

Royal Borough of Windsor and Maidenhead Local Development Framework

Sustainable Design and Construction Supplementary Planning Document (SPD)



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Planning and Development Unit
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Foreword

Foreword

I have a vision that the Royal Borough will be at the cutting edge of sustainable development, and this document seeks to inspire and encourage much greater thought and action from all developers - large and small.

Never before has it become so imperative to design in the most efficient insulation, sustainable drainage, high-quality fenestration etc.; and whatever you believe to be the cause of climate change - it is happening, and it is happening fast.

Buildings which are highly efficient in energy and resource terms will be more sought after and popular with buyers than those that are inefficient, and putting sustainable measures in at the design stage is infinitely cheaper and easier than retro-fitting.

One day all new buildings will be designed and built to reduce the impacts of how we live and work. Features such as rainwater harvesting, green roofs, air-source heat pumps and biomass boilers will be de rigueur and 'passive solar gain' will be the way your house is heated not a form of sun-tanning!

I urge you to strive for the highest standards of sustainability in your new building which will help save energy, save resources, save money, and perhaps the planet too. This document provides the tools and the incentive to achieve this, and when you've built your modern, highly-efficient building please tell us about it.

Cllr Mrs Alison Knight

Deputy Leader of the Council and Lead Member for Planning and Development, including Property Services

Glossary

Glossary

Glossary

Black Water	Reclaimed water that is used for toilet flushing and washing up.
Brown Roof	A roof covered in a thin layer of crushed rubble and gravel, intended to be colonised by spiders and insects.
Building Research Establishment's Environmental Assessment Method (BREEAM)	An assessment tool to measure the sustainability of a wide range of uses including offices, industrial, shops and schools.
Code for Sustainable Homes	An assessment tool which measures the sustainability of new homes against categories of sustainable design and construction.
Considerate Constructors Scheme	A UK certification scheme that encourages the considerate management of construction sites.
Development	The carrying out of building, engineering, mining or other operations, in, on, over or under land, or the making of any material change in the use of a building or other land.
Development Plan	Consists of the Regional Spatial Strategy and Development Plan Documents contained within the Council's Local Development Framework. Until the LDF is fully in place it will also include 'saved' policies from the Council's Local Plan.
Development Plan Document (DPD)	A spatial planning document within the Council's Local Development Framework which set out policies for development and the use of land. Together with the Regional Spatial Strategy they form the development plan for the area. They are subject to independent examination.
Energy Efficiency	Making the best or most efficient use of energy in order to achieve a given output of goods or services and of comfort and convenience.
Energy Efficiency Labeling Scheme	The EU energy label rates products from A (the most efficient / least energy used) to G (the least efficient / most energy used). The label must be shown on all refrigeration and laundry appliances, dishwashers, electric ovens and light bulb packaging at the point of sale.
Green Roof	The growing of plants on a roof top to benefit biodiversity, reduce storm run-off, minimise heat loss and prevent over heating.
Grey Water	Water that has been used in wash basins, showers and baths which is disinfected on-site and used again for uses such as toilet flushing and watering the garden.
Local Development Framework (LDF)	Consists of a number of documents which together form the spatial strategy for development and the use of land.

Glossary

Local Plan	A Borough-wide planning document setting out policies for development and the use of land. It will be replaced by the Local Development Framework.
Planning Policy Guidance (PPG)	A series of notes issued by the Government, setting out policy guidance on different aspects of planning. They will be replaced by Planning Policy Statements.
Planning Policy Statement (PPS)	A series of statements issued by the Government, setting out policy guidance on different aspects of planning. They will replace Planning Policy Guidance Notes.
Rainwater Harvesting	The capture of rainwater from buildings or spaces to help meet on-site water requirements, whether for external or internal use.
RBWM	The Royal Borough of Windsor and Maidenhead Council.
Reclaimed Materials	The reuse of a material in its existing state without the need for processing or energy intensive alteration.
Recycled Materials	The reuse of a material following a process of breaking it down into a raw state before being reconstituted. The breaking down of the original product often involves an energy intensive process.
Regional Spatial Strategy (RSS)	A long-term plan for the region which sets out strategic policies for development and the use of land. The Development Plan for the area comprises the RSS together with the Development Plan Documents within the Council's Local Development Framework.
Renewable Energy	Energy which is generated from resources that are unlimited, rapidly replenished or naturally renewable, and not from a combination of fossil fuels.
Royal Borough	The Royal Borough of Windsor and Maidenhead.
South East Plan	The Regional Spatial Strategy for the South East.
Supplementary Planning Document (SPD)	A spatial planning document within the Council's Local Development Framework which provides supplementary guidance to policies and proposals contained within Development Plan Documents. They do not form part of the development plan, nor are they subject to independent examination.
Sustainability Appraisal	Appraisal of plans, strategies and proposals to test them against broad sustainability objectives.
Sustainable Development	"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (The World Commission on Environment and Development, 1987).
Sustainable Drainage Systems (SUDS)	A range of measures which can be taken to effectively manage surface water drainage.
Water Butt	A large cask or barrel which is set up on its end to collect and store rainwater for irrigation purposes.

1 Introduction

1 Introduction

1.1 The council is committed to delivering its services in a sustainable manner and helping to create sustainable communities. Developing a culture of learning for sustainability defines the council's approach to all its work both internally (how the council goes about its business) and externally (seeking to influence behaviour changes in the wider community).

1.2 In 2007 the council signed up to the Nottingham Declaration pledging systematically to address the causes of climate change and prepare our community for its impacts.

1.3 A *Carbon Management Programme* was adopted in 2008. The programme commits the council to reducing CO₂ impacts by 25% by 2012/13 from council buildings (civic buildings, schools, leisure centres and car parks), fleet and staff travel, street lighting, waste production, and water usage.

1.4 A *Learning for Sustainability Strategy* was also adopted in 2008 encompassing eleven sustainability themes of health, energy, water, transport, waste and recycling, procurement, planning and design, biodiversity and landscape, inclusion and participation, local well-being and global dimension. Through the strategy the council will endeavour to ensure all actions are part of a process of continual learning.

1.5 This Supplementary Planning Document (SPD) has been produced to provide additional information to support existing policy and guidance on the sustainability performance of buildings and spaces. It supports the overall commitments to address the causes of climate change and prepare for its impacts.

1.6 The guidance set out in this SPD extends to all forms of development types, whether new build, the refurbishment of an existing property or the spaces between buildings. The information outlines the actions required from different forms and sizes of development. The SPD does not seek to cover all aspects of sustainability with issues such as location, land use and transport considered by alternative planning documents.

1.7 Although planning permission may not be required for certain projects, Building Regulations⁽¹⁾ apply to most new buildings and many alterations of existing buildings, whether domestic, commercial or industrial. It is therefore recommended that designers / developers seek advice and guidance on Building Regulations from RBWM Building Control Consultancy⁽²⁾ at an early stage. Advice on Building Regulations can be found at www.rbwm.gov.uk

Sustainable Design and Construction

1.8 The concept of sustainable development is at the heart of planning.⁽³⁾ It is not an alternative name for environmental responsibility but is far broader, encompassing the management of social and economic change within environmental capacity. A widely used definition is:

"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs."⁽⁴⁾

1.9 Planning Policy Statement 1: Delivering Sustainable Development (PPS1) describes the sustainable development as achieving an appropriate balance between the three aims of:

1. Environment – protecting and enhancing the quality of the environment in both rural and urban areas, being prudent in the use of resources in ways that respect the needs of future generations.
2. Society – promoting personal well-being, social cohesion and inclusion and creating equal opportunity for all citizens.
3. Economy – the promotion of a strong, stable and productive economy that aims to bring jobs and prosperity to all.

1.10 Sustainable design and construction has an integral role in the achievement of sustainable development by considering the role of individual developments. It aspires to create buildings that meet the needs of users and the wider community whilst minimising effects on the environment.

1 Building Regulations apply in England & Wales and promote standards for most aspects of a building's construction, including its structure, fire safety, sound insulation, drainage, ventilation and electrical safety, energy efficiency and the needs of all people, including those with disabilities, in accessing and moving around buildings

2 See website at www.rbwm.gov.uk/web/bc_consultancy or email building.control@rbwm.gov.uk

3 The Planning and Compulsory Purchase Act 2004, Section 39 Sustainable Development

4 The World Commission on Environment and Development, 1987 (the Brundland Commission.)

Introduction

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1.11 There are a number of drivers for the need to improve the sustainability performance of buildings. These include reducing future contributions to climate change, adapting to the consequences of climate change and decreasing the amount of waste generated. There is a particular focus on long-term benefits rather than short-term saving, with the whole lifetime of a building considered. Over its lifetime, a sustainable building will cost less to build, heat and light than a conventional building. As a result it will have had a much smaller impact on the environment. These economic and environmental gains have direct impacts on the sense of well-being of the occupiers and society as a whole.

1.12 Designing for sustainability has significant implications for site layout, form and the aesthetics of a building or of the spaces in between. Where possible, quality buildings should be retained and re-used in any development. Where demolition is necessary, valuable materials and components should be removed for re-use before general demolition starts. Sustainability needs to be designed in from the outset alongside other design matters such as crime reduction measures.⁵

1.13 One of the principal barriers to the wider acceptance of more sustainable forms of development is the perception that such measures incur additional costs. Research by the Building Research Establishment, the Housing Corporation and English Partnerships⁶ demonstrate that many performance improvements can be achieved at little or no additional cost. Reaching the highest standards does incur a cost premium, however, careful design and consideration of appropriate technologies at an early stage can minimise any cost premiums compared to 'bolt on' improvements.

The Purpose of this SPD

1.14 The purpose of the SPD is to help improve the sustainability performance of buildings and spaces through their construction and subsequent use. The SPD expands upon or provides further guidance on national, regional and local requirements. It thereby sets out measures that would deem to satisfy the council's requirements. Further information on the policy context is provided in Appendix A.

1.15 In achieving this aim, the SPD has the following objectives:

- To promote the sustainable use and disposal of resources.
- To raise awareness of sustainable design.
- To raise awareness of renewable energy technologies.
- To mitigate against the causes and adapt to the consequences of climate change.
- To promote the consideration of sustainability early within the design process.
- To make the Royal Borough a more attractive, well designed and sustainable place.
- To promote clear understanding, transparency, inclusiveness and consistency for all parties throughout the decision making process.

5 Secure by Design principles.

6 A Cost Review of the Code for Sustainable Homes, Report for English Partnerships and the Housing Corporation by Cyril Sweett, February 2007.

Introduction

1.16 While the council can only apply the SPD to developments which require formal planning permission, homeowners are strongly encouraged to consider what measures could be made to improve their own property. Homeowners can find advice on what alterations can be undertaken without formal planning permission on the Planning Portal website (<http://www.planningportal.gov.uk>). These permitted development rights include the installation of some renewable energy technologies.

The guidance set out in the SPD extends to all forms of development, whether change of use or the extension of an existing property and new build. All developments are expected to make improvements, however in line with the principles of reasonableness and proportionality, major developments are expected to achieve a higher level of sustainability performance to reflect the greater opportunity they present. In some instances, actions are not required for developments such as minor alterations to dwellings.

The guidance applies to Listed Buildings and buildings in Conservation Areas where there are special architectural or historic interest. When considering actions relating to historic buildings, advice should also be sought from the Conservation Team on the effects on the appearance of the building, its setting and whether the building would be able to support the technology with minimal intervention. Guidance within this SPD will need to be balanced against the historic environment objectives. Further information on traditional buildings and sustainable design and construction can be accessed via www.climatechangeandyourhome.org.uk

How to Use this SPD

1.17 This SPD is divided into two principal sections: Section 3: Sustainable Design and Section 4: Sustainable Construction. Sustainable design focuses on the design process to ensure the usage and adaptability of the building while sustainable construction focuses on materials and site construction matters. A reader is however encouraged to be familiar with the whole document since there is considerable overlap between these subjects, for example matters such as the energy performance of construction materials should be considered during the design process.

1.18 Within each section the main issues and options are clearly set out. At the end of each section a coloured box outlines the related requirement. Details are also provided on policy linkages and where additional information can be gained.

1.19 Section 2 Measuring and Demonstrating Sustainability, provides a summary of information required to comply with this SPD. Applications made without any evidence of how issues of sustainability have been considered and appropriate actions taken risk being refused. To help applicants comply, a checklist has been prepared (see Appendix D).

It is recognised that in some circumstances it may not be suitable or feasible for a specific development to meet all best practice requirements. Where an applicant considers that certain measures are not achievable they will need to demonstrate the reasoning behind this and that they are achieving the highest reasonable level of performance. This should be provided in the context of the overall development and a range of different design approaches to the site. Evidence must also consider the long-term, whole life costs associated with measures and not just address issues of initial capital outlay.

Measuring and Demonstrating Sustainability

2 Measuring and Demonstrating Sustainability

2.1 Applications for planning permission should be supported by evidence to demonstrate how the proposed development meets the requirements set out within this SPD.

2.2 The coloured boxes found throughout Section 3: Sustainable Design and Section 4: Sustainable Construction explain the requirements that will be expected of development. In line with the principles of reasonableness and proportionality, major developments are expected to achieve a higher level of sustainability performance than smaller developments. A summary of the information required for major, minor and householder / other developments for each topic is provided in the below tables.

Information In Support Of Planning Applications

Major Developments Developments involving 10 or more dwellings or 1,000m ² or more gross non-residential floorspace	
Topic	Useful Information
Major Developments	■ Requirement for residential developments (new construction) to meet the Code for Sustainable Homes Level 3 or above. ■ Requirement for non-residential developments (new construction) to meet BREEAM Very Good or above.
Energy Consumption	■ Requirement for developments to meet highest practical standards of sustainable design to reduce energy demand. Details should be provided within the Design and Access Statement.
On-Site Renewable Energy Generation	■ Requirement for developments to secure at least 10% of the expected energy demand from on-site renewable or low carbon sources.
Water Management	■ Requirement for residential developments (replacement or new dwellings) to achieve a per capita consumption of potable water of 120 litres or less per person per day. ■ Requirement for non-residential developments (replacement or new floorspace) to exceed statutory requirements. ■ Requirement for developments with an existing or proposed garden or other green area to include provision for rainwater harvesting.
Flood Risk Management	■ Developments are expected to comply with the Environment Agency's flood risk standing advice. ■ Where a Flood Risk Assessment is required developments should demonstrate through this how the design has addressed flood risk to, and arising from, the site.
Biodiversity	■ Requirement for developments to maintain or enhance biodiversity. Details should be provided within the Design and Access Statement.

Measuring and Demonstrating Sustainability

Major Developments Developments involving 10 or more dwellings or 1,000m ² or more gross non-residential floorspace	
Topic	Useful Information
Waste, Recycling and Composting Facilities	■ Requirement for developments to provide or have existing access to appropriate facilities for storage and collection of waste and recycling materials. ■ Requirement for developments with an existing or proposed garden or other green area to include provision for the on-site composting of green waste or communal collection facilities.
Cyclist Facilities	■ Requirement for developments to provide or have existing access to appropriate facilities for secure cycle storage and changing / drying facilities. ■ Requirement for residential developments (replacement or new dwellings) to provide at least 1 space per dwelling. ■ Requirement for non-residential developments (replacement or new floorspace) to provide at least 1 space per 10 employees and at least 1 shower cubicle per 10 cycle spaces (minimum of 1 cubicle).
Air, Noise and Light Pollution	■ Requirement for developments to provide evidence of how pollution impacts have been minimised. Details should be provided within the Design and Access Statement.
Responsibly Sourced and Recycled Materials	■ No specified requirement.
Site Waste Management	■ Requirement for developments to put in place a Site Waste Management Plan.
Pollution	■ Encouragement for developments to put in place a Site Environmental Management Plan and operate under the Considerate Constructors Scheme.

Minor Developments Developments involving 9 or fewer dwellings or up to 999m ² gross non-residential floorspace ⁷	
Topic	Useful Information
Energy Consumption	■ Requirement for developments to meet highest practical standards of sustainable design to reduce energy demand. Details should be provided within the Design and Access Statement.
On-Site Renewable Energy Generation	■ No specified requirement.
Water Management	■ Requirement for residential the developments (replacement or new dwellings) to achieve a per capita consumption of potable water of 120 litres or less per person per day. ■ Requirement for non-residential developments (replacement or new floorspace) to exceed statutory requirements.

⁷ Minor development can also include public houses, Gypsy and Traveller pitches, agricultural buildings and engineering and other operations.

Measuring and Demonstrating Sustainability

Minor Developments Developments involving 9 or fewer dwellings or up to 999m ² gross non-residential floorspace ⁷	
Topic	Useful Information
	■ Requirement for developments with an existing or proposed garden or other green area to include provision for rainwater harvesting.
Flood Risk Management	■ Developments are expected to comply with the Environment Agency's flood risk standing advice. ■ Where a Flood Risk Assessment is required developments should demonstrate through this how the design has addressed flood risk to, and arising from, the site.
Biodiversity	■ Requirement for developments to maintain or enhance biodiversity. Details should be provided within the Design and Access Statement.
Waste, Recycling and Composting Facilities	■ Requirement for developments to provide or have existing access to appropriate facilities for storage and collection of waste and recycling materials. ■ Requirement for developments with an existing or proposed garden or other green area to include provision for the on-site composting of green waste or communal collection facilities.
Cyclist Facilities	■ Requirement for developments to provide or have existing access to appropriate facilities for secure cycle storage and changing / drying facilities. ■ Requirement for residential developments (replacement or new dwellings) to provide at least 1 space per dwelling. ■ Requirement for non-residential developments (replacement or new floorspace) to provide at least 1 space per 10 employees and at least 1 shower cubicle per 10 cycle spaces (minimum of 1 cubicle).
Air, Noise and Light Pollution	■ Requirement for developments to provide evidence of how pollution impacts have been minimised. Details should be provided within the Design and Access Statement.
Responsibly Sourced and Recycled Materials	■ No specified requirement.
Site Waste Management	■ No specified requirement.
Pollution	■ No specified requirement.

⁷ Minor development can also include public houses, Gypsy and Traveller pitches, agricultural buildings and engineering and other operations.

Measuring and Demonstrating Sustainability

Householder / Other Developments Developments involving alterations to existing dwellings or the change of use of an existing building ⁽⁸⁾	
Topic	Useful Information
Energy Consumption	■ Requirement for developments to meet highest practical standards of sustainable design to reduce energy demand. Details should be provided within the Design and Access Statement.
On-Site Renewable Energy Generation	■ No specified requirement.
Water Management	■ Requirement for developments with an existing or proposed garden or other green area to include provision for rainwater harvesting.
Flood Risk Management	■ Developments are expected to comply with the Environment Agency's flood risk standing advice. ⁽⁹⁾ ■ Where a Flood Risk Assessment is not required development is expected to include permeable surfaces and where appropriate rainwater harvesting.
Biodiversity	■ Requirement for developments to maintain or enhance biodiversity. Details should be provided within the Design and Access Statement.
Waste, Recycling and Composting Facilities	■ Requirement for developments to provide or have existing access to appropriate facilities for storage and collection of waste and recycling materials. ■ Requirement for developments with an existing or proposed garden or other green area to include provision for the on-site composting of green waste or communal collection facilities.
Cyclist Facilities	■ Requirement for developments to provide or have existing access to appropriate facilities for secure cycle storage and changing / drying facilities.
Air, Noise and Light Pollution	■ No specified requirement.
Responsibly Sourced and Recycled Materials	■ No specified requirement.
Site Waste Management	■ No specified requirement.
Pollution	■ No specified requirement.

The Code For Sustainable Homes and BREEAM Assessments

2.3 The Code for Sustainable Homes (the Code) and the Building Research Establishment Environmental Assessment Methodologies (BREEAM) are certified assessment tools which measure the overall sustainability of a development. The Code only relates to newly constructed homes whereas BREEAM can be used to measure the sustainability performance of a wide range of uses including office, industrial, shops and school developments.

2.4 Major developments, that is those involving the erection of 10 or more dwellings or the provision of 1,000m² or more gross non-residential floorspace, are expected to demonstrate their sustainability through achieving the Code Level 3 or BREEAM Very Good.

⁸ Change of use applications in this category do not involve any additional floorspace.

⁹ The majority of householder developments are not required to submit a Flood Risk Assessment under the Environment Agency's standing advice.

Measuring and Demonstrating Sustainability

2.5 Both methodologies require a greater level of information to be available as the development proceeds from its initial design through to its implementation. To ensure a development can reach the necessary standard, applications for full planning permission should be accompanied by a Pre-Assessment Estimator Report. Planning conditions will then be used to secure the subsequent Initial Post Construction Review Assessment and the Final Certification.

2.6 Due to the lower level of information contained in an outline planning application, such applications may not be able to complete the Pre-Assessment Estimator at the initial stage to demonstrate the potential to reach the necessary standards. Where this is the case, planning conditions will be used to secure the completion of the Pre-Assessment Estimator Report demonstrating the potential to reach the necessary standard to support the reserved matters applications and subsequent stages. It is important at the outset that applicants satisfy themselves that the necessary standard can be reached to avoid difficulties as the scheme evolves. Further information on the Code, BREEAM and other assessment methodologies is provided in Appendix C.

2.7 Other applications will be expected to demonstrate compliance with this SPD through the Design and Assess Statement and, where necessary, through other dedicated statements. To help applicants comply with this SPD, a Summary Checklist has been prepared (see Appendix D).

Requirement 1

Major Developments

Residential Developments

All developments involving the construction of 10 or more dwellings will be expected to:

- Meet The Code for Sustainable Homes Level 3 or above.

Non-Residential Developments

All developments involving the construction of 1,000m² or more gross non-residential floorspace will be expected to:

- Meet BREEAM Very Good or above.

The level by which sustainability performance exceeds these standards will be material factor in the determination of planning applications.

Principal Links

- PPS1 Delivering Sustainable Development.
- PPS22 Renewable Energy.
- PPS25 Development and Flood Risk.
- South East Plan.
- South East Regional Sustainability Framework.

3 Sustainable Design

3 Sustainable Design

3.1 To design an individual or group of buildings to be more sustainable requires the consideration of a number of issues from the initial site appraisal, not just at the detailed design stage. Whilst improvements can always be achieved in sustainability performance can be achieved at any stage, the benefits that can be achieved can be lower and the costs higher if incorporated later in the design process.

3.2 This section provides guidance on how to maximise the opportunities for creating more sustainable forms of development, including design principles and the use of technology. In all cases, the most sustainable approach should be to minimise resource use and then meet the remainder in the least environmentally damaging way.

Energy Consumption

3.3 The generation of energy to heat, light and cool buildings is responsible for approximately half of the total CO₂ emissions in the UK. Part L of the Building Regulations requires a minimum standard of energy efficiency in new development, however with a number of simple design measures it should be practicable to improve upon minimum standards and significantly reduce energy consumption, thereby reducing CO₂ emissions.

3.4 Energy is the most important category of the Code for Sustainable Homes, with performance improvements able to achieve the highest number of credits. At a national scale, the government is committed to amending Building Regulations to increase energy efficiency in new buildings. It has outlined a timetable to achieve a 20% reduction in carbon emissions from new homes by 2010, and nearly 50% by 2013, before reaching zero carbon in 2016. It is also an ambition for all new non-domestic buildings to be zero carbon from 2019.

Passive Solar Gain

3.5 The siting, orientation and internal layout of buildings can have a significant impact on energy consumption. One of the simplest methods of reducing energy demand is to use passive solar designs to provide light and heat. Building orientation, materials and landscaping can also have a significant localised effect on climatic conditions. Not only does this offer reduced energy bills for the occupier but it also increases attractiveness by providing a pleasant living and/or working environment. It has been calculated that a combination of passive solar and energy conservation measures can reduce a new building's conventional heating requirement by 50%-80%.⁽¹⁰⁾

Typical Energy Savings from Passive Solar Design (Source: Energy Saving Trust)

Typical Energy Saving from Passive Solar Design	
Step-by-step changes from 'conventional' to passive solar design	Energy Savings (%)
Estate Layout	
Conventional planned houses orientated north / south	1-3
Estate layout designed to minimise shading from obstructions to solar gain	2-4
Typical energy saving from solar estate layout	3-5
House Design	
Glazing biased towards south (for the conventionally planned houses)	3-4
Houses re-planned internally to that most principal rooms face south	1-2
Typical energy saving from passive solar houses on passive solar estates	8-10

Sustainable Design

3

3.6 The particular approach used will depend to some extent on the size and use of building and the characteristics of the site. Key principles that can be applied are outlined below.

Siting and Orientation

3.7 The orientation of a building impacts the amount of solar gain available. Keeping the main glazed orientation of the building within 30° of south will maximise opportunity for solar gain. This orientation also makes the most opportunity of natural daylight for both lighting the building and for the use of solar technology for on-site energy generation and water heating. A slight south easterly orientation is generally preferable to south westerly as this maximises early morning gains and reduces the likelihood of overheating in the afternoon.

3.8 The road layout is a major factor in determining the orientation of residential areas. To allow for the optimum orientation of housing plots, roads should preferably be aligned along an east-west axis. Where the site dictates that roads are required along a diagonal axis, layouts should consider utilising larger detached houses one plot deep at intervals, arranging houses in groups, and skewing the plots in relation to the road direction. These principles are illustrated in the figure below.

Figure 1 Passive Solar Design in Estate Layout (Source: Energy Saving Trust)

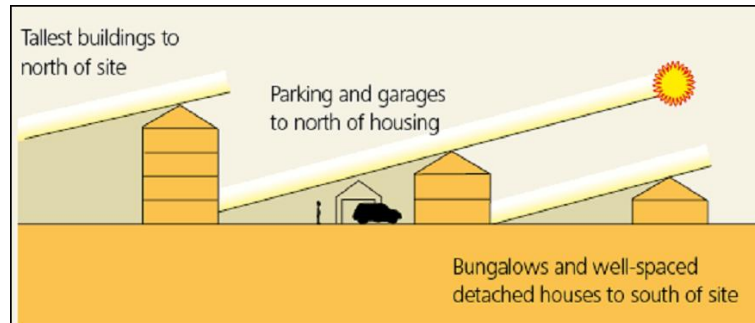


3.9 When buildings are in proximity to each other, consideration should be given to minimising overshadowing between buildings. Taller buildings should be located to the north of lower buildings so to maximise solar gain to the whole area. Varying the pitch of roofs can also be used to reduce overshadowing effects. Garages and other

3 Sustainable Design

non-habitable areas should be located to the north side of buildings to avoid shading. Where garages are provided to the side of a property, they should be positioned to avoid causing shading to windows. Open areas of car parking should also be located where it is overshadowed as this may be beneficial in the summer.

Figure 2 Building Spacing (Source: Energy Saving Trust)



Landscaping

3.10 Existing landscaping and any new provision should be taken into account when planning for passive solar gain. Poor positioning and orientation in relation to tall buildings, tall shrubs and trees will lead to overshadowing and the obstruction of sunlight. Particular care should be taken when planting within 30° of south. Landscaping can also be used to reduce the effects of cold north winds.

3.11 While excessive overshadowing should be avoided, appropriate landscaping can help reduce the likelihood of overheating in the afternoon. Trees which would cast a shadow over a building should be deciduous as these allow light to pass through them in the winter months so allowing passive solar gain, while offering shade and protection against glare in the summer months.

Figure 3 Unobstructed Sunlight (Source: Greenspec)

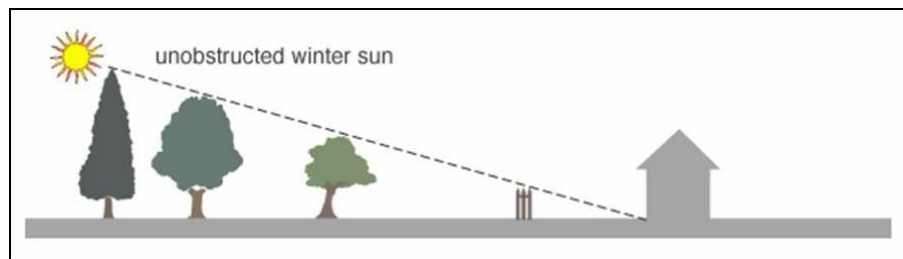
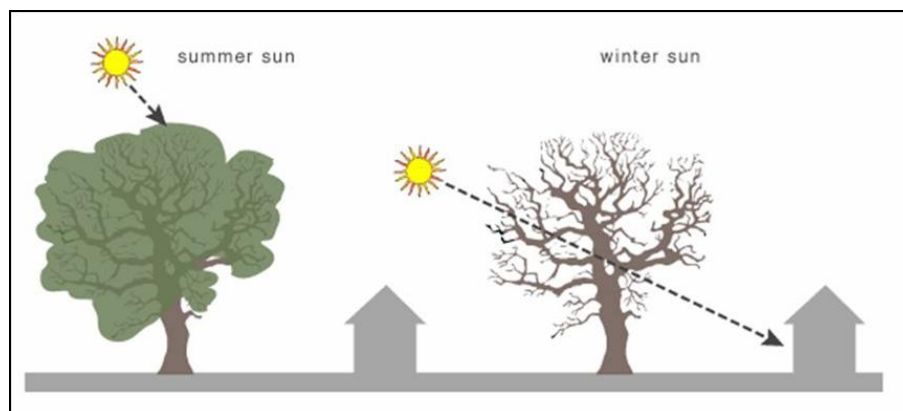


Figure 4 Use of Deciduous Trees (Source: Greenspec)

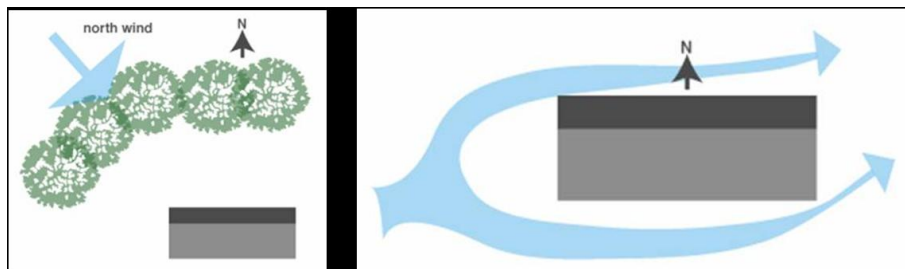


3.12 Landscaping can be used to provide shelter from the wind, so reducing heat loss. The most effective method is to plant trees with a mature height similar to that of the building and placed as a shelter belt. This should be located to the north of the building or in the direction of the prevailing wind at a distance of 1 to 3 heights away, or 3 to 4 heights away where passive solar gain is desirable. Evergreen trees can be used to provide year round shelter where solar gain is not required.

Sustainable Design

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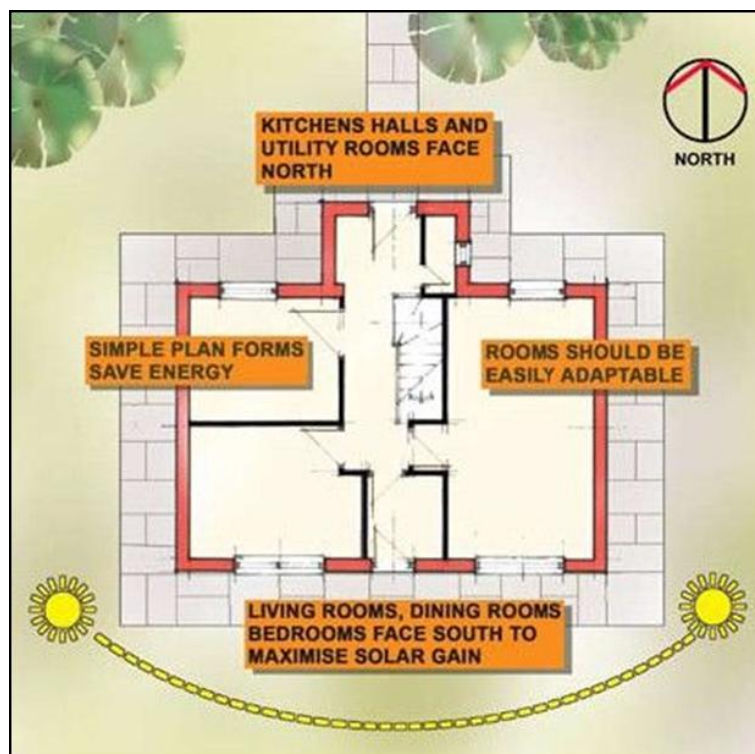
Figure 5 Wind Shelter and Building Orientation (Source: Greenspec)



Internal Layout

3.13 To maximise solar gain the internal layout of residential buildings should be designed to ensure that the most frequently used rooms are on the southern side of the building. The northern side of the building should be taken up with rooms that are used less frequently such as kitchens, utility rooms and bathrooms. However, the degree to which this can be achieved will need to be considered alongside other matters including the need to provide natural surveillance to other frontages. In general, the southern elevation should incorporate a larger proportion of glazing than other elevations to take advantage of solar gain. Glazing should also be less extensive so to minimise heat loss although this must be balanced with the need to provide natural lighting.

Figure 6 Internal Layout (Source: City of Bradford Metropolitan District Council)



3.14 Commercial buildings should be designed with consideration of their usage. While achieving good levels of natural light in offices is desirable, over glazing combined with internal heat gains from lighting, higher occupancy and IT equipment can lead to overheating. The use of a higher proportion of glazing on the northern elevation compared with the south elevation can help achieve good daylight without solar gain.

Thermal Mass

3.15 Materials with a high thermal mass can buffer against heat fluctuations. These absorb heat and release it slowly over time. This helps prevent overheating in the summer and colder conditions during the winter. Generally, heavy materials such as stone and concrete have a high specific heat capacity whilst light weight materials such as wood have a lower capacity.

3 Sustainable Design

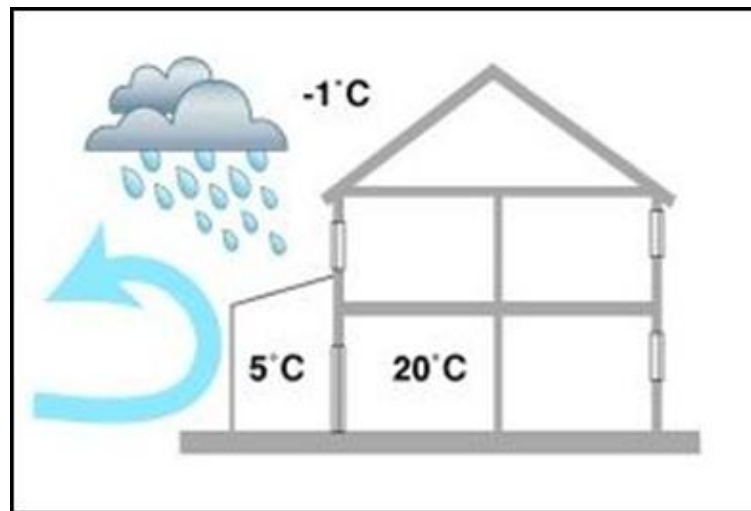
Energy Efficiency

Heat Loss

3.16 Heat loss from a building should be minimised in order to maximise the efficiency with which energy is used. A range of measures can be incorporated into a building to deliver improvements in energy efficiency.

3.17 High levels of insulation can be integrated into roofs, walls and floors. Heat loss through windows can be reduced through the use of double or triple glazing, however, adequate ventilation is essential to avoid condensation problems. Conservatories, or other non-domestic extensions, can shelter the main building from the weather so forming a buffer from wind chill and rain.

Figure 7 Buffer Effect of Buildings (Source: Greenspec)



Sub-metering

3.18 Sub-metering is the measuring and collating of detailed energy use data across one or more parts of a site. The data increases the awareness of how energy is being used and can lead to the identification of energy efficiency measures and process controls to reduce the total energy use.

Energy Efficient Appliances

3.19 Heating, lighting and a range of domestic appliances are essential to the use of residential and commercial buildings alike. Nevertheless they are a major consumer of energy with lights and appliances accounting for the largest growth in residential energy use (2% per annum) over the last 30 years.⁽¹¹⁾ The careful choice of appliances can reduce the energy demand and therefore costs significantly.⁽¹²⁾

3.20 When fitting out a building, the use of the most energy efficient appliances is encouraged, for example A rated white goods and energy efficient light bulbs.

Natural Lighting

3.21 Natural daylight is the entry of sunlight through windows, skylights, atria and other building components. The average energy cost in the home from lighting is 13% of the total energy used.⁽¹³⁾ This can rise to 40% for some offices. Designing for natural lighting can therefore reduce energy use, and therefore save money, as well as help provide a pleasant environment in which to live and work.

11 Code for Sustainable Homes Technical Guide.

12 The EU energy label rates products from A (the most efficient / least energy used) to G (the least efficient / most energy used). The label must be shown on all refrigeration and laundry appliances, dishwashers, electric ovens and light bulb packaging at the point of sale.

13 Centre for Alternative Technology.

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3.22 A properly designed development will seek to distribute daylight evenly and avoid glare and overheating. While achieving a good level of natural lighting is desirable, the use of glazing needs to be balanced against the needs to avoid overheating through solar gain. The use of a higher proportion of glazing on the northern elevation compared with the south elevation can help achieve good daylight without excessive solar gain. Commercial buildings may also benefit from other design features such as movable shutters and external blinds to provide shade but still allow daylight to penetrate the building. Products are also available which incorporate solar photovoltaic technologies to generate on-site renewable energy.

3.23 Natural daylight is controlled not only by the position and amount of glazing, but also by the depth of rooms. Rooms should be designed to provide natural lighting and ventilation via windows, however, in some instances the use of sun pipe technologies, internal glazing and atriums can be an appropriate way to improve natural lighting.

Natural Ventilation

3.24 With predicted climate change expected to result in higher summer temperatures, it is likely that buildings will also need greater protection from overheating to prevent uncomfortable internal temperatures. In addition some buildings may need to reduce the risk of overheating, for example offices with IT equipment.

3.25 Natural ventilation should be used in preference to mechanical systems which can have a high energy demand and in some cases rely on refrigerants that are more harmful to climate change than CO₂.

3.26 Natural ventilation can be increased by a variety of measures including:

- **Cross ventilation:** openings on opposite walls (or even adjacent walls) can draw air through a space or roof-mounted turbines can draw air in through the top floor windows to reduce overheating in the summer. Windows should be openable and trickle vents or other such devices should be installed to provide controllable background ventilation.
- **Passive Stack Effect:** using pressure differentials to bring cool fresh air from outside the building in without the use of mechanical systems.

3.27 Mechanical ventilation may be required to supplement natural ventilation. Where this is the case it should be designed to be energy efficient, requiring only small levels of energy to run, yet achieve significant benefits in a development. This may be through motorised windows which open and close automatically using a thermostat.

Requirements and Further Information

Requirement 2

Energy Consumption

All developments will be expected to achieve the highest practical standards of sustainable design to reduce energy demand throughout the lifetime of the development.

Design and Access Statements submitted with a planning application will be expected to provide details of how the proposal has addressed energy demand including details and justification of those options included, and those not included, within the proposed development.

Links

- Local Plan Policies N6, DG1, E10, H10, H14.
- South East Plan Policies CC2, CC3, CC4 and NRM11.
- The Code for Sustainable homes Ene2 Building Fabric, Ene3 Internal Lighting and Hea1 Daylighting.
- Checklist South East Questions 1.3 and 1.6.

Further Information

- Energy Saving Trust, Passive Solar Estate Layout.

3 Sustainable Design

On-site Renewable Energy Generation

3.28 Once the energy needs of a building have been minimised, it is important to consider how the remaining energy need can be met. This is important for heating and cooling as well as electricity generation. There are opportunities in all types of development to use low impact energy sources, however the type of installation will be affected by the physical nature of the site, for example historic interest, building height and the amount of on-site open space.

3.29 Renewable energy is that which is generated from resources that are unlimited, rapidly replenished or naturally renewable, and not from a combination of fossil fuels. Low carbon technologies are those which use a limited amount of energy to operate but are significantly more efficient than conventional approaches, so reducing overall consumption.

3.30 The benefits of incorporating renewable energy technologies will be assessed while having regard to any potential degree of impact of existing character and local amenity. Where the installation would have an adverse impact which would clearly outweigh the benefit of the technology, other options for improving the sustainability of the development should be pursued.

Solar Power

3.31 Solar photovoltaic technology converts the energy from the sun into electricity. The greater the intensity of light, the greater the generation of electricity, meaning that solar panels are often located on south facing roofs⁽¹⁴⁾ or amounted on flat roofs as an array. While solar panels can be visually intrusive, careful placement can avoid or limit impact. It is also possible to buy solar panels which mimic the design of roofing tiles.

3.32 Solar panels do not generate any noise, have no moving parts and in general have a long life with low maintenance making them an ideal approach in most urban and rural locations. The economic viability is however only realised over a long period.

Figure 8 Solar Panels: Roof Tile and Flat Roof Designs (Source: Dulas Ltd)



Solar Water Heating

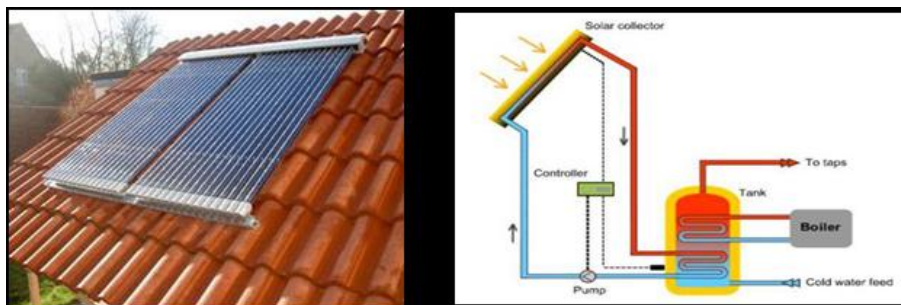
3.33 Solar water heating systems absorb energy from the sun to heat water. While water temperatures of as much as 65°C can be achieved, the system often works alongside conventional water heating systems. The necessary equipment does not generate noise and requires little maintenance but does require an area of south facing roof where it is possible to access the existing water heating system. Solar water heating systems can often be designed discretely into new buildings.

¹⁴ While overshadowing will reduce energy production only daylight is required to generate electricity and not direct sunlight, meaning that it will continue to operate throughout the year and on cloudy days.

Sustainable Design

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Figure 9 Solar Water Heating

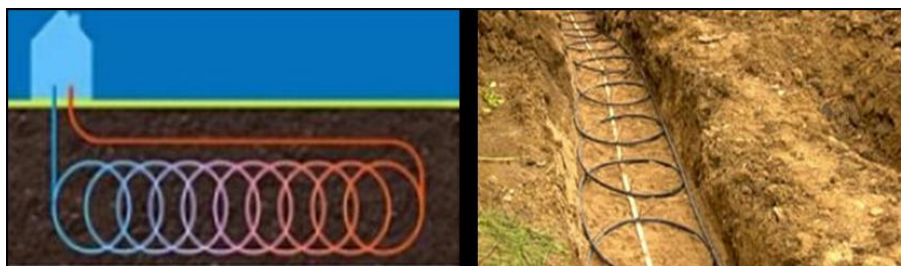


Ground Source Heat Pumps

3.34 Ground source heat pumps use the stable high volume / low level warmth of the earth⁽¹⁵⁾ and convert it into low volume / high level heat. The recovered heat can then be used to heat water or spaces.

3.35 There are two basic forms of ground source heat pump. The first comprises a bore hole where a long pipe is driven vertically down deep into the ground.⁽¹⁶⁾ The second is a trench system, in which a loop or coil is laid out horizontally at a shallow depth.⁽¹⁷⁾ In both systems, heat is transferred by water running through the pipe into a compressor which raises it to a usable higher temperature. Being almost entirely underground ground source heat pumps cause little or no visual impact.

Figure 10 Ground Source Heat Pump: Trench System (Source: Energy Saving Trust)



3.36 The feasibility of a ground source heat pump will depend on the type of system chosen and the underlying ground conditions. A detailed ground survey will be required to determine the practicality of the site and the location of any underground obstructions such as utility services.

Air Source Heat Pumps

3.37 Air source heat pumps work by converting the temperature of the outside air into heat for the building and supplying energy for the hot water system. The only outside space required is an external wall, making this system ideal for compact forms of development such as flats or smaller houses.

3.38 Air source heat pumps are designed to work in combination with other heating systems rather than acting as the sole energy source and buildings must be sufficiently well insulated to maximise results.

Wind Power

3.39 Wind turbines convert the power of the wind into electricity using rotating blades to drive a generator. To be effective the turbine must be sited where it would benefit from adequate wind and where the blades would be free to rotate without interference or turbulence. There are two types of wind turbine: horizontal blade turbines and vertical blade turbines.

3.40 There are three categories of turbine:

¹⁵ At several metres below the earth's surface the ground maintains a constant temperature of 11-13°C.

¹⁶ 15m to 150m depending on ground conditions and the size of the system.

¹⁷ Approximately 2m.

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1. Large: A collection of large scale wind turbines located in countryside locations (hub height can be as much as 100m). These are often referred to as wind farms. Electricity is provided for use in the national grid.
2. Small: Individual Free Standing: often smaller turbines than within a wind farm but can still be significant structures (hub height typically 6m to 25m). Usually located in non-residential areas. Generally provides electricity to nearby properties.
3. Micro: small turbines mounted on buildings so that the blades extend above the roof of a building. Generally provides on-site electricity generation.

Figure 11 Building Mounted and Vertical Wind Turbines



3.41 Turbines can be effectively integrated into the design of buildings, however, local wind speed should be monitored for at least 6 months to ensure the viability of the location. Due to their size and prominent appearance consideration must be given to their visual impact. Issues of noise also need to be considered if in proximity to houses and other sensitive activities or designations.

3.42 Larger wind turbines can cause a physical obstruction to air traffic movements and cause interference to Air Traffic Control radar installations. Due to the proximity of airports, aerodrome and meteorological masts, the erection of tall structures within parts of the Royal Borough is subject to checks to ensure against the degrading of aircraft safety and the operation of defence facilities.

Hydroelectric Power

3.43 Hydroelectric power converts the energy of falling, or running, water into electricity. The energy produced is directly proportional to the volume of water and the distance it falls. It is therefore possible for a small volume of water falling over a long vertical distance, to produce as much energy as a larger volume of water falling a shorter distance.

3.44 The River Thames flows through the Royal Borough for approximately 25 miles providing an opportunity for 'run of river' hydroelectric schemes, where water is taken from behind a low weir, with no facility for storage, and returned to the same watercourse after passing through a turbine. There are a total of ten weirs within, or partly within, the Royal Borough.⁽¹⁸⁾ The council has granted planning permission for a hydroelectric scheme at Romney Lock in Windsor and encourages the development of similar schemes where it can be designed to be compatible with other river uses, wildlife and any nearby homes. Early consultation with the council, the Environment Agency and Natural England on potential impacts is encouraged.

3.45 While run of the river hydroelectric schemes will generally be small in scale, their waterside location will in many instances place them in areas valued for their visual and natural amenity. While imaginative landscaping and design can reduce visual impact, particular attention should be given to the architectural quality of the built elements and the choice of building materials.

Biomass and Biofuels

3.46 Biomass refers to the use of organic material such as wood and waste to generate heat and electricity. It can be categorised into two types: dry biomass and wet biomass. The use of dry biomass involves combustion, whereas the use of wet biomass involves fermentation or digestion.

¹⁸ Hurley, Temple, Marlow, Cookham, Boulton (Maidenhead), Bray, Boveney and Romney (Windsor), Old Windsor and Bell weir (Runnymede).

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Dry Biomass

3.47 The most common source of dry biomass material is wood from forests, urban tree pruning farmed coppices or wood waste from farms. The raw material is normally processed into pellets or wood chips. Dry biomass is considered carbon neutral as the CO₂ emitted during burning is balanced with the CO₂ absorbed in growing the organic material.⁽¹⁹⁾ To ensure that the benefits of biomass are not outweighed by the impact of transporting the material, it is essential that there is a local and adequate supply. Currently, the nearest site for the production, storage and supply of renewable wood fuel is at Wexham, Slough.⁽²⁰⁾

3.48 Biomass can be burnt directly to heat water and/or spaces, or be used in more efficient combined heat and power systems to generate both heat and electricity (see related section for further information). It can be used across all types of development, including single dwellings, however, the need to provide space for the combustion plant and storage facilities make small sites impractical. Arrangements also need to be in place for the disposal of ash.⁽²¹⁾

3.49 Under the right economic and supply conditions, the payback for biomass can be shorter than other renewable technologies. However, the technology requires higher maintenance and monitoring to ensure compliance with legislation such as the Clean Air Act.

Wet Biomass

3.50 Wet biomass involves the fermentation or digestion of waste to provide a gas which is then burned to produce heat and/or electricity. The process has the benefit of using materials which are otherwise difficult to dispose of including agricultural, household and industrial residues and sewage sludge.

3.51 Due to the nature of wet biomass, site selection for plants needs to carefully consider transport movements to and from the site and the effects of odour.⁽²²⁾

Combined Heat and Power

3.52 Conventional electricity generation through combustion is inefficient since only a small part of the input energy is converted to electricity with the remainder lost through waste heat. Combined heat and power (CHP) is the simultaneous generation of usage heat and electricity in a single process. The 'waste' heat produced through the generation of electricity is captured and utilised improving the overall efficiency of energy conversion which can reach as high as 85% compared with 40% from conventional methods⁽²³⁾. Where a chiller unit is added to a CHP system, this is referred to as a 'trigeneration' system or combined cooling heat and power (CCHP).

3.53 While CHP systems can be used in all types and scale of developments, they are most suited to where there is a relatively large and constant demand for heat or cooling. They are particularly suitable for leisure centres, hotels, hospitals and various industrial processes. CHP is also suited to community heating schemes where heating is supplied to the wider area through a grid of insulated hot water pipes to buildings including both residential and commercial properties. Buildings that take heat from the community system do not require their own boiler. The electricity generated can be used to run the plant, linked to properties or exported to the national grid. CHP is particularly suited to tall residential blocks where it can offer significant efficiencies over traditional heating systems which are compromised by stringent safety and ventilation requirements for gas supply.

3.54 Micro CHP is the production of heat and electricity on a small scale. This is a new technology which allows the benefits of CHP at a domestic level. It involves the replacement of an existing boiler with a gas fired micro CHP generator which can provide a house with all its heating needs and a significant proportion of its electricity needs. The house would remain linked to the national grid to fulfil the remainder of its electricity needs.

3.55 At present, most CHP schemes are not based on biomass but are gas or waste fired. If CHP is implemented for the efficiency gains over conventional use of fossil fuels, the infrastructure should be future proofed to enable conversion to biomass as markets develop.

19 Plants absorb CO₂ during photosynthesis.

20 TV Tree Station.

21 Ash is produced at a rate of around 1% of the total weight of biomass burned. The ash from most biomass fuels can be safely returned to the soil as fertiliser.

22 It should be noted that anaerobic digestion can bring benefits in terms of odour reduction over the raw fuel.

23 According to the Combined Heat and Power Association, the efficiency of conventional coal-fired and gas-fired power stations, which discard heat, is typically around 38% and 48% respectively at the power station.

3 Sustainable Design

Requirements and Further Information

Requirement 3

On-Site Renewable Energy Generation

All developments involving 10 or more dwellings or 1,000m² or more gross non-residential floorspace will be expected to secure at least 10% of their expected energy demand⁽²⁴⁾ from on-site renewable or low carbon sources.

Information submitted with a planning application should include:

- an assessment of the expected energy demand of the proposed development, including all on-site energy requirements such as lighting, heating and services;
- an assessment of the percentage of energy to be provided from on-site renewable or low carbon sources; and
- an explanation of the technologies included, and others considered but not included. The explanation should provide any necessary detail on feasibility and any consideration given to visual, noise, air pollution or other local impacts.

Where supported by evidence of feasibility, higher standards may be set in site specific planning briefs.

Links

- PPS22: Renewable Energy.
- Planning for Renewable Energy: A Companion Guide to PPS22.
- South East Plan Policies CC2, NRM11, NRM12, NRM13 and NRM14.
- The Code for Sustainable Homes Ene1 Dwelling Emission Rate and Ene7 Low or Zero Carbon Technologies
- Checklist South East Questions 1.7 - 1.10.

Further Information

- London Renewables, Integrating Renewable Energy into New Developments: Toolkit for Planners, Developers and Consultants; available at http://www.london.gov.uk/mayor/environment/energy/docs/renewables_toolkit.pdf
- The Carbon Trust, Renewable Energy Sources: Opportunities for Business; available at www.carbontrust.co.uk
- The Renewable Energy Centre; available at www.renewableenergycentre.co.uk
- Energy Saving Trust, available at www.energysavingtrust.org.uk

Water Resource Management

3.56 The south east is one of the driest parts of the UK and experiences high levels of water demand. In some areas the existing balance of supply to demand is very sensitive, with demand close to exceeding currently available sustainable supplies. According to the Environment Agency, there is sufficient water resource to serve the needs of the Maidenhead and parts of the Windsor areas, however some of the Windsor and Ascot area have a deficit supply.⁽²⁵⁾

3.57 Domestic water consumption has increased 70% in the past 30 years and is now averaging over 159 litres per person per day. This water is purified to a very high standard using chemicals and energy, yet approximately 35% of this water is for toilet flushing, whilst another 40% is used for washing clothes, cleaning and watering the garden.

3.58 Climate change is predicted to lead to hotter, drier summers. What rainfall does occur is more likely to occur as short storms. A reduced rainfall and increase in temperature clearly means that water conservation and efficiency should be an increasing priority.

²⁴ The proportion of expected energy demand is calculated against the final design of the building.

²⁵ Environment Agency, State of the Environment Report (2008).

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Water Saving Devices

3.59 Water efficiency measures can be designed into new buildings as well as being retrofitted into existing ones. Examples of water efficiency measures include:

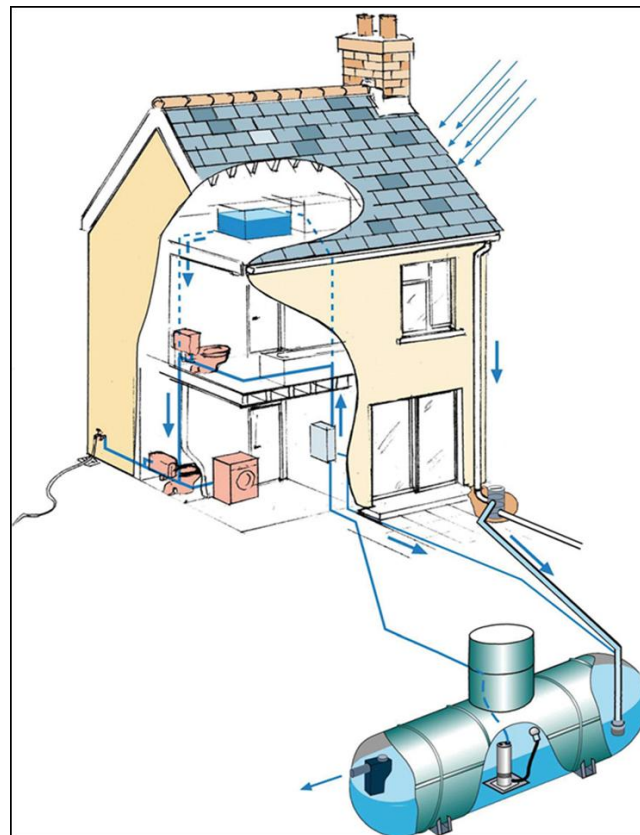
- **Dual flush / low flush toilets:** water regulations require that new toilets have a maximum flush of only 6 litres, although best practice dual flush toilets can have a flush volume as low as 4 and 2 litres.
- **Waterless urinals;** standard urinals use round 6 to 10 litres of water to flush. Buildings with high occupancy such as offices and schools benefit quickly from the installation of waterless urinals offering savings of more than £1,000 a year.
- **Spray / low flow / self closing taps:** taps which restrict and automatically close off flow are cost effective and easy to fit.
- **Efficient white goods:** more efficient appliances often cost the same as less efficient models.

Rainwater Harvesting

3.60 Rainwater harvesting is the collection of water that would otherwise have gone down the drain, into the ground or been lost through evaporation. A rainwater harvesting system can be as simple as a water butt which collects rainwater from a down pipe for use in the garden. Larger systems may collect rainwater from the roof or driveway of a property which is then filtered and stored (usually in an underground tank). This water is not suitable for drinking but can be used to supply toilets, outside taps and even washing machines.

3.61 While the use of water butts and efficiency measures are capable of significantly reduce domestic water needs, many commercial buildings and schools would benefit financially from larger scale rainwater harvesting schemes.

Figure 12 Rainwater Harvesting System (Source: Environment Agency)



3.62 Systems should always be connected to the mains system to ensure water is available if stored levels become too low. Systems should also allow excess water to flow into the storm drainage system.

3 Sustainable Design

Reclaimed Water

3.63 Reclaimed water is that which has already been used. There are two types of reclaimed water: greywater recycling and blackwater recycling.

Greywater Recycling

3.64 Greywater is that which has been used in wash basins, showers and baths. This can be disinfected on-site and used again for such uses as toilet flushing and watering the garden. It is not suitable for drinking, washing, cooking or food production.

Blackwater Recycling

3.65 Black water is that used for toilet flushing and washing up. This may be reclaimed by passing it through a system which breaks down solids and purifies the water ready for reuse. As with greywater, treated blackwater is not suitable for drinking, washing, cooking or food production. Blackwater recycling has high maintenance costs and can be impractical to use on small or confined sites. It can however be suitable for large development.

Sustainable Landscape Design

3.66 Landscaping, whether a garden or formal grounds, may require regular watering during periods of hotter or dryer weather. This can place an increased demand on mains water supply. This demand can be reduced by:

- **Use of drought resistant plants:** selecting drought resistant plants reduces water needs compared with other species. Planting should also seek to utilise the site's existing hydrology so imitating natural vegetation⁽²⁶⁾.
- **Use of water retaining mulches:** mulches reduce evaporation by the sun and wind so retaining water in the soil for longer and reducing the need for water.
- **Avoiding over dense planting:** a high density of planting creates competition between plants, increasing the overall need for water.
- **Use of rainwater harvesting and reclaimed water:** capturing rainwater and using recycling water used for other activities such as wash basins, baths and showers can safely be used for general irrigation.
- **Automatic drip irrigation systems:** these are water efficient and cost-effective solutions that provide regular watering as required, depending upon weather conditions.
- **Closed system fountains:** where water features are used (such as fountains), they should be closed systems recycling water.

3.67 In addition to water requirements, plant selection should take into account the site's context, for example the nature of planting in the wider area, soil type and conditions, aspect, exposure and shade.

26 Some drought resistant plants are unable to cope with high water tables and may benefit from planting in dryer, more exposed locations.

Sustainable Design

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Requirements and Further Information

Requirement 4

Water Resource Management

All developments are expected to include water efficiency measures to reduce overall water consumption.

Provision should be made in accordance with the following specification:

Residential Development

All developments involving the replacement or creation of a dwelling will be expected to achieve a per capita consumption of potable water of 120 litres or less per person per day. The calculation should be based on the water efficiency calculation for dwellings.⁽²⁷⁾

Non-Residential Development

All developments involving the replacement or creation of new non-residential floorspace will be expected to exceed statutory requirements. Savings should be calculated against benchmarks provided by CIRIA and the BREEAM water calculator.

Developments with an existing or proposed garden or other green area will be expected to include provision for rainwater harvesting for irrigation purposes.⁽²⁸⁾

Links

- South East Plan Policies CC2, CC3, CC4 and NRM1
- The Code for Sustainable Homes Wat1 Internal Potable Water Use and Wat2 External Water Use
- Checklist South East Questions 1.4 - 1.5
- South East Regional Sustainability Framework Objective 24

Further Information

- Environment Agency, Conserving Water in Buildings, A Toolkit for Delivering Water Management and Climate Change Adaptation Through the Planning System, available at www.environment-agency.gov.uk
- CIRIA, Water Key Performance Indicators and Benchmarks for Offices and Hotels, available at www.ciria.org
- Envirowise, available at www.envirowise.gov.uk
- Waterwise, available at www.waterwise.org.uk

Flood Risk Management

3.68 Flooding can come from rivers and streams, directly from rainfall on the ground surface and from rising groundwater, overwhelmed sewers and drainage systems. Climate change is anticipated to increase the frequency, pattern and severity of flooding making flood risk management an increasingly important fact in deciding where to locate development and how to design it.

3.69 The Environment Agency provides information on the fluvial flood risk for England and Wales, identifying areas (known as Flood Zones) with different levels of risk. 27% of all properties in the Royal Borough are at risk from flooding, including 11,706 properties that are in an areas of higher flood risk (1 in 100 years)⁽²⁹⁾. The Environment Agency updates the data on a quarterly basis.

²⁷ The water efficiency calculator for new dwellings is contained within the Department for Communities and Local Government Circular 05/2009. The methodology will also be used in the updated Code for Sustainable Homes Technical Guidance.

²⁸ The incorporation of a water butt within a household extension will normally be interpreted as the minimal action to satisfy this criterion.

²⁹ Source: Environment Agency (2007).

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3.70 In addition to fluvial flooding, parts of the Royal Borough are also affected by other sources of flooding. Information on all known sources of flooding are brought together in the council's Strategic Flood Risk Assessment (SFRA). The SFRA brings together recommendations for drainage, emergency planning and development control. The acceptability of a development with regard to its particular flood risk is considered in other planning documents including the SFRA, with this SPD concerning itself with the design and construction of development which is acceptable in principle under wider planning policy.

3.71 The traditional approach to drainage was to remove water from a site as quickly as possible. However, it is now widely recognised that this approach can harm the environment. It can increase the risk of flooding elsewhere, increase the risk of water pollution and aid the depreciation of groundwater.

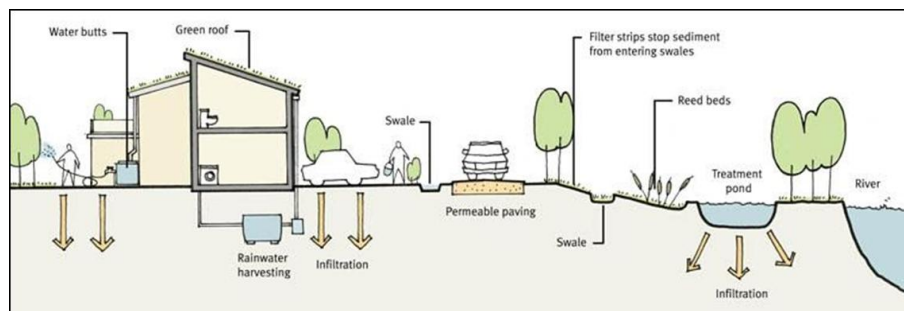
3.72 The effect of development is generally to reduce the permeability of at least part of the site, markedly changing the site's response to rainfall. Without specific measures, the volume and speed of surface run-off can overwhelm drainage systems, threatening the development itself and land elsewhere.

3.73 The term Sustainable Drainage Systems (SUDS) is frequently used to cover a range of measures which can be taken to effectively manage surface water drainage. SUDS are an alternative to the traditional approach to drainage in that they attempt to reduce the total amount, flow and rate of surface water run-off. SUDS generally fall into 3 groups:

1. Source Control Techniques: aim to reduce the amount of surface run-off from the site;
2. Permeable Conveyance Systems: aim to slow the speed of run-off to allow settlement, filtering and infiltration; and
3. Passive Treatment Systems: provide passive treatment to collected surface water before discharge into a storm sewer or watercourse.

3.74 SUDS can be designed into all development types and sizes. However, the right SUDS technique will depend on the geology, topology, soil conditions and hydrology of the site. The choice will also be influenced by the quality of the land (whether it is affected by contamination), the need to protect groundwater resources⁽³⁰⁾ and the permeability of the soil.

Figure 13 Sustainable Drainage Techniques (Source: Environment Agency)



3.75 In order to ensure that SUDS are successful and effective over time, they should be considered early in the site appraisal, not just at the detailed design stage. It is important that SUDS have clear long-term maintenance arrangements. Without maintenance arrangements, SUDS may become less effective over time, for example through silting. The Council does not generally take on responsibility for SUDS.

Permeable Surfaces

3.76 Many materials used for roads, pavements and areas of hardstanding do not let water to pass through them. Rainfall is therefore removed into drains and directed off the site. Permeable surfaces are those which allow water to pass through them into the underlying ground. This can either be through the material itself or joints between block. Permeable surfaces can be made from materials such as gravel, reinforced grass and concrete and asphalt where they have been designed with a system of voids.

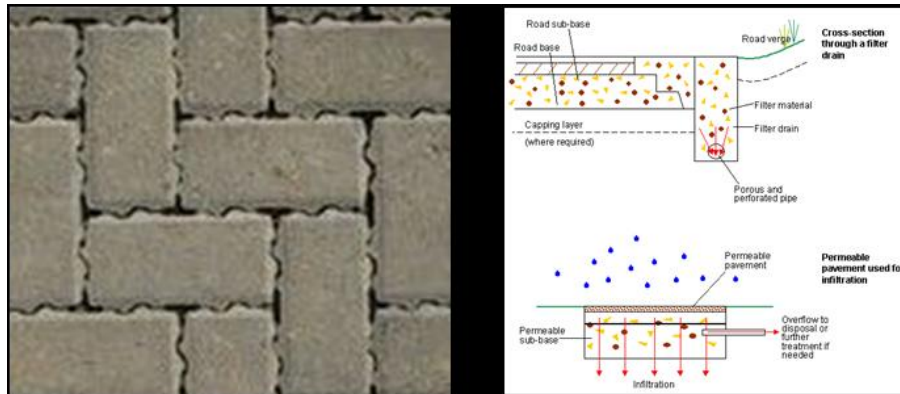
3.77 Depending upon the permeability of the subsoil, water can either drain directly into the ground or alternatively be stored in a reservoir under the paving for reuse, infiltration or delayed discharge.

³⁰ The Environment Agency have published groundwater vulnerability and groundwater source protection zones to indicate areas where there are specific concerns regarding the quality of the groundwater.

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Figure 14 Permeable Surfaces: Paving Blocks and Filter Drains (Source: Environment Agency and CIRIA)



Green Roofs

3.78 A green roof is the growing of plants on a roof top. In order for plants to grow successfully a series of layers are used that retain water, so reducing storm water run off. The benefits of green roofs is not limited to flood risk management. They can also reduce heat loss from a building during winter months and prevent overheating in the summer, remove CO₂ and other pollutants from the atmosphere, reduce the heat island effect by lowering surrounding air temperatures and provide a wildlife habitat. Further information on green roofs and their construction is discussed in more detail under Biodiversity.

Infiltration Techniques

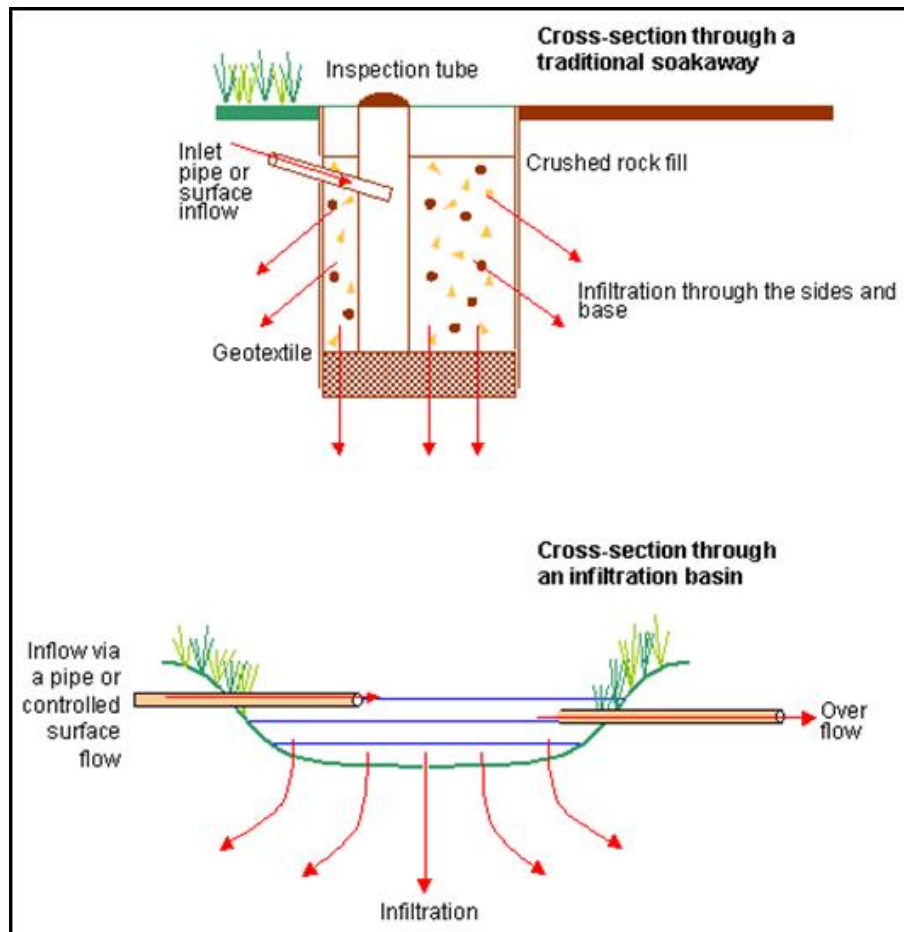
3.79 Infiltration devices work by enhancing the natural capacity of the ground to store and drain water, so reducing surface run-off. They work by either providing storage for run-off, allowing infiltration to occur over a longer period, and/or improving the natural ability of the soil to drain water by increasing the surface area or slowing the flow of water from a site. The amount of water that can be dealt with depends on the infiltration of the ground. Limitations occur where soil is not very permeable, the water table is shallow or the groundwater under the site may be put at risk.

Infiltration Trenches, Filter Drains and Soakaways

3.80 Infiltration trenches, filter drains and soakaways store water below the ground allowing infiltration to occur over a longer period. An infiltration trench is a shallow, excavated trench that has been backfilled with stone to create an underground reservoir. Storm water flowing into the trench gradually infiltrates into the subsoil. The long-term performance is enhanced by the inclusion of a filter strip, gully or slump pit to remove excess solids at the inflow. A filter drain /infiltration basin is a trench filled with a permeable material, often with a perforated pipe in the base of the trench to assist drainage. This can be used to store and conduct water, but may also be designed to permit infiltration. Filter drains are commonly used for road drainage.

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Figure 15 Infiltration Devices (Source: CIRIA)

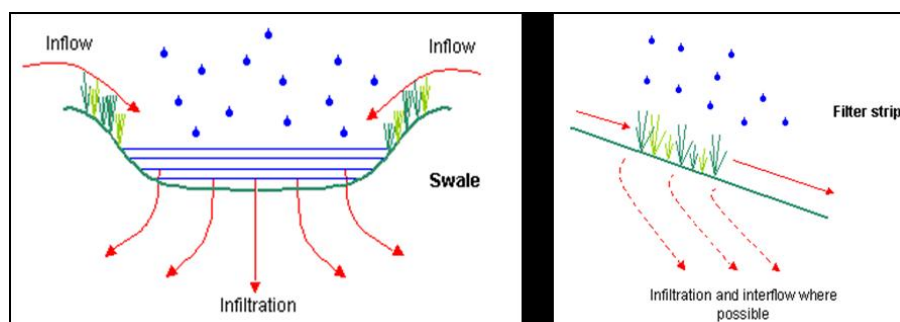


Swales and Filter Strips

3.81 Swales and filter strips are grassed depressions which lead surface run-off from impermeable areas to a storage or discharge system. Swales are long shallow channels, whilst filter strips are gently sloping areas of ground. They work by allowing rainwater to run in sheets through the grass, slowing and filtering the flow. This effectively removes polluting solids through filtration and sedimentation. The grass also helps absorb nutrients. Where necessary, swales can be lined below the soil to protect groundwater sources or, if a permeable membrane is used the rate of infiltration in highly permeable soils can be slowed.

3.82 Swales and filter strips are often integrated into the development site, for example through open spaces and road verges. The use of local wild grasses and flower species can introduce visual interest and provide a wildlife habitat.

Figure 16 Swale and Filter Strips (Source: CIRIA)

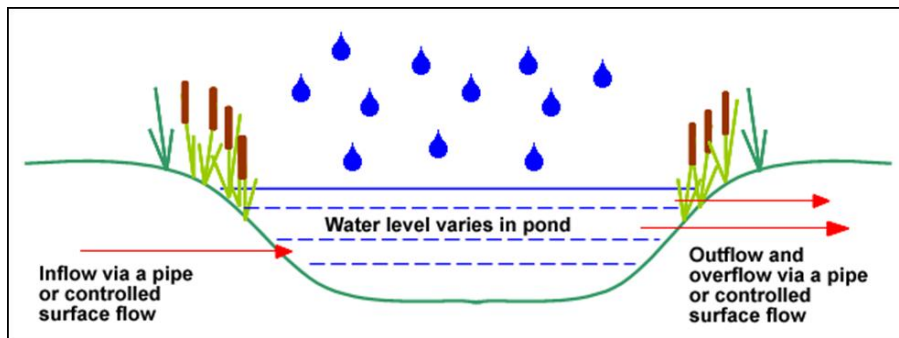


Basins, Ponds and Wetlands

3.83 Basins, ponds and wetlands are areas which store surface water run-off on the surface. Basins are dry areas which only store water following rainfall. Ponds hold water all year round but are designed to hold more water through a raise in water level following rainfall.

3.84 Basins and ponds offer opportunities for creating an attractive environment. Basins can be incorporated into open spaces across the site, while ponds can be landscaped to form a variety of wildlife habitats.

Figure 17 Pond (Source: CIRIA)



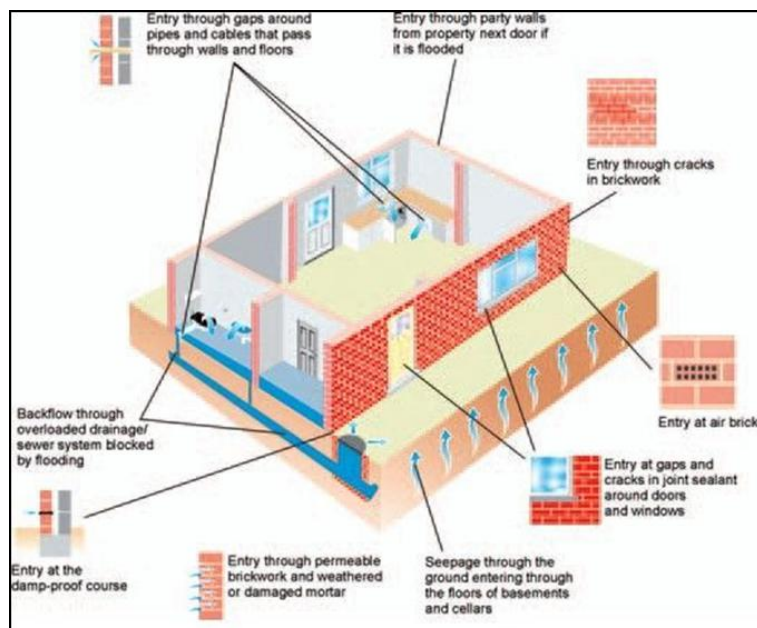
Flood Resilience and Resistance

3.85 While the risk of flooding cannot be wholly prevented, careful building design and the use of certain construction techniques can reduce the overall impact of flooding.

3.86 Flood resilient buildings are designed to reduce the consequences of flooding and facilitate recovery from the effects of flooding sooner than conventional buildings. This 'dry proofing' may be achieved through the use of water resistant materials for floors, walls and fixtures and the siting of electrical controls, cables and appliances at a higher than normal level. The layout of a property can also ensure that living accommodation and essential facilities are provided above non-habitable spaces.

3.87 Flood resistant construction can prevent entry of water or minimise the amount of water that may enter a building where there is flooding outside it. Examples of flood resistant construction or 'wet proofing' include raising the floor levels to above that of the predicted flood water and the use of flood barrier designs of boundary walls and fences. Flood resistant construction should always be accompanied by flood resilient techniques.

Figure 18 Potential Entry Routes for Flood Water (Source: DCLG and CIRIA)



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3.88 The use of flood resilient and resistance techniques do not in themselves justify building in areas liable to flood. When proposed, it will be necessary to demonstrate that the applied measures do not increase the risk of flooding elsewhere.

Requirements and Further Information

Requirement 5

Flood Risk Management

All developments are expected to comply with the Environment Agency's flood risk standing advice.⁽³¹⁾

Developments requiring the submission of a Flood Risk Assessment are required to demonstrate how the design has addressed flood risk to and arising from the development.

Developments not required to submit a Flood Risk Assessment are expected to show how any new hard standing will be constructed of permeable materials and, where appropriate, provision for rainwater harvesting,⁽³²⁾ in order to secure a reduction in overall flood risk.

Links

- PPS25 Development and Flood Risk
- PPS25 Practice Guide
- Local Plan Policies F1 and NAP4
- Interpretation of Policy F1 (Areas Liable to Flooding) Supplementary Planning Guidance, June 2004
- Interpretation of Policy NAP4 (Pollution of Groundwater and Surface Water) Supplementary Planning Guidance, June 2002
- RBWM Strategic Flood Risk Assessment: Level 1 (April 2009)
- South East Plan Policies CC2 and NRM4
- The Code for Sustainable Homes Sur1 Reduction of Surface Water Run-Off from the Site and Sur2 Flood Risk.
- Checklist South East Question 1.1

Further Information

- DCLG, Improving the Flood Performance of New Buildings: Flood Resilient Construction, Guidance on the Permeable Surfacing of Front Gardens, available from www.communities.gov.uk
- Environment Agency, Flood Risk Standing Advice for England, available from www.environment-agency.gov.uk
- Environment Agency, Sustainable Drainage Systems: A Guide for Developers, available at www.environment-agency.gov.uk
- CIRIA, Sustainable Drainage Systems, available at www.ciria.org.uk

Biodiversity

3.89 The built environment makes a vital contribution to supporting biodiversity with both gardens and buildings supporting a range of plants, invertebrates, birds and mammals. Development offers an opportunity to create habitats and to incorporate beneficial biodiversity features as part of good design, for example by including green and brown roofs, nest and bat boxes, window boxes and appropriate planting.

31 The Environment Agency publish standing advice (standardised) advice for planning applicants and their agents. The advice takes into account variations in the level of flood risk and the types and sizes of development.

32 Under Requirement 4: Water Resource Management, developments with an existing or proposed garden or other green area will be expected to include provision for rainwater harvesting for irrigation purposes. The incorporation of a water butt within a household extension will normally be interpreted as the minimal action to satisfy this criterion.

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3.90 Large parts of the Royal Borough are of international and national importance to biodiversity.⁽³³⁾ National planning policy⁽³⁴⁾ seeks to ensure the integrity of these sites is not harmed. Any development likely to harm the integrity of these sites would not be permitted.

3.91 Almost all development sites will have some existing biodiversity value. This should be identified and opportunities taken for integrating suitable on-site habitats into new buildings and their grounds considered at an early stage in the design process. Specific measure will depend to some extent on the characteristics of the site and the form of the intended development.

3.92 Taken together, habitats associated with buildings can act as 'stepping stones' in a wider network of green spaces, allowing wildlife to move more freely. Increasing the connectivity of habitats will help assist the migration and adaptation of species to the impacts of climate change.

Green Roofs

3.93 A green roof is the growing of plants on a roof top. In order for plants to grow successfully a series of layers are used that retain water to support the plants, while allowing excessive water to drain off, and to protect the roof surface from damage by roots. While any form of planting could be created as part of a green roof, technical and financial constraints generally mean that grasses, sedum and mosses are the most appropriate species.

3.94 There are three main types of green roof:

1. **Intensive:** Often referred to as roof gardens, they are the equivalent to gardens found at ground level. Construction occurs over a reinforced concrete deck which is normally accessible. This form of green roof is the most expensive since it places a high level of structural demand on the building and requires high maintenance including irrigation, fertilising and weeding.
2. **Simple Intensive:** Vegetated with lawns or ground covering plants which require regular maintenance including irrigation, fertilising and cutting. This form of green roof is less expensive to provide than intensive forms as there are more moderate demands are placed on the building structure. This form of green roof is often designed to be overlooked rather than accessed.
3. **Extensive:** Vegetation normally consists of mosses, succulents, herbs and grasses, all species intended to be self sustaining with no irrigation and minimum maintenance. This form of green roof is the least costly to provide with minimal structural demand on the building with the design not being accessible except for basic maintenance and use of only a thin substrate.

Figure 19 Extensive Green Roof



3.95 The benefits of green roofs are not limited to biodiversity. They can also reduce storm water runoff, reduce heat loss from the building during winter months and prevent overheating in the summer, remove CO₂ and other pollutants from the atmosphere, and reduce the heat island effect by lowering surrounding air temperatures. Green roofs are often considered an attractive feature by building occupiers.

3.96 The design and construction of green roofs will need to consider:

- Urban design and aesthetics;
- Building structure (including load weight of wet soils and plants);
- Waterproofing;
- Insulation;
- Drainage;
- Irrigation;
- Growing medium (for example soil depth);
- Species;

33 Within the Royal Borough there are areas designated as Special Areas of Conservation (SAC), Special Protection Areas (SPA), Wetlands of International Importance (Ramsar site) and Sites of Special Scientific Interest (SSSI).

34 PPS9: Biodiversity and Geological Conservation.

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- Access (including maintenance); and
- Cost.

Brown Roofs

3.97 A brown roof involves covering the roof of a building with a thin layer of crushed rubble and gravel, ideally from the development site itself. They are intended to be gradually colonised by spiders and insects, providing biodiversity interest itself as well as a feeding site for insectivorous birds.

Nest Boxes, Bat Boxes and Bricks

3.98 The installation of nest boxes for birds, bats and insects bricks at suitable locations around a development site can be highly beneficial to biodiversity. Existing and proposed habitats should be considered in determining appropriate actions. In locating nest boxes consideration should be given to the level of shelter and shade, for example in unsheltered positions nest boxes should face between north and east to avoid strong sunlight and the wettest winds. Bird, bat and insect boxes come in a variety of designs to suit different species.⁽³⁹⁾

Green Facades

3.99 Planting on flanking / facade walls has a number of biodiversity benefits including the provision of additional wildlife habitat. As with green roofs, planting on walls can reduce heat loss during the winter and help maintain a comfortable internal temperature during summer months. Lichens, grasses, flowering and climbing plants and shrubs are all suitable for green facades. Planting should be designed so that safe access to the wall surface and any services such as down pipes, guttering and flues are capable of being maintained.

Figure 20 Bird Nest Box (Photographer Peter Wakely, Natural England)



Trees, Hedges and Buffer Strips

3.100 Landscapes which are rich in biodiversity will create an attractive setting for a development and improve its value. Opportunities should be taken to retain and enhance existing habitats in addition to areas of new landscaping. Consideration should be given to the use of locally native and wildlife friendly species in order to maximise biodiversity benefit.

3.101 The retention of existing and inclusion of new hedgerows and trees should be considered where they will not unduly conflict with passive solar gain or the use of the development. The nature of the sub-soil should also be considered, particularly clay sub-soils which naturally swell and shrink with seasonal variations. Where possible buffer strips should be used to provide a transition between different habitat types.

Requirements and Further Information

Requirement 6

Biodiversity

All developments will be expected to maintain or enhance biodiversity.

Design and Access Statements are required to provide details of how the proposal has addressed existing biodiversity value and where appropriate sought to make enhancements across the site.

Where a significant impact on biodiversity is likely or probable, an ecological assessment will be required to be submitted alongside the planning application.

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Links

- PPS9 Nature Conservation
- Local Plan Policies N6, N7 and N9
- South East Plan Policies CC8, NRM5 and NRM7
- The Code for Sustainable Homes Eco1 Ecological Value of Site, Eco2 Ecological Enhancement, Eco3 Protection of Ecological Features and Eco4 Change in Ecological Value of Site.
- Checklist South East Questions 5.1 - 5.4

Further Information

- Thames Valley Environmental Records Centre; available at www.tverc.org
- Berks, Bucks and Oxon Wildlife Trust; available at www.bbwt.org.uk/
- Natural England; Green Roofs: Their Existing Status and Potential for Conserving Biodiversity in Urban Areas, available at www.naturalengland.org.uk
- RTPI, Planning for Biodiversity, available at www.rtpi.org.uk
- CIRIA, Working With Wildlife, available at www.ciria.org.uk
- Bat Conservation Trust; available at: www.bats.org.uk
- Royal Society for the Protection of Birds; available at www.rspb.org.uk

Waste, Recycling and Composting Facilities

3.102 In 2008/09 almost 68,000 tonnes of waste was produced by households within the Royal Borough. About 63% of this waste was sent to landfill sites. It is generally accepted that approximately 70% of collected household waste can be recycled or composted. Currently the Royal Borough recycles or composts around 37% of all waste. The national target is to achieve 40% by March 2011.⁽³⁶⁾ Apart from squandering resources, landfill disposal and/or incineration create a range of other environmental problems. The amount of household waste generated in the Royal Borough has traditionally been high but this has been reducing over recent years.

3.103 The council currently operates a kerbside collection scheme for approximately 58,000 households both for waste and recycling. In addition there are a number of sites which offer collection banks for a number of materials such as glass, paper and clothes. Feedback from community engagement shows high levels of support for home composting and recycling. Preference is strongly focused towards kerbside collection, making it essential that new buildings make it as easy as possible for the occupier to store waste and recyclable materials.

3.104 The sorting or reuse of waste at source is the most efficient method of treatment. Green waste should generally be composted on-site and used to maintain areas of landscaping or the wider grounds.

3.105 For further information on the Council's strategy for waste collection and minimisation see www.rbwm.gov.uk/web/recycling_rubbish_waste.htm

Storage Facilities

3.106 There is local concern about unsightly bins and litter (especially plastic bottles) being blown out of recycling boxes. Individual or shared waste sorting and recycling facilities should be designed into a development from the outset in order to avoid these problems. Storage bins should be provided in kitchens and secure and discreet recycling bins and composting areas should be integrated into the building or site fabric. Whilst this will apply to all new dwellings, internal storage is particularly important in flatted developments where the main collection facility may be some distance away. Provision needs to take account of storage needs identified for current residential collections and meeting the future higher recycling standards.

³⁶ The government no longer sets specific targets for individual local authorities. The date March 2011 refers to the end of the reporting year 2010/11.

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Bin Sizes

Bin Sizes	
Individual Bin	Dimensions (mm)
240 litre waste wheelie bin	Height 1100 Depth 740 Width 580
53 litre recycling box	Height 300 Depth 400 Width 600
1100 litre communal waste bin	Height 1470 Depth 1115 Width 1370
660 litre communal waste bin	Height 1250 Depth 780 Width 1370
360 litre recycling bin	Height 1115 Depth 880 Width 665

3.107 Currently, individual houses are issued with a 240 litre wheelie bin and two 53 litre recycling boxes. Communal facilities are provided for flatted developments using a combination of 1100 litre and 660 litre waste bins, with 360 litre cycling bins. A minimum of 240 litres of waste capacity should be provided for every five residents.

Composting Facilities

3.108 Composting is a natural process which converts organic waste into an earth like mass by means of bacteria and micro-organisms. Compost can be used to improve the soil quality and nutrient value of gardens. Home composting facilities should be incorporated discreetly into all new residential developments to minimise the transportation of green waste and landfill. Houses should be provided with individual facilities located where they can be easily accessed from the kitchen. Communal facilities can be provided for flatted developments.

Requirements and Further Information

Requirement 7

Waste, Recycling and Composting Facilities

All developments are expected to provide or have access to appropriate facilities for the storage and collection of waste. In all cases, provision should be located on level hardstanding, secure and discreet, covered, within reasonable distance of the property's external access and accessible to disabled people.

Developments providing a garden or other green areas will be expected to include provision for on site composting of green waste. Where on-site composting is considered inappropriate, regard should be given to alternatives such as communal collection facilities and macerators.

In considering the appropriate facilities for the storage and collection of waste applicants are expected to consult the Council's strategy for waste collection and minimisation to establish current guidelines on the types of material that will be collected from properties, the manner in which this will occur and at what frequency.

Links

- Waste Local Plan for Berkshire Policy WLP1.

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- South East Plan Policies CC2, CC4, W1 and W2.
- The Code for Sustainable Homes Was1 Household Waste Storage and Recycling Facilities and Was3 Composting.
- Checklist South East Questions 6.9 and 6.11.

Further Information

- Department for Environment, Food and Rural Affairs, available at www.defra.gov.uk
- Environment Agency, available at www.environment-agency.gov.uk
- Waste and Resource Action Programme (WRAP), available at www.wrap.org.uk

Cyclist Facilities

3.109 The transport sector currently accounts for over a quarter of the UK's CO₂ emissions. It is the only sector of the economy from which emissions have been rising consistently since 1990, largely due to increases in car ownership, longer distances being travelled and a greater proportion of local trips being undertaken by car. Some 80% of CO₂ emissions from the transport sector emanate from road transport.⁽³⁷⁾

3.110 Cycling accounts for less than 3% of trips made in the UK, compared with up to 20% in other European countries. The 2001 Census revealed that the proportion of the working population who cycle to work in the Royal Borough was 2.8%, slightly below the average for Berkshire and the South East. In parts of Windsor and Eton the proportion was higher at 8%.

Secure Cycle Storage

3.111 Provision for cyclists is essential to support the development of cycling as a practical transport choice. Residential developments should be designed to ensure that the occupants can store and conveniently access bicycles. For individual dwellings this may constitute a shed or garage, however, in flatted developments communal parking areas should include secure cycle parking for both residents and visitors.

3.112 Commercial developments should be designed to incorporate showers, changing facilities and lockers in addition to secure cycle parking to enable employees to travel to work by bicycle. At least 1 cycle space should be provided for every 10 employees, with 1 shower cubicle should be incorporated for every 10 cycle parking spaces, with a minimum of 1 cubicle. Applicants are encouraged to utilise water saving devices designs and incorporate water reclaiming systems (see section on Water Resource Management).

3.113 Secure cycle parking facilities should normally:

- Allow the bicycle to be supported and secured by the frame, for example a Sheffield stand. Wheel slots or butterfly racks will not be acceptable;
- Be split into individual lockers so to avoid reliance on other users to maintain security;
- Be positioned where it would be overlooked by the public or staff, or at least CCTV, and be appropriately lit in order to maximise the actual and perceived level of security;
- Be positioned where it can be easily reached from access routes, including roads and cycle lanes; and
- Be protected from the weather with a roof which allows for the effects of wind.

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Figure 21 Secure Cycle Parking: Locker Type



Cycle Lanes

3.114 Cycle lanes or tracks are an important part of the overall traffic management. To develop a safe, convenient, efficient and attractive transport infrastructure that encourages cycling, all types of development should consider the incorporation of cycle lanes, including new links, where changes to the highway network are being made.

Requirements and Further Information

Requirement 8

Cyclist Facilities

All developments are expected to make appropriate provision or have access to secure cycle storage for both occupiers and visitors and cyclists changing / drying facilities. Where appropriate provision should also be made for the movement of cyclists through the site.

Provision for occupiers should be made in accordance with the following specification

Residential Development - Houses

- At least 1 cycle space per dwelling

Residential Development - Flats

- At least 1 cycle space per dwelling

Non Residential Development

- At least 1 cycle space per 10 employees.
- At least 1 shower cubicle per 10 cycle spaces, with a minimum of 1 cubicle.

Design and Access Statements submitted with a planning application will be expected to provide details of how the proposal has addressed cycle facilities including details of cyclist movement and how this relates to the provision of secure parking and changing / drying facilities.

Links

- Local Plan Policy T7

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- RBWM Local Transport Plan
- South East Plan Policies CC2 and T4.

Further Information

- Department of Transport, Manual for Streets (2007), Design Manual for Roads and Bridges (2007), Cycle Infrastructure Design (2008), available at www.dft.gov.uk
- Sustrans, available at www.sustrans.org.uk
- CTC (National Cyclist Organisation), available at www.ctc.org.uk

Air, Noise and Light Pollution

3.115 Planning policies at all levels are constantly trying to balance the need to provide ever-increasing demand for land with the protection of the environment. In many cases this has led to the redevelopment of brownfield land, increased development densities, the use of land close to major roads.

3.116 The quality of the environment is important in all developments. To maintain and improve the quality of the environment, it is essential that issues of pollution be considered in the location and design of development.

Air Pollution

3.117 The principal source of air pollution within the Royal Borough is vehicle emissions. This has led to the definition of two Air Quality Management Areas (AQMAs).⁽³⁸⁾ Although the main determinant of travel is location or the relationships between places, which is outside the remit of this SPD, measures can still be taken at a site level to reduce air quality impacts arising from and impact on a development.

3.118 Developers should take into consideration existing sources of air pollution and overall ambient air pollution levels for both current exposure and that which may reasonably be expected in the foreseeable future. Where measures to address air quality are required the priority should be to design out impacts. Remaining impacts should be addressed through mitigation and offsetting.

3.119 Measures that can help address air quality impacts include:

- **Estate layout:** the layout of the estate or development should allow for easy and safe access from the surrounding area by walking, cycling and public transport. Impacts on the wider transport network should also be considered.
- **Travel Planning:** trip generating activities should encourage greater walking, cycling and use of public transport through travel plans.
- **Internal Layout:** the site should be arranged to separate sources of pollution and sensitive uses or activities. Best practice is to move residential buildings and populated spaces away from busy roads.
- **Car Parking and Movement:** the level of car parking can have an influence on the way users access the site. The creation of pollution traps should be avoided.
- **Landscape:** dense vegetation such as groups of trees and hedges can act as barriers to deflect air pollution from a fixed source. The overall layout of the development should allow for any landscaping barrier to mature and be managed without causing conflict with buildings.
- **Energy Efficiency:** reducing the emissions produced from the development can be achieved through efficiency measures and the use of renewable or low-carbon technologies.

Noise Pollution

3.120 Noise can have a significant effect on the environment and on the quality of life, particularly when at home. Major sources of noise within the Royal Borough are from aircraft and road traffic. Ways of reducing the impact of noise, particularly in residential developments, needs to be carefully designed into the overall design and internal layout of new buildings and spaces. Developers should take into consideration existing sources of noise and overall ambient noise levels for both the current exposure and that which may be reasonably expected in the foreseeable future. In addition to external noise, the transmission of noise between adjoining users or buildings, such as flats or terrace housing, can cause problems.

38 AQMAs are defined at Maidenhead town centre and in Windsor at the junction of A332 Windsor Relief Road and the A308 Goslar Way.

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3.121 Measures that can help address noise issues include:

- **Estate Layout:** impact from identified noise sources (for example road traffic, railway and venues) should be avoided by allowing adequate distance between the source and sensitive areas of the proposed development, building form and orientation. Screening by use of less sensitive buildings, walls and landscaping can also help to avoid impacts.
- **Internal Layout:** rooms which are not sensitive to noise should be located towards the noise source so forming a barrier between the noise and more sensitive activities. The stacking of conflicting uses should be avoided, for example, bedrooms should not be located above or below the living area of an adjoining flat.
- **Landscape and landform:** dense vegetation such as groups of trees and hedges can act as barriers by helping to absorb or deflect noise. Effectiveness can be improved by the incorporation of bunds (soil mounds) along with any dense vegetation. The overall layout of the development should allow for any landscaping barrier to mature and be managed without causing conflict with buildings.
- **Materials:** materials with a higher density normally provide greater resistance to the passage of airborne noise, but may be vulnerable to impact noise. Sandwich or composite constructions may be specified to perform a variety of acoustic functions.
- **Positioning of Building Services:** building services such as air extraction ducting should be positioned away from sensitive windows and properties and be isolated from the buildings frame to prevent structural noise. Particular care should be taken to avoid or attenuate fan and vent noise with passive alternatives sought where possible.
- **Noise Insulation:** good practice includes the use of noise insulation techniques. Particular attention should be paid to roofs, glazing and party walls and floors.
- **Construction:** noise generating activities, for example air handling equipment, vehicle manoeuvring, loading / unloading should be identified and located as sensitively as possible. Low noise methods should be used where practicable.

Light Pollution

3.122 Light pollution is a real problem affecting the lives of local residents in parts of the Royal Borough. Light pollution occurs when light is misdirected or poorly controlled. Unnecessary light can cause glare, be intrusive, waste energy and disrupt wildlife. These issues must be balanced with public safety and crime prevention benefits of lighting. Lighting may also contribute to the overall design of a buildings and spaces, increasing its visual impact.

3.123 Measures to reduce light pollution include:

- Provision of lighting only where necessary;
- Directing light downwards, minimising the upward spread of light beyond horizontal;
- Directing the main beam angle of lights directed towards a potential observer is below 70 degrees;
- Uniform lighting, avoiding bright and dark spots which interfere with visibility and can cause glare;
- Ensuring lighting systems are energy efficient, by considering energy demand and automated controls.

Requirements and Further Information

Requirement 9

Air, Noise and Light Pollution

Design and Access Statements submitted with a planning application will be expected to provide evidence of how the proposal has addressed issues of air, noise and light pollution to minimise their effects from existing sources and prevent the creation of new effects.

Where significant impacts from pollution to or from the proposed development is likely or probable, an assessment of existing levels of pollution will be required to be submitted alongside the planning application.

Links

- PPG24 Noise.
- Local Plan Policies NAP1, NAP2, NAP3, NAP4 and H10.
- South East Plan Policies NRM9 and NRM10.
- The Code for Sustainable Homes Hea2 Sound Insulation.
- Checklist South East Questions 3.18 - 3.19.

Further Information

- DCLG and Countryside Commission, Lighting in the Countryside: Towards Best Practice, available at www.communities.gov.uk
- Environment Agency, available at www.environment-agency.gov.uk
- Institution of Lighting Engineers, Guidance Notes for the Reduction in Light Pollution, available at www.ile.org.uk
- The Chartered Institute of Building Services Engineers, available at www.cibre.org.uk

Sustainable Construction

4 Sustainable Construction

While the sustainability performance of a building can be markedly improved through its design, the construction process can also have a significant effect on environmental impact. This section provides guidance on how to increase sustainability through the use of materials and site construction arrangements.

Responsibly Sourced and Recycled Materials

4.1 Materials used in the construction of buildings, spaces and in providing infrastructure have environmental impacts ranging from energy used to create and transport them, impact on human health and biodiversity, substances released to the environment during use and when finally disposed of.

4.2 Using responsibly sourced and recycled materials can make a major contribution to sustainable development by slowing the demand for non-renewable resources, using less energy in producing and transporting products, and reducing environmental impacts.

Recycled and Re-Used Materials

4.3 The proportion of materials and components that can be reused or recycled at the end of a building's life should be maximised. This can be by designing for deconstruction and disassembly and avoiding where possible the use of composite materials which are particularly hard to recycle. While quality buildings should wherever possible be retained and re-used in development, where this is not possible consideration should also be given to the use of recycled building materials from any existing building which is to be replaced and materials from off-site suppliers of recycled materials.

4.4 Developers should specify the proportion of reclaimed or recycled materials to be used in the proposed development, with a minimum target of 25-30% of roads, pavements, public spaces and car parks to be from locally reclaimed or recycled materials in line with good practice.⁽³⁹⁾

4.5 The Waste and Resource Action Programme (WRAP) provides advice and case studies on reducing construction and demolition waste.

Lifecycle Environmental Impacts

4.6 The choice of construction materials has wide potential impacts but sustainability can be greatly enhanced by careful specification. Construction products should be chosen which are environmentally friendly, of low embodied energy and which can be recycled or reclaimed when buildings come to the end of their life. The use of whole life cycle assessments has increased in recent years with manufacturers now able to provide information on the wider environmental impacts associated with products.

4.7 It is possible to establish the life cycle impacts of productions through The Green Guide and the BRE publication 'Methodology for Environmental Profiles of Construction Materials, Components and Buildings'. The Green Guide applies a summary from A+ to E, with A+ rated specifications having the lowest overall environmental impact.⁽⁴⁰⁾

Responsible Use of Timber

4.8 The use of timber is significant and rising in the building industry. Although timber is a renewable resource it can only be considered such when from a sustainable source. Timber has been subject to high profile research and campaigns, with certification schemes now existing to ensure that timber has been taken from responsible managed forests.

4.9 Developers should specify the proportion of timber to be used the proposed development comes from certified sources, with a minimum target of 75% expected to be achieved in line with good practice.⁽⁴¹⁾ All other timber should be from a known and identified source with a sustainable purchasing policy.

39 Checklist South East Question 6.4.

40 Impact is assessed over a 60 year period and includes considerations of repair and maintenance, and impacts relating to assumed dismantling / demolition.

41 Checklist South East Question 6.3 specifies good practice as the attainment of 75% of all timber products being from a sustainable source.

Sustainable Construction

Local Sourcing

4.10 The local sourcing of products and equipment has a number of environmental benefits particularly reducing the distance of transportation and associated energy costs. The use of locally distinctive materials can also help maintain local character. The definition of locally sourced may vary depending on materials, however, sourcing within 35-50 miles of a site is generally accepted.⁽⁴²⁾

Requirements and Further Information

Requirement 10

Responsibly Sourced and Recycled Materials

The use of responsibly sourced and recycled materials is encouraged. The level of consideration and use of a sustainable supply and materials which have the least environmental impact will be a material factor in the determination of planning applications.

Links

- South East Plan Policies CC3, CC4 and M1.
- The Code for Sustainable Homes Mat1 Environmental Impact of Materials, Mat2 Responsible Sourcing of materials - Elements, Mat3 Responsible Sourcing of Materials - Finishing, Pol1 Global Warming Potential of Insulants and Pol2 NOx Emissions.
- Checklist South East questions 6.2 to 6.6.

Further Information

- Building Research Establishment, The Green Guide, available at www.bre.co.uk/greenguide
- Forestry Stewardship Council, available at www.fsc.org
- Waste and Resource Action Programme (WRAP), available at www.wrap.org.uk
- Waste Watch available at www.wastewatch.org.uk
- Recycled Product Guide, available at www.recycledproductions.org.uk

Site Waste Management

4.11 Construction and demolition waste amounts to 87 million tonnes every year.⁽⁴³⁾ This accounts for over 40% of the waste being deposited in landfill. Much construction waste is a valuable resource which can be reused or provide an income.

4.12 A Site Waste Management Plan (SWMP) is a tool for managing site construction waste. They seek to improve the resource efficiency by promoting the economic reuse of construction materials and methods which allow waste to be minimised, recycled or recovered. SWMPs are now required for all construction projects with an estimated cost of £300,000 excluding VAT.⁽⁴⁴⁾ The SWMP must:

- Describe each waste type expected to be produced in the course of the project;
- Estimate the quantity of each type expected to be produced; and
- Identify the waste management action proposed for each different waste type, including reuse, recycling, recovery and disposal.

4.13 Where possible, quality buildings should be re-used in any development. However, where demolition is necessary, there should be a selective programme which allows the most valuable or potentially contaminating materials and fittings to be removed safely for later re-use or processing before demolition starts.

42 Checklist South East Question 6.5.

43 Waste Strategy for England 2007.

44 The Site Waste Management Plans Regulations 2008.

Sustainable Construction

4.14 The deconstruction, or dismantling, of a buildings is preferable to wholesale demolition. This is the most efficient practice for separating materials for re-use, recycling and disposal. It can also be more cost-effective than wholesale demolition when taking into account the reduction of landfill disposal costs and the revenue from the sale of salvaged materials. Time is the most important resource when deconstructing a building and so needs to be programmed into any schedule.

4.15 In designing new development and preparing for construction, consideration should be given to the on-site storage of resources for re-use (for example top soil or hardcore), the creation of a waste management area to allow the segregation and storage of materials, and whether opportunities exist for the recycling or processing of materials via a local waste recovery centre.

Requirements and Further Information

Requirement 11

Site Waste Management

Developments involving 10 or more dwellings or 1,000m² or more gross non-residential floorspace will be expected to put in place a Site Waste Management Plan in order to minimise the production of construction waste and maximise reuse and recycling.

Links

- Waste Local Plan for Berkshire Policy WLP1.
- South East Plan Policies CC4, W1, W2 and M1.
- The Code for Sustainable Homes Was2 Construction Site Waste Management.
- Checklist South East Questions 6.9 and 6.11.

Further Information

- DTI, Site Waste Management Plans Guidance for Construction Contractors and Clients
- WRAP, Aggregates Resource Efficiency in Demolition and Construction
- Wastewatch, available at www.wastewatch.org.uk
- Envirowise, available at www.envirowise.gov.uk
- Netregs, Simple Guide to Waste Management Plans, available at www.netregs.gov.uk

Pollution

4.16 The overall aim of planning and pollution control policy is to ensure the sustainable and beneficial use of land. Within this aim, polluting activities that are necessary for society and the economy should be so sited and planned, and subject to such planning conditions, that their adverse effects are minimised and contained to within acceptable limits. Opportunities should be taken wherever possible to use the development process to assist and encourage the remediation of land already affected by contamination.

Considerate Construction

4.17 Construction practices have a large impact on the local areas and residents. Dust, noise, vibration, dirty roads, increased traffic, parking problems, water pollution and soil contamination are all often recorded.

4.18 The Considerate Constructors Scheme is a UK certification scheme that encourages the considerate management of construction sites. It has been operational since 1997 and seeks to ensure that construction sites are managed in an environmentally, socially considerate and accountable manner.

Sustainable Construction

Land Contamination and Prevention

4.19 Developers are responsible for ensuring that a proposed development will be safe and suitable for the purpose for which it is intended. Applicants must therefore ensure that potential areas of contamination are identified, adequately investigated and then appropriately remediated. If there is any reason to suspect that a site might contain some historical contamination left from previous activities, the Council's Environmental Protection Team should be consulted.

4.20 The biggest risk of soil pollution often occurs during construction. Activities such as dewatering, water discharges and surface water runoff, digging foundations, and moving contaminated soil all present risks. However, most pollution incidents can be avoided by ensuring that good environmental management practices are implemented. Construction sites and industrial activities can set up systems which can be accredited through the BS7750 or ISO 14001 standards. These accreditations require a commitment towards a strategy of continuous improvement in environmental management, to have pollution prevention procedures in place and to monitor performance.

4.21 Establishing environmental management systems is best done at the outset of a project or industrial activity. Smaller construction sites can achieve good management practice by preparing and implementing a Site Environmental Plan.

Requirements and Further Information

Requirement 12

Pollution

All developments involving 10 or more dwellings or 1,000m² or more gross non-residential floorspace will be encouraged to implement Site Environmental Management Plans and operate under the Considerate Constructors Scheme.

Links

- PPS23: Planning and Pollution Control.
- South East Plan Policies NRM2, NRM9 and NRM10.
- The Code for Sustainable Homes Man2 Considerate Constructors Scheme.

Further Information

- CIRIA Environmental Good Practice on Site
- PPS23: Planning and Pollution Control
- Environment Agency Model Procedures for the management of Land Contamination (CLR 11)

Policy Context

A Policy Context

This appendix provides an overview of national, regional and local policy and guidance which relate to sustainable design and construction.

National Context

The Planning and Compulsory Purchase Act 2004

Section 39 of the Planning and Compulsory Purchase Act 2004 sets out that local planning authorities exercise their functions with the objective of contributing to the achievement of sustainable development.

PPS1 Delivering Sustainable Development

Planning Policy Statement 1 states that "*sustainable development is the core principle underpinning planning.*"⁽⁴⁵⁾ Local planning authorities are obliged to ensure that development plans contribute to global sustainability by addressing the causes and potential impacts of climate change through policies which reduce energy use, reduce emissions, promote the development of renewable energy resources, and take climate change impacts into account in the location and design of development.⁽⁴⁶⁾ A key objective is that developments are sustainable, durable and adaptable and make efficient and prudent use of resources.⁽⁴⁷⁾ Policies should also take account of environmental issues such as the management of waste including producing less waste and using less resources wherever possible.⁽⁴⁸⁾

Supplement to PPS1: Planning and Climate Change

This dedicated supplementary document to PPS1 sets out how planning should contribute to reducing emissions, stabilising climate change and take into account the unavoidable consequences. Applicants for planning permission should consider how well their proposal for development contributes to the ambition of a low-carbon economy and how well adapted they are for the expected consequences of climate change.

Local planning authorities should follow the principle of locating and designing development to limit CO₂ emissions, making good use of opportunities for decentralised and renewable or low carbon energy, and minimise future vulnerability to the changing climate. Local planning authorities should expect development to:

- Take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption and overall to minimise CO₂ emissions;⁽⁴⁹⁾
- Expect a proportion of the energy supply of new development to be secured from decentralised and renewable or low-carbon energy sources;⁽⁵⁰⁾
- Give priority to the use of sustainable drainage systems, paying attention to the potential contribution to be gained to water harvesting from impermeable surfaces and to encourage layouts that accommodate waste water recycling;⁽⁵¹⁾ and
- Provide for sustainable waste management.⁽⁵²⁾

Specific and standalone assessments of new development should not be required where the requisite information can be made available to the local planning authority through the submitted design and access statement.⁽⁵³⁾

45 PPS1, paragraph 3.

46 PPS1, paragraph 13(ii) and 20.

47 PPS1, paragraph 36.

48 PPS1, paragraph 20.

49 Supplement to PPS1, paragraph 42.

50 Supplement to PPS1, paragraph 20.

51 Supplement to PPS1, paragraph 42.

52 Supplement to PPS1, paragraph 42.

53 Supplement to PPS1, paragraph 11 and 41.

Policy Context

A

PPS9 Biodiversity and Geological Conservation

Planning Policy Statement 9 promotes sustainable development by ensuring that biological and geological diversity are conserved and enhanced as an integral part of development. Decisions should be consistent with national, regional and local biodiversity priorities and objectives. When considering planning applications, local planning authorities should maximise opportunities for biodiversity enhancements as part of good design and, where appropriate, planning obligations.⁽⁵⁴⁾

PPS10 Planning for Sustainable Waste Management

Planning Policy Statement 10 sets the objective of breaking the link between economic growth and the environmental impact of waste through establishing more sustainable waste management, and moving the management of waste up the 'waste hierarchy' of reduction, reuse, recycling and composting, using waste as a source of energy, and only disposing as a last resort.

PPS22 Renewable Energy

Planning Policy Statement 22 recognises that the development of renewable energy alongside improvements in energy efficiency can contribute to sustainable development by ensuring all homes are adequately and affordably heated, reducing emissions of CO₂, decreasing reliance on fossil fuels and create associated jobs.

PPS22 states that local planning authorities and developers should consider the opportunity for incorporating renewable energy projects in all new developments.⁽⁵⁵⁾ In addition policies may be developed which require a percentage of the energy to be used in new residential, commercial or industrial development to come from on-site renewable energy developments.⁽⁵⁶⁾

A companion guide to PPS22 has been published expanding and providing technical information relating to renewable development, including passive solar design.

PPS23 Pollution Control

Planning Policy Statement 23 requires local planning authorities to limit, and where possible reduce greenhouse gas emissions through improved energy efficiency, minimise the emission of pollutants including light, air, noise, soil and water, and make suitable provision for the drainage of surface water through Sustainable Drainage Systems (SUDS).

PPS25 Development and Flood Risk

Planning Policy Statement 25 aims to ensure that flood risk is taken into account at all stages of the planning process. It addresses both the risk of flooding to the site and the risk of flooding arising from development, and where possible reduce flood risk overall.

Larger developments and proposals in areas at risk of flooding are required to undertake a Flood Risk Assessment (FRA) to inform the overall acceptability of the use, location and design of development.⁽⁵⁷⁾ Sustainable Drainage Systems (SUDS) are encouraged to manage surface water to mimic the site's performance prior to development.⁽⁵⁸⁾

Regional Context

South East Plan

The South East Plan was approved in May 2009. It replaces the earlier Regional Planning Guidance for the South East (RPG9) and the Berkshire Structure Plan.

⁵⁴ PPS9, paragraph 14.

⁵⁵ PPS22, paragraph 18.

⁵⁶ PPS22, paragraph 8.

⁵⁷ PPS25 requires planning applications for development proposals of 1 ha or greater in Flood Zone 1 and all proposals for new development in Flood Zones 2 and 3 to be accompanied by a FRA. Further information is available in PPS25, Appendix E.

⁵⁸ PPS25, paragraph F6.

Policy Context

The principal objective of the South East Plan is to achieve and maintain sustainable development in the region.⁽⁵⁹⁾ Those policies directly related to sustainable design and construction are listed below. The summary concerns only those aspects of the policy relevant to this SPD and is not necessarily a complete summary of the policy.

South East Plan Policy Links

South East Plan Policy Links	
Policy	Summary
CC1 Sustainable Development	Principal objective to achieve and maintain sustainable development. Ensure actions contribute to meeting the objectives set out in the Regional Sustainability Framework.
CC2 Climate Change	Measures to mitigate and adapt to effects of climate change will be implemented, including: 1) ensuring resilience to climate change impacts; 2) incorporation of sustainable drainage measures and high standards of water efficiency; 3) improving energy efficiency and carbon performance of buildings; 4) ensuring accessibility to sustainable modes of transport; 5) encouraging renewable energy; and 6) reducing biodegradable waste landfill.
CC3 Resource Use	A programme of action to stabilise ecological footprint by 2016 and reduce it by 2026, including: 1) increased efficiency of resource use in development; 2) adaptation of existing development to reduce its use of energy, water and other resources.
CC4 Sustainable Construction	Adopt and incorporate sustainable construction standards and techniques, including: 1) high standards of energy and water efficiency; 2) design to increase natural lighting, heat and ventilation and a proportion of energy demand from renewable sources or low-carbon sources; 3) reduction and increased recycling of construction and demolition waste and procurement of low-impact materials; and 4) designing for flexible use.
T4 Parking	Amongst other matters, ensure sufficient cycle parking including secure cycle storage for flats and houses which lack garages.
NRM1 Sustainable Water Resources and Groundwater	Avoid adverse effects on the water environment. Require development to be compatible with River Basin Management Plans, water company asset management plans, the Regional Water Resource Strategy and Catchment Abstraction Management Strategies, groundwater vulnerability maps and groundwater protection zone maps. Identify circumstance where new development will need to be supported by water efficiency standards exceeding Building Regulations and set out the circumstances where sustainable drainage solutions should be incorporate into development.

Policy Context

A

South East Plan Policy Links	
Policy	Summary
NRM2 Water Quality	Water quality will be maintained and enhanced through avoiding adverse effects of development on the water environment.
NRM4 Sustainable Flood Risk Management	Require incorporation and management of sustainable drainage systems and other water retention and flood storage measures to minimise direct surface run-off.
NRM5 Conservation and Improvement of Biodiversity	Avoid net loss of biodiversity and actively pursue opportunities to achieve net gain.
NRM7 Woodlands	Support the implementation of the Regional Forestry and Woodland Framework, including promoting and encouraging the economic use of woodlands and wood resources.
NRM9 Air Quality	Achieve improvements in air quality including 1) mitigating the impact of development and reduce exposure to poor air quality through design, particularly residential development; and 2) the use of best practice during construction activities to reduce dust and other pollutants.
NRM10 Noise	Measures to address and reduce noise pollution, including soundproofing and screening as part of sustainable design and construction.
NRM11 Development Design for Energy Efficiency and Renewable Energy	Promote and secure greater use of decentralised or low-carbon energy in new development, including through setting ambitious targets. In advance of local targets, developments of more than 10 dwellings or 1,000m ² of non-residential floorspace should secure at least 10% of their energy demand from decentralised and renewable or low-carbon sources. Use design briefs and supplementary planning documents to promote design for energy efficiency, low carbon and renewable energy. Incorporation of renewable energy sources including passive solar design, solar water heating, photovoltaic, ground source heat pumps and in larger scale development, wind and biomass generated energy.
NRM12 Combined Heat and Power	Encourage the integration of combined heat and power, including mini and micro-CHP. The use of biomass fuel should be investigated and promoted.
NRM13 Regional Renewable Energy Targets	Targets for electricity generation from renewable resources. The greatest potential for electricity generation is from wind, biomass and solar. The greatest potential for heat generation is from solar and biomass.
NRM14 Sub-Regional Targets	Contribution to achievement of sub-regional targets for land-based renewable energy.
W1 Waste Reduction	Reduce growth in all waste. Targets for 2010 and 2020.

Policy Context

South East Plan Policy Links	
Policy	Summary
W2 Sustainable Design, Construction and Demolition	Require development design, construction and demolition to minimise waste production and associated impacts through the reuse of construction and demolition materials, and the promotion of layouts and designs that provide adequate space to facilitate storage, reuse, recycling and composting.
M1 Sustainable Construction	Promote the use of construction materials that reduce the demand for minerals by requiring new projects to include a proportion of recycled and secondary aggregates wherever practicable.

South East Regional Sustainability Framework

The South East Regional Sustainability Framework (RSF) sets a common vision, two regional goals, four priorities and 24 objectives that will help guide sustainable development in the South East. The RSF contains a Sustainability Appraisal guide that aims to encourage regional and local organisations, businesses and community groups to review their own plans and strategies against the framework.

Those objectives most directly related to sustainable design and construction are listed below along with the associated indicator and target.

South East Regional Sustainability Framework

South East Regional Sustainability Framework Links		
Objective	Indicator	Target
1 To ensure that everyone has the opportunity to live in a decent, sustainably constructed and affordable home suitable to their need	F. Percentage of new build and retrofit homes meeting EcoHomes Very Good standard or above or equivalent Code for Sustainable Homes	- Proposed national target that all new homes be carbon neutral by 2016
14 To improve efficiency in land use through the appropriate re-use of previously developed land and existing buildings – including re-use of materials from buildings – and encourage urban renaissance	-	-
15 To reduce the risk of flooding and the resulting detriment to public well-being, the economy and the environment	C. New development with sustainable drainage installed D. Number of additional houses where flood risk has been reduced	- All new development applications to show that sustainable drainage has been considered and implemented if appropriate - By 2010, to increase the numbers of properties adequately protected by 15,000
16 To reduce air pollution and ensure air quality continues to improve	A. Days when air pollution is moderate or high	- Local authorities to seek an improvement in air quality in their areas so that there is a significant reduction in the number of days of medium and high air quality pollution by 2026

Policy Context

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South East Regional Sustainability Framework Links		
Objective	Indicator	Target
17 To address the causes of climate change through reducing emissions of greenhouse gases	A. Emissions of greenhouse gases by source B. Per capita CO ₂ emissions	- To reduce the region's carbon dioxide emissions by at least 20% below 1990 levels by 2010 and by at least 25% below 1990 levels by 2015 – South East Plan targets - National Target – by 2050, reduce greenhouse gas emissions from activities within the region by 60%
18 Ensure that the South East is prepared for the impacts of climate change	A. Population that are within water resource zones that are in deficit	-
19 To conserve and enhance the region's biodiversity	-	-
21 To improve the efficiency of transport networks by enhancing the proportion of travel by sustainable modes and by promoting policies which reduce the need to travel	C. Trips per person by mode	-
22 To reduce the global social and environmental impact of consumption of resources by using sustainably and ethically produced, local or low impact products	A. Regional Ecological Footprint B. Percentage of commercial buildings meeting BREEAM Very Good Standard or above or equivalent	- To stabilise the Ecological Footprint by 2016 and reduce it thereafter
23 To reduce waste generation and disposal, and achieve the sustainable management of waste	A. Total types of all waste arisings and method used for its management	- To increase diversion of all waste from landfill in the region to 71% by 2010 and 86% by 2025 - To increase recycling and composting of all waste in the region to 50% by 2010 and 65% by 2025. - To reduce growth of all waste in the region 1% per annum by 2010, and 0.5% per annum by 2020
24 To maintain and improve the water quality of the region's rivers, ground waters and coasts, and to achieve sustainable water resources management	E. Per capita consumption (PCC) of water	- To stabilise and then reduce the per capita consumption of water to 135 litres per day by 2016
25 To increase energy efficiency, security and diversity of supply and the proportion of energy generated from renewable sources in the region	A. Energy use per capita B. Installed capacity for energy production from renewable sources	- By 2010, install 620MW of renewable energy (5.5% of generation capacity) - By 2016, install 895MW of renewable energy (8% of generation capacity) - By 2026, install 1,750MW of renewable energy (16% of generation capacity)

Policy Context

Local Context

Waste Local Plan for Berkshire

The Waste Local Plan for Berkshire provides a countywide framework for managing the generation of waste through the planning system. It forms part of the development plan for the Royal Borough. Current policies which are relevant to sustainable design and construction are listed below. The summary concerns only those aspects of the policy relevant to this SPD.

Waste Local Plan for Berkshire Policy Links

Waste Local Plan for Berkshire Policy Links	
Policy	Summary
WLP1 Sustainable Development	Regard will be had to the extent to which development is sustainable in form and location and helps to conserve natural resources and waste generation.

RBWM Local Plan

The Royal Borough of Windsor and Maidenhead Local Plan forms part of the development plan for the Royal Borough. The Government has replaced the system of Structure Plans and Local Plans with Regional Spatial Strategies and Local Development Frameworks. Policies in the Local Plan will be replaced by policies in the Development Plan Documents prepared as part of the Local Development Framework. Current policies which are relevant to sustainable design and construction are listed below. The summary concerns only those aspects of the policy relevant to this SPD.

RBWM Local Plan Policy Links

RBWM Local Plan Policy Links	
Policy	Summary
N6 Trees and Development	Development should retain existing suitable trees and include tree planting and landscaping scheme.
N7 Hedgerows	Development should retain existing hedgerows. Where unavoidable replacement planting and improved planting is required.
N9 Wildlife Heritage Sites	Particular regard will be had to protect natural features of Local Nature Reserves and Wildlife Heritage Sites. Measures to safeguard and enhance such sites within any development proposal.
DG1 Design Guidelines	Development should include landscaping should form an integral part of the overall layout and design, utilising existing vegetation where possible. Adequate access should be provided for refuse collection.
F1 Development Within Areas Liable to Flood	Development in itself, or cumulatively with other developments, should not impede the flow of flood water, reduce the capacity of the floodplain to store flood water or increase the number of people or properties at risk from flooding.
NAP1 Road / Rail Noise and Development	Noise sensitive developments will not be permitted in areas subject to specified road traffic related noise levels.

Policy Context

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RBWM Local Plan Policy Links	
Policy	Summary
NAP2 Aircraft Noise and Housing Development	Housing developments will not be permitted in areas subject to specified aircraft related noise levels.
NAP3 Polluting Development	Permission will not be given for developments likely to emit unacceptable levels of noise, smells or fumes beyond the site boundary.
NAP4 Pollution of Groundwater and Surface Water	Developments will not be permitted which poses an unacceptable risk to the quality of groundwater and surface water.
E10 Design and Development Guidelines	Development for business and industrial development should be designed to be neighbourly and provide on site environmental improvements.
H10 Housing Layout and Design	Residential development should make arrangements for the maintenance of open spaces and landscaping, provide for safe movement, and provide adequate sound insulation.
H14 House Extensions	House extensions should not cause unacceptable loss of light to adjoining properties.
T7 Cycling	Provision should be made for cyclists, including secure parking.

Sustainable Community Strategy

Sustainable Community Strategies (SCSs) set out the strategic vision for a place and are linked into regional overarching strategies. They provide the vehicle for considering and deciding how to address difficult cross cutting issues such as the economic future of an area, social exclusion and climate change. Local authorities are required to produce a SCS following consultation with their local communities and key local partners through the Local Strategic Partnership (LSP).

Planning Policy Statement 12: Local Spatial Planning expects Local Development Frameworks to be aligned not only with national and regional plans, but also the shared priorities set out in the SCS. The Local Strategic Partnership - the Community Partnership for the Royal Borough, have recently started the process of reviewing the SCS. The existing SCS contains a number of priorities directly relevant to sustainable design and construction, including: promoting sustainable construction techniques, improving domestic energy performance, promoting awareness of our environment and the adoption of sustainable ways of living, and widening travel choice.

Energy Demand Information

B Energy Demand Information

In advance of locally specific targets, Requirement 3 of this SPD implements the regional policy of developments of 10 or more dwellings or 1,000m² or more gross non-residential floorspace secure at least 10% of their energy demand from decentralised and renewable or low-carbon sources. To show compliance with the requirement, applicants are required to submit an energy demand statement.

Applicants are encouraged to consider how they will achieve this early in the design process. This helps ensure that renewable systems are successfully integrated into the layout and design of a development and that costs are kept to a minimum. Early consideration also enables the applicant to weigh out the potential advantages of increasing energy efficiency and passive systems in order to reduce the size of the 10% requirement.

The energy statement should set out which efficiency and renewable energy technologies were considered and the feasibility of each. All on site energy requirements need to be included in any calculations. This includes street lights, car parking lights, heating and lighting of communal areas and lifts. Non-residential buildings must include an estimate of process loads which form a considerable proportion of the overall building energy use. Energy statements providing figures without context will be rejected. The London Renewables Toolkit⁽⁶⁰⁾ provides useful information on the feasibility of energy efficiency measures and renewable energy technologies.

Energy Performance of Buildings Directive

The Buildings Energy Performance Directive (EPBD) was approved on 16 December 2002 and brought into force on 4 January 2003. The principal objective of the Directive is to promote the improvement of the energy performance of buildings within the EU through cost-effective measures. There are four main aspects to the EPBD.

- 1) Establishment of a calculation methodology: Member States must implement a methodology for the calculation of the energy performance of buildings, taking account of all factors that influence energy use;
- 2) Minimum energy performance requirements: there must be regulations that set minimum energy performance requirements for new buildings and for large existing buildings when they are refurbished;
- 3) Energy performance certificate: there must be an energy performance certificate made available whenever buildings are constructed, sold or rented out;
- 4) Inspections of boilers and air-conditioning: there must be regulations to require inspections of boilers and heating systems (or an alternative system of providing advice as discussed below), and inspection of air conditioning systems.

Energy Calculations and CO₂ Emissions

Energy information should be calculated in kWh for both electricity and gas. The first stage is to calculate the predicted energy demand in the absence of energy efficiency measures and technologies. It is from this baseline that the renewable energy target will be calculated. Green tariff electricity is not counted towards the consideration of on-site generation or of a developments ability to meet the 10% target.

Applicants should demonstrate the predicted heating, cooling and electricity demand of the whole development site in kWh⁽⁶¹⁾ for each fuel type used (e.g. gas and electricity). The first stage should estimate the predicted energy use in the absence of various energy efficiency measures and technologies. This should include space heating, water heating, lighting and use of appliances.

Because not all energy is equal, the associated baseline carbon dioxide emissions should also be calculated. For example, the CO₂ emissions from electricity are much higher than from gas:

- Electric energy: 1 kWh per annum = 0.43 kg of CO₂ per annum;
- Gas energy: 1 kWh per annum = 0.19 kg of CO₂ per annum⁽⁶²⁾

60 www.london.gov.uk/mayor/environment/energy/docs/renewables_toolkit.pdf

61 kWh = kilowatt hour. This is the basic unit used to measure energy in this context and relates to 1 kilowatt of energy (i.e. the power) consumed over an hour. This is a common term for all fuels.

62 A full list of CO₂ emission factors is provided in Part L of the Building Regulations.

Energy Demand Information

It should be noted that a reduction in carbon dioxide (CO₂) emissions is not the same as a reduction in carbon (C). In order to reduce carbon by 1kg, CO₂ emissions must be reduced by 3.67kg.

Various benchmarks and methodologies can be used to predict energy requirements as noted below; Sustainability Statements must specify the methodology or benchmarks used. Advice for house builders can be obtained from the Energy Saving Trust⁽⁶³⁾ and for commercial development from the Carbon Trust.⁽⁶⁴⁾

Domestic Buildings

Building Regulations: Part L of the Building Regulations can be used to predict CO₂ emissions in buildings of the same size and function. The Target Emission Rate (TER) is the maximum permitted CO₂ emission rate. The methodology can be used to show how energy efficiency measures achieve an improvement over the TER. Where estimates are made for energy use which falls outside the remit of the Part L, such as external lighting and energy use by occupants, a clear indication must be given of the source of information.

Standard Assessment Procedure (SAP⁽⁶⁵⁾) Rating: The Government's approved methodology for rating the energy performance of dwellings. The scale runs from 1 (extremely poor) to 100 (extremely good) and the indicators are used to demonstrate compliance with Part L of the Building Regulations. The Dwelling Emission Rate (DER) is the estimated CO₂ emissions in kg/m² per annum for the building as designed for energy used in heating, hot water and lighting. This must be below the Target Emission Rate (TER) which sets the maximum allowable CO₂ emissions under the Building Regulations. SAP software can be accessed through www.bre.co.uk/sap2005.

However, SAP does not include calculations for cooking, lighting or appliances, so the impact of these uses should be estimated and a clear indication given of the source of information. A number of software models make these calculations, for example the National Home Energy Rating Scheme (NHER). In the case of small developments, an additional 20% can be added to the initial SAP calculation to account for the excluded elements.

BREDEM-12: BREDEM-12 is a model for estimating the energy consumption in dwellings for space heating, hot water, lighting, cooking and electrical appliances.

Energy Performance Certificates: From October 2008 all buildings whenever sold, built or rented will need an Energy Performance Certificate (EPC). The certificate provides energy efficiency A-G ratings and recommendations for improvement. The ratings - similar to those found on products such as fridges - are standard so the energy efficiency of one building can easily be compared with another building of a similar type. From October 2008, all buildings whenever built, sold or rented require one, including those on the market before the phased introduction of EPCs for domestic properties in 2007. EPCS are produced by accredited energy assessors. Confirmation of a EPC rating is required by Building Control before a Completion Certificate is issued. More information is available at www.communities.gov.uk.

Non-Domestic Buildings

Simplified Building Energy Model⁽⁶⁶⁾ (SBEM): SBEM provides an analysis of the energy consumption of buildings other than standard dwellings, used in support of the National Calculation Methodology (NCM) and the Energy Performance of Buildings Directive (EPBD). The calculation method is also used in determining CO₂ emissions rates for new buildings for compliance with the new Part L of the Building Regulations (England and Wales) and equivalent Regulations in Scotland and N Ireland. More information is available at www.bre.co.uk.

Energy Demand Statement: Information to Provide

When assessing the Energy Demand Statement the following will be checked:

1. Have the energy demand (in kWh) and carbon emissions (in kg/CO₂) for the site been predicted?
2. Have all assumptions been provided? i.e. whether these have come from Building Regulations or benchmarks?

63 See www.energysavingtrust.org.uk

64 See www.carbontrust.co.uk

65 Excerpt from Part L2 Building Regulations applies to the erection of a building. Where this regulation applies, the person carrying out the work shall, ensure that, appropriate air pressure testing is carried out in accordance with a procedure approved by the Secretary of State; and give a copy of the results of the testing to the local authority.

66 Excerpt from Part L2 Building Regulations applies to the erection of a building. Where this regulation applies, the person carrying out the work shall ensure that, appropriate air pressure testing is carried out in accordance with a procedure approved by the Secretary of State; and give a copy of the results of the testing to the local authority.

Energy Demand Information

3. Are all energy uses covered? i.e. buildings, communal lifts, street lighting etc.
4. Have full details of energy efficiency measures been provided?
5. Have the energy demand and carbon emissions for the site been predicted, taking into account energy efficiency measures?
6. Has a thorough analysis of CHP and/or community heating been provided?
7. Has a thorough renewable energy feasibility study been provided for all relevant technologies?
8. Is there a clear statement of what renewable energy systems are proposed and the associated energy and carbon savings?
9. Is the longer term maintenance of the equipment considered?
10. Are there justified reasons if 10% (for relevant developments) is not achieved? The 'undue burden' test should specify whether this is due to economic viability or physical feasibility (e.g. noise sensitive receptors, storage space etc).
11. If 10% on-site places an undue burden, have off-site options been considered?
12. Is a summary of the above information provided?

Certified Assessment Methodologies

C

C Certified Assessment Methodologies

The Code for Sustainable Homes

The Code for Sustainable Homes (the Code) is an assessment tool which measures the sustainability of new homes against categories of sustainable design and construction, rating the whole home as a complete package. There are nine categories:

1. Energy and CO₂ Emissions;
2. Water;
3. Materials;
4. Surface Water Run-Off;
5. Waste;
6. Pollution;
7. Health and Well-Being;
8. Management; and
9. Ecology.

The Code uses a 1 to 6 star rating system to communicate the overall level of sustainability performance. A home assessed as 6 stars will have achieved the highest sustainability rating. The Code contains mandatory minimum standards for energy, water, materials, waste and surface water run-off. There are further non-mandatory standards in each of the other categories providing flexibility to design development around the most appropriate actions for the use and site.

A Code assessment can only be carried out by a licensed and accredited Code assessor. This ensures the rating is independent. In order to build to the Code, a developer will need to hire the services as a Code assessor who will be able to advise what measures and features could be incorporated to achieve the different levels of performance.

The below table shows the stages of assessment under the Code and how these link to planning.

Code for Sustainable Homes: Stages of Assessment

Code for Sustainable Homes: Stages of Assessment	
Stage of Assessment	Link to Planning
Registration A Code Assessor should be contacted and appointed who will register the proposed development with the Building Research Establishment (BRE).	This must take place before a planning application is submitted.
Pre-Assessment Estimator / Design Stage Assessment The first stage of assessment is carried out during the design stage of the proposed development. The appointed Code Assessor will be able to advise during this process on the most suitable and cost effective measures for the site. The Code Assessor will need to work closely with the design team to:	It is strongly advised that this is carried out early in the design process and before a planning application is submitted. All relevant planning applications must be accompanied by a copy of the Pre-Assessment Estimator Report showing the level of performance achieved (Code Level 3 is the expected minimum) It is accepted that due to the lower level of information contained in an outline planning application, applications may not be able to complete a full Pre-Assessment

Certified Assessment Methodologies

Code for Sustainable Homes: Stages of Assessment	
Stage of Assessment	Link to Planning
- Evaluate the performance of each environmental feature; and - Assemble and check evidence provided by the developer and design team to show the intended specification. When the Code Assessor is satisfied with the performance under the Code, they will be able to sign-off a Pre-Assessment Estimator Report to be submitted with the planning application or submit a report to BRE to receive Interim Code Certification	Estimator Report. In such cases, a planning condition will be attached to a planning permission requiring the submission and approval of the Pre-Assessment Estimator Report prior to the development commencing.
Post Construction Review As each dwelling is completed, the Code Assessor will gather evidence to demonstrate that it has been built in accordance with the detailed provided in the Pre-Assessment Estimator Report. This is known as the Initial Post Construction Review Assessment. When the Code Assessor is satisfied with the performance under the Code, they will submit a report to BRE to receive the Final Code Certification for the development.	A condition will be attached on any relevant planning permission requiring the submission of a Post Construction Review Report to be carried out by a Code Assessor. The submission of the Final Code Certification will be required to discharge the condition.

Further information on the Code, including how to get hold of a Code assessor and the Code technical guide, can be gained from www.communities.gov.uk

Nil-Rated Certificate

It is not compulsory for every new home to be built to the Code. However, from 1 May 2008 it is compulsory for every new home in England to have a rating against the Code and for information on this rating to be provided to prospective purchasers through the Home Investment Pack (HIP).⁽⁶⁷⁾ This rating will make it clear whether the home has been built to the Code or not, and if it has, what standard it has achieved. To facilitate this, from 1 May 2008, the HIP will either have to contain a certificate (or interim certificate) showing the rating that the home has received in respect of the Code or a nil-rated certificate showing that the home has only been designed to meet current Building Regulations.

The Building Research Establishment Environmental Assessment Method (BREEAM)

The Building Research Establishment Environmental Assessment Method (BREEAM) is a widely recognised assessment tool which can be used to measure the sustainability of a wide range of uses including offices industrial, shops and schools. Should a development not fit within the standard assessment types, a bespoke assessment can be commissioned. The Code for Sustainable Homes has superseded the BREEAM assessment for residential buildings known as Eco-homes.

BREEAM assesses the performance of developments in 9 areas:

1. Management;
2. Energy Use
3. Health and Well-Being;
4. Pollution;

⁶⁷ Note: The new regulations for providing for mandatory ratings does not apply to properties (individual or as part of an ongoing development) where the initial notice, full plans or Buildings Notice have been received by Building Control prior to 1st May 2008.

Certified Assessment Methodologies

5. Transport;
6. Land Use;
7. Ecology;
8. Materials; and
9. Water.

Credits are awarded in each area according to performance and then set of environmental weights is used to provide a single combined score from Pass to Excellent.

Further information on BREEAM, including how to get hold of a BREEAM assessor, can be gained from www.bre.org.uk

Checklist South East

The Checklist is an easy-to-use online tool that has been developed by the South East England Development Agency (SEEDA) and the Building Research Establishment. The Checklist specifically seeks to guide the design of new developments by making sense of current policy by highlights best practice, complementing BREEAM Ecohomes and the Code for Sustainable Homes.

The Checklist complements BREEAM and the Code for Sustainable Homes by looking at issues relevant to the overall development scale as opposed to the individual development sites and buildings. It covers regionally specific sustainability and planning issues, emphasising those of higher priority. It can also be adapted to reflect locally significant concerns.

Further information on the Checklist South East can be gained from www.southeast.sustainability-checklist.co.uk

Summary Checklist

D Summary Checklist

Summary Checklist

Planning applications should provide information demonstrating what actions they have taken to improve the sustainability of the proposed development. Detailed justification should also be provided of actions which have not been followed. This summary checklist may be used to ensure information provided fully complies with this SPD.

Summary Checklist

Topic	Question	Action Taken	
		Yes	No
Major Developments	Has a Pre-Assessment Estimator Report been undertaken to show that the development is capable of meeting in the case of residential developments the Code for Sustainable Homes Level 3 or in the case of non-residential developments BREEAM Very Good standards?		
Energy Consumption	Does the development maximise the use of passive solar gain whilst minimising the potential for overheating?		
	Does the development maximise the use of insulation both within its design and use of materials?		
	Does the development utilise energy efficient appliances?		
	Does the development maximise the opportunity for natural lighting whilst avoiding glare and minimising the potential for overheating?		
	Does the development maximise opportunities for natural ventilation?		
On-Site Renewable Energy Generation	Does the development incorporate on-site renewable energy generation to meet at least 10% of the expected energy demand?		
Water Resource Management	Does the development incorporate water saving devices?		
	Does the development maximise opportunities for rainwater harvesting and recycled water?		
	Has the landscaping been designed to minimise watering needs, particularly from the mains supply?		
Flood Risk Management	Does the development incorporate Sustainable Drainage Systems to manage surface water run-off from areas of hardstanding and roofing?		
	Could the development support the inclusion of basins or ponds to reduce the overall risk of flooding?		
	Has the development been designed to reduce the consequences of flooding?		
Biodiversity	Does the development maintain, protect or enhance wildlife habitats?		

Summary Checklist

D

Topic	Question	Action Taken	
		Yes	No
	Does the development incorporate opportunities to enhance the overall biodiversity value of the site?		
Waste, Recycling and Composting Facilities	Does the development incorporate or have access to internal and external storage to facilitate for waste and recycling?		
	Does the development incorporate or have access to facilities for composting?		
	Are the waste, recycling and composting facilities easily accessible for occupiers?		
Cyclist Facilities	Does the development provide or have access to secure cycle storage for residents, occupiers and visitors?		
	Does the development include shower and changing facilities for employees?		
	Does the development take opportunities to provide safe cycle access within and through the site?		
Air, Noise and Light Pollution	Does the development minimise the effects of air, noise and light pollution from existing sources?		
	Does the development prevent the creation of new effects of air, noise and light pollution?		
Responsibly Sourced and Recycled Materials	Have as many materials as possible been reused or recycled at the end of a building's life?		
	Have construction materials been chosen which are environmentally friendly, of low embodied energy and which can be recycled or reclaimed when the building comes to the end of its life?		
	Does at least 75% of the timber used in the development come from a certified source?		
	Are materials sourced locally (within 35 - 50 miles of a site)?		
Site Waste Management	Has a Site Waste Management Plan been prepared?		
	Does the site layout or phasing allow for the on-site storage of materials for re-use and the creation of a waste management area?		
	Does the development utilise materials from the demolition of existing buildings on the site or recycled materials from elsewhere?		
Pollution	Will the construction site be managed according to the Considerate Constructors scheme?		
	Will the construction site be operated according to a Site Environmental Management Plan?		