

Supplementary Planning Document Number 5



Sustainable Building Design and Construction

Adopted February 2006





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This document is also available in large print, braille, on audio tape, computer disc or in other languages.

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Credits

Front cover

Wellspring Healthy Living Centre, Barton Hill, Bristol.

With thanks to Community at Heart.

Other photographs: thanks to UWE, Ashley Vale

Action Group, HBG





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EXECUTIVE SUMMARY

This guidance sets out Bristol's commitment to achieving sustainable development through the planning process. It supplements Bristol Local Plan policies, brings together relevant national and regional guidance, and provides clear and practical advice on sustainable building design and construction. In particular it relates to:

- the quality of life theme in the Local Plan
- the Sustainable Development objectives set out in the Management of the Environment chapter of the Local Plan:
- Local Plan policies ME1, ME2, ME4, ME5, ME6, ME8, ME11 and NE4

The Supplementary Planning Document (SPD) has been developed in accordance with local, regional and national planning policy, and the adoption of this guidance means that sustainable design and construction are material considerations to be given weight in considering development proposals, and can be the subject of planning conditions and/or obligations in respect of appropriate development. Applicants for planning permission will be expected to have considered this planning guidance and in so doing to have focused on the five sustainable design and construction aims defined here to:

- reduce overall energy use and maximise potential for renewable energy supply and use
- minimise waste and maximise re-use and recycling both during construction and after occupation
- conserve water resources, enhance water quality, incorporate water sensitive design and minimise vulnerability to flooding
- minimise polluting emissions to water, air and soil and minimise noise and light pollution
- maximise use of materials from sustainable sources

For larger development sites, applicants are encouraged to set out how they have addressed these aims in a sustainability statement which can be based on the framework provided by these key questions for each aim:

Energy

- E1** How will natural heating, cooling, daylight and ventilation be used in the development?
- E2** How will the design ensure the efficient use of energy and reduce overall energy use?
- E3** How will the design incorporate the use of energy from renewable sources?



Use of solar panels on a new house in Ashley Vale.

Waste and recycling

- WR1** How will the development provide space or facilities for the separate collection of all materials that can be recycled, or easy access to recycling facilities?
- WR2** How will the development re-use demolition, construction or other reclaimed wastes on or close to the site and/or from elsewhere?
- WR3** How will waste of new construction materials be minimised during construction?



Water

- W1** How will any vulnerability to current or future flooding be minimised?
- W2** How will mains water be conserved and discharges of waste water into the main drainage system be minimised?
- W3** How will discharges of polluted waters be minimised?
- W4** How are the aims of enhanced amenity and biodiversity being addressed through water sensitive design?

Pollution

- P1** How will the development clean up any contamination on site and/or avoid land contamination in future?
- P2** How will pollution of all kinds be minimised during construction?
- P3** How will the development impact on external air quality?
- P4** Will noise pollution be minimised within the development and from external sources?
- P5** How will light pollution be minimised in and around the development?

Materials

- M1** How will the materials be specified to help maintain local character and ensure long life?
- M2** Will materials be specified to ensure low environmental impact and to maintain good internal air quality?
- M3** Will PVC be avoided where an alternative is available?

Environmental assessments

- EA1** Will the design be assessed against an accredited scheme to assess the building's sustainability such as the BREEAM or Ecohomes standards and a target rating set?
- EA2** Will any housing element of the development exceed a rating of 80 on the Building Research Establishment (BRE) SAP Rating?



Interesting use of materials from glazing to straw bale panels at the UWE architecture studio.





PART ONE

1.1 Introduction

Bristol has a longstanding commitment to being a sustainable city, and sustainable design and construction of buildings is a crucial factor in this. More sustainable buildings are crucial to meet targets to reduce carbon dioxide emissions, both regionally and nationally - half the energy used in Bristol is used in heating, lighting and cooling buildings.

Sustainable building design and construction will also create comfortable, attractive and healthy places for people to live and work in. Increased energy, water and running costs for buildings and more demanding regulations mean that it makes good commercial sense to anticipate requirements and aim for best practice and quality design. Building regulations cover some aspects of sustainable building design (in particular energy), and the trend of recent years is for the regulations to become ever more demanding in terms of

achieving sustainable design and construction aims. This guidance does not seek to require applicants to go beyond the current standards. However, choosing to do so, aspiring to emerging trends in good practice and looking for site specific opportunities can help "future proof" a building and ensure it that it will meet the rising standards occupiers will come to expect for many years to come. Using sustainable design and construction methods is also likely to provide higher quality and more aesthetically pleasing buildings

Good sustainable design will also deliver developments with lower running costs - an attribute that is highly attractive to both householders and businesses. Increasingly, commercial organisations, public bodies and individuals want to do their bit by being demonstrably socially and environmentally responsible. They want to show that they are minimising greenhouse gas emissions, recycling materials, and using renewable energy technology. A number of recent sustainable construction developments in the UK have generated huge interest and a queue of potential buyers. A recent survey by the Commission for Architecture and the Built Environment and the World Wildlife Fund showed that 87% of housebuyers want to know whether their homes are environmentally friendly and 84% would be prepared to pay more for an eco-friendly home.



Sustainable building design and construction will also create comfortable, attractive and healthy places for people to live in - new houses at Ashley Vale



1.2 Policy and context

The *Planning and Compulsory Purchase Act* (2004) sets the framework for planning policy development. Clause 39 of the bill – ‘Sustainable development’ requires any bodies drafting a regional spatial strategy or local development document to:

“exercise the function with the objective of contributing to the achievement of sustainable development”

Planning Policy Statement 1: Delivering Sustainable Development (2005) states that:

“sustainable development is the core principle underpinning planning”

This guidance requires planning authorities to:

“ensure that sustainable development is pursued in an integrated manner, in line with the principles...set out in the UK strategy”

and 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”

This SPD gives clarity on how this may be achieved, and is based on the *Bristol Sustainable Development Guide to Construction* which was published in 2002. The guide has been extensively distributed and used as a basis for sustainability submissions on some major development sites in the city. A programme of associated seminars has also been offered between 2003 and 2005, based on the topics in the guide.

The guide has been well received, and cited as an example of good practice. Feedback from colleagues, developers and architects has suggested securing adoption of the guide as a supplementary planning document, to enhance the status of the advice, and to provide focussed advice on building design and construction. This feedback has been used to inform the development of this document.

Local Policy

The adopted *Bristol Local Plan* (1997) sets out the intention to:

"... recognise and act upon local, national and global environmental issues by adopting and implementing a long term environmental strategy to ensure a cleaner, greener, healthier and safer city both for present and future generations."

This guidance sets out Bristol’s commitment to achieving sustainable development through the planning process. It supplements Bristol Local Plan policies, brings together relevant national and regional guidance, and provides clear and practical advice on sustainable building design and construction. In particular it relates to:

- the quality of life theme in the Local Plan to: “recognise and act upon local, national and global environmental issues by adopting and implementing a long term environmental strategy to ensure a cleaner, greener, healthier and safer city both for present and future generations.”
- the Sustainable Development objectives set out in the Management of the Environment chapter of the Local Plan:

“2.1.3 A key objective of the Chapter and the Plan as a whole is to ensure that development proposals are sustainable. Sustainable development has been defined as “development which meets the needs of the present without compromising the ability of future generations to meet their own needs”





(World Commission on Environment and Development 'The Brundtland Report – Our Common Future', 1987). ...Every development proposal has the potential to damage or change the environment. One of the roles of planning therefore is to ensure that any damage is kept to a minimum and within acceptable limits. At the same time it is important to identify opportunities for improving the environment through good design.'

- The detailed objectives set out on the Management of the Environment Chapter, section 2.3:

2.3.1 To ensure that development proposals provide a safe, clean and healthy environment, which improves the quality of life of people living within Bristol both now and in the future.

2.3.2 To ensure that, for all development proposals, a thorough assessment and evaluation of the environmental effects is undertaken at an early stage, including the identification of any appropriate compensatory and mitigation measures, and that Full Environmental Statements are submitted where necessary.

2.3.3 To encourage energy efficiency in the design of new developments and in building conversions, extensions and refurbishments.

2.3.4 To support proposals for renewable sources of energy in appropriate locations.

2.3.5 To ensure the appropriate siting, location and design of all potentially polluting developments and pollution-sensitive developments in order to minimise any risk of pollution, or loss of amenity to local residents, or adverse impact on the physical environment.

2.3.6 To ensure that new development activity does not increase the risk of flooding.

2.3.7 To ensure that new development provides appropriate space and facilities for the storage, separation and collection of waste material for reuse and recycling.'

- and to Local Plan policies ME1, ME2, ME4, ME5, ME6, ME8, ME11 and NE4

The *Bristol Local Plan Sustainability Appraisal* (2001) was commissioned to inform the revision of the Local Plan for Bristol, and so will inform the Local Development Framework. This has been used to inform the Sustainability Appraisal for this SPD.

The *Community Strategy for Bristol* (2003, updated 2005) includes maintaining a high quality environment as one of its five long term aims for Bristol:

'A high quality environment – Bristol to be a green capital in Europe, tackling the causes of climate change and creating a clean and attractive built and natural environment.'

The Corporate Plan for Bristol, 2006 – 2009 also has the creation of a high quality environment as a priority, and sets out Bristol City Council's commitment to:

'increasing awareness of environmental issues and improving environmental regulatory services....We will...encourage greater use of sustainable design and construction methods throughout all sectors.'

1.3 Purpose and status

The purpose of this supplementary planning document is to set out clearly Bristol's commitment to achieving sustainable development through the planning process, and to set aims for development sites. It supplements Bristol *Local Plan* policies, brings together relevant national and regional guidance, and provides clear and practical advice on sustainable construction. The content of this document is primarily concerned with environmental sustainability, as issues relating to social and economic sustainability are covered in other guidance.



SPD 5 provides focussed planning policy guidance on design and construction matters. Broader sustainability concerns – including the location of development, re-use of existing buildings, mixed use development, density, biodiversity, and the integration of transport and land use planning are addressed in the existing *Local Plan* and the emerging *Local Development Framework*.

This guidance has been developed in accordance with local, regional and national planning policy. The adoption of this guidance means that sustainable design and construction are material considerations to be given weight in considering development proposals, and can be the subject of planning conditions and/or obligations in respect of appropriate development. Applicants for planning permission will be expected to have considered this planning guidance and in so doing to have focused on the 5 sustainable design and construction aims as set out in section 2.1.

For larger development sites, applicants are encouraged to submit a sustainability statement which can be based on the framework provided by the key questions for each aim set out in Part Two.

1.4 How to use this document

In part two of this guidance many practical suggestions are made for creating more sustainable buildings, related to the following key sustainable design and construction aims. These aims have been identified through extensive consultation, on the basis of the existing *Guide to Sustainable Development and Construction*, and are consistent with national, regional and local objectives.

A key message of this guide is that the earlier in the development process sustainability is considered the lower will be the costs of doing so.

This means that the inclusion of sustainability considerations should start at project inception. Key questions to consider include:

- Has the client been informed about the potential benefits of adopting sustainable design principles?
- Have strategic sustainability objectives been developed for the site?
- Have you ensured that the design team has access to the full range of expertise to enable sustainability to be adequately considered?

The suggested approach is to draft a brief for the site which sets out how the development will contribute to sustainable development. The key questions and checklists provided can act as a prompt for this, to help ensure all the relevant issues are covered. The sustainability statement can then simply describe how the site design and planned construction will respond to each of the key questions relating to the sustainable design and construction aims.

For each key question, supporting information is provided, together with details of agencies who can help and further contacts, both national and local – for example, grant schemes for renewable energy features. A checklist is provided in each section, to act as a prompt for the key decisions to be taken at different stages, from feasibility through to occupation.

In section 2.7, some information on environmental assessment methods is given, together with related key questions. These methods provide a useful means of demonstrating that sustainability has been considered.





PART TWO

2.1 Sustainable design and construction aims

Part two of this guidance is concerned with key sustainable design and construction aims. These aims have been identified through extensive consultation, on the basis of the existing Guide to Sustainable Development and Construction and are consistent with national, regional and local objectives. For each aim there is a section containing key questions and supporting information.

These aims are to:

- reduce overall energy use and maximise potential for renewable energy supply and use
- minimise waste and maximise reuse and recycling both during construction and after occupation
- conserve water resources, enhance water quality, incorporate water sensitive design and minimise vulnerability to flooding
- minimise polluting emissions to water, air and soil and minimise noise and light pollution
- maximise use of materials from sustainable sources

There is also a section (2.7) on environmental assessment methods, with key questions and supporting information.



Entrance lobby at the Wellspring Healthy Living Centre, Barton Hill.



2.2 Energy

Local Plan policy - Bristol Local Plan [Policy ME1](#) deals with renewable energy:

“ME1 Proposals for the utilisation and development of renewable sources of energy will be permitted providing there is no unacceptable impact on:–

- (i) The amenity of local residents due to noise or other disturbance;*
- (ii) Public health and safety;*
- (iii) The visual quality of important landscape designations;*
- (iv) The natural environment.”*

Sustainable Design and Construction Aim: reduce overall energy use and maximise potential for renewable energy supply and use

Background

Bristol’s buildings, in their construction and operation, account for around half the city’s energy use. Through better design and operation, energy consumption could be dramatically cut, saving money and reducing emissions of greenhouse gases such as carbon dioxide (CO₂), a major cause of climate change.

Reduction in the use of fossil fuels can also be aided by incorporating sustainable energy supply such as CHP (combined heat and power) and using renewable energy sources. By combining energy efficiency, passive solar design and sustainable energy supply it is now possible to design new developments with net zero carbon emissions.

Energy use can be reduced through designs that keep buildings naturally cool in the summer and warm in the winter. Warmer summers increase the demand for air conditioning, which increases energy consumption, but careful building design can prevent or reduce the need for air conditioning through insulation and natural ventilation.

Buildings that are comfortable and well ventilated in all seasons also promote health and wellbeing. Fuel poverty and the lack of access to affordable energy services to people on low incomes, is a problem for many residents of the city. For elderly people, high summer temperatures can pose a threat to health. Improving the availability of energy efficient, comfortable and affordable housing is a high priority.



Wellspring Healthy Living Centre in Barton Hill has been designed to be naturally cool in summer and warm in winter.

The National and Regional Context

The *UK Climate Change Programme* recognises that buildings have to become more efficient in their use of energy and a greater proportion of our energy supply needs to come from sustainable sources. The UK is committed to increasing electricity generated from renewable energy sources by 10% and to installing enough CHP plant to generate 10,000MW of electricity by 2010. The government *Performance and Innovation Unit Energy Review* has recommended increasing the target for electricity from renewable sources to 20% by 2020 and improving energy efficiency in the domestic sector by 20% by 2010 and a further 20% in the following decade.





The commitment to increase renewable energy supply is embraced in *Planning Policy Statement 22: Renewable Energy*. This recommends that local planning authorities:

- consider the opportunity to incorporate renewable energy projects in all new developments and encourage such schemes
- set out criteria that will be applied in assessing applications for planning permission for renewable energy projects
- consider small scale projects and not reject planning applications which include renewable energy generation because the level of output is small

The renewable energy assessment and targets for the South West commissioned by Government Office South West has recommended that the region should work towards a target of procuring between 11% and 15% of its electricity from renewable resources. It also suggested that the former county of Avon could contribute 9-10 MW of new renewable capacity (not including photovoltaics) by 2010.

The commitment for greater energy efficiency is also enshrined in the *Home Energy Conservation Act* (1995) and the Government's *Fuel Poverty Strategy* (2001). The *Regional Sustainable Development Framework - A Sustainable Future for the South West* has set an objective to promote efficient use of affordable energy and reduce energy demand.



Demonstration Ecohome at the CREATE Centre.

The *Utilities Act* also states that energy suppliers now have a duty to invest in domestic energy efficiency in existing and new homes. The EU is bringing forward legislation that will require an energy certificate to accompany all buildings for sale or for rent by 2008.

Building design also needs to take account of the need to adapt to climate change without increased energy use by integrating shelter and natural cooling and ventilation.

Bristol's Commitment to Action

- The Bristol Local Plan (adopted December 1997) - *Policy ME1* deals with energy conservation and renewable energy
- Bristol City Council aims to play its part in reducing energy use and emissions of greenhouse gases. The council is a member of the Councils for Climate Protection (CCP) Programme, through which Bristol is committed to reducing its emissions and has adopted a *Climate Protection and Sustainable Energy Strategy*.
- A study undertaken by Energy for Sustainable Development (2001) for the council sets out the options to raise the amount of energy supplied from renewable sources to 9.8% of total energy demand or 24% of its electricity demand by 2010.
- The *Home Energy Conservation Act* (1995) places a duty on Bristol City Council to secure a significant improvement in domestic energy efficiency across all housing tenures. Bristol City Council takes these obligations seriously and has developed a range of initiatives in partnership with other organisations aimed at assisting householders to live affordably in warmer homes.
- The Centre for Sustainable Energy based in the CREATE Centre runs the Bristol and Somerset Energy Efficiency Advice Centre and Renewable Energy Advice Service with support from the Energy Saving Trust and local authorities including Bristol City Council.



Key questions for energy

E1 How will natural heating, cooling, daylight and ventilation be used in the development?

We have freely available to us the energy from the sun. Passive solar gains can provide significant contributions to space heating, lighting and ventilation in a building. Different approaches are needed depending on the size and use of buildings.

Useful solar gain in housing and smaller commercial buildings can be increased by measures such as:

- Siting of buildings to maximise access to solar gain and minimise overshadowing
- Orientating buildings so that the main elevation is facing within 30 degrees of due south
- Ensuring that the main living spaces are located on the southern facing sides of the building with bedrooms on the north
- Providing shelter from prevailing winds in the form of trees or landscape design
- Maximising the area of glazing on the south side of a building and minimising glazing on the north side. It is essential that any such design should incorporate means to regulate solar gain to prevent over-heating
- Incorporating heavy internal walls to store the heat from solar gain

In large commercial offices as much as 40% of energy costs can be accounted for by lighting so good access to natural light should be a key design parameter. However excessive solar gain can add to the heat generated by lighting, equipment and people to cause overheating and increasing cooling demands. So design features to avoid excessive solar gain should be

incorporated such as louvres, external blinds and large roof overhangs to provide shade in high summer sun but still allowing maximum daylight.

Sustainable design also includes the use of natural ventilation which can be achieved by fitting opening windows or vents in buildings, using displacement ventilation or using an atrium to create a rising 'heat stack'. This is a much more sustainable option than air conditioning systems, which are costly to install and run, contribute to climate change and have been linked to 'sick building syndrome'. Ice storage cooling can also be considered.



Maximising solar gain in winter with large glazed areas, and a roof overhang to provide shade in summer - the architecture studio at UWE.



E2 How will the design ensure the efficient use of energy and reduce overall energy use?

Energy efficiency measures reduce harmful emissions and also deliver considerable savings in running costs during the life of the building. Effective measures include:

- Super insulation of walls, roofs and floors
- Advanced glazing systems such as argon filled low-emission double glazing
- High-efficiency boilers (e.g. gas condensing boilers) with good heating controls
- High-efficiency luminaires and lighting controls
- In larger buildings - Building Energy Management Systems (BEMS) to control and optimise lighting, heating and ventilation



Warmcell insulation made from recycled newspapers to insulate walls.

E3 How will the design incorporate the use of energy from renewable sources?

By using energy from renewable sources such as wind, solar, hydro and biomass; and by increasing the efficiency of energy use through Combined Heat and Power (CHP) and District Heating (DH) systems major reductions in energy use and green house gas emissions can be achieved. Technologies can be incorporated into the design of new developments, such as:

- Solar water heaters can be placed on the roof
- Photovoltaic (PV) arrays can be incorporated into wall cladding, roof tiles or glazing to generate electricity
- CHP plant can provide both electricity and heat and can be fired by gas or renewable energy sources such as coppice wood
- Ground store heat pumps or heat exchange systems can be used for heating
- Wind turbines
- Biomass can be integrated into larger schemes



Solar panels on roofs at Ashley Vale.



In larger developments, installing a district heating or cooling network should be considered. These distribute heat or cooling from central plant (such as a CHP plant) across a neighbourhood (for more information contact the CHP Association). There may be potential to connect to an existing district heating or cooling network or to co-operate with neighbouring building developments. Cooling in commercial office building is already a significant energy requirement and is likely to grow with our changing climate.

When considering building integrated renewable energy generation, such as wind, solar and photovoltaics, careful siting and design can minimise potential visual impact. Existing planning policy governs issues such as proximity to existing development, and advice in *Planning Policy Statement 22* includes:

'landscape and visual effects...may be minimised through appropriate siting, design and landscaping schemes'

Energy aim : checklist

Feasibility

- Have you considered the potential for using district heating or combined heat and power (CHP), including the potential to share such plant with others in the area?
- Have you considered incorporating solar, wind or photovoltaic energy generation into the design?
- Have you assessed the energy running costs of the development against the costs of up-front investment in energy conservation?
- Have you considered linking the development to renewable energy supplies?

Outline Proposal

- Have you assessed the proposed site, and considered how to incorporate passive solar design and where necessary shelter and shading?
- Does the structure and form of the development enhance the potential for energy conservation?
- For housing developments, does the strategy provide affordable comfort conditions for occupiers?

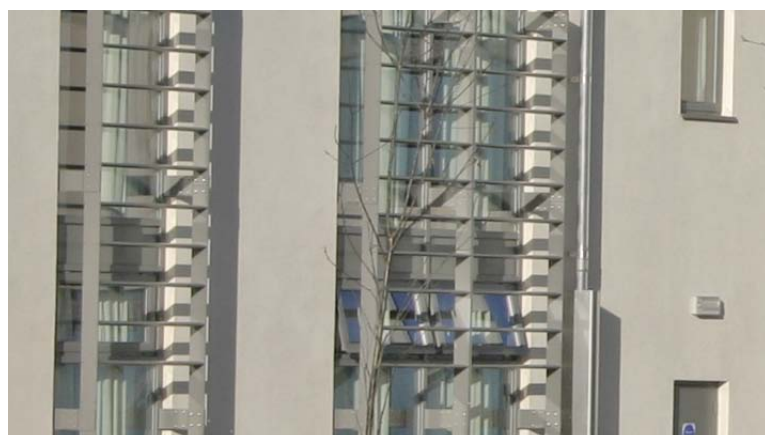
Detailed design

- Have you ensured that you have correctly sized heating and ventilation plant?
- Have your specifications ensured that energy use for lighting is minimised?
- Have you incorporated any renewable energy features in the design, or at least allowed for them to be introduced at a later stage?
- Have you adopted an Energy or Environmental Management System for the building?

Occupation

- Is a maintenance manual and instruction handbook available for building users, with details of heating, lighting and ventilation systems?

Use of external blinds for shading at Henbury School.





Further Information

- Building Research Establishment – for BREEAM assessments and guidance on energy conservation
www.bre.co.uk
- Energy Saving Trust (EST) – offers advice on energy efficiency and conservation to home owners and small businesses
www.est.org.uk
- The Carbon Trust promotes low carbon technology for non-domestic uses in the private and public sector
www.thecarbontrust.co.uk
- ISO14001: More information from the BSI:
www.bsi-global.com
- Eco Management and Audit Scheme
www.emas.org.uk
- Association for Environment Conscious Building (AECB)
www.aecb.net
- Combined Heat and Power Association
www.chpa.co.uk
- Part L of the Building Regulations
www.projects.bre.co.uk
- Clear Skies – grants for renewable energy installations for householders and not for profit companies
www.clear-skies.org
- Action Energy and Design Advice – advice on energy conservation in new build and refurbishment – grant aided energy surveys and design consultancy
www.sustainable-energy.co.uk

Local Contacts

- Centre for Sustainable Energy – national body. Includes energy advice for business, advice on renewable energy and energy efficiency advice service for householders and small businesses
Create Centre, Smeaton Road,
Bristol BS1 6XN
www.cse.org.uk
- Climate Protection and Sustainable Energy Strategy, Bristol City Council (2004)
www.bristol-city.gov.uk/climate
- 'Eco Building – a selection of the most environmentally friendly buildings in the Bristol and Bath Area' – publication available from:
CREATE Centre, Smeaton Road,
Bristol, BS1 6XN,
tel 925 0505,
email create@bristol-city.gov.uk



Natural ventilation used at the new Henbury School.



2.3 Waste and recycling

Local Plan policy - Bristol Local Plan [Policy ME11](#) covers the provision of recycling banks in new development.

ME11 Major shopping, leisure and residential developments will be required to provide bottle banks for glass recycling for use by the public, taking into account the location of existing facilities. Suitable sites for these and other recycling banks will be assessed according to the following criteria:-

- (i) Access and safety for local people (particularly for women and disabled people);*
- (ii) Visual amenity;*
- (iii) Impact on local residents, due to noise and other disturbance;*
- (iv) Traffic and highway safety;*
- (v) The ability of collection vehicles to operate effectively.*

Sustainable Design and Construction Aim: minimise waste and maximise reuse and recycling both during construction and after occupation

Background

Bristol currently produces about 1.4 million tonnes of waste each year of which about 185,000 tonnes is domestic household waste. Analysis shows that between 70%-90% of collected household waste is recyclable or compostable, however over 80% of this waste goes to landfill. Apart from squandering resources, landfill disposal and incineration creates a range of other environmental problems. Organic waste produces large amounts of methane, a potent greenhouse gas that has 21 times the warming effect of carbon dioxide.

Nationally, manufacture of construction materials generates an estimated 12 million tonnes of waste per annum, while an additional 30 million tonnes of excavated soil and clay arise from construction site preparation. Demolition waste is produced in similar quantities. Building and demolition waste accounts for 46% of Bristol's waste going to landfill.

The National and Regional Context

Action is underway to reduce the proportion of waste going to landfill. The *European Community Directive 99/31* sets a target of reducing biodegradable municipal waste to landfill by 35% from 1995 levels by 2020. The *UK Government Waste Strategy for England and Wales* sets out the Government's vision for waste management, including a target for local authorities to recycle at least 33% of municipal waste by 2015. Current planning policy for England on waste is outlined in *Planning Policy Guidance 10: Planning and Waste Management*.

MPG6 outlines the Government's aim of replacing 20% of primary aggregate with reused or recycled waste material by 2006 and a whole range of recycled materials. The introduction of the Landfill Tax has created a significant financial incentive to reuse and recycle materials. It also makes using recycled materials in construction a more attractive financial option. The aggregate tax sends a similar message about reducing the unnecessary use of new minerals and supporting the re-use of construction and demolition materials.



Demolition waste which could be re-used.





On a construction site, as much as 20% of materials can be wasted. Burning surplus materials is common practice that is wasteful and causes pollution and smoke nuisance that can lead to prosecution. The government's strategy of more sustainable construction - *Building a better quality of life* - puts forward design for minimum waste as a key action for the construction industry.

Bristol's Commitment to Action

- The Bristol Local Plan (adopted December 1997) Policy ME11 covers the provision of recycling banks in new development.
- The council's weekly black box collection serves around 140,000 households, the most comprehensive such service in the UK, and this has contributed to a recycling rate of approximately 18%.
- Where it is not possible for the council to provide homes with individual recycling boxes, such as in a block of flats, mini recycling centres are provided.
- The council has also sold more than 12,000 compost bins to city residents.
- A headline indicator of quality of life in Bristol is the total waste arising in the city.
- An investigation has been commissioned looking at the disposal of construction waste by City Council departments.

Key questions for waste and recycling

WR1 How will the development provide space or facilities for the separate collection of all materials that can be recycled, or easy access to recycling facilities?

By creating space within the structure for the safe storage of waste for recycling, developers can make the option of recycling easier for residents and staff and assist the collection of material by waste contractors. This is particularly important in flats, and careful thought should be given to storage which is safe and convenient. For new developments:

- Space should be provided for storing recycling bins. This space should be sufficient to allow separate storage for all recyclable or compostable waste, including paper, cans, organic / garden waste, glass, cardboard, and plastics. Space for bins/boxes awaiting collection should be provided within the development and not on the footway.
- Where possible composting facilities should be provided. Compost provides a valuable and free nutrient source for food growing, whether on site or elsewhere
- Provide facilities for effective litter collection and cleansing.

Applicants for all significant developments should contact Bristol City Council to discuss provision for domestic waste storage, as in some instances it may be possible for a number of developments to share facilities or for new developments to use existing facilities adjacent to the site.



Grinding up demolition waste for re-use.



WR2 How will the development re-use demolition, construction or other reclaimed wastes on or close to the site and/or from elsewhere?

The redevelopment of brownfield sites usually leads to the production of quantities of demolition waste. In addition excavations for foundations and landscape design can result in the production of waste soils. These are potentially valuable materials. By re-using these materials developers can reduce their environmental impact and can also save on the now significant costs of landfill. Developers should:

- Audit the materials present on a site and assess the extent to which they could be put to use in the new development or in other developments elsewhere
- Identify any hazardous materials (e.g. asbestos) on site and arrange for containment and disposal by a licensed operator
- Assess the potential for using reclaimed and recycled materials from elsewhere
- Consider the life span of all construction materials used, new and recycled, and the ease with which they could be disposed of or used again once the structure reaches the end of its life



Some of the rubble generated by the demolition of Henbury School ready to be re-used.

WR3 How will waste of new construction materials be minimised during construction?

The waste of materials during construction is a waste of money and adds to the burden of materials being disposed of to landfill. Waste of construction materials can be minimised by:

- Design that utilises whole units of construction materials
- Storage of materials on site that minimises losses to damage by damp and rain
- Separation of waste materials to facilitate reuse on site or recycling
- Wood waste can be re-used or recycled through the Bristol Wood Recycling Project.



Re-used bricks were combined with new to build the lower walls of the Ecohome at CREATE.





Waste and recycling aim: checklist

Feasibility

- Have you audited the site and assessed the extent to which any materials could be re-used in the new construction project?
- Have you identified the extent to which recycled materials could be used in construction?
- How have you sought to minimise the amount of waste generated during construction and decommissioning of the development?
- Have you considered outlets for unwanted or re-usable materials that could be sent to reclamation businesses?

Outline Proposal

- Does the design minimise the quantity of new materials wasted?
- Have you considered using materials from the demolition of existing buildings on the site and using recycled materials?
- Does the proposal make the maximum use of space to avoid waste of valuable development land?

Detailed design

- Have you selected recycled materials or salvaged components?
- Have you opted for materials with a long life span and low maintenance requirements?
- How have you made provision for storing and recycling waste materials for all users of the site? Is this space easily accessible?

Construction

- Have you set up weather-proof storage for materials?
- Have you set up facilities for the separation of waste materials for recycling or re-use on site?

- Have you arranged to return delivery and packaging materials such as pallets back to the suppliers?

Further Information

- Waste and Resources Action Programme (WRAP) - Government sponsored organisation creating markets for recycled products
www.wrap.org.uk
- Wastewatch is an environmental charity promoting sustainable resource use.
www.wastewatch.org.uk
- Guidance on minimising waste in construction
www.rics.org
- Smartwaste - BRE have developed the Smartwaste tool to assist construction companies with sustainable waste management, reducing environmental impact and saving costs
www.smartwaste.co.uk

Local Contacts

- SITA - is the City Council's contractor for household waste collection
www.sitaonline.co.uk
- The Recycling Consortium is a not for profit company which encourages people to think again about waste and how it is dealt with. TRC is based in Bristol, but also serves local communities in North Somerset, Bath and North East Somerset and South Gloucestershire.
TRC, Create Centre, Smeaton Road, Bristol BS1 6XN
Tel: 0117 930 4355
Fax: 0117 929 7283
www.recyclingconsortium.org.uk
- The Bristol Wood Recycling Project collects waste wood from building sites for re-use and recycling.
www.bwrp.org.uk



2.4 Water

Local Plan policy - **Policy ME5** covers protection of groundwater supplies. **Policy ME8** covers development within the coastal zone. **Policy ME9** covers development subject to flood risk or which would increase flood risk. **Policy NE4** covers development that might cause harm to natural watercourses or loss of flood-plains.

ME5

The location and design of development will be required to incorporate appropriate remedial measures to avoid harm to groundwater supplies which may otherwise result from the development.

ME8 Development within the coastal zone defined on the Proposals Map, will only be permitted where:—

- (i) A coastal location is an operational requirement.*
- (ii) Appropriate flood defence works are undertaken as part of development.*
- (iii) Nature conservation interests are not significantly affected, either directly or indirectly.*

ME9

- (I) Development subject to flood risk will be required to provide the appropriate defence works at the same time as the development itself.*
- (II) Development which would increase the risk of flooding, or which is likely to cause unacceptable effects arising from surface water run-off, will be required to provide for the appropriate drainage infrastructure works and retention works at the same time as the development itself.*

NE4

- (I) Development which would cause unacceptable harm to the natural watercourse system or to the extent of the loss of natural flood-plain will not be permitted unless satisfactory compensatory measures are provided which take full account of requirements for land drainage, watercourse management, good water quality, nature conservation and amenity.*
- (II) Development which conserves or enhances the water environment will be permitted, provided that measures are included as appropriate to:—*
 - (i) Safeguard or enhance water quality (eg by decontamination);*
 - (ii) Ensure there is no unacceptable damaging run-off from hard surfacing;*
 - (iii) Prevent pollution where harmful discharges are likely to occur;*
 - (iv) Retain wetland habitats and natural waterside vegetation and ensure their future management.*

Sustainable Design and Construction Aim:
conserve water resources, enhance water quality, incorporate water-sensitive design and minimise vulnerability to flooding



A wildlife pond incorporated into the design of a new amenity area around Seabank Power Station at Avonmouth.





Background

Water is central to our existence and quality of life. Construction projects therefore need to accommodate local and regional hydrological processes – rivers, groundwater, drinking water supplies, rainfall patterns. Hydrological systems pre-date human infrastructure, and sustainable design should recognise this and design in a way which respects the site constraints and opportunities relating to water. Water sensitive design can achieve the following:

- reducing peak flows to watercourses or sewers and potentially reducing the risk of flooding downstream
- reducing volumes and the frequency of water flowing directly to watercourses or sewers from developed sites
- improving water quality by removing pollutants from diffuse pollutant sources
- reducing potable water demand through rainwater harvesting
- improving amenity through the provision of public open space and wildlife habitat
- replicating natural drainage patterns, including the recharge of groundwater so that base flows are maintained.

We use greater quantities of water than we ever have, placing great pressure on river ecosystems and groundwater supplies. The last decade has seen the south west of England affected by drought and flooding with significant cost and discomfort to home owners and businesses in affected areas. Simple design measures could conserve water resources, save money and reduce flood risk.

The National and Regional Context

The *UK Climate Impacts Programme* (UKCIP) has forecast that over this century global warming will lead to significant changes in rainfall distribution and intensity. Summer precipitation in the southwest could fall by a fifth by the 2020s and over 50% by the 2080s (UKCIP 2002), increasing pressure on water supplies further. The Environment Agency is responsible for the national water resources strategy which is set out in *Water Resources: the Future Strategy* (March 2001).

Drier summers will be accompanied by wetter winters, with rainfall in the Bristol area predicted to increase by up to a quarter by end of the century. This rain is expected to increasingly fall in heavy downpours, heightening the flood risk. Climate change is also predicted to raise sea levels around the Bristol Channel by 76cm over this century, leading to greater risk of flooding of low lying areas such as Avonmouth, St. Philips, Ashton, Broadmead, Redcliffe and the City Centre. It is anticipated that insurance for properties on flood plains may become increasingly expensive or difficult to obtain.

As a result of the increasing risk of flooding *Planning Policy Guidance 25: Development and Flood Risk*, discourages all future development in vulnerable areas such as river flood plains and exposed low-lying sections of coastline. Where redevelopments of existing settlements on waterfronts or in areas at risk of flooding are planned, advice should be sought from the Environment Agency and site specific measures agreed. Raising the threshold of buildings above the flood level as defined by the Environment Agency (currently 9.4m AOD),



while reducing flood risk, can be in conflict with guidance on high quality urban design which provides active building frontages at street level, and inclusive accessible buildings and spaces. A package of measures which can include off site mitigation, a contribution to a regional scheme and / or on site flood protection measures would be preferred. Using ground floor levels for parking as a response to flood risk is not recommended, because it has a negative impact on the street, and favours cars over people on foot.



Rainfall in the Bristol area is predicted to increase by up to a quarter by the end of the century.

In addition to planning guidance, *Part H of the Building Regulations* was amended in 2002 to encourage and provide guidance on the incorporation of sustainable drainage approaches.

Water pollution is a serious problem in the south-west. In 1998 the region had the second highest number of pollution incidents in England. As well as acute incidents, the cumulative, long term effect of pollution from small amounts of oils, chemicals and other pollutants has a significant impact on water quality.

Diffuse pollution can be greatly reduced by using sustainable drainage designs for buildings, roads open space and other infrastructure. Wrong connections from properties and the connection of washing machines to rainwater downpipes are a significant cause of pollution. In Bristol 'Operation Streamclean' investigates and takes action to eliminate wrong connections. Care must also be taken both for use and disposal of water on the actual construction site. Not only will this reduce the amount of water used, but also reduce the risk of polluting watercourses and blocking drains.

The regional sustainable development framework *A Sustainable Future for the South West*, includes objectives to reduce water pollution, ensure the efficient use of water and minimise the risk of flooding.

Building regulations on drainage now have a surface water drainage hierarchy, with infiltration on site as the preferred disposal option, followed by discharge to watercourse and then connection to a sewer.



Sustainable drainage at Henbury School.





Bristol's Commitment to Action

- The *Bristol Local Plan* (adopted December 1997) *Policy ME5* covers protection of groundwater supplies. *Policy ME8* covers development within the coastal zone. *Policy ME9* covers development subject to flood risk or which would increase flood risk. *Policy NE4* covers development that might cause harm to natural watercourses or loss of flood-plains.
- The annual report: *Quality of Life in Bristol* includes indicators relating to water demand and water quality.
- Bristol City Council has a 'Living Rivers' project with support from the Environment Agency. This project aims to enhance water quality in the city, and increase awareness of and care for watercourses in Bristol. As well as the *Bristol Living Rivers Action Plan*, the *Floating Harbour Action Plan* details long term aims to improve water quality in Bristol.



Permeable paving in the Dings homezone.

Key questions for water

W1 How will any vulnerability to current or future flooding be minimised?

The Environment Agency's website contains detailed maps of areas of coast and river valleys that are vulnerable to inundation, and should be consulted to assess the flood risk on the proposed development site. Individual flood risk assessments will be required for development in flood risk areas identified by the Environment Agency. In some cases the risks may be such that the development will not be permitted. In other cases, development may be acceptable provided that the scheme is designed to minimise risks, that the use of the building does not expose occupiers to undue risk or that it contributes to flood defences or emergency arrangements.

Urban development and other land use changes have often heightened the risk of flooding through the creation of large areas of impermeable surfaces and drains which allow rapid flow of water off site. New developments, whether within flood plains or elsewhere, should aim to apply the CIRIA Guidance on Sustainable Drainage Systems (SUDS), which can slow run off and enhance water quality and biodiversity. (See also detailed SUDS design guidelines for Bristol, in Appendix D.)





- The amount of impermeable hard surface should be minimised to enable rainwater to filter through
- Existing water features on site, such as wetlands, should be protected and, where appropriate, new features created or restored. Wetlands areas can reduce the speed of water run-off
- Soakaways and other infiltration methods should be used where possible
- Where surface water cannot be absorbed on site, balancing ponds can help improve water quality and can also be developed as attractive features for wildlife
- The culverting and canalising of watercourses should be avoided as this can enhance the downstream flood risk (and upstream if the culvert is undersized)
- Developers should also consider future risks of flooding

W2 How will mains water be conserved and discharges of waste water into the main drainage system be minimised?

Water use per person has increased significantly over recent decades. The reasons for this include the greater use of water intensive white goods such as washing machines, the growth in the number of households and the increase in garden watering and car washing. The drawing of water from rivers and groundwater supplies puts great pressure on river and wetland ecosystems and can affect the water table. Householders in the UK use around 40% of all water consumed.

By incorporating water conservation measures into new and refurbished buildings, major savings in water use can be made, leaving businesses and home owners less vulnerable to possible future increases in water charges.

Rainwater can be harvested for use in flushing toilets and irrigating planting.

- In residential developments, the provision of water butts or community storage facilities to collect rainwater is a simple low cost measure.
- Buildings can be designed to allow recycling of 'grey' water for purposes that do not require mains supplies such as flushing toilets and garden / green space irrigation
- Water efficient toilets, taps and other appliances should be installed as standard
- The need for irrigation of any open space areas should be assessed and plants which require a large amount of water avoided



Using water butts to collect rainwater is a simple low cost measure.





W3 How will discharges of polluted waters be minimised?

- In general, the SUDS principles and design criteria should be followed for all site drainage
- In the case of sewage treatment, for more rural or peri-urban areas, consider using sustainable alternatives to mains sewage, eg constructed wetland treatment systems, which can also provide visual and biodiversity benefits

W4 How are the aims of enhanced amenity and biodiversity being addressed through water sensitive design?

Sustainability means taking an approach to landscape design that places an importance on water sensitive design.

- Urban watercourses provide an important corridor for wildlife, allowing movement and dispersal of species between habitats
- Urban watercourses support hundreds of species, both below and above the water and in the surrounding margins
- Green roofs provide biodiversity and aesthetic benefits, as well as reducing run-off.
- Provision of open space within development sites is a normal planning requirement. Such areas are suitable for the inclusion of a wide range of SUDS components (eg ponds, basins and swales). De-culverting and restoration of any existing watercourses could also be explored, providing careful assessment with Wessex Water has been undertaken.

Water aim: checklist

Feasibility

- Have you assessed the potential flood risk for the site, both now and in the light of predicted climate changes?
- Have you assessed the hydrology and aquatic habitats on and near the site and considered how these can be preserved and enhanced as part of the redevelopment?
- Have you considered the effect of the development on the quality and quantity of run-off from the site?
- Have you conducted a SUDS feasibility study? (see SUDS guidelines for Bristol, in Appendix D)
- Have you discussed water storage and retention requirements with the Environment Agency?

Outline proposal

- Have you considered the potential for treating waste-water on site and have you considered the potential to integrate reed-bed treatment into the landscape design of the site?
- How do you propose to minimise the use of potable water supplies, for example through grey water collection or the use of water efficient appliances?
- Does the design incorporate facilities to collect, store and use rainwater and / or grey water?
- How do you intend to protect and enhance water features on or near the development site?
- Have you considered the provision of a green roof or roof area?



Detailed design

- Have you considered integration of rain/grey water collection for flushing toilets and irrigating landscape features?
- Do your planting design plans for the site minimise the need for watering?
- Have you specified water efficient taps, WCs, showers and urinals?

Further Information

- Environment Agency - SUDS and Flood Risk Information
www.environment-agency.gov.uk
- CIRIA 522: Sustainable Urban Drainage Systems – design manual for England and Wales
www.ciria.org.uk
- Planning Policy Guidance Note 25: Development and Flood Risk
www.odpm.gov.uk
- Water Resource Information Site
www.water.org.uk
- UK Climate Impacts Programme offers information on the potential national and regional impacts of predicted climate change
www.ukcip.org.uk
- CABE – frequently asked questions on flooding
www.cabe.org.uk
- Green / Living Roofs
www.greenroofs.com
www.greenroof.co.uk
- Sewers for Adoption – 5th Edition, 2001
www.wrcplc.co.uk

Local Contacts

- Wessex Water is the regional water and sewage company providing water supply and sewerage services. The company can be contacted at:
Wessex Water,
Claverton Down Road,
Bath BA2 7WW
www.wessexwater.co.uk
- Bristol Water plc is the supplier of water to Bristol
Box 218, Bridgwater Road,
Bristol, BS99 7AU
Tel 0117 9665 881
www.bristolwater.co.uk
- Bristol Living Rivers Project – Bristol City Council and the Environment Agency joint project
www.bristol-city.gov.uk





2.5 Pollution

Local Plan policy - Policy ME2 covers general pollution impacts, Policy ME4 covers noise and Policy ME6 covers contaminated land.

ME2

Development which has an unacceptable impact on the environmental amenity or wildlife of the surrounding area by reason of fumes, odour, dust or other forms of air, land or water pollution will not be permitted. In determining planning applications account will be taken of:–

- (i) *Provision of adequate facilities for the safe storage and disposal from the site of waste materials.*
- (ii) *Measures to stop unacceptable levels of run off and emissions.*
- (iii) *Hours of operation.*
- (iv) *Location, design and layout.*
- (v) *Measures that reduce existing levels of pollution.*

ME4

- (I) *Development which has an unacceptable impact on the environmental amenity or wildlife of the surrounding area by reason of noise will not be permitted.*
- (II) *In determining planning applications in areas of existing noise such as roads, aerodromes, railway lines, industrial/commercial developments and sporting, recreational and leisure facilities, account will be taken of the provision of adequate sound insulation measures.*

ME6

Development on land which is contaminated will only be permitted if appropriate remedial measures are included in any planning proposal submitted to the council to ensure that the site is suitable for the proposed use and that there is no unacceptable risk of pollution within the site and in the surrounding area.

Sustainable Design and Construction Aim: minimise polluting emissions to water, air and soil and minimise noise and light pollution

Background

New development can enable polluted land to be restored but can also be a source of pollution both on and off site. There is increasing pressure to re-use land but the Environment Agency estimates that 300,000 hectares of land in England and Wales are blighted by contamination, the legacy of past industrial processes.

The construction process can create noise, dust, water and air pollution, damaging the environment and causing nuisance to those living nearby. In 2000, the Environment Agency recorded 483 pollution incidents arising from construction activities, making the sector a major contributor to the overall total of pollution incidents. Noise pollution has a significant impact on quality of life in the UK, and the problem is getting worse. Between 1984/5 and 1994/5 noise complaints to Local Authorities increased by 62%, with complaints about construction sites rising by 65%. Excessive construction noise can stem from equipment used on site, and also other factors such as vehicle movements.

The manufacture and transport of construction materials releases about 10% of the UK's carbon dioxide (CO₂) emissions and also is responsible for significant release of volatile organic compounds (VOCs), methane (CH₄), oxides of nitrogen (NO_x) and sulphur dioxide (SO₂). All such impacts can be reduced significantly through good environmental practice.



The National and Regional Context

Prevention of pollution is highly regulated and is covered by a raft of both European Union and UK legislation. Some of the legislation that is relevant to development and construction includes:

- EU Contaminated Land Directive
- Noise Act 1996
- Circular 11/94 Environmental Protection Act 1990
- Water Resources Act 1991
- Integrated Pollution Prevention and Control (IPPC)
- Control of Pollution (Amendment) Act 1989
- Environment and Safety Information Act 1988

The Environment Agency also produces a range of Pollution Prevention Guidance Notes including some specific to construction. The full range of the 26 guides can be found on the Environment Agency Website.

Planning Policy Guidance: 23 Planning and Pollution Control provides good guidance on how to minimise pollution risks in new development.

Bristol's Commitment to Action

- The *Bristol Local Plan* (adopted December 1997) *Policy ME2* covers general pollution impacts, *Policy ME4* covers noise and *Policy ME6* covers contaminated land
- Bristol City Council has now mapped all contaminated sites in the city.
- Land pollution and the amount of contaminated land are issues covered in *Indicators of Quality of Life in Bristol*
- A Pollution Control Team deal with pollution and nuisance including noise.
- The City Council are currently producing a Street Lighting Strategy which looks at the different types of street lamp available and considers them for different uses in different locations to limit the amount of light pollution. Some street lights are low energy.



Considerate Constructor scheme helping to improve the image of construction and reduce pollution.





Key questions for pollution

P1 How will the development clean up any contamination on site and/or avoid land contamination in future?

Through a range of mechanisms including Landfill Tax credits, the Single Regeneration Budget (SRB), English Partnerships and the South West Regional Development Agency, developers can now receive up to 100% funding for the costs of land remediation. Through rehabilitating contaminated land, developers can marry economic with environmental regeneration. Developers should provide information on the contamination status of the site they intend to develop and the reasons for selecting the site. Both CIRIA and the Environment Agency provide guidance and advice on dealing with contaminated land.

P2 How will pollution of all kinds be minimised during construction?

It is in the interests of construction companies to minimise pollution as breaches of regulations can result in significant fines. In most cases complying with codes of practice and adopting best practice should minimise nuisance to neighbours and safeguard the environment. The Considerate Constructor scheme provides a way of managing construction to minimise pollution and disruption and is recommended.

The following are relevant sources of information:

- A model *Code of Practice on Particulate Emissions* has been produced by the Building Research Establishment, to cut particulate emissions from construction activity and reduce its impact on human health and the local environment.
- The Environment Agency publishes *Pollution Prevention Guidelines 6 - Working at Construction and Demolition Sites*

- Control of pollution from construction sites - CIRIA
- Noise on construction sites is regulated by Local Authorities under the Control of Pollution Act (COPA) 1974

P3 How will the development impact on external air quality?

Air quality impacts can also be significant. Developers and operators need to assess the emissions that would result from heating cooling and ventilation plant. In particular they should specify heating plant with low nitrous oxide emissions.

The environmental impact of new developments can extend far beyond the site, most especially in relation to traffic movements and related air pollution. Transport impacts should be mitigated through the development of traffic reduction measures and the promotion of more sustainable modes of transport. This may be calculated using the 'Proximity Principle' in sourcing raw materials and waste disposal sites.

P4 Will noise pollution be minimised within the development and from external sources?

Transmission of noise can be a problem between dwellings such as flats and terraced housing. It can also be a problem in other building such as open plan offices. Ventilation and heating plant can also produce noise pollution particularly when located on roofs. Buildings located near to busy roads, railways or industrial sites may also suffer from high noise levels. Design of buildings can minimise these problems if attention is given to:

- Adequate sound insulation in floors and walls
- Sound insulation for plant rooms and plant housing



- Double glazing on all aspects exposed to high levels of noise
- Ventilation on aspects exposed to high levels of noise - natural ventilation by opening windows may not be a practical option

P5 How will light pollution be minimised in and around the development?

Light pollution has emerged as a significant issue in populated areas. Light pollution obscures the night sky, is wasteful of energy and can also be disruptive to those living in and beside any new development. Public safety requires that highways and other public space are illuminated. However, light pollution can be reduced by the use of directional lighting, as can energy costs, without any loss of illumination.

Pollution aim: checklist

Feasibility

- Have you considered the local environmental impact caused by the development, in terms of air, water, land and noise pollution?
- Have you surveyed the site for contamination?

Outline proposal

- Have you considered how to minimise exposure of the local community to external noise, air pollution, run off, traffic and wastes?
- Have you determined appropriate methods for remediation of contaminated land?
- Does the design minimise the nuisance from external noise on the inhabitants of the completed development?

Detailed design

- Have you assessed the potential light pollution impact of the site and the potential to reduce this?
- Have you specified adequate sound insulation?
- Have you specified low toxicity paints, sprays etc?

Construction

- Are you complying with best practice in controlling pollution during construction?
- Are you committed to using a Considerate Constructor scheme?

Further Information

- Environment Agency – information on environmental regulation, contaminated land and light pollution
www.environment-agency.gov.uk
- National Society for Clean Air
www.nasca.org.uk
- European Directive on Environmental Noise
www.europa.eu.int/comm/environment/noise
- UK Quiet Pages
www.quiet.org.uk
- Building Research Establishment
www.bre.co.uk
- The Noise Net
www.noisenet.org
- Considerate Constructor scheme – promoting working practices which minimise noise, dust and nuisance, and high quality site management
www.considerateconstructorsscheme.org
- Construction Industry Research and Information Association
www.ciria.org.uk
- Campaign for Dark Skies
Light pollution site
www.dark-sky.org





2.6 Materials

Local Plan policy - **Policy B1** refers to building design and to objectives in the built environment chapter to:

“.. promote a quality of new development which enhances the environment generally and meets the ‘green’ agenda described in Chapter 2: Management of the Environment”

B1 In determining applications, account will be taken of the following design issues:–

- (i) The local context*
- (ii) Accessibility*
- (iii) Safety and security*
- (iv) Layout and form*
- (v) Building exteriors and elevations*
- (vi) Landscape treatment and environmental works*
- (vii) Environmental impact*

Sustainable Design and Construction Aim: maximise use of materials from sustainable sources

Background

The choice of construction materials has wide potential impacts but sustainability can be greatly enhanced by careful specification. Reusing and recycling materials is often the most sustainable choice. Some plastics, paints, treatments and chemicals may contribute to health problems for those using the building (so-called ‘sick building syndrome’), are energy intensive and can leave a toxic legacy that is expensive and difficult to dispose of. Materials that need the minimum of processing e.g. timber from sustainable sources are generally preferable to highly processed materials such as plastics.

Use of locally sourced materials, for example local stone or timber, helps to maintain local character and reduce transport impacts. Longevity and low maintenance are highly desirable qualities. In all instances a balance needs to be drawn between factors, for example the use of aluminium might be justified on grounds of low maintenance, long life and recyclability even though it has high embodied energy. Construction in the UK uses 60 % of all softwood and 44% of hard wood timber, most of which is from unmanaged sources world-wide. Construction materials and energy use in buildings accounts for 50% of all energy consumption in the UK and construction accounts for 90% of mined aggregates.

The National and Regional Context

The Government is promoting the use of sustainable materials through its *Strategy for more sustainable construction - Building a Better Quality of Life*. It is promoting the *Eco Management and Audit Scheme (EMAS)* and *ISO 14001* that for companies involved in development and construction includes the use of sustainable materials. The government has also commissioned the Building Research Establishment to produce the *Green Guide to Specification* which provides a systematic assessment of the environmental impacts and benefits of all types of building elements. Selecting primarily A rated materials from this guide gives a straightforward method for specifying more sustainable materials.

In March 2001 the Prime Minister reiterated the UK commitment to require all timber supplied under government contracts to be from legal and sustainable sources.



Bristol's Commitment to Action

Bristol City Council's Property Services Division has adopted a policy of using materials rated A or B in the *Green Guide to Specification* wherever possible

- A timber and wood products policy was adopted by the Council in April 2001 committing all departments to review their contracts and service specifications over a five year period to emphasise preferential use of responsible timber. Contractors will also be informed of the preference for independently certified timber. There is guidance on the Bristol City Council web site about the use of local and responsibly managed timber and wood products.
- Bristol City Council has built the Ecohome at the CREATE Environment Centre to demonstrate the use of recycled and sustainable materials and to provide information to builders and developers. Contact CREATE for opening hours on 0117 925 0505
- The Sustainable City Team organise events and training promoting the sustainable use of materials in construction and refurbishment

Key questions for the use of materials

M1 How will the materials be specified to help maintain local character and ensure long life?

The choice of locally sourced materials can contribute towards local character in keeping with the surrounding community, and reduce road transport. Traditional materials such as local stone, brick and wood (particularly hardwoods) are not only attractive but have proved more durable than many synthetic materials and have lower lifetime environmental costs. Longer-lasting materials can save on repair costs and reduce the long-term use of energy and resources but may be less 'green' than simpler materials. The impact of local air pollution on the weathering of materials should be taken into account particularly where developments are adjacent to busy roads. Consideration should be given to sulphate attack.

M2 Will materials be specified to ensure low environmental impact and to maintain good internal air quality?

Current synthetic building materials create a range of environmental and health problems, from the impact of extraction and processing through to disposal. By opting for sustainable, natural and local materials, a healthier internal environment can be created in buildings while minimising environmental impact and supporting the local economy.

Where possible, the aim should be to:

- Use reclaimed materials, or if not, recycled materials (such as aggregates) for construction. This minimises energy use and the other environmental impacts linked to extraction and disposal. The best environmental option is to re-use materials already present on the development site



The Ecohome at CREATE used wood from sustainable sources in its construction and the table and chairs are made from reclaimed timber.





- Use locally sourced materials thereby reducing transport impacts and supporting local employment – however ensure that their extraction is not destroying an area important for nature conservation.
- Select materials which have low levels of embodied energy (energy used in manufacture)

The U-value (or heat loss factor) is a measurement to express the heat loss factor of a material. The lower the U value, the less heat can be transmitted through the material. This should be considered and taken into account when selecting materials to be used in the construction.

Many chemicals used to treat and coat walls, as solvents and as insulation have been shown to cause health problems for building users and to provide disposal problems on demolition. Architects should specify materials with low toxicity that are benign during use and on disposal. Natural, non-toxic and low VOC (volatile organic compounds) glues, solvents, treatments and coatings should be used wherever possible.



Clay plasters and natural paints are now readily available.

M3 Will PVC be avoided where an alternative is available?

PVC is a hazardous, non-biodegradable material that has also been linked to health problems in humans, both during use and on disposal through incineration or landfill. In almost every case PVC can now be replaced by more sustainable alternatives, and its use should be avoided if at all possible.

Materials aim: checklist

Feasibility

- Have you analysed the potential for on-site re-use and recycling of demolition and construction waste?
- How have you sought to minimise the amount of waste generated during construction and decommissioning of the development?

Outline proposal

- Have you considered the relative benefits of different construction techniques and materials?
- Have you sought to minimise the quantities of new materials used?
- Have you considered the compatibility of the new building(s) and materials with the surrounding neighbourhood?
- Have you ensured that as far as possible all materials used are locally sourced?
- Have you sought local suppliers for materials produced in or near Bristol?
- Have the SAP and U-values of the building and material been considered?



Detailed design

- Have you selected materials rated A or B in the *Green Guide to Specification*?
- Have you selected materials with low energy intensity (embodied energy)?
- As far as possible, have you opted for natural and non-toxic materials?
- Have you specified Forest Stewardship Council (FSC) accredited timber and wood products for all purposes?
- Have you selected materials with a long life and low maintenance requirements?

Further Information

- To assist in this process, the Building Research Establishment (BRE) has developed an Environmental Profiles website which provides reliable and independent information about building materials and components. Another useful information source is *Achieving Sustainability in Construction Procurement*, produced by the Office of Government Commerce. Can be obtained, together with the BRE Green Guide to Specification from BRE.
www.bre.co.uk
- Timber Recycling Information Centre
www.recycle-it.org
- Building for a Future - regular magazine for the association for Environment Conscious Builders with search facility. AECB also offers lists of contractors www.aecb.net
- CIRIA
www.ciria.org.uk
- Office of Government Procurement
www.ogc.gov.uk
- Forest Stewardship Council – product database
www.fsc-uk.demon.co.uk
- Green building shop – Stroud – materials, paints and books
www.greenshop.co.uk

- Construction Resources – eco building centre: materials, systems and training
www.constructionresources.com
- New Builder Online – Building for a Future – Green Building Bible, directory of builders
www.newbuilder.co.uk
- Worldwide Fund for Nature - newsletter
www.wwf.org.uk
- Friends of the Earth Good Wood Guide
www.foe.co.uk
- For advice on materials, small constructors, sustainable building methods -
www.constructsustainably.com

Local Contacts

- Forest of Avon Wood Products Co-operative a limited company promoting and selling locally produced woodland products
www.forestofavon.org
- Bristol City Council Timber and Wood Products Policy
www.bristol-city.gov.uk
- Bristol Wood Recycling Project – local not for profit social enterprise. Collects waste wood from clients including buildings sites, universities, schools and the general public. Timber and other products for sale to the community at reduced rates from site on Cattle Market Road.
www.bwrp.org.uk





2.7 Environmental assessment methods

Background

Some of the benefits of using independent environmental assessment methods to rate new buildings and developments are:

- demonstrating sustainability credentials to planning authorities
- demonstrating environmental credentials to investors to help minimise investment risk and increase the appeal to ethical investors.
- demonstrating superior environmental design to customers including reduced running costs, health, comfort and flexibility of internal environments, and access to local amenities

There is also growing evidence that achieving high ratings through these assessment methods gives a market advantage. The EU *Energy Directive* will require an energy rating to be applied to all new build projects, with the ratings available on display in public buildings. Developers who are already using these schemes will be at an advantage.

The National and Regional Context

There is a range of tools available to help assess and demonstrate the sustainability of a development. Among the best established environmental assessment methods are Standard Assessment Procedure (SAP) ratings, the Building Research Establishment Environmental Assessment Method (BREEAM) and Ecohomes.

The government requires all new homes to have a SAP rating, and for this to be clearly displayed on completion of construction. This requirement was incorporated into Building Regulations in 1995, although compliance is not always achieved.

Since 2003, the Housing Corporation, which provides funding to housing associations, has required an Ecohomes assessment for funded schemes, with a current minimum standard of 'pass' which will rise to 'very good' by 2006.

Bristol's Commitment to Action

In city council projects materials rated either 'A' or 'B' in the *BRE Green Guide* are used wherever possible, which contributes to a higher BREEAM score. In partnership projects, bidders are asked to reach a BREEAM score of at least 'good' and where possible, a percentage of the development should be rated 'excellent'.

Standard Assessment Procedure

The Standard Assessment Procedure (SAP) is the most widely used means of assessing the energy efficiency of domestic properties. SAP is measured on a scale of 1 to 120 – 1 being very poor, 120 being excellent. A typical SAP for an average house in England would be 45, and a typical SAP rating for a new house would be around 80. The factors that affect SAP rating include location and orientation, the size of the dwelling, fuel type and the hot water system used.

BREEAM and Ecohomes

BREEAM and Ecohomes are managed by the Building Research Establishment and these are both an environmental assessment tool and an accreditation scheme. BREEAM can be applied to offices, retail developments and industrial buildings and Ecohomes is the version of BREEAM for residential development. A BREEAM for schools is in development, and will be used to assess new school buildings. These assessments cover energy, water, materials, transport, pollution, ecology and health and give a rating of 'pass', 'good', 'very good' or 'excellent'. A checklist can be used to predict a rating from plans and specifications. A software tool to assist with this process is available from BRE – see below.



Key questions

EA1 Will the design be assessed against an accredited scheme to assess the building's sustainability such as the BREEAM or Ecohomes standards and a target rating set?

For development locations within Bristol, where the location is likely to be previously developed and close to public transport connections, a BREEAM rating of 'good' would be easy to achieve, and should be regarded as a minimum. Achieving a rating of 'very good' or 'excellent' would demonstrate that sustainability has been considered.

The BRE's ENVEST software tool can help simplify the complex process of designing environmentally friendly buildings. ENVEST allows developers to identify those elements of a building with the greatest influence on the buildings environmental impact. It also predicts the environmental impact of various strategies for heating, cooling and operating a building.

EA2 Will any housing element of the development exceed a rating of 80 on the Building Research Establishment (BRE) SAP Rating?

Applicants for planning permission within Bristol will be encouraged to demonstrate that the energy rating of housing has been considered early in the design process - a rating of 80 or over would be desirable. Designing to a high SAP rating ensures that low-income householders can have affordable warmth. Being able to demonstrate low energy running costs is a good selling feature for private housing.

Further Information

- Information on SAP ratings, BREEAM / Ecohomes, the Green Guide to Specification and ENVEST software
www.bre.co.uk
- Housing Corporation - responsible for investing public money in housing associations. Their website has a link to a 'Bank of Good Practice' with publications and examples of good practice
www.housingcorp.gov.uk
- Chartered Institute of Housing - information on good practice programme and on HouseMark
www.cih.org
- Sustainable Homes promotes good practice in housing. Site includes a good practice database
www.sustainablehomes.co.uk
- National Home Energy Rating and the EU Energy Directive
www.nher.co.uk



Use of sustainably sourced timbers at Ashley Vale self-build site.





European

The *EU Energy Performance of Buildings Directive*, in force from 2006, will:

- set minimum energy performance standards for new or substantially refurbished buildings
- require energy certification for all buildings constructed, sold or leased

The Directive also requires that for all new buildings with a floor area of more than 1000m² formal consideration is given to:

- combined heat and power (CHP)
- district heating or cooling
- heat pumps
- renewable energy sources

UK

Securing the future - the UK Government Strategy for Sustainable Development (2005) defines the purpose of sustainable development as enabling:

“all people throughout the world to satisfy their basic needs and enjoy a better quality of life, without compromising the quality of life for future generations”

The strategy defines five guiding principles:

- living within environmental limits
- ensuring a strong, healthy and just society
- achieving a sustainable economy
- promoting good governance
- using sound science responsibly

The *Planning and Compulsory Purchase Act* (2004) sets the framework for planning policy development. Clause 39 of the bill – Sustainable development requires any bodies drafting a regional spatial strategy or local development document to:

“exercise the function with the objective of contributing to the achievement of sustainable development”

Planning Policy Statement 1: Delivering Sustainable Development (2005) states that:

“sustainable development is the core principle underpinning planning”

This guidance requires planning authorities to:

“ensure that sustainable development is pursued in an integrated manner, in line with the principles...set out in the UK strategy”

and 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”

This guidance should be applied to local development documents and:

“may also be material to decisions on individual planning applications”

Our towns and cities: the future – the Urban White Paper (1999) sets out a new vision of urban living:

“Our vision is of towns, cities and suburbs which offer a high quality of life and opportunity for all. We want to see:

- people shaping the future of their community, supported by strong and truly representative local leaders;
- people living in attractive, well-kept towns and cities which use space and buildings well;
- good design and planning which makes it practical to live in a more environmentally sustainable way, with less noise, pollution and traffic congestion;
- towns and cities able to create and share prosperity, investing to help all their citizens reach their full potential; and
- good quality services health, education, housing, transport, finance, shopping, leisure and protection from crime that meet the needs of people and businesses wherever they are”

Sustainable Communities: building for the future (2003) is the plan published by the Office of the Deputy Prime Minister to change the way in which housing is provided, and focus on the creation of sustainable communities:



“Some of the key requirements of sustainable communities are:

- a safe and healthy local environment with well designed public and green space
- sufficient size, scale and density, and the right layout to support basic amenities in the neighbourhood and minimise use of resources including land
- good public transport and other transport infrastructure both within the community and linking it to urban, rural and regional centres
- buildings – both individually and collectively – that can meet different needs over time, and that minimise the use of resources
- a well integrated mix of decent homes of different types and tenures to support a range of household sizes, ages and incomes...”

The *Egan Review: Skills for Sustainable Communities* (2004) considers the important role of planners and other built environment professionals in creating sustainable communities. This report recommends consideration of sustainability by all key players at a pre-application stage, where there is most scope for achieving sustainable design.

The *Sustainable Buildings Task Group* (2004) was set up by the Department of Trade and Industry and the Office of the Deputy Prime Minister jointly to identify how government and industry can improve the quality and sustainability of new and refurbished buildings. The task group report recommends a code for sustainable buildings which sets out best practice standards on energy efficiency, flood resilience, water consumption, greenhouse gas emissions and waste production.

Climate Change - the UK Programme (2001)

This sets out the significant challenges presented by climate change and the need to cut greenhouse gas emissions and adapt to climate change impacts, and sets a target to reduce UK CO₂ emissions to 20% below 1990 levels by 2010.

The *Energy White Paper* (2003) sets out four goals for our energy policy:

- to put ourselves on a path to cut the UK’s carbon dioxide emissions - the main contributor to global warming - by some 60% by about 2050 with real progress by 2020;

- to maintain the reliability of energy supplies;
- to promote competitive markets in the UK and beyond, helping to raise the rate of sustainable economic growth and to improve our productivity; and
- to ensure that every home is adequately and affordably heated

The planning system has an important role to play in achieving these goals.

Regional

The *Regional Planning Guidance for the South West - RPG 10* (2001) has been adopted as the initial Regional Spatial Strategy for the South West and forms part of the Development Plan Documents under the Planning and Compulsory Purchase Act. *RPG 10* includes a commitment to:

“manage development pressures so that the environmental qualities of the region are conserved, both for their own sake and to underpin the region’s attractiveness as a place to live and work”

This will be replaced by a revised document in 2006, which will set out a regional framework for development. The basic principles for this include:

- enhancing our distinctive environments
- promoting sustainable construction, minimising waste and energy use. The full version of this will include sub-regional spatial planning strategies – for Bristol, this is being prepared by the West of England Partnership, made up of Bristol, North Somerset, South Gloucestershire and Bath and North East Somerset.

The draft strategy is based on a:

“vision of sustainable growth supported by successful investment, to improve the quality of life for all”

The *South West Regional Environment Strategy* (2004) is the sustainable development framework for the South West region and provides a framework for other key regional and sub-regional policies.

Future Foundations - Building a Better South West (2001) sets out a sustainable construction charter for the region which organisations in the region are invited to adopt.





European

EU Energy Performance of Buildings Directive
European Journal, 2003

UK

Planning and Compulsory Purchase Bill (Act)
ODPM, 2004

UK Strategy for Sustainable Development
DEFRA, 1999

Planning Policy Guidance 1: General policy and
principles ODPM, 2001

Planning Policy Guidance 9: Nature
Conservation ODPM, 2001

Planning Policy Guidance 12: Development
Plans ODPM, 1999

Planning Policy Statement 22: Renewable
energy ODPM, 2004

Planning Policy Guidance 25: Development and
Flood Risk ODPM, 2001

Planning Policy Statement 1 – Creating
sustainable communities ODPM, 2004

Our towns and cities – the future - Urban
White Paper ODPM, 1999

Sustainable Communities: building for the
future ODPM, 2003

Egan Report: Skills for Sustainable
Communities ODPM, 2004

Sustainable Buildings Task Group Report
ODPM, 2004

Climate Change – the UK Programme
DEFRA, 2001

Shaping Neighbourhoods – Hugh Barton,
Richard Guise, Marcus Grant Spon, 2003

Our energy future - creating a low carbon
economy - Energy White Paper DTI, 2003

Towards Good Practice in Sustainable Urban
Land Use - Bristol LA21 Land Use Group BCC /
SWRDA / Architecture Centre

The Green Guide to Specification
Buildings Research Establishment

South West

Regional Planning Guidance 10 – South West
ODPM, 2001

SW Regional Environmental Strategy
SWRA, 2004

Bristol

Bristol Local Plan
Bristol City Council, 1997

Bristol Local Plan Sustainability Appraisal
Bristol City Council, 2001

Bristol Climate Protection and Sustainable
Energy Strategy
Bristol City Council, 2004

Bristol Local Transport Plan
Bristol City Council, 2000 – 2005

Bristol Air Quality Action Plan
Bristol City Council, 2004

Bristol's Community Strategy
Bristol City Council, 2003, revised 2005

Corporate Plan for Bristol
Bristol City Council, 2006 – 2009

Housing Links Us All – Bristol City Council
Housing Strategy
Bristol City Council

Indicators of the Quality of Life in Bristol
Bristol City Council, 2004

Bristol City Council Environmental Access
Standard
Bristol City Council, 2001

(all available at: www.bristol-city.gov.uk)



BREEAM

Building Research Establishment Environmental Assessment Method – a nationally recognised system for independently assessing the sustainability of planned or existing buildings.

Community Strategy

A plan to develop improved ways of working among public, private, business, voluntary and community organisations which aim to improve the quality of life of people who live in Bristol.

CREATE

Bristol City Council's Environment Centre – base for the Sustainable City Team, and numerous voluntary organisations working for sustainability.

Ecohomes

A nationally recognised system provided by the Building Research Establishment for independently assessing the sustainability of planned or existing houses and flats.

Local Development Framework

Successor to the Local Plan, and required by the Planning and Compulsory Purchase Act 2004 – sets out key policies, plans and objectives for development in the city.

Local Plan

The document which is formally adopted to regulate development in the city. Planning decisions are made in accordance with the Local Plan policies and plans.

Planning obligation

An agreement entered into by a developer with the planning authority to provide facilities relating to the development.

Renewable energy

Energy from sources which are not finite, including sun, wind and water.

Sustainable development / Sustainability

The principle that the environment should be protected in such a condition and to such a degree that ensures new development meets the needs of the present without compromising the ability of future generations to meet their own needs.

Supplementary Planning Document

A document which sets out in more detail how core objectives in the Local Plan and the Local Development Framework can be met.





Introduction

The overall process for delivering Sustainable Drainage Systems is set out in current national guidance – *CIRIA C522* – and follows the sequence:

- sketch concept
- initial consultation
- outline drainage proposals
- outline planning permission
- drainage design and consultation

Design Criteria

Design Criteria = “a set of conditions agreed by the developer, planner, and regulators that the proposed system should satisfy.” *CIRIA C522*. In order to ensure that the sketch concept and outline drainage proposals for a drainage design meet SUDS objectives, they must conform to general design criteria set down by the planning authority in the first instance. These which follow have been derived from a Planning Checklist developed by the Environment Agency, based on current national guidance – *Sustainable Urban Drainage Systems; design manual for England and Wales CIRIA C522 (2000)*.

General Criteria

appropriate for all development sites

The SUDS design should reflect the original drainage pattern for the site, and consider:

Quantity

- demonstrate a storm return period analysis with allowance for climate change and management of flood frequencies (1 in 1, 1 in 2, 1 in 30, and 1 in 100 years return period)
- demonstrate flow routes including low flow and flood routes with an exceedence pathway

Quality

- evaluate pollution risk
- demonstrate pollution prevention measures
- demonstrate ‘the management train’
- demonstrate required ‘treatment stages’ for the level of treatment required
- evaluate infiltration potential and impact on groundwater (groundwater protection zones), where relevant
- demonstrate ‘first flush’ interception and management
- demonstrate management of ‘treatment volume Vt’
- demonstrate SUDS technique selection

Amenity / biodiversity

- evaluate surface water runoff as a resource eg: rainwater harvesting, water butts etc
- demonstrate local community benefit eg: recreation, education, multi-use, visual quality
- evaluate and provide wildlife opportunities

This checklist confirms basic SUDS principles and forms the basis for a Sketch Concept (graphical representation) and the development of an Outline Drainage Proposal (note: together, these can form the ‘SUDS Strategy’ or ‘SUDS Design Statement’). The Outline proposals (Stage 1 consultation – p.21 *CIRIA C522*) should state which SUDS techniques are to be used and demonstrate the management train (prevention, source control, site control and regional control in series), treatment stages, and the manner in which SUDS features are to be integrated in the landscape. Indicative locations and land-take only are required at this stage. All the above are considered relevant to the granting of outline planning permission or to inform the planning process before detailed planning permission.



Specific Design Criteria

to be applied on a site-by-site basis, depending on circumstances and expert advice

Quantity

- demonstrate storage hierarchy eg: up to 2 year storm in 'source control features' and designated wetlands or ponds; up to 30 year storage in designated basins; up to 100 year + climate change in public open space
- avoid below ground storage in geo-cellular structures, or demonstrate pre-filter and silt removal mechanisms; or use geo-cellular boxes only within voided stone pre-treatment systems

Quality

- demonstrate that all 'first flush' runoff is intercepted in pre-treatment structures prior to flow to wetland features to protect amenity
- demonstrate that there is no by-pass of 'first flush' volumes to protect wetlands
- demonstrate silt interception and management system

Amenity / biodiversity

- provide water butts to all houses
- provide rainwater harvesting in the case of commercial & school premises
- provide living/green roofs where deemed applicable
- provide surface water features to agreed % of site area
- provide biodiversity habitat to agreed % of site area (linked to local BAP)
- provide path access and interpretation boards to SUDS system

Design & Construction

- recognition of the need to address contaminated land & silt removal issues in design, construction and management
- where permeable paving is used, consideration should be given to siting services in alternative locations where possible, as this is difficult to reinstate
- provide construction phase 'method statement'. Environment Agency Pollution Prevention Guidance must be adhered to.
- it will be necessary to confirm that the SUDS design has considered Health & Safety through 'best practice' design procedures and risk assessment. This will affect the design of collection devices, inlets and outlets, storage features, wetlands and ponds and CDM 'Construction (Design and Management) Regulations 1994. Open SUDS features can be designed using Health & Safety considerations and reference to ROSPA (Royal Society for the Prevention of Accidents) guidance.

Management

- provide appropriate management plan and maintenance schedule
- site information sheets should be available for contractors.

NOTE: Although they can bring significant environmental benefits, SUDS are not exempt from environmental regulation. They must comply with all relevant UK statutes and regulations, and all drainage (including SUDS) designs should adhere to relevant codes of practice and available pollution prevention guidance.



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