

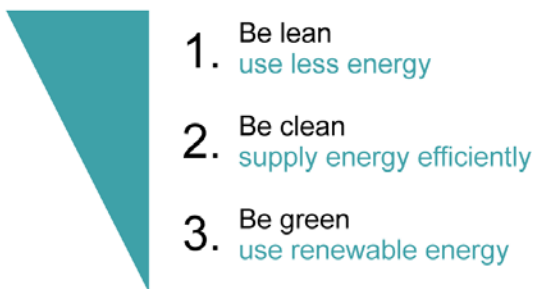
2 The energy hierarchy

KEY MESSAGES

- All developments are to be design to reduce carbon dioxide emissions
- Energy strategies are to be designed following the steps set out by the energy hierarchy

- 2.1 Buildings in Camden account for 88% of Camden's overall carbon dioxide emissions. These emissions result from the energy used within buildings. Therefore the Council encourages all buildings to be as energy efficient as possible. Our approach is to implement the energy hierarchy as set out in policy CS13 of the Core Strategy. The energy hierarchy is a sequence of steps that, if taken in order, will minimise the energy consumption in a building.
- 2.2 This section provides an overall introduction to the energy hierarchy and energy statements. This section sets out:
- The energy hierarchy
 - How to apply the energy hierarchy
 - When an energy statement is required
 - What to include in an energy statement
- 2.3 The next four sections provide more detailed guidance on each of the 3 steps in the hierarchy.

The 3 steps of the energy hierarchy are:



- 2.4 All developments are expected to reduce their carbon dioxide emissions by following the steps in the energy hierarchy to reduce energy consumption.
- 2.5 Developments involving 5 or more dwellings and/or 500sq m (gross internal) floorspace or more are required to submit an energy statement which demonstrates how carbon dioxide emissions will be reduced in line with the energy hierarchy (see below for more details on what to include in an energy statement).

Gross internal area

The area within the perimeter of the outside walls of a building as measured from the inside surface of the exterior walls, with no deduction for hallways, stairs, closets, thickness of walls, columns, or other interior features.

What to include in an energy statement?

- 2.6 An energy statement is to set out how a development has been designed to follow the steps in the energy hierarchy. It should demonstrate how the proposed measures are appropriate and viable to the context of the development.

Baseline energy demand and carbon dioxide emissions

Calculate the baseline energy demand of the development and the corresponding carbon dioxide emissions arising from the development. You should clearly show the methodology used. See below for more guidance on how to calculate the baseline demand and carbon dioxide emissions.

Reduce the demand for energy

Describe the design measures which are proposed to maximise the energy efficiency of the development. See sections 2 and 3 for guidance on how to ensure your development is as energy efficient as possible.

Supply energy efficiently

Describe how your development has considered further reducing carbon dioxide emissions by sourcing energy efficiently e.g. through the use of decentralised energy, such as combined heat and power systems. See section 4 for guidance on decentralised energy network and combined heat and power.

Calculate the energy use and the corresponding carbon emissions from the development having applied the first two stages of the energy hierarchy.

Use renewable energy

Describe how your development has considered using renewable energy technologies to further reduce carbon dioxide emissions. See section 5 for more guidance on renewable energy.

Calculate the remaining energy use and the corresponding carbon emissions from the development having applied all three stages of the energy hierarchy.

Conclusion

A concluding section should be provided outlining the contribution of each set of measures, technology or combination of technologies towards meeting the relevant targets set out in this guidance and providing recommendations as to which approach is most suitable for the site. Where it has not been possible to reach the targets, a clear explanation should be provided.

- 2.7 An energy statement should present technical data while remaining easy to read and to understand. Clearly laid out tables should be used to present data for ease of reading and comparison. Plans should be used where possible, e.g. to indicate suitable roof areas for installing solar technologies or the location of a plant room. References should be used to explain where data has been obtained from.

Calculating the baseline energy demand and carbon dioxide emissions

- 2.8 You should produce a single energy statement for the entire development. The baseline energy demand should include an assessment of all the energy consumed in the operation of the development, including where there will be more than one occupier, use or building. This should include regulated energy or 'fixed' consumption (covered by building regulations) e.g. fixed lighting, heating and hot water systems, ventilation/cooling etc and non-regulated energy sources from 'plug-in' sources (not covered by building regulations) e.g. cooking, electrical appliances, centralised IT (server room) systems, communications equipment. Major developments should use modelling SAP/SBEM (Standard Assessment Procedure/Simplified Building Energy Model) to calculate this data. Benchmark data is only acceptable for minor developments.
- 2.9 The energy statement should clearly identify the total baseline energy demand and the carbon dioxide emissions of the development prior to the inclusion of any measures to reduce carbon dioxide emissions beyond the minimum requirements of current Building Regulations. The statement should clearly demonstrate the energy demand and carbon dioxide emissions of the development regulated by the Building Regulations as well as the additional energy demand and resulting carbon dioxide emissions. Reductions in each type of energy use should be demonstrated and the resulting total energy demand and carbon dioxide emissions.
- 2.10 Baseline carbon dioxide emissions should be calculated for energy use using Part L of the Building Regulations for domestic and non-domestic developments. Total development emissions should take into account all emissions sources.

Further information

Camden Core Strategy	Policy CS13 - <i>Tackling climate change through promoting higher environmental standards</i> – sets out Camden's overarching approach to environmental sustainability.
Camden Development Policies	Policy DP22 - <i>Promoting sustainable design and construction</i> – sets out Camden's detailed requirements for developments to comply with.
Mayor of London	The London Plan Supplementary Planning Guidance, Sustainable Design and Construction: – sets out the Mayor's requirements for environmental sustainability.
GLA Energy Team Guidance on Planning Energy Assessments October 2010	Sets out how the GLA want Energy Assessments accompanying planning applications to be set out and what information is to be provided www.london.gov.uk/sites/default/files/guidance-energy-assessments-28-sep-10.pdf
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

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.

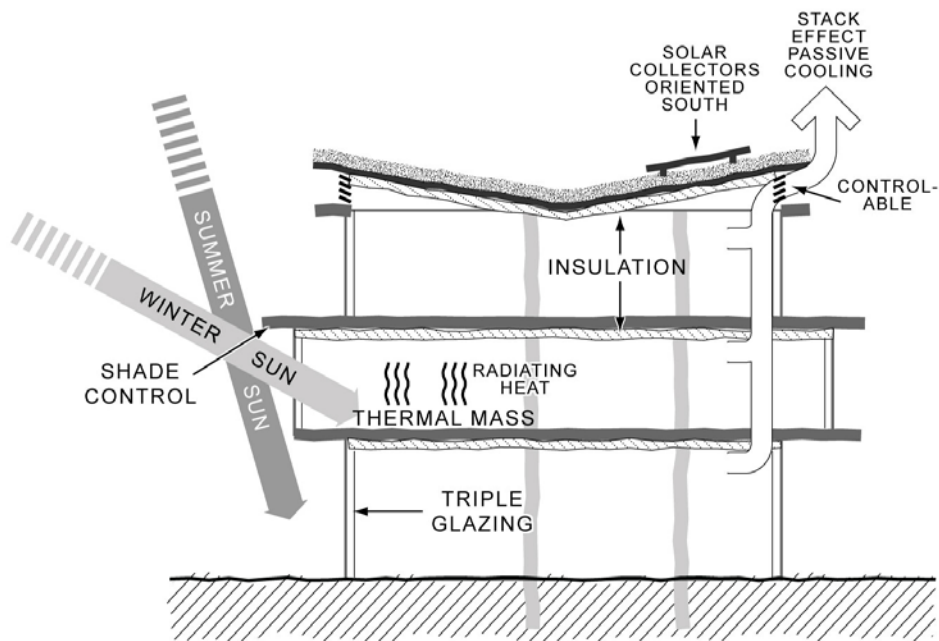
Cold bridging

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 35% improvement on the current 2013 Building Regulations:
- 2010 – 2013 25 per cent
 - 2013 – 2016 35 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. 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%
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 London Plan carbon reduction target in policy 5.2 cannot be met onsite, we may accept the provision of measures elsewhere in the borough or may require a s106 financial contribution to Camden's carbon offset fund which will be used to secure the delivery of carbon

reduction measures elsewhere, in connection with projects identified in the Council's Environmental Sustainability Plan 'Green Action for Change'. A contribution may be in the form of an integral element of the development, "in-kind" provision on or off site or a financial contribution secured through a s106 agreement (in accordance with CIL regulations). 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

4 Energy efficiency: existing buildings

KEY MESSAGES

As a guide, at least 10% of the project cost should be spent on environmental improvements

Potential measures are bespoke to each property

Sensitive improvements can be made to historic buildings to reduce carbon dioxide emissions

- 4.1 Many of the sections in this guidance focus on reducing the environmental impact of new buildings, however Camden's existing buildings account for almost 90% of the borough's carbon dioxide emissions. Therefore it is essential that these buildings make a contribution towards the borough's reduction in carbon dioxide emissions.
- 4.2 This section provides more information on how existing buildings can be more energy efficient. It builds on the previous section, which covered Stage 1 of the energy hierarchy and improving energy efficiency in new buildings.
- 4.3 Camden Core Strategy Policy CS13, paragraph 13.9 expects development or alterations to existing buildings to include proportionate measures to be taken to improve their environmental sustainability, where possible.

WHAT DOES THE COUNCIL EXPECT?

- All buildings, whether being updated or refurbished, are expected to reduce their carbon emissions by making improvements to the existing building. Work involving a change of use or an extension to an existing property is included. As a guide, at least 10% of the project cost should be spent on the improvements.
- Where retro-fitting measures are not identified at application stage we will most likely secure the implementation of environmental improvements by way of condition. Appendix 1 sets out a checklist of retro fit improvements for applicants.
- Development involving a change of use or a conversion of 5 or more dwellings or 500sq m of any floorspace, will be expected to achieve 60% of the un-weighted credits in the Energy category in their BREEAM assessment. (See the section on Sustainability assessment tools for more details).
- Special consideration will be given to buildings that are protected e.g. listed buildings to ensure that their historic and architectural features are preserved.

How can I make an existing building more energy efficient?

- 4.4 There are many opportunities for reducing the energy we use in our homes. The design and the materials used can make a significant contribution. Simple measures, such as closing curtains at dusk, can help stop heat loss. Installing condensing boilers, heating controls and energy saving light bulbs and appliances reduce energy use and carbon dioxide emissions significantly. Reduced energy use also means lower energy bills.
- 4.5 When dealing with historic buildings a sensitive approach needs to be taken. Guidance on this is provided later within this section.

Draught proofing

- 4.6 There is a range of effective draft proofing measures you can use to help insulate your home:
- Fix brush seals to exterior doors and letterboxes, and tape to ill-fitting doors;
 - Put reflector panels behind radiators to reflect heat into the room; and
 - Use shutters for windows and/or thicker curtains that do not drape over radiators.

Energy efficient lighting

- 4.7 In most homes lighting accounts for 20% of the electricity bill. It is easy to cut waste by simply turning off lights and adjusting blinds and curtains to let in more natural light. When lighting a room, always use energy saving light bulbs.

Windows

- 4.8 Windows let light and heat into your home, but they can also let a lot of heat out when temperatures are colder outside than inside. If you are replacing windows or building an extension, thermally efficient glazed windows will provide more effective insulation than older windows. Double glazed panels can now be fitted into some original wooden frames, without the need to replace the whole frame. This helps preserve the historic character of the building.
- 4.9 The use of PVCu windows is not considered to be acceptable in historic buildings, conservation areas and listed buildings as this material detracts from their historic significance and the architectural qualities of historic buildings and places. See below for more information on listed buildings and conservation areas.
- 4.10 There is a range of simple measures which can improve the energy efficiency of windows. These include:



- General repair and maintenance – which can substantially improve the energy efficiency of windows, as much of the heat lost through windows is through leaks and cracks.
- Installation of draught seals – which can help to further eliminate cold draughts and leaks.
- Secondary glazing – adding a second sheet of glass or plastic to a window frame can improve sound-proofing as well as energy efficiency. If carefully designed it can be unobtrusive and appropriate in a listed property or one within a conservation area.
- Secondary protection - e.g. shutters or heavy curtains, although these are predominantly a night-time option.

Insulation

- Loft insulation - Your home may already have some loft insulation, but if the material is thin it will not be saving as much energy and money as it could. Fitting proper loft insulation is the most cost-effective way of saving energy. As a guide, your loft insulation should be around 250mm thick to be effective.
- Floor insulation - If you have any gaps between your floorboards and skirting boards, you can reduce heat loss by sealing them with a regular tube sealant, like the silicon sealant used around the bath. It is also very useful to insulate underneath the floorboards at ground floor level.
- Cavity wall insulation involves filling the gap between the bricks with insulating material. It can reduce heat loss by up to 60%. Most homes built after 1930 will have a cavity that could be insulated
- Solid wall insulation (internal or external) – buildings constructed before 1930 almost always have solid wall construction. The only way to insulate solid walls is to add insulation to the inside or outside of the wall. External insulation involves adding a decorative weather-proof insulating treatment to the outside of your wall while internal insulation involves attaching insulating plaster board laminates or wooden battens in-filled with insulation to the inside of the wall. Generally 100mm of insulation is required to be effective. Solid wall insulation, whether internal or external, will require relocation of the services attached to the wall e.g. radiators, electrical sockets, drainpipes.

Heating and hot water

- New boiler - Replacing an old boiler (more than 10 years old) with a high efficiency condensing boiler and heating controls to provide heating and hot water could significantly cut energy consumption.
- New/upgraded central heating – If you install a new boiler the rest of your central heating system may need upgrading, for example large, old radiators could be replaced with smaller, more efficient radiators that are better suited to the new boiler

- Upgrading heating controls - You can install heating controls that allow you to control the temperature in different parts of your building. These can be included as an electronic timer control for your boiler, room thermostats for your main living area and thermostatic valves on all your radiators.
 - Insulating hot water pipes and your hot water tank will retain hot water for longer, and save money on heating it.
- 4.11 See the Council's website for further information for householders on various retro-fitting measures and whether permission is required.

Generating your own energy

- 4.12 Buildings can also reduce their energy consumption by generating their own energy in the form of heat or electricity using low carbon and renewable technologies which use little or no energy. See section 6 of this guidance on renewable energy for more advice on the technologies that are available and appropriate in Camden.

CASE STUDY

Renovated Victorian Eco-home: A semi-detached Victorian house in one of Camden's conservation areas was transformed in 2007, reducing its carbon footprint by 60%. Works undertaken to improve energy efficiency included:

- internal solid wall insulation;
- a new fully insulated roof;
- underfloor insulation;
- double glazing; and
- draught proofing.

Heat is provided by an efficient condensing boiler complemented by solar hot water panels on the rear extension; power to the panels' water pumps is provided by solar panels. Other improvements include an upgraded ventilation system with heat recovery, water saving features (e.g. rainwater harvesting for garden irrigation, dual flush toilets), low energy lighting and energy monitoring.

For further information on this property and improvements to other properties of a similar age see www.sd-commission.org.uk



What if my building is historic, Listed or in a conservation area?

- 4.13 Historic buildings have special features that need to be conserved and therefore need to be treated sensitively. This section explains how energy efficiency improvements can be achieved without causing harm to the historic environment.

- 4.14 Reflecting the special qualities of historic buildings, additional consents may be required for statutorily designated buildings (listed buildings, or those in conservation areas). The Council's website has more detailed guidance on what types of permission are required. The Council will aim to balance the conservation of fuel and power against the need to conserve the fabric of the building.
- 4.15 Historic buildings can perform well in terms of energy efficiency. When looking to install high energy efficiency measures, however, it is essential to ensure that works do not compromise the character and significance of the building or area.
- 4.16 In order to identify the most appropriate measures, we recommend taking the following approach, which takes into account measures best suited to individual buildings and households (i.e. taking human behaviour into consideration as well as the building envelope and services):
- Assess the heritage values of the building;
 - Assess the condition of the building fabric and building services;
 - Assess the effectiveness and value for money of measures to improve energy performance;
 - Assess their impact on heritage values; and
 - Assess the technical risks.
- 4.17 A range of thermal efficiency measures can then be implemented, which avoid harm to the historic environment. Ranked according to their impact on heritage and the technical risks, these include:
1. Ensure that the building is in a good state of repair
 2. Minor interventions - upgrade the easier and non-contentious elements:
 - insulate roof spaces and suspended floors;
 - provide flue dampers - (close in winter, open in summer);
 - use curtains, blinds and window shutters;
 - provide energy efficient lighting and appliances
 - draught-seal doors and windows;
 - provide hot water tank and pipe insulation.
 3. Moderate interventions - upgrade vulnerable elements:
 - install secondary (or double) glazing (if practicable);
 4. Upgrade building services and give advice to building users on managing them efficiently:
 - install high-efficiency boiler and heating controls;
 - install smart metering;
 - install solar panels, where not visible from the street or public spaces.

5. Major interventions - upgrade more difficult and contentious elements (where impact on heritage values and level of technical risk shown to be acceptable)
- provide solid wall insulation.
- 4.18 When considering refurbishment, it is the owner's responsibility to ensure that any work does not cause unlawful or unnecessary damage to the building.
- 4.19 The Energy Savings Trust and English Heritage have published detailed guidance on refurbishing and improving the efficiency of historic buildings. See the Further Information section below for details of where to find these guides.
- 4.20 Before carrying out any work, find out if your property is listed, in a conservation area or subject to any other planning restrictions such as an Article 4 Direction. Then check if any of the proposed works require consent – such as listed building consent, planning permission or conservation area consent. See CPG1 Design for more information on Camden's historic buildings. The Council's website also provides detailed information on these matters.

Article 4 Direction

Removes the permitted development rights awarded to properties by legislation and means a planning application has to be made for minor works that usually do not need permission.

Further information

Energy efficiency in existing buildings:

The Energy Saving Trust	<p>A national agency promoting energy efficiency in the domestic sector. For information on home energy efficiency measures including grants, visit their website: www.energysavingtrust.org.uk</p> <p>The Energy Saving Trust also provides technical guidance on energy efficiency in the Publications and Case Studies section of their website. www.est.org.uk/housingbuildings/publications</p> <p>Recommended Best Practice in Housing technical guidance documents:</p> <ul style="list-style-type: none"> • CE120 - Energy Efficient Loft Extensions • CE122 - Energy Efficient Domestic Extensions
GreenSpec	<p>Provides details of products and how they can be used to improve the efficiency of your home or building</p> <p>www.greenspec.co.uk</p>
The Planning Portal	<p>Provides information on what alterations you can make to your home without requiring planning permission</p> <p>www.planningportal.gov.uk</p>

Energy efficiency in historic buildings:

Historic England	<p>Historic England, the UK government's adviser on the historic environment, has produced the following guidance:</p> <ul style="list-style-type: none"> • A Guide to Energy Conservation in Traditional Buildings, which looks at a range of improvements that can be made to reduce the heat lost through a building's walls, windows, floor and roof. This guide is one of a series looking at reducing energy consumption in traditionally constructed homes. https://www.historicengland.org.uk/advice/technical-advice/energy-efficiency-and-historic-buildings/ • Meeting building regulations Part L in existing buildings. The purpose of the guidance is to help prevent conflicts between the requirements of the regulations and the conservation of historic and traditionally constructed buildings. https://www.historicengland.org.uk/advice/technical-advice/energy-efficiency-and-historic-buildings/ • saving energy in historic buildings at www.climatechangeandyourhome.org.uk which includes very detailed information about a wide range of improvements, e.g. insulating solid walls.
The Energy Saving Trust	<p>Provides technical guidance on energy efficiency in the Publications and Case Studies section of their website. www.est.org.uk/housingbuildings/publications</p> <p>This includes their Recommended Best Practice in Housing technical guidance documents: CE138 - Energy Efficient Historic Homes</p>
The Victorian Society	<p>Has information on their website on greening Victorian homes - www.victoriansociety.org.uk/advice/greening</p>
Building Conservation	<p>Provides a directory of useful contacts, grant sources and websites www.buildingconservation.com</p>
The Sustainable Development Commission	<p>Provides case studies of existing homes that have improved their energy efficiency, including the example detailed in this section. www.sd-commission.org.uk</p>

Appendix 1: Checklist for retro-fitting measures

Applies to all:

- changes of use
- conversions
- extensions over 30sq m

Please note that not all the measures will be appropriate for all buildings and some measures will require planning permission e.g. alterations to the front of a property

Measure	Specification	Evidence
Draught proofing		
Reflective radiator panels		
Overhauling/upgrading windows		
New boiler		
LED lighting		
Meters, timers, sensors, controls on heating or lighting		
Mechanical Ventilation with Heat Recovery		
Insulation		
Hot water tank & pipes		
Roof		
Walls Internal		
Walls External		
Floor		
Renewable energy technology		
Solar PV panels		
Solar thermal (hot water) panels		
Ground source heat pumps		
Double glazed windows / Secondary glazing		
Combined heat and power unit		
Green or brown roof		
Rainwater harvesting		
Other measures		
Join the Camden Climate Change Alliance (commercial only)		
Off-setting contribution		

6 Renewable energy

KEY MESSAGES

There are a variety of renewable energy technologies that can be installed to supplement a development's energy needs

Developments are to target a 20% reduction in carbon dioxide emissions from on-site renewable energy technologies.

- 6.1 This guidance covers Stage 3 of the energy hierarchy. Stage 3 involves considering how renewable energy technologies can be used to further reduce the carbon dioxide emissions of a development. You will find information in this section on the types of renewable energy technologies that are available and when they are most appropriate. Stages 1 and 2 of the energy hierarchy – energy efficiency and decentralised energy & CHP – are dealt with in sections 2, 3 and 4.
- 6.2 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. Paragraph 13.11 states that developments will be expected to achieve a 20% reduction in carbon dioxide emissions from on-site renewable energy generation unless it can be demonstrated that such provision is not feasible. The 20% reduction should only be attempted once stages 1 and 2 of the energy hierarchy have been applied.

WHAT DOES THE COUNCIL EXPECT?

All developments are to target at least a 20% reduction in carbon dioxide emissions through the installation of on-site renewable energy technologies. Special consideration will be given to heritage buildings and features to ensure that their historic and architectural features are preserved.

When assessing the feasibility and viability of renewable energy technology, the Council will consider the overall cost of all the measures proposed and resulting carbon savings to ensure that the most cost-effective carbon reduction technologies are implemented in line with the energy hierarchy.

Renewable energy technologies

Solar/Thermal Hot Water Panels

What is it?

A system made of flat plate collectors or evacuated tubes which allow water to flow through and be heated by the sun's rays.



What does it do?

Uses the sun's heat to warm water - up to 85 degrees Celsius

What issues should I consider?

- Flat plate systems are cheaper. Evacuated tube systems are more efficient so need less space.
- Generally used for hot water where approximately 4sq m of solar panel per household is sufficient with 80 litres of hot water storage.
- Aim to minimise pipe lengths as this reduces heat losses.
- Not ideal with combined heat and power as it can reduce the efficiency of the CHP system.

Where might this technology be appropriate?

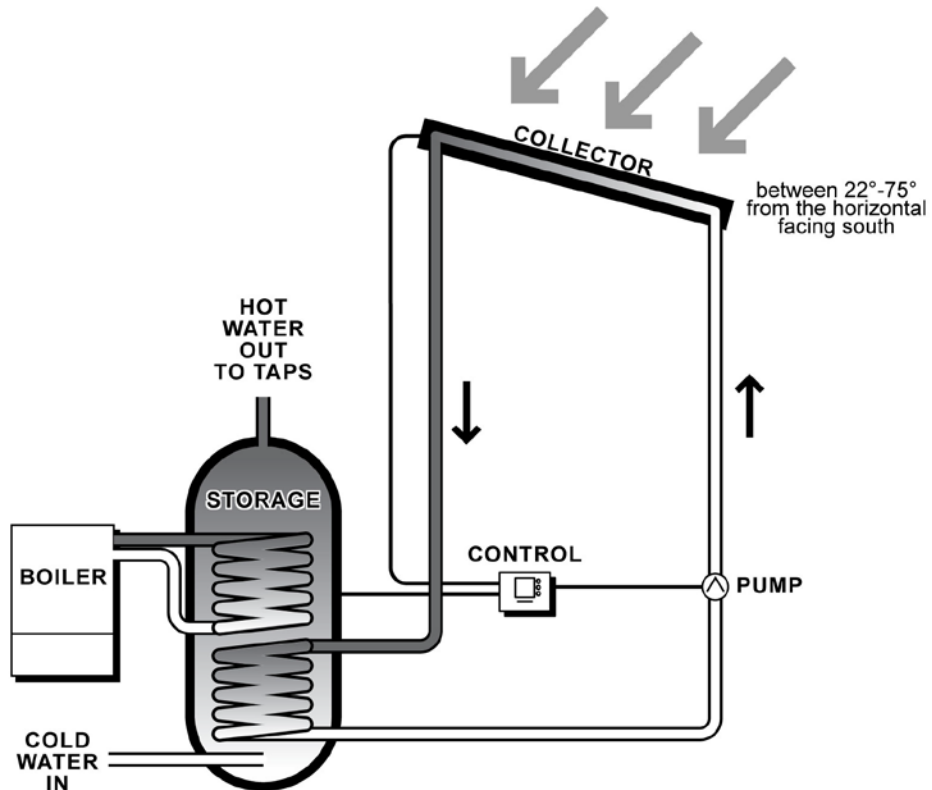
- Suitable for developments with all year hot water demands.
- South facing at 30-40 degrees is ideal, but as the panels do not rely on direct sunlight they can still be efficient at other angles.
- Can be fitted to existing buildings, but need to consider additional weight of the panels and compatibility of heating/hot water system

WHAT DOES THE COUNCIL EXPECT FOR THIS TECHNOLOGY?

- Where space allows, panels are to meet 100% of the site's summer hot water needs, which equates to 50-60% of the annual demand.
- Applicants are to confirm the number and size of panels or the overall square meters to be installed

- The accompanying heating system such as the top up boiler must be compatible. For example, it must include a storage tank and be able to use pre-heated water.
- Larger schemes should use a central system
- A meter is to be installed on the system for monitoring

Figure 6. Solar Hot Water Heating Schematic



Photovoltaic (PVs)

What is it?

Photovoltaic cells are panels you can attach to your roof or walls. Each cell is made from one or two layers of semiconducting material, usually silicon. There are a number of different types available e.g. panels, tiles cladding and other bespoke finishes.



How does it work?

When light shines on the PV cell it creates an electric field across the layers. The stronger the sunshine, the more electricity is produced.

What issues should I consider?

- PV works best in full sunlight.
- Consider movement of shadows during the day and over the year. Overshadowing can impact the overall performance of the PV array.
- The best commercial efficiency is 22%.
- In general 1sq m of conducting material such as crystalline array will provide an output of 90-110 kWh per year.

Where might this technology be appropriate?

- On a roof or wall that faces within 90 degrees of south, and isn't overshadowed by trees or buildings. If the surface is in shadow for parts of the day, your system will generate less energy.
- On top of a green or brown roof is ideal because the cooler temperature created locally by the vegetation improves the efficiency of the solar panel.
- Can be fitted to existing buildings, but need to consider additional weight of the panels.

WHAT DOES THE COUNCIL EXPECT FOR THIS TECHNOLOGY?

- Preference is for PVs to be flush to the roof or wall, but considerations will include the efficiency of the panel/s and whether they are visible
- Applicants are to confirm the number and size of panels or the overall square meters to be installed
- A meter is to be installed on the system for monitoring

Ground Source Heat Pumps (GSHP) or geothermal

What is it?

A network of underground pipes, which circulate a mixture of water and chemicals (to prevent freezing) through a loop and a heat exchanger.

How does it work?

The heat from the ground is absorbed by the liquid that is pumped through the buried pipes. A heat exchanger in the heat pump extracts the heat from the liquid and transfers it the water in the building's heating system which can be used for central heating and hot water. In the summer, when the ground is cooler than the air, the system can be reversed to provide cooling.

What issues should I consider?

- There are horizontal and vertical systems.
- Horizontal systems, also known as loop systems use trenches
- Vertical systems use boreholes which require a ground survey and a drilling license from the Environment Agency
- There are a range of permits and consents that might be required
- Generally provides heat at lower temperatures (30-50 degrees Celsius) than normal gas boilers.
- Buildings need to be well insulated for a GSHP to be effective
- The pump requires electricity to run so this technology will not be renewable or energy efficient in all developments.

Where might this technology be appropriate?

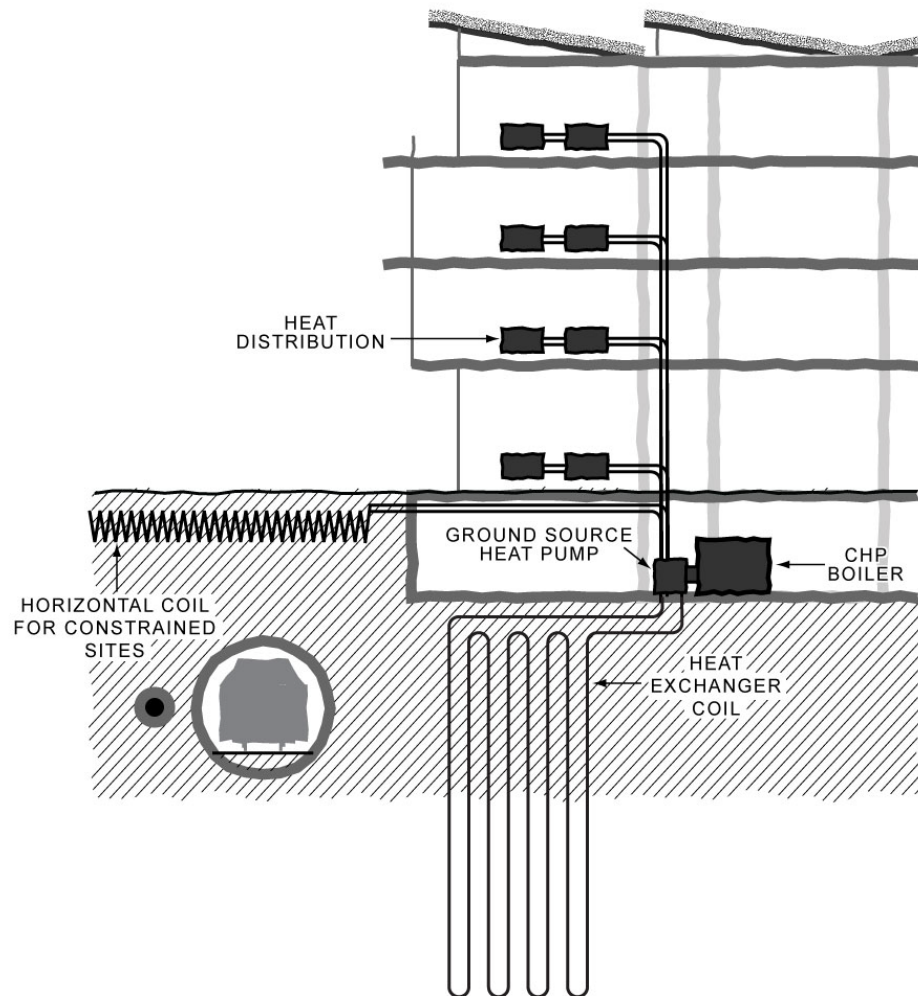
- The lower temperatures mean that GSHPs are well suited for underfloor heating
- Ideal for buildings which need heating in winter and cooling in summer

WHAT DOES THE COUNCIL EXPECT FOR THIS TECHNOLOGY?

- Evidence is to be provided to demonstrate that the local geology can accommodate the necessary excavation
- Consider how much electricity is required to work the pump versus the energy savings of providing heat or cooling. The carbon content of the electricity required to run the pump could be higher than the gas need to run a traditional gas boiler. The ratio of heat or cooling produced to the energy used to produce the heat is called the coefficient of performance (COP). For example, a heat pump which uses 1kW of electricity to produce 4kW of usable energy has a COP of 4 and is therefore 400% efficient. GSHPs need to have a COP of 4 or more to be considered renewable.

- When considering the carbon efficiency of a heat pump system the Council will take into account research and evidence of past performance of heat pumps and the seasonal performance.
- A meter on the system for monitoring

Figure 7. Ground Source Heat Pump Schematic



Air source heat pumps (ASHP)

What is it?

A heat pump that extracts heat from the outside air to heat the interior of a building or to heat hot water. It can also extract the heat from inside a building to provide cooling.

How does it work?

Air to water heat pumps operate on a similar principle to an ordinary refrigerator. Heat from the atmosphere is extracted by an outdoor unit and is absorbed by a refrigerant solution which is then compressed to a high temperature. The heat generated is used by the indoor unit to create hot water for a traditional heating and hot water system.

Air to air heat pumps work in a similar way, but instead of generating hot water, the heat from the compressed refrigerant solution is turned into hot air by an indoor unit which is used to heat the building.

What issues should I consider?

- ASHPs need electricity to run
- Can be less efficient than GSHPs as air temperature is more variable, i.e. colder in the winter when more heat needs to be extracted from the air.
- Consider the noise and vibration impact.
- Consider the visual impact.

Where might this technology be appropriate?

- Where there is no gas connection.
- Where the heating demand is isolated and for a short period of time.
- Can produce cool air as well as heat, so could be suitable in buildings which may otherwise require air conditioning

WHAT DOES THE COUNCIL EXPECT FOR THIS TECHNOLOGY?

- Consider how much electricity is required to work the pump versus the energy savings of providing heat or cooling. We will expect carbon calculations to show that their use for heating is more efficient than gas. Otherwise they will not be acceptable. The calculations will be based on the co-efficient of performance (COP) and the carbon content of electricity and gas. ASHPs need to have a COP of more than 4 to be more efficient than a conventional heating system.
- When considering the carbon efficiency of a heat pump system the Council will take into account research and evidence of past performance of heat pumps and the seasonable performance.
- Noise assessment and mitigation report to be submitted
- A meter on the system for monitoring

Biomass heating and power

What is it?

A boiler which generates heat for central heating as well as hot water or a system which generates heat and electricity, known as a Combined Heat and Power (CHP) system.

How does it work?

Produces heat or heat and electricity by burning organic materials (such as wood, straw, energy crops or liquid biofuels). Natural gas can also be used, however, this will be considered to be a 'low carbon technology' rather than renewable, as gas is a fossil fuel.

What issues should I consider?

- The suitability of this technology will depend on the:
 - local air quality
 - need for air quality mitigation measures
 - source and carbon intensity of processing the fuel
 - emissions generated from transporting the fuel
 - the impact on air quality – biomass boilers releases higher levels of nitrogen oxides (NOx) and particulates than conventional gas fired boilers or CHP systems
- There are a range of permits and consents that might be required
- Space is needed for power plant and fuel store
- Servicing arrangements for fuel delivery and transfer
- Possibility of sharing the system with other developments or consider establishing of a Community Combined Heat and Power scheme (CCHP)

Where might this technology be appropriate?

Biomass fed CHP systems are generally only proven on very large scale.

WHAT DOES THE COUNCIL EXPECT FOR THIS TECHNOLOGY?

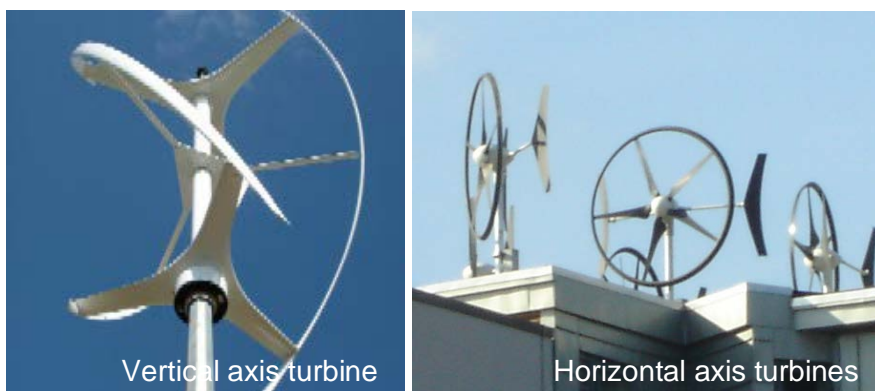
- Boilers must be accredited as 'exempt appliance' under the Clean Air Act 1999
- Technical information relating to the biomass boiler/CHP will be required
- All biomass boilers and CHP will require an air quality assessment, including location and height of flues, details of emissions and how the emissions can be mitigated

- Biomass boilers and CHP are required to be designed, operated and maintained in accordance with best practise measures to minimise emissions to air. (Please refer to the section on Air Quality in the CPG6 Amenity for more detailed information)
- Evidence of potential fuel suppliers – a local fuel source is preferable
- Fuel is to be carbon neutral. Preparation of fuels must be treated and handled appropriately to ensure there are zero carbon emissions e.g. natural drying process not one that uses energy
- A meter on the system for monitoring

Wind turbines

What is it?

Blades or turbines which are rotated by the power of the wind.



How does it work?

The wind turns the blades of the turbine to produce electricity. Horizontal or vertical axis turbines are available

What issues should I consider?

- Require a certain level of wind to make them feasible which is often difficult in London where there large obstacles such as buildings and trees which distort the flow of wind.
- If poorly located could use more energy than they generate.
- Need to be orientated towards the prevailing wind.
- Noise, vibration and flicker.

Flicker:

Rotating wind turbine blades can cast moving shadows when the sun is in a low position behind the turbine

Where might this technology be appropriate?

Could be suitable for low density developments or those with large amounts of open space e.g. schools and playing fields.

WHAT DOES THE COUNCIL EXPECT FOR THIS TECHNOLOGY?

- An assessment of the impact on neighbouring properties, particularly flicker, noise and vibrations
- A wind study and feasibility report.
- A meter on the system for monitoring

What is the feed-in tariff?

- 6.3 The feed-in tariff is a scheme where energy suppliers make regular payments to householders and communities who generate their own electricity from renewable or low carbon sources. The scheme guarantees a minimum payment for all electricity generated by the system, as well as a separate payment for the electricity exported to grid. These payments are in addition to the bill savings made by using the electricity generated on-site.
- 6.4 When considering the viability of the installation of technologies, the financial benefits of the feed-in tariff must be considered.

Further information

The London Energy Partnership	<p>Has produced a toolkit which explains how renewable energy can be integrated into new developments: London Renewables Toolkit - Integrating renewable energy into new developments: Toolkit for planners, developers and consultants</p> <p>Available from the London Energy Partnership website www.lep.org.uk</p>
REAL Renewable Energy Action for London	<p>A web resource run by Creative Environmental Networks which provides information on installing renewable energy for home owners, architects and developers. www.cen.org.uk/REAL</p>
Environmental Protection UK and LACORS	<p>Have produced guidance on biomass and air quality. The guidance provides background material on the issues involved, and details procedures for assessing and managing the effects of biomass on air quality – specifically nitrogen dioxide (NO₂) and particulates (PM₁₀ and PM_{2.5}).</p> <p>There are a number of guidance leaflet available on their website:</p> <ul style="list-style-type: none"> • ‘Biomass and Air Quality Guidance for Local Authorities’ <p>‘Biomass and Air Quality, Developers’ Information Leaflet’ www.environmental-protection.org.uk/biomass</p>
The Mayor of London	<p>Mayor's Air Quality Strategy includes emissions standards for new biomass and CHP equipment which will be implemented by the GLA www.london.gov.uk/publication/mayors-air-quality-strategy</p>

7 Water efficiency

KEY MESSAGES

At least 50% of water consumed in homes and workplaces does not need to be of drinkable quality re-using water

All developments are to be water efficient

Developments over 10 units or 1000sq m should include grey water recycling

7.1 Core Strategy Policy CS13 protects the borough's existing water infrastructure to ensure we have an adequate water supply as well as adequate water storage and foul water capacity. Development Policy DP23 expects all developments to be designed to be water efficient and to minimise the need for further water infrastructure.

7.2 This section outlines what measures the council will expect to ensure developments reduce the consumption of water and reduce the amount of water that is disposed of.

WHAT DOES THE COUNCIL EXPECT?

The Council expects all developments to be designed to be water efficient by minimising water use and maximising the re-use of water. This includes new and existing buildings.

Minimising water use

7.3 The simplest way of doing this is through installing efficient water fittings and plumbing, such as

- dual flush toilets;
- low flow taps and shower heads; and
- low water consuming washing machines and dishwashers.

7.4 Your development will need to use a range of these measures to reduce their water consumption. Specifications should be practical for the intended occupier to ensure that fittings are not simply replaced.

7.5 Your development should include meters which are visible to occupants, as this has been shown to result in reductions in water use.

7.6 We will assess the performance of water minimisation measures used against the water category in BREEAM (see section 8 on sustainability assessments for more information).

Maximising the re-use of water

7.7 At least 50% of water consumed in homes and workplaces does not need to be of drinkable quality. For example, rain water can be water used for flushing toilets, washing laundry and watering plants and gardens.

Collecting rain water

- 7.8 This involves collecting rainwater from a building's roof, as well as its surroundings, and storing it in a tank. Once filtered of leaves and larger objects, the water can be re-used for toilet flushing, laundry and watering plants. If used outside, the rain water harvesting system can take the form of a simple water butt. If used within the building it will need to be supplied through pipes and taps that are separate from the standard mains water supply.



WHAT WILL THE COUNCIL EXPECT?

The Council will require buildings with gardens or landscaped areas that require regular maintenance to be fitted with water butts.

Green/brown roofs and collecting rain water

- 7.9 Green/brown roofs can be designed to include rain water collection. However, more consideration needs to be given to the materials and pipe work that will go underneath the green/brown roof structure. Green/brown roofs with rainwater harvesting may also need to use extra filters to ensure the water can be re-used. See section 10 for more information on green/brown roofs.

Re-using water

- 7.10 'Grey water' (water that has already been used in hand basins, baths and showers) can be stored, filtered and disinfected, and then reused, for toilet flushing, garden watering or laundry. It is also possible to recycle 'black water' (water used for toilet flushing and washing up) although this is more resource intensive. Both 'grey water' and 'black water' systems will require regular maintenance to ensure their ongoing quality and effectiveness. A separate standard mains supply will also always be needed in addition to provide drinking water.

The Council will require developments over 10 units or 1000sq m and/or intense water use developments, such as hotels, hostels, student housing etc to include a grey water harvesting system, unless the applicant demonstrates to the Council's satisfaction that this is not feasible.

- 7.11 When considering the feasibility of grey water systems applicants should consider
- The cost of the system;
 - Cost savings for owner/occupier over a 10 year period;
 - Projected grey water generation;
 - Projected demand for use of grey water; and

- Water savings as a result of the grey water system.

Further information

The Environment Agency produces a range of guidance about how to conserve and reduce water consumption.

- Conserving Water in Buildings: Fact Sheets, Environment Agency,
- Greywater: An information guide, Environment Agency, 2008
- Harvesting rainwater for domestic uses, Environment Agency, 2008

They are all available on the EA website:

www.environmentagency.gov.uk

8 Sustainable use of materials

KEY MESSAGES

Reduce waste by firstly re-using your building, where this is not possible you should implement the waste hierarchy

The waste hierarchy prioritises the reduction, re-use and recycling of materials

Source your materials responsibly and ensure they are safe to health.

- 8.1 This guidance relates to Core Strategy policy CS13 - *Tackling climate change through promoting higher environmental standards* in design and construction. It encourages developments to be sustainable: through the choice of appropriate materials which will assist in minimising energy needs both during construction and occupation periods and by making efficient use of resources.
- 8.2 It also relates to Development Policy DP22 - *Promoting sustainable design and construction which* encourages developments to conserve energy and resources through the use of recycled and renewable buildings materials.
- 8.3 This guidance shows how you can minimise the use of resources through your choice of materials to limit the environmental impact of developments. You can achieve this by focusing on the sustainable (re)use of existing materials as far as possible before considering introducing new materials. There are 5 key measures:
1. Managing existing resources;
 2. Specifying materials using the Building Research Establishment's Green Guide to Specification;
 3. Ensuring that materials are responsibly sourced;
 4. Minimising the harmful effects of some materials on human health; and
 5. Ensuring that specified materials are robust and sensitive to the building type and age.

Managing existing resources

- 8.4 Most development sites have existing materials which can be re-used, recycled or obtained from nearby development sites. You should always look for options to sensitively re-use, refurbish, repair and convert buildings, rather than wholesale demolition (see Camden Development Policies paragraph 22.4). This will reduce the amount of resources used and will help reduce construction waste.
- 8.5 Where the retention of a building or part of a building is not possible, you should aim to tackle the quantity of waste produced - from the demolition phase through to the construction phase – through the use of the waste hierarchy.

WHAT WILL THE COUNCIL EXPECT?

All developments should aim for at least 10% of the total value of materials used to be derived from recycled and reused sources. This should relate to the WRAP Quick Wins assessments or equivalent as (highlighted in the waste hierarchy information section below). Special consideration will be given to heritage buildings and features to ensure that their historic and architectural features are preserved.

Major developments are anticipated to be able to achieve 15-20% of the total value of materials used to be derived from recycled and reused sources.

The Waste Hierarchy

- 8.6 The 'waste hierarchy' ranks the different ways in which waste can be treated so that it limits the amount of resources used and waste generated. You are to justify the use of (existing) resources and materials in your development through the implementation of the waste hierarchy below to minimise waste generated during the demolition and construction process.

Figure 8. The waste hierarchy



- 8.7 In line with the waste hierarchy, during the construction phase, our preferred approach is:
1. the use of reclaimed materials;
 2. the use of materials with higher levels of recycled content; and
 3. the use of new materials.
- 8.8 Similarly, in demolition you should:
1. prioritise the on site reuse of demolition materials;
 2. recycle materials on site recycling, then off site recycling; and
 3. the least preferred option - disposal to landfill.

Reduce

- 8.9 Reducing waste is the preferred option and at the top of the waste hierarchy – this means the Council prefers you prevent waste being produced in the first place rather than recycle or dispose waste that is

produced. You should focus on opportunities for waste reduction from the outset, at the earliest stages of design, as well as through better methods of purchasing and ways of working, for example by ordering the right amount of materials for the job.

8.10 Where demolition is necessary, you and your contractors are encouraged to:

- safely remove the most valuable or more contaminating materials and fittings for later re-use or processing before work commences.
- optimise the reuse and recycling of demolition materials - the Council strongly encourages the use of the Demolition Protocol where substantial demolition is proposed (over 1000 square meters). In general the protocol is a 'demolition waste audit' - a process that describes the percentage of the materials present on a site which can be reused/recycled (either in the development site or one nearby). For further detailed guidance on the Demolition Protocol (2003), refer to: Institute of Civil Engineers (ICE) and London Remade: www.londonremade.com
- You are to demonstrate that the most significant opportunities to increase the value of materials derived from recycled and reused content have been considered. A good way of achieving this aim at no additional construction cost is to use the Waste and Resources Action Programme (WRAP) by selecting the top ten WRAP Quick Wins or equivalent, and implement the good practice guidance highlighted: www.wrap.org.uk
- Building contractors are legally required to produce Site Waste Management Plans (SWMP) for all projects with an estimated construction cost of over £300,000. A Site Waste Management Plan provides a framework for managing waste in line with the hierarchy by identifying types and quantities of materials for re-use/recycling to reduce the amount of waste produced by construction projects. For further guidance see the WRAP NetWaste tool which has a site waste management plan function: www.wrap.org.uk
- The WRAP Quick Wins assessment can form part of a development's Site Waste Management Plan.
- Designing for deconstruction (rather than demolition) is strongly encouraged. Deconstruction is the dismantling of a structure in the reverse order in which it was constructed, which means that the materials that were put on last are removed first.
- From the outset, new buildings should be designed with the prospect of future deconstruction being implementable. This process will facilitate the segregation and extraction of materials that could be carefully removed intact during redevelopment, and then re-used/recycled wherever possible.
- You are encouraged to incorporate a 'material salvage phase', in which construction and surplus materials are recovered from the site. Additionally, materials should be segregated into categories, e.g.

timber waste, metal waste, concrete waste and general waste – to aid re-use or recycling.

- 8.11 Only once all the 'Reduce' options have been considered, should you consider the other waste options.

Re-use

- 8.12 Re-using materials (either onsite/off-site) is defined as putting resources/materials to an alternative use so that they are not wasted and disposed of. This can be done during the design, procurement and construction phases of a development by, for example:
- identifying and segregating materials already on site for re-use in the new development, such as:
 - bricks, concrete
 - internal features – historic fireplaces, timber floorboards, doors
 - metal frames, plastics, granite
 - sub-soil, top soil;
 - using the BRE Smart Waste www.smartwaste.co.uk management plan tool. This is an on line template contractors can use to input data on the amount and type of waste and have it sorted by the management tool;
 - making materials not reused on site available for reuse elsewhere. Consider the exchange/sale/donation of construction site materials to waste recovery businesses, such as: BRE Materials Information Exchange (www.bre.co.uk); Waste Alert North London's Waste Exchange service (www.wastewatch.org.uk), etc. These specialists can sort the waste materials into various types and then find businesses that can reuse/recycle them.

Recycling

- 8.13 Recycling materials (either onsite/off-site), is the preferable solution only when waste minimisation 'reduce' or reuse are not feasible. The recycling of materials enables them to be made into something new). Every opportunity should be taken to recycle materials, this can be done by, for example:
- identifying and segregating materials for recycling, such as:
 - metals and high value materials
 - timber, plasterboard, packaging
 - concrete crushed and re-used for concrete aggregate;
 - using the BRE Smart Waste www.smartwaste.co.uk, mentioned above
 - considering 'take-back' schemes with suppliers for materials and packaging. This where suppliers take back any materials not used as well as any packaging the materials are delivered in

- making materials not reused on site available for reuse elsewhere, as discussed above.

Disposal

- 8.14 Disposal is the least preferred waste management approach. Developers should only consider disposal of materials and waste after all of the above approaches have been carried out. Disposal generally involves burying the materials in a landfill or burning it at high temperatures in an incinerator. Where disposal is the only option for the materials developers should:
- identify materials that are contaminated and cannot be reused and arrange for their safe and legal disposal by the authorised waste management;
 - remove all toxic and hazardous materials from a development site in accordance with any relevant legislation, unless they are integral to the structure or a feature to be retained, and any harm to environmental or public health should be mitigated;
 - limit waste disposal to minimise the amount of land fill tax that needs to be paid.

Using the BRE Green Guide to Specification

- 8.15 You are encouraged to use the BRE Green Guide which provides guidance on how to make the best environmental choices when selecting construction materials and building components. The Green Guide ranks, materials and components on an A+ to E rating scale – where A+ represents the best environmental performance / least environmental impact, and E the worst environmental performance / most environmental impact.
- 8.16 In new-build and development projects with either - 500sq m of any floorspace or more or 5 dwellings or more - you should seek to achieve an area weighted average of A+ to B for the major building elements (roof, external walls, floor finishes, internal partitions and windows) in accordance with the BRE Green Guide to Specification. For further guidance see the sections on BREEAM assessments in section 9 of this guidance which sets out standards for developments to meet in the Materials category. For further guidance on BRE Green Guide to Specification: www.bre.co.uk

Responsible Sourcing

- 8.17 You should specify materials from suppliers who participate in responsible sourcing schemes such as the BRE BES 6001:2008 Responsible Sourcing Standard. All timber specified should be sourced from schemes supported by the Central Point of Expertise for Timber Procurement such as Forest Stewardship Council (FSC) accreditation (which ensures that the harvest of timber and non-timber products maintains the forest's ecology and its long-term viability). The use of

responsible sourcing can contribute towards attaining the BREEAM credits but a clear audit trail will need to be provided to gain these credits. For further guidance on responsible sourcing of materials: <http://www.bre.co.uk/>

'Healthy' materials

- 8.18 The Council recommends the use of environmentally sensitive building (non-toxic) materials and avoiding the use of materials or products that produce VOC (volatile organic compounds and formaldehyde) which can affect human health. For current controls on VOC's see the link below. The use of 'healthy' material options can contribute towards attaining the BREEAM credits but a clear audit trail will need to be provided to gain these credits.

Historic materials

- 8.19 In projects that involve the refurbishment of heritage buildings (those built before 1919) or those in conservation areas, materials should be specified in line with the following hierarchy:
- Reclaimed materials should be matching and appropriate to the building type/area (original construction time/period) and sufficiently robust in their performance not to compromise building function;
 - Materials with a low environmental impact as determined by the BRE Green Guide to Specification subject to approval from Conservation Officers and provided those materials do not compromise the performance (thermal, structural or otherwise) of the existing building; and
 - When selecting insulation materials for older buildings, preference should be given to natural fibre based materials that prevent moisture retention in the building fabric.

How will the Council secure the sustainable use of materials?

Design and Access Statement

- 8.20 As part of the Design and Access Statement for your development, you will be expected to describe how the development has considered materials and resources. This statement should provide an explanation of the opportunities for the selection and sourcing of sustainable materials that have been considered in the proposal, and the reasons for the sourcing choices made. Your statement should also detail which existing materials on the site are to be re-used as part of your development or made available for re-use elsewhere.

Construction Management Plan (CMP)

- 8.21 A Construction Management Plan will be required to support many developments and will help manage on site impact arising from demolition and construction processes. The types of schemes where a CMP will usually be appropriate include:

- major developments;
- basement developments;
- developments involving listed buildings or adjacent to listed buildings; and
- For a full list see Development Policy DP26 - *Managing the impact of development on occupiers and neighbours*, paragraph 26.10 and the relevant sections on Construction management plans in CPG4 Basements and Lightwells, CPG6 Amenity, and CPG8 Planning Obligations.

A set of minimum standards and a template Construction Management plan is available on the Council's website.

Site Waste Management Plan (SWMP)

- 8.22 Where a 'site waste management plan' (SWMP) is required (in projects with an estimated construction cost of over £300,000) it should include a pre-demolition audit of materials completed by a qualified professional and submitted with an application, in accordance with the Demolition Protocol. The audit must show what materials can and will be reused. If a full audit cannot be provided with the application, it should be submitted to and approved by the Council prior to commencement of works on site. Therefore the Construction Management Plan (where required) will have to reflect that space will be required to sort, store and perhaps crush/recycle materials as part of the SWMP. This link into the WRAP NetWaste tool has a site waste management plan function: www.wrap.org.uk/construction/tools_and_guidance/net_waste_tool

Planning obligations and Section 106

- 8.23 Meeting the requirements for sustainable design and construction is often achieved in the detailed design or construction phases. Normally, requirements for environmental design will be dealt with using conditions, but in some circumstances a Section 106 agreement may be required to secure an environmental assessment of the proposed development carried out by an impartial assessment body or a sustainability plan to provide and maintain the highest environmental standards of development.
- 8.24 If a proposal generates a requirement for a management plan such as a SWMP or CMP (as discussed above) but cannot be implemented through the approved design or satisfactorily secured through conditions, they may be secured as part of a Section 106 Agreement. The requirements will be relevant, proportionate and related to the specific nature and potential impacts of the development proposed. The associated costs to the Council of any post-planning decision assessments, verification, or monitoring in relation to these and other related sustainability and energy plans shall be met by the developer.

Further information

Sustainable Design and Construction	The London Plan Supplementary Planning Guidance, Mayor of London www.london.gov.uk
BREEAM	BRE Environmental Assessment Method www.breeam.org
BRE Smart Waste	An on-line site waste management plan tool. It's a template contractors can use to input data. www.smartwaste.co.uk
Materials	<p>For Materials Information Exchange and Architectural salvage and surplus building materials:</p> <ul style="list-style-type: none"> • Architrader - www.architrader.com • SALVO - www.salvomie.co.uk/ • Waste Exchange - www.wasteexchange.net <p>To find out how you can use more recycled and reclaimed products and building materials see www.ecoconstruction.org. There is a searchable database of available products on this website with information about the manufacturing processes of the products and their compositions, as well as contact details of suppliers.</p> <p>Design for deconstruction – principles of design to facilitate reuse and recycling, B Addis (2003) CIRIA Best Practice Guidance C607.</p>
Volatile Organic Compounds	<p>For current controls on avoiding VOCs and using healthy materials, see:</p> <p>British Standard (BS) regulates UFFI quality, limits the product's use and limits ingress of formaldehyde vapour into buildings (BS: 5617, 5618 (1985)).</p> <p>A BS Institution standard (BS 5669 part I (1989), BS 1142 (1989)) regulates the formaldehyde content, together with test methods that must be used to assess formaldehyde levels in particle boards and fibreboards.</p>

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

13 Biodiversity

KEY MESSAGES

Proposals should demonstrate:

- how biodiversity considerations have been incorporated into the development;
- if any mitigation measures will be included; and
- what positive measures for enhancing biodiversity are planned.

- 13.1 Development can harm biodiversity directly by destroying or fragmenting habitat, or indirectly by altering local conditions for species. Conversely, sensitively designed developments can increase connectivity between urban habitat patches, and contribute to landscape scale conservation and enhancement of biodiversity.
- 13.2 Biodiversity is integral to the planning process and we will expect it to be fully incorporated into the design and construction stages. In principle, all development activity should have minimal impacts on biodiversity and enhance it wherever possible.
- 13.3 It is essential that the development process, from demolition to construction, is undertaken in an appropriate manner to avoid harm to biodiversity. This guidance sets out:
- What species are protected;
 - What are our priority species and habitats;
 - How to protect biodiversity in the development process;
 - Habitat provision, enhancement, creation and restoration; and
 - Management and monitoring.

When does this guidance apply?

- 13.4 This guidance applies to all development sites. Sites already designated or adjacent to sites designated for their biodiversity value or that form part of a green corridor should receive special attention proportionate to the weight afforded by these designations. These include sites which are identified in the LDF and designated as:
- Sites of Special Scientific Interest (SSSI),
 - Sites of Nature Conservation Importance (SNCI) and
 - Local Nature Reserves (LNR)
 - Habitat corridors and Habitat Corridor – missing links
- 13.5 Sites of Metropolitan Importance for nature conservation and the Blue Ribbon Network are identified by the Mayor of London. An indicative map is contained in the London Plan.

- 13.6 It is also important to conserve and improve land outside designated areas as these areas support biodiversity networks through connecting, stepping stone and buffering qualities. Opportunities to improve biodiversity must be considered in all developments.

What species are protected?

- 13.7 Certain species are protected under UK or European Legislation. Natural England provides a list of protected species as well as legislative and policy guidance relating to protected species and the planning system: www.naturalengland.org.uk/ourwork/planningtransportlocalgov/spatialplanning/default.aspx
- 13.8 National advice for protected species www.naturalengland.org.uk/ourwork/planningtransportlocalgov/spatialplanning/standingadvice/default.aspx
- 13.9 The protection given to species under UK and EU legislation is irrespective of the planning system. It is the applicant's responsibility to ensure that any activity on a site (regardless of the need for planning consent) complies with the appropriate wildlife legislation.
- 13.10 Applicants should note that Paragraph 98 of ODPM Circular 06/2005 states that 'The presence of a protected species is a material consideration when a planning authority is considering a development proposal that, if carried out, would be likely to result in harm to the species or its habitat'.
- 13.11 Paragraph 99 states 'It is essential that the presence or otherwise of a protected species, and the extent that they may be affected by the proposed development is established before the planning permission is granted, otherwise all relevant material considerations may not have been addressed in making the decision'.
- 13.12 Certain development activities within the vicinity of protected species and their habitats require a licence from Natural England. Developers are strongly advised to contact the Natural England Wildlife Management and Licensing Service to discuss any protected species issues.

What are the priority habitats and species?

The Natural Environment and Rural Communities Act 2006

- 13.13 Section 40 of the Natural Environment and Rural Communities Act 2006 imposes a duty on public bodies "to have regard" to the conservation of biodiversity in England, when carrying out their normal functions. Under Section 41 of the same Act the Secretary of State has published a list of species of flora and fauna and habitats considered to be of principal importance in the conservation of biodiversity. Whilst we will give specific consideration to the species and habitats on this list when planning for biodiversity and assessing planning applications, we will also take seriously our duty to conserve all biodiversity. The full list can

be found on the Natural England web-site
www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx

The Camden Biodiversity Action Plan

- 13.14 The Camden Biodiversity Action Plan (BAP) provides a framework for improving biodiversity. There are species and habitats identified as priorities in national, regional or borough Biodiversity Action Plans that although may not have legal protection, are still a material consideration in planning, and we will take into account in the planning process.
- 13.15 The Camden's BAP contains a number of targets and actions that we will consider in the protection and enhancement of biodiversity in Camden.

Where to find the Biodiversity Action Plans:

- UK Biodiversity Action Plan Priority Habitat Descriptions
www.ukbap.org.uk/library/UKBAPPriorityHabitatDescriptionsfinalAllhabitats20081022.pdf#TO
- The London Biodiversity Action Plan
www.lbp.org.uk/londonhabspp.html
- Camden Biodiversity Action Plan
www.ukbap-reporting.org.uk/plans/lbap.asp

How will we protect biodiversity in the development process?

- 13.16 We will use a 'five-point approach' to planning decisions for biodiversity, based on the five following principles – information, avoidance, mitigation, compensation and new benefits. (based on Royal Town Planning Institute Good Practice Guide - 'Planning for Biodiversity')

Camden's 'five-point approach' to planning decisions for biodiversity

1. Information – We will require appropriate information at the outset on habitats and species and the impact of development on them;
2. Avoidance – Developments should avoid adverse effects to wildlife and habitats as far as reasonably possible;
3. Mitigation - Where avoidance is not possible, biodiversity impacts should be reduced as far as reasonably possible. We may use conditions or planning obligations/agreements to achieve this;
4. Compensation - Appropriate replacement and compensation will be required, where, exceptionally development that is harmful to biodiversity is permitted;
5. New benefits - In all cases, opportunities should be taken to enhance on-site biodiversity, or within the locality or borough, to provide new benefits for wildlife, for example, by habitat creation or enhancement.

Before the design stage

- 13.17 Developments are to consider the quality of the existing biodiversity and the potential for enhancement as any site or building may have important biodiversity or contain nature conservation features. This should be done by carrying out a habitat and ecology survey.

Requirement for ecological surveys

- 13.18 Ecological surveys carried out in accordance with this guidance are expected to be submitted upfront with any planning application, and will be used to assess the impact of the development on biodiversity, within the site, the locality, or where appropriate, on the regional or national resource. The paragraph below provides details of the recommended level of information to be provided.

When in the development process is a survey to be done?

- 13.19 Ecological surveys are to be carried out prior to the design stage. Information for the development site and wider area is to be obtained from, but not limited to:
- London Environmental Records Centre
 - appropriate statutory or non-statutory conservation organisations e.g. London Bat Group
- 13.20 A habitat survey is to identify important habitat features, including BAP Priority Habitats. Whilst the presumption is not to lose any areas of BAP priority habitat in particular, other habitats are also valuable. The scale and detail of the surveys should be in proportion to the size of the proposed development and likelihood of protected species using the site. The aim is to characterise important habitats and species, the presence of any protected species, and the extent that they may be affected by the proposed development. This information is to also inform the design and form of the development.

What developments need to carry out a survey?

- 13.21 For Protected Species - Table 1 in the Appendices sets out when a survey and assessment is required. For Designated sites and priority habitats - Table 2 in the Appendices sets out when a survey and assessment is required.

What needs to be included in a survey?

- 13.22 The level of scope and detail required is outlined in the Appendices. Optimal times to carry out surveys are provided in Figure 1 in the Appendices.

Who should carry out the survey?

- 13.23 Protected species such as bats, may be found throughout Camden in buildings, or in structures and using features for foraging or commuting,

and it may not appear immediately obvious that a protected species may be found on site or impacted upon by the proposed development. Developers are to employ the services of a professional ecological consultant. The Institute of Ecology and Environmental Management provides a commercial directory search of their membership directory at <http://www.ieem.net/ieemdirectory.asp>. The Council's Nature Conservation Section can advise on the scope of survey work required.

The design stage

- 13.24 This is arguably the most critical time in the development process to ensure that nature conservation opportunities and constraints are identified and taken account of. The aim should be to create ecologically orientated and sustainable development. During the design stage the biodiversity value of developments can be improved significantly if the design and management of buildings and landscaping elements is more explicitly geared towards nature.

LIGHTING

Lighting can have particular negative impacts on biodiversity. Unnecessary lighting should be avoided. Where lighting may harm biodiversity timers or specific coloured lighting will be required to minimise any disturbance.

- 13.25 Proposals should demonstrate how biodiversity considerations have been incorporated into the development, if any mitigation measures will be included, and what positive measures for enhancing biodiversity are planned. Where there are significant features of nature conservation value on site the Council will seek to secure, retain and enhance these features. All developments (major and minor) can contribute to a robust functioning ecosystem by providing a well-connected system of habitats, and the design stage is the perfect time to achieve this. A built structure or landscaping elements has the potential to impact on biodiversity and ecology, and developers must consider how to minimise any adverse effect upon both biodiversity and ecology. Developers must also consider how a built structure and any landscaped elements can deliver wider ecological benefits and enhancements at this stage.
- 13.26 Some species range a long way from their "core" habitat and there is a risk that species may be left isolated in a highly urban and fragmented landscape such as Camden with no access to suitable foraging areas or water. Developers may therefore be required to retain and enhance foraging areas or routes (e.g. for bats) or carry out other provisions that contribute towards conservation of the species on or off-site.

The construction planning phase

- 13.27 The nature conservation value of a site and its surrounding area will also need to be protected during the construction phase. A list of measures to ensure the nature conservation interest is protected is given below. The list is not to be considered exhaustive.

- 13.28 Measures to protect the nature conservation interest during the construction phase
- Timing of development to avoid disturbance to species such as birds in the breeding season;
 - Use of protective fencing to preserve important ecological areas and reduce direct damage by fencing off storage areas and areas for construction huts, and carefully planning and limiting and their placement;
 - Planning vehicular movements to minimise the impact on ecologically sensitive areas and reduce soil compaction;
 - In ecologically sensitive areas keep disruptive elements such as light, noise and human presence to a minimum;
 - Implement measures to protect water courses and ground water from pollution;
 - For sites of high nature conservation value, or its adjoining sites a construction management plan to protect biodiversity during the construction phase may be requested and secured by legal agreement or planning condition prior to the commencement of works on the site.

Post-construction

- 13.29 Where a site has been identified as having nature conservation importance, maintenance and monitoring may be required once the development has been completed. The management and maintenance of areas of nature conservation value that are to be retained, enhanced or created on a development site are essential to ensure these areas of nature conservation attain their full potential. A long term management plan should outline the conservation objectives, the means of monitoring habitats and species, and describe the practical maintenance measures that may be needed. Implementation of the management plan is likely to be a contractor's responsibility and should be considered at the tender evaluation stage. Maintenance and monitoring may be secured by way of a legal agreement or planning condition.
- 13.30 Where appropriate, the Council will seek a legal agreement where on site biodiversity aims are unlikely to be met through the use of a condition attached to a planning permission.

Habitat provision, enhancement, creation and restoration

- 13.31 In line with policy and guidance, opportunities should be sought for the incorporation of biodiversity into developments and for habitat creation or enhancing existing habitats in any development proposal. It is not a case of one size fits all. This list is not exhaustive and developers are encouraged to follow this guidance and think creatively to fully integrate biodiversity into design.

Best practice examples of habitat provision, enhancement, creation and restoration

Design Area	Design Opportunities	Details
Roofs	Green roofs Brown roofs Roof gardens and terraces	Green roofs are intentionally vegetated roof surfaces. Typically, they can be intensive on a deep growing medium (150-400mm), or extensive on shallower growing medium (60-200mm) or any transition between the two. In all cases consideration will need to be given to type of habitat desired. Other than the traditional sedum matting, green roofs can provide a varied profile comprising mosaics of bare ground with very early pioneer communities on nutrient-poor substrates e.g. locally sourced aggregate, through to more established open grasslands with herbs, or even trees and scrub and ponds. Green roofs should not be seen as an automatic substitute for ground level landscaping. Consideration should first be given to ground level landscaping for biodiversity. Further information can be found at: http://livingroofs.org/
	Artificial roost	Artificial roosts for bats can be incorporated into conversions or within new development such as a roof void by providing suitable access. Products are available to aid bat roosting potential or access to potential roost spaces such as bat access tiles.
	Bird and Bat boxes	The type of box, its location, and surroundings will depend on the species the box is intended for. You will need to take into account ecological requirements of the target species: position, aspect, height, obstructions, cleaning and maintenance, whether a single or colonial species, and whether surroundings suitable for commuting and/or foraging. It is preferable to install boxes into the fabric of the building as this provides longevity. There are numerous bird and bat boxes specifically designed for brickwork. Example: Swift boxes installed in brickwork Swift boxes should be sited on a north, north west or west aspect out of the sun and heat which can harm the chicks. They should be installed at a height of at least 6 to 7m, preferably under the shelter of the eaves or overhanging roofs. A 5 metre drop, clear of obstructions provides clear airspace for high speed entry and egress. Several boxes

		together will assist the formation of swift colonies.
Buildings	Walls Green/living walls	Living walls are typically composed of climbing plants. They provide opportunities for wildlife such as habitat for insects and spiders, which in turn will be food for insect-eating birds and bats, and if sufficiently dense provide can provide nesting habitat for birds. They can also reduce fragmentation of habitats by forming a link between ground level landscaping and green roofs. Climbers can adhere directly to brick and stone, but where it is desirable to encourage growth away from the building facade a network of trellises and wires can be used.
	Lighting	Artificial lighting has significant impacts on animals and insects, disrupting activities such as the search for food and mating behaviour. Where lighting is necessary, take into account: type of lamp (low pressure sodium lamps or high pressure sodium preferred), aim to avoid light spillage using hoods, cowls etc., the height of lighting column should be as short as possible, light levels should be as low as possible, and timing of lighting to provide some dark periods. The Bat Conservation Trust in association with the Institution of Lighting Engineers (ILE) has produced a guidance document 'Bats and Lighting in the UK'
Outdoor Space	Sustainable Urban Drainage Systems (SUDs)	SUDs can help to slow down the runoff rate and store water on a temporary basis, reducing the impact of urbanisation on flooding, and provide a habitat for wildlife. Examples include the use of constructed wetlands, such as ponds, reed beds, planted swales, and detention basins.
	Ponds/reed beds	Ponds and reed beds can have significant wildlife value. Ponds can be constructed using concrete, butyl liners or puddled clay. It is better that they are designed using methods such as rainwater harvesting as this can be fed directly into a pond, as topping up with mains water adds nutrients to the pond and can lead to algal blooms.
Landscaping and planting.	General Planting	Retaining and planting native plants of UK or local origin will not only help to maintain the integrity of ecosystems close to the development, but will also increase biodiversity within the development itself. Planting of trees, bushes, forbs and grass

		<p>can be used to complement natural vegetation.</p> <p>Only native/local provenance species to be planted on sites adjacent to or within specified distance of a SNCI and should reflect or complement the species composition of the SNCI where possible.</p> <p>Peat-free products only should be used in planting schemes.</p>
	Wildflower meadows/areas of long grass	Wildflower rich grassland or meadows reflecting natural communities of local soil types can be created, or restored, in areas of greenspace. These habitats need ongoing management to maintain their biodiversity interest. It is expected that a management plan and provision for ongoing management is provided as part of any development proposal. Areas of amenity grassland of are of limited value for biodiversity.
	Tree, shrub and understorey planting.	Depending on the scale of planting proposed, this encompasses single trees to small areas of scrub, and even woodland. Where possible, it is desirable to plant native species reflecting natural communities of local soil types. If possible establish a graded canopy down from large trees to smaller, dense lower shrubs, to field and ground layer. However, the urban environment is highly modified by people and the value of non-native plants with high species associations is also recognized.
	Hedgerows	Hedgerows comprised of native species reflecting natural communities of local soil types are by far the best for wildlife. Climbers such as honeysuckle and bramble can be integrated into hedgerows. Existing native species hedgerows should be as far as possible retained, or replaced. Even low species rich hedgerows may form commuting routes for species such as bats.
	Flower planting for birds and insects	Choose plants likely to attract wildlife. Any planting scheme will need ongoing management to maintain its' biodiversity interest. It is expected that a management plan and provision for ongoing management is provided as part of any development proposal. Natural England's Gardening with Wildlife in Mind provides a searchable list of native and non-native plants that benefit wild species at http://www.plantpress.com/wildlife/home.php

	Retention of ecologically important habitats	Where there is remnant natural vegetation on site, the aim should be to maintain these areas. Loss or damage to these areas should be kept to a minimum.
	Hard surfaces	Hard surfaces should be kept to a minimum in new schemes. Permeable materials should be used. This will encourage insects and reduce run-off. Soil sealing on site should be kept to a minimum. Any runoff should be directed onto vegetated area. Run-off that is high in pollution and certain nutrients can pollute ponds and waterways, altering their biodiversity.
	Deadwood	Deadwood habitats can be integrated creatively into a development, such as monoliths with coronet cuts to provide habitat for deadwood specialists such as fungi and wood boring beetles.
	Orchards	Traditional orchards are hotspots for biodiversity supporting a wide range of wildlife. Traditional fruit and nut varieties are preferred. These features will require on-going management. It is expected that a contaminated land assessment is provided by the applicant if the produce is for consumption.
	Herbicide and pesticide use	Herbicide and pesticide use should be avoided and alternative control methods used, except when controlling invasive species.

Habitat Suitability Maps

- 13.32 Where the nature of the development provides opportunities for habitat creation, this should contribute to habitat creation targets in the BAP. Developers should contact the Nature Conservation Section, who will advise on the choice of habitat by reference to the Habitat Suitability Maps developed by GiGL and LBP. The role of the site in buffering or connecting neighbouring or nearby open space should also be taken into consideration as part of this process, as should the habitat composition of such open space.
- 13.33 In cases where the site is not covered by the Habitat Suitability Maps (i.e. not existing open space), large-scale habitat creation should reflect the landscape character of the area, as identified in Natural England's London's Natural Signatures project
www.naturalengland.org.uk/regions/london/ourwork/londonnaturalsignatures.aspx

Management and monitoring

- 13.34 The management and maintenance of areas of nature conservation value that are to be retained, enhanced or created on a development site is essential to ensure these areas of nature conservation attain their full potential. A long term management plan should outline the conservation objectives, the means of monitoring habitats and species, and describe the practical maintenance measures that may be needed. Implementation of the management plan is likely to be a contractor's responsibility and should be considered at the planning application stage.

Compensation

- 13.35 Where, exceptionally, damage or loss to natural habitats is unavoidable and or inadequate mitigation proposed, compensatory measures will be required. This may involve new habitat creation or habitat enhancement, a contribution towards meeting the objectives of the Camden Biodiversity Action Plan or improvements to the Boroughs biodiversity. The Council will seek to use planning conditions and planning legal agreements to achieve this.

Further information

Natural England Wildlife Management and Licensing Service	provides advice on wildlife management and issues licences www.naturalengland.org.uk/ourwork/regulation/wildlife/default.aspx
Livingroofs.org	Independent UK Resource For information on Green Roofs www.livingroofs.org

Biodiversity Appendices

13.36 Extra information on biodiversity surveys

- In general, it is expected that all surveys and baseline ecological information collected from the site must be submitted at the planning application stage.
- A desk study and site walkover surveys must be carried out on all Major Developments to identify the ecological characteristics of a site and any significant impacts. This will also inform whether further ecological surveys are necessary to be submitted with any planning application. Surveys may be required on smaller developments where protected species or priority BAP species or habitat are likely to be present - refer to tables and information below for guidance;
- Developers are expected to carry out a protected species survey where desktop surveys show protected species in the vicinity.
- Surveys must be carried out by suitably qualified and experienced persons e.g. Member of IEEM;
- Surveys must be carried out using recognised survey methodology and following good practice guidelines i.e. in suitable weather conditions, at an appropriate time and of appropriate duration and frequency, and at the correct period of the year;
- Habitat surveys must be to an appropriate level of detail e.g. Extended Phase I Habitat Survey with Target Notes, to characterise the nature conservation interest of the site;
- The survey data should be used to inform the design and form of the development, and any recommendations for management afterwards.
- An assessment must be provided of the likely effects of development, and the magnitude of their potential impact of the development on nationally, regionally and locally important habitats and species recorded on site or in the locality;
- The assessment should identify measures to be taken to avoid impacting on those important species and habitats, either directly or indirectly, on site and in the locality, during demolition and construction operations;
- Survey data will be considered valid for a period of 1 Year after which re-surveys may be required;
- If the level of detail provided is deemed inadequate then additional surveys will be required;
- The results of site surveys must be made available to the London Environmental Records Centre (Greenspace Information for Greater London).

Local Requirement for Protected Species: Criteria and Indicative Thresholds (Trigger List) for when a Survey and Assessment is required

Proposals for Development That Will Trigger a Protected Species Survey	Species likely to be affected and for which a survey will be required							
	Bats	Badgers	Breeding Birds	Plants	Hedgehogs	Reptiles	Amphibians	Notable Invertebrate
Proposed development which includes the modification, conversion, demolition or removal of buildings and structures (especially roof voids) involving the following: <ul style="list-style-type: none"> all buildings with weather boarding and/or hanging tiles that are within 200m of woodland and/or water; pre-1960 detached buildings and structures within 200m of woodland and/or water; pre-1914 buildings within 400m of woodland and/or water; pre-1914 buildings with gable ends or slate roofs, regardless of location; all tunnels, mines, kilns, ice-houses, adits, military fortifications, air raid shelters, cellars and similar underground ducts and structures; all bridge structures, aqueducts and viaducts (especially over water and wet ground). 	•		•					
Proposals involving lighting of churches and listed buildings Proposals involving flood lighting of green space within 50m of woodland, water, field hedgerows or lines of trees with obvious connectivity to woodland or water.	•		•				•	•
Proposals affecting woodland, or field hedgerows and/or lines of trees with obvious connectivity to woodland or water bodies.	•	•	•	•			•	•
Proposed tree work (felling or lopping) and/or development affecting: <ul style="list-style-type: none"> old and veteran trees that are older than 100 years; trees with obvious holes, cracks or cavities, trees with a girth greater than 1m at chest height; 	•		•					•
Major proposals within 500m of a pond or Minor proposals within 100m of pond (Note: A major proposals is one that is more than 10 dwellings or more than 0.5 hectares or for non-residential development is more than 1000m ² floor area or more than 1 hectare)	•						•	•
Proposals affecting or within 200m of rivers, streams, canals, lakes, or other aquatic habitats.	•		•	•			•	•
Proposals affecting 'derelict' land (brownfield sites), allotments and railway land.		•	•	•	•	•	•	•
Proposed development affecting any buildings, structures, feature or locations where <u>protected species are known to be present</u> *.	•	•	•	•	•	•	•	•
Major proposals within 500m of Hampstead Heath or Minor proposals within 100m of Hampstead Heath (Note: A major proposals is one that is more than 10 dwellings or more than 0.5 hectares or for non-residential development is more than 1000m ² floor area or more than 1 hectare)	•		•	•	•	•	•	
Table adapted from version produced by ALGE 2007, Validation of Planning Applications								
*Confirmed as present by either a data search (for instance via the local environmental records centre) or as notified to the developer by the local planning authority, and/or by Natural England, the Environment Agency or other nature conservation organisation.	Bats	Badgers	Breeding Birds	Plants	Hedgehogs	Reptiles	Amphibians	Notable Invertebrates

Exceptions for when a full species survey and assessment may not be required

- a) Following consultation by the applicant at the pre-application stage, the LPA has stated in writing that no protected species surveys and assessments are required.
- b) If it is clear that no protected species are present, despite the guidance in the above table indicating that they are likely, the applicant should provide evidence with the planning application to demonstrate that such species are absent (e.g. this might be in the form of a letter or brief report from a suitably qualified and experienced person, or a relevant local nature conservation organisation).
- c) If it is clear that the development proposal will not affect any protected species present, then only limited information needs to be submitted. This information should, however, (i) demonstrate that there will be no significant affect on any protected species present and (ii) include a statement acknowledging that the applicant is aware that it is a criminal offence to disturb or harm protected species should they subsequently be found or disturbed.

In some situations, it may be appropriate for an applicant to provide a protected species survey and report for only one or a few of the species shown in the Table above e.g. those that are likely to be affected by a particular activity. Applicants should make clear which species are included in the report and which are not because exceptions apply.

Local Requirements for Designated Sites and Priority Habitats:

Criteria (Trigger List) for When a Survey and Assessment are Required

1. Designated sites (as shown on the Council's Proposals Map)

Nationally designated sites

- Site of Special Scientific Interest (SSSI)
- National Nature Reserve (NNR)

Regionally and locally designated sites

- Local Sites (e.g. Site of Nature Conservation Importance)
- Local Nature Reserve (LNR)

2. Priority habitats (Habitats of Principal Importance for Biodiversity under S.41 of the NERC Act 2006)

- Arable Field Margins
- Ancient and/or species-rich hedgerows
- Lowland heathland
- Lowland dry acid grassland

- Lowland meadows (e.g. species-rich flower meadows)
- Lowland mixed deciduous woodland
- Lowland Beech and Yew Woodland
- Open Mosaic Habitats on Previously Developed Land
- Ponds
- Reed beds
- Traditional Orchards

3. Other biodiversity features

(as identified by the Local Biodiversity Partnership - see paragraph 84 ODPM Circular 06/2005)

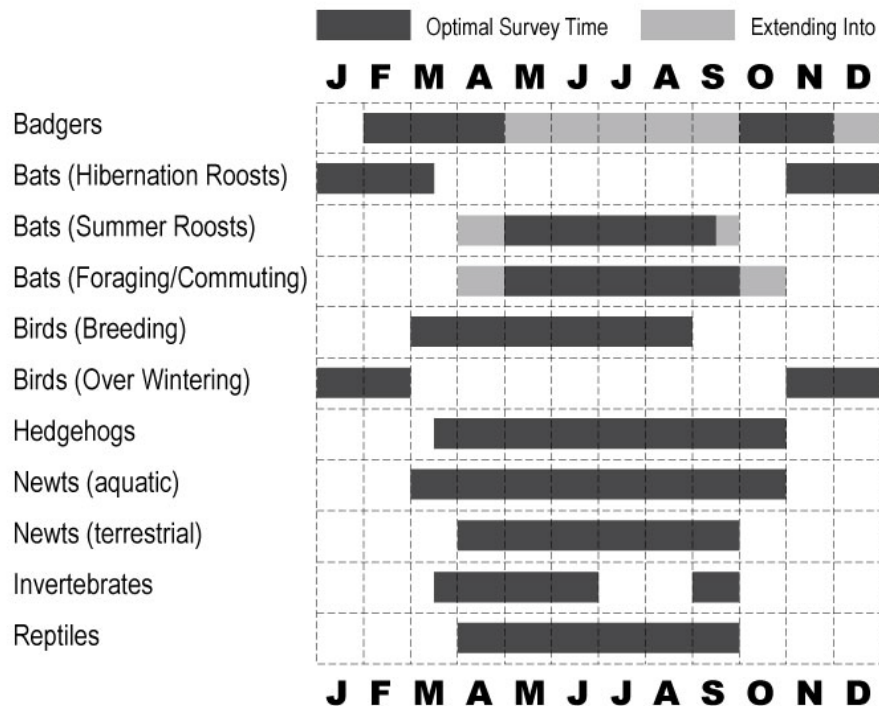
- Waterways and wetlands (e.g. canals, lakes, reservoirs, ponds, aquifer fed fluctuating water bodies)
- Woodland, Hedgerows and Trees (e.g. secondary woodland and scrub, mature/veteran Trees, deadwood habitats)
- Parks, Open Space and Private Gardens (e.g. urban green space, parks, allotments, orchards, flower-rich road verges, canal sides, wildlife gardens)
- The Built Environment (e.g. previously developed land, railsides and churchyards and cemeteries)

Exceptions When a Full Survey and Assessment May Not Be Required

International and National Sites: A survey and assessment will not be required where the applicant is able to provide copies of pre-application correspondence with Natural England, where the latter confirms in writing that they are satisfied that the proposed development will not affect any statutory sites designated for their national or international importance.

Regional and Local Sites and Priority Habitats: A survey and assessment will not be required where the applicant is able to provide copies of pre-application correspondence with the Local Planning Authority's ecologist (where employed), or ecological advisor and/or the local Wildlife Trust that they are satisfied that the proposed development will not affect any regional or local sites designated for their local nature conservation importance or any other priority habitats or listed features.

Figure 10. Ecological survey seasons



Points to note regarding surveys are as follows:

- For certain species and habitats surveys can be carried out at any time of year, but for other species, particular times of year are required to give the most reliable results, as indicated in Figure 11
- Surveys conducted outside of optimal times (Figure 11) may be unreliable. For certain species (e.g. Great Crested Newt) surveys over the winter period are unlikely to yield any useful information. Similarly negative results gained outside the optimal period should not be interpreted as absence of a species and further survey work may be required during the optimal survey season. This is especially important where existing surveys and records show the species has been found previously on site or in the surrounding area. An application may not be valid until survey information is gathered from an optimum time of year.
- Species surveys are also very weather dependent so it may be necessary to delay a survey or to carry out more than one survey if the weather is not suitable, e.g. heavy rain is not good for surveying for otters, as it washes away their spraint (droppings). Likewise bat surveys carried out in wet or cold weather may not yield accurate results.
- Absence of evidence of a species does not necessarily mean that the species is not there, nor that its habitat is not protected (e.g. a bat roost is protected whether any bats are present or not).

- Local Biological / Environmental Records Centre may have useful existing information and records.
- Competent ecologists should carry out any surveys. Where surveys involve disturbance, capture or handling of a protected species, then only a licensed person can undertake such surveys (e.g. issued by Natural England). Surveys should follow published national or local methodologies. Further details may be found in the Local Authority's SPD for Biodiversity or on the following web sites:
- IEEM at: www.ieem.org.uk/Publications.htm - Guidelines for Survey Methodology
- Natural England:
<http://www.naturalengland.org.uk/publications/default.htm>



