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New Mews House, Rear of The Albert Pub, Princess Road, NW1 8JR

Sustainable Design and Construction Statement

NEW MEWS HOUSE, REAR OF THE ALBERT PUB, PRINCESS ROAD, NW1 8JR
Sustainable Design and Construction Statement

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Registration of Amendments

Revision	Amendment Details	Revision Prepared By	Revision Approved By
A	Updated to include revised scheme, updated energy modeling and calculations and completion of BIA and drainage strategy.	MS	FK

EXECUTIVE SUMMARY

Create Consulting Engineers Ltd has been appointed to provide a Sustainable Design & Construction Statement to support the forthcoming planning application for the proposed New Mews House at the Albert Pub in London. This report has been developed to detail the sustainability features of the development and demonstrates how they relate to the following guidance documents:

- London Plan – 2011;
- Greater London Authority (GLA) guidance on preparing energy assessments (April 2014);
- Camden Core Strategy – 2010;
- Camden Development Policies – 2010-2015;
- Camden Planning Guidance – CPG 3 – Sustainability;
- Code for Sustainable Homes Sustainability Assessment Tool.

An Energy Strategy has been developed for the scheme and demonstrates how the development will exceed the mandatory energy requirements of Code for Sustainable Homes Level 4 (25% Improvement over Part L1A:2010) in line with Camden Core Strategy – CS 13 & Camden Planning Guidance CPG 3 – Sustainability.

The Energy Strategy summarises the key energy enhancement features of the new dwelling created in the rear garden of the Albert Pub, resulting in the reduction in carbon dioxide (CO_2) emissions. With reference to the Energy Hierarchy of the London Plan, energy efficiency measures from passive and plant performance optimisation ('Be Lean') along with the integration of feasible Low Carbon technologies ('Be Clean') and Zero Carbon technologies ('Be Green') are assessed, reported and summarised within this document.

The strategy aims to reduce energy demands by first incorporating suitable passive design measures, followed by the specification of an efficient building fabric and highly efficient Heating, Ventilation and Air Conditioning (HVAC) systems. Through optimised energy efficient building fabric and air tightness, the Part L1A:2013 Dwelling Fabric Energy Efficiency (DFEE) Standard for the scheme (**62.3 kWh/yr/m^2**) achieves an improvement over Part L1A:2013 Target Fabric Energy Efficiency (TFEE) Standards of **10.05%.**

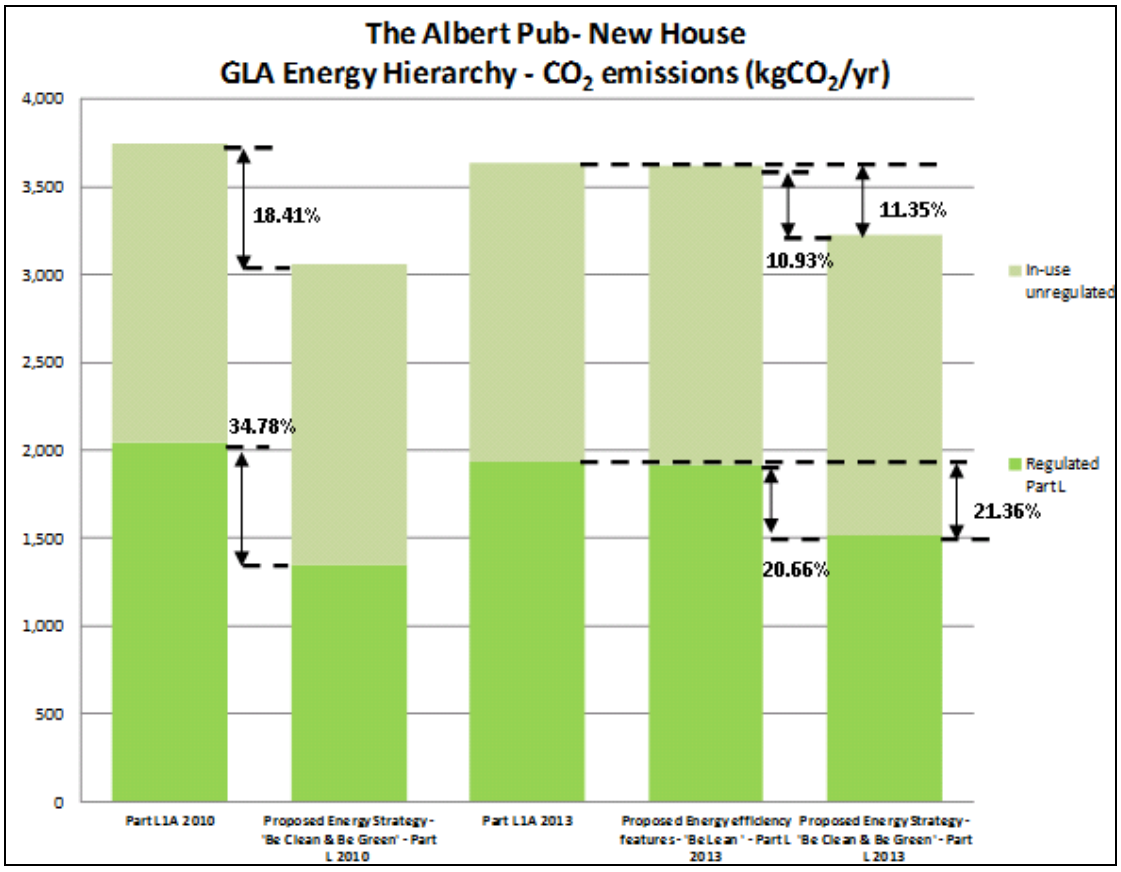
A low carbon and renewable energy feasibility study has been carried out for the development following the recommendations of London Plan policies 5.6 & 5.7 and Camden Core Strategy Policy CS 13 and Camden CPG 3 – Sustainability, Sections 2,3,5 and 6. Wind power (roof mounted and stand alone), solar hot water system, photovoltaics, biomass heating (stove and district system), gas / biomass CHP and air / ground source heating and cooling have all been considered. Due to the practical constraints of the site, photovoltaics (PV) have been found as the most viable and practical option for the development based on suitable unshaded roof areas. The proposed PV array will lead to the production of **762 kWh/yr** of renewable electricity and a saving of **395 kgCO_2/yr**.

The addition of renewable energy systems on the new Mews House at the Albert Pub will lead to:

- 395 kg of CO_2 savings per year representing **10.93%** CO_2 emission reduction from renewable technologies (**20.66%** regulated CO_2 emission reduction).

- An improvement over Part L1A:2010 and Part L1A:2013 of **34.78%** and **21.36%** respectively allowing the dwelling to exceed the minimum requirement of Code for Sustainable Homes Level 4.

The proposed PV area has been maximised for the scheme within the constraints of the site and roof configuration. The CO_2 emissions reduction for the regulated loads of the scheme achieved by the PV array specified for the scheme exceeds the 20% CO_2 emissions reduction requirement of Camden Core Strategy Policy CS13 – Tackling climate change through promoting higher environmental standards and Camden Planning Guidance CPG 3 – Sustainability. Achieving 20% reduction in CO_2 emissions for the total loads of the scheme through the installation of on-site renewable technologies is not considered practically or technically feasible for the scheme due to the very constricted nature of the site (rear garden of the existing pub), preventing the viable and efficient use of most Low and Zero Carbon technologies and leading to a scheme with a high net floor area to roof area ratio therefore limiting the roof area available for solar technology installation.



Copy of Figure 5.3: Energy Hierarchy – The Albert Pub – New Mews House

The Code for Sustainable Homes Assessment tool has been used to demonstrate the sustainability credentials of the scheme. This is in line with Camden Development Policy DP22 & Camden Planning Guidance CPG 3 – Sustainability, Section 9.

A Code for Sustainable Homes pre-assessment exercise has been carried out for the scheme by licensed Code for Sustainable Homes assessors within Create Consulting' Energy team. Each of the Code criteria was fully discussed at a Sustainability/Code workshop led by the Code assessor and attended by the design team on the 1st May 2014. This meeting ensured that all members of the development team have a full understanding of the successful integration of the Code for Sustainable Homes credits and process within their designs.

The pre-assessment shows Code for Sustainable Homes Level 4 is robustly targeted with a targeted score of **72.03%**. A formal assessment will take place when tender documentation is produced and will require submission of a full evidence bundle from the client and the design team to show compliance with the credits. The Code for Sustainable Homes assessor has been and will continue to form an integral part of the design team and a consistent point for reference, review and questions. This approach is proven through experience to offer the surest route to successful Code certification and holistic sustainable design.

In accordance with the London Borough of Camden Planning Guidance CPG 3 - Sustainability standards (Clauses 3.22 & 9.8), the scheme will achieve 50% of the un-weighted credits in Water and Material categories. Reasons for not achieving more than 47.75% of the energy credits have been detailed in the report. The constricted nature of the site which have limited the roof area available for PV and the fixed scale of compliance of the CSH Fabric Energy Efficiency issue which does not take into account the dwelling's form and layout (contrary to the Building Regulation TFEE approach), have prevented the achievement of any credits under CSH Ene 2 issue (Fabric Energy Efficiency) and more than one credit under Ene 7 issue (Low and Zero Carbon Technologies) and 3.8 credits for CSH Ene 1 issue (Dwelling Emission Rate). We therefore do not consider it feasible to achieve an un-weighted score greater than 47.75% achieved.

The Sustainable Design and Construction Statement for the development proposals for the new Mews House demonstrates that the design will holistically incorporate sustainable development principles into the full range of sustainability aspects covered by the Code for Sustainable Homes and the London Borough of Camden Planning Guidance CPG 3 - Sustainability.

1.0 INTRODUCTION

1.1 Create Consulting Engineers Ltd has been commissioned by Brooks/Murray Architects to prepare a Sustainable Design & Construction Statement for the proposed New Mew House located in the rear garden of the Albert Pub, London.

1.2 This Sustainable Design & Construction Statement has been produced to summarise the work performed to date with respect to predicting the energy performance of the development, the Code for Sustainable Homes level for the scheme, and demonstrate how the inclusion of sustainable technologies have been considered.

Site Location and Description

1.3 The Site is located within the London Borough of Camden on the west side of Princess Street, at 200 m from Primrose Hill and 500m from Camden Town tube station. (Please refer to Figure 1.1 below).

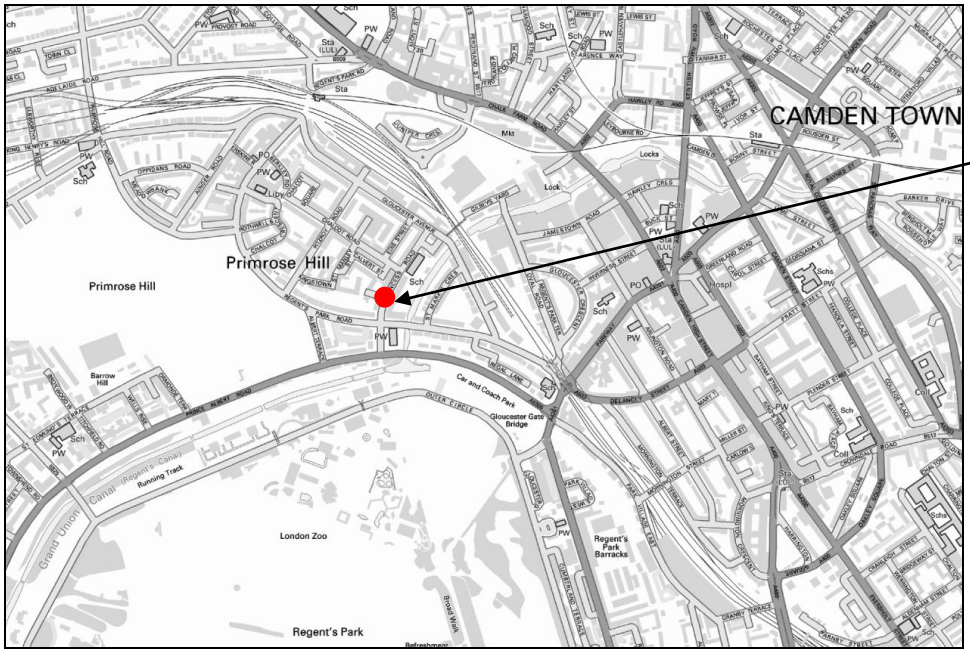


Figure 1.1: Site Location

1.4 The development proposal consists of the creation of a new two bedroom house in the garden of the existing Albert Pub.

Objectives

1.5 The objectives of this report are to:

- Demonstrate how the proposed development will meet the policy requirements of the London Borough of Camden Core Strategy Policy CS13: Tackling climate change through promoting higher environmental standards, Development Policy DP22: Promoting sustainable design and construction, DP23: Water and Camden Planning Guidance CPG 3 – Sustainability relevant to the scale and nature of the development.

- Identify the most suitable passive and energy efficient design approach for the scheme and the feasibility of Low and Zero Carbon technologies.

- Identify the drivers relating to an energy efficient design over and above minimum compliance with current Building Regulations and other appropriate local. The planning and construction programme for this scheme is also considered in relation to emerging and future policies and regulations.

- Summarise the results of the Code for Sustainable Homes (CSH) pre-assessment exercise carried out for the scheme, detailing the commitments made by the project team during the CSH workshop meeting held on 1st May 2014 in line with the London Borough of Camden - Development Policy DP22: Promoting sustainable design and construction, Camden Planning Guidance CPG 3 - Sustainability - Section 9.

- Respond to Camden Planning Guidance CPG 3 – Sustainability.

Report Structure

1.6 This introductory section is followed by a comprehensive review of national policy on sustainability. Section 3 details the energy efficiency features proposed for the scheme and the energy modelling exercise which has been carried out for the development. Sections 4 & 5 detail the low and zero carbon technologies feasibility study carried out for the site. Section 6 summarises the result of the Code for Sustainable Homes pre-assessment exercise for the scheme. Section 7 provides a summary of the sustainability features proposed for the scheme in relation to Camden Planning Guidance CPG 3 – Sustainability. Section 8 provides a summary and conclusion on the Sustainable Design and Construction Strategy for the scheme.

2.0 CURRENT AND FUTURE PLANNING POLICIES / GOOD PRACTICE REVIEW AND PROJECT REQUIREMENTS

National Planning Policy Framework (March 2012)

2.1 This framework sets out the Government's planning policies for England and how these are expected to be applied. Taken together, these policies articulate the Government's vision of sustainable development, which should be interpreted and applied locally to meet local aspirations. The main relevant sections are:

- *'Paragraph 17: Support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change, and encourage the reuse of existing resources, including conversion of existing buildings, and encourage the use of renewable resources (for example, by the development of renewable energy)';*

- *'Paragraph 93: Planning plays a key role in helping shape places to secure radical reductions in greenhouse gas emissions, minimising vulnerability and providing resilience to the impacts of climate change, and supporting the delivery of renewable and low carbon energy and associated infrastructure. This is central to the economic, social and environmental dimensions of sustainable development.'*

- 'Paragraph 95: To support the move to a low carbon future, local planning authorities should:
  - *Plan for new development in locations and ways which reduce greenhouse gas emissions;*
  - *Actively support energy efficiency improvements to existing buildings; and*
  - *When setting any local requirement for a building's sustainability, do so in a way consistent with the Government's zero carbon buildings policy and adopt nationally described standards.'*

- *'Paragraph 96: In determining planning applications, local planning authorities should expect new development to:*

- *Comply with adopted Local Plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and*
  - *Take account of landform, layout, building orientation'*

- *'Paragraph 97: To help increase the use and supply of renewable and low-carbon energy,* local *planning authorities should recognise the responsibility on all communities to contribute to energy generation from renewable or low-carbon sources. They should:*

- *Have a positive strategy to promote energy from renewable and low-carbon sources, including deep geothermal energy;*
- *Design their policies to maximise renewable and low-carbon energy development while ensuring that adverse impacts are addressed satisfactorily;*
- *Consider identifying suitable areas for renewable and low-carbon energy sources, and supporting infrastructure, where this would help secure the development of such sources;*
- *Support community-led initiatives for renewable and low carbon energy, including developments outside such areas being taken forward through neighbourhood planning;*
- *Identify opportunities where development can draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers'.*

- *'Paragraph 98: When determining planning applications, local planning authorities should:*
  - *Not require applicants for energy development to demonstrate the overall need for renewable or low carbon energy and also recognise that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions; and*
  - *Approve the application if its impacts are (or can be made) acceptable. Once suitable areas for renewable and low carbon energy have been identified in plans, local planning authorities should also expect subsequent applications for commercial scale projects outside these areas to demonstrate that the proposed location meets the criteria used in identifying suitable areas.'*

The London Plan (2011)

2.2 This Spatial Development Strategy for Greater London includes objectives to reduce the capital's impact on, and exposure to, the effect of climate change. Policies that are appropriate to the scale of the proposed single dwelling within the rear of the Albert Pub include:

Policy 5.2: Minimising Carbon Dioxide Emissions

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

- *'Be Lean'*: reduction of the energy demand and associated emissions using a passive design approach and high specification plant;

- *'Be Clean'*: further reducing energy demand and associated emissions by incorporating viable Low Carbon technologies;

- '*Be Green'*: meeting a proportion of the residual demand via renewable energy technologies, where feasible.

2.4 Major development proposals should include a detailed energy assessment to demonstrate how the targets for carbon dioxide emissions reduction are to be met within the framework of the energy hierarchy. As a minimum, energy assessments should include the following details:

- Calculation of the energy demand and carbon dioxide emissions covered by the 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.

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

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

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

Policy 5.6: Decentralised Energy in Development Proposals

2.5 Development proposals should evaluate the feasibility of Combined Heat and Power (CHP) systems, and where a new CHP system is appropriate also examine opportunities to extend the system beyond the site boundary to adjacent sites.

2.6 Major development proposals should select energy systems in accordance with the following hierarchy:

1. Connection to existing heating or cooling networks;
2. Site wide CHP network;
3. Communal heating and cooling.

2.7 Potential opportunities to meet the first priority in this hierarchy are outlined in the London Heat Map tool. Where future network opportunities are identified, proposals should be designed to connect to these networks.

Policy 5.7: Renewable Energy

2.8 Within the framework of the energy hierarchy (see Policy 5.2), major development proposals should provide a reduction in expected carbon dioxide emissions through the use of on-site renewable energy generation, where feasible.

Policy 5.9: Overheating and Cooling

2.9 Major development proposals should reduce potential overheating and reliance on air conditioning systems and demonstrate this in accordance with the following cooling hierarchy.

1. Minimise internal heat generation through energy efficient design;
2. Reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls;
3. Manage the heat within the building through exposed internal thermal mass and high ceilings;
4. Passive ventilation;
5. Mechanical ventilation;
6. Active cooling systems (ensuring they are the lowest carbon options).

2.10 Major development proposals should demonstrate how the design, materials, construction and operation of the development would minimise overheating and also meet its cooling needs. New development in London should also be designed to avoid the need for energy intensive air conditioning systems as much as possible.

2.11 Please note that although the scheme is not a major development, the approach detailed in the above policy have been followed as best practice in the proposed energy strategy.

Greater London Authority (GLA) guidance on preparing energy assessments (April 2014)

2.12 This GLA guidance note provides further details on how to prepare an energy assessment to accompany strategic planning applications as set out in London Plan Policy 5.2. The guidance note reiterates that the purpose of energy assessments is: '*to demonstrate that climate change mitigation measures comply with London Plan energy policies, including the energy hierarchy'*.

2.13 The energy assessment carried out for the scheme (Please refer to Sections 3-5), follows the principles of this GLA guidance note.

London Borough of Camden Policies

Camden Core Strategy (2010)

2.14 Camden's Core Strategy set out the key elements of the Council's planning vision and strategy for the borough. It is the central part of the Local Development Framework (LDF), a group of documents setting out Camden's planning strategy and policies.

- Policy CS13: Tackling climate change through promoting higher environmental standards.
  - Ensuring patterns of land use that minimise the need to travel by car and help support local energy networks;
  - Promoting the efficient use of land and buildings;
  - Minimising carbon emissions from the redevelopment, construction and occupation of buildings by implementing, in order, all of the elements of the energy hierarchy;
  - Ensuring buildings and spaces are designed to cope with, and minimise the effects of climate change.

Camden Development Policies (2010-2015)

2.15 Camden Development Policies form part of the Council's Local Development Framework (LDF), a group of documents setting out the planning strategy and policies in the London Borough of Camden. The most relevant development policy for this scheme relating to Sustainable Design and Construction is:

- Policy DP22: Promoting Sustainable Design and Construction
  - New build housing are expected to meet Code for Sustainable Homes Level 4 by 2013;
  - Developments are required to be resilient to climate change;
  - Developments are required to incorporate green or brown roofs and green walls wherever suitable;

- Policy DP23: Water. The Council require developments to reduce their water consumption, the pressure on the combined sewer network and the risk of flooding by:
  - Incorporating water efficient features and equipment and capturing, retaining and re-using surface water and grey water on-site;
  - Limiting the amount and rate of run-off and waste water entering the combined storm water and sewer network through the use of sustainable urban drainage methods to reduce the risk of flooding;
  - Reducing the pressure placed on the combined storm water and sewer network from foul water and surface water run-off and ensuring development in the areas identified by the North London Strategic Flood

Risk Assessment as being at risk of surface water flooding are designed to cope with the potential flooding;

- Ensuring that developments are assessed for upstream and downstream groundwater flood risks in areas where historic underground streams are known to have been present; and
- Encouraging the provision of attractive and efficient water features.

Camden Planning Guidance CPG 3 – Sustainability (2013)

2.16 Camden Planning Guidance has been prepared to support the policies of the London Borough of Camden Local Development Framework (LDF). This guidance is therefore consistent with the Core Strategy and the Development Policies, and forms a Supplementary Planning Document (SPD) which is an additional "material consideration" in planning decisions. 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:

- CS13 - Tackling climate change through promoting higher environmental standards
- DP22 - Promoting sustainable design and construction
- DP23 - Water

Sustainability Assessment Methods, Code for Sustainable Homes (CSH)

2.17 The Code was initially introduced on a voluntary basis for residential developments in the private sector, although many local authorities now have planning requirements for a particular level of the CSH to be achieved.

2.18 The London Borough of Camden Development Policy DP22 - Promoting Sustainable Design and Construction, requires that new residential developments achieve Code for Sustainable Homes Level 4 from 2013.

2.19 The Code for Sustainable Homes assesses the environmental performance of a housing development against nine categories:

- **Energy/CO_2**, covering operational energy and transport.
- **Water**, covering internal and external water use.
- **Materials**, covering the environmental impact of materials and recycling facilities.
- **Surface water run-off,** covering impacts from flooding and water pollution.
- **Waste,** covering construction waste and recycling.
- **Pollution,** covering impacts from air pollution.
- **Health** and **Well-Being,** covering daylighting, noise accessibility and outdoor space.
- **Management,** covering Home User Guide, construction impacts and security.
- **Ecology and Land Use**, covering landscaping, biodiversity and density.

2.20 The proposal for a single dwelling, Mew House within the rear garden of the Albert Pub is aiming to achieve a score that surpasses CSH Level 4 demonstrating its exemplary performance in terms of sustainable design. A Code for Sustainable Homes Pre-Assessment has been prepared in support of the planning application to demonstrate compliance with the London Borough of Camden Development Policy DP22 - Promoting Sustainable Design and Construction.

Building Regulations Approved Document Part L1A 2013

2.21 Part L of the current Building Regulations (2013) considers the reduction of carbon emissions in new and existing buildings. As the proposal consist of a new build domestic building, it falls under Part L1A of the Regulations.

2.22 The proposed Mew House will achieve an improvement over Part L1A: 2013 of **21.36%.** The proposal will also achieve an improvement over Part L1A:2010 of **34.78%** exceeding the energy requirement of the Code for Sustainable Homes Level 4 (25% Improvement over part L1A:2010).

2.23 The assessment of the dwelling against Part L have been included in Section 3 & 4, which uses the results of the Building Regulations National Calculation Method (NCM) as a baseline for demonstrating the estimated energy consumption of the proposed development and the measures applied to reduce this consumption and the resulting carbon dioxide emissions. The results are summarised in the following section of this report.

3.0 BE LEAN – EFFICIENCY STRATEGY

Introduction

3.1 The proposed energy strategy has, as its first priority, minimised energy consumption through suitable orientation and the performance of the building envelope, facades and plant. The following sections detail the energy efficiency features of the development.

Energy Efficiency Features Proposed

Physical Form of the Building

3.2 The proposed scheme incorporates a number of beneficial design features. Good levels of natural daylight will be achieved in the main living area through the use of large windows and shallow room plan. This will reduce reliance on artificial lighting and thus limit energy consumption. Shading control systems in the form of occupier controlled interior blinds/curtains will be provided to limit the potential for unwanted solar gains in summer. The impacts of the physical form of the building on solar gain and daylight are developed in Sections 3.4 and 3.5. The physical form of the building also offers opportunities for the utilisation of thermal mass, which is discussed further in Section 3.6.

Building Envelope Specification and Thermal Performance

3.3 The building fabric U-values and air tightness for the proposed dwellings have been agreed through discussions with Brooks/Murray Architects on the 1st May 2014. They meet and exceed the building fabric elements standards of Part L1 2013 (Criteria 2 – Limits on design flexibility). Please refer to Table 3.1:

Energy Efficiency Features	Camden CPG – Sustainability – Recommended Building Fabric Standard	The Albert Pub – New Mews House
U wall (W/m^2K)	0.20	0.18
T U basement wall (W/m^2K)	0.20	0.14
U ground floor (W/m^2K)	0.2	0.14
U roof (W/m^2K)	0.13	0.11
U window (W/m^2K)	1.5	1.4 (sliding windows) / 1.1 (other windows)
U doors (W/m^2K)	1/1.5	1
Permeability rate (m^3/hm^2) @ 50Pa	3	5*
Ventilation		Natural
Thermal bridging		Accredited construction details

Table 3.1: Building Fabric Standard Specified for the Development

*Value exceeding LB Camden CPG 3 standards, allowing the efficient use of a low carbon natural ventilation strategy in line with the London Plan Cooling Hierarchy. This value is compensated by the higher performance achieved for the walls and the roofs U-values compared to LB CPG 3 standard.

Passive Solar Design

3.4 Passive solar design involves adapting the building massing, layout and glazing to best respond to the local climate and annual sunpath, with the aim of reducing energy demands and improving occupant comfort through the use of heat and light from the sun. One of the main façade of the scheme is orientated South/South-West which will ensure the dwelling can benefit from passive solar heating in winter whilst avoiding overheating through the use of an integrated external overhang cutting high summer solar angle.

3.5 Blinds will also offer efficient solar control as they provide both solar shading and glare control, which in turn improves occupier comfort and reduces the risk of overheating for the dwelling The glazing units will also be provided with a solar transmittance specified to optimise solar control of the overall unit.

Thermal Mass

3.6 Utilising the thermal mass of a building can help to regulate internal temperatures and temper heating and cooling loads by absorbing and radiating heat, thus reducing annual energy consumption. To exploit the thermal mass of the building, either direct or indirect contact is required between the structure and the occupied space, via exposed surfaces or energy exchange systems. Due to the proposed residential use, there is limited opportunity to exploit thermal mass directly; this is because the internal finishes such as carpets will reduce the effectiveness of the brick and stone structure as an energy store, however it is expected that the use of thermal mass through the exposed walls will be achieved to some extent. In the cooling season, use of thermal mass will be achieved through night time purge ventilation through the openable windows, to remove the heat absorbed by the thermal mass during the day.

Ventilation Strategy / Scope for Natural Ventilation

3.7 As detailed in Section 3.3 the air permeability of the proposed development has been assumed to be 5 m^3/m^2@50PA/hr for the scheme.

3.8 The dwelling will be naturally ventilated in line with the London Plan Cooling Hierarchy.

The Choice and Design of Building Systems and Plant

3.9 The building systems and plant have been designed to optimise the efficiency of the systems by matching installed capacity to anticipated building demand. Items of equipment, which make up the building's mechanical building services installation, will be specified to achieve high annual energy efficiency in operation and will be regularly serviced to maintain their performance.

3.10 The proposed method of heating and hot water to the dwelling will be via an individual highly efficient condensing gas boiler (≥89.7% - Boiler assumed: Icos System HE 15E). The boiler will be a high efficiency low NOx emission boiler with interlock, delayed start thermostat, modulating burner control and generic enhanced load compensation. The heating within the dwelling will be delivered by conventional radiators. Use of efficient system controls for local temperature adjustment in each occupied space such as time and temperature zone control will be incorporated to reflect the user demands. Very well insulated hot water cylinder (200L) will be specified with very low heat loss (≤ 1.9 kWh/day) for hot water heating storage.

3.11 All the lighting will be through dedicated energy efficient lighting.

<u>London Plan Cooling Hierarchy / London Borough of Camden Core Strategy CS13 - Tackling climate change through promoting higher environmental standards</u>

3.12 The section above details how the different measures implemented have responded to the London Borough of Camden Core Strategy Policy CS13 and followed the London Plan cooling hierarchy developed in Policy 5.9 Overheating and Cooling. In summary:

- Minimise internal heat generation through energy efficient design & reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls
  - Occupant controlled blinds for all windows;
  - Optimised solar transmittance of the glazing units.

- Manage the heat within the building through exposed internal thermal mass and high ceilings
  - Some thermal mass effect through exposed walls;
  - Effect limited due to internal finishes (carpets);
  - During the cooling season, effective uses of thermal mass through night time purge ventilation.

- Passive ventilation
  - Natural ventilation selected for the scheme.

- Mechanical ventilation
  - Mechanical extracts for kitchens and bathrooms.

- Active cooling systems (ensuring they are the lowest carbon options);
  - No active cooling system is proposed for the scheme.
  - The dwelling passes Approved Document Part L1A overheating criteria without the need for comfort cooling.

3.13 Several factors have an impact on the summer internal temperature such as:

- Volume of the dwelling;
- Ventilation strategy;
- Size and orientation of glazed elements;
- Energy transmittance of glazing - g value of glazing;
- Opening regime;
- Frame factor;
- Blind specification;
- Overhang;
- Thermal mass.

3.14 The SAP certified software NHER Plan Assessor v 6.1 which follows Appendix P of SAP 2012 has been used to assess the overheating risk of the scheme. The new dwelling passes criterion 3 of Building Regulations Approved Document Part L1A 2013.

Energy Delivered / CO_2 Emissions Estimation

Standard Assessment Procedure

3.15 The Standard Assessment Procedure (SAP 2012) forms the basis for demonstrating dwelling compliance with Part L1A of the Building Regulations 2013 and as such it has been used to estimate Part L compliance and to predict the annual building regulated energy consumption and CO_2 emissions of the dwelling.

3.16 The energy consumption and CO_2 emissions of unregulated elements (cooking and appliances) have been estimated based on the methodology developed in Appendix L of SAP 2012.

3.17 Simulations are based upon the latest set of architectural plans and elevations plans prepared by Brooks/Murray Architects issued in October 2014.

Results of the SAP Calculations and Energy Demand Estimation

3.18 Through optimised energy efficiency features only, the dwelling achieved a Part L 2013 Dwelling Fabric Energy Efficiency Standard (DFEE) of **62.3 kWh/m^2/year** which represent a **10.05%** improvement compared to the Part L1A:2013 Target Fabric Energy Efficiency Standard (TFEE).

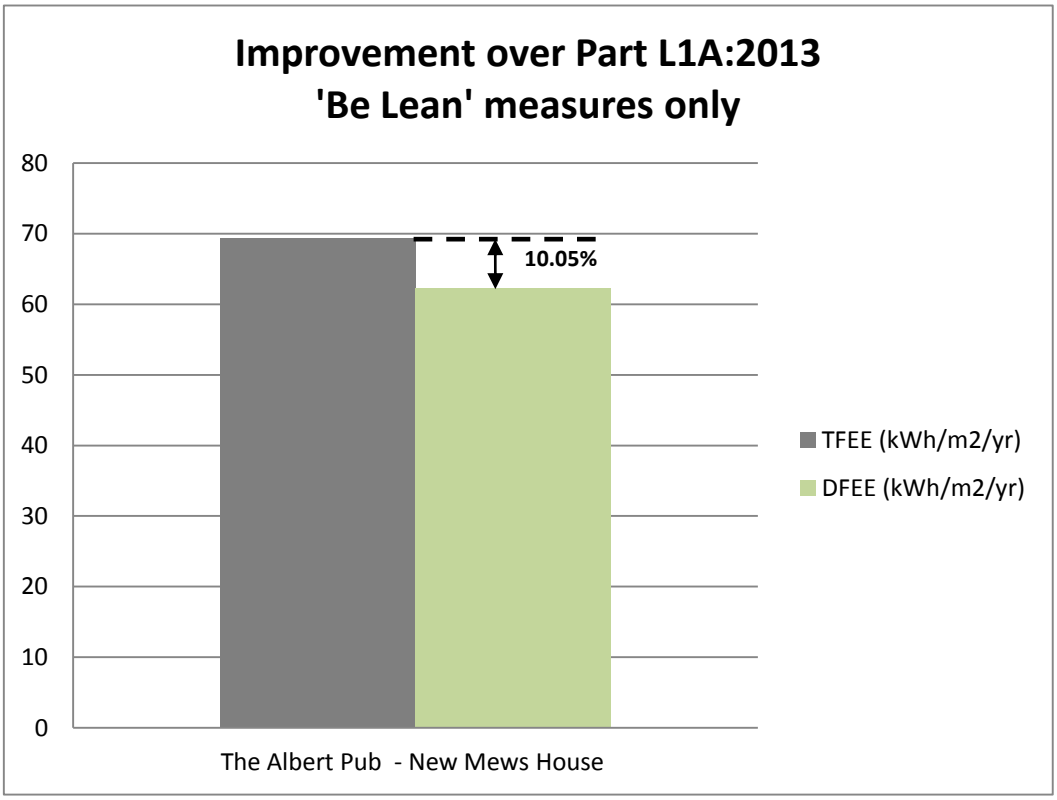


Figure 3.1: Improvement over Part L 'Be Lean' measures only

Conclusion of the Energy Efficiency Strategy

3.19 The energy efficiency features specified for the development will lead to a significant reduction in anticipated energy consumption and CO_2 emissions compared to a standard development, through very good passive building design in the first instance and then by the specification of energy saving features within the services design.

Energy Signature of the Scheme (under 'Be lean' measures only)

3.20 The energy delivered to the development has been estimated based on the results of the energy simulation carried out for the new Mews House with the energy efficiency features agreed (See Section 3.2-3.11). The simulations have been carried out following SAP 2012 methodology and using SAP Appendix L for the estimation of the energy demand from cooking and electrical appliances. Please refer to Tables 3.2 and Figure 3.2:

Residential Energy demand Proposed development 'Be Lean'	Albert Pub – New Mews House		
	Total energy demand (kWh/year)	Total energy demand (kWh/year/m^2)	Total CO_2 emissions ($kgCO_2$/year)
Space heating	5,319.6	56.4	1,149.0
Water heating	2,427.2	25.7	524.3
Lighting	388.8	4.1	201.8
Electrical appliances	2,819.5	29.9	1,463.3
Cooking	658.0	7.0	241.8
Pumps and Fans	75.0	0.8	38.9
Gas	8,075.8	85.5	1,744.4
Electricity	3,612.3	38.3	1,874.8
Total	11,688.1	123.8	3,619.2

Table 3.2: Energy Delivered – 'Be Lean' measures only

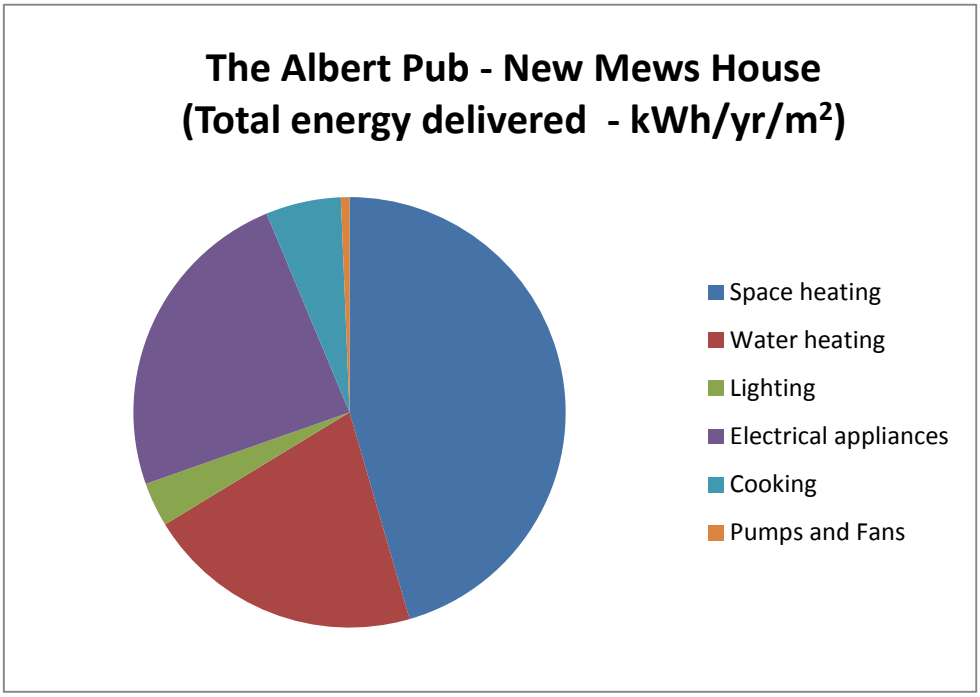


Figure 3.2: Energy delivered to the development

3.21 The total CO_2 footprint for the proposed development has been estimated at approximately **3.62 tonnes** per annum, using the development's Part L2A:2013 loads plus estimated operational 'in use' loads, before the addition of low and zero carbon technologies.

4.0 BE CLEAN: LOW CARBON TECHNOLOGIES

Combined Heat and Power (CHP)
Suitability for the Scheme: Unsuitable

4.1 The potential integration of conventional CHP plant has been evaluated for proposals at the new Mew House within the rear garden of the Albert Pub, in compliance with appropriate planning policies including the London Plan Policy 5.6 'Decentralised Energy in Development Proposals'. Decentralised CHP recovers the waste heat from the power generation prime mover that would otherwise be lost, via the engine water jacket, exhaust gases and oil cooler (dependent on model).

4.2 The energy demand assessment for the development has been reviewed with regard to the potential feasibility of CHP meeting a proportion of the heat demand, along with a proportion of the site's electricity demand, with an overall reduction in carbon dioxide emissions. The heating load in developments such as the Albert Pub does not have a consistent base load but rather has high peaks during the day and virtually no load during the night. Plant space availability is very challenging with thermal storage of sufficient capacity being unrealistic and inappropriate to the loads of the scheme. Overall, this is incompatible with the effective and efficient operation of a CHP plant.

4.3 The dwelling would have typical peak heating loads throughout the day, with significant periods of non-occupancy with corresponding periods of no heating load. It is well established that longer continuous running times are preferable, as the stop-start regime of shorter run-times has a negative impact on combustion plant lifespan, maintenance schedules and increases the flue gas emissions. The greatest greenhouse gas and unburned fuel emission concentrations occur when the unit starts from cold.

4.4 The following issues impact on the feasibility of CHP serving the new dwelling:

- Corresponding uncertainty of heat loads in relation to expected occupancy patterns, resulting in very low to unfeasible minimum heating baseloads.
- Plant space limitations, with corresponding integration issues for any CHP unit, associated distribution systems, thermal storage and heat rejection plant.
- Noise issues with CHP unit.
- Commercially available micro-CHP units too large for such a small scale scheme.

4.5 The threshold for financial viability of CHP varies according to the fluctuations in fuel price, with higher gas prices in relation to electricity prices increasing the required operating periods for an economically viable CHP system. Due to the limited and uncertain demand for heat, with no significant and certain heating baseload, CHP (delivering power and heat) would provide no material CO_2 emissions reduction and is therefore not suitable for this scheme.

Future Provision for District Heating Connection
Suitability for the Scheme: Suitable

4.6 The scheme and associated design has been assessed for the feasibility of connecting to a future city-wide district heating scheme. Safeguarding of space for Heat Exchangers (HEX), generally involving replacing or supplementing a boiler with a HEX to act as lead thermal source, along with provisional pipe work routes and connections has been reviewed within the design and assessed for viability.

4.7 There are currently no existing community heating systems for the development to potentially connect into. The site is more than a 1.8 km away from the proposed UCL and Euston Road networks - See Figure 4.1 below:

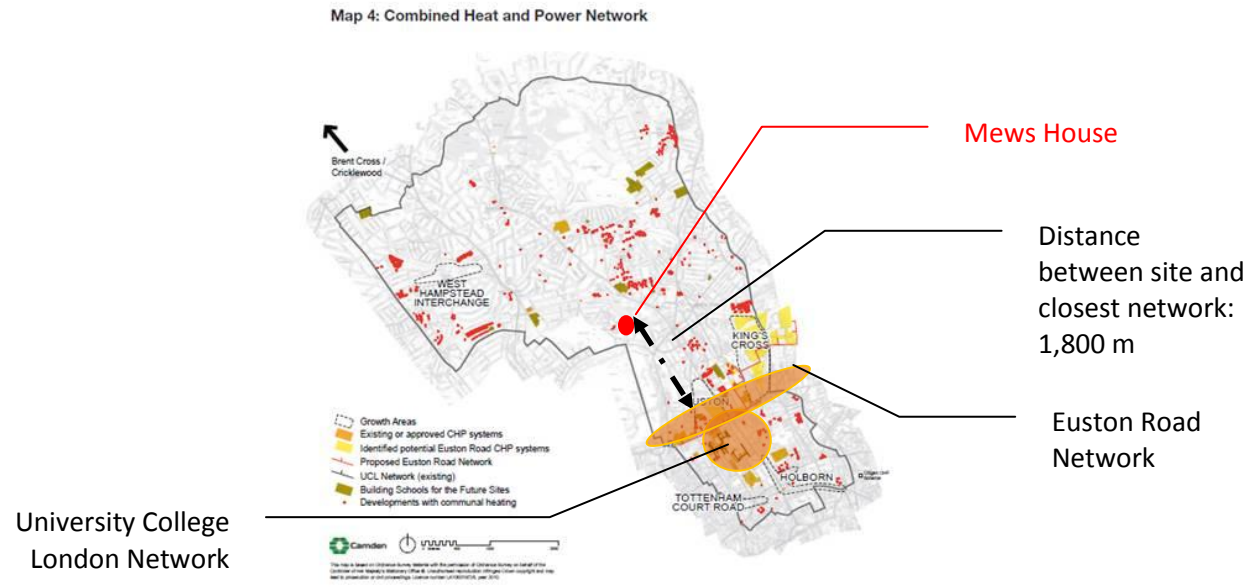


Figure 4.1: Camden District Heating System Map

4.8 Based on the proposed heating strategy for the new Mews House using an individual condensing boiler, the hot water service and the heating from the dwelling could potentially be served from an external district scheme system should a district scheme become reality, subject to future detailed feasibility analysis. In this case, the gas boiler supplying heating to the new dwelling will be replaced by a dwelling heat exchanger. It is assumed that connections will be made via Kingstown Street.

5.0 BE GREEN: ZERO CARBON TECHNOLOGIES

5.1 The following analysis of renewable energy technologies is in accordance with relevant planning policies, including the London Plan (2011) Policy 5.7 'Renewable Energy', the 'London Renewables Toolkit' (2004), Core Strategy Policy CS13: Tackling climate change through promoting higher environmental standards, Development Policy DP22: Promoting Sustainable Design and Construction and Camden Planning Guidance CPG 3 - Sustainability - Section 6 - Renewable Energy.

5.2 All renewable technologies have been assessed to determine whether they are feasible for inclusion within the single dwelling of Mews House: wind turbines (roof mounted and stand alone), photovoltaic panels, solar hot water, biomass heating (building integrated and district), biomass combined heat and power (CHP), air source heat pump and ground sourced heating and cooling systems. Viable renewable technologies that can be integrated into the design and make a worthwhile contribution to reducing the site's CO_2 emissions have been reviewed in detail.

5.3 Key parameters which have been considered when selecting appropriate combination of technologies include:

- Opportunities of the site and energy demand/of the development;
- Practical implementation considerations;
- Maintenance requirements;
- Implications for internal arrangement and space allocation, infrastructure and site layout;
- Public acceptability;
- Deliverability;
- Potential funding opportunities;
- Carbon contribution and cost per CO_2 saving;
- Future policies/aspirations;
- Interactions of the technologies with one another.

Wind Power: Urban Wind Turbines
Suitability for the Scheme: Unsuitable

5.4 The following analysis of urban wind power is in accordance with relevant planning policies, including London Plan (2011) Policy 5.7 'Renewable Energy' and the 'London Renewables Toolkit' (2004).

5.5 The following key issues exist for wind turbines sited within an urban environment:

- Significant planning issues are likely to exist for wind turbine masts proposed within this London location, with respect to height and townscape impact issues.

- Taller masts would be necessary in order to improve air speed availability, quality and turbine output, with resulting architectural and townscape conditions, along with structural and maintenance access impacts.
- There is currently considerable evidence of urban wind turbines failing to perform to manufacturer's output estimates. Turbulence from building density and existing chimneys will affect 'clean' air streams and reduce turbine output.
- Turbines sized for the urban environment are likely to produce very modest power outputs and corresponding reduction in the sites total carbon dioxide emissions. Turbulent air is likely to increase turbine wear and noise. Turbines located within the urban environment can also result in blade flicker and stroboscopic effects under certain conditions.
- The constricted nature of the site (located in the rear garden of an existing pub) prevents the incorporation of a wind turbine in this location. Moreover, it is considered that wind turbines would have a detrimental impact on the building's appearance and setting and would appear incongruous in long and short range views.

5.6 Consequently, this site is not viable for the installation of wind turbines.

Heat Pumps
Suitability for the Scheme: Unsuitable

5.7 Heat Pumps, utilising low grade, ground source or recovered heat can potentially provide high efficiency, low carbon heating and/or cooling. The use of low carbon Heat Pump technology is in keeping with a range of planning policies including the London Plan Policy 5.7 'Renewable Energy' as well as the London Renewables Toolkit (2004).

5.8 Ground Source Heat Pumps (GSHP) utilising the ground as a thermal resource, can provide heating and cooling, and has been reviewed in the context of this development, with the following outcomes:

- There is no space around the buildings for a horizontal system.
- It is not considered practically and economically feasible to integrate pile/loop under the development.
- Insufficient heating load exists to be able to operate typical GSHP for long enough periods to contribute significant emissions reduction in heating mode.
- Heat Pumps cannot recover low grade heat from any other sources on site.

5.9 Consequently GSHP are not considered viable for this scheme.

5.10 An Air Source Heat Pump (ASHP) could be used for the heat supply of the development. However, this system will lead to very limited savings due to use of carbon intensive electricity and the low COP of this system.

Solar Thermal Hot Water Service System (HWS) Array
Suitability for the Scheme: Unsuitable

5.11 Solar Thermal array converts sunlight into heat. The location and positioning of the solar thermal array is therefore important in achieving acceptable performance.

5.12 An overview of technical issues associated with the use of solar thermal in relation to scheme includes:

- Solar thermal evacuated tube systems generally offer the highest efficiency but have an associated higher capital cost, are readily repairable where a single tube or set of tubes fail.
- Solar thermal flat plate systems may have lower efficiency but are often more robust with lower levels of capital cost.
- Panels benefit from being orientated as close to south as possible (where solar radiation is at its highest) and angled at approximately 30 degrees to benefit from the highest average noon-day solar radiation along with the self-cleaning action from the rain.
- Solar thermal systems should be installed in shade-free environments in order to provide satisfactory performance, comply with Best Practice along with the London Renewables Toolkit.

5.13 Specific issues relating to the scheme that will impact on the successful integration of solar thermal systems, include:

- Relatively long pipe work runs with associated parasitic losses.
- Solar thermal systems tend to be bulkier with corresponding integration and maximum roof height and structural load issues becoming more significant.
- The daily solar output would not match the load profiles and therefore require significant solar thermal storage and associated plant space; plant space is very limited.
- This system would not lead by itself to the achievement of the minimum energy standard of Code for Sustainable Homes level 4: 25% Improvement over part L1A: 2010.
- Consideration is given for competition for roof space relating to other renewable technology such as PV which could provide greater CO_2 savings.

5.14 Consequently, for reasons of integration issues, along with limited emissions reduction performance, solar thermal systems are not appropriate for the scheme.

Bio-fuel

Suitability for the Scheme: Unsuitable

5.15 Bio-fuels have the potential to contribute to the reduction of CO_2 emissions of various developments by using this fuel within a boiler or CHP plant. Biofuels are considered to have low or zero CO_2 intensities as theoretically the CO_2 released when these fuels are combusted is no greater than the CO_2 that has been absorbed from the atmosphere when the plants grew. The only CO_2 emissions attributed to bio-fuels are those associated with the collection, processing and distribution of the bio-fuels, and are available as liquid or solid fuels. Liquid fuels are generally named bio-diesel and are available in various blends up to 100% (B100). Bio-diesels can be produced from virgin crops or by recycling cooking oils. Solid bio-fuel or bio-mass is typically wood chips or wood pellets.

5.16 However there are a number of issues which must be considered with this type of fuel in urban locations:

- Potential air quality impacts with combusting bio-fuels in urban areas, in particular elevated NOx emissions and particulates that must be addressed. It should also be noted that several London boroughs are strongly discouraging the use of biofuels for air quality reasons.
- Transporting this type of fuel increases lorry movements into and out of London, affecting congestion and transport emissions. The relatively rapid degradation of biodiesel would require appropriately sized on-site storage tanks with regular fuel deliveries.
- Importantly, the actual bio-diesel CO_2 intensity cannot be guaranteed due to variations in fuel stock supplier, demand, the energy input processing the fuel and CO_2 emissions due to growing, harvesting and processing the base fuel.
- Socio-economic issues from growing and harvesting feedstock, with potential impacts on food production, particularly for biodiesel that is imported. Solid biofuels have a lesser impact in this area.
- On-site fuel storage requirements requiring additional space, along with regular access to the on-site fuel storage area. Site space is limited at this scheme.
- Increased plant maintenance is generally required, adding to costs and plant down-time.
- Biomass CHP using solid fuels is not considered viable for this scheme as this technology is not sufficiently commercially developed. Additionally, commercially available plant sizes are generally of a larger output and less likely to suit smaller loads.

5.17 Consequently biofuels for combustion within a boiler or CHP plant are not appropriate for the scheme.

Photovoltaic's (PV)

Suitability for the Scheme: Suitable

5.18 The potential integration of photovoltaic panels has been evaluated for the new Mews House within the Energy Strategy, in compliance with appropriate planning policies, including the London Plan Policy 5.7 'Renewable Energy'.

5.19 Photovoltaic cells directly convert sunlight into electrical current using semiconductors. The output of a cell is directly proportional to the intensity of the light received by the active surface of the cell. The location and positioning of PV cells is therefore critical to achieving acceptable performance. Exposure to sunlight causes electricity to flow through the cells. Mono-crystalline PV cells provide higher levels of electricity generating performance over other panel types. PV panels can be incorporated into a range of building designs and positions, provided they are located in a shade-free environment and facing as close to south as possible.

5.20 Photovoltaic's are generally technically suitable for residential developments, however their use can be limited due to their high capital cost. With the introduction of the feed in tariff the high capital cost could be balanced with the running cost savings and the fixed tariff offered during a set period of time.

5.21 However, the following issues are considered in relation to the feasible integration of PV:

- High capital cost;
- Low maintenance;
- Simple installation;
- Self cleaning if tilted at an angle of 10 degrees or more;
- Electrical baseloads from pumps of the primary hot water distribution system and cold water booster system along with the residential space lighting will ensure that most of the generated electricity can be utilised on site. Any unused electricity can be sold back to the grid;
- Performance output and emissions reduction is greater for PV over solar thermal systems for this arrangement, panel area and specific project loads;
- The aesthetic appearance of this system will need to be discussed to ensure they do not endanger the traditional character of the development;
- Electricity Feed in Tariffs are available for this type of installation, improving the Return on Investment and payback periods;
- Access issues;
- Available unshaded area on the top of the horizontal roof of the new Mew House within the rear garden of the Albert Pub;
- Technology which can allow the achievement of the minimum energy standard of Code for Sustainable Homes Level 4: 25 % Improvement over Part L1A:2010.

5.22 For the reasons detailed above PV has been proposed for the scheme.

Modules Proposed

5.23 There are several different technologies used for the production of commercial solar modules, however, silicon-based technologies dominate commercial solar energy with the largest market share at over 90%. The use of high efficiency polycrystalline silicon solar cell is preferred as it provides a very good balance of performance and economy. Moreover, recent improvements in polycrystalline panel technology are bringing these modules closer to monocrystalline in size, efficiency and heat tolerance characteristic.

5.24 The following modules have been proposed to match the PV power capacity required for Code for Sustainable Homes Level 4 energy standard: Sharp ND - RD250A5 - See manufacturer datasheet in Appendix B.

PV Configuration Proposed

5.25 Based on the module selected and the available unshaded area of the roof of the new Mews House, 4 modules are proposed for the scheme. A mounting structure such as the Caymax-flat roof system will be used to ensure that the modules have a due South orientation and a tilt of 15 degrees to allow for self cleaning.

5.26 Although 15 degrees does not represent the optimum tilt for this location (30-40 degrees), the reduction in solar irradiation on the module is only reduced by 7% (based on latest PVGIS-CMSAF latest satellite data). Please refer to Figure 5.1 below:

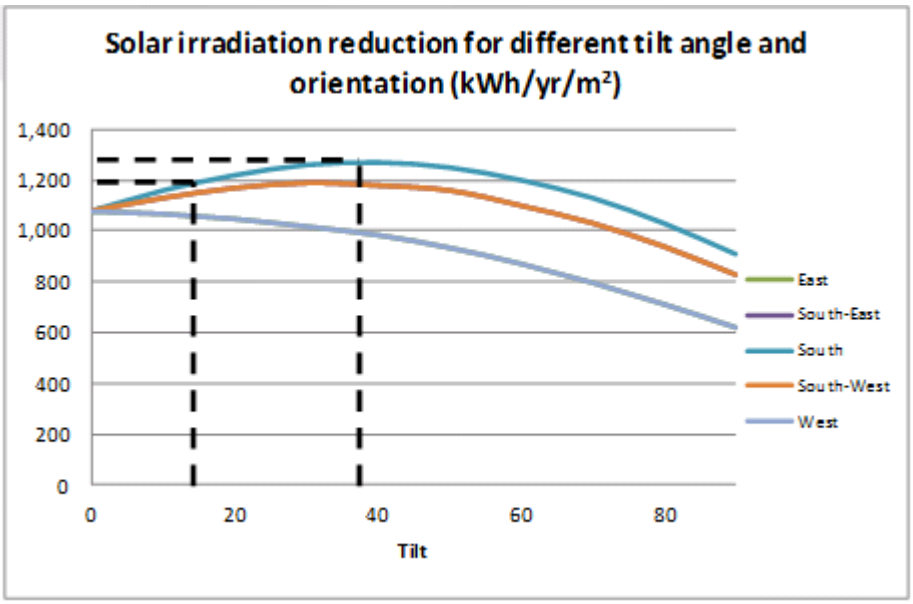


Figure 5.1: Reduction in solar irradiation for different tilt and orientation

5.27 An array of four PV modules located on a tilted structure on the horizontal roof of the new Mews House is proposed.– Please refer to Figure 5.2 below:

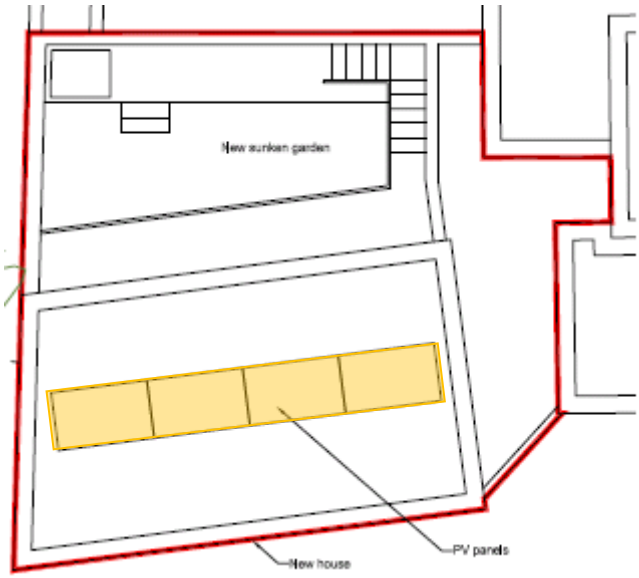


Figure 5.2: Proposed PV configuration- New Mews House -The Albert Pub

5.28 As shown in Figure 5.2 above, the proposed area of PV has been maximised for the scheme within the constraints of the site, roof configuration and access issues.

Assumptions for PV Systems and Solar Irradiation

5.29 PVGIS – Climate SAF satellite date for London provide an estimated solar irradiation on the PV orientated plane of 1,190 kWh/m^2/yr. PVGIS has also been used to estimate the losses due to temperature and angular reflectance in London for the proposed configuration:

- Losses due to temperature: 7.1 %;
- Losses due to angular reflectance: 3.5%.

5.30 The PV module efficiency is 15.2%.

5.31 The other losses have been estimated as:

- Inverter losses: 5%;
- Other miscellaneous system losses: 13.7%.

Calculation of PV Output and CO_2 Emission Reduction – Total Loads

Description of calculation step	The Albert Pub- New House	Units
Approximated PV Installed Capacity	**1.00**	**kWp**
Maximum annual irradiation at the specific location	1190.0	kWh/m^2/year
Module conversion efficiency	15.2%	%
Inverter efficiency	95.0%	%
Angular reflectance effect	96.5%	
Temperature losses factor	92.9%	
Additional system losses	86.3%	%
Resulting annual kWh system Electrical output from 1m^2 of panel	133	kWh/year
CO_2 factor for electricity	0.519	kgCO_2/kWh
CO_2 factor for displaced electricity	0.519	kgCO_2/kWh
Annual CO_2 saving from 1m^2 panel	69	kgCO_2/year
Panel area of proposed PV array	**5.7**	**m^2**
Delivered electricity requirement substituted by electricity generated by PV	**762**	**kWh/year**
Reduction in CO_2 emissions due to application of photovoltaic array	**395**	**kgCO_2/year**
Determine total DELIVERED gas energy in base building	8,076	kWh/year
CO_2 factor for gas	0.216	kgCO_2/kWh
CO_2 emissions due to DELIVERED gas in building with PV (same as base building)	1,744	kgCO_2/year
Total delivered electricity in base building	3,612	kWh/year
Delivered electricity requirement for building with proposed PV array	2,850	kWh/year
CO_2 emissions due to delivered electricity in base building	1,875	
CO_2 emissions due to delivered electricity in building with proposed PV array	1,479	kgCO_2/year
Base building total CO_2 emissions	3,619	kgCO_2/year
Total building CO_2 emissions in building with proposed photovoltaic array	**3,224**	**kgCO_2/year**
Percentage CO_2 emissions reduction due to proposed photovoltaic array	**10.93%**	**%**

Table 5.1: CO_2 emission reduction from PV – Total scheme

Calculation of PV Output and CO_2 Emission Reduction – Total Loads

Description of calculation step	The Albert Pub- New House	Units
Approximated PV Installed Capacity	**1.00**	**kWp**
Maximum annual irradiation at the specific location	1190.0	kWh/m^2/year
Module conversion efficiency	15.2%	%
Inverter efficiency	95.0%	%
Angular reflectance effect	96.5%	
Temperature losses factor	92.9%	
Additional system losses	86.3%	%
Resulting annual kWh system Electrical output from 1m^2 of panel	133	kWh/year
CO_2 factor for electricity	0.519	kgCO_2/kWh
CO_2 factor for displaced electricity	0.519	kgCO_2/kWh
Annual CO_2 saving from 1m^2 panel	69	kgCO_2/year
Panel area of proposed PV array	**5.7**	**m^2**
Delivered electricity requirement substituted by electricity generated by PV	**762**	**kWh/year**
Reduction in CO_2 emissions due to application of photovoltaic array	**395**	**kgCO_2/year**
Determine total DELIVERED gas energy in base building	7,747	kWh/year
CO_2 factor for gas	0.216	kgCO_2/kWh
CO_2 emissions due to DELIVERED gas in building with PV (same as base building)	1,673	kgCO_2/year
Total delivered electricity in base building	464	kWh/year
Delivered electricity requirement for building with proposed PV array	-298	kWh/year
CO_2 emissions due to delivered electricity in base building	241	
CO_2 emissions due to delivered electricity in building with proposed PV array	-155	kgCO_2/year
Base building total CO_2 emissions	1,914	kgCO_2/year
Total building CO_2 emissions in building with proposed photovoltaic array	**1,519**	**kgCO_2/year**
Percentage CO_2 emissions reduction due to proposed photovoltaic array	**20.66%**	**%**

Table 5.2: CO_2 emission reduction from PV – Regulated loads

5.32 The GLA methodology has been used to estimate the PV output and the CO_2 emission reduction achieved by the renewable energy system selected for the site.

5.33 It is estimated that the PV array proposed will produce **762 kWh/yr** of renewable electricity and saves **395 kgCO_2/yr** which represent a **10.93%** CO_2 emission reduction for the total load of the scheme and **20.66%** CO_2 emission reduction for the regulated loads.

5.34 Please note a meter will be installed to monitor the energy output from the PV panels in accordance with Camden Planning Guidance CPG 3 – Sustainability - Section 6.

Conclusion

5.35 A low carbon and renewable energy feasibility study has been carried out for the development following the recommendations of London Plan policies 5.6 & 5.7. Due to the practical constraints of the site, photovoltaics (PV) have been found as the only viable and practical option for the development based on suitable unshaded roof areas on the top of the development. The proposed PV array on the top of the horizontal roof and tilted roof of the new Mews House will lead to the production of 762 kWh/yr of renewable electricity and save 395 kgCO_2/yr, which represents a reduction in CO_2 emissions of **10.93%** for the overall load of the proposed new Mews House at the Albert Pub and **20.66%** of the residential regulated loads.

5.36 This system will lead to the achievement of an improvement over Part L1A 2010 and Part L1A:2013 of **34.78%** and **21.36%** respectively allowing the dwelling to exceed the minimum requirement of Code for Sustainable Homes Level 4.

5.37 The proposed PV area has been maximised for the scheme within the constraints of the site and roof configuration. The CO_2 emissions reduction for the regulated loads of the scheme achieved by the PV array specified exceeds the 20% CO_2 emissions reduction requirement of Camden Core Strategy Policy CS13 – Tackling climate change through promoting higher environmental standards and Camden Planning Guidance CPG 3 – Sustainability. The achievement of a 20% reduction in CO_2 emissions for the total loads of the scheme through the installation of on-site renewable technologies is not considered practically or technically feasible for the scheme due to the very constricted nature of the site (rear garden of the existing pub), preventing the viable and efficient use of most Low and Zero Carbon technologies and leading to a scheme with a high net floor area to roof area ratio therefore limiting the roof area available for solar technology installation.

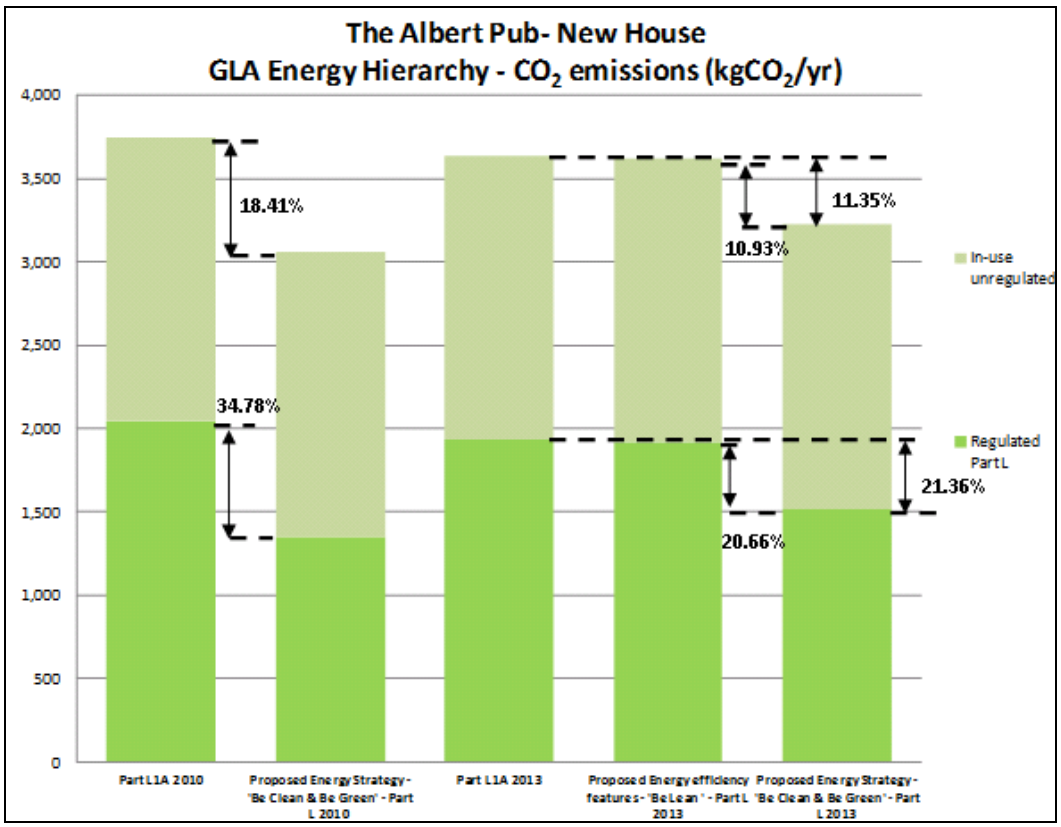


Figure 5.3: Energy Hierarchy – New Mews House

6.0 CODE FOR SUSTAINABLE HOMES PRE-ASSESSMENT

Introduction

6.1 Launched by the Department for Communities and Local Government (DCLG), the Code for Sustainable Homes is an environmental assessment method for new residential developments in England. It also sets out the standards expected from future improvements to the Building Regulations.

6.2 The Code for Sustainable Homes replaces Ecohomes in assessing residential developments for environmental performance whilst maintaining high quality of life and a safe and healthy internal environment. The issues assessed are grouped into nine categories: energy; surface water run-off, water; pollution; materials; management, waste, ecology and land use; health and well-being. Of the nine categories, energy and water require minimum standards for achievement of each Code level, whereas the other categories afford flexibility in gaining points ensuring the Code is flexible enough to be tailored to a particular development or market, although minimum standards for Code entry may apply.

6.3 The Code guidance is updated on a regular basis, and the latest version, against which the development proposals at the Albert Pub will be assessed, is the November 2010 version.

6.4 The Code was initially introduced on a voluntary basis for the private sector, although many local authorities now have planning requirements for a particular level of the Code to be achieved.

6.5 In accordance with the London Borough of Camden Development Policy DP22 - Promoting Sustainable Design and Construction, the new Mews House will aim to achieve Code for Sustainable Homes Level 4 demonstrating their exemplary performance in terms of sustainable design.

6.6 The Code for Sustainable Homes pre-assessment checklist provides an approximate indication of how a future formal assessment will score and the rating that will be achieved. The prediction checklist should therefore not be used as a guarantee of a subsequent rating but will inform how credits should be targeted during the formal assessment procedure.

Code for Sustainable Homes Levels

6.7 There are 6 different levels for the Code for Sustainable Homes which are related to the total number of credits obtained:

Code Level	Total Points Score (equal or greater than)
Level 1	36 points
Level 2	48 points
Level 3	57 points
Level 4	68 points
Level 5	84 points
Level 6	90 points

Table 6.1: Pass Rates Code for Sustainable Homes

Code for Sustainable Homes Minimum Standards

6.8 There are a number of minimum standards which must be achieved in order to award any level of the Code; these cover issues of materials, waste and surface water runoff. Additionally, there are minimum requirements for Energy and Water use, which get progressively harder to achieve as higher Code levels are targeted. A Code rating cannot be awarded unless the relevant minimum standards are achieved.

Code Level	**Energy & CO_2 Emissions** Improvement on Part L 2010	**Fabric Energy Efficiency**	**Water** Litres per person	**Lifetime Homes**	**Materials** Environmental Impact of materials	**Surface water run-off** Peak rates & annual volumes	**Waste** Household waste storage
1	None	None	120	None	At least 3 key elements to achieve BRE Green Guide 2008 rating of at least D.	To be no greater than previous conditions of the development site as described above	Adequate accessible storage of household waste as described above
2	None	None	120	None			
3	None	None	105	None			
4	25%	None	105	None			
5	100%	≤39kWh/m^2/yr for dwellings & mid-terrace ≤46kWh/m^2/yr for end terrace, semi & detached	80	None			
6	Zero Carbon		80	All principals of Lifetime homes applicable to the development must be achieved			

Table 6.2: Code Level and Mandatory Elements

6.9 The following sections detail how the scheme will respond to the different minimum standards:

Code for Sustainable Homes Energy Standard – Percentage improvement over Target Emission Rate (TER) as determined by the 2010 Building Regulation Standards

6.10 SAP/NHER energy simulations have been carried out for the dwelling of the development, and owing to very energy efficient features and renewable energy systems, a percentage improvement over the Target Emission Rate as determined by the 2010 Building Regulation Standards exceeding 25% will be achieved for the dwelling of the development. This is due to the optimised energy efficiency strategy proposed for the scheme and the specification of Photovoltaic panels on unshaded areas of the roof of the dwelling. This will allow the dwelling to achieve the minimum energy standard of Code for Sustainable Homes Level 4. Please refer to Sections 3 & 5 of this report for further details.

Code for Sustainable Homes Water Standard - Internal Potable Water Use

6.11 Four credits are presently targeted for the new Mews House based on very efficient water fittings including water efficient white goods (Please refer to Table 6.3). This will allow the dwelling to exceed the minimum water standards of Code for Sustainable Homes Level 4.

WC L	Basin Taps L/min	Bath L	Shower L/min	Kitchen tap L/min	Washing machine L/kg	Dish washer L/place	Daily water use L/person	CfSH Credits
4/2.6	3	150	8	3	6.25	0.71	89.8	4 credits

Table 6.3: Scenarios of Water Features

Code for Sustainable Homes Materials Standard

6.12 Minimum standard for all the different Code levels: At least three of the following 5 key elements of construction are specified to achieve a BRE Online Green Guide rating of at least 'D': roof structure and finishes, external walls, upper floor, internal walls, windows and doors.

6.13 No material specified for incorporation within the new Mews House at the rear garden of the Albert Pub development will have a rating of less than 'D', and the majority of the major building materials should be 'A' and 'A+' rated.

6.14 The materials selected for the dwelling will allow the achievement of at least 8 points for Mat 1 – Environmental Impact of Material credit.

6.15 An indicative way to achieve the required number of credits is proposed in table 6.4 below:

Elements	The Albert Pub – New Mews House– Material Specification
Roof	A+ - (3 points)
External Walls	A - (2 points)
Internal Walls (including separating Walls)	B - (1 point)
Upper and Ground Floors (including separating Floors)	C - (0.5 point)
Windows	A - (2 point)

Table 6.4: Green Guide rating scoring

Code for Sustainable Homes Surface Water Run-Off Standard

6.16 Ensure that peak run-off rates and annual volumes of run-off post development will be no greater than the previous conditions for the site and that the flooding of property would not occur in the event of local drainage system failure.

6.17 The drainage strategy will need to be designed to achieve the minimum CSH (Please refer to Section 7).

Code for Sustainable Homes Waste Standard

6.18 Minimum standard for all the different Code levels: Ensure there is a site waste management plan in operation which requires the monitoring of waste on site and the setting of targets to promote resource efficiency. Household waste storage: An adequate external space should be allocated for waste storage and sized to accommodate containers according to the largest of the following two volumes:

- The minimum volume recommended by British Standard 5906 (British Standards Institution, 2005) based on a maximum collection frequency of once per week. This volume is 100 litres for a single bedroom dwelling, with a further 70 litres for each additional bedroom.
- The total volume of the external waste containers provided by the Local Authority.

6.19 Storage space must provide *inclusive access and usability* (Checklist IDP). Containers must not be stacked. This requirement will be followed and improved on by the development.

Code for Sustainable Homes – Summary Prediction

6.20 A Code for Sustainable Homes pre-assessment exercise has been carried out for the scheme by licensed Code for Sustainable Homes assessors within Create Consulting' Energy team. Each of the Code criteria was fully discussed at a Sustainability/Code workshop led by the Code assessor and attended by the design team on the 1st May 2014. This meeting ensured that all members of the development team have a full understanding of the successful integration of the Code for Sustainable Homes credits and process within their designs.

6.21 The Code for Sustainable Homes pre-assessment checklist provides an approximate indication of how a future formal assessment will score and the rating that will be achieved. The prediction checklist should therefore not be used as a guarantee of a subsequent rating but will inform how credits should be targeted during the formal assessment procedure. The development can expect to secure the targeted credits, where supporting evidence is provided to the assessor at the formal assessment meeting.

6.22 The current prediction is that Code Level 4 is likely to be achieved, with a point's score of **72.03%**, where evidence is supplied to support the award of the CSH credits. The prediction indicates that all minimum standards will be achieved to meet the Code Level 4 target.

6.23 In accordance with the London Borough of Camden Planning Guidance CPG 3 - Sustainability standards (Clauses 3.22 & 9.8), the scheme will achieve 50% of the un-weighted credits in Water and Material categories.

6.24 The scheme only achieves 47.75% of the energy credits. It is not been considered feasible to improve upon this percentage for the following reasons:

- The air permeability value for the scheme could not be reduced further than 5 (m^3/hm^2)@50Pa to ensure the efficient use of a low carbon natural ventilation strategy in line with the London Plan Cooling Hierarchy.

- The Code for Sustainable Homes Ene 2 issue provides a single scale of compliance for the Fabric Energy Efficiency value of end terrace / semi-detached and detached properties. This scale does not take into account the form and layout of the proposed unit, penalising significantly detached properties such as the proposed new Mews House.

- The Code for Sustainable Homes approach is also not in line with the latest Fabric Energy Efficiency criteria of the revised Part L1A:2013 of the Building Regulations (informed by the Zero Carbon Hub). The Part L1A:2013 Target Fabric Energy Efficiency is based on a newly defined Notional Building and depends on the form and orientation of the proposed development. The optimised energy efficiency features specified for the scheme leads to a Part L1A:2013 Dwelling Fabric Energy Efficiency (DFEE) Standard of 62.3 kWh/yr/m^2, achieving an improvement over Part

L1A:2013 Target Fabric Energy Efficiency (TFEE) Standards (69.3 kWh/yr/m^2) of 10.05%. The Part L1A:2010 Fabric Energy Efficiency standard: 60.1 kWh/yr/m^2, does not allow however any credits to be achieved under the Code for Sustainable Homes Energy 2 issue (FEE to be equal or lower than 60 kWh/yr/m^2 to achieve any credits).

- The very constricted nature of the site (rear garden of the existing pub) has prevented the viability and efficient use of most Low and Zero Carbon technologies and has led to a scheme with a high net floor area to roof area ratio therefore limiting the roof area available for solar technology installation.

- The area of photovoltaic's that can be specified for the scheme has been maximised and limited by the available roof area. It is not possible to install more than 1 kWp of PV for the scheme. This system lead to the achievement of only one credit under Ene 07 – Low and Zero Carbon Technologies CSH issue (10.93% CO_2 emission reduction achieved for the regulated and unregulated loads – 15% CO_2 emissions reduction is required to achieve both credits under this CSH issue).

6.25 For these different reasons, it has not been possible to achieve any credits under CSH Ene 2 issue (Fabric Energy Efficiency) and more than 1 credit under Ene 7 issue (Low and Zero Carbon Technologies and more than 3.8 credits for CSH Ene 1 issue (Dwelling Emission Rate). We therefore do not consider it feasible to achieve an un-weighted score greater than 47.75% achieved.

6.26 Tables 6.5 & 6.6 show a resume of Code for Sustainable Homes credits, with the completed Code for Sustainable Homes pre-assessment table in Appendix C.

Issue Category	New Mews House- Credit			
	Category weighting %	Credits available	Credit value	Targeted Points Score
Energy	36.4%	31	1.17	14.80
Water	9.0%	6	1.50	5.00
Materials	7.2%	24	0.30	13.00
Surface Water	2.2%	4	0.55	1.00
Waste	6.4%	8	0.80	8.00
Pollution	2.8%	4	0.70	4.00
Health &	14.0%	12	1.17	11.00
Management	10.0%	9	1.11	9.00
Ecology	12.0%	9	1.33	8.00
Totals	100.0%	107		74
			Final weighted score	**72.03%**
			CODE Rating	**Level 4**

Table 6.5: Summary Code for Sustainable Homes Pre-Assessment – New Mews House

Code for Sustainable Homes Credit Tracker -November 2010 Version Pre-assessment Scoring Strategy					
Credit Issue		**Credits Targeted**	**Credits Available**	**Percentage Points Contribution**	**Weighted Score**
Energy and CO_2 Emissions					
Ene 1	Dwelling Emission Rate	3.8	10	36.40%	**17.38%**
Ene 2	Fabric Energy Efficiency	0	9		
Ene 3	Energy Display Devices	2	2		
Ene 4	Drying Space	1	1		
Ene 5	Energy Labelled White Goods	2	2		
Ene 6	External Lighting	2	2		
Ene 7	Low and Zero Carbon (LZC) Technologies	1	2		
Ene 8	Cycle Storage	2	2		
Ene 9	Home Office	1	1		
	Total indicative Energy score	**14.80**	**31.00**		
Water					
Wat 1	Indoor Water Use	4	5	9%	**7.50%**
Wat 2	External Water Use	1	1		
Total indicative Water score		**5.00**	**6.00**		
Materials					
Mat 1	Environmental Impact of Materials	8	15	7.20%	**3.90%**
Mat 2	Responsible Sourcing of Materials - Basic Building	4	6		
Mat 3	Responsible Sourcing of Materials - Finishing Elements	1	3		
Total indicative Materials score		**13.00**	**24.00**		
Surface Water Run-Off					
Sur 1	Management of Surface Water Run-off from	1	2	2.20%	**0.55%**
Sur 2	Flood Risk	0	2		
Total indicative Surface Water Run-off score		**2.00**	**4.00**		
Waste					
Was 1	Storage of Non-Recyclable Waste + Recyclable Household	4	4	6.40%	**6.40%**
Was 2	Construction Site Waste Management	3	3		
Was 3	Composting	1	1		
Total indicative Water score		**8.00**	**8.00**		
Pollution					
Pol 1	Global Warming Potential (GWP) of Insulants	1	1	2.80%	**2.80%**
Pol 2	NO_x Emissions	3	3		
Total indicative Pollution score		**4.00**	**4.00**		
Health and Wellbeing					
Hea 1	Daylighting	2	3	14%	**12.83%**
Hea 2	Sound Insulation	4	4		
Hea 3	Private Space	1	1		
Hea 4	Lifetime Homes	4	4		
Total indicative Health and Wellbeing score		**11.00**	**12.00**		

Management					
Man 1	Home User Guide	3	3	10%	**10.00%**
Man 2	Considerate Constructors Scheme	2	2		
Man 3	Construction Site Impacts	2	2		
Man 4	Security	2	2		
Total indicative Management score		**9.00**	**9.00**		

Ecology					
Eco 1	Ecological Value of Site	1	1	12%	**10.67%**
Eco 2	Ecological Enhancement	1	1		
Eco 3	Protection of Ecological Features	1	1		
Eco 4	Change in Ecological Value of Site	3	4		
Eco 5	Building Footprint	2	2		
Total indicative Ecology score		**8.00**	**9.00**		

TOTAL:	**73.80**	**107.00**		**72.03%**
			Code Level Targeted	**Level 4**

Table 6.6: Detailed Summary Code for Sustainable Homes Pre-Assessment – New Mews House

7.0 SUSTAINABILITY FEATURES OF THE SCHEME - LONDON BOROUGH OF CAMDEN CPG 3 - SUSTAINABILITY

7.1 The Code for Sustainable Homes pre-assessment and the London Borough of Camden Planning Guidance CPG 3 - Sustainability has been used to assist the successful incorporation of the following sustainability principles within the development proposals for the new Mews House at the Albert Pub.

Energy Hierarchy / Energy Efficiency /Decentralised Energy Network and CHP / Renewable Energy - Code requirements & London Borough of Camden CPG 3 – Sections 2, 3, 5 & 6:

7.2 The London Plan Energy hierarchy also detailed in Camden Planning Guidance CPG 3 - Sustainability has been followed for the scheme. An optimised energy efficient design will minimise the energy demand of the development. In addition, the use of renewable energy in the form of PV will provide a significant proportion of energy use.

7.3 The strategy aims to reduce energy demands by first incorporating suitable passive design measures, followed by the specification of an efficient building fabric and highly efficient Heating, Ventilation and Air Conditioning (HVAC) systems. Through an optimised energy efficient building fabric, the Part L1A:2013 Dwelling Fabric Energy Efficiency (DFEE) Standard for the scheme (**62.3 kWh/yr/m^2**) achieves an improvement over Part L1A:2013 Target Fabric Energy Efficiency (TFEE) Standard of **10.05%**.

7.4 A low carbon and renewable energy feasibility study has been carried out for the development. Due to the practical constraints of the site, photovoltaics (PV) have been found as the most viable and practical option for the development based on the amount of suitable unshaded roof area. The proposed PV array will lead to the production of **762 kWh/yr** of renewable electricity and a saving of **395 kgCO_2/yr**, which represents a reduction in CO_2 emissions of 10.93% for the overall development and 20.66% for the residential regulated loads.

7.5 The optimised energy strategy for the scheme will lead to an improvement over Part L1A:2010 and Part L1A:2013 of **34.78%** and **21.36%** respectively, allowing the scheme to exceed the minimum requirements of the Code for Sustainable Homes Level 4.

7.6 The proposed PV area has been maximised for the scheme within the constraints of the site and roof configuration. The CO_2 emissions reduction for the regulated loads of the scheme achieved by the PV array specified exceeds the 20% CO_2 emissions reduction requirement of Camden Core Strategy Policy CS13 – Tackling climate change through promoting higher environmental standards and Camden Planning Guidance CPG 3 – Sustainability. The achievement of a 20% reduction in CO_2 emissions for the total loads of the scheme through the installation of on-site renewable technologies is not considered practically or technically feasible for the scheme due to the very constricted nature of the site (rear garden of the existing pub), preventing the viable and efficient use of most Low and Zero Carbon

technologies and leading to a scheme with a high net floor area to roof area ratio therefore limiting the roof area available for solar technology installation.

7.7 A specific meter will be installed to monitor the energy output from the PV panels.

7.8 There are no existing community heating systems for the development to potentially connect into. The site is more than a 1.8 km away from the proposed UCL and Euston Road networks.

7.9 Based on the proposed heating strategy for the residential space using an individual condensing boiler for the new dwelling, the hot water service and the heating from the residential space could potentially be served from an external district scheme system should a district scheme become reality, subject to a detailed feasibility analysis. In this case, the gas boiler proposed to supply the heating to the new dwelling will be replaced by a dwelling heat exchanger. It is assumed that connections will be made via Princess Road.

7.10 Other energy efficient features proposed for the scheme include:

- Energy display devices.
- Drying space.
- Provision of a home office.
- Secured and covered cycle storage.
- Energy labelled white goods.

Adapting to Climate Change – London Borough of Camden CPG 3 - Section 12:

Adaptation to warmer temperatures

7.11 The London Plan 'Cooling Hierarchy' has been applied to the scheme, with the prioritisation of passive strategies for cooling:

- High performance building fabric, air permeability, thermal bridging;
- Occupant controlled blinds for all windows;
- Optimised solar transmittance of the glazing units;
- Some thermal mass effect through exposed walls;
- Efficient natural ventilation strategy;
- During the cooling season, effective uses of thermal mass through night time purge ventilation;
- No active cooling system is proposed for the scheme;
- Planting will be proposed for the sunken garden. Competition for useable unshaded roof area prevents the incorporation of a green roof into the scheme.
- The dwelling passes Approved Document Part L1A overheating criteria.

Adaptation to drier summers

7.12 The planting specified will be drought resistant and water butts will be provided to ensure rainwater is collected for external irrigation.

7.13 Water efficient fittings have been selected for the scheme. Please refer to the section on Water.

Adaptation to changing ground conditions

7.14 Services and infrastructure will be resilient to ground movement.

7.15 Potential swelling of soils during high rainfall will be minimised by rainfall collection systems. The rainwater butts provided for the new Mews House will collect water from the roofs and prevent this entering the ground.

Water Efficiency - Code requirements & London Borough of Camden CPG 3 – Section 7:

7.16 The following water efficient fittings will allow the scheme to achieve a potable water consumption of 90 L/person/day or less:

- Dual flush WCs (4/2.6 L or better);
- Low flow taps and showers (such as aerated showers) – 3 L/min taps and 8 L/min showers;
- Medium baths: 150 L;
- Water efficient appliances: 6.25 L/kg washing machine; 0.71 L/place dishwasher.

7.17 Water butts will be provided for external irrigation.

7.18 In addition to reducing the water consumption of the dwelling to less than 90 litres/person/day, occupants of the dwelling will be encouraged to adopt a more responsible attitude to water use. In accordance with the Code for Sustainable Homes Issue Man 1 a non technical 'Home User Guide' will be provided to the occupants of the dwelling. The guide will provide information on the operation and performance of the building, including details on the water efficient fittings, recommendations for their most efficient usage, and details on external water use.

7.19 Where feasible, the water meter within the dwelling will be located for easy reading to encourage occupants of the dwelling to monitor their water usage over time.

Sustainable Use of Materials - Code requirements & London Borough of Camden CPG 3 – Section 8:

7.20 All the manufacturers of the materials (basic building elements and finishing elements) will be required to hold ISO14001, BES 6001 or EMAS accreditation and use FSC certified timber.

7.21 The majority of the main building elements will receive an 'A' or 'A+' rating against the Green Guide to Specification.

7.22 Internal and external bins to collect kitchen waste and recycling will be provided to the dwelling.

7.23 Materials will be selected to ensure that they are not harmful to the environment and that they are robust and sensitive to the character of the area.

7.24 The scheme will aim for at least 10% of the total value of the materials used within the construction of the proposed development to be derived from recycled and reused sources, in accordance with the Waste and Resources Action Programme (WRAP) Quick Wins assessment or equivalent.

7.25 At least 85% (by weight or volume) of the non-hazardous construction waste generated on site will be diverted from landfill; as much as possible will be returned to suppliers via 'take back' schemes, salvaged for re-use or recycled using an approved waste management contractor.

7.26 The WRAP guidance and the waste hierarchy will be referred to during the construction phase.

7.27 A site waste management plan will be developed for the site which will include :

- Target benchmarks for resource efficiency, i.e. m^3 of waste per 100 m^2 or tonnes of waste per 100 m^2 set in accordance with best practice.
- Procedures and commitments to minimise non-hazardous construction waste at design stage. Specify waste minimisation actions relating to at least 3 waste groups and support them by appropriate monitoring of waste.
- Procedures for minimising hazardous waste.
- Monitoring, measuring and reporting of hazardous and non-hazardous site waste production according to the defined waste groups (according to the waste streams generated by the scope of the works).
- Procedures and commitments to sort and divert waste from landfill, through either;
    - Re-use on site (in situ or for new applications) or Re-use on other sites
    - Salvage/reclaim for re-use
    - Return to the supplier via a 'take-back' scheme

- Recovery and recycling using an approved waste management contractor
- Compost

Flood Risk and Drainage - Code requirements & London Borough of Camden CPG 3 – Section 11:

Flood Risk

7.28 Flood risks to the scheme have been considered as part of the Basement Impact Assessment report (See Create's Basement Impact Assessment report - Ref: RM/CS/P14-678/01_Rev A).

7.29 The report identified that historic records recorded flooding in Princess Street in 1975 highlights that the Primrose Hill area experienced surface water flooding in 2002 and that Princess Road flooded in 1975 & 2002. Based on subsequent conversations with Camden's Sustainability Team, the Royal Parks and Camden Highways Department it has not been possible to draw firm conclusions in relation to the location, duration and extent of flooding that has occurred or in relation to the extent of or success of any remedial works.

7.30 The site is confirmed as being within Critical Drainage area (CDA) 3003 (Primrose Hill) and Local Flood Risk Zone (LFRZ 3024.) and Camden Council highlighted that the capacity and maintenance of the inverted siphon under the canal adjacent to Gloucester Avenue is key to surface water drainage in the general area.

7.31 The EA's surface water flood mapping shows that the site itself is located just inside an area at 'Low' risk. Low risk means each year there is a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%). Flooding is shown to occur to a depth of <300mm in the area of the site.

7.32 Surface water flooding is a residual risk that will be managed by the design of site drainage including outfall design, appropriate setting of FFL/building thresholds and maintenance of private and public sewer network. As set out below, the property will require pumped foul and surface water drainage and the maintenance of these systems will be key.

7.33 The entrance threshold to the property should ideally be 32.5mAOD, to reduce the risk of surface water flooding to the property. It is noted that there is considerable uncertainty in the derivation of this level, and we strongly advise that a suitable freeboard should be considered as part of the detailed design.

7.34 Ensure that the building structure is waterproofed to at least 32.5mAOD.

7.35 The flood risk associated with adjacent sewers may also increase over time in the area due to climate change, which should be considered as part of the detailed design.

Surface water drainage

7.36 The drainage strategy has been designed to meet the Code for Sustainable Homes SUR 1 mandatory requirements and the second additional credit (Sur 1) as well as consideration of the London Borough of Camden CPG 3 guidance and requirements of the London Plan – Section 11.

7.37 The proposed surface water drainage strategy is shown on a sketch P14-678/SK01 in Appendix A and can be summarized as follows:

- The roof drainage will drain by gravity to existing ground levels whereby it will then be passed through a filter drain prior to the connection to the Thames Water sewer.
- The sunken garden will incorporate a drainage network within its sub-base which will drain towards a small prefabricated pump chamber whereby any water reaching this point will be pumped to a disconnecting manhole and outflow to the Thames Water sewer via the above mentioned filter drain.
- In order to ensure flooding of the property would not occur in the event of a local drainage system failure a pumped system is being used for the basement drainage.
- Duty standby pumps will also be included for both foul and surface water drainage.

7.38 The sunken garden and the filter drain will provide filter media to provide adequate treatment in line with the SUDS manual.

7.39 No surface water attenuation has been included as the impermeable areas are not increasing, and the mandatory requirements for CfSH are met by default in relation to runoff. Furthermore, as the existing brownfield runoff rates are lower than 5.0 l/s, it is not practical to incorporate any attenuation as this would require the restriction of flow rates to rates lower than 5.0 l/s, which would otherwise pose an unacceptable risk of blockage. This is consistent with the best practice and the approach set out in the current London Plan.

7.40 Infiltration forms of SUDs are not viable due to the low permeability of the ground; however, the sunken garden will perform a similar function as a green roof.

7.41 The incorporation of a heavily vegetated/grassed sunken garden will not result in surface water runoff during lower order rainfall events due to evapotranspiration. However flows to the sewer during more extreme rainfall events will flow at a slightly increased peak flow rate compared to existing. This approach is considered acceptable in line with best practice and the Mayors Plan and is unlikely to significantly change the hydrology in the local sewer network.

Brown Roofs, Green Roofs and Green Walls – London Borough of Camden CPG 3– Section 10:

7.42 The horizontal roof of the scheme has been entirely used for the provision of Photovoltaic panels which are required to meet Code for Sustainable Homes level 4 required by Camden

Development Policy DP22: Promoting Sustainable Design and Construction. Brown/green roofs on this horizontal roof are therefore not considered feasible.

7.43 The incorporation of green walls is unlikely to be feasible due to the very high proportion of glazing on the facades of the dwelling and due to over shading from surrounding existing buildings, making the incorporation of green walls problematic.

7.44 The sunken garden will however perform a similar function as a green roof in relation to drainage.

Biodiversity and Local Food Growing - Code requirements & London Borough of Camden CPG 3 – Sections 13 & 14:

7.45 The new proposed house has been provided with a sunken garden.

7.46 A Suitably Qualified Ecologist (SQE) will be appointed as part of the development to assess the current ecological value of the site and make recommendations for the protection and enhancement of the site and on-site actions during construction to protect features of ecological value. The investigation will include a desk top study, site survey and protected species search.

7.47 The existing site is thought to be of low ecological value. Within the constraints of the site there are some opportunities for improving the biodiversity of the site, for example at the entrance to the dwelling and within the private sunken garden. The SQE will provide recommendations allowing the achievement of an enhancement of ecological value for the site of +3 specifies (area weighted).

7.48 The occupants of the dwelling will be encouraged to grow their own food, as part of the landscaping proposals for the sunken garden. In accordance with the Code for Sustainable Homes Issue Man 1, a non technical 'Home User Guide' will be provided to the occupants of the dwelling. The guide will be extended to provide information on the types of fruit and vegetables that can be grown within confined spaces, planting schedules and maintenance information.

8.0 CONCLUSION

8.1 Create Consulting Engineers Ltd has been appointed to provide a Sustainable Design & Construction Statement to support the forthcoming planning application for the proposed new residential development (new Mews House), within the rear of the existing Albert Pub in London.

8.2 This report has been developed to detail the sustainability features of the development and demonstrates how they relate to the relevant planning policy documents including the London Plan, Camden Core Strategy, Camden Development Policies and Camden Planning Guidance CPG 3 - Sustainability.

8.3 The Energy Strategy section of this report has summarised the key energy enhancement features of the single dwelling of Mews House, resulting in the reduction in carbon dioxide (CO_2) emissions. With reference to the Energy Hierarchy of the London Plan, energy efficiency measures from passive and plant performance optimisation ('Be Lean') along with the integration of feasible Low Carbon technologies ('Be Clean') and Zero Carbon technologies ('Be Green') are assessed, reported and summarised within this document.

8.4 The strategy aims to reduce energy demands by first incorporating suitable passive design measures, followed by proposed enhancements to provide an efficient building fabric (where possible), and highly efficient Heating, Ventilation and Air Conditioning (HVAC) systems. Through an optimised energy efficient building fabric and air tightness the Part L1A:2013 Dwelling Fabric Energy Efficiency (DFEE) Standard for the scheme (62.3 kWh/yr/m^2) achieves an improvement over Part L1A:2013 Target Fabric Energy Efficiency (TFEE) Standards (69.3 kWh/yr/m^2) of 10.05%.

8.5 A low carbon and renewable energy feasibility study has been carried out for the development following the recommendations of London Plan policies 5.6 & 5.7 and Camden Core Strategy Policy CS 13, as well as Camden Planning Guidance CPG 3 – Sustainability, Sections 2, 3, 5 and 6. Wind power (roof mounted and stand alone), solar hot water system, photovoltaics, biomass heating (stove and district system), gas / biomass CHP and air / ground source heating and cooling have all been considered. Due to the practical constraints of the site, photovoltaics (PV) have been found as the most viable and practical option for the development based on suitable unshaded roof areas. The proposed PV array will lead to the production of **762 kWh/yr** of renewable electricity and a saving of **395 kgCO_2/yr**.

8.6 The addition of renewable energy systems on the new Mews House will lead to:

- 395 kg of CO_2 savings per year representing **10.93%** CO_2 emission reduction from renewable technologies (**20.66%** regulated CO_2 emission reduction).

- An improvement over Part L1A:2010 and Part L1A:2013 of 34.78% and 21.36% respectively allowing the dwelling to exceed the minimum requirements of the Code for Sustainable Homes Level 4.

8.7 The proposed area of PV has been maximised for the scheme within the constraints of the site and roof configuration. The achievement of a 20% reduction in CO_2 emission through the installation of on-site renewable technologies required by Camden Planning Guidance CPG 3 - Sustainability, is not considered practically or technically feasible for the scheme due to the very constricted nature of the site (rear garden of the existing pub) preventing the viable and efficient use of most Low and Zero Carbon technologies and leading to a scheme with a high net floor area to roof area ratio therefore limiting the roof area available for the incorporation of solar technology.

8.8 A Code for Sustainable Homes pre-assessment exercise has been carried out for the scheme by licensed Code for Sustainable Homes assessors within Create Consulting' Energy team. Each of the Code criteria was fully discussed at a Sustainability/Code workshop led by the Code assessor and attended by the design team on the 1st May 2014.

8.9 The pre-assessment shows that Code for Sustainable Homes Level 4 is robustly targeted with a targeted score of **72.03%.** The Code for Sustainable Homes assessor has been and will continue to form an integral part of the design team and a consistent point for reference, review and questions. This approach is proven through experience to offer the surest route to successful Code certification and holistic sustainable design.

8.10 In accordance with the London Borough of Camden Planning Guidance CPG 3 - Sustainability standards (Clauses 3.22 & 9.8), the scheme will achieve 50% of the un-weighted credits in Water and Material categories. Reasons for not achieving more than 47.75% of the energy credits have been detailed in the report. The constricted nature of the site which have limited the roof area available for PV and the fixed scale of compliance of the CSH Fabric Energy Efficiency issue which does not take into account the dwelling's form and layout (contrary to the Building Regulation TFEE approach), have prevented the achievement of any credits under CSH Ene 2 issue (Fabric Energy Efficiency) and more than 1 credit under Ene 7 issue (Low and Zero Carbon Technologies and more than 3.8 credits for CSH Ene 1 issue (Dwelling Emission Rate). We therefore do not consider it feasible to achieve an un-weighted score greater than 47.75% achieved.

8.11 The Sustainability and Energy Strategy for the new Mews House demonstrates that the design will holistically incorporate sustainable principles into the full range of sustainability aspects covered by the Code for Sustainable Homes and the London Borough of Camden Planning Guidance CPG3 – Sustainability.

9.0 DISCLAIMER

9.1 This report details information gathered from consultation with the design team and architectural drawings prepared by Brooks / Murray Architects. All information provided has been accepted in good faith as being accurate and representative of the proposed scheme at the time of review.

9.2 Create Consulting disclaims any responsibility to the Client and others in respect of any matters outside the scope of this report.

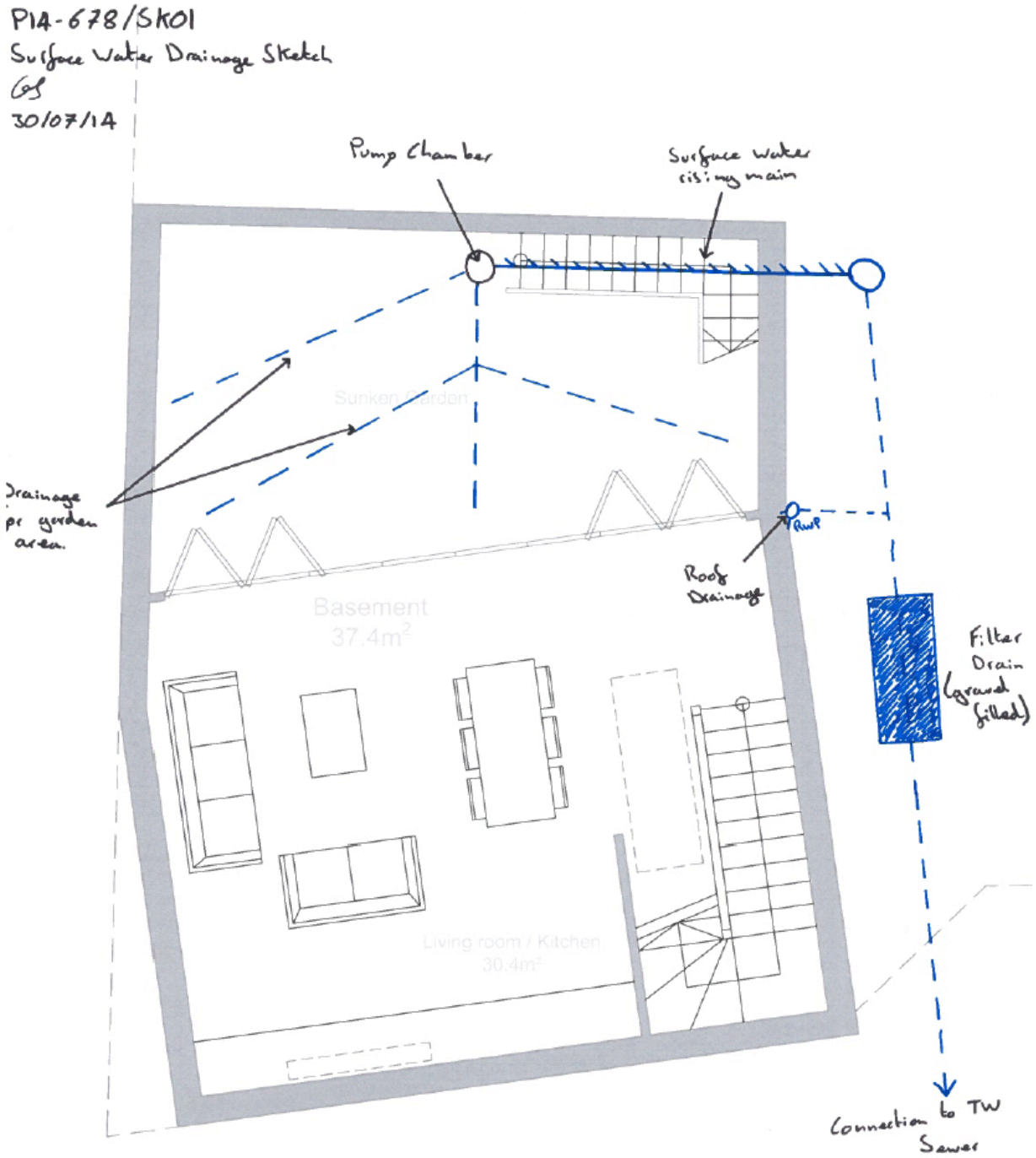
9.3 The copyright of this report is vested in Create Consulting Engineers Ltd and Brooks / Murray Architects. The Client, or his appointed representatives, may copy the report for purposes in connection with the development described herein. It shall not be copied by any other party or used for any other purposes without the written consent of Create Consulting Engineers Ltd or Brooks / Murray Architects.

9.4 Create Consulting Engineers Ltd accepts no responsibility whatsoever to other parties to whom this report, or any part thereof, is made known. Any such other parties rely upon the report at their own risk.

APPENDICES

APPENDIX A

APPENDIX A –DRAINAGE SKETCH



Notes:

+ Not for construction - Indicative only
+ Drainage / Pipe runs are indicative only and subject to change at the detailed design Stage.

APPENDIX B

APPENDIX B – PV TECHNICAL DATASHEET

SHARP

ND-RxxxA5 (60 cells)
xxx = 250|245|240|235|230 W
Polycrystalline silicon photovoltaic modules

Sharp is a pioneer in photovoltaics /This is Why Sharp solar modules have set standards for over 50 years.

Innovations from a photovoltaic pioneer

As a solar specialist with more than 50 years of experience in photovoltaics (PV), Sharp makes significant contributions to groundbreaking progress in solar technology. Sharp photovoltaic modules in the ND series are designed for applications with high power requirements. All Sharp ND series modules offer system integration which is optimal both technically and economically, and are suitable for installations in on- and off-grid PV systems.

EUPD RESEARCH TOP BRAND PV MODULES GERMANY 2012

AWARDS FOR BRAND AWARENESS, BRAND EVALUATION, INSTALLERS' CHOICE AND DISTRIBUTION.

Certificates and approvals

All modules are tested and certified according to
- IEC/EN 61215 und IEC/EN 61730, Anwendungsklasse A
- Schutzklasse II / CE
- MCS accredited product (MCS PV0007)

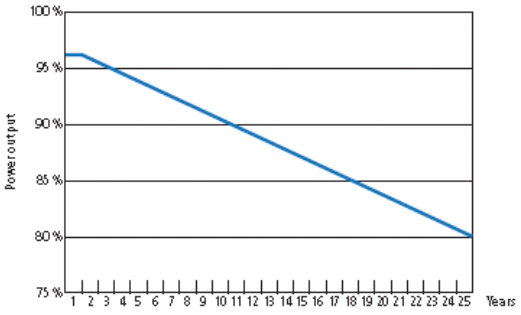
Sharp is certified based on
- ISO 9001:2008 und ISO 14001:2004

Product features

- High-performance photovoltaic modules made of polycrystalline (156.5 mm)² silicon solar cells with module efficiencies of up to 15.2%.
- 3 busbar technology for enhancing the power output.
- Anti-reflex coating to increase light absorption.
- Production controlled positive power tolerance from 0 to +5%. Only modules will be delivered that have the specified power or more for high energy yield.
- Delivery of modules in 5-watt intervals.
- Improved temperature coefficient to reduce power losses at higher temperatures.
- High power performance even at lower irradiations.

Quality from Sharp

Continual checks guarantee a consistently high level of quality. Every module undergoes visual, mechanical, and electrical inspection. This is recognisable by means of the original Sharp label, the serial number, and the Sharp guarantee:
- 10-year product guarantee
- 25-year linear performance guarantee
  - Minimum 96% of the specified minimum power output during the first year
  - Maximum 0.667% annual reduction of the power output for following 24 years



Passed DLG resistance-to-ammonia test

Passed salt mist corrosion test (IEC 61701)

ELECTRICAL DATA (AT STC)

		ND-R250A5	ND-R245A5	ND-R240A5	ND-R235A5	ND-R230A5	
Maximum power	P_{max}	250	245	240	235	230	W_p
Open-circuit voltage	V_{oc}	37.6	37.3	37.2	36.8	36.4	V
Short-circuit current	I_{sc}	8.68	8.62	8.57	8.49	8.41	A
Voltage at point of maximum power	V_{mpp}	30.9	30.7	30.4	30.3	30.3	V
Current at point of maximum power	I_{mpp}	8.10	7.99	7.90	7.76	7.61	A
Module efficiency	η_m	15.2	14.9	14.6	14.3	14.0	%

STC = Standard Test Conditions: irradiance 1,000 W/m², AM 1.5, cell temperature 25 °C.
Rated electrical characteristics are within ±10 % of the indicated values of I_{sc}, V_{oc} and 0 to +5 % of P_{max} (power measurement tolerance ±3 %).

ELECTRICAL DATA (AT NOCT)

		ND-R250A5	ND-R245A5	ND-R240A5	ND-R235A5	ND-R230A5	
Maximum power	P_{max}	180.2	176.6	173.0	169.3	165.7	W_p
Open-circuit voltage	V_{oc}	34.7	34.4	34.4	34.0	33.6	V
Short-circuit current	I_{sc}	7.0	6.96	6.92	6.85	6.79	A
Voltage at point of maximum power	V_{mpp}	27.7	27.5	27.2	27.1	27.1	V
Nominal Operating Cell Temperature	NOCT	47.5	47.5	47.5	47.5	47.5	°C

NOCT: Module operating temperature at 800 W/m² irradiance, air temperature of 20 °C, wind speed of 1 m/s

LIMIT VALUES

Maximum system voltage	1,000 V DC
Over-current protection	15 A
Temperature range	–40 bis +90 °C
Maximum mechanical load	2,400 N/m²

MECHANICAL DATA

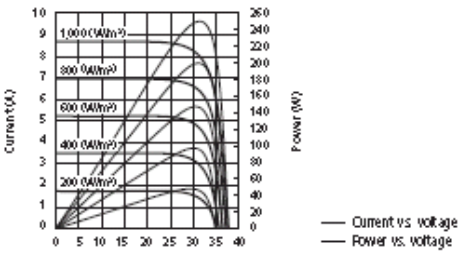
Length	1,652 mm (+/–2.0 mm)
Width	994 mm (+/–2.0 mm)
Depth	46 mm (+/–0.8 mm)
Weight	19 kg

TEMPERATURE COEFFICIENT

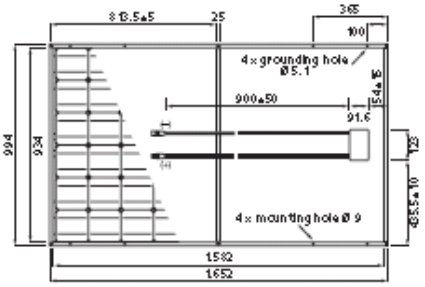
P_{max}	–0.440 % / °C
V_{oc}	–0329 % / °C
I_{sc}	+0.088 % / °C

CHARACTERISTIC CURVES ND-R250A5

Characteristic curves: current/power vs. voltage (cell temperature: 25 °C)



REAR VIEW



GENERAL DATA

Cells	polycrystalline, 156.5 mm × 156.5 mm, 60 cells in series
Front glass	low iron tempered glass, 3 mm
Frame	anodized aluminium alloy, silver
Connection box	PPE/PPO resin, IP65 rating, 58 × 125 × 15 mm, 3 bypass diodes
Cable	4 mm², length 900 mm
Connector	SMK (MC4 compatible), Type CCT99012361R2451F (Catalogue no. P51-7HVR51-7), IP67 rating To extend the module connection leads, only use SMK connector from the same series or Multi Contact AG MC4 connector (PV-KST04/PV-KBT04)

REGISTRATION

Sharp Solar guarantees the safety, quality and value of your product over many years – the only thing we ask you to do is to register your modules with the serial number, so that we can send you the guarantee certificate. Register your modules quickly and easily at www.brandaddedvalue.net.

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United Kingdom SolarInfo.uk@sharp.eu

SolarND_6015_E0412

APPENDIX C

APPENDIX C – DETAILED CODE FOR SUSTAINABLE HOMES PRE-ASSESSMENT CHECKLIST

		Credit Criteria	ASSUMPTIONS (all the criteria below must meet the requirements set out in the Code Technical Guide, and be supported by full evidence at the Assessment)	Credits Available	Credit weighting	Credits Targeted	Weighted Score
ENERGY AND CARBON DIOXIDE EMISSIONS	**Ene 1: Dwelling Emission Rate** **This credit has Minimum Mandatory Standards**	The 2010 Building Regulations have been revised to align with the minimum mandatory requirements of Ene 1 - DER. Therefore in achieving compliance with Part L of the Building Regulations the building will automatically achieve the minimum mandatory energy requirement of Code level 3. Above this, credits are awarded based on the % improvement of the DER over the TER, as taken from the SAP worksheets. % Improvement: 8 16 25 36 47 59 72 85 100 Zero Carbon Credits awarded: 1 2 3 4 5 6 7 8 9 10 **Minimum Standard:** **3 credits - 25 % Improvement over Part L 2010 - CSH level 4** **9 credits - 100 % Improvement over Part L 2010 - CSH level 5** **10 credits - Zero carbon - CSH level 6**	The energy modelling carried out for the New Mews House has ascertained the building fabric performance and LZC systems required to achieve CSH level 4 - energy standard: 25 % Improvement over Part L1A:2010). U wall: 0.18 /0.14 W/m^2K (exposed walls and basement walls respectively) U basement floor: 0.14 W/m^2K U roof: 0.11 W/m2K U glazing: 1.4 W/m^2K (sliding windows) / 1.1 W/m^2K (other windows); Air permeability: 5 Ventilation: Natural ventilation Thermal Bridges: Accredited Construction Details. Heating System: High efficiency gas boiler: SEDBUK 89.7% - 200 L Water cylinder: Losses < 1.9 kWh/yr LZC system: 1 kWp located on the roof of the scheme. The energy modelling carried out for the New Mews House confirms that the optimised energy strategy for the scheme leads to the achievement of : - 34.78 % Improvement over Part L1A:2010 leading to the achievement of the CSH level 4 energy standard and the achievement of 3.8 credits under Ene 1 CSH issue. - 21.36% Improvement over Part L1A:2013 (Target Emission Rate criterion 1) (Confirmed at workshop of the 01/05/2014 and following the energy modelling for the scheme).	10	11.74%	3.8	4.46%
	Ene 2: Fabric Energy Efficiency **This credit has Minimum Mandatory Standards**	Improved Fabric Energy Efficiency (FEE) performance effectively future proof reductions in the amount of carbon dioxide emitted from the dwellings over their lifetime. Credits are awarded based on the FEE value, as taken from the SAP worksheets. FEE (kWh/m^2/yr) Detached House: 60 55 52 49 46 42 38 Points awarded: 3 4 5 6 7 8 9 **Minimum Standard:** **7 credits - FEE: 46 kWh/m^2/year for CSH levels 5 & 6**	The energy modelling carried out has confirmed that a Fabric Energy Efficiency (using Part L1A:2010 methodology) of 60.3 kWh/yr/m^2 was achieved for the New Mews House. This value does not allow the achievement of credits under this issue. Please note that the Dwelling Fabric Energy Efficiency (DFEE - based on Part L1A:2013 methodology) achieved for the scheme: 62.3 kWh/yr/m^2 meet the Part L1A:2013 Target Fabric Energy Efficiency Criterion 1 (TFEE: 69.3 kWh/yr/m2) – 10.05% Improvement. (Confirmed at workshop of the 01/05/2014 and following the energy modelling for the scheme).	9	10.57%	0	0.00%
	Ene 3: Energy Display Devices	An energy display device is provided to each unit to help occupants reduce their energy consumption. These devices should be capable of measuring, recording and displaying electricity and gas consumption. 1 - 2 credits are awarded where one or both of the electricity and/or primary heating fuel consumption data are monitored.	Energy display devices will be provided to the new dwelling to allow occupants to monitor both electricity and primary heating fuel consumption data. The following information will be displayed: • Local time • Current mains energy consumption (kW and kWhrs) • Current emissions (g/kg CO_2) • Current tariff • Current cost (in £ and p). For pre-payment customers = 'real time' data, for 'credit' paying customers = monthly cost • Accurate account balance information (amount in credit or debit) • Visual presentation of data • Historical consumption data. This will include cumulative consumption data in any of the following forms day/week/month/billing period. (Confirmed at workshop of the 01/05/2014)	2	2.35%	2	2.35%
	Ene 4: Drying Space	Credits are awarded where internal or external drying space is provided as follows: 1 - 2 bed units = 4m+ drying line 3+ bed units = 6m+ drying line If internal, the heated space must have adequate ventilation with a minimum extract rate of 30 l/s and be controlled according to the requirements for intermittent extract ventilation defined in AD F. Any fittings / fixings must be a permanent feature of the room or space.	The house will be provided with internal retractable drying lines located over the bath / external rotary driers with the following minimum line lengths: 6m+ drying line If the drying line is installed in a bathroom, it will have adequate ventilation with a minimum extract rate of 30 l/s and be controlled according to the requirements for intermittent extract ventilation defined by the Building Regulations for England and Wales Approved Document F1. If a rotary drier footers is used, it should be permanently fixed to the ground. (Confirmed at workshop of the 01/05/2014)	1	1.17%	1	1.17%
	Ene 5: Energy Labelled White Goods	Credits are awarded where all white goods are provided and meet the following ratings: – Fridges, freezers & fridge/freezers – A+ – Washing machines & dishwashers – A – Washer Dryers & tumble Dryers – B Where no white goods are fitted, 1 credit is awarded where information on EU Energy Efficiency Labelling Scheme is provided.	White goods will be provided for the New Mews House and will meet the following ratings: – Fridges, freezers & fridge/freezers – A+ – Washing machines & dishwashers – A – Washer Dryers & tumble Dryers – B AND A Home User Guide should be produced to provide occupants with information relating to the efficient operation of their home and the surrounding area. This guide will also include information on the EU Energy Efficiency Labelling Scheme in order to encourage the purchase of energy-efficient appliances. (Confirmed at workshop of the 01/05/2014)	2	2.35%	2	2.35%

		Credit Criteria	ASSUMPTIONS (all the criteria below must meet the requirements set out in the Code Technical Guide, and be supported by full evidence at the Assessment)	Credits Available	Credit weighting	Credits Targeted	Weighted Score
	Ene 6: External Lighting	Credits are awarded where: **Space lighting,** including lighting within the communal areas, is dedicated to only accept lamps with a luminous efficacy greater than 40 lumens/circuit Watt AND fitted with appropriate control systems. **Security lighting:** Burglar security lights: max wattage of 150 W AND movement detecting control devices (PIR) AND daylight cut-off sensors All other lighting: dedicated energy efficient AND have daylight cut-off sensors or timers.	Space lighting, and any security lighting fitted, will meet the requirements. Space lighting will be energy efficient and controlled by either PIR, daylight sensors or time switches. Any security lighting must be controlled by both photocell and PIR motion sensors and have a circuit wattage no greater than 150W. Where security lighting is not specified the second credit covering security lighting can be awarded by default. (Confirmed at workshop of the 01/05/2014)	2	2.35%	2	2.35%
	Ene 7: Low or Zero Carbon Technologies	1 or 2 credits are awarded where there is a 10 or 15% minimum reduction in CO_2 emissions as a result of LZC technologies. The feasibility study must cover: • Energy generated by the LZC source per year • Payback • Landuse • Local Planning Issues • Noise • Whole life cost and lifecycle impact of the potential specification in terms of carbon emissions • Any available grants • All technologies appropriate to the site and energy demand of the development • Reasons for excluding other technologies	A compliant LZC study has been carried out for the scheme. The roof can accommodate a PV array of 1 kWP which should lead to 10.93% CO2 savings. One credit is therefore achieved for the scheme. (Confirmed at workshop of the 01/05/2014 and following the completion of the energy modelling and LZC study for the scheme)	2	2.35%	1	1.17%
	Ene 8: Cycle Storage	1 credit is awarded for the provision of storage for the following: Studio - 1 bed unit = 1 cycle per 2 units 2 - 3 bed unit = 1 cycle per unit 4 bed+ unit = 2 cycles per unit 2 credits are awarded for the provision of storage for the following: Studio - 1 bed unit = 1 cycle unit 2 - 3 bed unit = 2 cycles per unit 4 bed+ unit = 4 cycles per unit Storage must be weatherproof, adequately sized and secure in compliance with clause 35 of the Secure by Design – New Homes 2010.	Secure, weatherproof storage will be provided to meet the requirements for 2 credits: 2 compliant cycle spaces. Storage will be weatherproof, adequately sized and secure in compliance with clause 35 of the Secure by Design – New Homes 2010. The storage will be accessible directly from the public right of way and be appropriately sized. (Confirmed at workshop of the 01/05/2014)	2	2.35%	2	2.35%
	Ene 9: Home Office	Credits are awarded where home office facilities are provided as follows: adequate ventilation, two double power sockets, two telephone points / double telephone point / one telephone point and cable or broadband connection, a window with a daylight factor in the room of at least 1.5% The home office must be able to allow a desk, chair and filing cabinet or bookshelf with space to move around the desk (1.8m wall length minimum)	Home office facilities will be supplied in the study. To be compliant this room will be designed to ensure the following is provided/achieved: Daylight factor of 1.5%, two double power sockets, two telephone points / double telephone point / one telephone point & broadband, a window, ventilation, 1.8m wall space. (Confirmed at workshop of the 01/05/2014)	1	1.17%	1	1.17%
			TOTAL ENERGY AND CARBON DIOXIDE EMISSIONS SCORE	**31**	**36.40%**	**14.8**	**17.38%**
WATER	**Wat 1: Indoor Water Use** **This credit has Minimum Mandatory Standards**	The Water Efficiency Calculator for New Dwellings is used to calculate the internal potable water use. Credits are awarded where low flush / flow fittings are specified and/or flow rates are reduced using regulator control. **Minimum Standard:** **1 credits - maximum water consumption of 120 l/p/d for CSH Level 1/2** **3 credits - maximum water consumption of 105 l/p/d for CSH Level 3/4** **5 credits - maximum water consumption of 80 l/p/d for CSH Level 5/6**	The minimum standard of code for sustainable homes level 4 will be exceeded based on the specification of water efficient fittings. The following list is an indicative list of the standards of fittings which will be installed for the scheme leading to the award of 4 credits: - dual flush WCs (4/2.6 L or better) - low flow taps and showers (such as aerated showers) - 3L/min wash hand basin taps and 3L/min kitchen taps and 8 L/min showers , - small baths: 150 L - Water efficient appliances: 6.25 L/kg washing machine ; 0.71L/place dishwasher The calculation method shall be in accordance with the CLG Water Efficiency Calculator for new dwellings. (Confirmed at workshop of the 01/05/2014)	5	7.50%	4	6.00%
	Wat 2: External Water Use	1 credit is awarded where a rainwater collection system is specified to meet the following: Terraces and patios = 100 litres minimum 1-2 bed homes = 150 litres minimum 3+ bed homes = 200 litres minimum Communal areas = of 1 litre per m^2 allocated to each dwelling / 200 litres minimum The system must be correctly specified.	A compliant water butt should be provided for the New Mews House with a capacity of 200L. (Confirmed at workshop of the 01/05/2014)	1	1.50%	1	1.50%
			TOTAL WATER SCORE	**6**	**9%**	**5**	**7.50%**
MATERIALS	**Mat 1: Environmental Impact of Materials****This credit has Minimum Mandatory Standards**	Credits are awarded based on the Green Guide 2008 rating achieved by the key elements of the building envelope. **Minimum Standard: At least three of the following five key elements achieve a relevant Green Guide rating from the 2008 version of The Green Guide of A+ to D:- Roof- External Walls- Internal Walls (including separating walls)- Upper and Ground Floors (including separating floors)- Windows**Credits are awarded based on the green guide rating of the five key elements listed above : A+ (3 points)A (2 points)B (1 point)C (0.5 points)The CSH Materials Calculator is used to assess the number of credits awarded for the five key elements described above.	At this stage of design it is not possible to assess the exact number of credits that can be achieved. However the architect is to review the BRE Green Guide to Specification (www.thegreenguide.org.uk) and bear it in mind when considering materials selections for the main building fabric. Where possible the team should aim to use A and A+ rated materials as these have the lowest environmental impact.At this stage, 8 credits are targeted for the scheme. (Confirmed at workshop of the 01/05/2014)	15	4.50%	8	2.40%

		Credit Criteria	ASSUMPTIONS (all the criteria below must meet the requirements set out in the Code Technical Guide, and be supported by full evidence at the Assessment)	Credits Available	Credit weighting	Credits Targeted	Weighted Score
	Mat 2: Responsible Sourcing of Materials - Basic Building Elements	Credits are awarded based on the specification of responsibly sourced materials for the building elements. Where 80% of the assessed materials in the following Building Elements are responsibly sourced: a. Frame; b. Ground floor; c. Upper floors (including separating floors); d. Roof; e. External walls; f. Internal walls (including separating walls); g. Foundation/substructure; h. Staircase. Additionally, 100% of any timber in these elements must be legally sourced. The CSH Materials Calculator is used to assess the number of credits awarded for the five key elements described above.	All the products used for the basic building elements should be responsibly sourced. This means using products that are manufactured under a recognised Environmental Management System such as ISO 14001 as a minimum, and preferably under more robust responsible sourcing systems such as Forest Stewardship Council (FSC) or BES 6001. The number of manufacturers for construction products achieving BES 6001 is increasing rapidly, with the majority of the UK's large cement and concrete product manufacturers and their franchises accredited (e.g. Lafarge, Hanson and Cemex). It is anticipated that other manufacturers such as Pilkington Glass, Saint Gobain and Corus / Tata will soon achieve accreditation. At this stage 4/6 credits are targeted for this issue. (Confirmed at workshop of the 01/05/2014)	6	1.80%	4	1.20%
	Mat 3: Responsible Sourcing of Materials - Finishing Elements	Credits are awarded based on the specification of responsibly sourced materials for the finishing elements. Where 80% of the assessed materials in the following Finishing Elements are responsibly sourced: a. Stair b. Window c. External & internal door d. Skirting e. Panelling f. Furniture g. Fascias h. Any other significant use Additionally, 100% of any timber in these elements must be legally sourced. The CSH Materials Calculator is used to assess the number of credits awarded for the key elements described above.	The design team should begin to gather an understanding of the ability of the proposed supply chains to deliver responsibly sourced and manufactured products. This means using products that are manufactured under a recognised Environmental Management System such as ISO 14001 as a minimum, and preferably under more robust responsible sourcing systems such as Forest Stewardship Council (FSC) or BES 6001. Mat 03 credit is considered significantly more challenging than credit Mat 02 as sourcing every finishing element through certified manufacturers can be very costly. However, the scheme will aim at achieving 1/3 credit for this issue based on careful selection of products coming from certified manufacturer/supplier. 1 credit has therefore been targeted at this stage. (Confirmed at workshop of the 01/05/2014)	3	0.90%	1	0.30%
			TOTAL MATERIALS SCORE	**24**	**7.20%**	**13**	**3.90%**
SURFACE WATER RUN OFF	**Sur 1: Management of Surface Water Run-off** **This credit has Minimum Mandatory Standards**	**Minimum Standard: Ensure that peak run-off rates and annual volumes of run-off post development will be no greater than the previous conditions for the site and that the flooding of property would not occur in the event of local drainage system failure.** Two credits for using SUDs to improve water quality of the rainwater discharged or for protecting the quality of the receiving waters by: One credit for ensuring no discharge to the watercourse for rainfall depths up to 5mm (follow guidance in the Interim Code of Practice for Sustainable Drainage systems - CIRIA 2004) One credit where the run-off from all hard surfaces receive an appropriate level of treatment in accordance with The Suds Manual to minimise the risk of pollution.	The drainage strategy has been designed to meet the minimum mandatory standards. In order to prevent flooding to the basement from local drainage system failure, the proposed drainage strategy relies on a pumped drainage network to convey foul and surface water flows from the basement to the sewer. This will need to be routinely inspected and maintained to prevent failure. Duty standby pumps will also be included. The first additional credit is not achievable due to the practicable constraints of the site. The second additional credit will be achieved by using a filter drain to provide the on site attenuation to treat all surface water runoff prior to outfall to the Thames Water sewer in Kingstown Street. (Refer to BIA report (Ref RM/CS/P14-678/01_Rev A) and Section 7 of this report).	2	1.10%	1	0.55%
	Sur 2: Flood Risk	Credits are awarded based on the flood risk level of the site. A full Flood Risk Assessment covering the risk of flooding from all sources must be carried out by a suitably qualified consultant. 2 credits are awarded where the site is in a low risk area. 1 credit is awarded where the development is in Zone 2 or 3, the finished floor levels of all habitable rooms and access routes must be at least 600mm above the design flood level, and flood resistant and resilient measures are in place.	A full FRA covering the risk of flooding from all sources has not been undertaken. No credits have been targeted for this credit due to uncertainty in relation to surface water flooding/sewer flooding. Mitigation measures have been included in the scheme to address these risks. Further opportunities to obtain these credits could be sought at the detailed design stage. (Refer to BIA report (Ref RM/CS/P14-678/01_Rev A) and Section 7 of this report).	2	1.10%	0	0.00%
			TOTAL SURFACE WATER RUN OFF SCORE	**4**	**2.20%**	**2**	**0.55%**

		Credit Criteria	ASSUMPTIONS (all the criteria below must meet the requirements set out in the Code Technical Guide, and be supported by full evidence at the Assessment)	Credits Available	Credit weighting	Credits Targeted	Weighted Score
WASTE	**Was 1: Storage of Non-recyclable Waste and Recyclable Household Waste** **This credit has Minimum Mandatory Standards**	**Minimum Standard:** **An adequate external space should be allocated for waste storage and sized to accommodate containers according to the largest of the following two volumes:** **• The minimum volume recommended by British Standard 5906 (British Standards Institution, 2005) based on a maximum collection frequency of once per week. This volume is 100 litres for a single bedroom dwelling, with a further 70 litres for each additional bedroom.** **• The total volume of the external waste containers provided by the Local Authority.** **Storage space must provide inclusive access and usability (Checklist IDP). Containers must not be stacked.** Two credits where there is dedicated internal storage for recyclable household waste but no (or insufficient) dedicated external storage capacity for recyclable material, nor Local Authority collection scheme and where the following criteria are met: At least three internal storage bins: • all located in an adequate internal space • with a minimum total capacity of 60 litres. Four credits where there is a combination of internal storage capacity provided in an adequate internal space, with either: • a Local Authority collection scheme, or • no Local Authority collection scheme but adequate external storage capacity Local Authority collection scheme present : In addition to a Local Authority collection scheme (with a collection frequency of at least fortnightly), at least one of the following requirements must be met: • Recyclable household waste is sorted after collection and a single bin of at least 30 litres is provided in an adequate internal space. • Materials are sorted before collection and at least three separate bins are provided with a total capacity of 30 litres. Each bin must have a capacity of at least 7 litres and be located in an adequate internal space. • An automated waste collection system which collects at least three different types of recyclable waste No Local Authority collection scheme but adequate external storage capacity There must be at least three identifiably different internal storage bins for recyclable waste located in an adequate internal space: • with a minimum total capacity of 30 litres • with a minimum individual capacity of at least 7 litres. A private recycling scheme operator must be appointed to maintain bins and collect recyclable waste regularly. Recycling containers must: • be located in an adequate external space • be sized according to the frequency of collection, based on guidance from the recycling scheme operator • store at least three types of recyclable waste in identifiably different bins.	The London Borough of Camden is running a recycling collection scheme with post collection sorting (weekly). The following will be provided to achieve 4 credits: - An adequate external space will be allocated for waste storage and sized to accommodate containers provided by the Local Authority. The space will be large enough to accommodate a 240L container. - Provision of a single bin of at least 30 litres is provided in an adequate internal space. The external bins will be accessible in accordance with checklist IDP, which includes a level threshold and 1500mm turning circle to enable wheelchair access. External bins will be covered. (Confirmed at workshop of the 01/05/2014)	4	3.20%	4	3.20%
	Was 2: Construction Site Waste Management	Minimising Construction Waste 1 Point Where there is a compliant Site Waste Management Plan (SWMP) that contains: a. Target benchmarks for resource efficiency, i.e. m3 of waste per 100 m2 or tonnes of waste per 100 m2 set in accordance with best practice b. Procedures and commitments to minimize non-hazardous construction waste at design stage. Specify waste minimisation actions relating to at least 3 waste groups and support them by appropriate monitoring of waste. c. Procedures for minimising hazardous waste d. Monitoring, measuring and reporting of hazardous and non-hazardous site waste production according to the defined waste groups (according to the waste streams generated by the scope of the works) Diverting Waste from Landfill Where there is a compliant Site Waste Management Plan (SWMP) including procedures and commitments to sort and divert waste from landfill, through either; a. Re-use on site (in situ or for new applications), b. Re-use on other sites, c. Salvage/reclaim for re-use, d. Return to the supplier via a 'take-back' scheme, e. Recovery and recycling using an approved waste management contractor, f. Compost according to the defined waste groups (in line with the waste streams generated by the scope of the works). AND One of the following has been achieved: Where at least 50% by weight or by volume of non-hazardous construction waste generated by the project has been diverted from landfill. 2 Points OR Where at least 85% by weight or by volume of non-hazardous construction waste generated by the project has been diverted from landfill. 3 Points	A SWMP will be developed in accordance with Code for Sustainable Homes Checklists Was 2A, B and C, which summarise the relevant guidance set by the SWMP regulations and best practice guidance from DEFRA, BRE and WRAP, to ensure that: The resource efficiency benchmark will be set in accordance with best practice. At least 85% non-hazardous waste will be diverted from landfill allowing the achievement of 3 credits for the scheme. Waste will be minimised from the design stage, segregated into the identified waste groups, monitored, measured and reported on. (Confirmed at workshop of the 01/05/2014)	3	2.40%	3	2.40%
	Was 3: Composting	Credit is awarded where individual home composting facilities are provided;	An individual waste composting facilities will be provided in the sunken garden of the New Mews House. (Confirmed at workshop of the 01/05/2014)	1	0.80%	1	0.80%
			TOTAL WASTE SCORE	**8**	**6.40%**	**8**	**6.40%**

		Credit Criteria	ASSUMPTIONS (all the criteria below must meet the requirements set out in the Code Technical Guide, and be supported by full evidence at the Assessment)	Credits Available	Credit weighting	Credits Targeted	Weighted Score
POLLUTION	**Pol 1: Global Warming Potential (GWP) of Insulants**	Credit is awarded where all insulating materials used within the roof, walls, floors, external doors, hot water cylinder and pipe insulation must only use substances with a Global Warming Potential of less than five, and an Ozone Depleting Potential of zero. Any foamed insulating materials must use blowing agents which conform to these requirements.	The development will specify insulation materials that have a Global Warming Potential of less than 5 to achieve this credit. (Confirmed at workshop of the 01/05/2014)	1	0.70%	1	0.70%
	Pol 2: NOx Emissions	Credits are awarded based on the dry Nox emissions level of the boiler system installed, as follows: < / = 100 mg/kWh = 1 credit < / = 70 mg/kWh = 2 credits < / = 40 mg/kWh = 3 credits	A high efficiency condensing gas boiler with low NOX emissions: 40mg/kWh will be used for the scheme allowing the achievement of 3 credits under this issue. (Confirmed at workshop of the 01/05/2014)	3	2.10%	3	2.10%
			TOTAL POLLUTION SCORE	**4**	**2.80%**	**4**	**2.80%**
HEALTH + WELLBEING	**Hea 1: Daylighting**	Credits are awarded based on daylighting performance, as follows: Kitchens achieve a minimum Average Daylight Factor of 2% = 1 credit Living rooms, dining rooms and studies achieve a minimum Average Daylight Factor of 1.5%= 1 credit 80% of the working plane in each room will receive direct light from the sky = 1 credit	The dwelling has been designed to ensure daylight penetration is maximised. Detailed daylight calculations have confirmed that two credits were achieved for the scheme based on compliant daylight factors in kitchens and living rooms/dining rooms/study. (Confirmed at workshop of the 01/05/2014 and following daylight calculations)	3	3.50%	2	2.33%
	Hea 2: Sound Insulation	Credits are awarded based on improvements in sound insulation performance over Part E, as follows: Airborne: 3dB higher and Impact: 3dB lower = 1 credit Airborne: 5dB higher and Impact: 5dB lower = 3 credits Airborne: 8dB higher and Impact: 8dB lower = 4 credits	As the scheme consists of a detached dwelling, 4 credits are awarded by default.	4	4.67%	4	4.67%
	Hea 3: Private Space	Credits are awarded for the provision of adequately sized private space in a private or communal garden / outside area, as follows: Private space = 1.5 sqm/bedroom Shared space = minimum 1sqm/bedroom The space must be accessible to wheelchair users	The New Mews House will have a compliant outdoor space. This credit will therefore be achieved for the scheme.	1	1.17%	1	1.17%
	Hea 4: Lifetime Homes **This credit has Minimum Mandatory Standards**	Credits are awarded where all of the 16 Lifetimes Homes points applicable to the dwelling are complied with. **Minimum Standard:** **4 credits - CSH level 6**	The development will be fully Lifetime Homes compliant. These credits are therefore expected to be achieved. (Confirmed at workshop of the 01/05/2014)	4	4.67%	4	4.67%
			TOTAL HEALTH AND WELLBEING SCORE	**12**	**14%**	**11**	**12.83%**
MANAGEMENT	**Man 1: Home User Guide**	Credits are awarded where a Home User Guide including information on the site and surroundings is provided to the building occupier.The guide will be relevant to the non technical home owner and will be available in an alternative format upon request.	A Home User Guide will be provided to occupants of the new dwelling enabling them to understand and operate their home as efficiently as possible. The Home User Guide will include operational instructions as well as information on the surrounding area to achieve maximum credits. (Confirmed at workshop of the 01/05/2014)	3	3.33%	3	3.33%
	Man 2: Considerate Constructors Scheme	The site must be registered under the Considerate Constructors Scheme or similar. Credits are awarded based on the score achieved, as follows: Credits are awarded based on the score achieved, as follows: 25 - 34 = 1 credit * 35 - 40 = 2 credits ** * a score of 5 in each of the 5 sections must be achieved ** a score of 7 in each of the 5 sections must be achieved	The construction phase of the development will be registered with the Considerate Constructors Scheme, to target a score of at least 35 against the Considerate Constructors Scheme's Code of Considerate Practice (with a minimum score of 7 in each of the 5 section), to demonstrate the scheme is being managed in accordance with 'Best Practice'. (Confirmed at workshop of the 01/05/2014)	2	2.22%	2	2.22%
	Man 3: Construction Site Impacts	1 - 2 credits are awarded where [procedures are in place to monitor 2 - 4 of the following items: – Monitor, report and set targets for CO_2/energy use during construction – Monitor, report and set targets for CO_2/energy use from site related transport – Monitor, report and set targets water consumption from site activities – Adoption of Best practice policies in respect of water pollution related to site activities. – Adopt best practice policies in respect of air (dust) pollution from site activities – 80% of site timber is reclaimed, re-used or responsibly sourced (including formwork, site hoardings and other temporary site timber used for the purpose of facilitating construction)	The contractor should be required to monitor, report and set targets for; - CO_2 emissions arising from site activities - Water consumption from site activities In addition, contractors should be required to adopt best practice policies for air (dust) and water (ground & surface) pollution occurring on site. This will allow the achievement of 2 credits for the site. (Confirmed at workshop of the 01/05/2014)	2	2.22%	2	2.22%
	Man 4: Security	Credits are awarded where the design complies with Section 2 – Physical Security from Secured by Design – New Homes	An Architectural Liaison Officer (ALO) or Crime Prevention Design Advisor (CPDA) will be consulted at the design stage and their recommendations incorporated into the dwelling's design to ensure Section 2 - Physical Security from 'Secured by Design - New Homes' is complied with. (Confirmed at workshop of the 01/05/2014)	2	2.22%	2	2.22%
			TOTAL MANAGEMENT SCORE	**9**	**10%**	**9**	**10.00%**
ECOLOGY	**Eco 1: Ecological Value of Site**	Credits are awarded where the site is of low ecological value and ecological features outside of the construction zone but within the development site are protected	The construction site includes some ecological features. A suitably qualified ecologist should advise whether the ecological features of the construction site (which are to be removed), are of any ecological value. The features of ecological value within close proximity of the site should be adequately protected. (Credit status to be confirmed by an ecologist).	1	1.33%	1	1.33%

	Credit Criteria	ASSUMPTIONS (all the criteria below must meet the requirements set out in the Code Technical Guide, and be supported by full evidence at the Assessment)	Credits Available	Credit weighting	Credits Targeted	Weighted Score
Eco 2: Ecological Enhancement	Credits are awarded where a Suitably Qualified Ecologist visits site prior to any site works to complete an ecological survey and make recommendations. All of the key and 30% of the additional recommendations are adhered to.	A Suitably Qualified Ecologist will be appointed to provide recommendations for the ecological enhancement of the site. The developer will commit to incorporate all key recommendations and 30% of the additional recommendations made by the ecologist. The ecological assessment for the site will respond to LB Camden CPG3 - 13 - Biodiversity. (Confirmed at workshop of the 01/05/2014)	1	1.33%	1	1.33%
Eco 3: Protection of Ecological Features	Credits are awarded where features of ecological value are adequately protected.	The construction site includes some ecological features which are to be removed. A suitably qualified ecologist should advise whether the ecological features to be removed are of any ecological value. The credit can be achieved if a suitably qualified ecologist confirms the features removed are of insignificant ecological value or/and where an arboriculturalist has confirmed a feature can be removed owing to poor health/condition. The credit could then be achieved provided all other features are adequately protected in accordance with the ecologist's recommendation. (Credit status to be confirmed by an ecologist).	1	1.33%	1	1.33%
Eco 4: Change of Ecological Value of Site	Credits are awarded based on the change in ecological value due to planting and site enhancements, as follows: Between -9 and -3 species / hectare = 1 credit Between -3 and +3 species / hectare = 2 credits Between +3 and +9 species / hectare = 3 credits More than +9 species / hectare = 4 credits	The change of ecological value of the site is expected to be positive based on the specification of biodiverse ground landscaping (based on the recommendation of the suitably qualified ecologist). (Confirmed at workshop of the 01/05/2014)	4	5.33%	3	4.00%
Eco 5: Building Footprint	Credits are awarded based on the building footprint and net internal floor area: net internal ground floor area ratio. 1 credit is awarded where: Houses have a ratio of 2.5:1 2 credits are awarded where: Houses have a ratio of 3:1	The development net internal floor area: net internal ground floor area ratio is of 3:1, two credits are therefore expected to be achieved for the scheme.	2	2.67%	2	2.67%
		TOTAL ECOLOGY SCORE	**9**	**12%**	**8**	**9.33%**
				TOTAL ASSESSMENT SCORE	**74**	**72.03%%**
					CODE LEVEL	**4**