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Green

Sustainability and Energy Statement

11a Primrose Hill Road
London Borough of Camden

On behalf of
Undercover Architecture Limited

18/11/2013
Job Ref: 5240

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1.0 INTRODUCTION

1.1 Document Purpose

1.1.1 This Sustainability Statement, which includes a Code for Sustainable Homes (Code) pre-assessment, has been prepared by Metropolis Green on behalf of Undercover Architecture Ltd. to accompany the planning application submitted to the London Borough of Camden for the development of a new 3 storey dwelling at the site of 11a Primrose Hill Road.

1.1.2 This report describes how the applicable sustainability policies and standards can be met by the proposed development. In addition, a pre-assessment of the proposed development has been prepared under the Code for Sustainable Homes (Code) environmental assessment methodology; however, for further information please refer to the Code for Sustainable Homes Technical Guide November 2010.

1.1.3 Section 2.0 of this report provides a description of the site and the proposed development. Section 3.0 provides an overview of the applicable planning context, including national, regional and local policies and a summary of the Code environmental assessment scheme applied to the proposal. Section 4.0 contains an analysis of how the proposed development addresses the sustainable design and construction issues noted in the London Plan and the relevant London Borough of Camden planning policies.

1.1.4 The Code Pre-Assessment is based on the information and commitments provided by the design team to date, and shows that the site has the potential to achieve Code Level 4 with a score of 73.20% which is above the mandatory threshold for Code Level 4 and leaves a small margin of flexibility.

1.1.5 A summary of the Code Pre-Assessment report will be included with this document (See Appendix A).

2.0 SITE CONTEXT AND BACKGROUND

2.0.1 The site is located on a private residential estate road, which runs parallel with the main road of Primrose Hill Road. This private road forms part of the Chalcot Park Estate, which is a 20th Century residential development comprising of a mix of terraced housing. No. 11 Primrose Hill Road and the proposed site for No. 11a are located at the south eastern corner of the estate, at the junction of King Henry's Road and Primrose Hill Road.

2.0.2 The site has good transport links being within walking distance of Swiss Cottage and Chalk Farm Underground Stations, providing access to the Jubilee and Northern Lines respectively. Several bus routes also run close to the site along Adelaide Road, providing services to Shepherd's Bush, Brent Cross and Camden Town.

2.1 Scheme Proposal

2.1.1 The strategy adopted at 11a Primrose Hill Road involves the erection of a three storey end of terrace house (Class C3), within the side garden of 11 Primrose Hill Road.

2.1.2 It is the client's intention to seek to achieve Code Level 4 certification under the Code and thereby to build a sustainable dwelling.

2.1.3 Due to the stringent requirements of the Code, the proposed design will offer clear benefits in terms of significantly reduced operational carbon and water usage.

2.1.4 In addition the proposal includes the inclusion of a green roof and green wall, which further promote the development's sustainability credentials. The green wall, in particular, will front onto King Henry's Road, giving the dwelling a much 'softer' appearance.

3.0 POLICY CONTEXT

3.1 Planning Policy

3.1.1 Sustainable development is the core principle underpinning planning, and has a key role to play in the creation of sustainable communities. In order to ensure the implementation of sustainable development and to determine the targets and standards to be met by the proposed development, it is necessary to review the relevant national, regional and local planning policies with respect to sustainability and the site's location. A summary of the planning policy context for the site and proposed development is provided below.

3.2 National Policy

National Planning Policy Framework, March 2012

3.2.1 The National Planning Policy Framework (NPPF) was published in March 2012 and sets out the Government's planning policies for England, and how these policies are expected to be applied. The policies in the document, taken as a whole, constitute the Government's view of what sustainable development in England means in practice for the planning system.

3.2.2 Paragraph 14 of the NPPF states that:

> At the heart of the National Planning Policy Framework is a **presumption in favour of sustainable development**, which should be seen as a golden thread running through both plan-making and decision-taking.
> For **decision-taking** this means:
> - approving development proposals that accord with the development plan without delay

3.2.3 The NPPF outlines a set of core land-use planning principles that should underpin both plan-making and decision-taking, three of which are particularly relevant to this Sustainability Statement. Under paragraph 17, these principles are that planning should:

> - 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);

- contribute to conserving and enhancing the natural environment and reducing pollution. Allocations of land for development should prefer land of lesser environmental value, where consistent with other policies in this Framework; and
- encourage the effective use of land by reusing land that has been previously developed (brownfield land), provided that it is not of high environmental value.

3.2.4 Design is addressed in section 7 of the NPPF, and paragraph 56 states:

> The Government attaches great importance to the design of the built environment. Good design is a key aspect of sustainable development, is indivisible from good planning, and should contribute positively to making places better for people.

3.2.5 Meeting the challenge of climate change is addressed in section 10 of the NPPF, and paragraph 93 notes that 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

3.2.6 Further to the above, paragraphs 95 and 96 state:

> 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.
>
> 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, massing and landscaping to minimise energy consumption.

3.2.7 Conserving and enhancing the natural environment is addressed in section 11 of the NPPF, and excerpts from paragraph 109 state that the planning system should contribute to and enhance the natural and local environment by:

- minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures; and
- preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability.

3.2.8 Paragraph 118 notes that when determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by encouraging opportunities to incorporate biodiversity in and around developments.

3.2.9 Noise is addressed under paragraph 123 which notes that Planning policies and decisions should aim to:

- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development; and
- mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions.

3.2.10 Additionally, paragraph 125 notes that by encouraging good design, planning policies and decisions should limit the impact of light pollution from artificial light on local amenity.

3.3 Regional Policy

The London Plan: Spatial Development Strategy for Greater London, July 2011

3.3.1 The London Plan was published in July 2011 and is the overall strategic plan for London, setting out an integrated economic, environmental, transport and social framework for the development of London to 2031. The policies relevant to this report are found in Chapter 5 (and to a lesser extent in Chapter 7) of the London Plan.

Policy 5.2: Minimising Carbon Dioxide Emissions

3.3.2 Policy 5.2 addresses carbon dioxide emission reductions and energy assessment requirements. The policy states:

Planning decisions

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

1. Be lean: use less energy
2. Be clean: supply energy efficiently
3. Be green: use renewable energy

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

Residential buildings:

Year	Improvement on 2010 Building Regulations
2010-2013	25 per cent (Code for Sustainable Homes level 4)
2013-2016	40 per cent
2016-2031	Zero carbon

Non-domestic buildings:

Year	Improvement on 2010 Building Regulations
2010-2013	25 per cent
2013-2016	40 per cent
2016-2019	As per building regulations requirements
2019-2031	Zero carbon

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

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

a. 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

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

c. 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)

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

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

Policy 5.3: Sustainable Design and Construction

3.3.3 Policy 5.3 is the main policy within the London Plan which addresses sustainable design and construction and states:

Strategic

A. The highest standards of sustainable design and construction should be achieved in London to improve the environmental performance of new developments and to adapt to the effects of climate change over their lifetime.

Planning decisions

B. Development proposals should demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process.

C. Major development proposals should meet the minimum standards outlined in the Mayor's supplementary planning guidance and this should be clearly demonstrated within a design and access statement. The standards include measures to achieve other policies in this Plan and the following sustainable design principles:

a. minimising carbon dioxide emissions across the site, including the building and services (such as heating and cooling systems)

b. avoiding internal overheating and contributing to the urban heat island effect

c. efficient use of natural resources (including water),

including making the most of natural systems both within and around buildings

d. minimising pollution (including noise, air and urban run-off)

e. minimising the generation of waste and maximising reuse or recycling

f. avoiding impacts from natural hazards (including flooding)

g. ensuring developments are comfortable and secure for users, including avoiding the creation of adverse local climatic conditions

h. securing sustainable procurement of materials, using local supplies where feasible, and

i. promoting and protecting biodiversity and green infrastructure.

3.3.4 The Mayor's supplementary planning guidance referred to in part C. of Policy 5.3 above is addressed further in sections 3.2.6 and 3.2.7 of this report below.

3.3.5 The London Plan contains a number of other policies relevant to this report, which are not outlined in full. These policies can be found in the list below, and reference should be made to the London Plan for further information:

- Policy 5.5: Decentralised Energy Networks
- Policy 5.6: Decentralised Energy in Development Proposals
- Policy 5.7: Renewable Energy
- Policy 5.8: Innovative Energy Technologies
- Policy 5.9: Overheating and Cooling
- Policy 5.10: Urban Greening
- Policy 5.11: Green Roofs and Development Site Environs
- Policy 5.12: Flood Risk Management
- Policy 5:13: Sustainable Drainage
- Policy 5.15: Water Use and Supplies

Sustainable Design and Construction: The London Plan Supplementary Planning Guidance, May 2006

3.3.6 The Mayor's Supplementary Planning Guidance (SPG) on Sustainable Design and Construction was published in May 2006 to provide additional information to support the implementation of the London Plan. Policy 5.3 of the current London Plan continues to refer to this SPG.

3.3.7 The SPG is based on eight broad sustainable design and construction measures (referred to in previous London Plan policy 4B.6) and contains both Essential Standards and Preferred Standards for development within each section. As encouraged in section 1.6 of the SPG, this Sustainability Statement is structured around the sections of the SPG and notes how the proposed development addresses the Essential and Preferred Standards.

3.4 Local Policy

Camden Core Strategy 2010-2025

3.4.1 The London Borough of Camden's Core Strategy sets out the key elements of the Council's planning vision and strategy for the borough. It is the central part of Local Development Framework (LDF) and was adopted in November 2010. The LDF is a group of documents setting out the borough's planning strategy and policies.

> The Core Strategy contributes to achieving the vision and objectives of Camden's Community Strategy and helps the Council's partners and other organisations deliver relevant parts of their programmes. It covers the physical aspects of location and land use but also addresses other factors that make places attractive, sustainable and successful, such as social and economic matters. It plays a key part in shaping the kind of place Camden will be in the future, balancing the needs of residents, businesses and future generations.

3.4.2 Within the Core Strategy there are specific policies relating to sustainability.

> The Core Strategy sets out the Council's approach to managing Camden's growth so that it is sustainable, meets our needs for homes, jobs and services, and protects and enhances quality of life and the borough's many valued and high quality places. Section 3 focuses on delivering the key elements of Camden's strategy relating to:
>
> - making Camden more sustainable and tackling climate change, in particular improving the environmental performance of buildings, providing decentralised energy and heating networks, and reducing and managing our water use;
> - promoting a more attractive local environment through securing high quality places, conserving our heritage, providing parks and open spaces, and encouraging biodiversity;
> - improving health and well-being;
> - making Camden a safer place while retaining its vibrancy; and

- dealing with our waste and increasing recycling.

The implications of our actions on the environment are increasingly clear and action is needed at global, national and local levels. The Core Strategy has an important role in reducing Camden's environmental impact and achieving sustainable development – meeting our social, environmental and economic needs in ways that protect the environment and do not harm our ability to meet our needs in the future. A Sustainable Camden that adapts to a growing population is one of the elements in the vision in Camden's Community Strategy.

CS13 – Tackling climate change through promoting higher environmental standards

3.4.3 The Core Strategy Policy CS13 sets out the approach that developers should take when considering energy and carbon reductions for developments.

Reducing the effects of and adapting to climate change

The Council will require all development to take measures to minimise the effects of, and adapt to, climate change and encourage all development to meet the highest feasible environmental standards that are financially viable during construction and occupation by:

a) ensuring patterns of land use that minimise the need to travel by car and help support local energy networks;

b) promoting the efficient use of land and buildings;

c) minimising carbon emissions from the redevelopment, construction and occupation of buildings by implementing, in order, all of the elements of the following energy hierarchy:

i. ensuring developments use less energy,

ii. making use of energy from efficient sources, such as the King's Cross, Gower Street, Bloomsbury and proposed Euston Road decentralized energy networks;

iii. generating renewable energy on-site; and

d) ensuring buildings and spaces are designed to cope with, and minimise the effects of, climate change.

The Council will have regard to the cost of installing measures to tackle climate change as well as the cumulative future costs of delaying reductions in carbon dioxide emissions

Local energy generation

The Council will promote local energy generation and networks by:

e) working with our partners and developers to implement local energy networks in the parts of Camden most likely to support

them,

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

Water and surface water flooding

We will make Camden a water efficient borough and minimise the potential for surface water flooding by:

g) protecting our existing drinking water and foul water infrastructure, including Barrow Hill Reservoir, Hampstead Heath Reservoir, Highgate Reservoir and Kidderpore Reservoir;

h) making sure development incorporates efficient water and foul water infrastructure;

i) requiring development to avoid harm to the water environment, water quality or drainage systems and prevents or mitigates local surface water and down-stream flooding, especially in areas up-hill from, and in, areas known to be at risk from surface water flooding such as South and West Hampstead, Gospel Oak and King's Cross.

Camden's carbon reduction measures

The Council will take a lead in tackling climate change by:

j) taking measures to reduce its own carbon emissions;

k) trialing new energy efficient technologies, where feasible; and

l) raising awareness on mitigation and adaptation measures.

Camden Development Policies 2010-2025

3.4.4 The Core strategy has informed the Council's Development Polices. Section 3 of this particular document sets out a number of policies to promote sustainability and tackle climate change.

3.4.5 The objectives of Section 3 are enforced through policy DP22 Promoting sustainable design and construction and DP23 Water.

Policy DP22 - Promoting sustainable design and construction

The Council will require development to incorporate sustainable design and construction measures. Schemes must:

a) demonstrate how sustainable development principles, including the relevant measures set out in paragraph 22.5, have been incorporated into the design and proposed implementation; and

b) incorporate green or brown roofs and green walls wherever suitable.

The Council will promote and measure sustainable design and construction by:

c) expecting new build housing to meet Code for Sustainable Homes Level 3 by 2010 and Code Level 4 by 2013 and encouraging Code Level 6 (zero carbon) by 2016.

The Council will require development to be resilient to climate change by ensuring schemes include appropriate climate change adaptation measures, such as:

f) summer shading and planting;

g) limiting run-off;

h) reducing water consumption;

i) reducing air pollution; and

j) not locating vulnerable uses in basements in flood-prone areas.

Policy DP23 - Water

The Council will require developments to reduce their water consumption, the pressure on the combined sewer network and the risk of flooding by:

a) incorporating water efficient features and equipment and capturing, retaining and re-using surface water and grey water on-site;

b) limiting the amount and rate of run-off and waste water entering the combined storm water and sewer network through the methods outlined in part a) and other sustainable urban drainage methods to reduce the risk of flooding;

c) reducing the pressure placed on the combined storm water and sewer network from foul water and surface water run-off and ensuring developments in the areas identified by the North London Strategic Flood Risk Assessment and shown on Map 2 as being at risk of surface water flooding are designed to cope with the potential flooding;

d) 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

e) encouraging the provision of attractive and efficient water features.

Camden Planning Guidance Sustainability (CPG3)

3.4.6 The Core Strategy is supported by Supplementary Planning Documents (SPDs) which play an important role in planning decisions. SPDs provide detailed guidance on how planning strategy and policies will be implemented for specific topics, areas and sites.

3.4.7 CPG3 contains advice and guidance for developers on ways to achieve carbon reductions and more sustainable developments. It also highlights the Council's requirements and guidelines which support the relevant Local LDF policies, including DP22 as noted above.

3.4.8 Section 9 covers sustainability assessment tools, with BREEAM Domestic Refurbishment (formerly EcoHomes) and Code for Sustainable Homes being of particular relevance to this development (see section 3.4 below). The key message of the document is that new build dwellings will have to be designed in line with the Code for Sustainable Homes and the creation of 5 or more dwellings from an existing building will need to be designed in line with EcoHomes.

3.4.9 Developers are strongly encouraged to meet the following standards in accordance with Development Policy DP22 - Promoting sustainable design and construction:

3.4.10

Time period	**Minimum rating (EcoHomes/Code)**	**Minimum standard for categories - % of un-weighted credits – (EcoHomes/Code)**
2010-2012	Very Good/Level 3	Energy -60%/50% Water – 60%/50% Materials – 40%/50%
2013-2015	Excellent/Level 4	
2016 +	Excellent/Level 6	

3.5 The Code for Sustainable Homes

3.5.1 The Code for Sustainable Homes is an environmental assessment for rating and certifying the performance of new homes. It is a national standard and was released by the Department for Communities and Local Government in December 2006. From April 2007, the Code replaced EcoHomes. The Building Research Establishment (BRE) are responsible for administering and monitoring the scheme and are also

responsible for all certification and quality assurance of this national environmental standard for housing.

3.5.2 The Code measures the sustainability of a new home against 9 categories of sustainable design, rating the 'whole home' as a complete package. The Code uses a 1 to 6 star rating system to communicate the overall level of the environmental performance of the new home.

3.5.3 Points in each category are weighted and therefore individual credits across the categories score differently. For example credits available in energy have a far heavier weighting than those in surface water run-off. It is a requirement of Camden council that the scheme achieves 50% of the credits available in the Energy category.

3.5.4 All Code assessments are completed in two phases – the Design Stage (DS) and the Post Construction Stage (PCS). Only after the PCS assessment has been completed and all the evidence for achieving the target level has been submitted will the final certification for the dwelling be issued by BRE.

3.5.5 For the purposes of planning, a Code Pre-Assessment was submitted to ensure that the design team set a strategy for achieving the target Code level also demonstrating to the Local Planning Authority that the scheme is able to achieve the specified level of the Code.

3.5.6 The Code is an important standard that will help the development and construction industry adapt to the real challenges that the industry faces in terms of reducing its environmental impact and importantly, in driving down carbon emissions to help stop climate change.

3.6 Mandatory Standards and Tradable Credits

3.6.1 This section of the report details the mandatory standards and tradable credits of the Code for Sustainable Homes.

3.6.2 Firstly, there are two types of mandatory elements in the Code. There are mandatory elements that are the same across all levels of the Code (non-credit scoring), and there are elements that increase with each level of the Code (credit scoring).

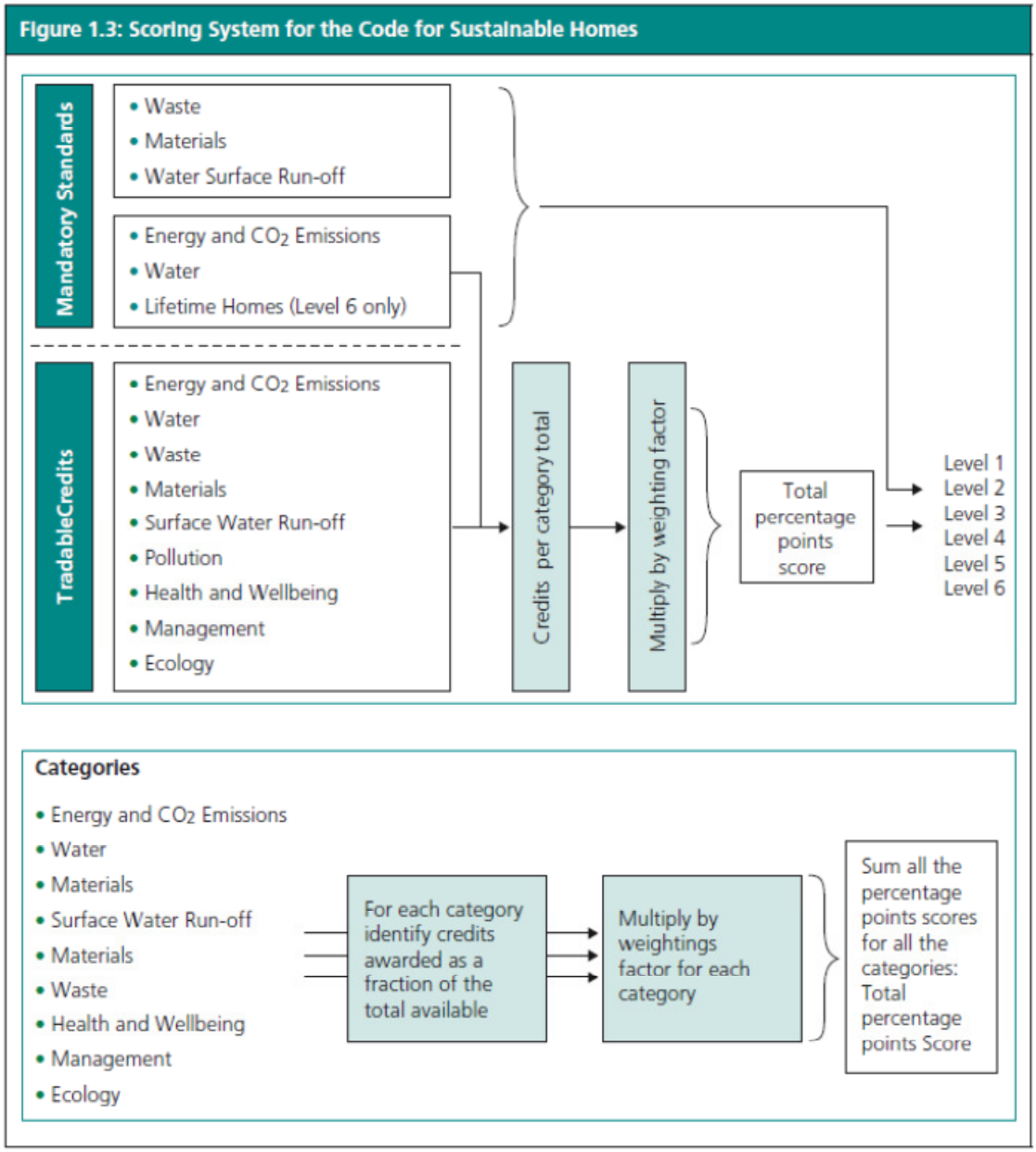
3.6.3 Table 1 below depicts both the different types of mandatory elements and how they interact with the tradable credits to arrive at a given Code level. Mandatory standards are very important factors in achieving the desired (or any level) of the Code.

3.6.4 Tradable credits make up the flexible element of the Code. Once the mandatory elements have been met, the developer may then choose

which credits are sought in order to meet the desired level of the Code. At increasing levels of the Code virtually all tradable credits must be met to achieve these higher environmental standards.

3.6.5 It must however be noted that credits are subject to change. This is in-line with the rationale of the Code which recognises that there will be unforeseen and unpredictable changes that arise during the construction of new buildings and dwellings. For this reason, the minimum threshold for CSH level 3 has been exceeded to ensure that if credits are lost during either the DS or PCS, the scheme will still be able to achieve the target level of the Code.

Figure 1 - Mandatory Standards and Tradable Credits



4.0 ENERGY STRATEGY

4.0.1 This section of the report has been developed to ensure that the relevant London Borough of Camden energy policies can be achieved on site. This report assesses the energy efficiency measures of the proposed scheme and the low carbon options for supplying energy to the development before examining the potential for renewable energy technologies to reduce carbon emissions of the development.

4.1 Energy Efficiency Measures

4.1.1 Metropolis Green has been working with the project architects, Undercover Architecture Ltd to determine the most efficient and feasible way to reduce the carbon emissions of the development.

4.1.2 Minimising heat loss from the building fabric to avoid wasted energy is essential. Heat loss through walls, windows and surface areas of the building must be significantly lower than Building Regulations recommended values, requiring specification of building fabric with very low U-values. Heat loss through thermal bridges, where the continuity of insulation and/or the building envelope is broken, can be minimised through excellent workmanship and careful design, removal of unnecessary structural elements or insulation of structural elements.

4.1.3 Improving the fabric and services efficiency is the most effective way of reducing carbon emissions as these measures will last the lifetime of the building. Reducing the CO_2 in turn reduces the amount of low carbon and renewable energy technologies required to comply with regulations and policies, as well as lowering costs.

4.1.4 Passive design measures such as building orientation, fabric performance, air tightness and natural ventilation will be optimised within the buildings on site to prevent overheating and avoid excessive requirements for heating and cooling.

4.1.5 The U-values and input parameters that have been used to achieve the optimum results for the development at 11a Primrose Hill are shown in Table 1 (overleaf).

Table 1: Summary of Input Parameters for Notional and Efficient Baselines

	Efficient Baseline
External Wall U-value	0.2
Ground Floor / Basement Floor U-value	0.12
Exposed floor above the entrance	0.2
Flat Roof U-value	0.13
Windows & Openings U-values	1.5
Building Regulations 2010 Accredited construction details	Yes (y-value =0.05)
Air Permeability	5
DHW System	gas boiler, SEDBUK 2009 efficiency 89.5%,
Water Consumption	125 litres per person per day or less
Space Heating System	gas boiler, SEDBUK 2009 efficiency 89.5%, time and temperature zone control, delayed start thermostat, weather compensator
Ventilation System	MVHR Nuaire MRXBOX 95-WH1
Energy Efficient Lighting	100%

4.1.6 Thermal bridging will be minimised in accordance with Accredited Construction Details and air permeability of 5 m^3/hour/m^2 @ 50Pa is to be achieved.

4.1.7 Fabric elements will be improved beyond the limiting parameters specified in Part L1A document. Further energy efficiency measures will also be applied to space heating and hot water generation utilising a high 89.5% efficient SEDBUK 2009 gas boilers for space heating domestic hot water (DHW) provision. Additional heating system control features were also included in modelling, such as time and temperature zone control, boiler interlock and weather compensator.

4.1.8 To ensure improved energy efficiency and adequate thermal comfort conditions it proposed that mechanical ventilation via a highly efficient

mechanical ventilation heat recovery system (MVHR) is specified for both the dwelling. MVHR passes warm extract air through a heat exchanger, enabling majority of the waste heat to be recovered to be used to warm incoming air; thus less energy is required to heat the incoming supply air to room temperature

4.1.9 The design team have committed to going beyond the minimum low energy lighting requirements outlined in Part L and will specify 100% low energy space lighting for dwellings at the development.

4.1.10 The predicted regulated CO_2 emissions after energy efficiency measures equate to 2172 $kgCO_2$/year. Table 2 below provides a breakdown of the energy demand for the development.

Table 2: Energy Consumption and Carbon Emissions

Energy Efficiency Measures	
Space Heating Energy kWh/yr	5,705
DHW Energy kWh/yr	2727
Lighting Energy kWh/yr	510
Aux Energy kWh/yr	461
Un-Reg Energy kWh/yr	4,101
Regulated Carbon Emissions $kgCO_2$/yr	**2172**
DER over TER Improvement	**20.6%**

4.2 Overheating and Cooling

4.2.1 The design team have worked to ensure that the risk of summer overheating and any reliance on mechanical cooling is minimised in line with the 'cooling hierarchy'. This is demonstrated through the application of passive design measures for the development.

4.2.2 The orientation of the building is constrained by the site location, neighbouring building and street orientation. Although, careful design along with low u-value glazing allows for a balance between beneficial solar gains and possible overheating.

4.2.3 Good natural daylighting within the development at 11a Primrose Hill will create significant benefits in terms of reduced electrical use for lighting, solar gains to reduce winter heating consumption and a healthier, more pleasant environment.

4.2.4 Internal heat generation has been minimised through energy efficient design. The proposal demonstrates that issues of potential overheating have been considered carefully and addressed through a combination of high levels of air-tightness and energy efficient design, with high levels of fabric performance and insulation.

4.2.5 Natural ventilation is provided to the dwelling through fully openable windows to allow for occupant control of ventilation, reducing the risk of summer overheating and the demand for mechanical systems. Studies have shown that the ability to open windows enables occupants to cope with a wider range of temperatures, thus reducing reliance on mechanical systems.

4.2.6 Initial analysis based on SAP Appendix P: Assessment of Internal Temperature in Summer shows that the comfort levels of threshold temperature of SAP Appendix P have not been exceeded for any dwelling within the building. The occupants can expect mean internal temperatures of up to 22°C on the hottest summer days

4.3 Communal Heating and Combined Heat and Power (CHP)

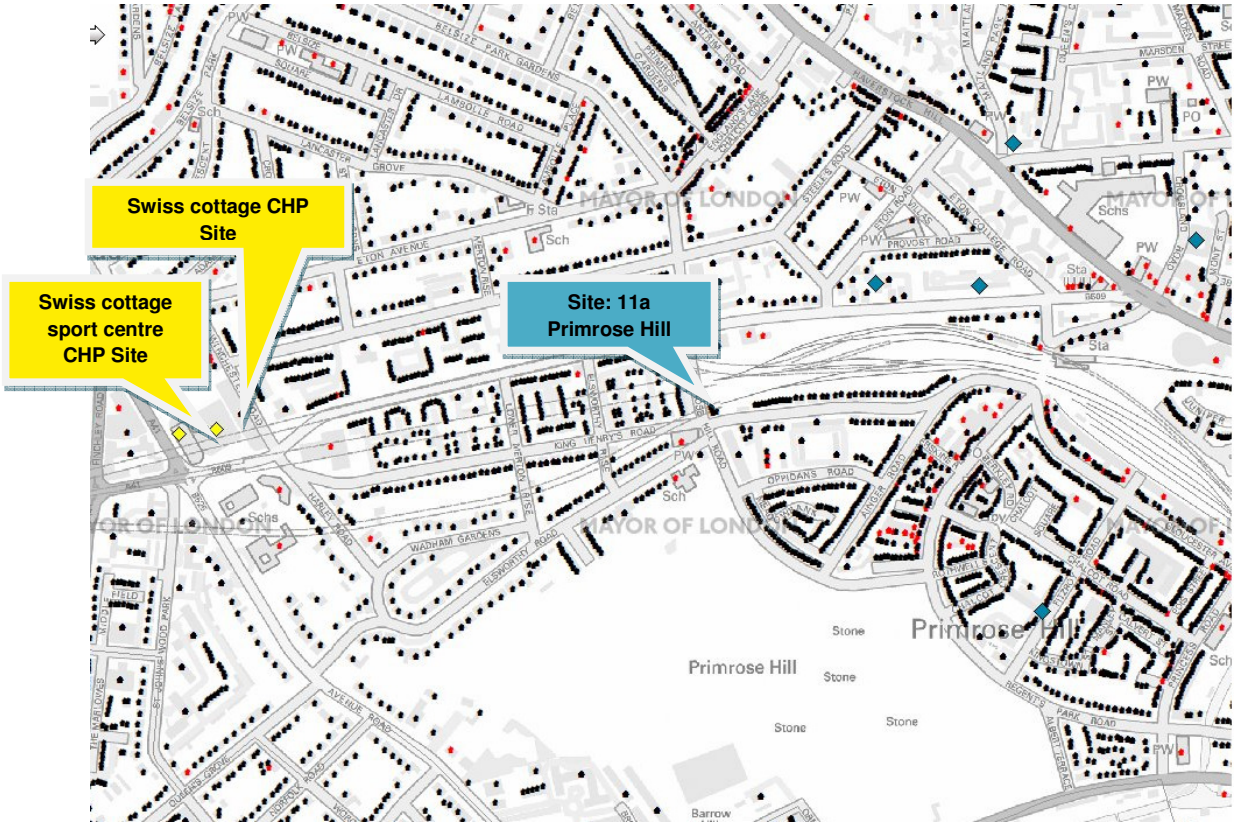
4.3.1 As part of the energy strategy analysis a site-wide CHP solution has been investigated and found not to be the optimal technology for this site due to insufficient base load heat demand. If specified, the CHP would run with a frequent on-off cycle, which would significantly reduce the efficiency and availability of the system and increase the maintenance requirements.

4.3.2 It has been established that the specification of highly efficient individual gas boilers providing space heating and DHW together with the fabric improvements discussed in previous section delivers the optimal carbon reductions in the most cost effective way.

4.3.3 An investigation of the area was undertaken using the London Heat Map tool to determine opportunities to connect to existing heat infrastructure.

4.3.4 Investigation into existing heat networks in the area using the London Heat Map have shown that the nearest existing CHP installation is Swiss Cottage, at a approximately 750m distant away from the 11a Primrose Hill Road site (See Figure 2, overleaf). Connection to the existing CHP is deemed to be not feasible due the distance between the sites. The cost involved in infrastructure works would be extremely high and would not only include the cost of digging the roads and laying pipes, but would disruptive to the local community.

Figure 2: London Heat Map Indicating CHP Sites and District Heat Networks



4.4 Renewable Energy Technology

4.4.1 Each of the approved renewable energy technologies have been appraised, examining the size and cost of each system required to maximise CO_2 reductions in line with the Mayor's energy hierarchy and local policy. The feasibility of each technology at the proposed site is also discussed in the Appendix B of this document in order to determine the most suitable solution for the site.

4.4.2 Energy Hierarchy approved renewable energy technologies include:

- Wind
- Photovoltaics (PV)
- Solar Water systems
- Biomass Heating/CHP
- Ground Source Heating/Cooling

4.4.3 The choice of technology is dependent upon a range of factors including: orientation, height of the building, surrounding buildings and environment, site size and layout, geology, conservation and biodiversity.

4.4.4 PV panels have been deemed the most suitable option for this site, offering the greatest CO_2 reduction in the space available.

4.4.5 Photovoltaic systems convert solar energy directly into electricity through semiconductor cells. The panels generate electricity from both direct light and diffuse light. Photovoltaic panels can either be mounted externally to the building or be integrated into the building cladding (known as Building Integrated Photovoltaic or BIPV).

4.4.6 The available roof spaces have been investigated and it has been determined that there is a sufficient space for a total of 5no. PV panels and it is possible to offset the electrical consumption of the development by a total of 858.4kWh/year, hence lowering the carbon emissions of the development.

4.4.7 Analysis has shown that PV reduces the regulated carbon emissions of the development by a predicted 455 $kgCO_2$/year to 1,717$kgCO_2$/year. A 21% reduction in regulated carbon emissions can be attributed to PV over the Efficient Baseline, which is in line with Camden Planning Guidance GPG3 targets.

4.4.8 Results of implementing the PVs at 11a Primrose Hill are summarised in Table 3 below. The proposed solution will increase the average DER over TER improvement of the development to 28.3% (Figure 4) enabling the development to meet the mandatory Code Level 4 requirement.

Table 3: Energy and Carbon Emissions with PV

Renewables Baseline	
Space Heating Energy kWh/yr	5,705
DHW Energy kWh/yr	2,727
Lighting Energy kWh/yr	510
Aux Energy kWh/yr	461
Un-Reg Energy kWh/yr	4,101
Regulated Carbon Emissions $kgCO_2/yr$	**1,717**
DER over TER Improvement	28.3%

Figure 3: Regulated Carbon Reduction

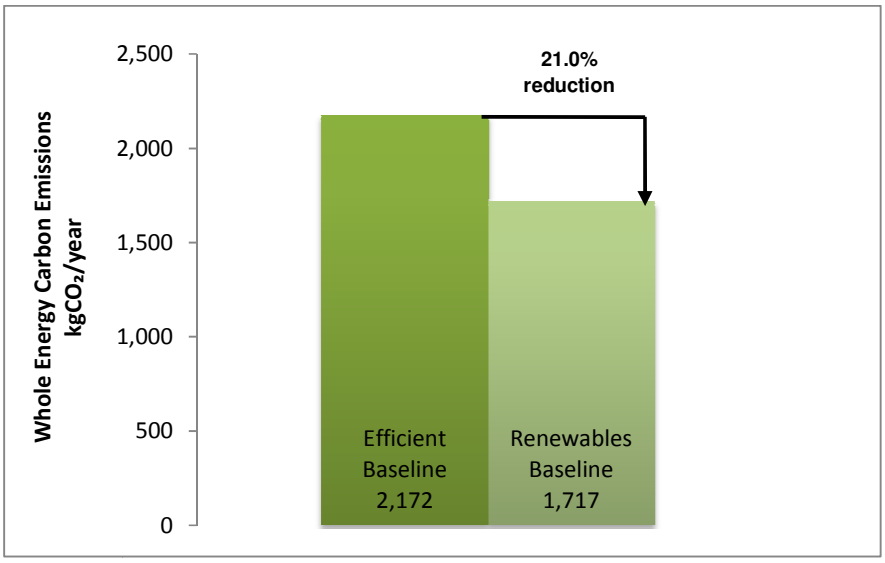
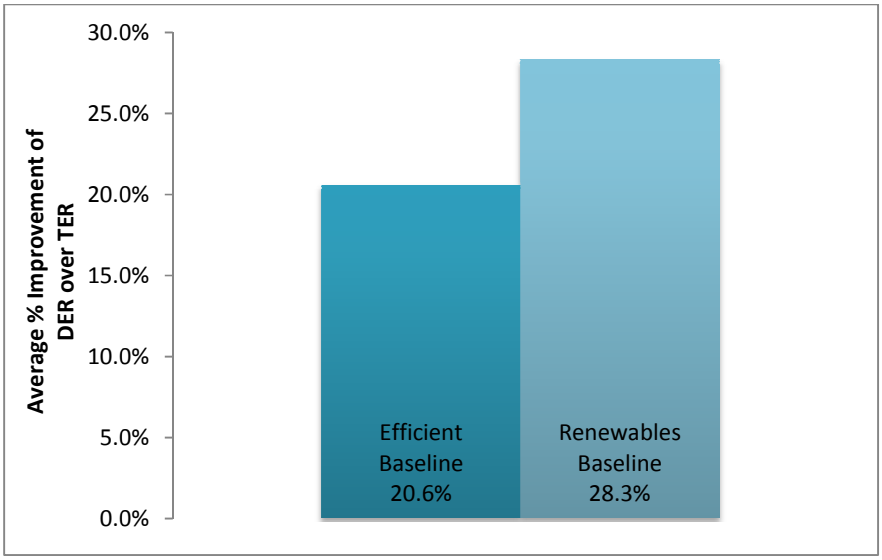


Figure 4: Average DER over TER Improvements of the Development



4.4.9 Careful consideration has been given to maximising the use of PV on site to both provide renewable energy to the site and to meet Code and Borough of Camden targets. Efforts have been made to ensure the visual impact of PV is minimised, and to ensure the appropriate placement for optimal orientation and functionality of the panels.

4.4.10 Orientation and layout of the PV panels on the available roof space has been carefully investigated. The modelled PV array was based on the total of 5no. 195Wp mono-crystalline silicon panels. (please note the final layout is subject to specialist sub-contractor design and may differ from the proposed array)

4.4.11 The proposed array has been arranged with modules facing south to maximise the output and increase efficiency of the system actively contributing to the sustainability of the proposed development.

4.4.12 The modules should be installed tilted at an angle of 30° in order to maximise the output of panels that can be fitted onto the available roof space. The minimum angle panels should be installed at is 10°, any less and the modules will not self-clean, invalidating their warranty.

4.4.13 The modules installed on the flat roofs will also need to be spaced at approximately 800mm apart to avoid overshadowing of neighbouring modules and to provide a walkway for safe installation and access.

5.0 CODE FOR SUSTAINABLE HOMES PRE-ASSESSMENT SUMMARY

5.0.1 This section of the report describes how the design team intends to achieve credits in each of the 9 Code categories at 11a Primrose Hill Road. It is important to note that as the project progresses some of the scores indicated in this report may change, however the design team are aware of the requirements set by the London Borough of Camden and will ensure that at all times the scheme will remain above the threshold for Code level 4.

5.1 Energy

5.1.1 The Energy category is arguably one of the most important areas of the Code. The minimum mandatory 25% improvement of Dwelling Emission Rate (DER) over Target Emission Rate (TER), when calculated according to Building Regulations Part L1A, will be achieved through a combination of high quality construction standards and materials, high performance windows, energy efficient heating plant, pumps, fans and ventilation equipment, along with high levels of insulation. This will result in a very energy efficient dwelling with highly efficient fabric. Such methods will be implemented to achieve best practice in thermal performance and heat loss parameters beyond Building Regulation minimums.

5.1.2 An Energy Strategy has been developed to ensure that the mandatory element of Code issue Ene 1 – Dwelling Emission Rate is met and CO_2 emissions are significantly reduced. The proposed approach is a combination of a highly efficient gas boiler, highly efficient fabric and efficient services ensuring reduced CO_2 emissions over the lifetime of the building. The DER over TER improvement target that is considered challenging but technically and viably achievable for this site. Consequently 3.3 credits have been allocated for Ene 1 – Dwelling Emission Rate.

5.1.3 A total of 6.2 credits have been awarded for Ene 2 - Fabric Energy Efficiency (FEE), which represents another challenging target but one that the assessor believes is obtainable. Attempting to push the performance of the dwelling any further than this level would result in unacceptably thick walls, severely impacting internal floor area. Furthermore, the resulting increase in cost of materials would make the development financially unviable.

5.1.4 The design team have made a commitment to provide Energy Display Devices that inform occupants of their energy consumption in order to enable them to make decisions and manage the dwelling more energy

efficiently. As such 2 credits have been allocated for issue Ene 3 – Energy Display Devices.

5.1.5 The proposal allows for the installation of a compliant drying line in the external space. Consequently, 1 credit can be allocated for issue Ene 4 – Drying Space.

5.1.6 The design team has committed to specifying white goods that meet the requirements set out in the Code technical guidance. As such, 2 credits can be allocated for issue Ene 5 – Energy Labelled White Goods.

5.1.7 External Lighting is addressed by issue Ene 6 – External Lighting. The design team have committed to complying with the Code requirements and, as such, 100% energy efficient external space and security lighting, with movement and daylight sensors will be provided. Therefore, 2 credits have been allocated under issue Ene 6.

5.1.8 As mentioned in the Energy Strategy section, the proposed development includes the installation of PV panels, which will result in a reduction in carbon dioxide emissions of at least 10%. As a result 1 credit has been awarded for issue Ene 7 – Low or Zero Carbon Technologies

5.1.9 As part of the drive for more sustainable transport solutions, 2 Code compliant cycle storage spaces will be installed on site. As a result of this provision 2 credits have been allocated under issue Ene 8 – Cycle Storage.

5.1.10 A Code compliant home office will be specified; therefore 1 credit has been allocated under issue Ene 9 – Home Office.

5.1.11 Overall, 20.5 of the available 31 credits will be achieved, which as a result of the weighting factors will deliver 24.07 points to the scheme in total. This score exceeds the minimum 50% requirement set by the London Borough of Camden, achieving 66.12% of the available credits in this category.

5.2 Water

4.2.1 Achieving the mandatory element of the Water category is a challenge. A Code level 4 dwelling must achieve a water consumption rate of 105 litres per person per day (l/p/d) for issue Wat 1, which represents a significant reduction on current building regulations that would allow for 125 l/p/d.

4.2.2 The design team will achieve the specified level of daily water consumption through careful selection and installation of water efficient

fittings and fixtures including taps, WCs, baths and showers that consume less potable water than standard specifications for the same type of fittings. As a result, a total of 3 credits have been allocated for issue Wat 1 – Indoor Water Use.

4.2.3 One credit has been allocated for Wat 2 – External Water Use by having a rainwater collection system which will supply water for garden irrigation.

4.2.4 Overall 4 of the available 6 credits will be achieved, which as a result of the weighting factors will deliver 6.00 points to the scheme in total. This score exceeds the minimum 50% requirement set by the London Borough of Camden, earning 66.66% of the available credits in this category.

5.3 Materials

4.3.1 The Materials category of the Code promotes the sustainable procurement and use of materials, taking into account their environmental impact by using the BRE Green Guide to Specification and the responsible sourcing of basic building and finishing elements.

4.3.2 For every Code level there is a mandatory element of the Code to achieve an A+ to D rating for at least three out five building elements, which include; the Roof, External Walls, Internal Walls, Upper and Ground Floors, and Windows. Thereafter the higher the Green Guide rating, the more points are awarded. This supports the selection of materials with low life cycle impacts and is rewarded under Code issue Mat 1 – Environmental Impact of Materials. The design team have committed to achieving 12 credits for this issue and, due to the early involvement of the Code Assessor; the design team is aware of these requirements and have specified elements which achieve a higher rating in the Green Guide.

4.3.3 Issues Mat 2 – Responsible Sourcing of Materials: Basic Building Elements and Mat 3 – Responsible Sourcing of Materials: Finishing Elements, target responsible sourcing of basic and finishing building materials throughout the design and construction stage. Based on the information available to the assessor 4 credits have been allocated for Mat 2 and 2 credits have been allocated for Mat 3. Detailed information regarding the materials to be specified during construction is required in order to assess the responsible sourcing of materials.

4.3.4 Overall 18 of the available 24 credits will be achieved, which as a result of the weighting factors will deliver 5.40 points to the scheme in total. This score exceeds the minimum 50% requirement set by the

London Borough of Camden, achieving 75.00% of the available credits in this category.

5.4 Surface Water Run-Off

4.4.1 The Surface Water Run-Off category of the Code deals with the risk of flooding from new developments and addresses wider issues of flood risk associated with climate change.

4.4.2 In order to meet the mandatory criteria for this credit area, the post construction conditions can be no worse than the existing conditions. In order to demonstrate compliance with the criteria an appropriately qualified drainage engineer will be required to carry out calculations as prescribed in the Code and in-line with the guidance in the SUDs Manual (CIRIA C697, 2007) and Preliminary Rainfall Run Off Management for Developments (EA/DEFRA, 2007) or for at least the 1 year and 100 year return period events.

4.4.3 The site is located in Flood Zone 1 and as such has a low risk of flooding and achieves full credits for this issue. A flood risk assessment will be completed to award these credits as part of the full Code assessment.

4.4.4 Overall 2 of the available 4 credits will be achieved, which as a result of the weighting factors will deliver 1.10 points to the scheme in total. Please note that there may be scope to gain further points in this category once detailed calculations have been completed.

5.5 Waste

4.5.1 The Waste category of the Code deals with waste and recycling issues for both the construction stage and the occupation stage of the development, ensuring the waste hierarchy is addressed.

4.5.2 The London Borough of Camden operate a recycling collection scheme compliant with Code for Sustainable Homes requirements. The mandatory requirements for this category will be met by providing compliant external storage space for the required volume of space for external waste and recycling facilities at the front of the property. The design team have committed to the provision of dedicated internal storage containers for recyclable waste with a total capacity of 30 litres, most probably in the kitchen. As such, 4 credits have been allocated under Was 1 – Storage of Non-Recyclable Waste and Recyclable House Hold Waste.

4.5.3 The requirement under Was 2 – Construction Site Waste Management for a Site Waste Management Plan (SWMP) will be met through contractual agreements with the selected construction contractor. Credits have been allocated for this issue on the basis that the SWMP will be prepared in line with best practice and will include commitments and procedures for sorting, recycling and diverting at least 85% of waste from landfill. As such, 3 credits have been allocated for this issue.

4.5.4 The provision of Code compliant composting facilities is included within the development proposal. As a result, 1 credit has been allocated for issue Was 03 – Composting.

4.5.5 Overall 8 of the available 8 credits in this category will be achieved, which as a result of the weighting factors will deliver 6.40 points to the scheme in total. This score exceeds the minimum 40% requirement set by the London Borough of Camden, achieving 100% of the available credits in this category, demonstrating exceptional performance in this category of the assessment.

5.6 Pollution

4.6.1 The pollution category aims to promote the reduction in the use of insulating materials that have a high Global Warming Potential (GWP) and to reduce the amount of nitrogen oxide (NOx) that is released into the atmosphere through the heating plant.

4.6.2 All new insulation materials will be specified with a GWP of less than five, which have low embodied impact relative to their thermal properties. As such 1 credit has been awarded under the issue Pol 1 – Insulant GWP.

4.6.3 High efficiency gas boilers will be specified for the dwelling, with NO_x emissions of less than 40 mg/kWh. Therefore, all 3 available credits have been allocated for this issue.

4.6.4 Overall 4 of the available 4 credits will be achieved, which as a result of the weighting factors will deliver 2.80 points to the scheme in total.

5.7 Health and Wellbeing

4.7.1 The Health and Wellbeing section of the Code covers factors that contribute to the overall comfort and welfare of the occupants of the dwelling.

4.7.2 Based on the information available to the assessor, it is anticipated that the development will achieve the required minimum daylight factor within the kitchen. Full daylighting calculations will be prepared to demonstrate the average daylight factor, to confirm that all rooms achieve the minimum daylight factor and the required amount of view of sky in order to allocate further credits. As such, only 1 credit has been allocated under issue Hea 1 at this stage, with the possibility of awarding up to 2 additional credits once calculations have been completed.

4.7.3 As 11a Primrose Hill Road is will be an end of terrace dwelling. The only property it will be attached to is owned and inhabited by the client. Consequently pre completion sound testing is expected to be feasible. The design team have committed to achieving the highest sound insulation performance standard. Accordingly, the full 4 credits for issue Hea 2 – Sound Insulation have been allocated.

4.7.4 The occupants of the proposed dwelling will have access to a small first floor balcony as well as a private garden area and communal garden. As a result, 1 credit has been allocated under issue Hea 3 – Private Space.

4.7.5 The dwelling has been designed to a standard which will meet and exceed the requirements for the Lifetime Homes standard. Therefore, 4 credits have been allocated for issue Hea 4 – Lifetime Homes.

4.7.6 A minimum 10 of the available 12 credits will be achieved, which as a result of the weighting factor will deliver 11.66 points to the scheme in total.

5.8 Management

4.8.1 The Management section of the Code targets both the construction stage and the way the dwelling is used during occupation.

4.8.2 A Home User Guide will be produced which will provide occupants with information regarding: energy efficiency; water use; sustainable improvement recommendations, local transport facilities; materials; waste; emergency information; and local amenities. As such 3 credits have been allocated under issue Man 1 – Home User Guide.

4.8.3 The construction contractor for this project is obliged through contractual arrangements to achieve significantly beyond best practice standards of the Considerate Constructors Scheme, and will also be required to commit to monitor, report and set targets for construction site impacts. As such 2 credits have been allocated under issue Man 2 – Responsible Construction Practices.

4.8.4 Additionally, a commitment has been made to meet the requirements of issue Man 3 – Construction Site Impacts. As such, 4 or more of the following actions will be required to be undertaken by the main contractor, allowing for the allocation of 2 credits for this issue:

a. monitor, report and set targets for CO_2 production of energy use arising from site activities;

b. monitor and report CO_2 or energy use arising from commercial transport to and from site

c. monitor, report and set targets for water consumption from site activities;

d. adopt best practice policies in respect of air (dust) pollution arising from site activities

e. adopt best practice policies in respect of water (ground and surface) pollution occurring on the site

f. 80% of site timber is reclaimed, re-used or responsibly sourced.

4.8.5 Overall 7 of the available 9 points will be achieved, which as a result of the weighting factors will deliver 7.77 points to the scheme in total.

5.9 Ecology

4.9.1 Ecology is an important and heavily weighted category of the Code, and as such the points available in this category are invaluable to help the scheme achieve Code Level 4.

4.9.2 The site has no ecological value and therefore earns 1 credit by default for issue Eco 1 – Ecological Value of Site.

4.9.3 At present, there are no plans to appoint a Suitably Qualified Ecologist (SQE) to carry out an appraisal of the site and provide recommendations on appropriate ecological features. Consequently no credits can be earned for issue Eco 2 – Ecological Enhancement.

4.9.4 One credit can be awarded by default for issue Eco 3 – Protection of Ecological Features as it has already been determined that the site is of low ecological value.

4.9.5 Currently, 2 credits have been allocated for a neutral change in ecological value to the site under Eco 4 – Change of Ecological Value of Site. It is the opinion of the assessor that the proposed inclusion of a green roof will greatly improve chances of earning all 4 credits in this issue. However, they can only be evaluated and awarded on the appointment of an SQE.

4.9.6 Initial calculations regarding the density of the proposed development show that the dwelling will have a Net Internal Floor Area: Net Internal Ground Floor Area ratio of greater than 3:1. As such 2 credits have been allocated under issue Eco 5 – Building Footprint.

4.9.7 Overall 6 of the available 9 credits will be achieved at this stage, which as a result of the weighting factors will deliver 8.00 points to the scheme in total.

6.0 CONCLUSION

5.0.1 This Sustainability Statement demonstrates that the proposed redevelopment of 11a Primrose Hill Road has targeted very high standards of design and building quality. The proposed development maximises a site with a recognised opportunity for sustainable redevelopment and will provide a high quality dwelling. The sustainable design and construction strategy focuses on the implementation of sustainable systems for energy, water, management, pollution and the use and choice of materials.

5.0.2 Standard Assessment Procedure (SAP) calculations have been completed in order to develop a robust Energy Strategy for the development. The proposed approach is a combination of a highly efficient gas boiler, highly efficient fabric and efficient services ensuring reduced CO_2 emissions over the lifetime of the building for a DER improvement of 47% over the TER.

5.0.3 Water consumption can be substantially reduced through the specification of water efficient fixtures and fittings (including low flow rate showers and taps and dual flush toilets) in order to achieve a water efficiency target of 105 litres/person/day and a rain water collection system for irrigation of the garden area. This specification will meet the minimum requirements in the Water category for Code Level 4.

5.0.4 New environmentally friendly and responsibly sourced materials that have a Green Guide rating of A+ to D and insulating materials that have a GWP <5 will be specified to the greatest extent possible.

5.0.5 The proposed development has sought to improve the ecological features of the site with the inclusion of a green roof, green wall, and planting. It should also be noted that the green wall will face onto the north side of St Mary's Church which is a Grade II listed building. As such the view of the development from the Church and surrounding street will be much 'softer' than the current brick wall.

5.0.6 Waste and recycling facilities will be provided and the reuse and disposal of construction waste will be guided by a Site Waste Management Plan. The site will be registered with the Considerate Constructors Scheme and will achieve beyond best practice compliance. Additionally, the construction team will monitor, set targets and report on construction site impacts.

5.0.7 The Code for Sustainable Homes pre-assessment demonstrates that the proposed development can achieve Code level 4 with a score of 73.20% in line with the London Borough of Camden Development Policy DP22 meeting the minimum standards achieving greater than

50% of the available credits under energy, water and materials. It should be noted that this pre-assessment has been undertaken early in the design process and is therefore subject to change. It is also important to note that the threshold for Code level 4 can be achieved by attaining other credits within the Code for Sustainable Homes, and not achieving some of those allocated in the pre-assessment.

5.0.8 In conclusion, this report demonstrates that the proposed development has carefully considered the sites potential environmental impacts and details how those impacts will be managed and mitigated.

APPENDIX A: SAP CALCULATION RESULTS

Efficient Baseline

Residential			Energy Consumption Breakdown						Regulated CO_2 Emissions	Unregulated CO_2 Emissions	SAP 2009		% Improvement DER over TER
Floor	Description	Floor area (m2)	Space Heating (Main) (kWh/an)	Space Heating (Secondary) (kWh/an)	DHW (kWh/an)	Lighting (kWh/an)	Aux (kWh/an)	Un-Reg (kWh/an)	$kgCO_2$/annum	$kgCO_2$/annum	DER	TER	
	Dwelling	153	5,705	0	2,727	510	461	4,101	**2,172**	**2,120**	**12.44**	**15.67**	20.6%
Total / Average		153	**5,705**	**0**	**2,727**	**510**	**461**	**4,101**	**2,172**				

Renewables Baseline

Residential			Energy Consumption Breakdown						PVs		Regulated CO_2 Emissions	Unregulated CO_2 Emissions	SAP 2009		% Improvement DER over TER
Floor	Description	Floor area (m2)	Space Heating (Main) (kWh/an)	Space Heating (Secondary) (kWh/an)	DHW (kWh/an)	Lighting (kWh/an)	Aux (kWh/an)	Un-Reg (kWh/an)	PVs kWp	PVs Electricity Offset	kgCO2/annum	kgCO2/annum	DER	TER	
	Dwelling	153	5,705	0	2,727	510	461	4,101	0.9	858.4	**1,717**	**2,120**	**11.23**	**15.67**	28.3%
Total / Average		153	**5,705**	**0**	**2,727**	**510**	**461**	**4,101**	**0.9**	**858**	1,717				

APPENDIX B: OTHER APPRAISED TECHNOLOGIES

B1 Wind Turbines

B1.1 Wind is one of the most cost-effective methods or generating renewable electricity. However wind is more suited to low density areas where there is more space necessary for maintenance, less turbulent wind patterns, and they are less likely to be the cause of noise and vibration to nearby properties. High density areas are not ideal with current wind turbine technology.

Feasibility

B1.2 Installation of wind turbines is neither feasible nor suitable for 11a Primrose Hill. There are a number of concerns with wind turbines in an urban environment including; visual impact, noise, cost, maintenance and space. Although calculations for the modelled systems indicate that wind systems contribute to carbon reductions, it must be noted that under dense urban environments the energy outputs generated by wind turbines can be quite unpredictable. This is mainly due to the neighbouring buildings acting as obstructions causing turbulence to the incoming wind flow. The site would need to be evaluated appropriately (over a period of 12 months) using wind speed monitoring & recording devices in order to give an accurate prediction in terms of energy output derived by the real wind speed measurements recorded on site.

B1.3 In addition to these concerns, the actual energy output of any turbines installed is likely to be much lower than the modelled outputs due to turbulence created in the urban environment. Turbulence can be overcome by installing turbines on minimum 30m high towers but this will exacerbate the concerns/impacts listed above.

B1.4 Life cycle assessment of wind turbines shows that they can repay embodied energy within a few years if suitably sited. Additionally wind turbines have a long lifetime with relatively little maintenance required, and when considering life cycle costs, even with the feed in tariff and energy savings considered they have a longer payback time than other renewable technologies

B1.5 In comparison to PV panels, the energy output is less predictable, as the annual sun path remains the same year on year whereas wind is unpredictable.

B1.6 Therefore, wind turbines have been determined to be unsuitable for the development at 11a Primrose Hill.

B2 Biomass Heating

B2.1 Wood is the most commonly used form of biomass fuel, and can either be burned in solid fuel boilers for central heating applications, or for raising steam for power generation in large installations.

B2.2 Typically, biomass installations are sized to meet a base heat load with peak load and load variations to be met from gas-fired boilers. Biomass boilers operate most efficiently and are therefore most cost effective when working continuously at full load, they do not respond well to rapidly fluctuating demand. When assessing the feasibility of a biomass installation, storage space and biomass delivery requirements need to be taken into account.

Feasibility

B2.3 Although the calculations typically show that a biomass boiler could provide a higher level of carbon reductions than gas boilers, the main operational concerns are raised in relation to air quality, storage capacity and logistics of parking for delivery of wood pellets/chips etc.

B2.4 Air quality is another major concern with biomass heating due to NOx (Nitrogen Oxides) and Particulate Matter (PM10) emissions.

B2.5 Biomass systems also require space for storage and delivery of fuel. Additionally, fuel delivery carries implications for parking, increased emissions and pressure from transport. In the context of the current layout, there is insufficient space able to be allocated for the biomass storage facility. Therefore, it is determined that biomass heating solution cannot be practically implemented and it is not a suitable renewable energy technology for the site.

B2.6 Life cycle assessment of biomass boilers shows that the embodied energy is usually repaid within a few years.

B2.7 When considering life cycle costs, there are higher maintenance requirements than other forms of renewable energy, fuel costs are predicted to rise and the value of net lettable space required for storage must be considered.

B2.8 When considering noise impact, the impact of fuel deliveries must be considered, otherwise, the impact is similar to conventional plant.

B2.9 Therefore, it is determined that a biomass heating solution cannot be practically implemented and is not suitable for the development at 11a Primrose Hill.

B3 Solar Thermal

B3.1 Solar Thermal hot water heating systems harvest energy from the sun to heat water. The solar heating collectors are generally positioned on the roof of a building, they can also be wall mounted, although with reduced efficiency. A fluid within the panels, heats up by absorbing solar radiation. The fluid is then used to heat up new water which is stored in a separate water cylinder.

B3.2 As an alternative to PVs, implementing Solar Hot Water (SHW) can deliver carbon saving to new hot water generation for space heating as well as for new hot water production.

Feasibility

B3.3 Solar thermal contributes towards hot water provision for dwellings. This technology offsets carbon emissions for hot water supplied by gas boilers. PV offsets electrical consumption from mains electricity, however gas has lower carbon intensity therefore, Solar Thermal contributes a lower carbon reduction than PV. Also, due to a limited hot water demand, the carbon savings would be limited at the development utilising SHW panels. Therefore, it is determined that the solar thermal water heating option is not the optimal renewable solution for the development at 11a Primrose Hill.

B4 Ground Source Heat Pump (GSHP)

B4.1 In the UK, soil temperatures stay at a constant temperature of around 11-12℃, throughout the year. Ground source heat pumps take this low temperature energy and concentrate it into more useful, higher temperatures, to provide space heating and water heating. The process is similar to that used in refrigerators. A fluid is circulated through pipes in the ground absorbing the heat from the soil, the fluid is passed through a heat exchanger in the pump which extracts the heat from the fluid and increases it via a compression cycle. This is then used to provide heating and heat new hot water.

Feasibility

B4.2 It has been determined that connection to existing or installation of new Ground Source Heat Pump plant is not a feasible option for the 11a Primrose Hill scheme. This is due to the large area required for boreholes exterior to the building.

B4.3 Energy modelling studies and cost analysis typically shows that installation of a GSHP is one of the most costly options for this site and would require further detailed analysis of conflicts with existing systems, ground conditions and soil conductivity before determining whether or not the required levels of carbon savings could be achieved.

B4.4 Land use, plant space and physical security for the ground collectors and the heat pump units also need to be taken into consideration. For horizontal collector systems, a potentially large area is required for the collector pipework. This area should be free of trees which will cause problems for installation of the pipework. It can be beneath the building but it is most effective in an open area. For borehole or vertical collectors, land requirements are reduced but still significant as the boreholes must be a minimum of five metres apart.

B4.5 Noise impact of heat pumps is considered to be negligible although concerns have been raised where older systems are poorly maintained and become noisy.

B4.6 Studies have raised concerns over operational efficiencies matching manufacturers stated efficiencies and costs of maintenance required. Taking all of these considerations into account, it is judged that GSHP is not a suitable or affordable technology for 11a Primrose Hill.

APPENDIX C: CODE FOR SUSTAINABLE HOMES PRE-ASSESSMENT

breglobal

Results

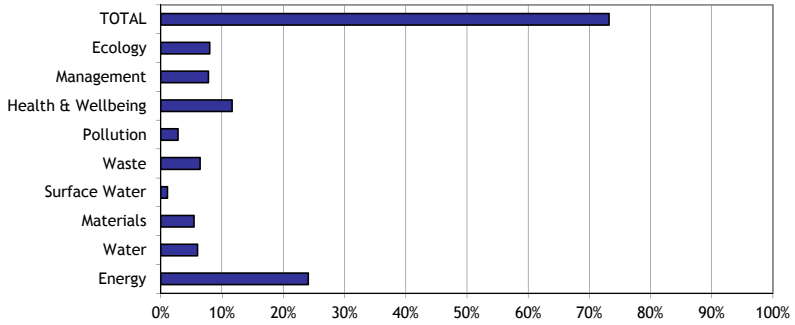
Development Name:	11a Primrose Hill
Dwelling Description:	New 3 storey dwelling
Name of Company:	Metropolis Green
Code Assessor's Name:	Miranda Pennington
Company Address:	
Notes/Comments:	

PREDICTED RATING - CODE LEVEL: 4

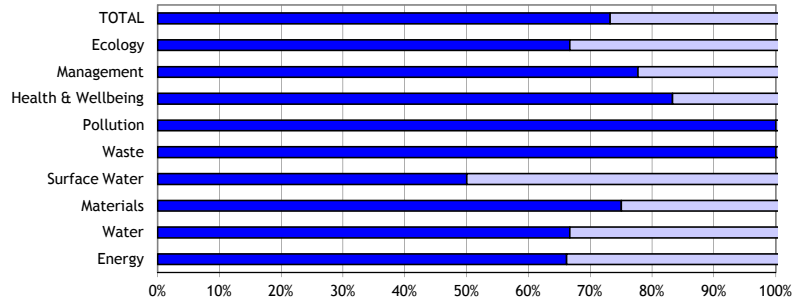
Mandatory Requirements: **All Levels**

% Points:	**73.20%**	**- Code Level: 4**
Breakdown:	**Energy**	**- Code Level: 4**
	Water	**- Code Level: 4**

Graph 1: Predicted contribution of individual sections to the total score and percentage of total achievable score



Graph 2: Predicted percentage of credits achievable: Total and by Category



NOTE: The rating obtained by using this Pre Assessment Estimator is for guidance only. Predicted ratings may differ from those obtained through a formal assessment, which must be carried out by a licensed Code assessor.

CATEGORY 1 ENERGY	Overall Level: 4	Overall Score	73.20
% of Section Credits Predicted:	66.12	Credits	Level
Contribution to Overall % Score:	24.07 points	20.5 of 31 Credits	Level 4

Ene 1 Dwelling Emission Rate	Credits are awarded based on the percentage improvement of the Dwelling Emission Rate (DER) over the Target Emission Rate (TER) as calculated using SAP 2009. Minimum standards for each Code level apply. The Code energy calculator can be used to calculate a predicted score. Enter the predicted score What is the predicted number of credits? 3.3 OR Are zero net CO_2 emissions achieved? ☐	3.3 of 10 Credits	Level 4
Ene 2 Fabric Energy Efficiency	Credits are awarded based on the Fabric Energy Efficiency (kWh/m^2/yr) of the dwelling. Minimum standards apply at Code levels 5 and 6. The Code energy calculator can be used to calculate a predicted score. Enter the predicted score Apartments, Mid-terrace ○ OR End terrace, Semi and Detached ◉ OR Staggered Mid terrace ○ What is the predicted number of credits? 6.2	6.2 of 9 Credits	-
Ene 3 Energy Display Devices	Credits are awarded where a correctly specified Energy Display Device is installed monitoring electricity and/or primary heating fuel consumption. Select whether the EDD monitors electricity and/or fuel None Specified ○ Primary Heating only ○ OR Electricity only ○ OR Electricity and primary heating fuel ◉	2 of 2 Credits	-

Issue		Credits	Level
Ene 4 Drying Space	One credit is awarded for the provision of either internal or external secure drying space with posts and footings or fixings capable of holding 4m+ of drying line for 1-2 bed dwellings and 6m+ for dwellings with 3 bedrooms or greater. **Will drying space meeting the criteria be provided?** Yes (◉) OR No (○)	**1 of 1 Credits**	-
Ene 5 Energy Labelled White Goods	Credits are awarded where each dwelling is provided with either information about the EU Energy Labelling Scheme, White Goods with ratings ranging from A+ to B or a combination of the previous according to the technical guide. **Select the appropriate option below** EU Energy labelling information **only** (☐) A+ rated appliances (☑) A rated washing machine and dishwasher (☑) B rated tumble dryer or washer dryer (☑) EU Energy labelling information provided (☐)	**2 of 2 Credits**	-
Ene 6 External Lighting	Credits are awarded based on the provision of space lighting* with dedicated energy efficient fittings and security lighting fittings with appropriate control gear.. **Space Lighting** None provided (○) OR Non Code compliant lighting (○) OR Code compliant lighting (◉) **Security Lighting** None provided (○) OR Non Code compliant lighting (○) OR Code compliant lighting and controls (◉) **Dual lamp luminaires** Compliant with both above criteria (☐) * Statutory safety lighting is not covered by this requirement	**2 of 2 Credits**	-

Issue		Credits	Level
Ene 7 Low or Zero Carbon Technologies	Credits are awarded where there is a 10% or 15% reduction in CO_2 emissions resulting from the use of low or zero carbon technologies. Select % contribution made by low or zero carbon technologies Less than 10% of demand ○ OR 10% of demand or greater ◉ OR 15% of demand or greater ○	**1 of 2 Credits**	-
Ene 8 Cycle Storage	Credits are awarded where adequate, safe, secure and weather proof cycle storage is provided according to the Code requirements. Fill in the development details below Number of bedrooms: 3 Number of cycles stored per dwelling* 2.0 * if you have storage for 1 cycle per two dwellings insert 0.5 in number of cycles stored per dwelling	**2 of 2 Credits**	-
Ene 9 Home Office	A credit is awarded for the provision of a home office. The location, space and services provided must meet the Code requirements. Will there be provision for a Home Office? Yes ◉ OR No ○	**1 of 1 Credits**	-

CATEGORY 2 WATER	Overall Level: 4	Overall Score	73.20
% of Section Credits Predicted: 66.66		Credits	Level
Contribution to Overall Score: 6.00 points		4 of 6 Credits	Level 4
Wat 1 Indoor Water Use	Credits are awarded based on the predicted average household water consumption, calculated using the Code Water Calculator Tool. Minimum standards for each code level apply. Select the predicted water use / Mandatory Requirement greater than 120 litres/ person/ day ○ OR ≤ less than 120 litres/ person/ day ○ OR ≤ less than 110 litres/ person/ day ○ OR ≤ less than 105 litres/ person/ day ◉ OR ≤ less than 90 litres/ person/ day ○ OR ≤ less than 80 litres/ person/ day ○	3 of 5 Credits	Level 3 AND Level 4
Wat 2 External Water Use	A credit is awarded where a compliant system is specified for collecting rainwater for external irrigation purposes. Where no outdoor space is provided the credit can be achieved by default. Select the scenario that applies No internal or communal outdoor space ○ OR Outdoor space with collection system ◉ OR Outdoor space without collection system ○	1 of 1 Credits	-

CATEGORY 3 MATERIALS	Overall Level: 4	Overall Score	73.20
% of Section Credits Predicted: 75.00		Credits	Level
Contribution to Overall Score: 5.40 points		18 of 24 Credits	All Levels
Mat 1 Environm-ental Impact of Materials	Mandatory Requirement: At least three of the five key building elements must achieve a Green Guide 2008 Rating of A+ to D. Tradable Credits: Points are awarded on a scale based on the Green Guide Rating of the specifications. The Code Materials Calculator can be used to predict a potential score. Mandatory Requirement Will the mandatory requirement be met? ☑ Enter the predicted score What is the predicted number of credits? 12	12 of 15 Credits	All Levels
Mat 2 Responsible Sourcing of Materials - Basic Building Elements	Credits are awarded where materials used in the basic building elements are responsibly sourced. The Code Materials Calculator can be used to predict a potential score. Enter the predicted Score What is the predicted number of credits? 4	4 of 6 Credits	-
Mat 3 Responsible Sourcing of Materials - Finishing Elements	Credits are awarded where materials used in the finishing elements are responsibly sourced. The Code Materials Calculator can be used to predict a potential score. Enter the predicted Score What is the predicted number of credits? 2	2 of 3 Credits	-

CATEGORY 4 SURFACE WATER RUN-OFF	Overall Level: 4	Overall Score	73.20
% of Section Credits Predicted: 50.00%		Credits	Level
Contribution to Overall Score: 1.10 points		2 of 4 Credits	All Levels

Sur 1 Management of Surface Water Run-off from developments

Mandatory Requirement: Peak rate of run-off into watercourses is no greater for the developed site than it was for the pre-development site and that the additional predicted volume of rainwater discharge caused by the new development is entirely reduced as far as possible in accordance with the assessment criteria. Desiging the drainage system to be able to cope with local drainage system failure. Tradable Credits: Where SUDS are used to improve water quality of the rainwater discharged or for protecting the quality of the receiving waters.

Mandatory Requirement

Will the mandatory requirement be met? ☑

Select the appropriate option

- No SUDS ☐
- No runoff into watercourses for the first 5 mm of rainfall ☐
- Runoff from hard surfaces will receive an appropriate level of treatment ☐

0 of 2 Credits | **All Levels**

Sur 2 Flood Risk

Credits are awarded where developments are located in areas of low flood risk or where in areas of medium or high flood risk appropriate measures are taken to prevent damage to the property and its contents in accordance with the Code criteria in the technical guide.

Select the annual probability of flooding (from PPS25*)

- Zone 1 - Low ◉
- OR Zone 2 - Medium ○
- OR Zone 3 - High ○

Select the apropriate option(s)

- Low risk of flooding from FRA** ☑
- All measures of protection are demonstrated in FRA ☐
- Ground floor level and access routes are 600 mm above design flood level ☐

2 of 2 Credits | -

* Planning Policy Statement 25 - Planning and Flood Risk

** FRA - Flood Risk Assessment

CATEGORY 5 WASTE	Overall Level: 4	Overall Score	73.20
% of Section Credits Predicted:	100.00%	Credits	Level
Contribution to Overall Score:	6.40 points	8 of 8 Credits	All Levels

Was 1 Storage of non-recyclable waste and recyclable household waste

Mandatory Requirement: The space provided for waste storage should be sized to hold the larger of either all external containers provided by the Local Authority or the min capacity calculated from BS 5906. Tradable Credits are awarded for adequate internal and/ or external recycling facilities.

Mandatory Requirement

Will the minimum space be provided and be accessible to disabled people? ☑

Internal Recyclable household waste storage

Where there is no external recyclable waste storage and no Local Authority collection scheme

Internal storage (capacity 60 litres) ☐

0 of 2 Credits

Local Authority collection Scheme

Post Collection sorting

Internal storage (capacity 30 litres) ☐

Pre-collection sorting

Internal storage (3 separate bins, capacity 30 litres) ☑

4 of 4 Credits — **All Levels**

External Storage, no Local Authority collection scheme

3 separate internal storage bins (capacity 30 litres) ☐

AND

Houses

External Storage(capacity 180 litres) ☐

Flats

Private recycling operator ☐

3 or greater types of waste collected ☐

0 of 4 Credits

Issue		Credits	Level
Was 2 Construction Site Waste Management	A credit is awarded where a compliant SWMP is provided with targets and procedures to minimise construction waste. Credits are available where the SWMP include procedures and commitments for diverting either 50% or 85% of waste generated from landfill. SWMP details Does the SWMP include: + No SWMP ○ + SWMP with targets and procedures to minimise waste? ○ + SWMP with procedures to divert 50% of waste ○ + SWMP with procedures to divert 85% of waste ◉	**3 of 3 Credits**	
Was 3 Composting	A credit is awarded where individual home composting facilities are provided, or where a community/ communal composting service, either run by the Local Authority or overseen by a management plan is in operation. Select the facilities available No composting facilities ○ Individual composting facilities ◉ OR Communal/ community composting*? ○ Local Authority ☐ OR Private with management plan ☐ * including if an automated waste collection system is in place	**1 of 1 Credit**	-

CATEGORY 6 POLLUTION	Overall Level: 4	Overall Score	73.20
% of Section Credits Predicted: 100.00%		Credits	Level
Contribution to Overall Score: 2.80 points		4 of 4 Credits	All Levels
Pol 1 Global Warming Potential (GWP) of Insulants	A credit is awarded where all insulating materials only use substances (in manufacture AND installation) that have a GWP of less than 5. Select the most appropriate option All insulants have a GWP less than 5 ◉ OR Some insulants have a GWP of less than 5 ○ OR No insulants have a GWP of less than 5 ○	1 of 1 Credits	-
Pol 2 NOx Emissions	Credits are awarded on the basis of NOx emissions arising from the operation of the space and water heating system within the dwelling. Select the most appropriate option Greater than 100 mg/kWh ○ OR Less than 100 mg/kWh ○ OR Less than 70 mg/kWh ○ OR Less than 40 mg/kWh ◉ OR Class 4 boiler ○ OR Class 5 boiler ○ OR All space and hot water energy requirements are met by systems who do not produce NOx emissions ○	3 of 3 Credits	-

CATEGORY 7 HEALTH & WELLBEING	Overall Level: 4	Overall Score	73.20
% of Section Credits Predicted: 83.00%		Credits	Level
Contribution to Overall Score: 11.66 points		10 of 12 Credits	No level

Hea 1 Daylighting

Credits are awarded for ensuring key rooms in the dwelling have high daylight factors (DF) and a view of the sky.

Select the compliant areas

Room	
Kitchen: Avg DF of at least 2%	☑
Living Room*: Avg DF of at least 1.5%	☐
Dining Room*: Avg DF of at least 1.5%	☐
Study*: Avg DF of at least 1.5%	☐
80% of working plane in all above rooms receive direct light from the sky?	☐

Any room used for Ene 9 Home Office must also achieve a min DF of 1.5%.

1 of 3 Credits | -

Hea 2 Sound Insulation

Credits are awarded where performance standards exceed those required in Building Regulations Part E. This can be demonstrated by carrying out pre-completion testing or through the use of Robust Details Limited.

Select a type of property

Detached Property	○
Attached Properties:	
- Separating walls and floors only exist between non habitable spaces	○
- Separating walls and floors exist between habitable spaces	◉

Select a performance standard

	Performance standard not sought	○
	Airborne: 3db higher; Impact: 3dB lower	○
OR	Airborne: 5db higher; Impact: 5dB lower	○
OR	Airborne: 8db higher; Impact: 8dB lower	◉

4 of 4 Credits | -

Issue		Credits	Level
Hea 3 Private Space	A credit is awarded for the provision of an outdoor space that is at least partially private. The space must allow easy access to all occupants. Will a private/ semi-private space be provided? Yes, private/semi-private space will be provided ◉ OR No private/semi-private space ○	1 of 1 Credits	-
Hea 4 Lifetime Homes	Mandatory Requirement: Lifetime Homes is mandatory when a dwelling is to achieve Code Level 6. Tradable credits: Credits are awarded where the developer has implemented all of the principles of the Lifetime Homes scheme. Mandatory Requirement Dwelling to achieve Code Level 6? ☐ Lifetime Homes Compliance All Lifetime Homes criteria will be met ◉ OR Exemption from LTH criteria 2/3 applied ○ Credit not sought ○	4 of 4 Credits	No level

CATEGORY 8 MANAGEMENT	Overall Level: 4	Overall Score	73.20
% of Section Credits Predicted: 77.00%		Credits	Level
Contribution to Overall Score: 7.77 points		7 of 9 Credits	All Levels

Man 1 Home User Guide	Credits are awarded where a simple guide is provided to each dwelling covering information relevant to the 'non-technical' home occupier, in accordance with the Code requirements. Tick the topics covered by the Home User Guide Operational Issues? ☑ Site and Surroundings? ☑ Is available in alternative formats? ☑	3 of 3 Credits	-
Man 2 Considerate Constructors Scheme	Credits are awarded where there is a commitment to comply with best practice site management principles using either the Considerate Constructors Scheme or an alternative locally/ nationally recognised scheme. Select the appropriate scheme and score No scheme used ○ Considerate Constructors OR Best Practice ○ OR Significantly Beyond Best Practice ◉ Alternative Scheme* OR Mandatory + 50% optional requirements ○ OR Mandatory + 80% optional requirements ○ * In the first instance, contact a Code Service Provider if you are considering to use an alternative scheme.	2 of 2 Credits	-
Man 3 Construction Site Impacts	Credits are awarded where there is a commitment and strategy to operate site management procedures on site as following: Tick the impacts that will be addressed Monitor, report and set targets, where applicable, for: - CO_2/ energy use from site activities ☑ - CO_2/ energy use from site related transport ☐ - water consumption from site activities ☑ Adopt best practice policies in respect of: - air (dust) pollution from site activities ☑ - water (ground and surface) pollution on site ☑ 80% of site timber is reclaimed, re-used or responsibly sourced ☐	2 of 2 Credits	-

Issue		Credits	Level
Man 4 Security	Credits are awarded for complying with Section 2 - Physical Security from Secured by Design - New Homes. An Architectural Liaison Officer (ALO), or alternative, needs to be appointed early in the design process and their recommendations incorporated. Secured by Design Compliance Credit not sought ◉ OR Secured by Design Section 2 Compliance ○	**0 of 2 Credits**	-

CATEGORY 9 ECOLOGY	Overall Level: 4	Overall Score	73.20
% of Section Credits Predicted: 66.00%		Credits	Level
Contribution to Overall Score: 8.00 points		6 of 9 Credits	All Levels

Eco 1 Ecological Value of Site	One credit is awarded for developing land of inherently low value. Select the appropriate option Credit not sought ○ OR Land has ecological value ○ OR Land has low/ insignificant ecological value* ◉ * Low ecological value is determined either a) by using Checklist Eco 1 across the whole development site; or b) where an suitably qualified ecologist is appointed and can confirm or c) produces an independent ecological report of the site, that the construction zone is of low/ insignificant value; AND the rest of the development site will remain undisturbed by the works.	1 of 1 Credits	-
Eco 2 Ecological Enhancement	A credit is awarded where there is a commitment to enhance the ecological value of the development site. Tick the appropriate boxes Will a *Suitably Qualified Ecologist* be appointed to recommend appropriate ecological features? ☐ AND Will all key recommendations be adopted? ☐ AND 30% of other recommendations be adopted? ☐	0 of 1 Credits	-
Eco 3 Protection of Ecological Features	A credit is awarded where there is a commitment to maintain and adequately protect features of ecological value. Type and protection of existing features Site with features of ecological value? ○ OR Site of low ecological value (as Eco 1)? ◉ AND All* existing features potentially affected by site works are maintained and adequately protected? ☐ *If a suitably qualified ecologist has confirmed that a feature can be removed due to insignificant ecological value or poor health conditions, as long all the rest have been protected, then this box can be ticked.	1 of 1 Credits	-

Issue		Credits	Level
Eco 4 Change of Ecological Value of Site	Credits are awarded where the change in ecological value has been calculated in accordance with the Code requirements and is calculated to be: Change in Ecological Value Major negative change: fewer than -9 ○ Minor negative change: between -9 and -3 ○ OR Neutral: between -3 and +3 ◉ Minor enhancement: between +3 and +9 ○ Major enhancement: greater than 9 ○	**2 of 4 Credits**	-
Eco 5 Building Footprint	Credits are awarded where the ratio of combined floor area of all dwellings on the site to their footprint is: Ratio of Net Internal Floor Area: Net Internal Ground Floor Area Credit Not Sought ○ OR Houses: 2.5:1 OR Flats: 3:1 ○ OR Houses: 3:1 OR Flats: 4:1 ◉ OR Houses & Flats Weighted (2.5:1 & 3:1) ○ OR Houses & Flats Weighted (3:1 & 4:1) ○	**2 of 2 Credits**	