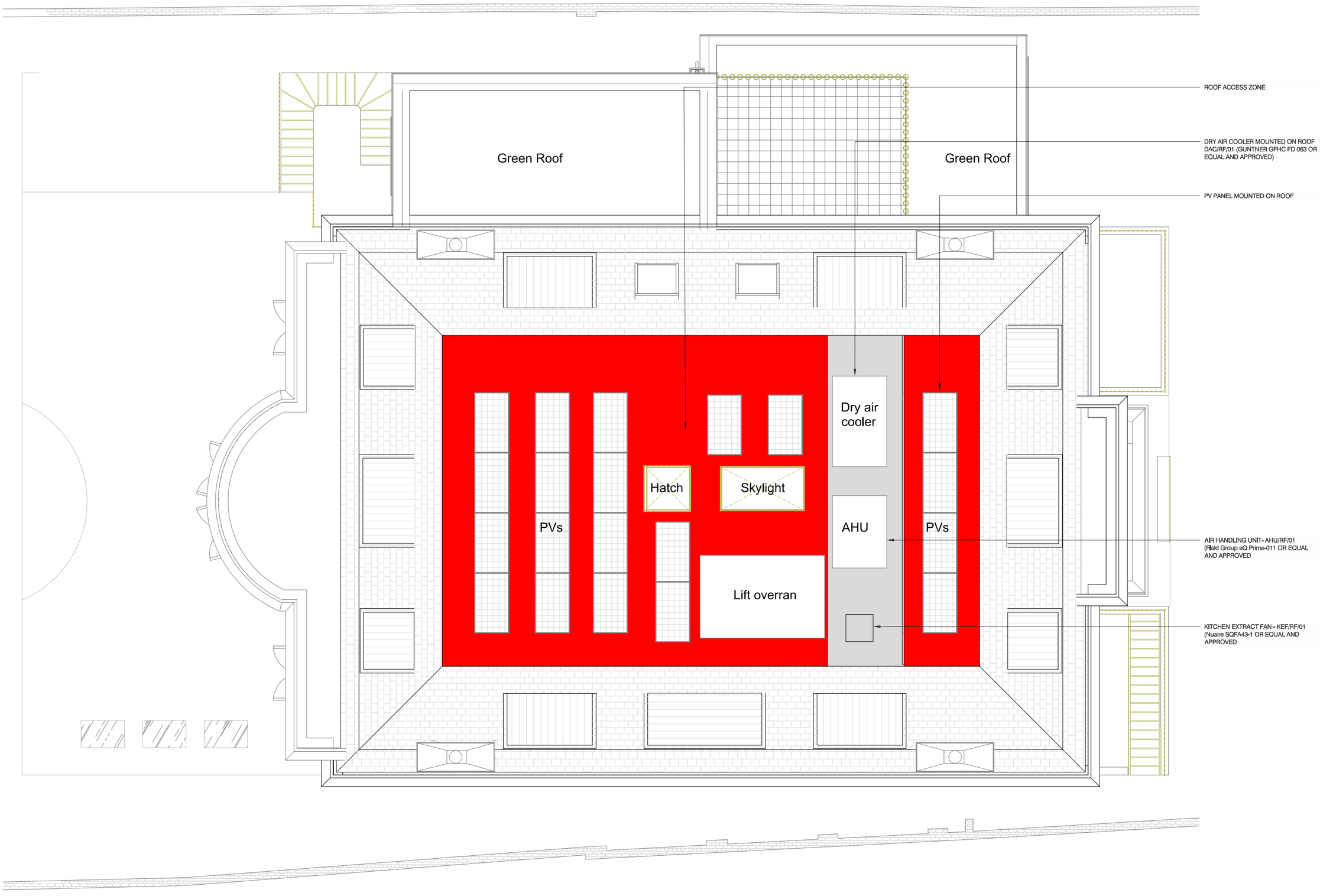
Installation Type	Unit	Capacity / Flow Rate	Use Factor		Total Use (l/p/day)
WC Single Flush	volume (litres)	0.0	4.4	0.00	0.00
WC Dual Flush	full flush (litres)	0.0	1.5	0.00	0.00
	part flush (litres)	0.0	3.0	0.00	0.00
WC's (Multiple)	volume (litres)	3.1	4.4	0.00	13.53
Taps Exc. Kitchen	(l/s)	5.0	1.6	1.58	9.48
Bath (shower present)	(l/s)	170.0	0.1	0.00	18.70
Shower (bath present)	(l/s)	8.0	4.4	0.00	34.96
Bath Only	(litres)	0.0	0.5	0.00	0.00
Shower Only	(l/s)	0.0	5.6	0.00	0.00
Kitchen Taps	(l/s)	6.0	0.4	10.36	13.00
Washing Machines	(l/kg dry load)	8.2	2.1	0.00	17.16
Dishwashers	(l/place setting)	1.3	3.6	0.00	4.50
Waste Disposal	(l/s)	0.0	3.1	0.00	0.00
Water Softener	(l/s)	0.0	1.0	0.00	0.00
Total Calculated Water Use (l/p/day)					**111.33**
Grey/RainWater Reused (l)					0.00
Normalisation Factor	(Factor)				0.91
Total Consumption CSH (l/p/day)					**101.31**
External Water Use Allowance (l)					5.00
Total Comsumption Part G (l/p/day)					**106.31**

Assesment Result	**PASS**

APPENDIX 3 – PV PANEL LAYOUT

NOTES

1. Do not scale this drawing
2. Drawing only to be used for the status indicated
3. Drawing to be read in conjunction with relevant architectural and structural drawings and specifications
4. Refer to architectural drawings for setting out of all plant & equipment
5. All plant installations shall be compliant with the requirements set out within the Acoustic Planning Compliance Report by KP Acoustics.



NO.	REVISION	DATE
P3	Preliminary	29/06/21
P2	Preliminary	07/05/21
P1	Preliminary	31/01/20

DRAWING STATUS

PRELIMINARY

LOCATION PLAN

INTEGRATION
3-5 SPAFIELD STREET
LONDON EC1R 4QB
T 44 (0) 20 7183 8610
INTEGRATIONUK.COM

CLIENT

PRIVATE CLIENT

ARCHITECT

KSR ARCHITECTS LLP
14 Greenland Street
London, NW1 0ND

PROJECT

79 AVENUE ROAD
London
NW8 6JD

TITLE

MEP SERVICES
Roof Services Layout

DATE	SCALE	SIZE
APRIL 2021	1:50	A1

DRAWING NO.	REV.
581-INT-XX-RF-DR-MEP-6007	**P3**