ENERGY & SUSTAINABILITY STATEMENT

32-34 Avenue Road

Produced by XCO2 for Private Client

April 2022

XCO2
56 Kingsway Place, Sans Walk
London EC1R 0LU

+44 (0)20 7700 1000
mail@xco2.com
xco2.com

CONTENTS

EXECUTIVE SUMMARY 5
INTRODUCTION 7
PLANNING POLICIES 8
PROPOSED SUSTAINABILITY MEASURES 16
ENERGY STRATEGY 26
CONCLUSIONS 37
APPENDIX A – OVERHEATING RISK ASSESSMENT ..... B
APPENDIX B – SAP RESULTS AND ASSUMPTIONS ..... B
APPENDIX C – SUSTAINABILITY PRO-FORMA C

	1.0					
Remarks	Draft	Revision				
Prepared by	JS	JS				
Checked by	KM	KM				
Authorised by	RM	RM				
Date	13/04/2022	26/04/2022				
Project reference	9.734	9.734				

EXECUTIVE SUMMARY

The sustainability and energy strategy for the 32-34 Avenue Road development has been developed to comply with the relevant policies of the London Plan and of the London Borough of Camden's Local Plan.

The proposals incorporate a range of sustainable design and construction measures, primarily addressing the sustainable management of resources, the protection and enhancement of the environment and the effective adaptation and mitigation of the development to climate change.

This report presents the sustainability strategy and assesses the predicted energy performance and carbon dioxide emissions of the proposed development at 32-34 Avenue Road, located in the London Borough of Camden.

The proposed development comprises the construction of one three-storey building plus a lower ground floor.

This document is divided into three parts:

1. Planning policies;
2. Proposed sustainability measures; and,
3. Energy Strategy.

The Planning Policy section provides an overview of the site and planning policies applicable to this development in accordance with the London Borough of Camden's Local Plan and supplementary guidance and the London Plan 2021.

The second section on proposed sustainability measures outlines the sustainability measures that have been adopted in the team's aim to maximise sustainability within the site.

The third section describes the predicted energy performance and carbon dioxide emissions of the proposed development at 32-34 Avenue Road. The development will be compared to a notional building constructed to Part L1A standards.

Key sustainability features of the proposals include:

- The re-use of previously developed land;
- Effective site layout in response to the neighbouring context;
- Efficient design of the proposed massing, openings and internal layouts so that habitable spaces across the site benefit from abundant daylight and sunlight levels, whilst impacts to neighbouring buildings are kept to a minimum;
- The specification of water efficient fittings to limit water consumption to less than 105 litres per person per day for domestic uses;
- The protection of natural features of ecological value;
- The incorporation of SUDs in the form of permeable paving and an attenuation tank;
- Enhancing the biodiversity of the site through an extensive green roof, green walls and planting throughout;
- Achieving an UGF OF 0.4;
- Effective pollution management and control: the development is not expected to have any significant adverse effects to air, noise, land or watercourses.

The energy strategy for the scheme focuses on the efficiency of the fabric and building services, so that the energy demand is reduced to the extent feasible. Energy efficiency is primarily achieved through a highly insulated building envelope, a good air permeability rate and a satisfactory thermal bridging y-value. Highly efficient lighting, space conditioning and hot water systems, as well as appropriate controls further reduce the regulated energy demand and consumption of the development. The proposal also incorporates air source heat pumps (ASHPs) as the primary heating system.

In total, the development is expected to achieve regulated CO_2 savings of 41.0% compared to a notional development that meets the minimum Part L 2013 Regulations standards of performance.

The proposed development therefore complies with the London Plan CO_2 savings target of 35% overall.

To achieve 'zero carbon' for the residential portion of the scheme, 12.2 tonnes per annum of regulated CO_2, equivalent to 365.4 tonnes over 30 years, from the new-build domestic portion should be offset offsite. This equates to a total carbon offset contribution of £34,715.

Any carbon offset contributions will be subject to viability discussions and detailed design stage calculations.

The proposals in their entirety reflect the client and design team's aspirations in delivering a high-quality, energy efficient development that underpins the sustainability of the built environment.

INTRODUCTION

The proposed residential development is located within the London Borough of Camden. This section presents the description of the site and of the development proposal.

SITE & PROPOSAL

The proposed development is located within the London Borough of Camden and comprises a 3-storey residential building plus a lower ground floor.

The site is located in a residential area, with the surrounding context currently comprising two to three storey residential properties. It is bounded to the north and west by Radlett Place, the south by Avenue Road and to the east by Primrose Hill 11 Aside Football Pitches.

The location of the development site is shown in Figure 1 below.

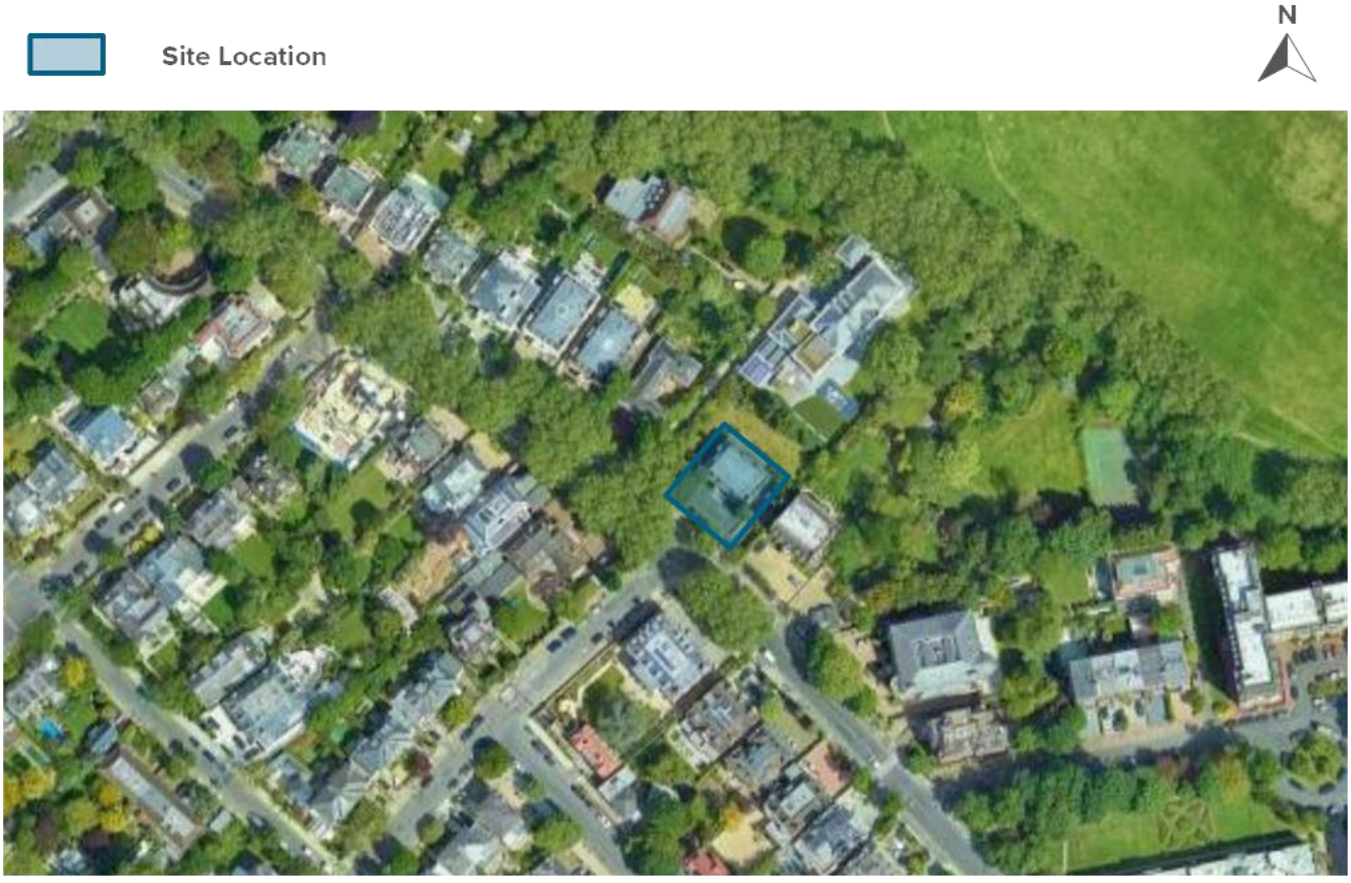


Figure 1: Location of the application site.

PLANNING POLICIES

The proposal will seek to respond to the energy and sustainability policies of the London Plan and of the policies within the London Borough of Camden's Local Plan and supplementary guidance.

The most relevant applicable energy policies in the context of the proposed development are presented below.

THE LONDON PLAN (2021)

The London Plan (2021) published 2nd March 2021 sets out the Mayor's overarching strategic spatial development strategy for greater London and underpins the planning framework from 2019 up to 2041. This document replaced the London Plan 2016.

The new Plan has a strong sustainability focus with many new policies addressing the concern to deliver a sustainable and zero carbon London.

Policy GG6 Increasing Efficiency and Resilience is an overarching policy references London's target to become zero carbon by 2050 and the need to design buildings and infrastructure for a changing climate, addressing water, flood and urban heat island.

Sustainability is a trend through the whole Plan but is particularly addressed in chapter 9 Sustainable Infrastructure. The following sections outline the key principles of sustainable design and construction to be incorporated in major proposals.

Policy SI1 Improving air quality requires development proposals to be at least air quality neutral and submit an Air Quality Assessment.

"...
Development plans, through relevant strategic, site specific and area-based policies should seek opportunities to identify and deliver further improvements to air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality.
..."

Any mitigation required to meet the Air Quality Neutral target should be done on site preferably.

Policy SI2 Minimising greenhouse gas emissions sets the requirements for all major developments to follow the energy hierarchy and achieve net-zero-carbon for both residential and non-residential schemes (via on-site carbon reductions and offset payments) and introduces new targets at Lean stage:

"...
This means reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand in accordance with the following energy hierarchy:
1) be lean: use less energy and manage demand during operation
2) be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly
3) be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site
4) be seen: monitor, verify and report on energy performance.
..."

"...
A minimum on-site reduction of at least 35 per cent beyond Building Regulations is required for major development. Residential development should achieve 10 per cent, and non-residential development should achieve 15 per cent through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided, in agreement with the borough, either:
1) through a cash in lieu contribution to the borough's carbon offset fund, or
2) off-site provided that an alternative proposal is identified and delivery is certain.
..."

This policy also sets the requirements to consider whole-life carbon emissions, including embodies carbon and unregulated emissions:

"...
Major development proposals should calculate and minimise carbon emissions from any other part of the development, including plant or equipment, that are not covered by Building Regulations, i.e. unregulated emissions.

Development proposals referable to the Mayor should calculate whole lifecycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions.
..."

The policy supporting text provides additional clarifications on the requirements for major developments:

- Developments including major refurbishments should also aim to meet the net-zero carbon target.
- All developments should maximise opportunities for on-site electricity and heat production from solar technologies (photovoltaic and thermal), use innovative building materials and smart technologies.
- Recommendation to use SAP10 carbon factors as per GLA Energy Guidance.
- Recommended carbon offset price of £95 per tonne CO_2.
- Requirement for major developments to monitor and report operational energy performance to the GLA.

Policy SI 3 Energy Infrastructure requires all major developments within Heat Network Priority Areas will need to utilise a communal low-temperature heating system. Where developments are utilising CHP this policy also requires them to demonstrate that 'the emissions relating to energy generation will be equivalent or lower than those of an ultra-low NOx gas boiler'. Any combustion on site should meet the requirements of part B of Policy SI1.

Policy SI 4 Managing heat risk requires:

A Development proposals should minimise adverse impacts on the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure.

B Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:
1) reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure
2) minimise internal heat generation through energy efficient design
3) manage the heat within the building through exposed internal thermal mass and high ceilings
4) provide passive ventilation
5) provide mechanical ventilation
6) provide active cooling systems.

Policy SI5 Water infrastructure sets the requirements to manage water resources efficiently:

"...
Development proposals should:
1) through the use of Planning Conditions 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)
2) achieve at least the BREEAM excellent standard for the 'Wat 01' water category or equivalent (commercial development)
3) incorporate measures such as smart metering, water saving and recycling measures, including retrofitting, to help to achieve lower water consumption rates and to maximise future-proofing.
..."

Policy SI 7 Reducing waste and supporting the circular economy introduces the notion of circular economy whereby materials are retained in use at their highest value for as long as possible. For referable applications a Circular Economy Statement demonstrating how developments promote circular economy and aim to be net zero-waste must be submitted.

Policy SI12 Flood risk management and **Policy SI 13 Sustainable drainage** sets the requirements for development proposals to ensure that flood risk is minimised, and that sustainable drainage is incorporated. This should be pursued by integrating different strategies including natural flood management. Development proposals should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible. For this green features should be employed, following the drainage hierarchy.

Policy D14 Noise requires that noise impacts are minimised and mitigated to avoid any adverse impacts on health and quality of life and to reflect the principles set in **Policy D13 Agent of Change** that "*places the responsibility for mitigating impacts from existing noise and other nuisance-generating activities or uses on the proposed new noise-sensitive development.*"

Policy G5 Urban greening requires major developments to contribute to greening of London assessed by an Urban Greening Factor (UGF).

Boroughs should develop their UGF but *"the Mayor recommends a target score of 0.4 for developments that are predominately residential, and a target score of 0.3 for predominately commercial development (excluding B2 and B8 uses)."*

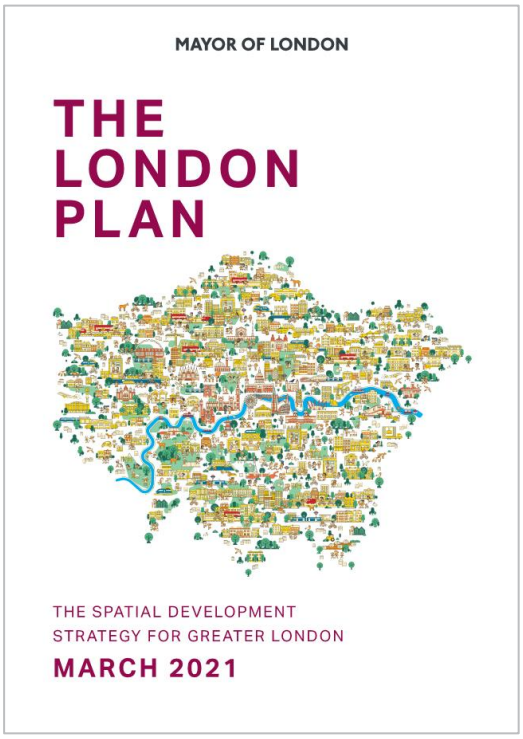
Separate guidance on UGF is under consultation in Spring/Summer 2021.

Policy G6 Biodiversity and access to nature states:

> *"...*
> *Development proposals should manage impacts on biodiversity and aim to secure net biodiversity gain. This should be informed by the best available ecological information and addressed from the start of the development process.*
> *..."*

It is noted that the proposed scheme does not constitute 'major' development, and therefore London Plan policies, intended for major developments, are not applicable in this case.

The London Plan's Energy Hierarchy has however been followed in developing the energy strategy for the proposals, in line with Local Plan guidance. Further details on the Energy Hierarchy can be found in the Energy Strategy Summary section of this report.



GLA GUIDANCE ON PREPARING ENERGY ASSESSMENTS

This document (last updated in April 2020) provides guidance on preparing energy assessments to accompany strategic planning applications; it contains clarifications on Policy SI 2, of the new London Plan, carbon reduction targets in the context of zero carbon policy, as well as detailed guidelines on the content of the Energy Assessments undertaken for planning.

The guidance document specifies the emission reduction targets the GLA will apply to applications as follows:

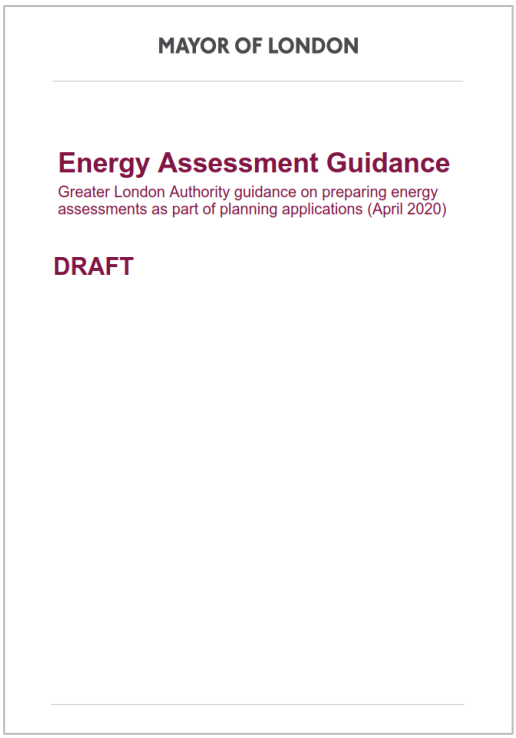
The regulated carbon dioxide emissions reduction target for major domestic and non-domestic development is net zero carbon, with at least a 35% on-site reduction beyond Part L 2013 of the Building Regulations.

The definition of zero carbon homes is provided on Page 54 of the guidance:

> *Zero carbon homes - homes forming part of major development applications (i.e. those with 10 or more units) where the residential element of the application achieves at least a 35 per cent reduction in regulated carbon dioxide emissions (beyond Part L 2013) on-site. The remaining regulated carbon dioxide emissions, to 100 per cent, are to be offset through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings elsewhere.*

The new guidance also includes changes to technical requirements relating to the use of updated carbon factors, cost estimates, overheating risk analysis, the structure of the heating hierarchy and scrutiny over the performance of heat pumps.

The structure of this report and the presentation of the carbon emission information for the development follows the guidance in this document.


MAYOR OF LONDON

Energy Assessment Guidance

Greater London Authority guidance on preparing energy assessments as part of planning applications (April 2020)

DRAFT

HOUSING SPG

This document provides guidance on the implementation of housing policies in the London Plan and it replaces the 2012 Housing SPG.

Part 2 covers housing quality and updates London housing standards to reflect the implementation of the government's new national technical standards through the Minor Alterations to the London Plan (2015-2016).

As design affects the quality of life, health & wellbeing, safety and security of users and neighbours, this guidance is integral to sustainable development and will be cross-referenced as relevant in the subsequent sections.

CAMDEN LOCAL PLAN (2017)

The Camden Local Plan, adopted in 2017, sets out the following policies for energy:

Policy CC1: Climate change mitigation

The Council will require all development to minimise the effects of climate change and encourage all developments to meet the highest feasible environmental standards that are financially viable during construction and occupation.

We will:

a) promote zero carbon development and require all development to reduce carbon dioxide emissions through following the steps in the energy hierarchy;

b) require all major development to demonstrate how London Plan targets for carbon dioxide emissions have been met;

c) ensure that the location of development and mix of land uses minimise the need to travel by car and help to support decentralised energy networks;

d) support and encourage sensitive energy efficiency improvements to existing buildings;

e) require all proposals that involve substantial demolition to demonstrate that it is not possible to retain and improve the existing building;

f) expect all developments to optimise resource efficiency.

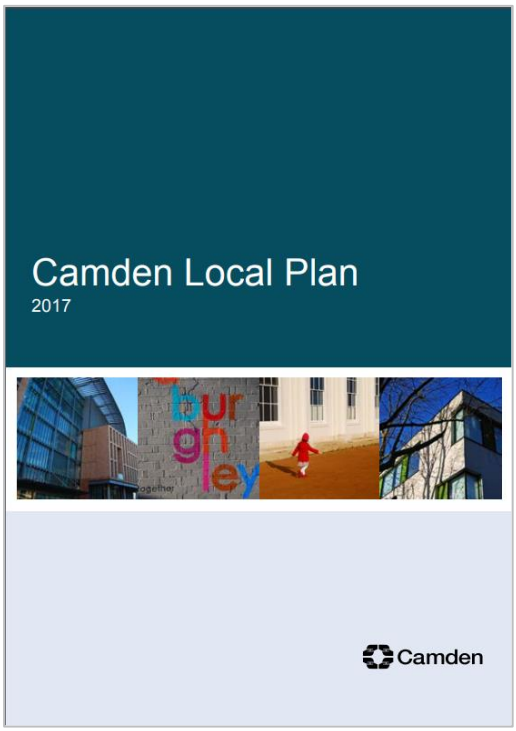
For decentralised energy networks, we will promote decentralised energy by:

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.



CAMDEN PLANNING GUIDANCE – ENERGY EFFICIENCY AND ADAPTION

The Camden Planning Guidance for Energy Efficiency and Adaption has been prepared to support the policies within the Camden Local Plan (2017). The guidance provides most specific information on the key energy and resource issues within the Borough. The document was adopted in January 2021 and replaces the CPG Energy Efficiency and Adaption March 2019.

The sections of the current version of the document that will be covered by the following sections of this Energy Statement are listed below :

The energy hierarchy

- *All developments in Camden is expected to reduce carbon dioxide emissions by following the energy hierarchy in accordance with Local Plan policy CC1.*
- *Energy strategies are to be designed following the steps set out in the energy hierarchy.*

Making buildings more energy efficient

- *Natural 'passive' measures should be prioritised over active measures to reduce energy.*
- *Major residential to achieve 10%, and non-residential to achieve 15% reduction (beyond part L Building regulations), in accordance with the new London Plan, through on-site energy efficiency measures (Be lean stage).*

Decentralised energy

- *All new major developments in Camden are expected to assess the feasibility of decentralised energy network growth.*

Renewable energy technologies

- *There are a variety of renewable energy technologies that can be installed to supplement a development's energy needs.*
- *Developments are to target a 20% reduction in carbon dioxide emissions from on-site renewable energy technologies.*

Energy statements

- *Energy statements are required for all developments involving 5 or more dwellings and/or 500sqm or more of any (gross internal) floorspace.*
- *Energy statements should demonstrate how a development has been designed following the steps in the energy hierarchy.*
- *The energy reductions should accord to those set out in the following chapter 'Energy reduction'.*

Energy reduction

- *All development in Camden is expected to reduce carbon dioxide emissions through the application of the energy hierarchy.*
- *All new build major development to demonstrate compliance with London Plan targets for carbon dioxide emissions.*
- *Deep refurbishments (i.e. refurbishments assessed under Building Regulations Part L1A/L2A) should also meet the London Plan carbon reduction targets for new buildings.*
- *All new build residential development (of 1 – 9 dwellings) must meet 19% carbon dioxide reduction.*
- *Developments of five or more dwellings and/or more than 500sqm of any gross internal floorspace to achieve 20% reduction in carbon dioxide emissions from on-site renewable energy generation.*

Energy efficiency in existing buildings

- *All developments should demonstrate how sustainable design principles have been considered and incorporated.*
- *Sensitive improvements can be made to historic buildings to reduce carbon dioxide emissions.*
- *Warm homes and buildings are key to good health and wellbeing. As a guide, at least 10% of the project cost should be spent on environmental improvements.*
- *The 20% carbon reduction target (using on-site renewable energy technologies) applies for developments of five or more dwellings and/or more than 500sqm of any gross internal floorspace.*

Reuse and optimising resource efficiency

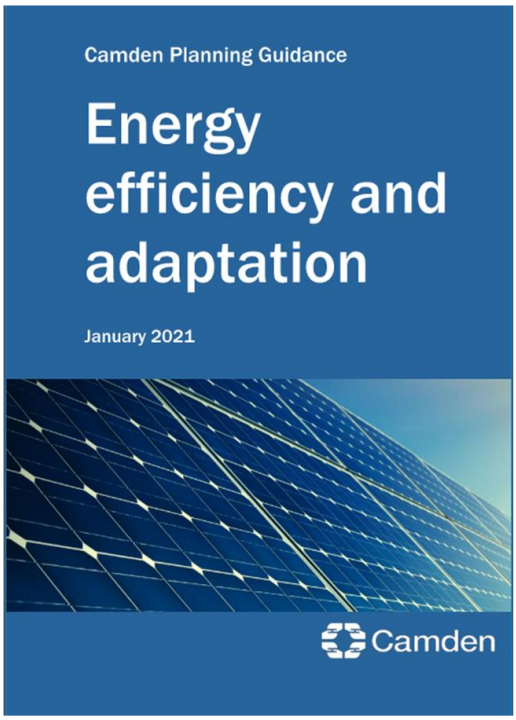
- *Creative and innovative solutions to repurposing existing buildings, and avoiding demolition where feasible will be expected.*
- *All development should seek to optimise resource efficiency and use circular economy principles.*
- *Where demolition cannot be avoided developments are expected to divert 85% of waste from landfill (see paragraph 8.17 Local Plan).*

Sustainable design and construction principles

- *All developments involving 500 sqm or more should address sustainable design and construction measures (proposed in design and implementation) in a Sustainability Statement (Local Plan policy CC2).*
- *Active cooling (air conditioning) will only be permitted where its need is demonstrated and the steps in the cooling hierarchy are followed (Local Plan policy CC2).*
- *Development is expected to reduce overheating risk through following the steps in the cooling hierarchy. All new development should submit a statement demonstrating how the cooling hierarchy has been followed (Local Plan policy CC2).*
- *All developments should seek opportunities to make a positive contribution to green space provision or greening.*

Sustainable design and construction principles

- *BREEAM Excellent is required for all non-residential development of 500sqm or more floorspace.*
- *Other assessment tools such as Home Quality Mark and Passivhaus are encouraged, they can serve to demonstrate the incorporation of sustainable design principles.*



PROPOSED SUSTAINABILITY MEASURES

This part of the report presents the key elements of the proposal that underpin environmental sustainability, demonstrates how the development complies with sustainable development policies and incorporates guidance on sustainable design and construction.

LAND AND SITE LAYOUT

Land use

The land for this proposal is efficiently used as the scheme will be constructed on previously developed land. The site currently comprises a large, detached house.

Reuse of Existing Buildings

A whole life cycle carbon assessment was carried out for the proposed development to assess the retain and refurbish proposal against the progressed new build proposal. This assessment concluded that when considering embodied carbon & operation energy the refurbished scheme has total carbon emissions higher than that of the new build option over a predicted 60-year lifespan. This is attributed to the lower performance of the building fabric and internal conditions from the refurbished option, compared to that possible from the demolition and erection of a new building.

The demolition waste that arises as part of this new build development will be reused within the project wherever feasible. Where this is not viable, the waste will be recycled.

Land Form and Site Layout

Consideration has been given to the layout and scale of the surrounding buildings. The height of the surrounding context 2-4 storey residential buildings.

The scheme comprises a residential development that includes the construction of one, three-storey building plus lower ground floor. Therefore, acknowledging the surrounding context within its design.

Daylight & Sunlight Impacts

Consideration has been given to neighbouring amenity and open spaces; due to appropriate design of the building and overall site layout these will experience minimal overshadowing effects. The scheme has also been found to have no adverse effects on access to daylight and sunlight of neighbouring properties (please refer to the Daylight and Sunlight Assessment submitted in support of this application).

Micro-climate

A microclimate is the distinctive climate of a small-scale area and the variables within it, such as temperature, rainfall, wind or humidity may be subtly different to the conditions prevailing over the area as a while. The main characteristics of microclimates within London are temperatures and wind. The proposed scheme is not of a scale that could potentially have any significant impact on wind conditions around the site or any adverse effects on pedestrian and residents' comfort.

Urban Greening

The proposed scheme will contribute to the increase of green spaces within London by providing landscaped areas, which contribute to increase in physical activity and relaxation of the owner, improvement of local air quality, and reduction of Urban Heat Island effect.

Impacts on Neighbours from Demolition and Construction

Construction impacts such as dust generation and increased traffic movements will be minimised through adoption of best practice construction measures, formalised through the production of a Construction and Environmental Management Plan to be delivered by the main contractor where appropriate.

Land Contamination

In the event of any discovery of potentially contaminated soils or materials, this discovery will be quarantined and reported to the most senior member of site staff or the designated responsible person at the site for action. The location, type and quantity will be recorded and the Local Authority, a competent and appropriate third party will be notified immediately. An approval from the Local Authority will be sought prior to implementing any proposed mitigation action.

HEALTH AND WELLBEING

Inclusive Design

The development aims to prioritise the future needs of occupants by ensuring that the dwelling is designed to comply with Part M of the Building Regulations.

Safety and Security

The design team will comply with the principles of Secured by Design to provide safe and secure spaces.

Open Spaces/Amenity

Private amenity spaces are provided as part of the design to allow the owner areas to gather, socialise and connect to the natural environment. This will also enhance the occupant's wellbeing as nature can significantly improve mood and happiness.

Daylight/Sunlight

By including good levels of glazing throughout the design the proposed development ensures that occupants enjoy satisfactory levels of visual comfort and beneficial effects from daylight exposure, whilst also reducing energy consumption by minimising the use of artificial lighting as far as feasible.

Physical activity

The presence of amenity providers (shops, pharmacies, public park) within walking distance to the development will encourage residents to walk rather than use personal vehicles.

ENERGY & CARBON DIOXIDE EMISSIONS

The Energy Strategy for the development has been designed in line with the London Plan's Policy SI2 which states that every effort should be made to minimise carbon dioxide emissions in accordance with the following energy hierarchy:

- Be lean: use less energy
- Be clean: supply energy efficiently
- Be green: use renewable energy
- Be seen: monitoring

Be Lean

The buildings have been thoughtfully designed to reduce energy demand through an enhanced building fabric, minimising heat loss through air infiltration, reducing reliance on artificial lighting, utilising low energy lighting and ensuring adequate levels of ventilation are maintained whilst reducing heat loss through the specification of MVHR.

Be Clean

The application site is located in an area where district heating is not expected to be implemented in the future. ASHP are instead proposed to provide heat to the dwelling.

Be Green

A range of renewable technologies were considered for generating on-site renewable energy. Air source heat pumps (ASHP) were considered a suitable technology for this development due to adequate space to house the necessary plant equipment, easy installation process, and substantial CO_2 savings. The incorporation of this technology into this development would contribute a reduction of 30.5% of regulated CO_2 emissions over the baseline emissions.

Be Seen

In addition to the above design measures, the development will incorporate monitoring equipment and systems to enable occupiers to monitor and reduce their energy use.

A smart meter will be installed to monitor the heat and electricity consumption; the display board will demonstrate real-time and historical energy use data and will be installed at an accessible location within the dwelling.

WATER

Water Efficiency

The development at Avenue Road aims to reduce water consumption to less than 105 litres per person per day, in line with the recommended target set out in the Housing SPG, through the use of water efficient fittings, and these are listed below.

Table 1: Recommended specification for sanitary fittings

Fitting	Fitting specification
WC	6/3 litres dual flush
Kitchen sink tap	6 litres per min
Wash basin tap	4 litres per min
Shower	8 litres per min
Bath	180 litres
Washing machine	8.17 litres/kg
Dishwasher	1.25 litres/place setting

Water Efficient Landscaping

Potable water consumption reduction from irrigation can be further maximised through a combination of water reuse and use of both native and drought resistant plant species, which will thrive with little to no irrigation and rely only on natural rainfall.

MATERIALS AND WASTE

Responsible Sourcing

100% of the timber used during construction will be sourced from accredited Forest Stewardship Council (FSC) or Programme for the Endorsement of forestry Certification (PEFC) source.

The main contractor will be required to prioritise products holding responsible sourcing certification (EMS/ISO14001) for the key process as per minimum, to ensure economic, social and environmentally responsible practices are implemented throughout construction products supply chain.

Healthy Materials

To minimise potential sources of indoor air pollution, low VOC paints, finishes and other products will be prioritised as far as practically possible. Best practice design detailing and careful construction techniques will also be employed to reduce the risk of thermal bridging and condensation issues, limiting the potential for mould growth.

Embodied Carbon

To further reduce carbon emissions over the lifecycle of the building, low embodied carbon materials will be used as far as practically possible, whilst also focusing on design practices to reduce waste production.

Circular Economy

Circular economy is based on three key principles: design out waste, keep products and materials in use, and regenerate natural systems. These principles will be applied during the design and construction of the proposed development by following the actions noted below:

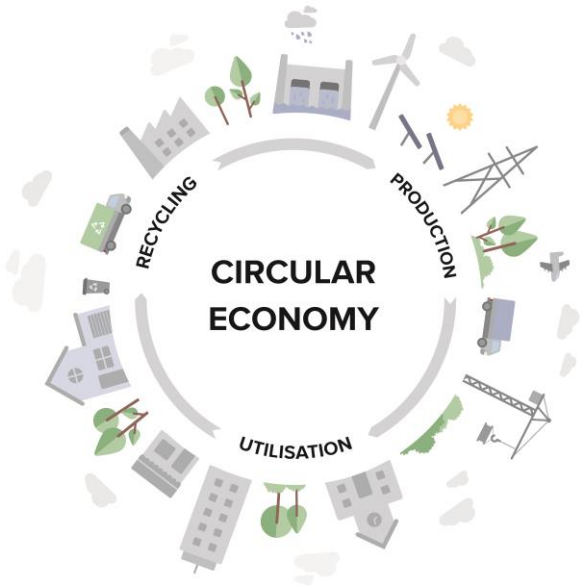
- Design out the need for building components and materials;
- Use of reclaimed materials and remanufactured components over new;
- Product selection considering its entire lifecycle, such as products which can be remanufactured or reused; products with high recycled content; products designed for disassembly; and recyclable or compostable materials.

Construction Waste

A site waste management plan will be prepared for the development and will include a pre-demolition audit to identify any key materials suited for recovery and reuse. The SWMP will outline the methodologies for estimating waste quantities and streams generated during the demolition, excavation and construction stages of the site works, and set out recommended measures required to be adopted by the Main Contractor to minimise these as far as practically possible.

Operational Waste

An operational waste management strategy will be produced and implemented for the proposed development. This will demonstrate how the development has taken into account sustainable methods for waste and recycling management during its operation in order to meet requirements from the London Plan and Camden policies and all applicable legal requirements.



NATURE CONSERVATION & BIODIVERSITY

The ecology on site will be improved via the introduction of landscaped areas within the proposed private garden. The intended planting strategy for these areas is simple low-level flora, with hedge planting and small ornamental trees. Native plant species will be introduced to these areas where possible. This will help to attract invertebrates, birds and other fauna to the area.

The proposed development aims to improve the green cover of the site by introducing an extensive green roof in addition to green walls and landscaped areas and has made provision for large private amenity space around the entire dwelling. Planting will include heat and drought resistant species, where feasible.

CLIMATE CHANGE ADAPTATION

Overheating

The potential risk of overheating will be mitigated by incorporating both passive and active design measures.

The space heating and hot water to the development will be provided by individual ASHPs. All heat sources and pipe work will be sufficiently insulated to avoid excess heat loss into internal space.

Efficient lighting will be used to further minimise internal heat gains and reduce energy expenditure.

Appropriately sized windows will reduce solar heat gains. Internal blinds will be included to reduce the solar gains into occupied rooms where required. Glazing with appropriate levels of solar transmittance will be used throughout the development to reduce solar gains and reduce the risk of overheating.

During peak summer periods the thermal mass of the buildings will absorb and store excess heat. The buildings will release heat in the cooler evenings to allow for cooler internal spaces, dampening the peak diurnal weather conditions.

The dwelling has been design with passive ventilation as primary strategy for dissipating heat.

Surface Water and Flooding

Sustainable urban drainage systems (SUDS), comprising permeable paving and planting, will be incorporated on site and the buildings' fabric and structure will be designed to minimise risk of infiltration and damage via flooding where possible.

In addition, an attenuation tank with a 750m^2 catchment area will also be incorporated as part of the design.

In accordance with the London Plan, the peak surface water run-off rates will be reduced as far as feasible prior to discharge to the public sewer.

AIR, NOISE AND LIGHT

Air Quality

Air pollution risks from construction and demolition activities on site will be minimal in line with the SPG 'The control of dust and emissions from construction and demolition' under the following categories:

- demolition;
- earthworks;
- construction;
- trackout; and,
- non-road mobile machinery (NRMM).

The potential impacts from dust and stationary plant emissions during the construction period and the potential impact from traffic flows on the local road network on both on-site and off-site receptors, during and after construction should be monitored. Where necessary, mitigation measures should be implemented to reduce any air quality impact.

During the operational phase of the development, combustion of fossil fuels and associated combustion emissions for heating will be reduced via improved levels of insulation and air tightness for the buildings' fabric, and the specification of highly efficient electricity-led servicing strategy.

Noise

The development will incorporate design and building fabric measures to mitigate potential noise levels from the proposed development and ensure the impact of any external sources on internal ambient noise levels are within acceptable limits.

Light Pollution

The lighting design of the proposed development will follow the recommendations of the Institution of Lighting Engineers' Guidance Notes for the Reduction of Obtrusive Light (2005), to minimise light pollution.

Water Pollution

Water pollution to surrounding watercourses will be minimised where possible. In addition, contractors will adopt best practice policies to mitigate water pollution from construction activities on site.

The development will discharge domestic sewage via a connection to the public foul sewer or combined sewer network where it is reasonable to do so.

TRANSPORT

Alternative means of transportation

In order to underpin the reduction of emissions from transport, the development has been designed to encourage cycling; cycle parking will be provided to the dwelling via a secure garden shed location externally on the side of the house by the secondary entry.

Public Transport Accessibility

The proposed site has good transport links. The closest tram station is Swiss Cottage, located approximately 0.5 miles from the site (9 minute walk). From here, the Jubilee line can be caught for transport further afield in London. Alternatively, overground trains can be caught from the South Hampstead tram station which is located a 15 minute walk from the site.

The closest bus stops are located at equal distances on both Adelaide Road, to the north of the site and Prince Albert Road, to the south of the site. From these stops a range of buses can be caught, including the 31, C11, N28, N31 and 274 services.

ENERGY STRATEGY

This section describes the predicted energy performance and carbon dioxide emissions of the proposed 32-34 Avenue Road development based on the information provided by the design team.

The overall regulated CO_2 savings *on site* against a Part L 2013 compliant scheme are estimated at 41.0% for the development.

METHODOLOGY - BE LEAN, BE CLEAN, BE GREEN

The methodology used to determine CO_2 emissions is in accordance with the London Plan's three-step Energy Hierarchy (Policy SI2). The development is compared to a Building Regulations Part L 2013 compliant scheme. The reductions made through each step are outlined below.

BE LEAN – USE LESS ENERGY

The proposals incorporate a range of passive and active design measures that will reduce the energy demand for space conditioning, hot water, ventilation and lighting. Measures will also be put in place to reduce the risk of overheating.

PASSIVE DESIGN MEASURES

ENHANCED U-VALUES

The heat loss of different building fabric elements is dependent upon their U-value, which is a measure of the thermal transmittance through the element. An element with low U-value provides better levels of insulation and reduced heating demand.

The proposed development will incorporate high levels of insulation and high-performance glazing beyond Part L 2013 targets and notional building specifications, in order to reduce the demand for space conditioning (heating and/or cooling).

The table below shows the improved performance of the proposed building fabric beyond the Building Regulations requirements.

Table 2: Thermal Envelope U-values

Domestic (U-values in W/m².K)			
Element	**Building Regulations**	**Proposed**	**Improvement**
External Walls	0.30	0.15	50%
Swimming pool basin walls	0.25	0.20	33%
Dormer cheeks	0.30	0.20	33%
Floor	0.25	0.10	60%
Main Roof	0.20	0.10	50%
Terraces/ dormers	0.20	0.15	25%
Windows	2.00	1.20	40%

AIR TIGHTNESS IMPROVEMENT

Heat loss may also occur due to air infiltration. Although this cannot be eliminated altogether, good construction detailing and the use of best practice construction techniques can minimise the amount of air infiltration.

The proposed development will aim to improve upon the Part L 2013 minimum standards for air tightness by targeting air permeability rates of $3m^3/m^2.h$ at 50Pa.

REDUCING THE NEED FOR ARTIFICIAL LIGHTING

The design of the development incorporates large areas of glazing across all building elevations, to optimise daylight in occupied spaces. Good internal daylight levels will translate to less dependency on artificial lighting and will indirectly deliver energy and carbon savings, together with pleasant, healthy spaces for occupants.

ACTIVE DESIGN MEASURES

HIGH EFFICACY LIGHTING

The development intends to incorporate low energy lighting fittings throughout. All light fittings will be specified as low energy lighting and will primarily accommodate LEDs.

HEAT RECOVERY VENTILATION

Mechanical ventilation heat recovery (MVHR) is proposed. The mechanical ventilation system will include heat recovery in order to achieve ventilation in the most energy-efficient way.

HEAT GENERATION

At the Be Lean Stage of the energy hierarchy, gas boilers with 89.5% efficiency have been assumed in the assessment. Air source heat pumps with high energy efficiency ratios are proposed to be used as part of the final strategy (Be Green stage) and carbon emissions will be minimised. It is proposed that the gross efficiency of these heat pumps is at least 170%.

CONTROLS

Advanced lighting and space conditioning controls will be incorporated, specifically:

- Heating controls in dwellings will comprise either programmer and room thermostats; and,
- Time and temperature zone controls.

MONITORING

Apart from the above design measures, the development will incorporate monitoring equipment and systems to enable occupiers to monitor and reduce their energy use.

Smart meters will be installed to monitor the heat and electricity consumption of each dwelling; the display board will demonstrate real-time and historical energy use data and will be installed at an accessible location within the dwellings.

MINIMISING OVERHEATING

The potential risk of overheating will be mitigated by incorporating passive and active design measures, in line with the London Plan Policy SI4 and the Cooling Hierarchy, as follows.

MINIMISING INTERNAL HEAT GENERATION THROUGH ENERGY EFFICIENT DESIGN

Heat sources and pipework will be sufficiently insulated to reduce heat dissipation in occupied spaces. Efficient lighting will be used to further minimise internal heat gains and reduce energy expenditure.

REDUCING THE AMOUNT OF HEAT ENTERING THE BUILDING IN SUMMER

The openings across the development have been appropriately designed to offer satisfactory daylight and views to occupied spaces, without disproportionately increasing solar gains and overheating risks.

.

USE OF THERMAL MASS AND HIGH CEILINGS TO MANAGE THE HEAT WITHIN THE BUILDING

In summer, and during peak hours of the day a high thermal mass building envelope will absorb and store excess heat that builds up into the space maintaining a cooler indoors compared to a low thermal mass building.

The stored heat will be released back into the space during the cooler hours of the evening; allowing for

night time ventilation the released heat will be rejected to the outside.

A high thermal mass envelope, when coupled with night time ventilation is therefore capable of dampening the peak internal conditions during the day that could otherwise cause thermal discomfort.

PASSIVE VENTILATION

The development has allowed for passive ventilation as the main strategy for dissipating heat that builds up within the building. The passive ventilation strategy includes single-sided ventilation, cross ventilation and night purge ventilation through openable windows and doors, operated by the occupants.

MECHANICAL VENTILATION

The primary strategy for fresh air supply will be through an MVHR system, with a by-pass 'summer mode' activated to allow for free cooling of occupied spaces through the incoming outdoor air and the dissipation of built-up heat.

The dwelling has been designed with passive ventilation as a primary strategy for dissipating heat during peak summer conditions.

OVERHEATING RISK ASSESSMENT

The potential risk of overheating was assessed via the Part L Building Regulation compliance tool SAP.

A non-significant overheating risk was found for the proposed dwelling when modelled in SAP. The SAP overheating risk assessment output be found in Appendix A.

ENERGY USE

The table below shows a breakdown of carbon dioxide emissions associated with the proposed development's fossil fuel and electricity consumption for the different uses. The site-wide data are presented, i.e. the sum of the demand for the development. The figures provide a comparison between the baseline condition and the proposed development once energy efficiency measures (Lean) have been applied.

This table demonstrates the energy savings achieved through energy efficiency measures (Lean stage of the Energy Hierarchy)

Table 3: Breakdown of energy consumption and CO_2 emissions for the baseline and the proposed schemes after 'Lean' measures are implemented

	Baseline			Lean		
	Energy (kWh/yr.)	$kgCO_2$ /yr.	$kgCO_2/m^2$	Energy (kWh/yr.)	$kgCO_2$ /yr.	$kgCO_2/m^2$
Hot Water	3,680	772	0.5	3,740	786	0.5
Space Heating	92,170	19,357	12.0	70,540	14,813	9.2
Cooling	0	0	0.0	0	0	0.0
Auxiliary	80	17	0.0	10,290	2,398	1.5
Lighting	2,170	505	0.3	2,110	492	0.3
Equipment	14,730	3,432	2.1	14,730	3,432	2.1
Total Part L	**98,090**	**20,651**	**12.8**	**86,680**	**18,489**	**11.4**
Total (incl. equipment)	**112,830**	**24,083**	**14.9**	**101,410**	**21,921**	**13.5**

BE LEAN CO_2 EMISSIONS & SAVINGS

By means of energy efficiency measures alone, regulated CO_2 emissions are shown to reduce by:

- 10.5% (2.2 tonnes per annum) across the whole site.

BE CLEAN – SUPPLY ENERGY EFFICIENTLY

The closest identified existing or proposed district heat networks are located at a distance of 1.2km and 1.8km from the site. Therefore, a connection to one of these networks is not deemed feasible for the proposed development; as a result no regulated carbon savings are targeted at this stage of the energy hierarchy.

ENERGY SYSTEM HIERARCHY

The energy system for the development has been selected in accordance with the London Plan decentralised energy hierarchy. The hierarchy listed in Policy SI3 states that energy systems should consider:

- Connection to existing heating and cooling networks;
- Site wide CHP network; and,
- Communal heating and cooling.

Local heat and power sources minimise distribution losses and achieve greater efficiencies when compared to separate energy systems, thus reducing CO_2 emissions.

In a communal energy system, energy in the form of heat, cooling, and/or electricity is generated from a central source and distributed via a network of insulated pipes to surrounding residences.

CONNECTION TO AN EXISTING NETWORK

The London Heat Map identifies existing and potential opportunities for decentralised energy projects in London. It builds on the 2005 London Community Heating Development Study.

An excerpt from the London Heat Map can be seen on the following page which shows the energy demand for different areas. Darker shades of red signify areas where energy demand is high. The map also highlights any existing and proposed district heating networks within the vicinity of the development.

A review of the map shows that the closest networks to the site are the existing Church Street network and the proposed Brent: South Kilburn network. These two networks are situated 1.2km south and 1.8km west of the site respectively. Therefore, a connection to either network is no deemed feasible. Please refer to figure 3 on the following page for a snapshot of the London Heat Map.

Figure 2: Excerpt from the London Heat Map. Existing district networks outlined in red, proposed networks in yellow.

COMMUNAL HEATING AND COOLING

A centralised system is not suitable to a development of this size, due to the development comprising only one dwelling.

INDIVIDUAL HEATING AND COOLING

The proposed development comprises only one dwelling therefore an individual low carbon HVAC strategy is deemed the most suitable.

Space heating and hot water for the proposed dwelling will therefore be provided by individual ASHPs.

BE CLEAN CO_2 EMISSIONS & SAVINGS

Given that it has not been found feasible or viable for the proposed development to incorporate the supply of low carbon heating or cooling, no carbon savings are achieved for this step of the Energy Hierarchy.

BE GREEN – USE RENEWABLE ENERGY

The renewable technologies feasibility study carried out for the development identified air source heat pumps as suitable technologies for the development. The regulated carbon saving achieved in this step of the Energy Hierarchy is 30.5% over the site wide baseline level.

RENEWABLE TECHNOLOGIES FEASIBILITY STUDY

Methods of generating on-site renewable energy (Green) were assessed, once Lean and Clean measures were taken into account.

The development of Avenue Road will benefit from an energy efficient building fabric which will reduce the energy consumption of the proposed development in the first instance. A range of renewable technologies were subsequently considered including:

- Biomass;
- Ground/water source heat pumps;
- Air source heat pump;
- Wind energy;
- Photovoltaic panels, and,
- Solar thermal panels.

In determining the appropriate renewable technology for the site, the following factors were considered:

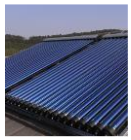
- CO_2 savings achieved;
- Site constraints;
- Any potential visual impacts, and,
- Compatibility with the 'Clean' stage proposals where applicable.

RENEWABLE ENERGY APPRAISAL SUMMARY

The table below summarises the factors taken into account in determining the appropriate renewable technologies for this project. This includes estimated capital cost, lifetime, level of maintenance and level of impact on external appearance. The final column indicates the feasibility of the technology in relation to the site conditions (10 being the most feasible and 0 being infeasible). It is important to note that the information provided is indicative and based upon early project stage estimates.

The feasibility study demonstrates that ASHP would be the most feasible renewable technologies for the proposed Avenue Road development.

Table 4: Summary of renewable technologies feasibility study

		Comments	Lifetime	Maintenance	Impact on external appearance	Site feasibility
Biomass		Not adopted – burning of wood pellets releases high NOx emissions and there are limitations for their storage and delivery within an urban location.	20 yrs.	High	High	5
PV		Not adopted – significant carbon savings are instead achieved with the use of ASHP which have been prioritised.	25 yrs.	Low	Med	8
Solar thermal		Not adopted – sufficient carbon savings are already being achieved plus more savings could gained from PV.	25 yrs.	Low	Med	8
GSHP		Not adopted -the installation of ground loops requires significant space, additional time at the beginning of the construction process and very high capital costs.	20 yrs.	Med	Low	4
ASHP		Adopted	20 yrs.	Med	Med	9
Wind		Not adopted - Wind turbines located at the site will have a significant visual impact on the site and surroundings.	25 yrs.	Med	High	2

DETAILED ASSESSMENT OF AIR SOURCE HEAT PUMPS

Air source heat pumps (ASHPs) employ the same technology as ground source heat pump (GSHPs). However, instead of using heat exchangers buried in the ground, heat is extracted from the external ambient air.

The efficiency of heat pumps is very much dependent on the temperature difference between the heat source and the space required to be heated. As a result, ASHPs tend to have a lower COP than GSHPs. This is due to the varying levels of air temperature throughout the year when compared to the relatively stable ground temperature. The lower the difference between internal and external air temperature, the more efficient the system.

ASHP is considered a suitable technology for the development for the following reasons:

- It is a high efficiency system that can cater for the space heating and cooling of the most energy-intensive areas of the proposed development;
- Requires less capital cost than GSHP and other renewable technologies;
- It can be integrated with the proposed ventilation strategy; and,
- It is simple to install when compared to other renewable technologies.

The table below summarises the technical data for the proposed ASHP and estimated CO_2 savings from the application of this technology. In total the ASHP technology would produce regulated CO_2 savings of 30.5% for the development.

Table 5: Summary of technical/operational data and estimated CO_2 savings for ASHP

ASHP for domestic spaces		
COP heating	1.7	
Carbon intensity of electricity	0.233	$kgCO_2/kWh$
Proportion of space heating and hot water met by ASHP	100	%
Proportion of space cooling met by ASHP	100	%
Energy met by ASHP	66,484	kWh/yr.
Energy used by ASHP	41,951	kWh/yr.
Total CO_2 savings	6.3	t/yr.
Regulated baseline CO_2 emissions	20.7	t/yr.
Total baseline CO_2 emissions	24.1	t/yr.
% Regulated CO_2 reduction*	30.5	%
% Total CO_2 reduction*	26.0	%

* % reduction from site baseline

Figure 3: Outdoor unit of an ASHP

BE GREEN CO_2 EMISSIONS & SAVINGS

The incorporation of renewable technologies will further reduce CO_2 emissions by a further:

- 30.5% (6.3 tonnes per annum) across the whole site.

CUMULATIVE ON-SITE SAVINGS

The total regulated CO_2 savings for the site are 8.5 tonnes, equivalent to 41.0% of the baseline emissions.

CARBON OFF-SETTING

The proposed development complies with the London Plan CO_2 savings target of 35% overall.

To achieve 'zero carbon' for the residential portion of the scheme, 12.2 tonnes per annum of regulated CO_2, equivalent to 365.4 tonnes over 30 years, should be offset offsite.

CONCLUSIONS

The sustainability strategy for the scheme at 32-34 Avenue Road has been developed in line with the relevant policies of the London Plan and of the London Borough of Camden's Local Plan and aims at the efficient management of resources, environmental protection and the effective adaptation and mitigation of the development to climate change.

The energy strategy has been developed in line with the three-step Energy Hierarchy and the cumulative CO_2 savings on site are estimated regulated CO_2 savings for the site as a whole are 41.0%.

SUSTAINABILITY

The proposed Avenue Road development will meet the targets set out by London Borough of Camden and the Greater London Authority (GLA).

Key sustainability features of the proposals include:

- The re-use of previously developed land;
- Effective site layout in response to the neighbouring context;
- Efficient design of the proposed massing, openings and internal layouts so that habitable spaces across the site benefit from abundant daylight and sunlight levels, whilst impacts to neighbouring buildings are kept to a minimum;
- The specification of water efficient fittings to limit water consumption to less than 105 litres per person per day;
- The incorporation of SUDs in the form of permeable paving and an attenuation tank;
- Enhancing the biodiversity of the site through an extensive green roof, green walls and planting throughout;
- Achieving an UGF OF 0.4;
- Effective pollution management and control: the development is not expected to have any significant adverse effects to air, noise, land or watercourses.

The sustainability measures incorporated reflect the client and design team's aspirations in integrating sustainability measures and demonstrates that the project is designed to exceed the planning policy sustainability requirements.

ENERGY STRATEGY

By implementing the three step Energy Hierarchy as detailed in the previous sections, the Regulated CO_2 emissions for the development have been reduced against a Part L 2013 compliant scheme through on-site measures alone by:

- 41.0% (8.5 tonnes per annum) across the whole site.

The proposed development complies with the London Plan CO_2 savings target of 35% overall.

To achieve 'zero carbon' for the residential portion of the scheme, 12.2 tonnes per annum of regulated CO_2, equivalent to 365.4 tonnes over 30 years, from the new-build domestic portion should be offset offsite.

Any carbon offset contributions will be subject to viability discussions and detailed design stage calculations.

The tables in the following pages summarise the implementation of the Energy Hierarchy for the proposed scheme and detail the CO_2 emissions and savings against the baseline scheme for each step of the hierarchy; as well as the savings achieved through carbon offset.

Overall, the proposed development has been designed to meet energy policies set out by the GLA

and the London Borough of Camden, which demonstrates the client and the design team's commitment to enhancing sustainability of the scheme.

DOMESTIC CUMULATIVE SAVINGS

Table 6: CO_2 emissions after each step of the Energy Hierarchy for the domestic part of the development

	Carbon dioxide emissions for domestic buildings (tonnes CO2 per annum)	
	Regulated	Unregulated
Baseline	20.7	3.4
After energy demand reduction	18.5	3.4
After heat network/CHP	18.5	3.4
After renewable energy	12.2	3.4

Table 7: Regulated CO_2 savings from each stage of the Energy Hierarchy for the domestic part of the development

	Regulated domestic carbon dioxide savings	
	Tonnes CO_2 per annum	% over baseline
Savings from energy demand reduction	2.2	10.5%
Savings from heat network/CHP	0	0.0%
Savings from renewable energy	6.3	30.5%
Cumulative on-site savings	8.5	41.0%
Cumulative for offset payments	365.4 tonnes over 30 years	

SITE-WIDE CUMULATIVE SAVINGS

Table 8: Site wide regulated CO_2 emissions and savings

	Total regulated emissions (tonnes CO_2/year)	Regulated CO_2 savings (tonnes CO_2/year)	Percentage saving (%)
Baseline	20.7	-	-
Be Lean	18.5	2.2	10.5%
Be Clean	18.5	0.0	0.0%
Be Green	12.2	6.3	30.5%
Total		8.5	41.0%
Offset to zero carbon for domestic		365.4 tonnes over 30 years	

APPENDIX A – OVERHEATING RISK ASSESSMENT

SAP Ref No.	Dwelling Type	Overheating Risk
1	Detached house	Not significant

APPENDIX B – SAP RESULTS AND ASSUMPTIONS

The table below lists, the TER and DER outputs and the % CO_2 reduction achieved after the Be Lean, Be Clean and Be Green measures have been applied for the proposed dwelling.

The following page shows the DER/TER FSAP2012 worksheets for the proposed dwelling at the Be Lean, Be Clean and Be Green stages. The SAP outputs are available on request.

SAP Ref No.	TER (Gas) ($kgCO_2/m^2/yr$)	Be Lean (Gas)		Be Clean (Gas)		Be Green (Electric)	
		DER ($kgCO_2/m^2/yr$)	% CO_2 reduction	DER ($kgCO_2/m^2/yr$)	% CO_2 reduction	DER ($kgCO_2/m^2/yr$)	% CO_2 reduction
1	13.51	13.89	-2.7%	13.89	0.0%	16.77	-19.5%

APPENDIX C – SUSTAINABILITY PRO-FORMA

London Borough of Camden

Energy Efficiency and Renewable Energy and Sustainability Plan

S106 Pro-forma V.3 – Part A Pre-implementation

(To be submitted for approval : planningobligations@camden.gov.uk)

Scheme address:	32-34 Avenue Road, Camden, London, NW8 6BU
Planning Reference:	
Related Planning References:	
Scheme Description:	The proposed development comprises a 3-storey residential building plus a lower ground floor.
Person/s undertaking review on behalf of applicant *(include organisation name and registration number)***:**	XCO2

This form must be completed by an appropriately qualified independent Energy and Sustainability Consultant, undertaking the review of the Energy Efficiency and Renewable Energy and Sustainability Plans, as required by the S106 Legal Agreement, on behalf of the applicant. Please complete the form in full. If you have any questions please contact planningobligations@camden.gov.uk

S106 CLAUSE DETAILS

Please summarise how the applicant is meeting their planning obligations relating to energy / sustainability as outlined within the S106 agreement (add/ remove rows as applicable).

S106 clause no.	S106 clause wording	Summary of performance

BUILDING SPECIFICATION TARGETS

Energy and Sustainability Statement key targets:

Please outline in the table below the key targets from the Energy and Sustainability Statements submitted at Full Planning stage, and summarise how the detailed design specification compares. Add or delete rows as necessary.

Please clearly outline any reasons for changes to the approved building specification.

	Approved Planning Documents: energy and sustainability statement targets	**Pre-Implementation (Detailed Design Stage): performance against targets**
Carbon reduction targets	The Camden Local Plan (2017) and Energy efficiency and adaptation SPG and London Plan (2021): • Zero Carbon, minimum 35% reduction beyond Part L on site • 10% reduction through on-site energy efficiency measures	The scheme is expected to achieve a 10.5% reduction through on-site energy efficiency measures and 41% reduction beyond Part L overall. Remaining emissions to zero carbon would be offset.
Building fabric u-values and air permeability	Enhanced U-values (W/m2K) and air tightness improvement on Part L 2013	The proposed development will incorporate high levels of insulation and high-performance glazing beyond Part L 2013 targets and notional building specifications and achieve an air permeability of 3m3/hm2 at 50Pa.
Low carbon technologies	Use of low carbon heating systems (e.g. local sources of waste heat or installing heat pumps	The proposed ASHPs are considered a low/zero carbon (LZC) technology as part of the GLA's Energy Hierarchy, for the supply of space heating and hot water.
Renewable energy targets	20% reduction in carbon dioxide emissions from on-site renewable energy generation (which can include sources of site related decentralised renewable energy)	The incorporation of ASHPs is anticipated to achieve a carbon reduction of over 30%.
Decentralised energy network connection	Supply energy efficiently through decentralised energy	The closest identified existing heat network is Church Street and Paddington Green and the closest proposed heat network is South Kilburn. These are located 1.2km south of the proposed site, through the Paddington Basin, and 1.8km west of the site. Due to the distance and scale of the development, it is not currently feasible to connect to either identified network. Carbon reductions are instead achieved through building fabric improvements and LZC technologies.
Metering, monitoring and management	• Energy monitoring, metering and controls to be provided at a level of detail proportionate to development, to inform and facilitate changes in user behaviour • Renewable energy and low carbon technologies to be metered	A smart meter will be installed to monitor heat and electricity consumption; the display board will demonstrate real-time and historical energy use data and will be installed at an accessible location within the dwelling.
	NA	Code for Sustainable Homes withdrawn prior to

Code for Sustainable Homes - **Overall % + Rating** - **% credits Energy** - **% credits Water** **% credits Materials**		scheme.
BREEAM - **Overall % + Rating** - **% credits Energy** - **% credits Water** - **% credits Materials**	BREEAM Excellent is required for all non-residential development of 500sqm	NA, no BREEAM standard or requirement for new residential development.
Materials, sourcing and waste	• Conduct pre-demolition audit identifying all materials within the building, documenting how they will be managed, with a preference for re-use on site, then re-use off site, remanufacture or recycling • 95% of construction and demolition waste to be diverted from landfill • Specify and source materials and other resources responsibly and sustainably	A pre-demolition audit will be carried out and plan for the management of materials produced to ensure at least 95% of construction and demolition waste is diverted from landfill. Material sourcing will be guided by a sustainable procurement plan.
Green infrastructure	• Protection of existing green spaces and promoting new appropriate green infrastructure • Urban Greening Factor target score of 0.4	An Urban Greening Factor of 0.4 has been achieved. Existing trees are to be retained where possible.In Addition a large number of new trees are to be planted around the boundary of the site. An extensive green roof and green walls are to be introduced. Flower rich perennial plants, amenity grassland and hedges are all also to be introduced across the site.
Water efficiency and SuDS	• Utilise Sustainable Drainage Systems (SuDS) in line with the drainage hierarchy to achieve a greenfield run-off rate where feasible • Minimise the use of mains water in line with the optional Requirement of the Building Regulations, achieving mains water consumption of 105 litres or less per head per day (excluding allowance of up to five litres for external water consumption)	The proposed development will incorporate two differing SUDS techniques. These will be permeable paving and an attenuation tank. The catchment areas for these will be 250m^2 and 750m^2, respectively. The development aims to reduce water consumption to less than 105 litres per person per day, through the use of water efficient fittings.
Other		

ENERGY HIERARCHY

Please enter in the tables below carbon reductions for each stage of the energy hierarchy (Baseline, Be Lean, Be Clean, Be Green) and for each development type, following the guidance outlined in the GLA's *Guidance on Preparing Energy Assessments* and *Camden Planning Guidance CPG3*.

Please be aware that where carbon dioxide reduction targets are not met, the applicant will be required to provide details of their remedial proposals, either to:

1. Retrofit on-site carbon reduction measures with a view to meeting targets, or
2. Implement carbon reduction measures elsewhere in the borough (prior agreement with the Council will be sought)
3. Make a carbon offset payment, where appropriate.

Key targets from approved Energy Statement:

	Commercial New-build (includes major refurbishments assessed under Part L2A)			Residential New-build (includes major refurbishments assessed under Part L1A)			Commercial Refurbishment (assessed under Part L2B)			Residential Refurbishment (assessed under Part L1B)		
	Total tCO2	tCO2 reduction*	% reduction*	Total tCO2	tCO2 reduction*	% reduction*	Total tCO2	tCO2 reduction*	% reduction*	Total tCO2	tCO2 reduction*	% reduction*
Baseline		N/A	N/A	20.7	N/A	N/A		N/A	N/A		N/A	N/A
Be Lean				18.5	2.2	10.5						
Be Clean				18.5	0.0	0.0						
Be Green				12.2	6.3	30.5						
TOTAL				12.2	8.3	41						
Target				0	20.7	100	N/A	N/A	N/A	N/A	N/A	N/A
Shortfall				12.2	12.2	59.0	N/A	N/A	N/A	N/A	N/A	N/A

** reduction calculated against previous stage (except TOTAL, which is calculated against Baseline)*

Pre-implementation (Detailed Design Stage) proposals:

	Commercial New-build (includes major refurbishments assessed under Part L2A)			Residential New-build (includes major refurbishments assessed under Part L1A)			Commercial Refurbishment (assessed under Part L2B)			Residential Refurbishment (assessed under Part L1B)		
	Total tCO2	tCO2 reduction*	% reduction*	Total tCO2	tCO2 reduction*	% reduction*	Total tCO2	tCO2 reduction*	% reduction*	Total tCO2	tCO2 reduction*	% reduction*
Baseline		N/A	N/A		N/A	N/A		N/A	N/A		N/A	N/A
Be Lean												
Be Clean												
Be Green												
TOTAL												
Target							N/A	N/A	N/A	N/A	N/A	N/A
Shortfall							N/A	N/A	N/A	N/A	N/A	N/A

** reduction calculated against previous stage (except TOTAL, which is calculated against Baseline)*

EVIDENCE:

Pre-implementation (Detailed Design Stage)

Enclosed? **Notes:**

	Yes	N/A	
Copies of SAP/ SBEM worksheets	☒	☐	Please submit SAP/SBEM calculations evidencing the CO2 savings for each stage of the energy hierarchy, including baseline (TER), alongside this report. State which apartments have been sampled (if applicable). Results need to reflect the detailed design of the development.

Title of Submission	Date produced	Author's Name, Organisation & Client
Energy Statement	26/04/2022	XCO2

Code for Sustainable Homes Design Stage Assessment	☐	☒	This will need to be a Design Stage Assessment. Although the Council is no longer able to condition new housing developments to achieve CfSH certification, applications already committed through S106 to achieving certification will be required to fulfil this obligation.

Title of Submission	Date produced	Author's Name, Organisation & Client
NA		

BREEAM Design Stage Assessment and Certificate	☐	☒	Please note: this will need to be the Design Stage Assessment revie and not a copy of the "Pre-Assessment" review. Applicants should also submit Design Stage certificates, or evidence from BRE of submission of this review for certification.

Title of Submission	Date produced	Author's Name, Organisation & Client
NA		

Technical details/ plans/ drawings of installed CHP and other low/ zero carbon technologies (where relevant)	☐	☒	Please submit details where relevant, as outlined in the S106.

Title of Submission	Date produced	Author's Name, Organisation & Client

CHP Air Quality Assessment	☐	☒	Please follow the Council's guidance on completing air quality assessments outlined in *CPG6*.

Title of Submission	Date produced	Author's Name, Organisation & Client

Decentralised Energy Network connection details.	☐	☒	Details should include: plans/drawings demonstrating: adequate plant room space provision; space for future heat exchanger; details of provisions made for connections (capped pipework, pipe routes, and provision of domestic hot water isolation valves); and any further details demonstrating that the connection has been designed in accordance with the CIBSE Heat Networks Code of Practice for the UK.

Title of Submission	Date produced	Author's Name, Organisation & Client

Remedial CO_2 and renewables proposals	☒	☐	Document containing full details of proposals to fulfil approved carbon reduction targets &/or renewable energy targets by: retrofitting on site, measures elsewhere in Borough, or additional offset contribution.

Title of Submission	Date produced	Author's Name, Organisation & Client
Energy Statement	26/04/2022	XCO2

Please provide any further information relevant to this development – prior to implementation:

I confirm that the information supplied in this Proforma (and supporting evidence) is accurate. I will notify the Council should any of the information contained change. The agreed contents of the Energy Efficiency and Renewable Energy and Sustainability Plan, the information contained in this Proforma and the terms of Section 106 agreement pursuant to the planning permission must be complied with, unless otherwise agreed in writing by the Council.

Signed:	
Print full name:	
Position:	
Date:	

Please submit to: planningobligations@camden.gov.uk

End of form A (Pre-Implementation)

London Borough of Camden

Energy Efficiency and Renewable Energy and Sustainability Plan

S106 Pro-forma – Part B Post Completion

(To be completed and submitted for approval prior to occupation)

S106 CLAUSE DETAILS

Please summarise how the applicant is meeting their planning obligations relating to energy / sustainability as outlined within the relevant S106 agreement (please add/remove rows as applicable).

S106 clause no.	S106 clause wording	Summary of performance

BUILDING SPECIFICATION TARGETS

Key targets from approved Energy and Sustainability Statements:

Please outline in the table below the key targets from the Energy and Sustainability Statements submitted at Full Planning stage, and summarise how the as-built building compares. Add or delete rows as necessary.

Please clearly outline any reasons for changes to the approved building specification.

	Approved Planning Documents: energy and sustainability statement targets	Post completion (Post Construction Stage): performance against targets
Carbon reduction targets		
Building fabric u-values and air permeability		
Low carbon technologies		

Renewable energy targets		
Decentralised energy network connection		
Metering, monitoring and management		
Code for Sustainable Homes - **Overall % + Rating** - **% credits Energy** - **% credits Water** **% credits Materials**		
BREEAM rating - **Overall % + Rating** - **% credits Energy** - **% credits Water** **% credits Materials**		
Materials, sourcing and waste		
Green infrastructure		
Water efficiency and SuDS		
Other		

Post-Completion (Post Construction Stage) results:

Please enter in the tables below the carbon reductions for each stage of the energy hierarchy (Baseline, Be Lean, Be Clean, Be Green) and for each development type, following the guidance outlined in the GLAs *Guidance on Preparing Energy Assessments* and *Camden Planning Guidance CPG3*.

Please be aware that where carbon dioxide reduction targets are not met, the applicant will be required to provide details of their remedial proposals either:

1. Retrofit on-site carbon reduction measures with a view to meeting targets
2. Implement carbon reduction measures elsewhere in the borough (prior agreement with the Council will be sought)
3. Make a carbon offset payment, where appropriate.

	Commercial New-build (includes major refurbishments assessed under Part L2A)			Residential New-build (includes major refurbishments assessed under Part L1A)			Commercial Refurbishment (assessed under Part L2B)			Residential Refurbishment (assessed under Part L1B)		
	Total tCO2	tCO2 reduction*	% reduction*	Total tCO2	tCO2 reduction*	% reduction*	Total tCO2	tCO2 reduction*	% reduction*	Total tCO2	tCO2 reduction*	% reduction*
Baseline		N/A	N/A		N/A	N/A		N/A	N/A		N/A	N/A
Be Lean												
Be Clean												
Be Green												
TOTAL												
Target							N/A	N/A	N/A	N/A	N/A	N/A
Shortfall							N/A	N/A	N/A	N/A	N/A	N/A

** reduction calculated against previous stage (except TOTAL, which is calculated against Baseline)*

Post Completion (Post Construction Stage) Review

	Enclosed? Yes	No	Notes:
Copies of SAP/ SBEM worksheets	☐	☐	Please submit SAP/SBEM calculations evidencing the CO_2 savings for each stage of the energy hierarchy, including baseline (TER), alongside this report. Please provide details of which apartments have been sampled (if applicable). Results will need to reflect the actual constructed building.

Title of Submission	Date produced	Author's Name, Organisation & Client

Code for Sustainable Homes Post Construction Assessment and Certificate	☐	☐	This will need to be the final Post Construction Stage Assessment review and certificate. Although the Council is no longer able to condition new housing developments to achieve CfSH certification, any application which has already committed to achieving certification through S106 will be required to fulfil this obligation.

Title of Submission	Date produced	Author's Name, Organisation & Client

BREEAM Post Construction Assessment and Certificate	☐	☐	This will need to be the Post Construction Assessment review and not a copy of the "Pre-Assessment" or "Design Stage" review. Applicants should also submit Post Construction Stage certificates, or evidence from BRE of submission of this review for certification

Title of Submission	Date produced	Author's Name, Organisation & Client

Technical details/ plans/ drawing of installed CHP and other low/ zero carbon technologies (where relevant)	☐	☐	Please provide confirmation/ evidence that approved measures have been implemented.

Title of Submission	Date produced	Author's Name, Organisation & Client

Decentralised Energy Network connection details.	☐	☐	Please provide confirmation/ evidence that approved measures have been implemented.

Title of Submission	Date produced	Author's Name, Organisation & Client

Remedial CO_2 and renewables proposals	☐	☐	Document containing full details of proposals to fulfil approved carbon reduction targets &/or renewable energy targets by: retrofitting on site, measures elsewhere in Borough, or additional offset contribution.

Title of Submission	Date produced	Author's Name, Organisation & Client

I confirm that the information supplied in this Proforma (and supporting evidence) is accurate. I will notify the Council should any of the information contained change. The agreed contents of

the Energy Efficiency and Renewable Energy and Sustainability Plan, the information contained in this Proforma and the terms of Section 106 agreement pursuant to the planning permission must be complied with, unless otherwise agreed in writing by the Council.

Signed:	
Print full name:	
Position:	
Date:	

Please submit to: planningobligations@camden.gov.uk

End of form – B (Post Completion)

XCO2
56 Kingsway Place, Sans Walk
London EC1R 0LU

+44 (0)20 7700 1000
mail@xco2.com
xco2.com