

Camden Planning Guidance

Sustainability

London Borough of Camden

CPG **3**



September 2013

CPG1 Sustainability

1	Introduction	5
2	The energy hierarchy	7
3	Energy efficiency: new buildings	11
4	Energy efficiency: existing buildings	21
5	Decentralised energy networks and combined heat and power ...	31
6	Renewable energy	43
7	Water efficiency	55
8	Sustainable use of materials	59
9	Sustainability assessment tools	67
10	Brown roofs, green roofs and green walls	73
11	Flooding	79
12	Adapting to climate change	85
13	Biodiversity	89
14	Local food growing	107

1 Introduction

What is Camden Planning Guidance?

- 1.1 We have prepared this Camden Planning Guidance to support the policies in our 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 document was updated on 4 September 2013 following statutory consultation to clarify the guidance in Section 9 related to the Code for Sustainable Homes. The Camden Planning Guidance documents (CPG1 to CPG8) replace Camden Planning Guidance 2006.
- 1.2 The Camden Planning Guidance covers a range of topics as well as sustainability (such as design, housing, amenity and planning obligations) and so all of the sections should be read in conjunction, and within the context of Camden’s LDF.

What is this sustainability guidance for?

- 1.3 The Council is committed to reducing Camden’s carbon emissions. This will be achieved by implementing large scale projects such as installing decentralised energy networks alongside smaller scale measures, such as improving the insulation and energy performance of existing buildings.
- 1.4 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*

What does the guidance cover?

- Energy statements
- The energy hierarchy
 - Energy efficiency – in new and existing buildings
 - Decentralised energy and combined heat and power (CHP)
 - Renewable energy
- Water efficiency
- Sustainable use of materials
- Sustainability assessment tools - Code for Sustainable Homes, BREEAM and EcoHomes
- Green roofs, brown roofs and green walls
- Flooding
- Climate change adaptation
- Biodiversity
- Urban food growing

3 Energy efficiency: new buildings

KEY MESSAGES

All new developments are to be designed to minimise carbon dioxide emissions

The most cost-effective ways to minimise energy demand are through good design and high levels of insulation and air tightness.

This guidance covers:

- Stage 1 of the energy hierarchy; and
- How to ensure new buildings are as energy efficient as possible.

- 3.1 Stage 1 involves ensuring that the design of a development includes a range of low carbon techniques that will reduce its energy consumption.
- 3.2 Stages 2 and 3 of the energy hierarchy – Decentralised energy networks and combined heat and power and renewable energy are dealt with in sections 4 and 5 of this document.
- 3.3 Core Strategy policy CS13 – *Tackling climate change through promoting higher environmental standards* encourages developments to meet the highest feasible environmental standards that are financially viable during construction and occupation.

WHAT WILL THE COUNCIL EXPECT?

All new developments are to be designed to minimise carbon dioxide emissions by being as energy efficient as is feasible and viable

Energy efficient design techniques

- 3.4 Energy efficient design requires an integrated approach to solar gain, access to daylight, insulation, thermal materials, ventilation, heating and control systems. It is important you always consider these aspects in relation to each other when designing a scheme.
- 3.5 This section provides detailed guidance on all the ways you can design your building to be more energy efficient. It is split into four sections:
- Natural systems;
 - Thermal performance;
 - Mechanical systems; and
 - Other energy efficient technology.

Natural systems

- 3.6 Designing natural systems into new buildings can make the most of naturally occurring energy, such as the heat and light from the sun.

Making the most of sunlight

- Consider locating principal rooms that require warmth and daylight on the south side of buildings to benefit from the sun's heat. Within 30 degrees of south is ideal.
- Consider any overshadowing from adjoining or of adjoining buildings and spaces that will reduce the amount of solar gain.
- Consider the possibility of including renewable energy technologies, for example by including a flat or south facing roof for solar panels.

Making the most of daylight

- Maximise the amount daylight while minimising the need for artificial lighting.
- Carefully design windows to maximise the amount of sunlight entering rooms to meet the needs of the intended use.
- Daylight is dependent on the amount of open, un-obscured sky available outside a window, the amount of sunshine and the amount of light reflected from surrounding surfaces.
- The size, angle and shape of openings together with room height depth and decoration determine the distribution of daylight.

3.7 More information on daylight and sunlight can be found in CPG6 Amenity.

Preventing overheating

- 3.8 Some developments may experience too much sunlight in the summer, therefore you should achieve a balance between benefitting from solar gain and preventing over heating. To prevent over heating:
- Locate any spaces that need to be kept cool or that generate heat on the north side of developments.
 - Use smaller windows on the south elevation and larger windows on the north.
 - Use shading measures, including balconies, louvers, internal or external blinds, shutters, trees and vegetation. Any shading needs to be carefully designed to take into account the angle of the sun and the optimum daylight and solar gain.
 - Include high performance glazing e.g. triple glazed windows, specially treated or tinted glass.
 - Make use of overshadowing from other buildings.
 - Include green and brown roofs and green walls which help to regulate temperature. See section 9 of this guidance on brown roofs, green roofs and green walls for more information.

Natural ventilation

- Natural ventilation includes openable windows, the 'stack effect' system where pressure differences are used to draw air through a building (see Figure 1) and, double layers, where one layer has

openable windows where air can flow freely. These systems allow air to be drawn through a building and can operate in tall buildings. Careful design of the space is required as air flows are impeded by walls and partitioning.

- Room layouts, shallow floor plans and high floor to ceiling heights all help the natural ventilation of buildings

Natural cooling

- Can be created by shading, the evaporation effect from trees and other vegetation including green roofs and walls which naturally cool the environment. See section 9 for more guidance on green roofs.

WHAT INFORMATION DOES THE COUNCIL REQUIRE?

- A full model of the building should be carried out to ensure the building design optimises solar gain and daylight without resulting in overheating for developments comprising 5 dwellings or more or 500sq m or more of any floorspace
- Consider maximising the use of natural systems within buildings before any mechanical services are considered

Thermal performance

- 3.9 The thermal performance of a building relates to the amount of heat that is retained inside and the amount that is lost to the outside air. Ensuring a high thermal performance is one of the most effective ways to ensure your development is energy efficient.

Insulation

- 3.10 A high level of insulation is the most effective way to ensure new buildings are energy efficient. Use insulation with low overall heat transfer coefficient (U-value). See the Energy Savings Trust's Insulation materials chart for details on the thermal performance of various materials.

U-value

The rate at which heat transfers through a building material. The lower the U-value, the better the insulator.

- 3.11 Consider how the insulation is attached to the building structure or walls. If a joint is badly insulated or if the material is penetrated by materials that conduct heat such as metal nails, it could cause cold patches and reduce the efficiency of the insulation. Ensure special attention is given to these potential heat loss areas to prevent cold bridging and potential points of condensation.

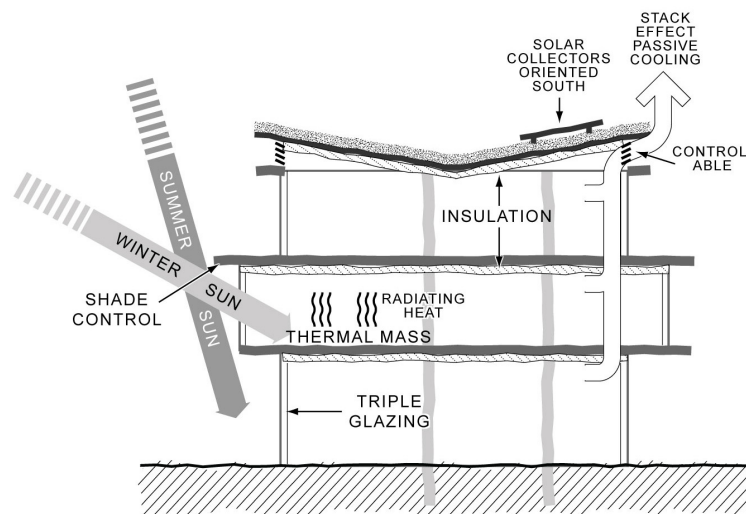
Cold bridging

Cold bridging occurs on a surface where one material loses heat faster than other, for example, through a concrete frame or a metal nail.

Materials with thermal properties

- 3.12 Materials with a high thermal mass e.g. concrete absorb and retain heat produced by the sun. These materials can be used to regulate indoor temperatures, especially to keep inside spaces cool during the day. Where heat is generated from within a building, exposed areas of thermal mass within the building can be used to transmit heat out of a building as the outdoor temperature drops.
- 3.13 Figure 11 below shows how heat from the sun can be absorbed by the thermal mass material and be released over time to help keep the building warm and insulated

Figure 1. Natural system principles



Thermal buffers

- 3.14 Porches, atriums, conservatories, lobbies and sheltered courtyards are useful 'thermal buffers'. You can design these features to prevent excessive heat loss from doors and windows by providing a transition between the cold outside and the warm inside of a building.
- 3.15 Insulation is central to low energy construction but it must be installed without any gaps to ensure a building is air tight to reduce heat loss. In some buildings around half of all heat losses are due to air leakage throughout the building materials.
- 3.16 To achieve air tightness, buildings must be designed with a continuous seal around the internal materials to eliminate unwanted draughts. Once the seals are in place, they ensure that the insulation can function to its optimum performance, saving energy and drastically reducing carbon emissions for the lifetime of the building.

Air tightness

Air tightness is the control of air leakage, i.e. the elimination of unwanted draughts and holes through the external materials of the building. It is measured by the rate at which air passes through a building (m³/m²/h)

- 3.17 Particularly air tight buildings may need to include a specialised ventilation system to ensure that naturally pre-heated fresh air is circulated through all the rooms without losing heat. See the section on Mechanical systems below for more information on Mechanical Ventilation with Heat Recovery (MVHR).

Mechanical systems

- 3.18 Mechanical systems are generally required by the Building Regulations to enable buildings to be occupied. These systems vary from simply extraction fans in kitchens and bathrooms to whole office cooling systems. The Council will expect applicants to consider the following when choosing mechanical systems:

Efficient heating

- Use heating systems that run using gas as they are generally more carbon efficient than systems which use electricity. Gas systems can also be designed so that they can be connected to a decentralised heating network.
- Locating plant e.g. pipes, flues, machinery, close to where the heat is required ensures a lower level of energy for pumping.
- A community heating scheme, where appropriate e.g. Combined Heat and Power (see section 4 of this guidance on Decentralised energy and combined heat and power for more information)
- Avoiding electric heating systems unless there is no access to a gas connection, or where heating is required for very short periods in isolated locations

WHAT INFORMATION DOES THE COUNCIL REQUIRE?

- Any development proposing electric heating (including heat pumps) will need to demonstrate the carbon efficiency of the proposed heating system. Specifications of the electric heating system and calculations will need to be provided to demonstrate that the proposed electric heating system would result in lower carbon dioxide emissions than an efficiency gas fuelled heating system.

Efficient ventilation and cooling

- Mechanical Ventilation with Heat Recovery (MVHR) conserves energy by recovering heat from stale warm air leaving a building and transferring the heat to the cooler incoming air.
- Water based cooling systems reduce the need for air conditioning by running cold water through pipes in the floor and/or ceiling to cool the air.

- Ground source cooling.
- Evaporation cooling which cools air through the simple evaporation of water.
- Exposed concrete slabs.
- The natural 'stack effect' which draws cool air from lower levels whilst hot air is released.

3.19 For some uses such as laboratories, where sterile conditions are essential, natural ventilation will not be required. These rooms should be located to minimise the heating or cooling required and close to the plant to limit the energy required by fans and pumps.

WHAT INFORMATION DOES COUNCIL REQUIRE?

- Where traditional mechanical cooling e.g. air conditioning units are proposed applicants must demonstrate that energy efficient ventilation and cooling methods have been considered first, and that they have been assessed for their carbon efficiency.
- NB: Air source heat pumps will be considered to provide air conditioning in the summer unless it can be demonstrated that the model chosen is not capable of providing cooling.

Other energy efficient technology

- In the average home, lighting accounts for around 20% of the electricity bill. In some developments it can be one of the highest energy consumers and can generate large amounts of heat that is wasted.
- High efficiency lighting with controlled sensors e.g. timers, movement sensors and photo sensors, which adjust the brightness of the light depending on the natural light level.
- Zoned lighting, heating and cooling with individual control.
- Specifying appliances which are A+ rated.
- Efficient mechanical services system or a building management system – computer systems which control and monitor a building's mechanical and electrical equipment. Their main aim is to control the internal environment, but in doing so can also reduce the energy consumption of a building.
- Using heat recovery systems.
- Energy monitoring, metering and controls should be used to inform and facilitate changes in user behaviour.

Heat recovery system

A heat recovery system uses heat leaving a building or generated as waste from mechanical operations to pre-heat fresh air entering a building

What is considered best practice?

- 3.20 Policy 5.2 *Minimising carbon dioxide emissions* of the Draft Replacement London Plan introduces a carbon dioxide reduction target for new development to make a 25% improvement on the current 2010 Building Regulations:
- 2010 – 2013 25 per cent
 - 2013 – 2016 40 per cent
 - 2016 – 2031 Zero carbon
- 3.21 The following standards focus on improving a building's fabric to achieve best practice U-values over and above current Building Regulations. The Council considers that the standards below are feasible in all but exceptional circumstances to meet the new London Plan targets and the Energy Saving Trust (EST) guidance on energy efficiency to achieve Level 4 of the Code for Sustainable Homes. There are other ways to reduce the energy efficiency of a building as set out in the first part of this section.
- 3.22 The table below generally relates to residential developments, however the building fabric standards are also applicable to commercial developments. For all developments a balance will need to be reached between the need to retain heat, the heat generated within a development and the need to remove excess heat.

Standards

External wall	0.20
Roof	0.13
Floor	0.20
Windows	1.50 British Fenestration Rating Council band B or better
Doors	1.00 (solid) 1.50 (glazed)
Air tightness	3.00 (m ³ /h.m ² at 50 Pa)
Proportion of energy efficient lighting	100%
Code for Sustainable Homes	Developments should achieve 50% of the un-weighted credits in the Energy category (See section 8 on sustainability assessment tools for more details relating to the Code for Sustainable Homes).
BREEAM	Developments will be expected to achieve 60% of the un-weighted credits in the Energy category of their BREEAM assessment. (See section 8 on sustainability assessment tools for more details relating to BREEAM).

Thermal insulation measured in U-Values (W/m².K)

What is carbon offsetting?

- 3.23 Where the new London Plan carbon reduction target in policy 5.2 (set out in paragraph 2.20) cannot be met onsite, we may accept the provision of measures elsewhere in the borough or a financial contribution which will be used to secure delivery of carbon reduction measures elsewhere. This process is known as carbon offsetting.

What does zero-carbon mean?

- 3.24 The government has set out a timetable for residential development to be zero carbon by 2016, public buildings by 2018 and non-residential development to be 'zero carbon' by 2019. The Council has reflected these ambitions in Development Policy DP22 – *Promoting sustainable design and construction* by using a stepped approach to the requirements for achieving higher levels of the Code for Sustainable Homes. Buildings built or refurbished today will be competing with low and 'zero-carbon' buildings in the near future. For commercial buildings this could have a particular impact on their future letability and value as new commercial buildings are anticipated to be zero carbon from 2019.
- 3.25 To determine how developments should meet the 'zero carbon' standard the Zero Carbon Hub has developed an energy efficiency standard for all new homes (currently awaiting government approval). For more information see the Zero Carbon Hub website www.zerocarbonhub.org

What does PassivHaus mean?

- 3.26 PassivHaus is a specific design and construction standard from Germany that can result in a 90% reduction in energy demand and usage. It can be applied to both commercial and residential buildings. Core Strategy policy CS13 - *Tackling climate change through promoting higher environmental standards* notes that PassivHaus is an example of energy efficiency principles.
- 3.27 To be PassivHaus buildings must meet the following criteria:
- the total energy demand for space heating and cooling is less than 15 kWh/m²/yr of the treated floor area;
 - the total primary energy use for all appliances, domestic and hot water and space heating and cooling is less than 120 kWh/m²/yr
- 3.28 PassivHaus' are designed using a special software package called the PassivHaus Planning Package (PHPP) and regional climate data.
- 3.29 The Council will be supportive of schemes that aim to PassivHaus standards, subject to other policy and design considerations. More information can be found on the PassivHaus website - www.passivhaus.org.uk

Further information

The London Plan	Sustainable Design and Construction: Supplementary Planning Guidance, Mayor of London provides detailed guidance on the energy hierarchy.
The Energy Saving Trust	Provides detailed guidance on the specification of new homes to reduce energy consumption. The Energy Saving Trust has developed a range of guidance and technical documents to help meet the energy performance requirements of the Code for Sustainable Homes and assess a range of materials and technologies for their thermal and carbon dioxide emissions levels. A wide range of best practise documents and guidance can be found at www.energysavingtrust.org.uk
The Town and Country Planning Association (TCPA)	Has produced a guide titled 'sustainable energy by design'. Section 4.1 of that document focuses on the design and development process, and shows how sustainable energy can be incorporated into new development in line with the energy hierarchy. www.tcpa.org.uk
Building Regulations	Approved Documents – Part L - Conservation of Fuel and Power. This section of the Building Regulations deals specifically with the energy efficiency of buildings. The latest version of the Regulations can be found on the Planning Portal website: www.planningportal.gov.uk
The Zero Carbon Hub	Has a lead responsibility for delivering homes to zero carbon standards by 2016. It has produced guidance on energy efficiency standards for new homes. www.zerocarbonhub.org

9 Sustainability assessment tools

KEY MESSAGES

A new build dwelling will have to be designed in line with the Code for Sustainable Homes

The creation of 5 or more dwellings from an existing building will need to be designed in line with EcoHomes

500sq m or more of non-residential floorspace will need to be designed in line with BREEAM

- 9.1 A way to ensure buildings are sustainable is to use a standardised environmental assessment tool to measure the overall performance of buildings against set criteria. Buildings that achieve high ratings use less energy, consume less water and have lower running costs than those designed to building regulations alone.
- 9.2 Paragraph 13.8 of Core Strategy policy CS13 - *Tackling climate change through promoting higher environmental standards* notes that BREEAM and the Code for Sustainable Homes provide helpful assessment tools for general sustainability.
- 9.3 This section explains:
- when you need to carry out an assessment
 - what the assessment tools are
 - Code for Sustainable Homes
 - BREEAM
 - EcoHomes
 - The standards which need to be met for each type of development. These are more detailed targets for Energy, Water and Materials than those in the Development Policy DP22 - *Promoting sustainable design and construction*.
 - The information required at each stage of the assessment

When do you need to carry out a sustainability assessment?

Development type	What does this include?	Threshold for assessment	Appropriate assessment tool
Residential - New build	New, self-contained houses and flats	all	Code for Sustainable Homes (CfSH)
Residential - Multi-occupation	Multi-residential buildings which contain a mix of residential accommodation (including student halls of residence, key worker accommodation, care homes and sheltered housing)	10 or more units/rooms or occupiers 500sq m of floorspace or more	BREEAM Multi-residential
Residential - Existing	Refurbishments, conversions and changes of use	5 dwellings or more 500sq m of floorspace or more	EcoHomes
Non-residential	Includes offices, retail, industrial, education health	500sq m of floorspace or more	BREEAM
Mixed use schemes	If your scheme includes both residential and non-residential uses that total 500sq m of floorspace or more we will require 2 assessments: a CfSH assessment for the residential part and also a BREEAM assessment for the non-residential parts.		

9.4 This table sets out when the Council will require a sustainability assessment for all the types of development and which assessment tool to use.

9.5 The assessment tools are updated periodically and therefore the most recent version of the assessment tool is to be used.

Code for Sustainable Homes

9.6 The Code for Sustainable Homes is an environmental impact rating system for all new housing. It sets standards for energy efficiency (above those in current building regulations) and sustainability. It aims to limit the environmental impact of housing.

9.7 The code works by awarding new homes a rating from Level 1 to 6, based on their performance against 9 sustainability criteria which are combined to assess the overall environmental impact. Level 1 is the

lowest and Level 6 is the highest. Homes that achieve level 6 are also known as 'zero carbon'.

Zero Carbon

Zero carbon refers to buildings that are so energy efficient they do not release any carbon emissions. The Government is currently aiming to ensure that all new homes are zero carbon by 2016. For more information visit www.zerocarbonhub.org

- 9.8 The Code for Sustainable Homes has a clear timetable for the delivery of sustainable buildings up to 2016 when new housing will be expected to be zero carbon.

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

Time period	Minimum rating	Minimum standard for categories (% of un-weighted credits)
2010-2012	Level 3	Energy 50%
2013 -2015	Level 4	Water 50%
2016+	Level 6 'zero carbon'	Materials 50%

BREEAM

- 9.9 BREEAM stands for Building Research Establishment Environmental Assessment Method. It is a tool to measure the sustainability of new non-domestic buildings. There are specific assessments for various building types such as offices, retail, industrial, education and multi-residential. For developments that are not covered by one of the specific BREEAM assessment tools, this often applies to missed use schemes, a tailored assessment can be created using the BREEAM Bespoke method
- 9.10 BREEAM assessments are generally made up of nine categories covering:
- Energy
 - Health and Well-being
 - Land use and Ecology
 - Management
 - Materials
 - Pollution
 - Transport
 - Waste
 - Water
- 9.11 Each of the categories above contain criteria which need to be met in order to gain credits. The higher the rating, the greater the number of specific credits needed. Some of the criteria have weighted credits which are used to reflect how important certain elements are, such as energy efficiency. All the credits are added together to produce the overall score. The development is then rated on a scale from PASS, to GOOD, VERY GOOD, EXCELLENT and ending with OUTSTANDING

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

Time period	Minimum rating	Minimum standard for categories (% of un-weighted credits)
2010-2012	'very good'	Energy 60%
2013+	'excellent'	Water 60% Materials 40%

EcoHomes

- 9.12 Ecohomes is a version of BREEAM for housing. It is used to assess the sustainability of existing housing where refurbishment, conversion or a change of use is proposed. It uses the same principles as BREEAM with categories, criteria and credits.

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

Time period	Minimum rating	Minimum standard for categories (% of un-weighted credits)
2010-2012	'very good'	Energy 60%
2013+	'excellent'	Water 60% Materials 40%

- 9.13 BRE are developing BREEAM for Domestic Refurbishments scheme to replace EcoHomes. We may update this guidance to reflect this change in the future.

What are the relevant stages?

Pre-assessment

- 9.14 The pre-assessment stage involves an initial review of the development to determine how sustainable it will be. It provides you with an early indication of the overall score your development will achieve by using the plans and drawings to estimate the number of credits that are likely to be achieved for each category. The results of the pre-assessment identify changes that need to be made to your scheme before construction begins to ensure it is as sustainable as possible. The pre-assessment stage also helps to identify if there are any experts, such as ecologists, that you need to invite to become involved in the development.
- 9.15 The results of your pre-assessment will form the basis of the condition or Section 106 planning obligation for the final development, so accuracy is crucial. In some circumstances it may be appropriate to over estimate

the credits needed to achieve the final rating as some credits can be lost during the final design stages.

AT THIS STAGE THE COUNCIL WILL EXPECT:

- The submission of a pre-assessment report at the planning application stage. The report should summarise the design strategy for achieving your chosen level of BREEAM and/or Code for Sustainable Homes and include details of the credits proposed to be achieved.
- The pre-assessment report is to be carried out by a licensed assessor. The name of the assessor and their licence number should be clearly stated on the report.

Design stage assessment

- 9.16 The aim of the design stage assessment is to review the detailed design specifications of your development. More detailed site specific information is generally available at this stage, in comparison to the pre-assessment stage, which allows the assessor to make a more precise estimate of the BREEAM or Code rating. Some elements of the assessment will need to be refined once construction has begun, because some materials and appliances are not specified until after or during construction. However, the assessor will ensure that any design and/or specification changes are reflected in the final Design Stage Assessment.
- 9.17 Once the assessor has completed the assessment it is submitted to the BRE for review and certification. The BRE will then issue a BREEAM or Code for Sustainable Homes Design Stage certificate indicating what level of sustainability the development has achieved.

AT THIS STAGE THE COUNCIL WILL EXPECT:

- Submission of an early design stage assessment to the Council prior to beginning construction of the development. This is needed to discharge the relevant condition or Section 106 planning obligation
- Ensure the assessor submits the final Design Stage Assessment to BRE for certification
- Submission of a copy of the Design Stage certificate to the Council

Post-construction assessment

- 9.18 The post-construction assessment reviews the design stage assessment and compares it with the completed development to ensure that all the specified credits have been achieved. It is carried out once your development has been completed and is ready for occupation. Once the assessment has been completed, it needs to be submitted to BRE for certification.

AT THIS STAGE THE COUNCIL WILL EXPECT:

- A post-construction assessment to be carried out as soon as possible after completion
- Submission of a copy of the post-construction certificate to the Council
- Submission of a copy of the Design Stage certificate to the Council, if not already submitted

- 9.19 There is often a delay between the completion of a development and the receipt of a post-construction certificate. Therefore the Council will allow occupation prior to the receipt of the final certificate. This approach will be monitored to ensure that the design stage certificate is consistent with the final post-construction report and certificate.

Further information

BRE (Building Research Establishment)	Provides detailed information on sustainability assessments, including the Code for Sustainable Homes, how to find an assessor, example assessments and how to submit your assessment: www.bre.co.uk
BREEAM	Provides detailed information on all the different types of BREEAM assessments that are available, how to use them, how to find an assessor, what all the different stages are and other useful guidance: www.breeam.org
The Code for Sustainable Homes	The Communities and Local Government website provides guidance and background information on the Code for Sustainable Homes: www.communities.gov.uk/planningandbuilding/theenvironment/codesustainable
Zero Carbon Hub	This organisation is working with the Government to implement the target towards ensuring all new homes are zero carbon. Their website provides information on what zero carbon is, how it can be achieved and case studies: www.zerocarbonhub.org

12 Adapting to climate change

KEY MESSAGE

All development should consider how it can be occupied in the future when the weather will be different

The early design stage is the most effective time to incorporate relevant design and technological measures.

- 12.1 In Camden the changing climate is likely to mean we will experience warmer, wetter winters with more intense rainfall and local flooding events. It will also bring hotter drier summers which will potentially increase the number of days we experience especially poor air quality. Hotter summers will also increase the demand for our open space, water and the use of electricity for mechanical cooling e.g. air conditioning.
- 12.2 Sections 1 to 11 have concentrated on climate change mitigation measures which are aimed at minimising the impact of human activity on the climate (e.g. by minimising carbon emissions). However, it is also important to think about how we will adapt to a changing climate, so this section is about responding to the unavoidable changes in climate that are already occurring. Adaptation recognises both risks and opportunities arising from climate change and the need to plan for them now.
- 12.3 Policy CS13 expects developments to be designed to consider the anticipated changes to the climate, especially developments vulnerable to heat and in those locations susceptible to surface water flooding.
- 12.4 Policy DP22 requires development to be resilient to climate change by ensuring schemes include appropriate adaptation measures.

WHAT WILL THE COUNCIL EXPECT?

All development is expected to consider the impact of climate change and be designed to cope with the anticipated conditions.

How to adapt to warmer temperatures

- 12.5 Plants and vegetation - Plants can have evaporative cooling effects. Improving the boroughs network of green spaces, parks, trees, and green roofs and walls will have a significant cooling effect.
- 12.6 Shading - Planting, shading and special glazing, such as triple glazing with filters that remove some of the suns harmful UV rays, can be used to reduce the heat from the sun. European style shaded squares and seating areas can also be used to provide cover during intense periods of heat / sunshine. Large, shade providing trees also provide cool, shady areas during summer.

Insulation

- 12.7 Materials should be selected to prevent penetration of heat, including the use of reflective building materials as well as green roofs and walls. Appropriate levels of glazing, which facilitates natural daylighting but prevents excessive overheating should also be considered.

Water cooling

- 12.8 Innovative use can be made of water for cooling, including by using ground or surface water. See sections 3 and 4 on energy efficiency and section 6 on renewable energy for more information.

Natural Ventilation

- 12.9 Instead of using air conditioning, buildings should be designed to enable natural ventilation and the removal of heat using fresh air. The use of plant equipment that expels hot air increasing the local outdoor air temperature.

Thermal materials

- 12.10 Materials with high thermal storage or mass capacity, particularly where it is exposed, can be used to absorb heat during hot periods so that it can dissipate in cooler periods, usually using ventilation.

Orientation

- 12.11 Buildings should be orientated as far as possible to reduce excessive solar gain and facilitate natural ventilation.

'Cool' surfaces

- 12.12 Certain materials on roadways or large parking areas can increase surface reflectivity (though it is important to avoid glare problems) or increase rainfall permeability to encourage the cooling effect of evaporation. Porous cool pavements offer the additional benefit of rainwater infiltration at times of heavy rain. Networks of 'cool roofs' made of light coloured materials can reduce solar heat gain and the need for mechanical cooling.

How to adapt to heavier rainfall**Sustainable Drainage Systems (SUDS)**

- 12.13 SUDS reduce the quantity of water leaving a site, limiting both the volume and rate of runoff during heavy rainfall and storms. They do this by using mechanisms to capture, filter and store rainwater on site (See section 11 on Flooding for more information on SUDS).

Green space

- 12.14 Green open space, verges and green roofs can be designed to filter and store rainwater, thus reducing pressure on drainage systems during heavy rainfall. Trees also reduce surface water runoff.

How to adapt to drier summers**Plants and vegetation**

- 12.15 Selecting drought resistant or low water use plants will greatly reduce water demands associated with landscape. This is sometimes known as xeriscaping.

Water efficient fixtures and fittings

- 12.16 These can significantly reduce demand for water and will become increasingly important for high density developments. (See the section on Water conservation and flooding for more information on minimising water consumption).

Re-using water

- 12.17 Collecting rainwater from roofs and other surfaces for reuse (for example in flushing toilets or irrigation) or recycling greywater from sinks or showers reduces water use. By reducing the amount of water entering the drains, water reuse also reduces the risk of surface water flooding.

How to adapt to changing ground conditions

- 12.18 During longer, hotter summers shrinkable clay soils are likely to dry out, making buildings and service pipes vulnerable to cracking. Wetter winters will contribute to risks of 'heave' where ground swells.
- Plants and trees - Trees can prevent shrinking and heave as they retain moisture in the soil.
 - Structural stability - Stronger retaining walls and fences with good drainage or use of vegetation can prevent surface erosion. Careful choice and placement of trees should avoid building subsidence where soils swell after heavy rainfall and shrink in hot, dry conditions.
 - SUDS – Use of SUDS techniques, such as surfaces which allow water to flow through and ponds, which increase infiltration of water into the ground, can reduce subsidence caused by drying out of soils (See section 11 on Flooding for more information on SUDS).
 - Foundation design - Foundations should be designed to be strong enough and extend downward below the zone that may be affected by seasonal variations in moisture content. Other measures include underpinning with concrete supports that extend under existing foundations into more stable soils and infilling of foundations.

Climate change and the historic environment

- 12.19 Many historic buildings have withstood climatic changes in the past, but we need to make sure they are protected from the impacts of a changing climate in the future. Many of the adaptation measures above can be used in the historic environment. However, the character of historic features and the potential for their damage and loss should always be taken into account when adaptation measures are being planned and executed.
- 12.20 These climate-change proposals should avoid harm to historic character and fabric, as assessed against the Planning (Listed Buildings and Conservation Areas) Act 1990 and PPS5. Please see English Heritage's Climate Change and the Historic Environment (2008) for further detail on climate change issues.
- 12.21 See section 4 on Energy efficiency: existing buildings of this guidance and section 2 on Heritage in CPG1 Design for more guidance on Camden's historic environment.

Further information

London Climate Change Partnership	Provides a checklist to help establish how developments can best adapt to climate change
"Adapting to Climate Change: A Checklist for Development"	www.climatesoutheast.org.uk
Chartered Institution of Building Services Engineers	Provides guidance on how to change and adapt buildings to be more sustainable and adapt to future climatic conditions. Their website has a number of guidance notes including: CIBSE TM36 – "Climate Change and the Indoor Environment: Impacts and Adaptation" www.cibse.org
UK Climate Impacts Programme	Helps organisations to adapt to climate change www.ukcip.org.uk