Sustainability Strategy and Energy Assessment

48 – 56 Bayham Place, London

For

Summer Butterfly Ltd

April 2017

CarbonPlan Limited, Omnibus Workspace, 39-41 North Road, London, N7 9DP Tel.: +44 (0)207 683 1432 E-mail: enquiries@carbonplan.co.uk

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Executive Summary

This document has been prepared for Summer Butterfly Ltd setting out the sustainability commitments in support of the application for full planning permission at 48-56 Bayham Place (Bayham Place) in the London Borough of Camden.

Each commitment accords with the London Borough of Camden's (LBC) planning policy and relevant supporting policies. Targets set out within the strategy are for residential use within the application area.

The Sustainability Statement considers the broad environmental concerns of climate change, pollution, impact on occupants and the wider community. It balances these with the need for high-quality, safe and healthy internal environments.

These standards accord with the requirements of Building Regulations.

Sustainable development is the key principle underpinning the proposed development at 48 -56 Bayham Place which recognises the effective protection of the environment and prudent use of natural resources. The proposed development will contribute to the sustainability of the district taking into account the need to tackle climate change by reducing carbon emissions, increasing the energy and water efficiency of the buildings, promoting the use of renewable energy systems and using natural resources wisely, through the use of sustainable building materials.

The proposed development is situated in a low flood risk area and due to the nature of the development, there will be no change in the buildings foot print or impermeable area; therefore run-off rates will not exceed those predevelopment.

Sustainable drainage systems have been investigated, however ground conditions are not conducive as the site is underlain by typically impermeable substrate. In addition the area of available land is too small to implement water retention devices, therefore rain and foul water will be discharged direct to the existing drainage network.

The utmost regard has been taken with respect to water conservation and proposals include the use of flow restrictors in taps and showers and delayed inlet valves fitted in WC's to restrict water flow and reduce the outlet flow and pressure to ensure the Government's maximum target of 110 litres per person per day is achieved.

The site is well placed to accommodate the development proposal as it is located in an area with a Public Transport Accessibility Level (PTAL) rating of 6b demonstrating an excellent level of public transport.

King's Cross, St. Pancras International and Euston stations are all within 20 minutes' walk of the site.

Mornington Crescent Station and Camden Town are both located within a short walking distance of the site to the north and west respectively. The site is also located within easy access to frequently used bus routes.

The principles of micro-generation are reflected in the Energy Assessment which has been compiled using carbon targets based on Part L1A 2013 Building Regulations.

An overview of the available Low and Zero Carbon Technologies has been included in the

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report and considered in relation to the proposed development. The document provides analysis of the estimated CO_2 emissions for 48-56 Bayham Place and a strategy for achieving the requirements of Part L 2013.

The scheme will be designed to surpass the current Building Regulations for carbon emissions, achieving a 24.87% reduction.

20.78% of the sites energy demand is from renewable energy.

Fabric efficiency standards are also defined within the report, as the most effective route for achieving significant carbon savings is based on first improving the building fabric.

This report proposes that the preferred solution for the development will be to deliver an energy efficiency fabric to reduce the heat demands of the building where possible, high efficiency individual gas boilers, heat recovery technology and photovoltaics.

An holistic sustainable approach has been the ultimate precursor when considering the overall design of this development. This approach includes minimising the waste going to landfill by reducing the materials used, reusing and recycling building materials and providing opportunities for recycling wherever possible. The development will use practices to ensure resource efficiency and more sustainable construction including resourcing from local certified suppliers.

An integrated approach to waste management and minimisation will be adopted by implementing the 'Waste Hierarchy', Reduce, Re-use and Recycle. This will be accomplished with procedures and commitments to minimise monitor and measure non-hazardous and hazardous construction waste at design stage.

Space will be provided for segregated recycling waste bins within the kitchen areas. This will involve the installation of a recycling bin, in addition to non-recyclable bins, where waste can be segregated accordingly.

The existing residential refuse store located at ground floor level has sufficient capacity to accommodate the additional residential units. A managed collection system will operate whereby bins are moved from the storage areas to the pick-up point within an acceptable distance to the public highway.

Opportunities for incorporating sustainable features into the development were explored as a fundamental part of the design process, to ensure that where possible, the proposals achieve the latest standards in sustainable design. Consideration of the principles of sustainable development has therefore formed an integral part of the design evolution and the resulting scheme reflects this.

Given the nature of the proposal the report shapes current thinking on the way in which the site will address LBC policy on sustainability but clearly as detailed design evolves should it become apparent that better/different options emerge then these will be explored.

Summer Butterfly Ltd recognise the importance of ensuring development is sustainable and commits to ensuring the Bayham Place development delivers on sustainability, where feasible, during both the construction phase and the occupation phase.

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1. Introduction

Summer Butterfly Ltd is seeking to obtain full planning permission for the redevelopment of 48-56 Bayham Place in the London Borough of Camden.

The site covers an area of approximately 0.03 hectares and is situated in the Regents Park Ward of the LBC. The application site is located on the north side of Bayham Place, to the west of Bayham Street and the east of Camden High Street.

The site is currently occupied by a ground plus 2 storey residential building which comprises 13 x studio apartments. The building was previously used as an office up until 2014 at which time it was converted under permitted development to residential accommodation. The building itself is not listed but is identified within the Camden Town Conservation Area as being a positive building.

In August 2015 prior approval (planning ref: 2015/4598/P) was granted by LB Camden for the change of use of the building from office (Class B1a) to residential (Class C3). In October 2016 planning permission (ref. 2016/4116/P) was granted by LB Camden for the erection of a part single, part double roof extension to the building to provide four self-contained units (Class C3), two rear extensions at first and second floor level and associated external alterations. Since the approval of the planning application in October 2016 the applicant has constructed the rear extensions at first and second floor level to allow the occupation of these floors. This application seeks an additional floor at third floor level and to replicate a similar two storey roof extension as approved under planning permission ref. 2016/4116/P. The scheme also includes a rear extension at second floor level.

The proposals seek:

'Erection of a single storey extension at 3rd floor level plus double roof extension to provide 9 self-contained units, rear extension at second floor level and associated works.'

The Sustainability Statement submitted in support of the full planning application and accompanying Energy Assessment, describes the approach that has been taken with regards to sustainability during the design stage process and considers the extent to which the development proposals accord with the principles of sustainable development. It has been prepared by CarbonPlan Ltd, a specialist energy and environmental consultancy for planning and development.

The formulation of the sustainability strategy for the proposed development has been progressed in response to several key priorities including:

- To achieve a viable reduction in CO_2 emissions with an affordable, deliverable and technically appropriate strategy;
- To address national, regional and local planning policies and requirements;
- To provide high quality homes that are adaptable to future changes in climate;
- To minimise the negative impact on the proposed development on both the local and wider climate and environment;
- To achieve high levels of sustainable design and construction;

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- To minimise emissions of pollutants such as oxides of nitrogen and particulate matter;
- To create a pleasant safe and friendly living environment that will be flexible to its residents'
- To enhance the comfort and satisfaction of the occupants.

In preparing this Sustainability Statement we have worked with the applicant to produce a strategy which recognises the economic, social and environmental roles of the planning system to achieve a sustainable form of development which is both policy compliant and deliverable. In preparing the strategy we have focussed on ensuring that the development is:

Economically Sustainable

- The provision of transport choice and options to those that live and visit within the development.

Socially Sustainable

- Effective and appropriate consultation of relevant stakeholders to inform the design of the proposed development;
- A housing mix which is beneficial to the needs of the area;
- Ensuring that the development is accessible to all;
- Committing to considerate construction practices

Environmentally Sustainable

- Integrating energy efficiency into the design of the development;
- Achieving a viable reduction in CO_2 emissions;
- Incorporating water efficiency measures to reduce consumption;
- Recognising the need to adapt to climate change;
- Sourcing materials in a sustainable way;
- Managing waste through measures to reduce, reuse and recycle.

The applicant is committed to delivering a truly sustainable development that is innovative in design and complements the existing environment.

1.1. Project Description

Preparation and submission of a full planning application to erect a single storey extension at 3rd floor level plus double roof extension to provide 9 self-contained units, rear extension at second floor level and associated works at 48 – 56 Bayham Place, London.

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2. Policy Context

The Statement, and targets within it, comply with National and Local policy requirements, in particular the National Planning Policy Framework, the Consolidated London Plan March 2016, Housing in London, London Sustainable Design and Construction Supplementary Planning Guidance and Camden's Local Plan.

2.1 National policy

The National Planning Policy Framework (March 2012)

The National Planning Policy Framework (NPPF) was published on 27th March 2012. The NPPF seeks to complement the Localism Act, brought into force in November 2011. It is the UK Governments national policy for town planning.

The core principle of the National Planning Policy Framework (NPPF) is a 'presumption in favour of sustainable development', which should be seen as a golden thread running through plan making.

Sustainable development is defined positively, seeking to meet the needs of the borough unless the adverse impacts would outweigh the benefits, or the NPPF indicates development should be restricted.

The NPPF requires that Local Plans:

- Plan positively for the development and infrastructure required in the area
- Cover a 15-year timeframe, taking account of longer term requirements
- Be based on co-operation with neighbouring authorities, public, voluntary and private sector organisations

More generally, the NPPF sets out guidance in relation to key planning principles including building a strong economy; ensuring the vitality of town centres; promoting sustainable transport; delivering a wide choice of affordable homes; good design; promoting healthy communities; protecting open space and the built environment; conserving the historic environment; and meeting the challenge of climate change.

The Energy Act 2011

This act provides impetus to enable secure low-carbon energy supplies and fair competition in the energy markets. The act creates a new financing framework to enable the provision of fixed improvements to the energy efficiency of households and non-domestic properties; the 'Green Deal', will give householders, private landlords and businesses finance upfront to make energy efficiency improvements, which would then be paid for by energy bill savings.

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Other measures include the roll out of smart meters, widening access to Energy Performance Certificates (EPC) and a new obligation on energy companies to help certain groups of consumers, who need extra support, with saving energy.

The Energy Act 2016 Chapter 20

The Energy Act is designed to help drive forward the government's energy goals and commitments, and received Royal Assent on 12th May 2016 to become an Act of Parliament.

The Act gives local communities (via local council planning authorities) the say on new onshore windfarm planning decisions via local council planning authorities, and removes need for Secretary of State consent for large onshore windfarms in England & Wales. It also brings forward closure of the costly Renewable Obligations Subsidies Scheme for new onshore wind developments.

It also allows the Oil and Gas Authority (OGA) to better support North Sea industry.

The document provides:

- expert advice and guidance to Government on achieving targets and carbon budgets
- greater energy efficiency, with more consumers becoming "producers" of their own energy at home
- Investment in low-carbon fuels and technologies, such as wind, wave, solar power and carbon capture and storage.

The Waste Management Plan for England (Dec 2013)

This document sets out where we are now in terms of the waste we generate in England and how we manage those materials.

2.2 Regional policy

The London Plan – Consolidated Alterations (Mar 2016)

The London Plan seeks to integrate economic, environmental, transport and social objectives and place them in a framework to progress London's development over the next 20-25 years.

Revised Early Minor Alterations (REMA) to the London Plan (2011) was adopted in October 2013 to ensure that it is consistent with the NPPF. Further Alterations to the London Plan (FALP) were adopted in March 2015. Additionally, on 14 March 2016, the Mayor adopted the Minor Amendments to the London Plan (MALP). From these dates respectively, the FALP and MALP are operative as formal alterations to the London Plan and form part of the development plan for Greater London. Where the London Plan is referenced within this document, this comprises the FALP and MALP as published.

The London Plan is a strategic document set out to produce a spatial development strategy. Legislation requires that the London Plan takes account of three cross cutting themes:

- economic development and wealth creation
- social development
- improvement of the environment

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The following outlines key policies which are relevant to the proposed development and this Statement.

Policy 3.8 – Housing Choice Policy requires new developments to offer a range of housing choices, in terms of mix, size and types whereby 90% of new housing meets Building Regulation requirement M4 (2) 'accessible and adaptable dwellings" and at least 10% meets Building Regulation requirement M4 (3) 'wheelchair user dwellings'.

Policy 5.2 – Minimising Carbon Dioxide Emissions requires boroughs and developers to ensure that major developments meet the following targets for carbon dioxide emissions reduction in buildings. These targets are outlined in the national Building Regulations, leading to zero carbon residential buildings from 2016 and zero carbon non-domestic buildings from 2019.

Currently the policy requires non-domestic buildings to meet improvements as per building regulation requirements.

Policy 5.3 - Sustainable Design and Construction states that the highest standards of sustainable design and construction should be achieved in London to improve the environmental performance of new developments. Major development should meet the minimum standards outlined in the London Plan Supplementary Planning Guidance and this should be clearly demonstrated.

Policy 5.5 - Decentralised Energy Networks states that the Mayor expects 25 per cent of the heat and power used in London to be generated through the use of localised decentralised energy systems by 2025. The Mayor will prioritise the development of decentralised heating and cooling networks at the development and area wide levels, including larger scale heat transmission networks.

Policy 5.6 - Decentralised Energy requires that all developments should evaluate the feasibility of Combined Heat and Power (CHP) systems, and examine the opportunities to extend the system beyond the site boundary to adjacent sites.

Policy 5.7 - Renewable Energy states that within the framework of the energy hierarchy, major development proposals should provide a reduction in expected carbon dioxide emissions through the use of on-site renewable energy generation. To this end there is a presumption that all major development proposals will seek to reduce carbon dioxide emissions by at least 20 per cent through the use of on-site renewable energy generation wherever feasible.

Policy 5.8 - Innovative Energy Technologies encourages the more widespread use of innovative energy technologies to reduce use of fossil fuels and carbon dioxide emissions.

Policy 5.9 - Overheating and Cooling seeks to reduce the impact of the urban heat island effect, reduce potential overheating and reduce reliance on air conditioning systems.

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Policy 5.12 - Flood Risk Management states that new developments must comply with the flood risk assessment and management requirements, and will be required to pass the Exceptions Test addressing flood resilient design and emergency planning.

Policy 5.13 - Sustainable Drainage requires that developments should use sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible.

Policy 5.15 - Water Use and Supplies requires that development should minimise the use of mains water by incorporating water saving measures and equipment and that residential development is designed so that mains water consumption meets a target of 105 litres/person/day or less**.**

Policy 5.18 – Construction, Excavation and Demolition Waste requires major development sites to recycle CE&D waste on-site wherever practicable. Developers are required to produce site waste management plans to arrange for the efficient handling of CE&D waste and materials.

Policy 6.9 – Cycling expects development proposals to provide secure, integrated and accessible cycle parking facilities.

Policy 6.10 – Walking requires high quality pedestrian environments including accessible, safe and convenient direct routes to town centres and transport nodes.

Policy 6.13 Parking necessitates the use of maximum standards in line with Table 6.2 of the Plan, electrical charging points, parking for disabled people and minimum cycle parking standards as set out in Table 6.3 of the Plan

Policy 7.3 - Designing Out Crime requires that development should reduce the opportunities for criminal behaviour and contribute to a sense of security without being overbearing or intimidating.

Policy 7.14 - Improving Air Quality requires developments to promote sustainable design and construction to reduce emissions form the demolition and construction of buildings. The policy also encourages sustainable travel behaviour to limit NOx emissions.

Policy 7.15 – Reducing and managing noise, improving and enhancing the acoustic environment and promoting appropriate soundscapes. This policy looks to avoid significant adverse noise impacts on health and quality of life by mitigating the potential impacts of noise in the vicinity of new development and improving and enhancing the acoustic environment.

The London Sustainable Design and Construction SPG (Apr 2014)

This document provides additional information to support the implementation of the Mayor's London Plan. The document forms part of the London Borough of Camden's Local Development Framework and should be read alongside the Core Strategy and London Plan.

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The SPG will be used to assist in determining planning applications.

This document reflects key sustainable design principles and outlines the standards applicable to developments.

London Plan Housing Supplementary Guidance (2016)

This Supplementary Planning Guidance (SPG) provides guidance on the implementation of housing policies in the 2015 London Plan and the 2016 Minor Alterations to the Plan (MALP). It replaces the 2012 Housing SPG.

The document includes chapters on housing supply, housing choice and housing quality, which reflects the Government's new national technical standards through the MALP and other Mayoral guidance.

2.3 Local Policy

Camden Council have adopted a number of planning documents that (alongside the Mayor's London Plan) form the 'development plan' for Camden – the starting point for planning decisions in the borough.

The London Borough of Camden's adopted Core Strategy (8 November 2010)

Policies that are considered pertinent to the application include:

Policy CS 6 - Providing quality homes.

Policy CS 11 - Promoting Sustainable and efficient travel.

Policy CS 13 - Tackling climate change through promoting higher environmental standards.

Policy CS 14 - Promoting high quality places and conserving our heritage.

Policy CS 16 - Improving Camden's health and well-being.

Policy CS 18 - Dealing with our waste and encouraging recycling.

Camden Development Policies

Camden Development Policies play a key part in delivering Camden's overall vision and objectives for the borough as set out in the Core Strategy.

The policies in this document provide additional detail and guidance with regards the Core Strategy and the issues covered in this statement.

DP 6 – Lifetime homes and wheelchair homes;

DP 17 – Walking, cycling and public transport;

DP18 – Parking standards and limiting the availability of car parking;

DP 22 – Promoting sustainable design and construction;

DP 23 – Water;

DP 24 - Securing high quality design;

DP 25 - Conserving Camden's heritage;

DP 26 - Managing the impact of development on occupiers and neighbours;

DP 28 - Noise and vibration;

DP 29 - Improving access;

DP 32 - Air quality and Camden's Clear Zone;

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Camden's Local Plan (2016)

Although not adopted yet, the Council's Local Plan has been submitted for examination. Policies within the Local Plan can therefore be considered when determining planning applications.

The following draft policies are relevant to this planning application

Policy H6 Housing Choice and mix

Policy C4 Safety and Security

Policy C5 Access for all

Policy A4 Noise and Vibration

Policy CC1 Climate change mitigation

Policy CC2 Adapting to climate change

Policy CC3 Water and flooding

Policy CC4 Air quality

Policy CC5 Waste

Policy T1 Prioritising walking, cycling and public transport

Policy T2 Car-free development and limiting the availability of parking.

Camden Planning Guidance 3: Sustainability (2015)

This guidance provides information on ways to achieve carbon reductions and more sustainable developments. It also highlights the Council's requirements and guidelines which support the relevant Local Development Framework (LDF) policies

Camden Planning Guidance 7: Transport (2011)

Camden faces considerable transport challenges including congestion and poor air quality and this guidance contains information on a variety of transport issues including travel plans, car free development, vehicle access, public spaces and cycling facilities.

3. Sustainability Assessment

Low environmental impact will be at the heart of the design for the proposed 48-56 Bayham Place development in the Regents Park Ward. This Sustainability Statement outlines the development's sustainability, energy efficiency and renewable energy strategies in order to meet the sustainability targets set out in the guidance from LBC.

The assessments consider the broad environmental concerns of climate change, pollution, impact on occupants and the wider community. They balance these with the need for a high-quality, safe and healthy internal environment. These standards go beyond the minimum requirements of the Building Regulations.

The following sustainable features are included in the proposed design:

- A number of passive design measures and efficient systems will be incorporated to

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reduce energy consumption and associated CO_2 emissions.

- The proposed accommodation will have good natural lighting within all occupied areas, which will improve comfort and reduce the requirement for artificial lighting.
- Good solar control will be provided by the selection of glazing/shading so as to avoid overheating in summer and increase passive gains in winter.
- The development will use low energy lighting internally and externally and utilise daylight triggered controls to dim lighting and reduce energy consumption.
- Building materials will be sourced locally where possible to reduce transportation pollution and support the local economy.
- All timber used on site will be purchased from responsibly sources such as FSC approved vendors.
- Material selection to take into account their overall environmental impacts. Achieving 'A+' ratings from the BRE Green Guide to Specification, where possible.
- Recycling facilities will be provided for all occupants to reduce waste during operation.
- Water use will be minimised by the specification of water efficient taps, shower heads, dual flush toilets and low water use appliances.
- All construction on site will be managed in an environmentally sound manner in terms of resource use, storage, waste management, and potential sources of nuisance or pollution
- Cycling will be encouraged within the proposed development, by providing dedicated cycle storage spaces for residents.

Following a review of the relevant Local, Regional and National policy objectives the following ten sustainability topics have been identified against which the development proposals were evaluated.

- Energy
- Land Use
- Waste
- Pollution
- Water
- Materials
- Transport
- Community and Social Needs; and
- Economic Prosperity

The following sections provide a general overview of each sustainability topic together with a precis detailing the site-specific initiatives committed to by the applicant and a commentary on how the initiatives comply with the objectives of sustainable development.

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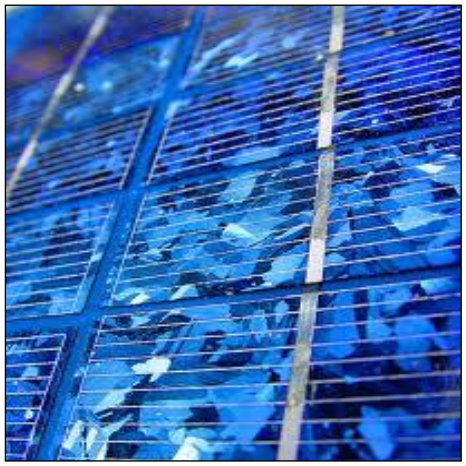
3.3 Energy



The concentrations of greenhouse gases in the atmosphere has risen since the beginning of the industrial revolution, the quantity of CO_2 produced makes it the main contributor to climate change. Approximately 50% of the total UK CO_2 emissions are attributable to energy used in heating, lighting and cooling buildings. A further 10% of emissions are derived from energy used during the production and transportation of materials and the construction of the building.

As well as producing CO_2, fossil fuels such as oil, coal and gas are finite resources and the electricity they produce should therefore be used as efficiently as possible in homes and workspaces. Appropriate building design can minimise heat loss and maximise solar heating, natural lighting and passive ventilation can be designed in to reduce energy requirements.

Developing sustainable energy systems is an essential part of adapting to the impacts of present and future climate change. This involves increasing the use of renewable energy sources to reduce dependence on finite fossil fuel reserves and thus reducing CO_2 emissions.

3.3.1 Sustainable Design & Construction

Passive design has been integrated into the scheme where feasible thus achieving good daylight, with natural ventilation. Window location has been selected to reflect orientation and internal use. Windows have been set back in the facade to enable a degree of solar shading and a cantilevered top floor on the south facade provides further shading benefits for the floor below.

Potential overheating has been further reduced through the use of internal blinds which offer occupant control.

The proposed development incorporates measures such as high levels of insulation for walls, glazing, roofs and floors, high efficiency gas boilers and enhanced heating controls, reduced air leakage and maximising the use of energy efficient lighting.

3.3.2 Increase Energy Efficiency

The London Plan requires residential buildings to express a 100% improvement over the Target Emission Rate outlined in the national Building Regulations. The proposed development detailed within this document is for 9 units and is therefore not considered a 'Major' development, however it is an *aspiration* of the Design Team and Client to achieve as close to a 19% CO^2 reduction over Part L 2013 Building Regulations and achieve a 20% reduction in carbon dioxide emissions from on-site renewable energy generation. These are the targets Camden Council recently published in its Minor Modifications to the Draft Camden Local Plan. During the development of the design plan, consideration has been given to ensuring that the design will meet the requirements of Part L1A 2013 of the Building Regulations which deals

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with the conservation of fuel and power in buildings throughout the UK.

The proposed development is substantially allocated to high quality residential accommodation. By definition this will be low density occupation and will therefore have relatively light demands on energy when considered on a unit area basis. The extension will be built to the highest standards and will operate at much higher efficiencies than is the case for existing residential buildings.

The proposed development embraces the Mayoral energy hierarchy for feasible heating systems and ultimately is lean (uses less energy), clean (uses energy efficiently) and green (uses Renewable and Low and Zero Carbon Technologies). This is reflected in the development of the energy strategy which proposes the use of a high efficiency fabric specification to reduce the heat demands of the dwellings where possible, installation of highly efficient MVHR, a high efficient gas boilers and Low and Zero Carbon technologies (LZC).

A detailed energy assessment demonstrates how the targets for carbon dioxide emission reductions could be met within the framework of the energy hierarchy.

3.3.3 Minimising Carbon Dioxide Emission

An Energy Strategy has been produce by CarbonPlan Ltd that includes the calculation of the energy demand carbon dioxide emissions covered by Building Regulations and, separately, the energy demand and carbon dioxide emissions from any other part of the development, including plant or equipment, that are not covered by the Building Regulations at each stage of the energy hierarchy. The assessment also provides proposals to reduce carbon dioxide emissions through the energy efficient design of the site, buildings and services and proposals to further reduce carbon dioxide emissions through the use of on-site renewable energy technologies.

The building fabric is commonly the most immediate and cost effective way of reducing energy use as it controls the ingress of sunlight and the ingress and egress of heat and air. The building has been modelled in SAP to accurately simulate how the building will work in real-world conditions and to enable accurate measurement of the effects of suggested improvement strategies.

All effort has been made to meet the specific carbon dioxide reduction targets on site using significantly improved fabric and energy efficient services and Photovoltaic panels.

The scheme has been designed to surpass the current Building Regulations for carbon emissions, achieving a 24.87% reduction.

3.3.4 Renewable Energy

The appropriateness of renewable energy types has been considered in the Energy Strategy which reviews the different renewable energy options against the proposed mix of uses.

The Energy Assessment assesses the potential application of the most suitable renewable technologies at the site, namely CHP, solar water heating, photovoltaics and ground and air source heat pumps. This identified that a solar thermal (Photovoltaic panels) solution is likely to be the most viable and achieves a 20.78% reduction in both regulated and unregulated CO_2 emissions.

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3.3.5 Transport related Energy

The scheme's layout and design aim to facilitate travel by cycle or foot, thereby minimising private car travel and associated carbon dioxide emissions. Suitable provision of cycle parking and associated facilities are anticipated encouraging the use of bicycles to access and move around the local area. This in conjunction with the sites good links to existing public transport services will contribute to a reduction in reliance on the private car – a major user of fossil fuels and source of atmospheric pollution.

3.3.6 Construction related Energy

The procurement of materials for the development will prioritise renewable or sustainable sources with low energy impact, for example, all timber will be sourced from forest Stewardship Council certified product suppliers or equivalent. In addition there is a commitment to use local materials, suppliers and labour during construction wherever practicable to reduce the need to travel.

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3.4 Land Use

A sequential approach should be taken in locating new development. This involves giving preference to previously developed land or buildings within urban areas, followed by development on the edge of existing urban areas with the development of Greenfield sites as the last option. Government targets require 60% of housing to be located on brownfield land, which reflects the Government's desire to retain important urban space and the need to achieve conservation objectives therefore contributing to social and environmental aspects of sustainable development. Reusing buildings can save significant amounts of waste material. Existing buildings can often be the basis of the character of the neighbourhood.

3.4.1 Previously Developed Land

48-56 Bayham Place site falls within the Camden Town Conservation Area close to the junction with Bayham Street.

In August 2015 prior approval (planning ref: 2015/4598/P) was granted by LB Camden for the change of use of the building from office (Class B1a) to residential (Class C3). In October 2016 planning permission (ref. 2016/4116/P) was granted by LB Camden for the erection of a part single, part double roof extension to the building to provide four self-contained units (Class C3), two rear extensions at first and second floor level and associated external alterations. Since the approval of the planning application in October 2016 the applicant has constructed the rear extensions at first and second floor level to allow the occupation of these floors. This application seeks an additional floor at third floor level and to replicate a similar two storey roof extension as approved under planning permission ref. 2016/4116/P. The scheme also includes a rear extension at second floor level.

The proposed extension provides an opportunity to enhance the quality of the accommodation through the provision of additional residential accommodation at roof level, and restoring some of the original features of the existing building's facade.

The design objective is to sensitively redevelop 48-56 Bayham Place as residential accommodation and restore original architectural features where possible; thereby extending its useful life, whilst preserving and enhancing the building's character and its setting within the immediate conservation area.

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3.5 Waste

Waste if not managed safely, can also result in pollution of the environment. The most sustainable approach is to reduce the overall amount of waste generated 'at source'. Wastes that are generated should then be reused wherever possible, or recycled as the next best environmental option. The least sustainable waste option is disposal (e.g. landfill). In order to turn around current patterns of waste management, we must minimise the amount of waste sent to landfill through diversion to other methods of disposal including re-use, recycling and composting, and using waste in energy generation.

3.5.1 Waste Management – Construction Phase

The contractor will be committed to reducing waste during the demolition and construction phase of the development. To successfully reduce waste requires building in measures from the project outset, as such waste management has been considered at this early planning stage.

In addition, assurance will be sought that the contractor is obligated through the Contract Specification, to develop and implement a Waste Management Plan for maximising the recovery of materials and components that are able to be recycled at the end of their design life, wherever practicable. The Waste Management Plan will also require the contractor to monitor and set targets on waste generated during the works.

3.5.2 Waste Management – Operational Phase

The applicant is committed to supporting the government's targets for recycling and landfill waste reduction. The following measures will be implemented to encourage and help ensure the residents will be able to maximise recycling of waste:

- Refuse storage is to be provided where both recyclable and non-recyclable waste can be stored;
- Space will be provided for segregated recycling waste bins within the kitchen areas. This will involve the installation of a recycling bin, in addition to non-recyclable bins, where waste can be segregated accordingly.
- External storage for waste and recycling will be provided in accordance with the LBC's waste collection service.

The existing residential refuse store located at ground floor level has sufficient capacity to accommodate the additional residential units. A managed collection system will operate whereby bins are moved from the storage areas to the pick-up point within an acceptable distance to the public highway.

The proposed refuse and servicing strategy is outlined further within the Design & Access Statement.

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3.5.3 Contaminated Land

A programme of mitigation measures will be introduced to prevent significant adverse effects on soil and water resources during and post construction to ensure the contractor is committed to protecting and enhancing the environmental quality of the borough including harmful emissions to land, air and water.

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3.6 Pollution

Chemical pollution can have significant adverse health effects on humans, animals, plants and ecosystems. As well as affecting plant and animal species, other forms of pollution such as light and noise can cause nuisance to neighbours. The reduction or prevention of pollution is therefore critical to sustainable development. New developments of all sizes need to play their part in ensuring that they do not have adverse effects through air quality and noise pollution issues both from construction and post construction stages of a development.

3.6.1 Air Quality

London has some of the highest pollution levels in the country.

Air quality issues in the borough are well known. The council's Air Quality Action Plan (AQAP) designates the whole borough as an Air Quality Management Area (AQMA), and identifies road transport as the major source of air pollution, giving rise to nitrogen dioxide and particulate matter which can cause respiratory illnesses and other adverse health effects.

The development has been designed to be car-free, instead concentrating on more sustainable means of travel and encouraging cycling and walking as alternatives.

During construction, air quality impacts are likely to be local to the development and will be temporary in nature (i.e. during the demolition/construction period only).

The construction phase impacts of the development will be mitigated through the adoption of best practice guidance. Operational phase mitigation will be based on assessing the impacts of the scheme with reference to National Air Quality Strategy Objectives and the implementation of appropriate mitigation measures based on preventing or minimising exposure to exceedence of the Objectives.

All contractors on site shall follow the regimen put in place for the development during construction stages to minimise emissions and comply with the relevant EA Pollution Prevention Guidelines. The contractor will sign up to achieve 'beyond best practice' standards with the Considerate Constructors Scheme.

3.6.2 Noise

Please refer to the Environmental Noise Report accompanying the planning application

3.6.3 Light Pollution

Lighting will be appropriate for the intended use; provide the minimum amount of light necessary to achieve its purpose; provide adequate protection from glare and light spill and be energy efficient.

It is anticipated that all external space and security lighting will be provided by energy efficient fittings with PIR and dusk to dawn daylight sensors and time switches. The lighting

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shall be designed in accordance with BS 5489-1: 2003 and BS EN 13201-2:2003 to ensure that an appropriate level of illumination is provided.

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3.7 Water

Water is becoming an increasingly scarce resource as demand continues to grow. To satisfy this increase in demand new sources of water and associated infrastructure have been required. However, the construction and operation of this infrastructure (for example reservoirs and treatment works) is expensive, energy intensive and damaging to the environment and therefore measures should be taken to reduce water consumption where possible.

Water resources face increasing demand arising from existing and new development, exacerbated by changes to the climate and rainfall patterns. Ensuring that new development has adequate supply and is water-efficient is therefore an important consideration.

New developments of all sizes need to play their part in sustainable water management ensuring that the developments do not have adverse effects through increased run-off rates and protection of river water quality and groundwater.

3.7.1 *Water Conservation*

Legislative guidance and documentation currently stipulates that water consumption for all new dwellings must not exceed 125 litres per person per day (including external usage).

Under Approved Document G '*Sanitation, hot water safety and Water efficiency*, mandatory standards and requirements are stipulated to reduce internal water consumption.

The 2010 edition has been amended to incorporate the changes following the Housing Standard Review. As of 1 October 2015 Approved Document G includes the following:

- Introduction of an optional requirement for tighter water efficiency in Regulation 36 (section G2)
- Introduction of a fittings approach as an alternative to using the Water Efficiency Calculator (section G2).
- Inclusion of the Water Efficiency Calculator methodology

As Camden is located in an area of serious water stress LBC expect the higher standards of the 'optional requirement', 110 litres per person per day (including 5 litres external usage) to be met.

To meet this level the following maximum consumption must be achieved:

Table 2.2 Maximum fittings consumption optional requirement level

Water fitting	Maximum consumption
WC	4/2.6 litres dual flush
Shower	8 l/min
Bath	170 litres
Basin taps	5 l/min
Sink taps	6 l/min
Dishwasher	1.25 l/place setting
Washing machine	8.17 l/kilogram

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3.7.2 Sustainable Urban Drainage System (SUDS)

Due to the nature of the development, there will be no change in the buildings foot print or impermeable area; therefore run-off rates will not exceed those predevelopment.

The use of SUDS has been investigated however the ground conditions are not conducive, as the site is underlain by typically impermeable substrate; in addition the area of available land is too small to implement water retention devices. Therefore rain and foul water shall be discharged direct to the existing drainage network.

3.7.3 Flood Zone

Following the incorporation of the reaches of the Rivers Fleet, Tyburn, Kilburn and Brent into the sewer network there are no main rivers in Camden and therefore the borough is located entirely in Flood Zone 1 which represents an annual probability of less than 0.1% of a flood occurring in any one year.

Due to the size of the application site (<1 hectare) a Flood Risk Assessment is not required by LBC.

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3.8 Materials

A sustainable resource management approach will help to minimise the contribution that both constructing and occupying a new development of any size makes to the problem. This is done by designing the development to use materials efficiently, specifying materials which are responsibly sourced, have low environmental impact and are reclaimed or recycled wherever possible, managing the construction process to minimise waste produced.

3.8.1 Procurement

The procurement of materials for the development will prioritise renewable or sustainable sources with low energy impact, for example, all timber will be sourced in accordance with UK Governments Timber Procurement Policy and have Forest Stewardship Council, Pan European Forest Certification or the UK Woodland Assurance Scheme. All other materials will be sourced from companies holding EMS, IS14001 and BES6001 certification.

When selecting materials for the development, preference will be given to the use of locally sourced materials and local suppliers where viable. This will benefit the local economy as well as having environmental benefits through reducing transportation requirements. This will be addressed and considered in more detail during the detailed design stage.

Consideration will be given to using environmentally low impact materials for the building envelope elements (roof, windows, internal walls, external walls and upper and ground floors) using the BRE Green Guide to specification. The guide is a comprehensive reference website providing direction on the relative environmental impacts for a range of building specifications. The ratings within the Guide are based on Life Cycle Assessment, using the Environmental Profile Methodology. Green Guide ratings range from E to A+, the development will aim to achieve A and A+ rated materials. Beyond this the dwellings will use passive energy efficiency improvements and design considerations to minimise the energy consumption required by the development to create a resilient residential scheme.

The development will be designed to a high quality with the objective of delivering a scheme that will be durable. The construction techniques will utilise high standards of traditional building materials that are well established and robust.

3.8.2 Recycling

The recycled content of a material can be described as either post-consumer or post-industrial content. Specifying materials with a high-recycled content is another method of saving, processing or manufacturing energy. Some typical building materials that can contain

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a high percent of recycled material include reinforcing and framing steel, concrete masonry units, gypsum wallboard and facing paper, acoustic ceiling panels and their suspension system.

Scope for increased recycling will be incorporated by specifying recycled materials and ensuring that even where new materials are used, as much as possible can be recycled at the end of the buildings' life.

Where possible measures to minimise, re-use and recycle materials to ensure resource efficiency will be considered.

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3.9 Transport

Certain modes of transport use significant amounts of energy, and are a major source of greenhouse and air pollution. In addition, increased road transport raises other considerations such as congestion and safety. The promotion of more sustainable modes of transport; encouraging accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling; and reducing the need to travel particularly by private car, are key aims of sustainable development.

3.9.1 Reduce the need to travel

The development has been designed to be car-free; therefore no car parking is required.

Secure cycle parking is included within the building and is in line with Table 6.3 of the London Plan.

3.9.2 Cycling and walking

As mentioned in the paragraph above easily accessible cycle storage will encourage occupants to engage in a more sustainable mode of travel.

Existing pavements in and around the development offer safe access to amenities and leisure facilities, encouraging occupants to walk and offering a sustainable option to both driving and public transport.

3.9.3 Public Transport

The site is located in an area with a Public Transport Accessibility Level ('PTAL') rating of 6b, demonstrating an excellent level of public transport as calculated using the Transport for London ('TfL') PTAL calculation methodology.

There is excellent proximity to a variety of public transport links. King's Cross, St. Pancras International and Euston stations are all within 20 minutes' walk of the site.

Mornington Crescent Station (Northern Line services) and Camden Town (Northern Line services) are both located within a short walking distance of the site to the north and west respectively. The site is also located within easy access to frequently used bus routes.

3.9.4 Reduce traffic congestion

Air quality issues in the borough are well known. The council's Air Quality Action Plan (AQAP) designates the whole borough as an Air Quality Management Area (AQMA), and identifies road transport as the major source of air pollution, giving rise to nitrogen dioxide and particulate matter which can cause respiratory illnesses and other adverse health effects.

This development is car free which means there is no car parking within the site other than that for operational and servicing needs. In addition residents will not be permitted to apply for on-

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street parking permits for themselves or visitors; this will lead to reductions in air pollution, noise levels and congestion.

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3.10 Community & Social Needs

How a development effects society in terms of the interaction of occupants with neighbouring communities and the general public is fundamental to sustainable development. Issues include access to education, health, welfare, community, recreational facilities and public open space, as well as public safety and crime prevention. It is important that residential developments are situated near to shops and services reducing the need to travel by car.

3.10.1 Access to opportunities, services and facilities for all

There are a range of facilities within the vicinity of the proposed development; these include a large number of well-known high street shops, restaurants, and coffee shops all within a 5 minute walk on Camden High Street. The nearest Doctors surgery is the Ampthill Practice which is a minutes' walk away and the nearest dental practice is located in Camden High Street a 4 minute walk from the development. Infant and junior schools are within a 10 minute walk from the development as are a number of fitness centres. The Post Office and nearest bank are within a 9 minute walk and all of the facilities are accessible on foot or by cycle from the site.

3.10.2 Increased access to leisure facilities

A Fitness centre is located at 193-199 Camden High Street and is open from 0600 to 22.00 offering spinning, Yoga, Pilates and kick boxing classes.

There is also a Fitness First centre located at 128 Albert Street which is open from 6.30 – 22.00 and offers group exercise, a gym, a cardio theatre and spin classes.

Pedestrian and cycle routes are located in and around the area and a new Cycle Superhighway (CS11) has been proposed. CS11 will run from Brent Cross, via Hendon Way and Finchley Road through the Swiss Cottage gyratory, down Avenue Road and into Regents Park. It will use either side of the Outer Circle to reach Portland Place where it should link to Central London Grid routes.

3.10.3 Reduce the level of noise

Where possible the development at 48-56 Bayham Place will be designed to minimise the impact of noise from external sources. This has been achieved through according with specified minimum performance and utilising good quality construction methods, high levels of air tightness and robust details.

Sound insulation standards will exceed Building Regulation requirements to ensure that the building provides an acceptable noise climate for occupants.

3.10.4 Inclusive design

The principles of inclusive design have been adopted at the earliest stages of the

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development process to ensure the physical environment can meet the highest standards of accessibility and inclusion complying with British Standard BS 8300.

The proposed apartments have been designed in accordance with the National Space Standards and building regulations Approved Document M4(2).

The approach to the entrance of the building is via a public pavement leading from Bayham Street. The entrance to the building has a level threshold and the pavement immediately outside is level (1:140), with a ground surface that does not impede wheelchair movement.

The existing street lamps provide ample illumination to the main entrance door to the building, providing safe access.

Appropriate facilities and access for disabled users will be incorporated into the design plan to ensure the dwellings are convenient and welcoming with no disabling barriers.

Full details can be found in the Design and Access Statement prepared by Ambigram Architects in support of the planning application

3.10.5 Daylight and Sunlight

Please refer to the Daylight, Sunlight and Overshadowing Report by Point Surveyors that accompanies this planning application.

3.10.6 Improve Health

The buildings high performance building fabric ensures:

- Better temperature control by lowering ventilation costs and prevent overheating.
- Improved comfort which provides a more comfortable environment through reducing draughts, solar glare, overheating and noise.

Access to Oakley Square Gardens and Goldington Crescent Gardens are within a six minute walk from the development. Walking offers considerable benefits for human health and public gardens are an important facility for people to get out and walk.

The proposed development has pedestrian and cycle routes located in and around its location; encouraging walking and cycling not only makes a positive contribution to health and well-being, but also reduces pressure on existing transport systems.

3.10.7 Wider community involvement

A Statement of Community Involvement has been prepared by Quatro and accompanies this planning application.

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3.11 Economic Prosperity

The creation of employment opportunities and the strengthening of local economies are recognised within the context of sustainable development as being of equal importance to environmental and other consideration. To meet the challenges of sustainable development, skilled and adaptable labour force and a flexible labour market is necessary. The promotion of jobs and employment, better education and training are considered essential.

3.11.1 Contribution to the Economy

Efforts have been made to respond to local economic opportunities and needs.

The construction of the proposed development will create work opportunities for the local population. Where possible, the development will utilise the local labour force and local businesses throughout the construction programme.

In the short term it is anticipated that there will be an increase in local spending both in terms of the sourcing of local supplies and local spend by on-site workers.

Longer term, the development will lead to additional spend in the local economy, helping to maintain and enhance existing facilities and services.

The proposed new residents are expected to look to Camden High Street for shopping and other facilities, contributing to the vitality and health of the borough.

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3. Technical Detail

In addition to this document which sets out the overarching strategy and targets a separate Technical Appendix has been provided which give additional detail on how key targets are to be met. This includes the Energy Strategy as an appendix to this document. The Energy Strategy summarises the energy strategy for the redevelopment detailing fabric efficiency standards and low and zero carbon technologies needed to meet the energy targets.

Flexibility through the detailed design process is important and so the information in these sections is provided only to show how the targets could be achieved and are based upon the design proposals as they stand. These documents do not represent a firm commitment to use the exact specifications shown rather they are put forward to give an indication of how some of the targets set out in this document can be achieved.

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4. Conclusion

Through the incorporation of sustainable design and construction methods, energy, water and waste saving measures the proposed development is considered high quality and sustainable.

The proposed development at 48-56 Bayham Place aims to comply with and demonstrates how the development will meet National and Local Planning Policy for matters relating to sustainability and therefore the application should not fail on sustainability grounds.

The key sustainability features of the development proposals are as follows:

- The new dwellings will be constructed to Part L 2013 Building Regulations;
- Water efficiency measure and devices will be installed to achieve a maximum daily water usage of 110 litres/person/day (including an allowance of 5 litres of less per day for external water consumption)
- Recycling facilities will be provided for domestic and construction related waste;
- The use of sustainable transport modes will be encourage with cycle storage provision;
- Where practical, building materials will be sourced locally to reduce transportation pollution and support the local community. Materials will be selected based on their environmental impact, with a preference to A+ or A rated materials from the BRE Green Guide to Specification where possible.
- Sound insulation values will target an improvement on Building Regulations Part E;
- New homes will be designed to minimise the risk of overheating where possible and
- The development will be registered with the Considerate Constructors Scheme.

The proposed development at 48-56 Bayham Place aspires to provide a high quality development that serves the local community and aids the regions commitments to meeting on-going sustainability targets. The measures proposed in the Sustainability Strategy and Energy Assessment support the delivery of sustainability during both the construction phase and the occupation phase and therefore contribute to local sustainability targets.

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Energy Strategy

48 –56 Bayham Place, London

For

Summer Butterfly Ltd

April 2017

Revisions schedule		
Issue Date:		
Report prepared by: Joe Treanor, Senior Sustainability Consultant		**Date:** **24 March 2017**
Checked by: Alan Calcott, Managing Director		**Date:** **27 March 2017**
Status	**FINAL**	
Revision	**Date**	**Changes**
V1	26/04/17	Updated text in places

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Contents

1.0 Executive Summary

This document has been prepared for the proposed redevelopment at 48-56 Bayham Place (Bayham Place) in the London Borough of Camden. The proposed development will involve the erection of a single storey extension at 3rd floor level plus double roof extension to provide 9 self-contained units, rear extension at second floor level and associated works. The site extends to circa 0.03 Ha.

As the development is situated in London Borough of Camden it will have to comply with the energy requirements of Part L1A 2013. Therefore, the following objectives have to be achieved for the development:

Actual Targets:

- **Ensure the site complies with Part L1A 2013 (Amendments published November 2013, in effect April 2014) of the UK Building Regulations.**

A target of 35% reduction in regulated CO_2 emissions over the baseline is in place for all major developments. Major Developments are defined as; for dwellings, where 10 or more are to be constructed (or if number not given, area is more than 0.5 hectares).

The proposed development detailed within this document is for 9 units over 0.3 hectares and is therefore not considered a 'Major' development, however it is an *aspiration* of the Design Team and Client to satisfy the incoming targets Camden Council recently published in its Minor Modifications to the Draft Camden Local Plan as outlined below.

Aspirational Targets:

- **Achieve as close to a 19% CO_2 reduction over Part L 2013 Building Regulations.**
- **Achieve a 20% reduction in carbon dioxide emissions from on-site renewable energy generation.**

This strategy embraces the London Plan energy hierarchy as outlined throughout this document.

The analysis in this report has been conducted by utilising an actual SAP 2012 calculation for each new build dwelling.

Based on the information available at this stage and the assumptions detailed in Section 3.2 of this report, the following baseline emissions have been calculated:

Table 1.1a: Target emission rate

Target Site wide emissions	Total (tCO_2/yr)	Equation
Part L1A 2013 Baseline	11.64	A
Site 19% CO_2 Target DER	9.43	B = A x (1-19%)
CO_2 emissions to be offset in total from Part L1A 2013 Baseline	2.21	C = A - B

The development proposes to satisfy the above targets as far as possible onsite. This strategy embraces the London Plan's energy hierarchy within the constraints of the site as follows:

- ***Be lean:*** ***use less energy.*** The enhanced building fabric specification outlined in Section 3 will minimise the heat demands of the development through passive design.
- ***Be clean:*** ***supply and use energy efficiently***. The development will include high efficiency gas boiler and heat recovery units for the ventilation to further reduce the fossil fuel demands of the development.
- ***Be green:*** ***use Low or Zero Carbon technologies.*** The development will integrate high efficiency Solar Photovoltaic Panels (PV) to generate renewable energy to further offset the emission of the dwellings.

The outcomes of implementing this strategy are detailed below on a site wide basis across the development:

Table 1.1b: New-Build dwellings total tCO_2/yr for each hierarchy stage

		Be Lean	Be Clean	Be Green
Regulated CO_2 Emissions	**Baseline CO_2 Emissions**	**Proposed Gas baseline Building (DER)**	**Proposed Gas baseline Building (DER)**	**Proposed Building (DER)**
Total Regulated (tCO_2/yr)	11.64	11.52	11.04	8.75
%age Reduction over Baseline	N/A	**1.06%**	**5.17%**	**24.87%**
%age Reduction from LZC	N/A	N/A	**4.16%**	**20.78%**

As shown in the tables above, the implementation of the proposed solution should ensure an improvement of 24.87% for the development.

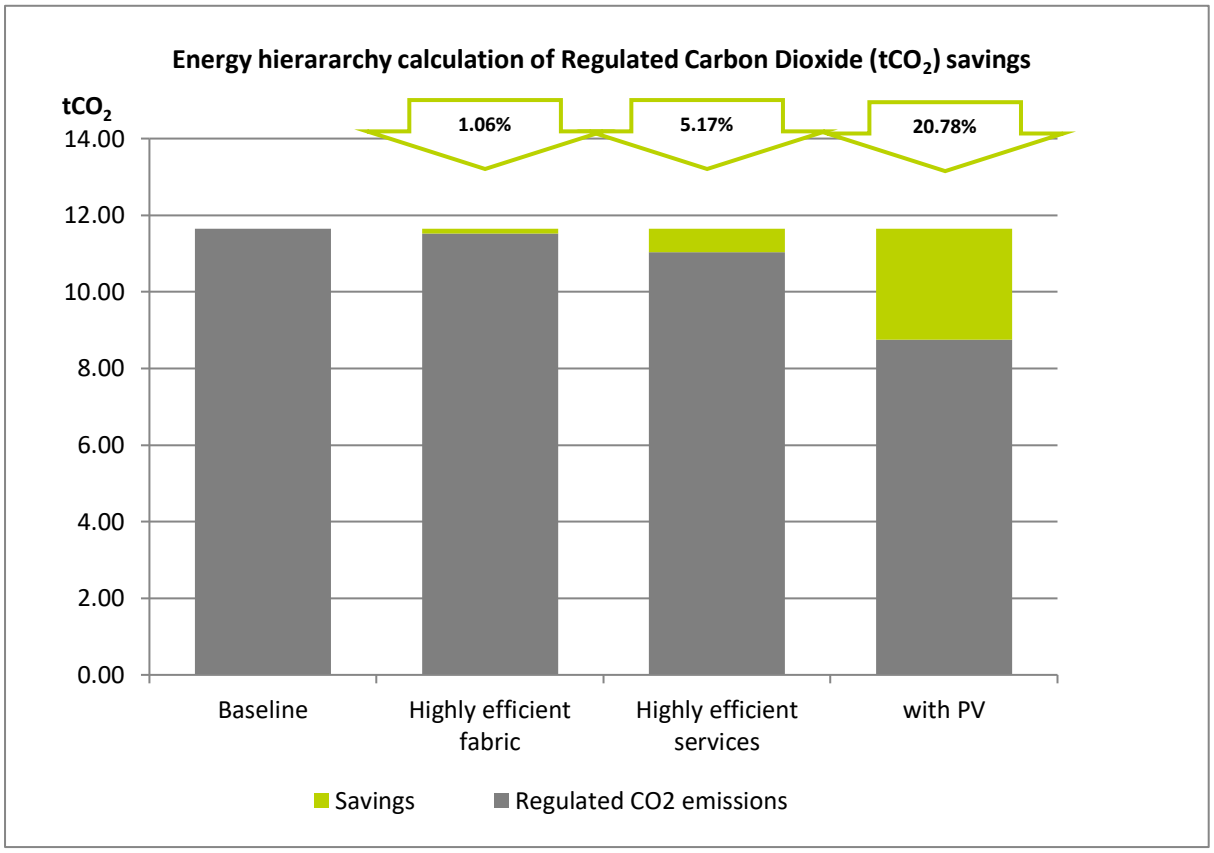
In summary, the proposed strategy offers the following savings from enhanced building fabric specifications and Low and Zero Carbon Technologies:

- A 24.87% reduction in regulated CO_2 emissions over the Part L1A 2013 baseline from fabric specifications, energy efficient services and the implementation of Low & Zero Carbon technologies (LZC).
- A 5.17% reduction in all site CO_2 (regulated & unregulated) emissions from the Part L1A 2013 from improved fabric specification before any Low & Zero Carbon technologies (LZC).
- 20.78% reduction in regulated emissions from Solar Photovoltaic Panels (PV) in line with the Camden policy

- A 12.38% reduction in all site CO_2 emissions from improved fabric specifications and Low & Zero Carbon technologies compared to the Baseline emissions, includes both regulated CO_2 emissions (those measured for Part L) and the unregulated CO_2 emissions (those attributed to cooking & appliances as calculated by SAP).

The scheme has incorporated the GLA's guidance and will deliver the target, as far as is feasible on site, the targets set out for Major Developments in the current London Plan.

Figure 1.1a: New-Build dwellings total tCO_2/yr for each hierarchy stage



2.0 Introduction

This Energy Strategy has been prepared for Summer Butterfly Ltd to present the results of an early stage analysis to satisfy the Local and Regional Planning Policy requirements relating to energy and CO_2 emissions for the proposed new development at 48 – 56 Bayham Place, London.

The proposed development will involve the erection of a single storey extension at 3rd floor level plus double roof extension to provide 9 self-contained units, rear extension at second floor level and associated works. The site extends to circa 0.03 Ha.

In August 2015 prior approval (planning ref: 2015/4598/P) was granted by LB Camden for the change of use of the building from office (Class B1a) to residential (Class C3). In October 2016 planning permission (ref. 2016/4116/P) was granted by LB Camden for the erection of a part single, part double roof extension to the building to provide four self-contained units (Class C3), two rear extensions at first and second floor level and associated external alterations. Since the approval of the planning application in October 2016 the applicant has constructed the rear extensions at first and second floor level to allow the occupation of these floors. This application seeks an additional floor at third floor level and to replicate a similar two storey roof extension as approved under planning permission ref. 2016/4116/P. The scheme also includes a rear extension at second floor level.

The analysis in this document includes SAP 2012 calculations for all dwellings.

2.1 Document structure

The first section provides the executive summary for this report and sets out what the objectives are.

This second section sets out the structure of the report, discusses the objectives and details any financial incentives available.

The third section sets out the base specifications for the site and details the further LZC requirements needed to comply with local planning requirements.

Section four gives information regarding the recommended LZC technologies, as well as giving information on why other technologies were discounted.

Section five goes into more detail regarding the recommended LZC technologies for the development.

Section six sets out the findings of the analysis.

2.2 Objectives

The development is situated in London Borough of Camden and will have to comply with the energy requirements of Part L1A 2013. Therefore, the following objectives have to be achieved for the development:

Actual Targets:

- **Ensure the site complies with Part L1A 2013 (Amendments published November 2013, in effect April 2014) of the UK Building Regulations.**

A target of 35% reduction in regulated CO_2 emissions over the baseline is in place for all major developments. Major Developments are defined as; for dwellings, where 10 or more are to be constructed (or if number not given, area is more than 0.5 hectares).

The proposed development detailed within this document is for 9 units over 0.3 hectares and is therefore not considered a 'Major' development, however it is an *aspiration* of the Design Team and Client to satisfy the incoming targets Camden Council recently published in its Minor Modifications to the Draft Camden Local Plan as outlined below.

Aspirational Targets:

- **Achieve as close to a 19% CO_2 reduction over Part L 2013 Building Regulations.**
- **Achieve a 20% reduction in carbon dioxide emissions from on-site renewable energy generation.**

3.0 Baseline Energy Demands and CO_2 Emissions

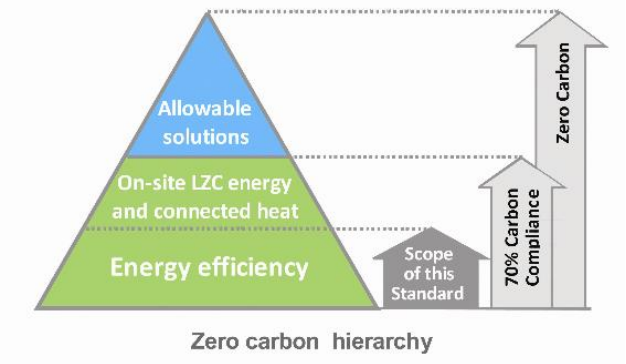
3.1 Context to Approach

The recommendations in this Energy Strategy are proposed as they embrace the themes outlined in the Mayor's energy hierarchy outlined in the London Plan 2016 (MALP), as well as following the current Zero Carbon trajectory:

- **Be lean:** *use less energy*
- **Be clean:** *supply and use energy efficiently*
- **Be green:** *use low or zero carbon technologies*

The Zero Carbon Hub is an independent workgroup that advise the UK Government on optimal solutions with the aim of achieving carbon neutral homes by 2016. As shown in the diagram below, the Zero Carbon Hub identified the "*energy efficiency improvement first"* approach as the most appropriate way to drive the new house toward carbon neutrality.

Zero carbon Hub recommended approach to carbon neutral housing

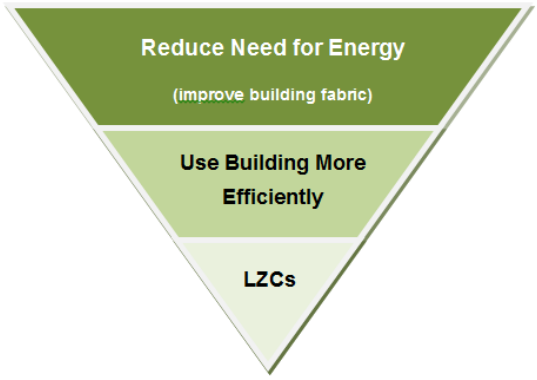


This approach consists of reducing the energy demand and CO_2 emissions by improving the energy efficiency of the building envelope and the mechanical and electrical services first. Once the energy demand of the building has been reduced from energy efficiency improvements then Low and Zero Carbon (LZC) technologies can be considered. It is widely accepted that the most effective way to reduce energy consumption (and therefore carbon emissions) is to follow the energy hierarchy (shown overleaf).

This approach is the most appropriate because energy efficiency improvements can be more cost effective than LZC systems and can provide significant energy and CO_2 savings especially over the lifetime of a product. In addition, energy efficiency improvements reduce the energy demand of the building and therefore contribute to reducing the size of LZC systems required to achieve low carbon buildings.

The energy efficiency of the dwellings can be improved by adopting passive design measures, such as enhancing the building fabric or designing the dwellings so as to improve passive solar gains through windows.

Energy Hierarchy:



Therefore, improving the energy efficiency of the development before implementing Low or Zero Carbon technologies is considered a preferred strategy as this follows the Mayor's energy hierarchy.

3.2 Base Specifications

The analysis in this report has been conducted by utilising an actual SAP 2012 calculation for all 9 of the new build dwellings. Once permission has been granted, the findings of this report will be confirmed upon the completion of the detailed design process.

The baseline demands for the New-Build dwellings are represented by the Part L1A 2013 Target Emission Rate, calculated using SAP 2012. Details of the limiting U-Values are given in Table 3.1 below:

Table 3.1 U-Values of building elements for all New-Build dwellings

Element	Part L1A 2013 Limiting U-Values (W/m^2K)
Walls	0.30
Floors	0.25
Roof	0.20
Windows	2.00

3.3 Setting the targets

As previously noted there is an aspiration planning target within this document that all site will comply with the targets Camden Council recently published in its Minor Modifications to the Draft Camden Local Plan. This corresponds to a 19% CO_2 reduction over Part L1A 2013 Building Regulations and a 20% reduction in carbon dioxide emissions from on-site renewable energy generation.

Based on the information available at this stage and the assumptions detailed in Section 3.2 of this report, the following baseline emissions have been calculated as shown in Table 3.2 below.

Table 3.2: Target for the 9 units

Target Site wide emissions	Total (tCO_2/yr)	Equation
Part L1A 2013 Baseline	11.64	A
Site 19% CO_2 Target DER	9.43	B = A x (1-19%)
CO_2 emissions to be offset	2.21	C = A - B

3.4 Meeting the targets – Improved fabric

Satisfying the 19% CO_2 reduction target can be achieved by passive design measures, such as building fabric improvements, or through the implementation of on-site Low and Zero Carbon technologies.

This early stage energy modelling is based on the following specifications, which may be subject to change during detailed design and is therefore provided for **illustration to show that compliance with the targets is achievable**. The specifications below are those that have been modelled for the dwellings and are shown to illustrate that the scheme can satisfy the Planning requirements.

One of the primary aims of Part L1A 2013 was to reduce the resultant CO_2 emissions of a dwelling by 6% compared to Part L1A 2010, which was expected to roughly reflect a 40% improvement over dwellings built to 2002 standards. Achieving Part L1A 2013 compliance through an enhanced fabric specification, without the reliance on Low or Zero Carbon Technologies, will ensure that the dwellings have low energy demands, helping towards the protection of occupants from energy price rises in the future.

Adopting the proposed Building Fabric Specifications and Energy Efficiency Measures alone follows the Energy Hierarchy of ***"being lean".*** Details of the U-Values used are given in Table 3.3 below.

Table 3.3: U-Values of building elements for all New-Build dwellings

Element	Modelled U-Values (W/m^2K)	Part L1A 2013 Limiting U-Values (W/m^2K)	%age improvement	Implementation Risk
Walls	**0.15**	0.30	**50%**	**LOW**
Floors	**0.11**	0.25	**56%**	**LOW**
Roof	**0.11**	0.20	**45%**	**LOW**
Windows	**1.40**	2.00	**30%**	**LOW**

In addition to these a target air permeability standard of 3 $m^2/hr/m^2$ has been sought.

3.5 Meeting the targets – Specifications

These U values have been used for each of the scenarios we have modelled which are detailed in Table 3.4 below.

Adopting these proposed Energy Efficiency Measures follows the next step in the Energy Hierarchy of ***"being clean".***

Table 3.4: Scenarios modelling in detail

	Scenario 1 Individual Gas Boilers	Scenario 2 Communal Gas Boiler	Scenario 3 Air Source Heat Pump
Heating System	High efficiency condensing gas boiler	Centralised system with single boiler feeding all flats via insulated pipework	Specialist Air Source heat pumps
Controls	Improved heating system controls - time and temperature zone control by suitable arrangement of plumbing and electrical services		
DHW supply	From main heating system		
Ventilation	High efficiency Mechanical Ventilation with Heat Recovery (MVHR)		
Lighting	100% Low Energy Lighting has been specified		

3.6 Meeting the targets – Renewable Energy

As can be seen in Section 4 the only appropriate renewable energy technology which could be applied to the Bayham Place scheme is a small Photovoltaic (PV) array using high efficiency panels connected to the landlords supply. A total array size of 4.95kWp has been used within this document to achieve the 20% reduction in carbon dioxide emissions from on-site renewable energy generation

Adopting this proposed Renewable Energy technology follows the next step in the Energy Hierarchy of ***"being green".***

4.0 Overview of LZC Technologies

Below is a brief overview of the available LZC Technologies which are commonly used and are accepted as such by DECC and BRE. A traffic light system is used to denote whether the systems are technically appropriate for the development.

Description	Traffic Light
Technology is technically and economically feasible with few barriers to implementation	
Technology is technically and economically feasible, but there are barriers to implementation	
Technology is technically or economically unfeasible and has been discounted	

The table below outlines the justification behind the discounting of technologies. A detailed review of each technology can be found in the Appendices.

4.1 Discounted technologies

Below is the rationale for discounting each technology.

Technology	Description	Traffic Light
Small scale wind	In light of the configuration of the site and the character of the location, there is a risk that this technology will not receive consent from Local Planning Authorities because of potential noise and aesthetical issues. Moreover, field trials have shown that small scale wind turbines often achieve much lower performances than expected in urban areas because of local wind turbulences. As well as the maintenance cost of this system, there is also a risk that implementing small wind turbines on this development will be economically unviable. Therefore, this technology has been discounted at this stage.	
Biomass	The implementation of a biomass heating system requires a large accessible space for fuel storage and the logistics of delivery could pose an issue in such a residential area. Therefore, this solution has been discounted at this stage.	
Ground Source Heat Pumps (GSHP)	The implementation of a GSHP is more risky than the proposed solutions with the ground conditions being unknown. Moreover, a vertical ground loop will probably be required for this development which will be very capital intensive due to drilling costs. Therefore it is discounted at this stage.	
Photovoltaic Thermal (PVt)	Hybrid solar systems that combine both photovoltaic cells with solar thermal collectors are an extremely effective technology. PV-t panels can be combined with a water to water heat pump in order to provide additional CO_2 offsets. However, as this system is more expensive than the proposed solutions that satisfy the targets it has been discounted at this stage.	

4.2 Technologies considered

The table below offers further solutions that are considered as potentially suitable for the development

Photovoltaic panels (PV)		
	Photovoltaic Cells (PV) generate electricity from sunlight using semiconductor cells linked together to form a module. Electricity can still be generated in cloudy and overcast conditions although more can be generated in direct sunlight. The conditions that provide optimal generation in the UK are with South facing panels with a 30^{o} elevation and no overshadowing. PV is considered a good solution for the development and follows the "***be green"*** element of the London Plan. A 4.95 kWp scheme will be installed on the rooftop for each scenario this will deliver 2.29 Tonnes of CO_2 savings.	

5.0 Proposed Solutions

As noted in Section 3 we have analysed in detail three potential solutions, all of which are technically feasible, and all of which have been measured against the same gas baseline.

5.1 Preferred Option 1 – Efficient fabric, Gas Boilers, MVHR and Photovoltaic panels

Using data from the SAP calculations with the specifications outlined in Section 3 the high efficiency fabric specification has been chosen to reduce the heat demands of the dwellings in the first instance. High efficient gas boilers installed to provide efficient and heat generation. The dwellings have also been modelled to include MVHR units for ventilation, recovering heat to further reduce space heating demands. The resultant savings from all of these measures is presented in the table below:

Table 5.1: Proposed solution for New-Build dwellings – Individual CO_2 savings

	Technology	Details	tCO_2 saved
being lean	**Enhanced Building Fabric**	Highly energy efficient building fabric to achieve Part L Compliance.	0.12
being clean	**High efficiency services**	High efficiency gas boilers to provide domestic hot water with improved heating system controls with MVHR ventilation	0.48
Being green	**Low and Zero Carbon Technology**	High efficiency Solar PV- circa 4.95 kWp PV	2.29
	TOTAL		**2.90**

Table 5.1 above shows that the enhanced building fabric with Gas Boilers, the installation MVHR and PV provided a saving of over 2.90tCO_2/yr.

A 4.95 kWp scheme will be installed on the rooftop to deliver a 2.29 Tonnes of CO_2 saving.

5.2 Further options analysis

Option 2 – Efficient fabric, Communal heating, MVHR and Photovoltaic panels

All specifications are identical to those within Option 1, however in this case a communal heating system is evaluated. The resultant savings from all of these measures is presented in the table below. The key issue with the deployment of a communal heating system is the small scale of the development. Also the location of a plant room on such a tight site coupled with the higher costs mean that this option is unlikely to be pursued.

Option 3 – Efficient fabric, Air Source Heat Pump and Photovoltaic panels

In this final scenario all fabric specifications remain as with the first two, however in this case an Air source heat pump (ASHP). The resultant savings from all of these measures is presented in the table below. The key issue with the deployment of ASHP systems would be the additional load on the local electrical network. They are also significantly more expensive than the gas boiler system and would only be pursued where the gas boiler system was not shown to be technically feasible.

Table 5.2: Proposed solutions for New-Build dwellings

Options	1	2	3
Heating Type	90% efficient Gas boiler	90% efficient Communal Gas boiler	Heat Pump
Specification	Floors 0.11	Floors 0.11	Floors 0.11
	Walls 0.15	Walls 0.15	Walls 0.15
	Roof 0.11	Roof 0.11	Roof 0.11
	Windows 1.4	Windows 1.4	Windows 1.4
	AT = 3	AT =3	AT =3
	MVHR	MVHR	MVHR
DER Tonnes/CO_2/Year	8.75	10.49	10.76
Baseline DER Part L 2013 Tonnes/CO_2/Year	11.64	11.64	15.27
%age improvement over Baseline DER Part L 2013	**24.87%**	**9.85%**	**29.55%**

6.0 Results and Recommendations

As can be seen in Section 5 three options have been modelled. In each scenario there are advantages and disadvantages however the recommendation solution is the implementation of Gas Boilers for this non major site, achieving an overall reduction of **24.87% over the Part L baseline**, as this is the most practical and economically feasible solution to satisfy the targets for this site.

The following tables set out the results from the analysis and are self-explanatory and in line with any major proposal in terms of detail.

Table 6.1: Table to show regulated CO_2 emissions

Regulated CO_2 Emissions	Regulated CO_2 emissions (tCO_2/yr)	CO_2 emissions saving over Part L baseline (tCO_2/yr)	% Reduction
New build baseline (Part L1A 2013)	11.64	0.00	0.0%
Be Lean	11.52	0.12	1.1%
Be Clean	11.04	0.60	4.2%
Be Green	8.75	2.90	20.8%

As can be seen from Table 6.1 the overall reduction achieved is **2.90tCO_2/yr**.

Table 6.2: Regulated & Unregulated CO_2 emissions after each stage of the Energy Hierarchy

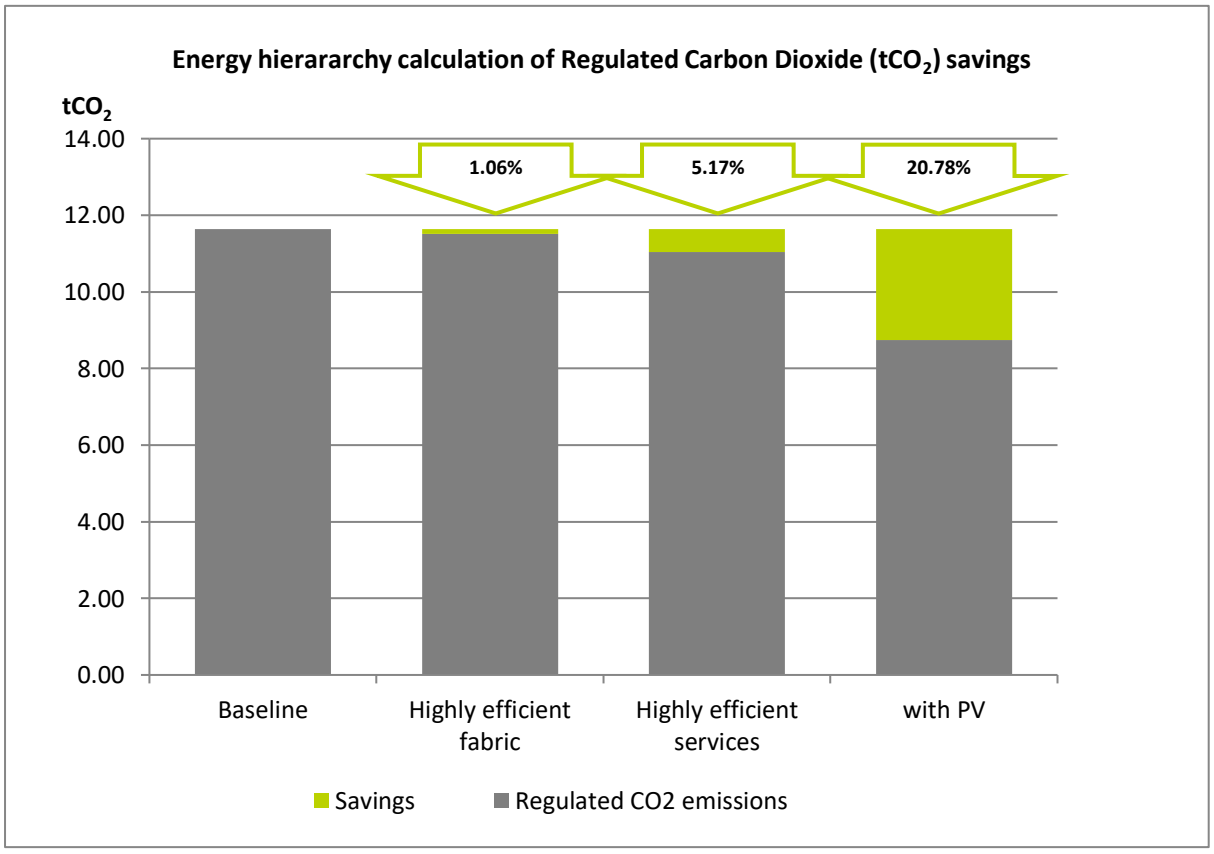
	CO_2 emissions (Tonnes CO_2 per annum)		Percentage Reduction
	Regulated	Unregulated	
Baseline: Part L 2013 compliant	11.64	23.39	0.0%
Be Lean	11.52	23.27	0.5%
Be Clean	11.04	22.79	2.1%
Be Green	8.75	20.50	10.1%

The outcomes of implementing this strategy are detailed below on a site wide basis across the development:

Table 6.3: New-Build dwellings total tCO_2/yr for each hierarchy stage

		Be Lean	Be Clean	Be Green
Regulated CO_2 Emissions	Baseline CO_2 Emissions	Proposed Gas baseline Building (DER)	Proposed Gas baseline Building (DER)	Proposed Building (DER)
Total Regulated (tCO_2/yr)	11.64	11.52	11.04	8.75
%age Reduction over Baseline	N/A	1.06%	5.17%	24.87%
%age Reduction from LZC	N/A	N/A	4.16%	20.78%

Figure 6.1: New-Build dwellings total tCO_2/yr for each hierarchy stage



As shown in the tables above, the implementation of the proposed solution should ensure an improvement of 24.87% for the development.

In summary, the proposed strategy offers the following savings from enhanced building fabric specifications and Low and Zero Carbon Technologies:

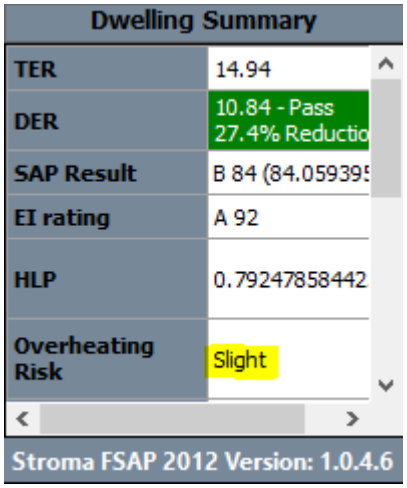
- A 24.87% reduction in regulated CO_2 emissions over the Part L1A 2013 baseline from fabric specifications, energy efficient services and the implementation of Low & Zero Carbon technologies (LZC).
- A 5.17% reduction in all site CO_2 emissions (regulated and unregulated) from the Part L1A 2013 from improved fabric specification before any Low & Zero Carbon technologies (LZC).
- 20.78% reduction in regulated emissions from Solar Photovoltaic Panels (PV) in line with the Camden policy
- A 12.38% reduction in all site CO_2 emissions from improved fabric specifications and Low & Zero Carbon technologies compared to the Baseline emissions, includes both regulated CO_2 emissions (those measured for Part L) and the unregulated CO_2 emissions (those attributed to cooking & appliances as calculated by SAP).

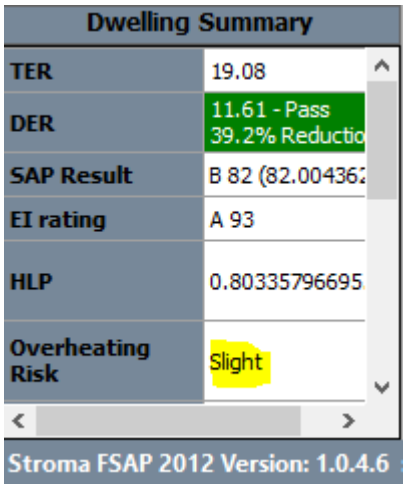
The scheme has incorporated the GLA's guidance and will satisfy the GLA requirements for a scheme of this size and also will satisfy the incoming Camden targets recently published in its Minor Modifications to the Draft Camden Local Plan.

Target	Target type	Satisfied
Part L1A 2013	Actual	YES
19% CO_2 reduction over Part L 2013 Building Regulations.	Aspirational	YES
20% reduction in CO_2 from on-site renewable energy generation.	Aspirational	YES

7.0 Part L overheating

Building Regulations (Part L) Overheating Part L of the Building Regulations focuses on levels of solar gain permitted into a space through facade / glazing. Under Part L1A for residential development this is expressed as a range of risk. To note, this criterion of Part L is not mandatory, i.e. it is not a strict requirement but is seen as good design practice.





Each apartment is to be mechanically ventilated with Heat recovery. This will be enabled to run in summer bypass at night to create night time cooling.

The window glazing will be installed with this in mind by using a glass with high g-values and Low-E coatings. Purge ventilation through glazing openings is to comply with Building Regulations Part F.

For Building Control and Part L of the Building Regulations the dwellings have a ‘slight’ to ‘medium’ overheating risk, this is acceptable to demonstrate compliance.

Appendix A: Preferred LZC technology

Solar Photovoltaic cells (PV)

Photovoltaic Cells (PV) generate electricity from sunlight using semiconductor cells linked together to form a module. Electricity can still be generated in cloudy and overcast conditions, although more can be generated in direct sunlight.

The conditions that provide optimal generation in the UK are with South facing panels with a 30˚ elevation and no overshadowing which is possible on this site.

Photovoltaic panels are considered as one of the preferred LZC technology for this development. The implementation of this technology requires very few alterations to the design and does not add a high load to the roofs.

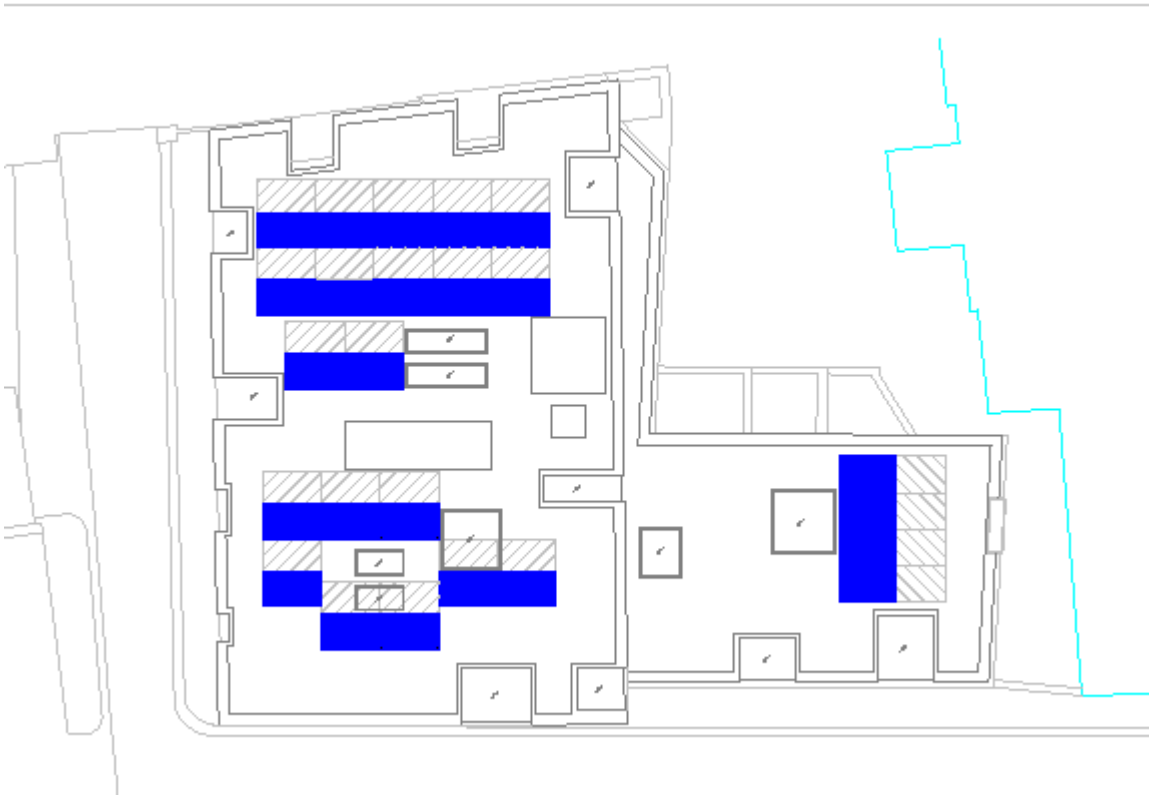
Advantages

- Costs continue to fall as technology improves
- Many panels are guaranteed for 20-25 year lifetimes but are expected to last for longer
- Maintenance is low as panels are usually cleaned by rainwater
- The technology has been existence for a long time and is well understood
- Low Planning Risk
- Easier and quicker to install compared to other LZCs
- The technology is eligible for the Feed in Tariff (FiT)

Disadvantages

- Any shading can seriously impact the efficiency of the system. Careful consideration should be given to the current and future levels of shading (e.g. service pipes/flues).
- Integration with Green Roofs may be an issue

Appendix B: PV Layout



The indicative drawing above identifies the 24no of PV Panels that are proposed on the top roof of the building.

Appendix C: CHP Appraisal

Combined Heat & Power (CHP)

CHP generates heat for space heating or hot water requirements whilst simultaneously generating electricity for on-site use or exporting to the grid. The systems are usually 'heat led' with much more heat generated than electricity. CHP works best with buildings that require a high demand of heat for a sustained period of time, such as hospitals, swimming pools and hotels.

Based on the SAP calculations it has been concluded that the size of the development and ultimately the heating base loads do not allow for the efficient operation of a CHP plant. Specifically, the hot water loads are minimal and will not ensure that a CHP unit would operate for the optimal number of hours during the year to be financially feasible over its lifetime.

Advantages

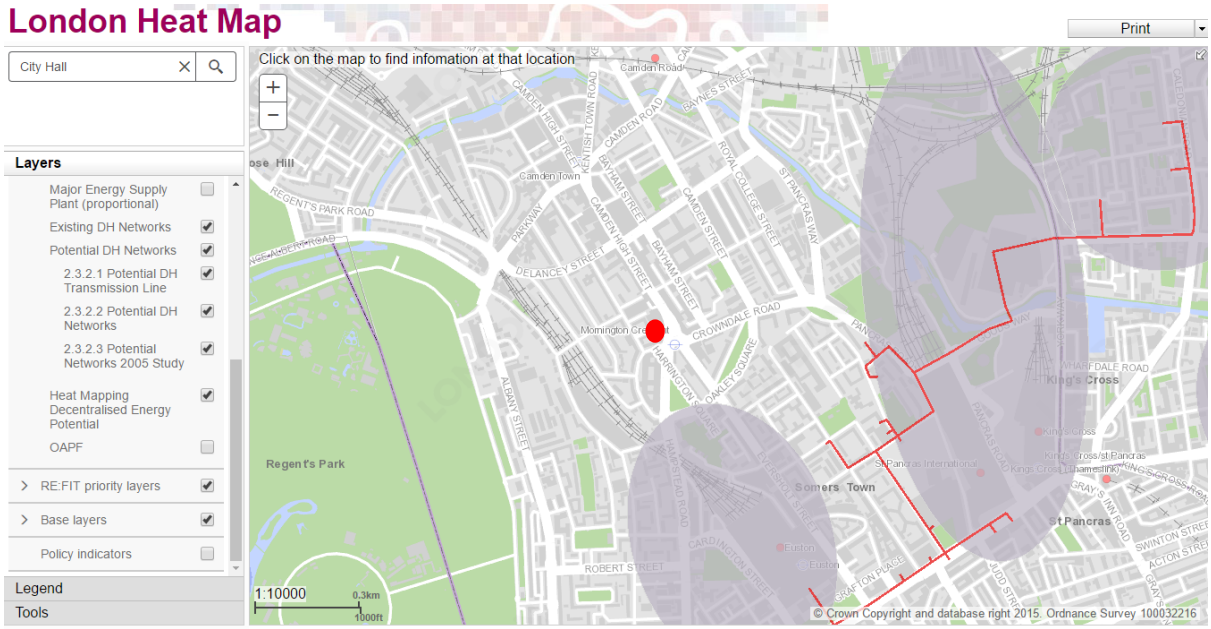
- Electricity generated from existing heating needs.
- Fewer transport/distribution losses than electricity from the grid.

Disadvantages

- Most suited to buildings with a prolonged high heating demand
- Works best when run for long hours to improve efficiency, therefore requiring a constant heat demand. In this instance, the CHP would not have large enough heat loads throughout the year to justify its implementation
- Regular expensive maintenance required and full overhaul after 10 to 15 years depending on yearly hours run
- Pollution should be considered in urban areas

Appendix D: Connection to offsite District Heating

As part of the CHP feasibility the London Heat Map tool was consulted and there are at present no existing CHP networks that can feasibly be connected to, as shown in the screen shot below. The potential (red line) is an extension to the Euston Road proposed network. The red marker represents Bayham Place.



This potential connection is broadly 700 m away on the heatmap if the feasibility has been implemented. The distance at present is unfortunately likely to be uneconomical however they are hopeful for future plans in the area to extend the network.