PLANNING ADVICE FOR INTEGRATED WATER MANAGEMENT

Integrating water management at the strategic scale of planning and design to achieve sustainable development

Prepared as part of the Cambridge Natural Capital Leaders Platform

Sink or Swim Water Collaboratory

UNIVERSITY OF CAMBRIDGE
INSTITUTE FOR SUSTAINABILITY LEADERSHIP

Executive Summary

Why this Advice Note?

Most planners do not think about water issues in a joined-up way, and until now there has been no single source of information on how the water sector works. There is a growing awareness of the important role of planning in joining up land use and water management. But there is a need to get the message across to planners that water is important and getting involved in partnerships to manage water will bring many benefits.

This Advice Note provides a one-stop-shop to de-mystify water management and demonstrate the benefits of building it into plans and planning decisions.

Opportunities to reduce risk and enhance urban areas and the natural environment

Bringing together planning for flooding, water and biodiversity, at all spatial scales from the catchment through the district to the individual building, as part of an integrated approach to water management can regenerate communities and provide vital housing, and at the same time enhance biodiversity and water availability and quality, reduce flood risk across whole communities and improve the public realm.

Getting multiple benefits

The catchment-based approach can provide significant benefits for spatial planning. Through engagement in catchment partnerships, local planners can influence what happens in other parts of the catchment that has a direct impact on development and growth in their local area. As well as direct improvements to water quality that improve the local environment and can unlock development potential, this also includes managing river flows and surface water to reduce flood risk. In areas where development and growth is being constrained by availability of water resources or problems with wastewater treatment from new development due to poor water quality or sewer flooding, catchment partnerships can provide innovative solutions with multiple benefits.

How to get more for less

Working in partnerships pooling resources enables schemes to go ahead that are not affordable for the individual partners on their own. Additionally, the sum of the pooled resources can be greater than the threshold cost of the scheme, allowing more to be achieved for the money, or savings to be made by the partners. Either way, this is getting more for less.

Complementing national planning policy and guidance

The Advice Note is intended to help planners in England to implement national planning policy in the National Planning Policy Framework (NPPF), providing examples of how the NPPF might be applied to manage land and water in a coordinated and sustainable way to balance environmental, economic and social demands at a catchment scale. It must be read alongside the policy and guidance in the NPPF and National Planning Practice Guidance and is not a substitute for that policy.

Exemplar case studies

The Advice Note shows planners what is possible in practice, using case studies drawn from across the water sector. It aims to empower planners to engage with water issues and encourage innovation in meeting development needs in a more sustainable way.

The risk of inaction

The risk for planners and the communities they plan for of not engaging with water include:

- Constraints on new development due to lack of water supply and waste water treatment capacity
- Missed opportunities for cost-saving
- Increased flood risk
- Poorer quality urban environments and attendant social problems

Cover image: Sustainable urban drainage in Peterborough. Source: Anglian Water

The Advice Note covers:

- How planners in England can work in partnership to take a holistic approach to managing water to achieve multiple benefits for development and local economies, local amenity, public health and well-being, the environment and biodiversity.
- The water policy framework, highlighting the relevant planning policy and showing how the different areas of policy fit together and who does what.
- What integrated catchment management and the catchment based approach are and what they do.
- What is involved in managing surface water and the benefits of getting it right, including links to flood risk management.
- Constraints on water supply and wastewater disposal, and how to work with water companies and the Environment Agency to integrate water plans with local plans.
- The tools and approaches planners can use.
- The sources of supporting information, evidence and data.

The value of the Advice Note

For the first time all the information on the water sector, including water supply, wastewater disposal, water quality and flood risk management, has been brought together in a single source. This Advice Note presents the information in an understandable and accessible way to show planners what is possible and the benefits they can get from engaging with water issues in an integrated way through partnerships with the other bodies involved in water management. It signposts a wide range of other guidance and useful sources, and presents numerous examples of good practice to show what is possible, across the spectrum of water issues. It aims to encourage innovation and empower planners to engage with water issues and deliver multiple benefits.

By using this Advice Note, planners and developers can provide the new homes and infrastructure that communities need at lower financial, environmental and social cost.

Restored park (and floodplain) in Ladywell Fields, Lewisham with a large swale as part of the landscaping to manage overland flow
Source: Peter Bide

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Collaboratory partners

Acknowledgements

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Forewords

Planners frequently see water as a challenge, constraining new development due to lack of water supply and waste water disposal capacity, water quality problems, and risks from flooding. To deal with water issues, planners need to understand the water sector and how different aspects of water management interact. However, until now there has been no single source of advice on how the water sector works.

This Advice Note fills the gap, demystifying the water sector and showing how it relates to land use planning. It shows planners how to turn the challenges of managing water into opportunities. Partnership working is a key strand through the advice, which shows planners how to bring water sector bodies and organisations together and engage people and communities to bring multiple benefits at lower cost.

The wide range of examples of good practice at all scales from neighbourhood to region show what is possible, and should inspire planners to grasp the opportunities from managing water in partnership to create new sustainable communities and make our towns and cities more liveable.

This Advice Note will help us plan new communities to provide the homes and infrastructure the country needs at less financial, environmental and social cost.

Hugh Ellis, Head of Policy, Town and Country Planning Association (TCPA)

We know water and its effective management is vital to life. For far too long we have seen water as a nuisance, or a challenge with either having too much, or too little water understandably becoming a national preoccupation. With better integration into our places and spaces water can be exploited as an opportunity to improve our health and wellbeing.

Not only can we better manage deluges or droughts, we can also improve the quality of our water in the natural and built environment, helping ecosystems flourish and providing opportunities for people to connect with water where they live, work and play.

This Advice Note unpicks the relevant English legislation and policy around water management for planners. Never before has a document pulled together this information with the sole purpose of helping planners join up the interaction between land use planning and water management. Not only should the Advice Note help planners ensure compliance with the required regulation it also helps deliver multiple benefits through consideration of the bigger picture, catchment management and opportunities for partnerships to better manage water and deliver a variety of positive outcomes.

The guidance and information within this Advice Note is supported by case studies demonstrating what can be achieved in practice and providing planners and water managers the confidence to apply the principles. It encourages new thinking and empowers planners to engage with other disciplines and communities to use water as an opportunity to deliver better places and spaces.

Paul Shaffer, Associate, CIRIA

The UK faces serious challenges ahead; the climate is changing, population is growing and both water demand and flood risk are increasing.

Our island receives plenty of rain, but in spite of this we have real and serious difficulties in conserving our precious water resources, much of which tragically drain into the sea. To most of us, it often seems that we have too much or too little water.

Whilst the water sector excels in specialism in particular areas, it is less adept at taking a holistic approach to deal with complex issues. We hope that this Advice Note will promote collaboration between the physical aspects of the water environment, and also its political and social context.

One of the biggest challenges to communities is now surface water flooding. The increasing intensity of storms, the effects of urban creep contributing to increased flows, as well as the need for additional new housing developments are all exacerbating the problem. Resilience has to be built into the system, and planning resilience into our land use has a central role.

This Advice Note helps to find the best solution for all aspects of the water cycle taking into account water supply, wastewater, surface water runoff and flood management by bringing together extensive expertise into a single, usable source. It will also play a part in promoting community health and wellbeing, biodiversity and regeneration, demonstrating the benefits of integrating water management with planning. It supports the implementation of the National Planning Policy Framework (NPPF) and complements the Planning Practice Guidance issued by DCLG. We hope it will be embraced by planners, communities and water professionals alike.

Dr Simon Festing, CEO, Chartered Institution of Water and Environmental Management (CIWEM)

1. Introduction

The aim of the Advice Note is set out here; what it is and what it contains. It explains how the Advice Note works and how to use it, signposting the other sections and what they cover.

1.1 The aim of this Advice Note

This Advice Note synthesises current English initiatives and practice to show planners what is possible and the benefits they can get from engaging with water issues in an integrated way through partnerships with the other bodies involved in water management. It brings together in one place a wide range of current guidance and best practice on planning for water by signposting them and showing how they link together.

The aim is to ensure that planners are motivated and competent to take water issues (at the strategic catchment level) and management of water demand and use in new developments into account in local plans as they are developed. This will enable strategic water management objectives and outcomes to become an integral part of local and neighbourhood plans and be taken into account in deciding planning applications. The advice note is intended to support implementation of the National Planning Policy Framework (NPPF) and complement the Planning Practice Guidance issued by DCLG.

The advice and examples of best practice are intended to help planners work with other public and private sector partners in order to manage land and water in a coordinated and sustainable way to balance environmental, economic and social demands at a catchment scale.

Partnerships are promoted so that the objectives of different groups can be brought together to meet collective needs in a much more efficient way. Outcomes that would have been unachievable on cost grounds on their own are achievable when the cost is shared amongst those benefitting from the outcomes.

The Advice Note identifies practical ways in which spatial planning can help meet the objectives of the Catchment-based approach and secure multiple benefits including: improved water and environmental quality; surface water and flood risk management; more liveable urban areas; and enhanced biodiversity (and help partners identify their contribution and how to work with planners and other partners).

Information is presented in an understandable and accessible way to encourage innovation and empower planners to engage with water issues. The Advice Note:

- Sets out the issues which planners should be aware of;
- Shows planners what is possible in practice and the benefits they can get from engaging with water issues in an integrated way through partnerships with the other bodies involved in water management;
- Presents numerous examples of good-practice to show what is possible in practice, across the spectrum of water issues; and
- Signposts a wide range of other guidance and useful sources

The advice in this note does not over-ride or substitute for the policy contained in the National Planning Policy Framework (NPPF) or the National Planning Practice Guidance.

1.2 What the Advice Note covers

The Advice Note provides an overview of a whole range of water management challenges, solutions and frameworks.

The water policy framework is explained, showing how the different areas of policy fit together and who does what. Integrated catchment management and the catchment based approach, and what they are and what they do is also explained.

The role of planners in water management is explained, and how they can work with the other stakeholders to take a holistic approach to managing water to achieve multiple benefits for development and local economies, local amenity, public health and well-being, the environment and biodiversity.

The Advice Note highlights what is involved in managing surface water and the benefits of getting it right, including links to flood risk management. It helps planners deal with constraints on water supply and wastewater disposal by working with water companies and the environment agency to integrate water plans with local plans.

The tools and approaches planners can use and the sources of supporting information, evidence and data available to them are set out and signposted.

1.3 How the Advice Note works and how to use it

Each section of the Advice Note starts by setting out the core issue then explaining why it is important for planning (what the opportunities are and the risks of not getting it right). The issue is illustrated by examples of good practice, giving practical examples of successful schemes to show what is possible. At the end of each section there are links to other relevant guidance.

There is a separate section at the end on tools and approaches that planners can use to manage water as an integral part of spatial planning, linked to the preceding sections.

Please refer to the supplementary document that contains the full details of case studies that exemplify best practice.

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Sources of supporting information, evidence and data (Section 8, page 59)

2. Benefits of integrating water issues in local planning

By working in partnership from the catchment to the individual building scale, planners can get multiple benefits and create opportunities to regenerate communities and provide vital housing; at the same time this enhances biodiversity and water availability and quality, reduces flood risk across whole communities and improves the public realm. This section explains how.

2.1 Improving local environments and community benefits.

An integrated approach to build sustainable communities

Bringing together planning for flooding, water and biodiversity at the full range of spatial scales, from the catchment through the district to the individual building, provides opportunities to reduce flood risk across whole communities. It also regenerates communities and provides vital housing, whilst at the same time enhancing biodiversity and water availability and quality, and improving the public realm.

Positive strategic planning from the catchment to building scale can achieve multiple benefits:

- Managing flows along the river from source to the sea reduces flooding and provides water during droughts, reducing the large scale economic and social disruption that otherwise result from flooding and drought.
- Water control structures such as agricultural reservoirs, flood storage areas and retention ponds provide a variety of valuable habitats as well as amenity/recreation space.
- As part of green infrastructure in towns, managing flows to reduce flood risk and providing footpaths, cycle-ways and urban green space to make places more connected and liveable.
- Improved water quality and quantity to provide wholesome private and public drinking water supplies and support a healthy natural environment.
- Supporting local tourism and local community well-being through improved water quality and physical habitats for passive and active recreation (parks, bathing waters, angling, walking and water sports).
- Reducing the risk of disruption to road, canal, river and estuary transport and flood water drainage from sediment laden run-off.

To achieve these benefits in a coordinated and sustainable way, activities across catchments need to be considered together as part of the Water Cycle. A Water Cycle Study (see Section 7.1) shows how they interact. Through understanding these interactions, planners can ensure that new developments do not compromise existing ones and that water quality and the environment are protected and enhanced.

The diagrams below illustrate the features of a ‘bad town’ and a ‘good town’ from a water management perspective.

Bad Town

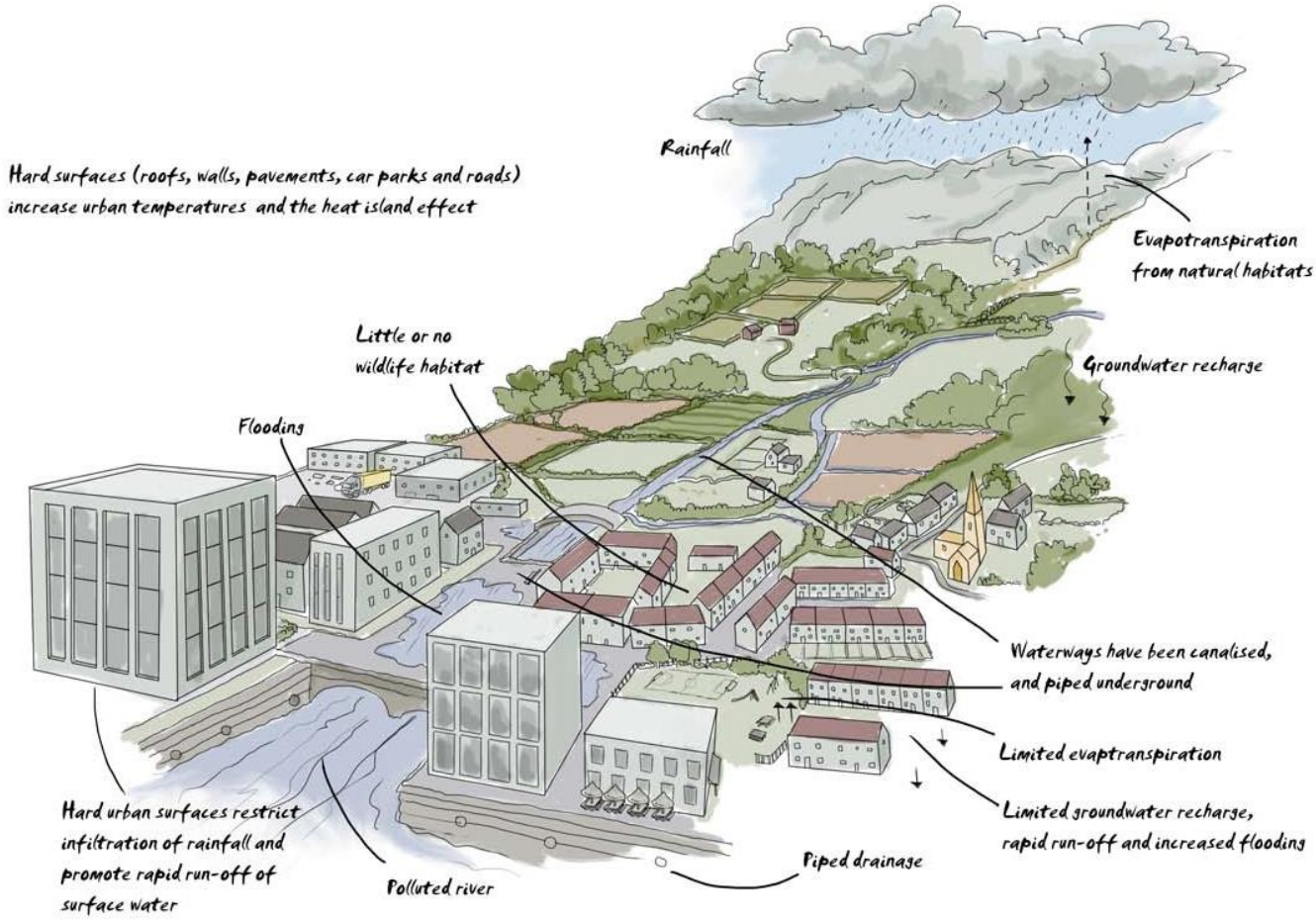

Figure 1: Illustration of a 'Bad Town'

Source: Andy Graham, John Day, Bob Bray and Sally Mackenzie, 2013, Sustainable Drainage Systems, Maximising the Potential for People and Wildlife, A guide for Local Authorities and Developers. RSPB-WWT

In Bad Town, rain runs quickly off poorly managed land upstream from the town with insufficient opportunity to soak into the ground and recharge groundwater. The water reaches the town very quickly, via canalised waterways, as a rapidly rising surge; this is added to by run-off from rain falling onto impermeable surfaces in the town. This surge of water overwhelms piped drainage and causes sewer overflow and property flooding (often with sewage). When it drains away into the canalised waterways the surge of now heavily polluted water continues to the next community downstream, without recharging local groundwater.

Good Town

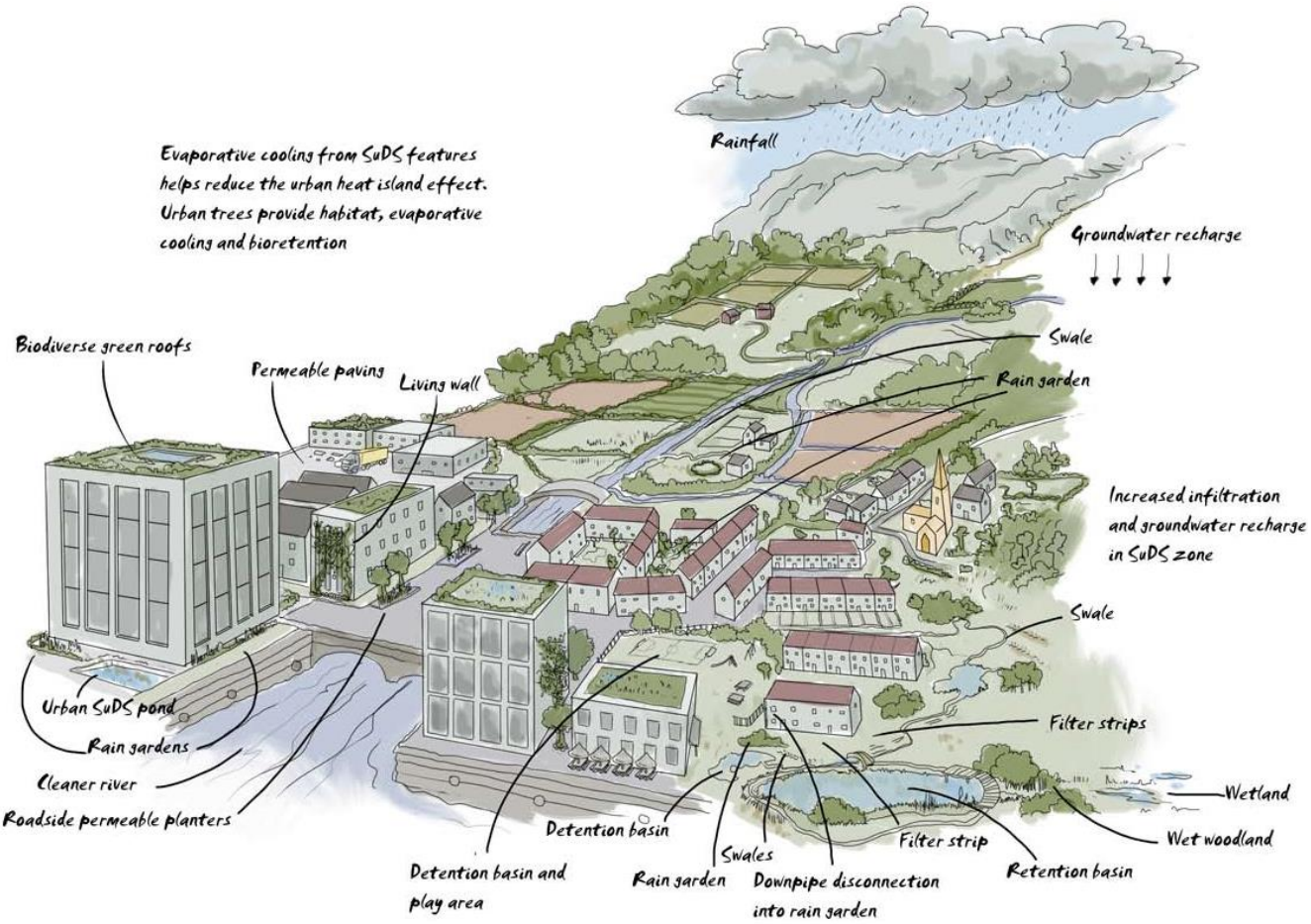

Figure 2: Illustration of a good town

Source: Andy Graham, John Day, Bob Bray and Sally Mackenzie, 2013, Sustainable Drainage Systems, Maximising the Potential for People and Wildlife, A guide for Local Authorities and Developers. RSPB-WWT

In Good Town, the well managed land and more natural habitats upstream absorb water and reduce not only the peak flow, but also the overall volume due to groundwater recharge and transpiration from plants and evaporation. The volume and speed of water arriving in the town is reduced further as excess water is stored temporarily in open space next to the waterways; this also doubles up as recreation space and public open space during times of low flow. SuDS (sustainable drainage systems) in the town, including green roofs, swales and detention basins within developments and permeable surfaces, reduce the run-off from rain falling directly on the town. The integrated drainage (SuDS and piped drainage) in the town can cope with the storm event so there is no property flooding; diffuse pollution is also prevented by SuDS such as filter strips and detention basins. The SuDS allow groundwater to recharge and the water that does leave Good Town is released back to the river slowly and is relatively clean, not causing problems for farmers and communities downstream. As well as providing recreational space and a more pleasant urban environment, the SuDS in Good Town also provide wetlands and other habitats to improve biodiversity.

2.2 Bringing it all together: spatial scales

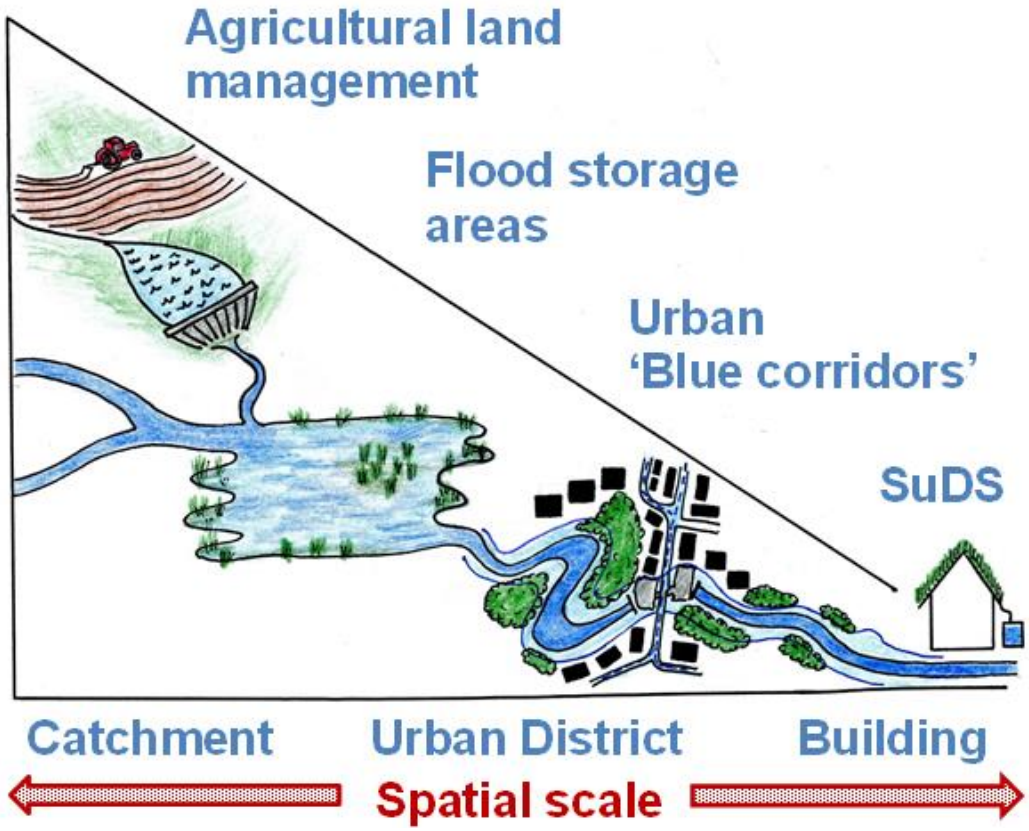

Figure 3: Spatial scales of integrated water management

The different parts of a river catchment and the land uses within it are connected so that what happens in one area affects others. If not positively managed, these interactions can have serious negative impacts, for instance poor agricultural and river management practice upstream can increase flood risk downstream. However, bringing the different activities at the full range of spatial scales across a catchment into a management strategy that makes the most of the possibilities offered by the interactions can replace the negative impacts with sustainable benefits.

Agricultural Land Management

Managing water at the higher levels of the catchment and in the uplands through good agricultural and land management practice and tree-planting retains water to control run-off and reduce peak flows and reduce siltation whilst also providing farmers and land-owners with a more even and reliable water supply.

Flood Storage

Providing flood storage areas further down the catchment retains water during times of high rainfall to reduce the risk of downstream flooding whilst also providing a range of habitats to enhance biodiversity and the components for nature improvement areas.

Urban 'Blue Corridors'

'Blue corridors' in urban areas provide flow paths and water storage to manage flows and flooding whilst also providing green infrastructure, resilience to climate change and improved urban access.

SuDS

Sustainable drainage systems reduce run-off and store water, managing water at source to lower flood risk downstream whilst also providing pleasant open space to enhance the amenity of an area. They can improve water quality and biodiversity and also improve energy efficiency whilst reducing urban 'heat island' effects.

2.3 Bringing it all together: funding

In an age of austerity, working in partnerships pooling resources enables schemes to go ahead that are not affordable for the individual partners on their own. Also, the sum of the pooled resources can be greater than the threshold cost of the scheme, allowing more to be achieved for the money, or savings to be made by the partners. Either way, this is getting more for less.

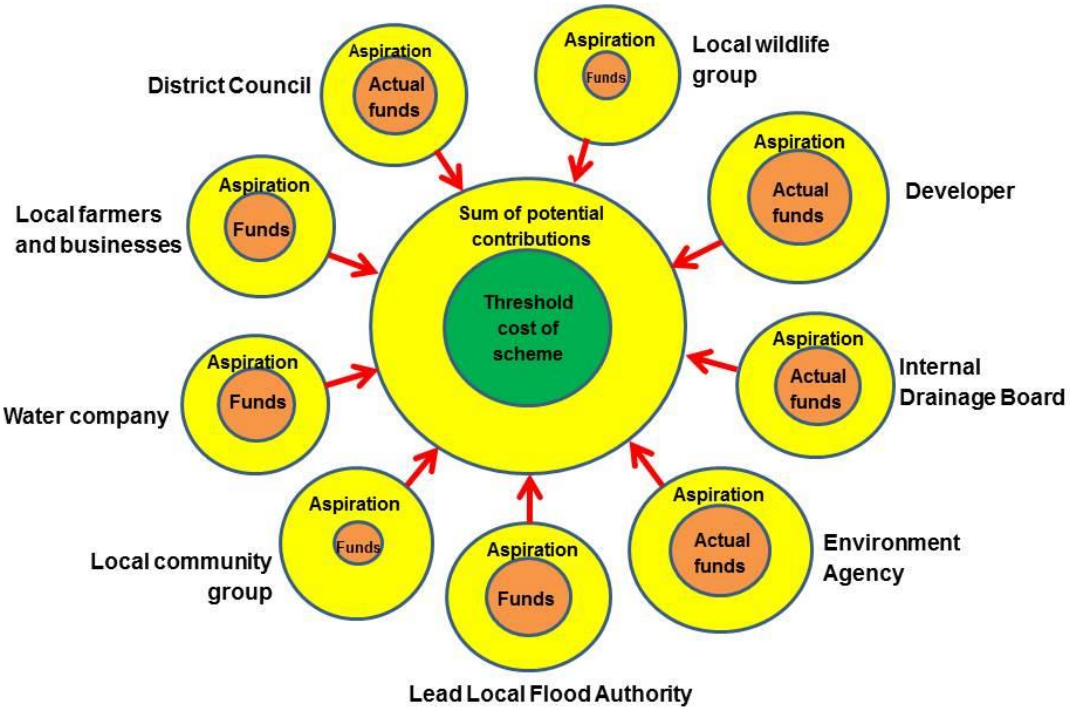

Figure 4: Partnership funding to do more for less

In this diagram, the green circle represents the minimum amount of funding needed to take the basic scheme forward, the threshold cost of the scheme. The orange circles represent the funds available to each separate body and the surrounding yellow circles represent their aspirations, which they cannot afford from their own funds. Looking at the size of the orange circles in relation to the green circle, it is clear that no single body has sufficient funds available to meet the threshold cost of the scheme by themselves. However, if the different bodies pool resources, they can not only meet the threshold cost, but have sufficient funds available to achieve wider aspirations and deliver multiple benefits.

As well as providing sufficient funds to enable projects to proceed, partnership funding offers other benefits to the individual partners:

- Sharing risks reduces individual organisations' exposure to risk.
- Pooling resources reduces duplication of effort and introduces efficiencies of scale that reduce costs and provide savings to the contributing partners. This will improve the viability of the project[1].

[1] The National Planning Policy Framework says that plans should be deliverable and that the scale of development identified in the plan should not be subject to such a scale of obligations and policy burdens that their ability to be developed viably is threatened. Viability can also be important in planning decisions where planning obligations or other costs are being introduced. In these cases decisions must be underpinned by an understanding of viability, ensuring realistic decisions are made to support development and promote economic growth.

2.4 Section Case Studies

#	Case Study	Summary
2A	Atlantic Gateway	*Regional scale regeneration involving three Local Enterprise Partnerships, based on renovating the water environment.*
2B	Taunton town centre regeneration	*A strategic partnership approach to managing floods that facilitated regeneration and reduced the risk to a whole town, while providing additional amenity benefits.*
2C	River Quaggy flood alleviation plan	*Reducing risk to the community by restoring floodplain to provide flood storage; much improved amenity space, and more biodiversity in a very built-up and biodiversity-poor part of London.*
2D	Worcester Waterworks	*Reducing flood risk to the community by regenerating a redundant water works and restoring floodplain, providing a park and sustainable new housing.*
2E	Mayesbrook Park	*Restoration of the Mayes Brook and its floodplain in Mayesbrook Park to provide multiple benefits: improving flood storage, biodiversity and adaptation to climate change within a city environment.*
2F	Stamford Brook	*Master-planning to help deliver water sensitive development - incorporating holistic water management, through a strategic approach to green infrastructure planning and hydrological design, into a development scheme to ameliorate flood risk and improve environmental quality and a series of connected greenways and wildlife corridors.*

3. The Policy Framework and Who Does What

The relationship between policy for spatial planning, flood and coastal risk management, water quality and water supply and waste water treatment can appear complex and confusing. This section makes those policy relationships clear, highlighting national planning policy and guidance on water with links to the relevant policy in the National Planning Policy Framework. It also sets out the statutory duties of water companies in relation to development.

The roles and relationships of the large number of bodies involved can be difficult to understand. This section provides a comprehensive picture of who does what, listing all the key players in the water sector and describing what they are responsible for, what they do and how they should join up. It also explains how the complementary duties to cooperate under planning and flood and water legislation link local plans to flood and water management.

3.1 NPPF policy and national planning practice guidance on water

National planning policy on all aspects of water is contained in the National Planning Policy Framework (NPPF). The NPPF sets out the Government's planning policies for England and how these are expected to be applied. The NPPF provides guidance for local planning authorities and decision-takers, both in drawing up plans and making decisions about planning applications.

The Government has issued new online planning practice guidance. The guidance has been launched in draft format as a new online resource. The 'user friendly' format is being tested with the intention of making planning practice guidance more accessible and will make it easier to keep up-to-date. The Planning Practice Guidance website can be found here.

This Advice Note is intended to provide examples of how NPPF policy might be applied to manage land and water in a coordinated and sustainable way to balance environmental, economic and social demands at a catchment scale. It must be read alongside the policy and guidance in the NPPF and Planning Practice Guidance and is not a substitute for that policy and guidance.

Water in the NPPF

The NPPF provides a holistic framework for the preparation of local and neighbourhood plans, and making planning decisions. Individual sections should not be read in isolation. However, the following summary, arranged by sections of the NPPF (all highlighted by paragraph number) may provide a useful pointer to those parts of the NPPF particularly relevant to water issues.

Core Planning Principles

17. (7th bullet). Contribute to conserving and enhancing the natural environment and reducing pollution. Allocations of land for development should prefer land of lesser environmental value, where consistent with other policies in this Framework.

Promoting Healthy Communities

73. Access to high quality open spaces and opportunities for sport and recreation can make an important contribution to the health and well-being of communities. Planning policies should be based on robust and up-to-date assessments of the needs for open space, sports and recreation facilities and opportunities for new provision.

Meeting the challenge of climate change, flooding and coastal change

94. Local planning authorities should adopt proactive strategies to mitigate and adapt to climate change, taking full account of flood risk … and water supply and demand considerations.

99. Local Plans should take account of climate change over the longer term, including factors such as flood risk, … water supply and changes to biodiversity and landscape. New development should be planned to avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure.

Flood risk

100. Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere. Local Plans should be supported by Strategic Flood Risk Assessment and develop policies to manage flood risk from all sources, taking account of advice from the Environment Agency and other relevant flood risk management bodies, such as lead local flood authorities and internal drainage boards. Local Plans should apply a sequential, risk-based approach to the location of development to avoid, where possible, flood risk to people and property and manage any residual risk, taking account of the impacts of climate change, by:

- Applying the Sequential Test.
- If necessary, applying the Exception Test.
- Safeguarding land from development that is required for current and future flood management.
- Using opportunities offered by new development to reduce the causes and impacts of flooding.
- Where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to facilitate the relocation of development, including housing, to more sustainable locations.

101. The aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding. The Strategic Flood Risk Assessment will provide the basis for applying this test. A sequential approach should be used in areas known to be at risk from any form of flooding.

102. If, following application of the Sequential Test, it is not possible, consistent with wider sustainability objectives, for the development to be located in zones with a lower probability of flooding, the Exception Test can be applied if appropriate. For the Exception Test to be passed:

- It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared.

- A site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

Both elements of the test will have to be passed for development to be allocated or permitted.

103. When determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where, informed by a site-specific flood risk assessment following the Sequential Test, and if required the Exception Test, it can be demonstrated that:

- Within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location; and

- Development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning; and it gives priority to the use of sustainable drainage systems.

104. For individual developments on sites allocated in development plans through the Sequential Test, applicants need not apply the Sequential Test. Applications for minor development and changes of use should not be subject to the Sequential or Exception Tests but should still meet the requirements for site-specific flood risk assessments.

Conserving and enhancing the natural environment

109. The planning system should contribute to and enhance the natural and local environment by:

- Recognising the wider benefits of ecosystem services.
- Minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.
- Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of … water pollution.

Local Plans

152. Local planning authorities should seek opportunities to achieve each of the economic, social and environmental dimensions of sustainable development, and net gains across all three. Significant adverse impacts on any of these dimensions should be avoided and, wherever possible, alternative options which reduce or eliminate such impacts should be pursued. Where adverse impacts are unavoidable, measures to mitigate the impact should be considered. Where adequate mitigation measures are not possible, compensatory measures may be appropriate.

156. Local planning authorities should set out the strategic priorities for the area in the Local Plan. This should include strategic policies to deliver:

- The provision of infrastructure for… water supply, wastewater, flood risk.

Using a proportionate evidence base - Infrastructure

162. Local planning authorities should work with other authorities and providers to:

- Assess the quality and capacity of infrastructure for … water supply, wastewater and its treatment, …flood risk..., and its ability to meet forecast demands.

Using a proportionate evidence base - Environment

165. Planning policies and decisions should be based on up-to-date information about the natural environment and other characteristics of the area including drawing, for example, from River Basin Management Plans. Working with Local Nature Partnerships where appropriate, this should include an assessment of existing and potential components of ecological networks. A sustainability appraisal which meets the requirements of the European Directive on strategic environmental assessment should be an integral part of the plan preparation process, and should consider all the likely significant effects on the environment, economic and social factors.

Spatial planning policy for nationally significant wastewater projects is in the Wastewater National Policy Statement.

3.2 How the different areas of policy (planning, flood risk management, WFD and water) fit together

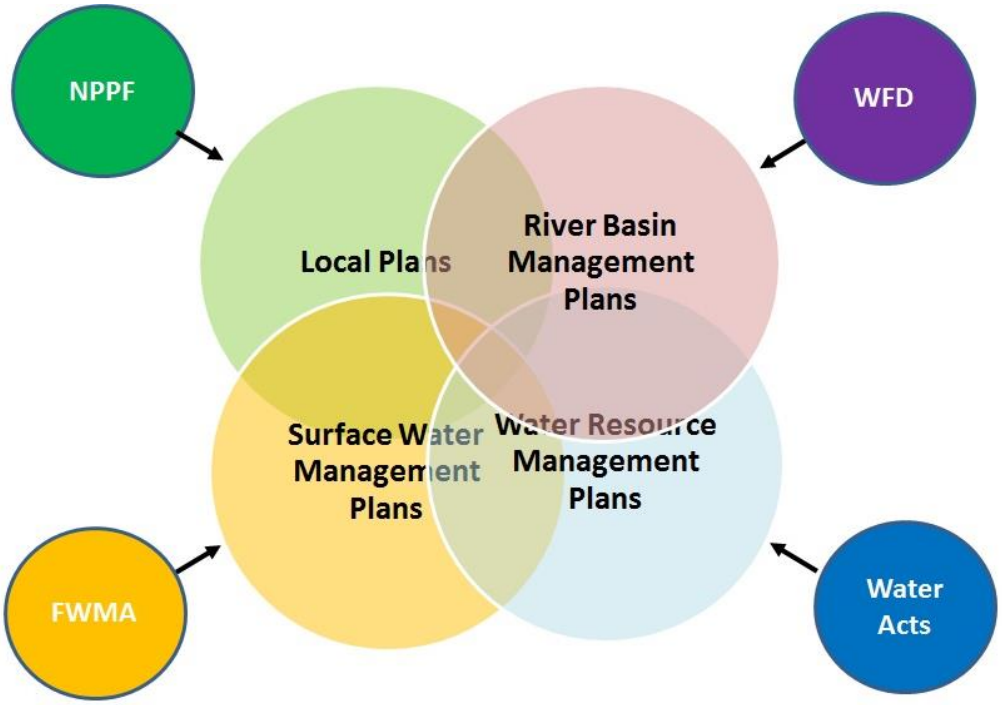

Figure 5: Inter-relationships between different areas of water policy

Spatial Planning

Planning policy is contained in the National Planning Policy Framework (3.1 above) which sets out the Government's planning policies for England and how these are expected to be applied. This is supported by Planning Practice Guidance.

Planning policy is applied through Local Plans, made by local planning authorities (county, district and unitary councils) and Neighbourhood Plans, made by town and parish councils or 'neighbourhood forums' (community groups that are designated to take forward neighbourhood planning in areas without parishes).

Flood and coastal erosion risk management

Two key pieces of legislation currently set out the way forward with managing flood risk: the Flood Risk Regulations and the Flood and Water Management Act 2010.

The Flood Risk Regulations implement the

requirements of the European Floods Directive which aims to provide a consistent approach to managing flood risk across Europe. The approach is based on a six year cycle of planning which includes the publication of:

- Preliminary Flood Risk Assessments (PFRAs) by 22 December 2011
- Hazard and risk maps by 22 December. 2013
- Flood risk management plans by 22 December 2015.

Responsibilities under the Flood Risk Regulations are consistent with the Flood and Water Management Act 2010.

The Flood Risk Regulations sets out a specific mechanism for ensuring regular assessments of risk are undertaken in the UK. Under this legislation the Environment Agency is updating what were previously known as Catchment Flood Management Plans, renamed as Flood Risk Management Plans (FRMPs). These will cover flood risk from main rivers and the sea at the strategic catchment level, but may also include partner actions on other sources of flood risk where agreed with Lead Local Flood Authorities (LLFAs) (county and unitary councils).

The Flood and Water Management Act places a duty on all flood risk management authorities to co-operate with each other. The act also provides lead local flood authorities and the Environment Agency with a power to request information required in connection with their flood risk management functions. Defra has issued Guidance setting out the high level principles of co-operation and sharing of information. The Act also introduced Local Flood Risk Management Strategies, prepared by Lead Local Flood Authorities which should set out the management of flood risk at a more local level, effectively sitting below the Environment Agency's Flood Risk Management Plans.

The use of surface water management plans (SWMPs) is another tool that has become common for Lead Local Flood Authorities to use in specific locations as identified through wider assessments such as the local strategies. The existence of a SWMP in an area should be given specific notice during the preparation of development plans for that area. Surface water management plan guidance has been written for local authorities to assist them as they co-ordinate and lead local flood risk management activities.

Water quality, quantity and habitats

The Water Framework Directive (WFD) sets out the requirements for River Basin Management Plans, which are produced by the Environment Agency every six years.

River Basin Management Plans identify the pressures that the water environment faces and what this means for the current state of the water environment in the river basin district, and what needs to be done about it. The first cycle of River Basin Management Plans run from 2009 to the end of 2015. The Environment Agency is developing the second cycle of plans (2016 to 2021). Defra has asked the Environment Agency to take a more local approach to planning (a catchment based approach) involving local stakeholders in the decisions around key pressures, objectives and actions required to meet these objectives, in line with WFD requirements and Aarhus Convention principles.

The National Standards for Sustainable Drainage (yet to be introduced) will also place a requirement for approved SuDS schemes to wherever possible manage water quality (see 3.4, 'SuDS Approving Bodies').

Water supply and waste water treatment and disposal

Regulations under the Water Industry Act 1991 (amended by the Water Act 2003) give water companies a statutory duty to prepare and maintain Water Resource Management Plans, which look ahead 25 years and describe how each water company aims to secure a sustainable supply of water. Water For Life

recognised that a more strategic approach was also required for drainage planning. More recently good practice guidance commissioned by the Environment Agency and Ofwat sets out a Drainage Strategy Framework for water and sewerage companies to prepare drainage strategies that support economic growth, protect the environment and plan for climate change.

The Environmental Permitting Regulations (2010) also make it an offence to knowingly permit potentially harmful discharges to enter controlled waters, without consent from the Environment Agency. Conditions associated with permits to discharge are set to ensure water achieves required standards and do not compromise water quality objectives. Similarly other activities in or near water require consents (such as licence to abstract water from rivers, lakes or ground) or to modify land drainage to ensure water habitat and flood risk management objectives are not compromised.

Water and sewerage companies have general duties to develop and maintain an efficient water supply system; and to provide, improve and extend a system of public sewers (see Box 1). Therefore, in essence they have duties to provide for new development. However, it is very important that water companies are consulted on major planning applications, and in some areas of constraint, all new dwellings, to ensure that the serviceability of these systems is not compromised by new connections to the detriment of other properties served by that network/system. This helps prevent low pressure issues with water supply, and flooding/pollution from the sewerage system. However, water and sewerage companies are not statutory consultees for planning applications (unlike Local Plans), so water companies have to develop relationships that ensure they are consulted. This is particularly important for drainage, as the right to connect into the sewerage system, also within water legislation, means that large developments can be connected ahead of infrastructure capacity being provided. This issue has been tested in the supreme court, resulting in a recommendation that sewerage companies be consulted as part of the planning process in order to manage this, as planning conditions (such as Grampian conditions – see Case Study 6B in the supplementary case study document) are the only way of protecting against this where it may cause flooding or pollution.

Box 1: Water company statutory duties (Water Industry Act 1991)

Section 37 General duty to maintain water supply system
(1) It shall be the duty of every water undertaker to develop and maintain an efficient and economical system of water supply within its area and to ensure that all such arrangements have been made —
(a) For providing supplies of water to premises in that area and for making such supplies available to persons who demand them.
(b) For maintaining, improving and extending the water undertaker's water mains and other pipes.

Section 94 General duty to provide sewerage system.
(1) It shall be the duty of every sewerage undertaker —
(a) To provide, improve and extend such a system of public sewers (whether inside its area or elsewhere) and so to cleanse and maintain those sewers [and any lateral drains which belong to or vest in the undertaker] as to ensure that that area is and continues to be effectually drained.
(b) to make provision for the emptying of those sewers and such further provision (whether inside its area or elsewhere) as is necessary from time to time for effectually dealing, by means of sewage disposal works or otherwise, with the contents of those sewers.

Joining up

These policy areas and the plans they generate need to be better joined up, so that they complement each other. This will therefore provide the water sensitive design in urban and rural areas that is required to help manage and reduce flood risk, as well as maintain and improve biodiversity and the water environment, using the optimal use of resources delivered through partnerships.

3.3 Duties to cooperate: linking local plans to Flood and Water Management

There is a strong statutory basis for joining up development and flood risk management plans.

The Localism Act introduced a Duty to Cooperate, which is designed to ensure that public bodies and statutory consultees involved in planning work together on issues that are of greater than local significance. A wide range of bodies are bound by the Duty, including: local planning authorities; county councils; the Environment Agency; Natural England and highways authorities. Local Nature Partnerships and Local Enterprise Partnerships and subsequent Business Improvement Districts are not subject to the Duty but Local Planning Authorities must co-operate with them when drawing up Local Plans. Water and sewerage companies are not subject to the Duty but the Government regards their engagement in Local Plans as essential. More guidance is here.

To make sure that different organisations are putting the Duty to Cooperate into practice, when local plans are examined for soundness, the Planning Inspector will look for evidence that the different bodies have worked together. If the Inspector is not satisfied that the local planning authority has cooperated as necessary, their plan could be found unsound. An active involvement in river catchment planning can provide evidence that the duty to co-operate is being complied with.

Under the Flood and Water Management Act (FWMA) all risk management authorities (EA, LLFAs, District Councils, WaSCs, Highway Authorities) have a duty to co-operate with each other and to share data. A key theme of the Pitt Review was for flood risk management authorities to work in partnership to deliver flood risk management better to the benefit of their communities.

The two Duties are complementary and self-reinforcing, providing a firm statutory basis for cooperation and partnership working.

In addition to the Duty to Cooperate, the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (SI 3242) puts a duty on public bodies to have regard to river basin management plans (and associated supplementary plans) when exercising their functions where it may affect a river basin district.

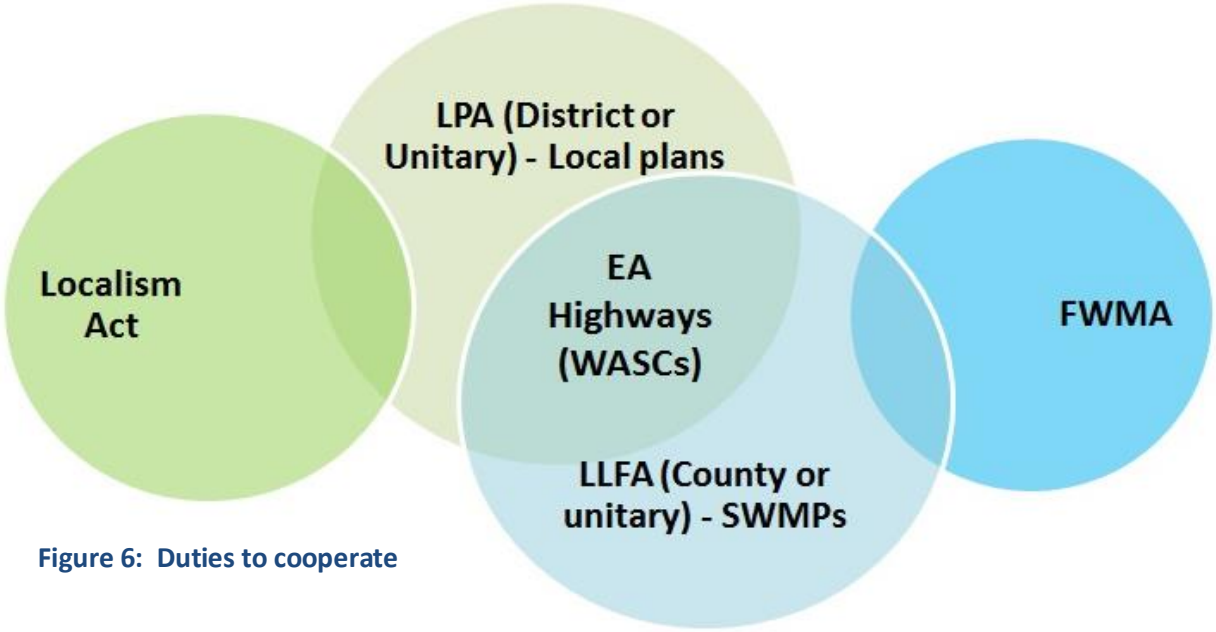

Figure 6: Duties to cooperate

3.4 Who does what: the bodies involved in water management and their roles

A large number of different bodies and organisations, public, private and third-sector, are involved in water management. If planners are to engage with the water sector and form useful partnerships, they need to know who does what and how those bodies and organisations relate to each other. This is explained below.

Figure 7: Who does what?

Government

The Government provides the legal, policy and guidance framework for water, including translating European Union Directives into English law. The Department for Communities and Local Government (DCLG) provides planning policy and guidance. The Department for Environment, Food and Rural Affairs (Defra) is responsible for policy and regulation on flood/coastal risk management, improving the environment, control of pollution, improving water quality, and regulating the water industry.

1. Environment Agency

The Environment Agency is responsible for managing water resources in England. It works with water companies to ensure that they deliver on their Water Resource Management Plans and with businesses and industry on how to reduce water consumption. It has a key role in meeting the requirements of the Water Framework Directive, being a competent authority for its implementation. It is the lead authority in England for protecting and improving inland and coastal waters through better land management; protecting inland and coastal waters from diffuse and point source pollution; sustainable use of water as a natural resource; and creating better habitat for wildlife that lives in and around water. It is responsible for preparing River Basin Management Plans and has a key role in implementing the Catchment Based Approach (see Section 3.2). It is also responsible for pollution control and environmental permitting.

With its national role, the Environment Agency has a strategic overview of all sources of flooding and coastal erosion. It is also responsible for flood and coastal erosion risk management activities on main rivers and the coast, regulating reservoir safety, and working in partnership with the Met Office to provide

flood forecasts and warnings. It produces the new Flood Risk Management Plans in cooperation with the other risk management authorities.

The Environment Agency must also look for opportunities to maintain and improve the environment for people and wildlife while carrying out all of its duties. It works with local planning authorities, Lead Local Flood Authorities, water companies, Natural England and other regulators such as OFWAT. In undertaking this work it has a duty to support sustainable development, and in respect of Water Framework Directive ensure the measures within River Basin Management Plans are not disproportionately costly on business and society as a whole.

The Environment Agency is a statutory advisor to local planning authorities on Local Plans and accompanying Sustainability Appraisals and is a statutory consultee for various forms of development, particularly those where flood risk is an issue.

2. Natural England

Natural England's national role includes responsibility for National Parks, Areas of Outstanding Natural Beauty, Special Protection Areas, Special Areas of Conservation, Ramsar Sites, National Nature Reserves, and Sites of Special Scientific Interest. It is also responsible for protected species and wildlife management and licencing. It is a statutory consultee in most aspects of the planning system, from local plans to development control.

Natural England has a statutory role in the water planning process to ensure that water companies can deliver their statutory obligations for Natura 2000 sites, Sites of Special Scientific Interest (SSSIs) and Biodiversity Action Plans (BAPs). Natural England also encourages water companies to adopt climate change mitigation and adaptation measures and the use of sustainable methods for tackling water quality and water-resource problems at source, through catchment-based approaches that deliver multiple objectives. Natural England works with the Environment Agency, local planning authorities, water companies, the RSPB, the Wildlife Trusts and regulators such as Ofwat.

3. Lead Local Flood Authorities

Lead Local Flood Authorities (unitary authorities or county councils, LLFAs) have lead responsibility for managing the risk of flooding from surface water, groundwater and ordinary watercourses in their areas. As part of this they are responsible for developing, maintaining and applying a strategy for local flood risk management and for maintaining a register of significant flood risk assets. LLFAs must coordinate planning and delivery with other local bodies and communities.

LLFAs, local planning authorities and the Environment Agency need to work closely together to ensure that the plans they are making, both locally and nationally, link up. An essential part of managing local flood risk is taking account of new development.

4. SuDS Approving Bodies

SuDS Approving Bodies (SABs) are being set up in unitary authorities and county councils, to be responsible for approving drainage before construction begins. Subject to approval by Parliament, drainage schemes will have to comply with new National Standards. The SAB must consult water companies, the Environment Agency, Internal Drainage Boards and Highways Authorities when applications affect their assets. For schemes serving more than one property the SAB will also adopt schemes and undertake maintenance.

5. Highway Authorities

Highway Authorities (the Highways Agency and unitary/county councils) are responsible for providing and managing highway drainage and roadside ditches on strategic roads, and must ensure that road projects do not increase flood risk or pollution. Highways authorities need to work with the Environment Agency, LLFAs and district councils to ensure that development and

flood management and pollution control activities are coordinated.

6. Local Planning Authorities

Local planning authorities (unitary authorities, national park authorities, county and district councils) are responsible for preparing local plans. They are required to work with other bodies and local communities, and their plans may not be passed as sound unless they have taken sufficient account of flood risk and water issues. They also decide planning applications for development proposals that may affect water bodies.

7. Water and Sewerage Companies

Water companies have a statutory duty to prepare, consult, publish and maintain water resource management plans for how they will meet customer demand over the next 25 years, including tackling growth and dealing with climate change whilst maintaining adequate water in the environment. They must review these plans annually, reporting any changes to the Environment Agency. As an integral part of their business plans, water companies may prepare catchment based drainage strategies to set out how they intend to deliver statutory drainage functions and customer needs in partnership with other organisations.

Water companies also have a statutory duty to prepare, consult, publish and maintain drought plans. Companies must produce a new plan every three and a half years, or if there is a material change, at any point during this period. Once a drought plan is published, water companies should keep it under review and report any changes to the Environment Agency and Government.

Water companies are responsible for wastewater treatment and disposal and managing and reducing sewer flooding. Water companies also play a major role in managing wider flood and coastal erosion risks. They manage the risk of flooding to water supply and sewerage facilities and the risk to others from the failure of their infrastructure.

They need to work with local planning authorities, developers, landowners and LLFAs to understand and manage risks, and coordinate the management of water supply and sewerage systems with new development, as well as maintaining infrastructure to a suitable standard (including replacing obsolete infrastructure, e.g. leaking sewers).

8. Internal Drainage Boards

Internal Drainage Boards are independent public bodies responsible for managing water levels in low-lying areas. They are the land drainage authority within their districts and their functions include supervising land drainage and flood defence works on ordinary watercourses. They involve local people, encourage volunteering and raise funds from those who benefit from their work, which includes creating and managing natural habitats as well as flood risk management.

9. Local Enterprise Partnerships (LEPs)

LEPs are at the heart of Government's drive to promote effective local economic growth. LEPs are business-led partnerships that can have a major influence on the type and location of economic growth and development. They do this through their decisions on the location and focus of enterprise zones, decisions on the allocation of public funds (such as EU Structural and Investment Funds or the Single Local Growth Fund) and through their wider engagement work with local partners to facilitate growth and development. LEPs are tasked with preparing robust Strategic Economic Plans (SEPs) to guide their interventions. SEPs should be based on a strong rationale, value for money and partnerships for delivery. Public Bodies under the Duty to Co-operate are required to have regard to the activities of the LEPs when considering strategic matters for inclusion in local plans. LEPs can be important partners in managing flood risk to business and local communities, and protecting and enhancing the water environment.

10. Communities

Local communities are crucial to effective flood risk and water management. Often it is when local communities and individuals start to work in partnership with the statutory organisations that otherwise undeliverable outcomes can be achieved. The plans and strategies of all the other bodies need to have buy-in from local communities, and their active involvement, if they are to succeed.

11. Local Groups

Local groups, such as local rivers trusts, nature partnerships and conservation groups, have a very important role in providing information for plan development and in partnerships for delivery.

Parish councils, and local neighbourhood groups, angling clubs, water sport clubs and farming clubs also have an important role to play in providing information and intelligence to help inform decisions.

12. Third Sector organisations

A range of Third Sector organisations and charities can make a significant contribution to planning objectives as members of partnerships. Organisations such as RSPB, WWT, Sustrans and Groundwork can contribute to develop benefits, for example ecosystems, green infrastructure, road safety and better urban quality.

13. Farmers and Land Managers

Farmers and land managers play a key part in managing water to reduce flood risk and improve water quality. The way they use and manage land has a significant impact on the volume and speed of water moving through the catchment and on levels of diffuse pollution. In the upper parts of the catchment land management and agricultural practice is very important for controlling the rate and quantity of run-off and discharges of fertiliser, silt and animal slurry into water courses. Further down the catchment they can provide land for flood storage as well as reducing diffuse pollution from fertilisers through good land management practice. Agricultural reservoirs can provide important contributions to local water supply. Farmers and land managers have a significant role in catchment partnerships, as most of the activities needed to improve local water quality in rural parts of the catchment, and compensatory activities to reduce urban flood risk need their active support.

14. Forestry Commission and private forest managers

The Forestry Commission and managers of private forestry play an important part in controlling water run-off into water bodies and preventing loss of soil and diffuse pollution in the upper parts of catchments. The way they manage forests and woodland can have a significant impact on reducing flooding and improving water quality lower down the catchment. They can play a significant part in catchment partnerships in a similar way to farmers and land managers.

Urban forests can also play an important role in water management in urban areas as well as providing a number of vital benefits for reducing urban heat islands and positively contributing to health and wellbeing.

15. The insurance industry and the Association of British Insurers (ABI)

The insurance industry can play a key role in ensuring development is sustainable by making sure that developers and local authorities consider the insurability of new development when preparing local plans and flood risk strategies. They can also have a role in using insurance to incentivise sustainable drainage and flood risk management solutions.

16. Regional Flood and Coastal Committees

The twelve Regional Flood and Coastal Committees in England are responsible for ensuring plans are in place for managing flood and coastal erosion risks across catchments and shorelines, and that these plans are supported by investment in flood and coastal erosion risk management. They have a key role providing a link between flood risk management authorities and other bodies to develop mutual understanding of flood and coastal erosion risks in their areas.

17. Coastal erosion risk management authorities

Coastal local authorities work with the Environment Agency and local communities to plan how to protect and manage the coast. They develop and maintain coastal flood and erosion risk information to contribute to national information maintained by the Environment Agency. They need to work with other flood risk management bodies to ensure that inland and coastal flood risk management is joined up.

18. Catchment partnerships

Catchment partnerships are at the centre of a Catchment Based Approach (see Section 4.2) to improve the quality of our water environment. Catchment partnerships look at the water environment in terms of all the ecosystems services connected to a healthy catchment to tackle the issues in the catchment in a collaborative way. They aim for better integration of planning and other activities to deliver multiple benefits including flood risk management. Catchment partnerships should involve all bodies with an interest in catchment management, including most of the other bodies above. They have an important role to provide evidence and information to help inform decisions on the management of water in a catchment, but individual members will also contribute their own actions to improve the environment. Developers have much to gain from working with catchment partnerships. In addition to helping meet their legal responsibilities, they can increase the value of sites by making development more resilient to climate change and enhancing amenity and biodiversity.

4. Integrated Catchment Management

Understanding what integrated catchment management is, what it does and why this is important is an essential pre-requisite for integrating water management into planning. This section explains integrated catchment management and sets out the challenges for making it work: communication between communities who can make things happen and the authorities planning what needs to happen; and linking those with the money to fund what is needed with the communities and landowners who can do it.

Partnership working through the catchment-based approach can meet these challenges. This section explains how, setting out the wider benefits of the catchment-based approach and how it can be integrated into the preparation of local plans to resolve water quality and availability and flood risk issues while also improving local environments and public amenity, and increasing biodiversity. It explains how the catchment-based approach provides ecosystem services and how ecosystem services can enable new development and give social benefits including enhanced well-being; and opportunities for sustainable business growth.

Spatial planning has a significant role in meeting Water Framework Directive (WFD) targets for water quality. This section gives detailed and clear advice on what planners can do to meet their WFD obligations.

4.1 Integrated catchment management – what it is, what is does

The land and water in river catchments[2] are used in many different ways, including agriculture, public and private water supplies, wastewater removal, manufacturing, housing and other built development, conservation, recreation and navigation. As waterbodies within a catchment are connected and part of the water cycle, these activities can affect the quality and quantity of water in other parts of the catchment. This can have direct impacts on activities in those other parts of the catchment as well as affecting the ability of catchment waters and associated wildlife to provide wider benefits to society such as clean water supply, flood protection and recreational opportunities (known collectively as "ecosystem services").

What is integrated catchment management?

Integrated catchment management is about bringing water issues and the people and organisations that can do something about them together at the right scale to achieve effective solutions and multiple benefits.

It is a process that links national and regional policy for water, flood risk and the environment to the local communities and businesses that can implement it. It brings benefits at several levels: directly to the communities and farmers and businesses involved, to the wider communities they are part of, and to the environment and biodiversity of the areas in which they live and work.

It recognises the catchment as the appropriate organising unit for understanding and managing:

- Water resources
- Surface water
- Flood risk from all sources
- Land use
- Ecosystems

[2] A catchment is an area with several, often interconnected water bodies (rivers, lakes, groundwater and coastal waters). Catchments can exist at many scales. However a good practical basis for defining catchments for integrating water planning and spatial planning are the Management Catchments that the Environment Agency uses for managing availability of water for abstraction. These are the starting point for the Catchment-based approach for delivering a better quality water environment in England (see next section)

What does integrated catchment management do?

It aims to integrate all environmental, economic and social issues within (or related to) a river catchment into an overall management strategy and derive the greatest possible mix of sustainable benefits for future generations and the communities in the area whilst protecting the natural resources upon which these communities rely.

It does it by promoting the coordinated development and management of water, land and related resources, and working with communities towards an agreed vision of sustainable land and water resource management for their catchment, so that the resultant economic and social benefits are maximised and the environment, public amenity and biodiversity are improved.

It is based on local and community action and relies on people collaborating on the development of a vision, agreeing on shared values and behaviours, making informed decisions and acting together to manage the land and natural resources of their catchment. Their decisions on the use of land, water and other environmental resources are made by considering the effect of that use on all the resources and people within the catchment.

The challenges for implementing integrated catchment management

There are two key challenges for integrated catchment management. The first is linking local communities, farmers and businesses who can make things happen with the regional and national plans and policies that set out what needs to happen. This is a two-way issue: those promoting national and regional strategies need to communicate and engage effectively with local communities about water issues and ensure that people really participate; and those local communities need to have their aspirations recognised and incorporated into strategy by the policy-makers. The second challenge is linking the businesses and organisations that can fund actions with each other and with the community groups and farmers that can do things, in ways that ensure that all benefit. Unlocking local contributions for partnership funding is especially challenging for the larger-scale projects that can bring the biggest benefits.

Partnerships at the catchment and sub-catchment scale are the key to responding to the challenges of communication and linking up the people that can make things happen. At the catchment and sub-catchment scale local planning can link local actions to River Basin Management Plans.

How Integrated Catchment Management works: Different scales

To meet these challenges in England, a new catchment based approach has been introduced.

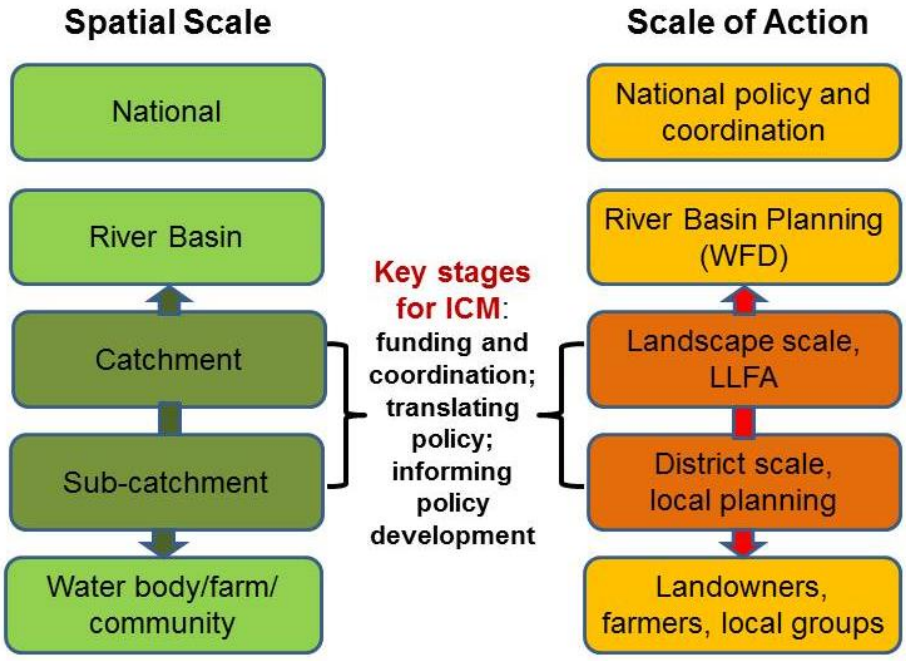

Figure 8: Spatial scale and scale of action for integrated catchment management

4.2 The catchment-based approach and the role of planners and the other stakeholders in integrated catchment management

What is the catchment-based approach?

The catchment based approach to managing the water environment looks at activities and issues in the catchment as a whole, rather than considering different aspects separately in different locations. It works by bringing people together from different sectors to identify issues and agree priorities for action – and ultimately building local partnerships to put these actions in place[3]. The Catchment Change Management hub also provides more information.

This approach has been adopted in England to provide a more locally focussed way of delivering a better quality water environment by integrating decision making and 'on the ground' delivery in relation to water and the environment within a wider socio-economic context. This Defra initiative is being promoted by the Environment Agency.

What does the catchment-based approach do?

It aims to promote a better understanding of the environment at a local level and encourage local collaboration that recognises the multiple benefits that can accrue from coordinated activities to improve the water environment. It also promotes more collaborative, inclusive and transparent decision-making when both planning and delivering activities to improve the water environment.

[3] 'Catchment Based Approach: Improving the quality of our water environment', DEFRA, June 2013

It provides a platform for a range of bodies and individuals including government agencies, local authorities, internal drainage boards, communities, landowners, farmers and businesses to work together to achieve much wider benefits associated with a better quality water environment including tackling diffuse agricultural and urban pollution, improving the public realm and enabling sustainable development and growth. In doing this it will also help the development and refinement of later stages of the River Basin Management Plans (which underpin the delivery of the objectives of the Water Framework Directive).

At the core of the catchment-based approach are catchment partnerships[4]. These groups involve all bodies with an interest in how water is managed and used, and work at the catchment level to agree and deliver the strategic priorities for the catchment.

[4] The Catchment Change Management Hub provides information on the catchment-based approach and catchment partnerships. Guidance on collaborative catchment management is available here.

4.3 How Integrated Catchment Management Works: Partnerships, Process and Outcomes

Benefits of the Catchment-based approach

The catchment-based approach can provide significant benefits for spatial planning. Through engagement in catchment partnerships, local planners can influence what happens in other parts of the catchment, which has a direct impact on development and growth in their local area. As well as direct improvements to water quality that improves the local environment and can unlock development potential, this also includes managing river flows and surface water to reduce flood risk. In areas where development and growth is being constrained by availability of water resources or problems with wastewater disposal due to poor water quality or sewer flooding, catchment partnerships can provide innovative solutions with multiple benefits. The direct benefits from improving water quality include:

- Improving local environments and public amenity
- Increased biodiversity

In the process of improving water quality, actions to reduce diffuse pollution, improve water efficiency and create sustainable drainage also generate other benefits:

- Making better use of water resources
- Resolving waste water treatment problems
- Better management of flood risk
- Improved agricultural productivity and reduced fertiliser use

Indirect benefits from integrated catchment management are ecosystem services and climate change adaptation that enable new development and give social benefits including enhanced well-being; and opportunities for sustainable business growth.

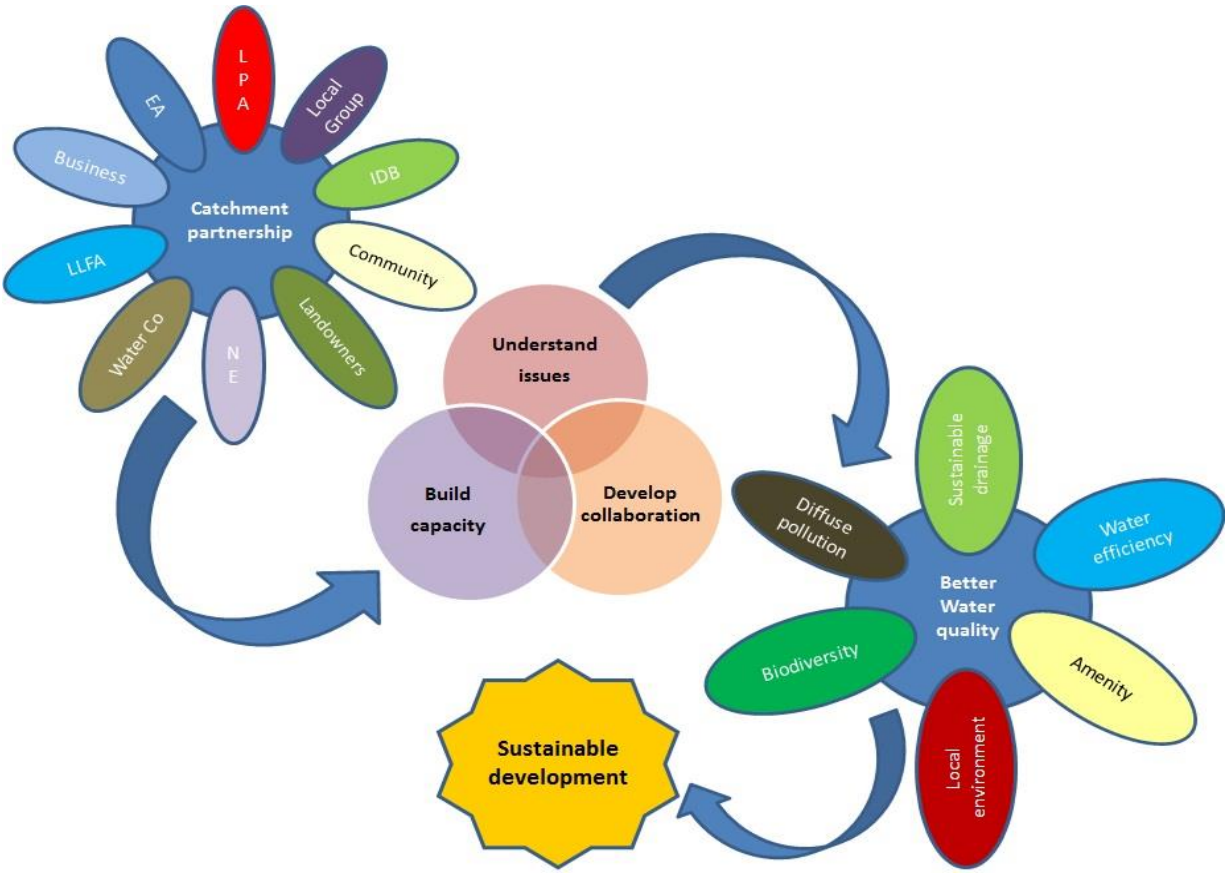

Figure 9: How integrated catchment management works

The overall outcome is enhanced sustainable development, through environmental, social and economic improvements.

To incorporate the catchment based approach into spatial planning and development control, Local Planning Authorities can prepare Supplementary Planning Documents which focus on managing flood risk and the water environment in and around new developments in ways that achieve multiple benefits and reduce the likelihood and consequences of flooding and pollution (see case study 4E). This can link to other SPDs on sustainable design and green infrastructure.

4.4 Role of spatial planning in achieving WFD objectives

The European Water Framework Directive (WFD) came into force in December 2000 and became part of UK law in December 2003. It provides an opportunity to plan and deliver a better water environment, focussing on ecology through river basin management planning. The catchment based approach aims to deliver improved water quality and more ambitious River Basin Management Plans that contribute to meeting targets under the Water Framework Directive.

The WFD aims to protect and enhance the ecological health of surface fresh, coastal and transitional water bodies as well as groundwater (good status being defined as a slight variation from undisturbed natural conditions), as well as achieving traditional chemical standards. In particular it will help deal with diffuse pollution which remains a big issue following improvements to most point source discharges. Successful implementation of the WFD will help protect all elements of the water cycle and enhance the quality of our groundwater, rivers, lakes, estuaries and seas.

The WFD recognises that certain sustainable human uses depend on physical water body modification. It allows the designation of heavily modified water bodies (HMWB) if the modifications necessary to support human uses mean that good ecological status cannot be achieved. HMWBs and also artificial water bodies (AWBs) are therefore expected to meet good ecological potential rather than good ecological status.

The Environment Agency is the competent authority for the Water Framework Directive in England. The Environment Agency's responsibilities are to:

- Analyse the characteristics of the eight river basin districts in England and assess the impact of human activity on the water bodies within these districts
- Monitor the ecological and chemical status of water bodies against the objectives set for them
- Prepare, review and keep an up-to-date a register of protected areas for each River Basin District
- Prepare and consult on the river basin management plans
- Take the lead in drawing up and carrying out the programme of measures to protect and improve water bodies to deliver a better water environment

Planners have a key role in delivering a better water environment, working with the Environment Agency to achieve WFD objectives. This can be achieved through working in partnership with other bodies to manage catchments. However, to meet NPPF requirements for conserving and enhancing the natural environment local planners should give direct consideration to whether new development may compromise the quality of water and water bodies, and opportunities to enhance it.

Ensuring that there is no deterioration in water bodies, and improving their condition has many advantages, including:

- Improving local environments and public amenity
- Increased biodiversity

In addition, good status in water bodies provides ecosystem services that enable new development and give social benefits including enhanced well-being; and opportunities for sustainable business growth.

The NPPF says that planning policies and decisions should be based on up to date information about the natural environment, including drawing from River Basin Management Plans. By working with the Environment Agency, planners can ensure that local plans and river basin management plans are congruent and control development so that relevant objectives of river basin management plans are met.

This approach also has potential synergies with the requirements of the National Standards for Sustainable Drainage where there is a requirement for approved SuDS schemes to help ensure there is no deterioration in water bodies.

The Environment Agency is developing advice on how developers can consider the impacts of their proposed modifications on water quality and physical characteristics of rivers[5], tidal and coastal water bodies. This includes identifying rules and thresholds to trigger the need for further assessment of certain physical modifications to surface water bodies.

Any assessment should consider if an Environment Agency permit will be required and, if so, the permit could be used to control impacts.

The scale and detail of the assessment should be proportional to the likely impact.

The aim should be to try to prevent deterioration, to contribute to improving the status of failing water bodies and be compliant with other aspects of the Water Framework Directive.

If a development site requires Environmental Impact Assessment (EIA), any assessment of impacts on water bodies should be included in that, using information obtained from the relevant River Basin Management Plan or directly from the Environment Agency about the status of potentially affected water bodies.

If a development does not require EIA but has the potential to affect water bodies then a separate WFD compliance assessment might be required. The process below for assessing impacts on water bodies is taken from the Environment Agency's internal guidance for assessing the impacts of new development.

- **Screening** – including basic data gathering (water body and proposed development) and an assessment of potential risk to WFD objectives
- **Further assessment** – including identification of impacts on water bodies, options to avoid impacts on water bodies, mitigation to reduce impacts and opportunities to contribute to betterment
- Justification is required where new modifications are expected to lead to deterioration of a water body or failure to meet WFD objectives (WFD Article 4.7)

[5] For rivers, the guidance only covers physical characteristics

Screening

Screening of potential impacts on water bodies covers an assessment of potential risk to WFD objectives including:

- ***Development impacts*** – how development could affect hydromorphology, biology and water quality elements. Thresholds and rules are used to trigger further assessment.
- ***Sensitive water habitat*** – how development would affect sensitive water habitat, including protected areas and high status water bodies

Further assessment

A further assessment consists of the following stages:

1. Deterioration assessment – should consider the risks from development, including physical modifications, on:

a) Hydromorphology
b) Biological elements (flora and fauna);

The deterioration assessment should recognise where permits, licences or consents that the Environment Agency issues will deal with other impacts including the risk of water pollution.

Deterioration assessment should also consider options to avoid impacts on water bodies, and mitigation to reduce impact

2. Ability to achieve good status – should consider whether the proposed development will prevent implementation of measures in the RBMPs to achieve good status or good potential as appropriate.

3. Improving water bodies – other practical opportunities to improve the water body as part of the proposed development.

4. Impacts on other water bodies – should consider whether or not the proposed development would permanently prevent a different water body from the one in which it is located from achieving good status or good potential as appropriate. Consider opportunities to improve status.

5. Other EC legislation – the outcome of further assessment must give the same level of protection as any other EC legislation that applies, to that water body through the designation of protected areas. These include Natura 2000 sites, Bathing Waters, Shellfish Waters, Freshwater Fish Directive reaches and Drinking Water Protected Areas.

Justification

Where the detailed assessment shows that physical modification would lead to unavoidable deterioration, there is a limited scope under Article 4.7 of the Water Framework Directive to allow for deterioration but this is very much the last resort.

Article 4.7 makes provision for deterioration of ecological status as the result of new modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater, or new sustainable human development activities provided that all the following conditions are met:

- All practicable steps are taken to mitigate the adverse impact on the status of the body of water.
- The reasons for those modifications or alterations are specifically set out and explained in the river basin management plan required under WFD Article 13 and the objectives are reviewed every six years.
- The reasons for those modifications or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives set out in the relevant River Basin Management Plan are outweighed by the benefits of the new modifications or alterations to human health, to the

maintenance of human safety or to sustainable development.
- The beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option.

Any application of Article 4.7 must be reported in the next River Basin Management Plan in liaison with the Environment Agency.

Articles 4.8 and 4.9 of the WFD also says that the new modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater, or new sustainable human development activities must not permanently exclude or compromise the achievement of the objectives of the Directive in other bodies of water within the same river basin district and must be consistent with the implementation of other community environmental legislation such as the Habitats Directive.

Examples of how spatial planning can contribute to local improvements in the water environment and to meeting the objectives of the Water Framework Directive are available here. Pages 14-26 cover planning and include examples of local plan policies.

4.5 Taking a holistic approach: integrated water management with protecting and enhancing ecosystem services

Ecosystem Services

Ecosystem services are defined as services provided by the natural environment that benefit people. Ecosystem services provide outputs or outcomes that directly and indirectly affect human wellbeing.

Some ecosystem services are well known, including food, fibre and fuel provision and the cultural services that provide benefit to people through recreation and appreciation of nature. Other services provided by ecosystems are not so well known. These include the regulation of the climate, purification of air and water, flood protection, soil formation and nutrient cycling. See the National Ecosystems Assessment (NEA) for further details.

An ecosystems approach provides a framework for looking at whole ecosystems in decision-making, and for valuing the ecosystem services they provide, to ensure that society can maintain a healthy and resilient natural environment now and for future generations.

An ecosystems approach is a way of looking at the natural environment throughout the decision-making process that focusses on the way that the natural environment works as a system. It involves consideration of the spatial scale of interactions with the natural environment, the range of constraints and limits, and the people involved in supplying and receiving ecosystem services and benefits. The value of the natural environment can be incorporated into the decision-making process by carrying out economic valuation of the ecosystem services involved.

The Environment Agency published a report in September 2013 (*Ecosystem Services and Flood and Coastal Erosion Risk Management*). This report investigates the potential for integrating ecosystem services and the Ecosystem Approach into Flood and Coastal Erosion Risk Management (FCERM) activities at the Environment Agency. It demonstrates the practicalities and challenges of incorporating ecosystem services assessments into FCERM maintenance activities. It uses three case studies from different regions in

England to illustrate the use of ecosystem services assessments for different maintenance challenges. These case studies have read-across to spatial planning. Click here for the full report.

Biodiversity offsetting

Biodiversity offsetting ensures that when a development damages nature (and this damage cannot be avoided) new, bigger or better nature sites will be created. It is a measurable way to ensure we make good the residual damage to nature caused by development which cannot be avoided or mitigated. This guarantees that there is no net loss to biodiversity from development and can often lead to net gain for nature. It complements existing safeguards in the planning system, making it quicker and simpler to agree a development's impacts to ensure losses are properly compensated for. Offsetting can also help create a ready market to supply compensation for residual damage to nature.

Creating areas for managing surface water and controlling water quality as part of the catchment-based approach provides opportunities for improving biodiversity. This can provide new sites for offsetting biodiversity losses from new development elsewhere.

Defra, Natural England and local councils in six pilot areas are working together to test the biodiversity offsetting approach. Defra has published a green paper on biodiversity offsetting and recently consulted on options for a biodiversity offsetting system and how the system may best operate.

4.6 Section Case Studies

#	Case Study	Summary
4A	The Northampton Drainage Plan	*A partnership project for the regeneration of Northampton promoting efficient use of existing infrastructure, to meet the challenge of high levels of proposed growth in an area that is already at high risk of river and surface water flooding.*
4B	Maldon Strategic Drainage Workshop	*A workshop to discuss the infrastructure needed to support growth in two settlements, Maldon and Heybridge, and to discuss potential opportunities to reduce flood risk, improve water quality, and deliver Water Framework Directive objectives.*
4C	Cambridge Local Plan 2014	*Integrated water and flood risk planning policy in a local plan, drawing evidence from regional and catchment-wide studies to provide a locally applicable policy that integrates water management into new developments within Cambridge.*
4D	Peterborough Flood and Water Management	*A comprehensive planning document bringing together policy on flood risk, sustainable drainage and the protection of aquatic environments to achieve multiple benefits and reduce the likelihood and consequences of flooding and pollution, addressing Water Framework Directive requirements.*
4E	Cuckfield Neighbourhood Plan	*A neighbourhood plan that recognises catchment-wide issues, with policies in the plan to ensure that new development has SuDS principles embedded into designs, and therefore does not increase flood risk downstream, in line with national policy.*
4F	Bristol Surface Water Management Plan	*Developing an innovative model to inform a strategic surface water management plan, using water sensitive urban design principles to reduce flood risk and provide benefits to socially deprived areas.*
4G	Greater Norwich Joint Core Strategy	*The Greater Norwich Development Partnership Joint Core Strategy (JCS) demonstrates how the water environment can be embedded as part of the vision that can be traced throughout the strategy to meet the challenge of enabling major development next to the Broads National Park.*
4H	Margate Surface Water Management Plan	*Integrated catchment management to develop a joined-up approach to managing surface water and water quality to enable growth in Margate.*

5. Surface Water Management

Managing surface water is a crucial but often daunting task for those planning new development and improving urban areas. This section shows how to manage surface water at source, and through each part of its onward flow in an integrated way using sustainable drainage systems (SuDS) to: reduce the damage from flooding; improve water quality; supplement water supply; enhance biodiversity; protect and improve the environment; and improve the public realm.

Multiple benefits and economies can be achieved by using the natural flood risk management approach described in this section, which also sets out the links to flood risk management, and how local authorities' flood risk management and spatial planning responsibilities relate to each other, and provides links to the guidance on planning and flood risk.

5.1 Managing water at source, SuDS

Sustainable drainage means managing rainwater (including snow and other precipitation) with the aim of:

- Reducing damage from flooding
- Improving water quality
- Protecting and improving the environment
- Protecting health and safety
- Ensuring the stability and durability of the drainage system[6]

Sustainable drainage systems (SuDS) are components or schemes designed to manage surface water in a way that mimics natural drainage. Well-designed SuDS manage flood risk, help adaptation to climate change and improve water quality and biodiversity.

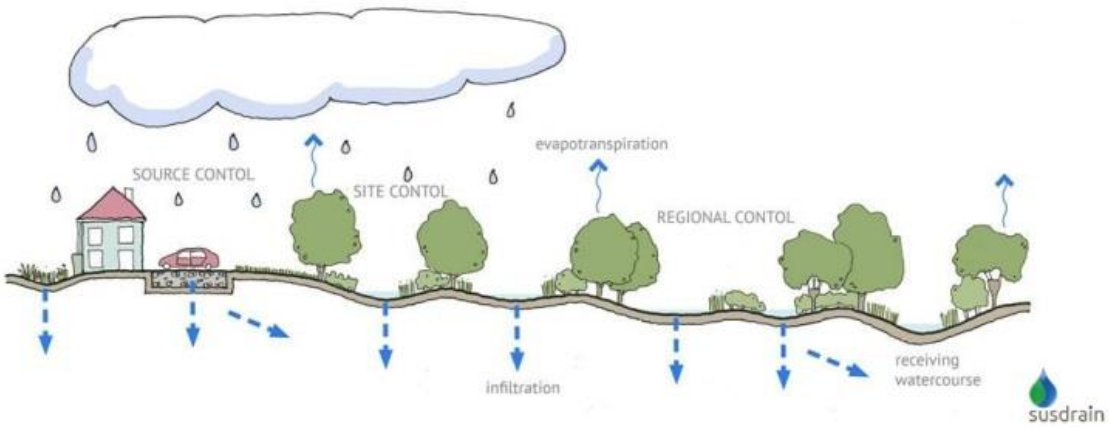

Figure 10: SuDS mimicking nature
Source: Susdrain

[6] Definition taken from Schedule 3, paragraph 2, Flood and Water Management Act 2010

SuDS can achieve multiple benefits including:

- Controlling surface water run-off from developments
- Ensuring that flood risk does not increase further downstream
- Removing pollutants from urban run-off at source
- Combining water management with green space to increase biodiversity and improve public amenity

SuDS aim to reduce the amount and rate of water flow by a combination of:

- Infiltration into the ground
- Holding water in storage areas
- Slowing down the movement of water

Susdrain, the community for sustainable drainage has produced an animation explaining how SuDS replicate natural drainage by managing rainfall close to where it falls, and how SuDS components like rain gardens and permeable paving can be used. It also shows the multiple benefits of SuDS including managing local flood risk, treating pollution from surface water runoff, enhancing biodiversity and providing great places for wildlife, people and communities.

Guidance on SuDS

CIRIA has produced a number of comprehensive guidance documents, including guidance for planners. The RSPB and WWF have produced guidance for local authorities and developers (Sustainable Drainage Systems - Maximising the potential for people and wildlife) on realising the benefits for biodiversity and urban green space from SuDS systems.

The Royal Horticultural Society has produced advice for builders and householders on permeable paving which can help to ensure that a planning application is not needed to pave a front garden and will also improve drainage, amenity and wildlife.

5.2 Minimising diffuse pollution

Water pollution can come from either diffuse or point sources. An example of point source pollution is treated sewage effluent discharged from a sewage treatment works. Point source pollution is controlled by regulation and is no longer a significant problem. However diffuse water pollution is a serious problem in some parts of England.

Diffuse pollution is caused by many small or scattered sources (Figure 11). It is a widespread and long-term threat to the ecology of lakes, rivers and coastal waters, and to the quality of groundwater and the costs of water supplies. It often occurs after rainfall and its composition is extremely variable. Common examples of diffuse water pollution include:

- Contaminated run-off from roads and buildings
- Accidental chemical and oil spills from transport and industrial sites
- Surplus nutrients, pesticides and eroded soils from farmland
- Surface water drain misconnections

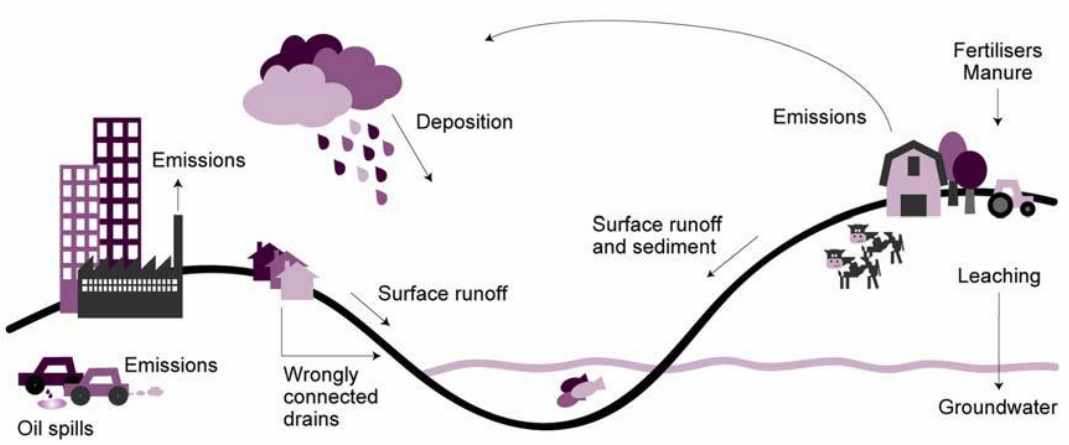

Figure 11: Common sources of diffuse pollution

Source: Environment Agency

On its own, each source of diffuse pollution may be of little significance. However, when the sources occur together, for example in an urban area, they can create significant problems. By its nature, this kind of pollution is difficult to control. However tackling diffuse pollution has many benefits beyond improving water quality.

The poor quality of many urban rivers adds to social deprivation and deters business investment, but cleaning up rivers can transform them into natural focal points for business and leisure, enhancing public amenity and economic growth.

The way land is used and how it is managed is critical to the risk of water pollution. Planning has a significant role in ensuring that the design of urban areas and individual developments prevent and reduce diffuse pollution. In particularly sensitive areas, potentially polluting development should be prevented or include special measures to prevent contamination of surface or groundwater. SuDS are key to this. SuDS should be incorporated into strategic plans for urban areas and included in all new developments (and wherever possible, retrofitted into existing development) in order to reduce diffuse pollution.

5.3 Supplementing water supply

New development must meet the mains water consumption requirements of relevant legislation and codes that reflect widespread stresses on potable or mains water supplies in some English regions. Mains water consumption requirements can be met by maximum use of water-economising measures such as dual-flush toilet cisterns, aerated tap and shower-heads, lower-volume baths, and water-efficient clothes and dishwashing appliances. However systems for harvesting rainwater for non-potable uses such as toilet-flushing, clothes-washing and the outside tap can also achieve the necessary total savings whilst also managing surface water at source.

Rainwater harvesting (RWH) can reduce domestic mains-water consumption by up to 50%; the remainder needs to be potable for cooking, drinking, bathing, showering and dish-washing. This potential saving can rise to over 90% in buildings that are not dwellings where the balance of daily water usage usually swings strongly towards non-potable applications.

In practice, real water savings will depend upon the ratio between how much water can potentially be collected, and the amount of non-potable water that will be used; variations in patterns of rainfall and consumption will also affect the total savings that can be made. These variables are reflected in the Code of Practice for RWH (BS-8515) which effectively constrains the size of the storage tank to hold no more than a c20-day supply; this, along with restricting collection from suitable roofs and effective pre-storage filtration, is aimed at ensuring that the quality of the non-potable water being supplied is clean/clear.

So that RWH systems offer attenuation for SuDS purposes, additional storage capacity is needed when a peak-flow weather event occurs. This is achieved by installing an oversized tank with an internal weir to provide the correct volume requirements on each side of the weir to meet the individual requirements of BS-8515 for RWH systems, and of the required SuDS attenuation.

On housing developments of several properties or more, communal systems that provide RWH for groups of properties may be cheaper to install, easier to maintain and provide more effective attenuation.

5.4 Enhancing biodiversity

Managing water in an environmentally sensitive way offers many opportunities to enhance biodiversity at the same time as managing flood risk and supplementing water supply. Planners and developers can use SuDS to also deliver green infrastructure, to meet the objectives of local authorities' green infrastructure plans and strategies. Concerns are often expressed by developers that using SuDS will reduce the amount of open public space. However imaginative design of SuDS can simultaneously provide open public space and surface water management, whilst also improving a development by creating habitats that encourage biodiversity. This can be achieved by creating visually attractive green (vegetated and landscaped) areas that are also blue (water) infiltration, storage and transfer corridors in developments, connecting people to water.

Planners and developers should consider ecology, flood risk and water quality management together at the design stage so that SuDS components (such as ponds and wetlands) fulfil their ecological potential and enhance biodiversity along with their other benefits. SuDS designed with wildlife and people in mind from the outset should result in wildlife-rich green space that offers many other amenity benefits. Retrofitting SuDS features as part of redevelopment can improve the biodiversity and amenity of the wider area.

Natural England's 'Nature Nearby' - Accessible Natural Greenspace Guidance (2010) specifically identifies SuDS as an opportunity for creating new green space in urban areas and states that when incorporated into site master plans alongside new footpaths, greenways and woodlands, they deliver a range of benefits to wildlife as well as people.

The RSPB and WWT have issued guidance for local authorities and developers (Sustainable Drainage Systems - Maximising the potential for people and wildlife) which sets five key principles for realising the benefits for biodiversity and urban green space from SuDS systems:

- Involve local communities in 'master planning' their SuDS environment at the earliest stage
- Involve them in the detailed design and management of SuDS
- Wherever possible, establish amenity and biodiversity in all SuDS, both new and retro-fit schemes
- Allocate adequate resources for design and long-term management
- Seek advice and input from ecologists and landscape architects

5.5 Links to flood risk management

Strategic consideration of flood risk

By treating flood risk strategically in the planning process so that flooding is considered from the outset, flood risk management can be embedded in plans and strategies, so it is an integral part of each neighbourhood's vision for its sustainable development. This provides greater certainty to all involved, particularly developers.

Getting multiple benefits

This makes for a much more effective use of resources: integrating development, regeneration and flood risk management can achieve multiple objectives (enhancing biodiversity and water availability and quality, and improving the public realm); developers can make better investment decisions; and local authorities and the Environment Agency can shift resources from development control. It also provides the opportunity to use new development and redevelopment to reduce flood risk to whole communities though area-wide management of surface water and flood risk.

Natural flood risk management

To make the most of the opportunities in terms of multiple benefits and economies, natural flood risk management should be used in conjunction with conventional flood defences. Natural flood management is the alteration, restoration or use of landscape features to manage surface water to reduce flood risk. It can be envisaged as landscape-scale SuDS. It can reduce erosion and benefit water quality, carbon storage and biodiversity. These positive effects may

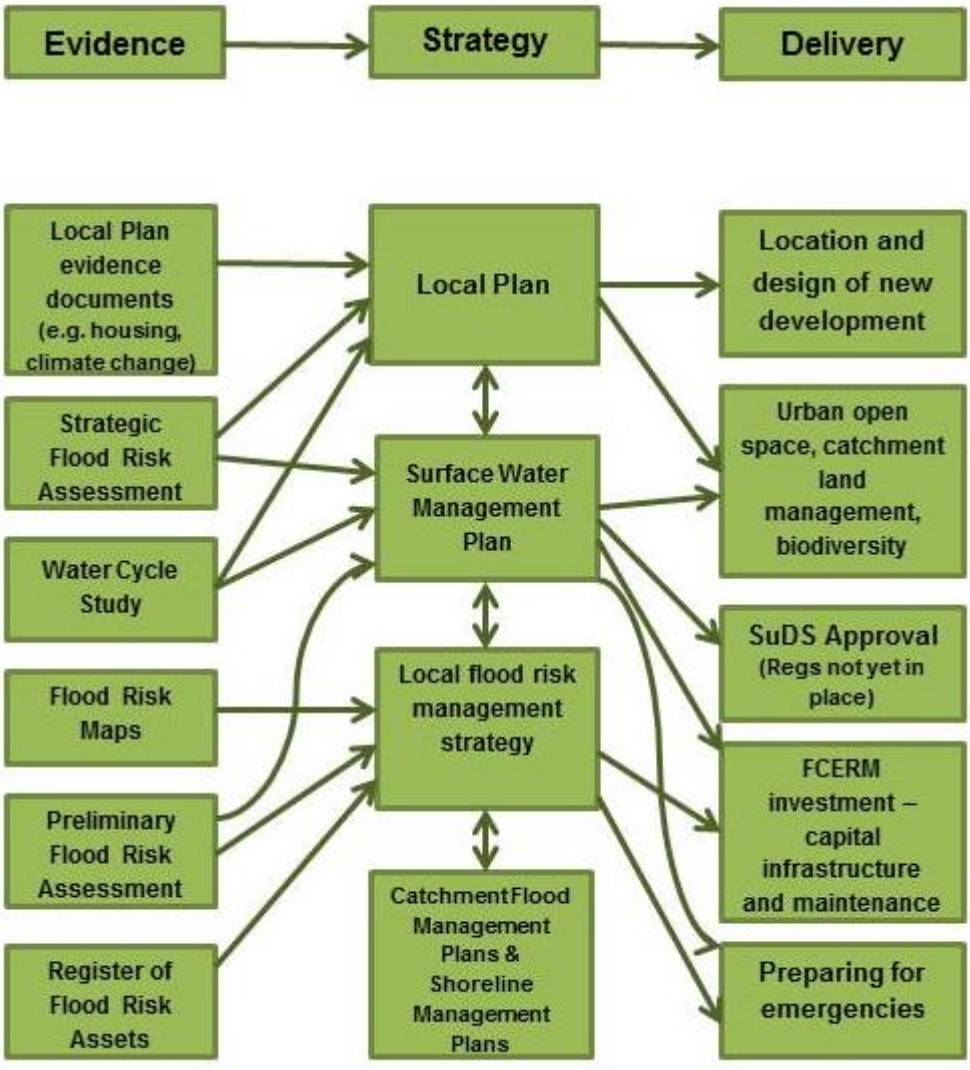

Figure 12: How flood and coastal risk management links to local planning

sometimes be more valuable than the reduction in flood risk.
Collaboration between land-owners and communities is a key to successful natural flood risk management. Long-term funding measures or incentives, and better use of local knowledge are also important.

Natural flood risk management aims to reduce the downstream maximum water height of a flood (the flood peak) or to delay the arrival of the flood peak downstream, increasing the time available to prepare for floods and reducing the pressure on conventional 'hard' flood defences. This is achieved by controlling the progress of water through a catchment using SuDS. Natural flood risk management relies on one, or a combination, of the following underlying mechanisms:

- Reconnecting rivers to their floodplains using methods such as: removal of flood banks: increased channel roughness to encourage over-bank flows, making better use of available floodplain areas
- Storing water by using, and maintaining the capacity of, wetlands, ponds, ditches, channels and embanked reservoirs
- Increasing soil infiltration, potentially reducing surface runoff. Transpiration from plants and evaporation from soil can also manage water at source to reduce runoff
- Slowing water by increasing resistance to its flow, for example, by planting floodplain or riverside woods
- Interrupting surface flows of water, for example, by water storage or planting buffer strips of grass or trees

Natural flood management strategies can be loosely classified by the location of their likely deployment, either near the source of floodwater or downstream, and by how the components of the strategy may be distributed on the ground. The classification highlights that addressing governance is important to successful implementation. Diffuse measures require cooperation between land-owners, and coordinated deployment across a catchment.

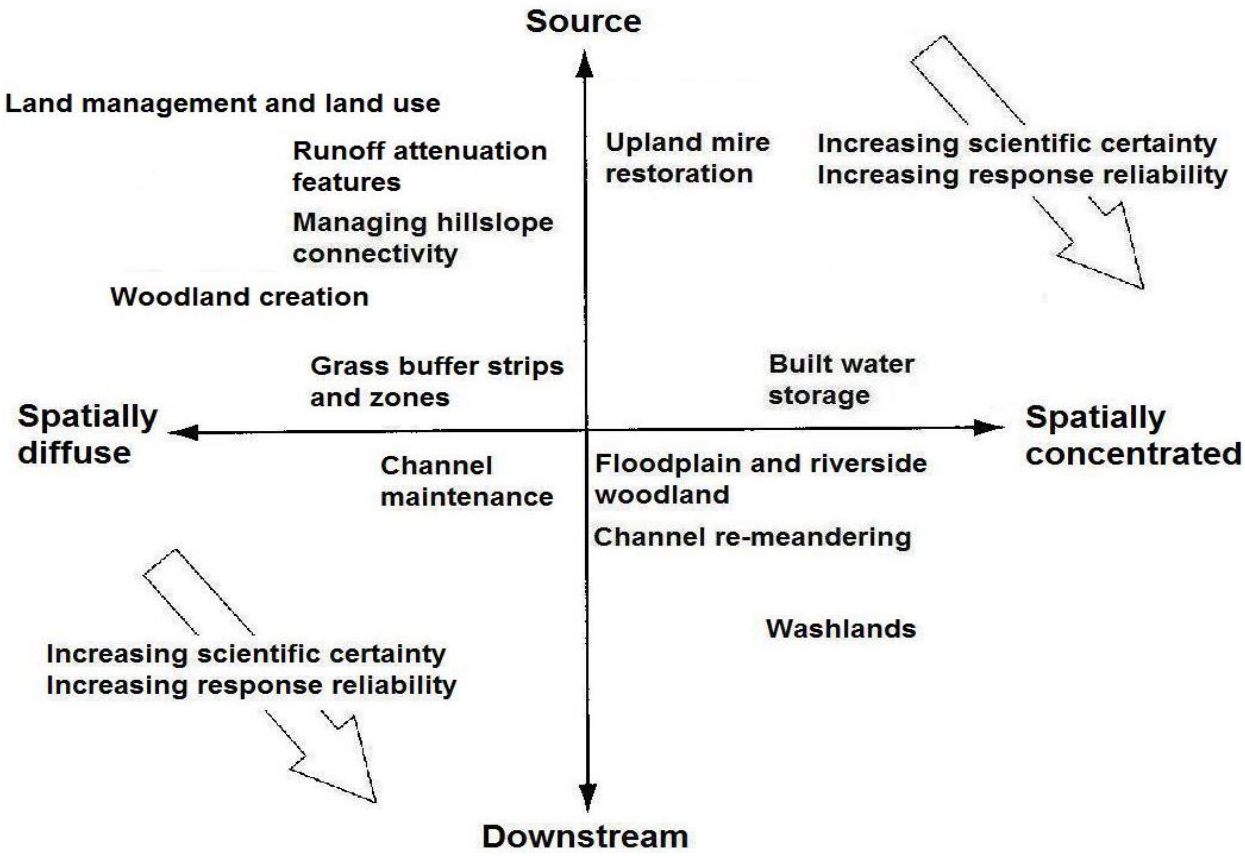

Figure 13: Natural flood management

Source: Parliamentary Office of Science and Technology Postnote Number 396 December 2011

What guidance is available?

DCLG's new web-based national planning practice guidance contains guidance on SuDS and managing flood risk.

The Local Government Association (LGA) Knowledge hub contains comprehensive information on managing flood risk for local authorities in terms of both spatial planning and flood risk management responsibilities under the Flood and Water Management Act. The website contains a comprehensive e-library on flooding and flood-related issues.

CIRIA and the Environment Agency have published guidance on managing urban flooding from heavy rainfall through design of places: Designing for exceedance.

The Association of Drainage Authorities (ADA) has produced a 10-point plan for managing flood risk which sets out how the principles of the catchment-based approach can be applied to flood risk management. It stresses that the different parts of a river catchment and the land uses within it are connected so that what happens in one area affects others, and how managing these interactions positively controls the flow of water through the catchment so that the risk of flooding to people, property and businesses can be reduced whilst at the same time bringing other benefits for water availability and quality, recreation and the environment.

5.6 Section Case Studies

#	Case Study	Summary
5A	**Manor Fields Park, Sheffield**	*Regeneration that provides 300 new dwellings, manages surface water more cost-effectively to reduce risk to the wider community, and provides a park and recreation facilities while also enhancing biodiversity.*
5B	**Upton, Northampton**	*A mid-density residential neighbourhood with Integrated SuDS, providing significant additional housing without increasing flood risk while retaining effective greenfield runoff rates, and reducing flood risk to the wider community.*
5C	**Croydon New South Quarter**	*A mixed-use development in the centre of Croydon that delivers around 800 residential units whist enhancing the water environment and reducing risk of flooding and pollution by restoring the River Wandle and lowering surface water run-off to greenfield rates.*
5D	**Ladywell Fields**	*Using natural flood risk management techniques to restore an urban river and its floodplain to reduce flood risk and increase biodiversity, and provide a much-needed safe park in a heavily urbanised part of London.*
5E	**The Crane Valley Catchment Plan**	*Partnership working across administrative boundaries to improve water quality, biodiversity and the public realm, and use natural flood management techniques to reduce flood risk in a heavily developed urban area.*
5F	Marston Vale Surface Waters Plan	*A catchment-scale integrated SuDS developed in partnership to enable significant growth and thousands of new homes.*

6. Managing Water for Development

Constraints on water supply and waste water treatment can stop development unless they are understood and managed. This section explains how these constraints can be overcome through partnership working with water companies and catchment partnerships.

How to bring water companies' Drainage Strategies and local plans together to identify and meet common objectives more efficiently and effectively is explained, in the context of the relationship between the planning system, water planning, flood risk management and river basin management.

6.1 Constraints on water supply

Water is becoming scarcer in parts of England due to climate changes at the same time as population and demand for water is increasing. In the South East of England, water demand exceeds the volume licensed for abstraction, with the shortfall being met from ground water. The Environment Agency says that 20 per cent of the UK's water is used domestically with over 50 per cent of this used for flushing WCs and washing, most of which comes from drinking quality standard or potable water. Constraints on water supply may limit the capacity of an area to accept additional development unless ways can be found to increase available water resources or reduce water use.

At the individual building scale, the amount of potable water used within the dwelling can be reduced by using fixed fittings which reduce water use in WC's, taps and showers. Further reductions could be achieved by installing grey water or rain water collection and treatment systems.

Owners and occupiers of premises and anyone who installs plumbing systems or water fittings have a legal duty to ensure that the systems satisfy the Water Fittings Regulations. These are national requirements for the design, installation and maintenance of plumbing systems, water fittings and water-using appliances. Their purpose is to prevent misuse, waste, undue consumption of water and to prevent contamination of drinking water.

Additionally, local planning policy for water stressed areas can require new domestic buildings to meet the Code for Sustainable Homes to manage water use. The Code measures the sustainability of a home against nine design categories, including water (to reduce the consumption of potable water in the home; and to encourage the recycling of rainwater and reduce the amount of mains potable water used for external water uses) and surface water run-off (to avoid, reduce and delay the discharge of rainfall to public sewers and watercourses to protect watercourses and reduce the risk of localised flooding, pollution and other environmental damage).

The Code for Sustainable Homes rates the 'whole home' as a complete package. Each category includes a number of environmental issues which have a potential impact on the environment. The issues can be assessed against a performance target and awarded one or more credits. Performance targets are more demanding than the minimum standard needed to satisfy Building Regulations or other legislation. They represent good or best practice, are technically feasible, and can be delivered by the building industry.

At the neighbourhood scale, where large developments are proposed local planning policy or planning agreements with developers can require development schemes to adopt demand reduction measures, such as water efficient fittings and efficient irrigation, and developing and using non-potable water supply resources to supplement potable supply.

6.2 Constraints on wastewater treatment

Wastewater conveyance and treatment capacity is a significant and often overlooked potential constraint on development. Cooperation and partnership working between planners and developers and water companies and the Environment Agency should identify potential problems and solutions early in the development planning process, reducing delays and costs to developers and making the most of opportunities to achieve multiple benefits and synergies.

If sewers are at or near capacity, new development can cause or exacerbate sewer flooding, with devastating impacts on property and the environment. This can be a significant issue in areas with combined sewers which carry both foul and surface water. Even if capacity issues do not lead to sewer flooding of property, they may exacerbate combined sewer overflows (CSOs), discharging a combination of foul and surface water into streams, rivers and the sea, through outfall pipes. Much of the UK network of combined sewers and CSOs dates back to Victorian times and hence these older systems can often be found in the oldest parts of towns and cities. CSOs provide a failsafe during heavy storms to stop household domestic sewage and storm water backing up through the system and flooding homes and streets. However where badly maintained or operated, CSOs can have a serious negative impact on water quality and biodiversity (as well as public amenity). Wastewater capacity constraints on new development can be mitigated by the use of SuDS to manage surface water at source, reducing or removing this water completely from the wastewater network. This leaves more capacity for foul water and reduces the chances of flooding. Larger developments offer opportunities to reduce sewer flooding and CSOs over a wider area through the use of well-designed SuDS.

6.3 Integrating water plans and local plans

Water and wastewater infrastructure, also called Water Services Infrastructre (WSI) requirements need to be included in local plans. If WSI is not considered in line with other infrastructure requirements, this may result in slower growth and/or environmental damage, as well as impact on water quality if wastewater treatment systems are overloaded and run-off is not adequately managed. Planners need to liaise with the Environment Agency and appropriate water and wastewater providers at the earliest opportunity so that all parties understand and take account of each other's processes, practices and issues in order to promote the efficient and sustainable delivery of infrastructure.

Water companies produce Drainage Strategies to help customers and other stakeholders understand how they intend to deliver their statutory functions over the long term within a particular area in a sustainable and economic manner. The Drainage Strategy should explain how a water and sewerage company will do this in conjunction with local planning authorities and other organisations (e.g. The Environment Agency, highways authorities, and housing developers) and how the company, in turn, will support these organisations in delivering their own responsibilities as well. For example, the Drainage Strategy should signal to local planning authorities and housing developers how sewerage infrastructure will develop so that they are able to plan accordingly and contribute to economic growth. The Environment Agency and Ofwat has published guidance: Drainage Strategy Framework for water and sewerage companies to prepare Drainage Strategies.

If local authority planners developing Local Plans work in partnership with water companies and the Environment Agency, a co-ordinated and efficient balance of the needs of each can be achieved: the need of planners to manage growth sustainably; water companies to comply with their statutory duty to connect new developments; and the Environment Agency to protect the environment. Where surface water drainage is arranged by Internal Drainage Boards they should also be involved in the process to manage water and minimise flood risk. If the necessary Water Services Infrastructure (WSI) is provided in a timely and sustainable manner the needs of all stakeholders should be met.

This use of water is part of a continuous cycle, consequently the needs of the water environment (its environmental capacity) and the provision of each of the elements of WSI (from storage and abstraction through treatment and delivery to wastewater removal and discharge of treated wastewater back into water courses) should be considered together. Within this 'Water Cycle' there are opportunities to consider reduced consumption, recycling and re-use of water. These are best identified through a Water Cycle Study (see Section 6.1), which allows the principles of sustainable development to be fully exploited. It considers all the WSI elements - how they interact, the impact of the scale and rate of development and how water should be properly managed. It ensures that new developments do not compromise existing ones and that water quality and the environment are protected and enhanced.

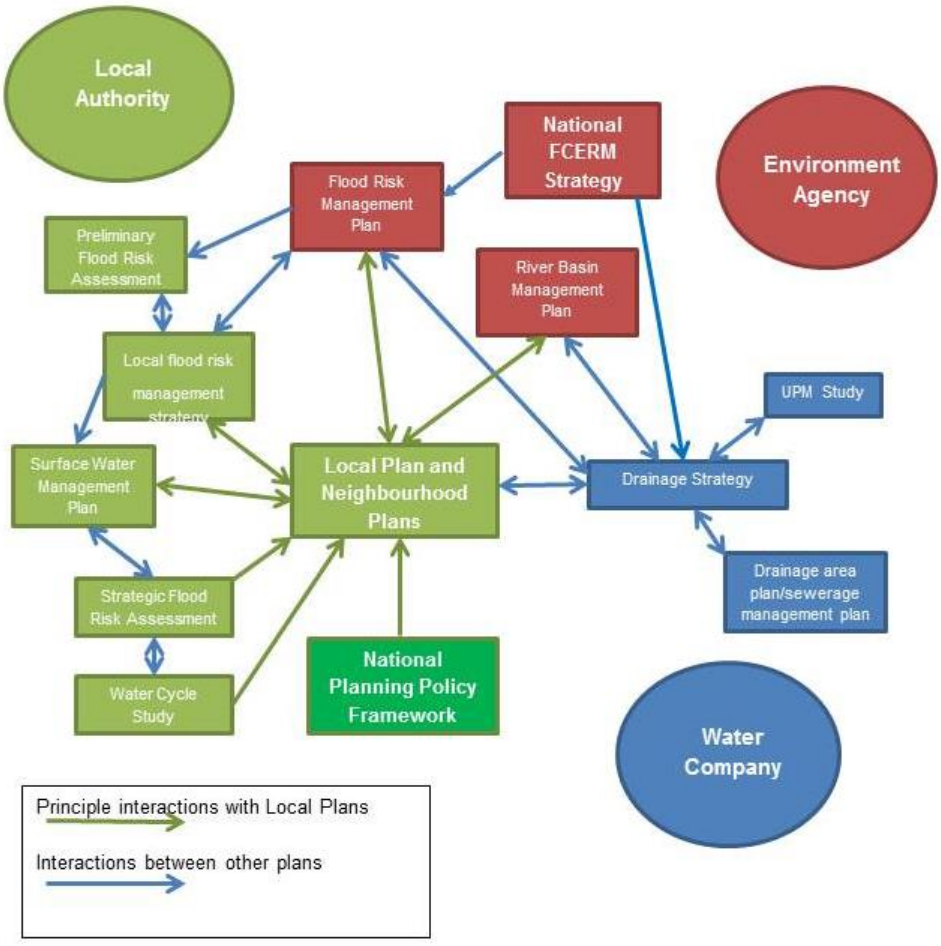

Figure 14: The relationship between the planning system, water planning, flood risk management and river basin management

6.4 Section Case Studies

#	Case Study	Summary
6A	Old Ford Recycling Plant	*Reducing water use and reducing waste water volumes in the Olympic Park with an innovative park-wide water recycling plant that achieves a 40% reduction in potable water use.*
6B	Grampian Style planning conditions	*Using planning conditions that prevent the start of a development until off-site works have been agreed and the network upgraded ahead of the development being occupied to address water or wastewater/sewerage capacity issues and prevent water problems.*
6C	Rackheath Eco-Community	*Using water cycle studies in a partnership approach to identify and overcome the water-related constraints on a significant new town eco-town development delivering 4000 homes and associated infrastructure.*
6D	Long Stratton	*Facilitating the provision of 1800 new dwellings in Long Stratton by overcoming waste water treatment constraints through a catchment-wide partnership approach based on water cycle study evidence and water quality modelling.*
6E	South Kesteven	*A local authority, water company and the Environment Agency working in partnership to manage water demand to enable growth in South Kesteven, phasing development to coordinate with investment in water recycling centres and catchment-wide demand management measures.*
6F	Chorley Sustainable Development Plan	*Local plan policy and advice/good practice that addresses water supply; reducing water use; and protection and enhancement of water quality and the water environment, including requirements to meet the provisions of the WFD and for partnership working.*
6G	Dover Core Strategy Water Management Plan	*Using a strong evidence base to justify very strong adopted Core Strategy policies on water efficiency.*
6h	Thames Water	*Proactive engagement in development planning to resolve water supply and waste water/sewerage issues, using a 'Water Services Infrastructure Guide for Local Planning Authorities' which has been circulated to all the local planning authorities in the water company's area.*

7. Tools and Approaches

A range of tools and approaches are available to planners to develop the evidence base on water issues for local plans and develop planning policies to create beautiful, successful and resilient places, whilst gaining the multiple benefits described in Section 1. This section describes them and gives directions to the evidence and guidance that supports each tool and approach.

7.1 Water cycle studies

What is a water cycle study?

A water cycle study provides a plan for and programme of water services infrastructure implementation. It is determined through an assessment of the environment and infrastructure capacity for: water supply; foul water disposal; flood risk management; and surface water drainage.

Large new developments are likely to need new or additional water services infrastructure. A water cycle study provides a collaborative, timely and proportionate way to plan for infrastructure needs:

- Where appropriate, a water cycle study can incorporate a town-wide FRA. In cases where the assessment identifies some potential risks associated with surface water drainage and/or sewer flooding, a water cycle study can also help in developing a plan for improving surface water management.
- A water cycle study should involve partnership working between the LPA, the developers, the Environment Agency, the relevant water and sewerage companies, and other interested parties.

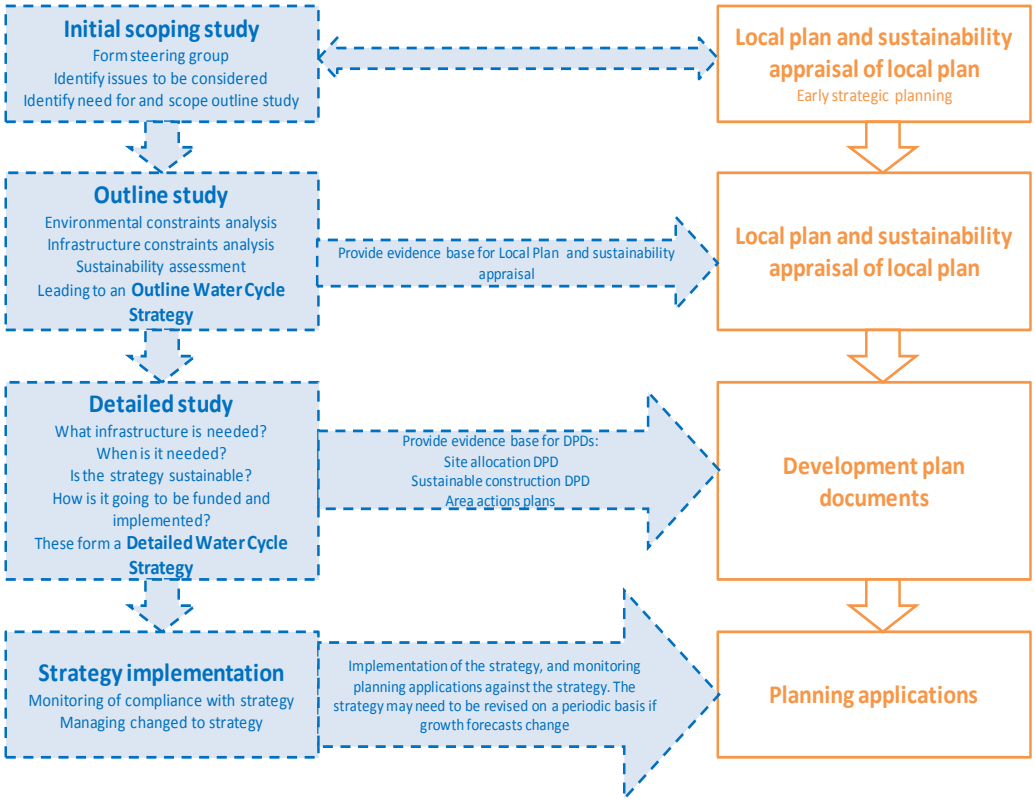

Figure 15: How the steps in a water cycle study relate to local planning

How to undertake a water cycle study

Undertaking a water cycle study will:

- Bring together the key stakeholders
- Confirm the scale and timing of water-related infrastructure needed at an early stage of planning
- Inform Local Plans by highlighting major issues, including immediate funding and longer-term maintenance costs
- Minimise the need for additional and potentially costly infrastructure
- Propose solutions to infrastructure provision that will reduce disturbance to existing communities
- Inform developers of the required flood mitigation infrastructure and likely responsibilities and costs
- Provide supporting information that water companies can use to justify investment plans
- Ensure that relevant environmental standards are met
- Provide general guidance on measures that developers should provide to reduce their impact on the water cycle and where possible make improvements

What guidance is available?

The Environment Agency has published guidance on water cycle studies which recommends that a water cycle study is carried out if any of the following conditions are met:

- The scale of growth proposed is significant when compared to the existing urban development. As a guide, the EA consider a 5% increase in new development during the time horizon of the Core Strategy/Local Plan to be significant
- The Environment Agency or other partners raise doubts about the environmental capacity of the water cycle to cope with proposed development
- The water company identifies there are constraints over funding, or putting new infrastructure in place to meet the development framework

A full water cycle study, including all of the three stages (outline study, detailed study and strategy implementation), may not be necessary. A scoping study will identify if an outline study is needed and an outline study will identify if a detailed study is needed.

CIRIA has published detailed guidance on water for new developments (WaND) which includes water cycle studies.

The Town and Country Planning Association (TCPA) have also published guidance on water cycle studies. Although this was aimed at requirements for ecotowns, the approach it outlines is still valid in a general context.

7.2 Water-sensitive urban design (WSUD)

What is water-sensitive urban design?

Water-Sensitive Urban Design is the process of integrating water cycle management with the built environment through planning and urban design to create beautiful, successful and resilient places. By giving the relationship between water and urban areas a higher priority, WSUD provides integrated solutions to flood risk management, sustainable water use and supply and the improvement of water quality in watercourses. It works by getting the people and partners that plan and design the built environment to apply these integrated solutions. Bringing together the skills and creativity of the practitioners who plan and design the places we live in will bring much wider benefits to communities.

What guidance is available?

The Construction Industries Research Association (CIRIA) together with its funders and partners has launched an ideas booklet (C723), scoping study (C724) and animation to discuss and promote the role of water sensitive urban design in the UK (click here for more details).

Together with its stakeholders CIRIA is considering approaches to further progress WSUD in the UK including supporting planners more to develop a vision for water and resource management.

The approach is described in the WSUD ideas book.

7.3 Urban Blue Corridors

What are Urban Blue Corridors?

In Urban Blue Corridors (also known as blue/green corridors) urban development is set back from watercourses, and overland flow paths and ponding areas create a mosaic of urban corridors designed to facilitate natural hydrological processes whilst minimising urban flooding, providing public open space, enhancing biodiversity and improving access. The establishment of such corridors helps relieve the pressure of flooding on upstream and downstream communities and makes flood protection options within the urban area more resilient and flexible. Urban Blue Corridors also contribute to networks of green infrastructure, which act as the life support systems for cities, towns and rural areas and provide a range of environmental, social and economic benefits.

The concept of Urban Blue Corridors represents a consolidation of what were previously recognised as separate flood risk management options/solutions and is intended to form an important part of future local authority flood risk schemes. By designating overland flow paths, surface water ponding areas, urban watercourse buffer areas and multi-use flood storage areas and linking these solutions together, Lead Local Flood Authorities working with Local Planning Authorities can provide multiple benefits including: more effective management of urban flood risk; improved access, additional and more useable public open space; and improved biodiversity. Urban Blue Corridors represent a new way of thinking about opportunities and solutions to urban flood risk management and can be applied at the local authority scale (strategic) as well as at a Masterplanning scale (community/neighbourhood) and site-specific scale.

What guidance is available?

Defra, in association with URS/Scott Wilson, Kingston University and London Borough of Croydon has published initial guidance (FD2619 Developing Urban Blue Corridors) in the form of a scoping study. This Scoping Study highlights the current gaps in the delivery of Urban Blue Corridors and provides an initial quantification of their benefits. It also provides an over-arching framework for developing these corridors.

7.4 Payment for Ecosystem Services (PES)

What is Payment for Ecosystem Services?

Payment for ecosystem services brings economic thinking and a market mechanism into the provision of natural resources. PES schemes are voluntary market-like transactions between buyers and sellers (beneficiaries and providers) of ecosystem services. Since there are clear benefits to

both, this should incentivise sustainable management.

The beneficiaries can be individuals, communities or businesses, or Government acting on their behalf.

PES schemes typically pay for the amount of ecosystem service that is delivered, but 'PES-like' schemes are also common, for example agri-environment programmes that pay farmers on the expected outcomes of their land management practices.

There are many examples of PES approaches in developing countries to help alleviate poverty and conserve natural resources. However, examples of privately funded PES in the UK are few and of relatively small scale.

PES can be a useful tool to facilitate water company involvement in partnerships with developers. Growing take-up and acceptance of catchment schemes linked to PES mechanisms funded by water companies are expected through the water price review process (PR14). While much attention is related to upstream catchment schemes, there are potentially other novel applications of PES funded natural solutions relating to water quality – for example, constructed wetlands for dealing with wastewater discharges compared to expensive and input-intensive treatment plants, or a PES scheme to address increased nutrient pollution from development.

What guidance is available?

Details are given in the Rural Economy and Land Use Programme (RELU) report "Enhancing the environment through payment for ecosystem services" and two reports published by Defra: "Developing the potential for Payments for Ecosystem Services: an Action Plan" and "Payments for Ecosystem Services: A Best Practice Guide".

Details are available through the Defra website.

7.5 Environmental capacity

Environmental capacity in relation to water abstraction is the amount of water that can be abstracted before unacceptable environmental impacts occur, e.g. low flows and harm to ecology and water quality. In relation to waste water treatment it is the required water quality to protect aquatic and wildlife environments.

There are strong links between ecosystem services and environmental capacity. The ability of the natural environment to provide ecosystem services is dependent on the environmental capacity. Environmental capacity can be defined on the basis of 'acceptability'. The environmental limit of a location to accommodate development is at the point when the impact on the environment switches from being acceptable to being unacceptable.

Society determines acceptability. Some acceptability limits are set nationally, e.g. through the Water Framework Directive and the NPPF. Local communities, through Local Plans, can define acceptability locally. However local views on acceptability are likely to be widely divergent depending upon the priorities of the individuals or communities concerned.

An environmental capacity study determines the point at which targets, standards and policy intent is likely to be compromised. The value of an environmental capacity study is that it can provide as objective a way as possible to address diverging views and to inform those with an interest and, ultimately, those who have to make decisions. The benefit of undertaking an environmental capacity study is that it makes this process explicit rather than implicitly implied.

An effective environmental capacity study will look at the cumulative impact of development rather than just focusing on each environmental theme or topic in isolation. A proposed development may not breach any single identifiable environmental limit, but it may impinge on a range of environmental limits that, together, could be considered to breach the environmental capacity of a location.

The environmental capacity study may be used to decide whether it is possible to mitigate and compensate for the impacts of development in order to ensure that environmental capacity is not breached. For example, investment in the upgrading of a sewage treatment works may allow more development to be accommodated without damaging water quality. The incorporation of water efficient appliances and sustainable drainage systems may allow for more development to be delivered without risk of unacceptable water abstraction or flooding. The restoration and creation of new habitats and other green infrastructure can help to compensate for those lost to development. There is a paucity of guidance on environmental capacity studies. However there are good examples that can provide a template, such as the Cannock Chase environmental capacity study carried out by LUC.

7.6 Integrated local delivery framework (ILD)

What is the Integrated Local Delivery Framework?

Integrated Local Delivery Framework (ILD) is an innovative 'bottom up' approach that works by valuing local knowledge and creates a framework where all organisations can work together in support.

It aims to inspire local communities to take action to lead on the protection of their local environment by simplifying the complexity of governance in a defined administrative area. In doing this it aims to identify projects of multiple benefits through parish planning[7]. ILD has eight key themes. The ILD approach:

1. Looks to work within the lowest appropriate National and European administrative structure (i.e. parish or ward, town, county, district, region, country).
2. Clarifies which statutory and non-statutory partners have an interest in the area so that they can be involved and their strategic aims and objectives identified and delivered within that administrative area.
3. Seeks to deliver a wide range of strategic objectives within the defined area in order to maximise the wider landscape scale potential effective use of public funds.
4. Seeks to strongly support and value the role and knowledge of the farming community.
5. Promotes the use of facilitation through an independent third party to develop a local management group that acts as the collective discussion forum for the area, with clear lines of communication to those public. agencies with legal responsibilities
6. Incorporates the Parish Council (or other local government framework)

Figure 16: ILD scoping links
Source: Jenny Phelps, FWAG

[7] *Inspiring and Enabling Local Communities: An integrated delivery model for localism and the environment*, CCRI, 2011

into the communication structure of the local management group to ensure continuity beyond project timescales.

7. Provides a forum for all those within the defined area to take action and offer knowledge and resource to achieve multi objective delivery with an inclusive list of partners.
8. Identifies funding opportunities, particularly through the Rural Development Programme for England (RDPE) and match funding through joined up partnership working.

How does ILD work?

The approach requires specialist facilitation. ILD is supported by skilled facilitators with a broad knowledge of environmental drivers, initiatives and programmes relevant to the area, and that are accredited to act in a specialist facilitation role to support farmers and reconnect the farmed environment with communities. Farming and Integrated Local Delivery Advisers (FIELD Advisers) work with Rural Community Councils to integrate environmental issues into parish planning. They offer communities advice and identify and signpost them to funding sources.

The ILD Model: Outline of a Six Step Process for Facilitators

1. Once invited begin initial scoping to determine the area, its assets, key individuals and strategic frameworks involved.
2. Map the management tasks and verify these in an inclusive and open format.
3. Develop a management group around key local and statutory stakeholders.
4. Encourage linkages and opportunities for local contribution and adoption of responsibilities.
5. Establish capacity and role of the local management group; identifying and prioritising tasks.
6. Implement proposals and embed management group and support. It starts with scoping of local assets and relating these to National Strategies back to Local contacts.

The first part of the scoping phase is to gather information on the key natural assets and characteristics within the inner circle (a) in Figure 16, the agreed area of interest. Next move to the middle circle (b), and record all the regional strategic frameworks that could be delivered within the defined central area. Finally move to the outer circle (c), representing the national and, in some respects, international strategic and policy frameworks relating to the inner circle (a). This should provide a good grasp of the range of physical assets and the associated frameworks at the local, regional and national levels.

The next part of the scoping is to identify the contacts responsible for delivery of these frameworks. This is done in reverse order (d to f), because a secondary aim here is to make the connections from the national and regional to the local level. So the aim at the national level (outer circle) is to identify the person (d) with responsibility for delivering the legal obligation associated with a designation or policy objective (c).

What guidance is available?

Further details are provided here - "Inspiring and enabling communities: the Integrated Local Delivery model for localism and the environment", Chris Short, Countryside and Community Research Institute, 26 Aug 2011.

7.7 Water neutrality and 'flow neutral' development

What is water neutrality?

Water neutrality is achieved where the total water used in an area after new development is no more than that used before that development took place, leaving water in the environment for wildlife and for people to enjoy.

Water neutrality can be achieved through a combination of options. This includes minimising the need for water by making new homes and buildings highly water efficient; widespread use of water metering and innovative water tariffs; and offsetting the remaining water demand through retrofitting existing homes and buildings with relatively simple water efficiency measures.

Water neutrality is unlikely to be achievable without some degree of retrofitting of water efficiency measures to existing households (and other buildings) in the area to balance out additional use by the new development itself. When examining the feasibility of water neutrality, a district should consider:

- *Appropriate scale:* The water neutrality concept should be applied to an appropriate geographical scale that enables the additional demand for water from new development to be directly mitigated by reducing existing demand. Advice should be taken from the water company and the Environment Agency.
- *Funding and delivery mechanisms for retrofitting:* These could include developer contributions, for instance Section 106 agreements, and/or agreements with water companies, local councils or housing associations to promote the take-up of water efficiency measures in the surrounding area.

What evidence and guidance is available?

A study in the Thames Gateway to explore the feasibility of achieving water neutrality showed that, even with the forecast new development, population growth and increases in water demand, water neutrality is technically possible to achieve[8].

7.8 Section Case Studies

#	Case Study	Summary
7A	**Water Cycle Studies in the Anglian Region**	*The use of water cycle studies in a partnership approach to support local plan making across the Anglian Region, to align water and spatial planning and deal with growing pressures on the water environment at local level.*
7B	**Upper Thames Catchment**	*Using the Integrated Local Delivery (ILD) approach to identify and manage water issues in the catchment through facilitated local community involvement to achieve multiple benefits with less cost, improving water quality to support Water Framework Directive objectives and enabling masterplanning for up to 2,500 dwellings and a significant amount of employment land.*
7C	**Walmore Common**	*Using the Integrated Local Delivery (ILD) approach to inspire and enable communities to secure sustainable local water management in the area around Walmore Common, to reduce flood risk and protect the environment.*

[8] Environment Agency, Defra, DCLG (2007) Towards Water Neutrality in the Thames Gateway. Environment Agency: Bristol

8. Sources of supporting information, evidence and data

Plans must be supported by a robust evidence base. This section provides planners with a comprehensive outline of the various sources of information they are likely to need, arranged under topic headings: integrated water management; the state of the water environment; surface water management; environmental capacity; valuing the environment; the National Ecosystem Assessment; and flood risk.

8.1 Integrated water management

The principles of the catchment-based approach are set out in a Defra publication Catchment Based Approach: Improving the quality of our water environment.

The Environment Agency has published a guide (Rivers by Design) that gives practical advice and information aimed at maximising the ecological, social and economic benefits of development by integrating water management into the planning and design of development at all scales. It is designed to show planners, architects and developers the crucial role that they can play in river restoration. It explains the context and need for river restoration and provides practical advice and information aimed at maximising the ecological, social and economic benefits of development by integrating water management into the planning and design of development at all scales. A series of case studies demonstrate successful examples of how well located, planned and designed development can increase ecological quality, reduce flood risk and create social and economic benefits such as improved recreational facilities and public spaces.

8.2 The state of the water environment

The Environment Agency has published a report on the state of river habitats in England, Wales and the Isle of Man.

The state of the environment and ecosystems in England, including the water environment, is covered by the UK National Ecosystem Assessment (UK NEA).

Natural England has a range of publications reporting on the state of the natural environment and its resources on its website.

The State of the Natural Environment 2008 report brought together for the first time the evidence about the current state of England's natural environment across Natural England's remit. Natural England supported this with State of the Natural Environment reports for each of England's nine regions: East Midlands; East of England; London; North East; North West; South East; South West; West Midlands; and Yorkshire and the Humber.

8.3 Surface water management

The Susdrain website is a good starting point for information on surface water management.

CIRIA has produced a number of guidance documents covering a range of opportunities and challenges related to general water management, all the way through to specific SuDS components. The more notable publications are: CIRIA C697, the SuDS Manual; the more recent publication CIRIA C713 Retrofitting for surface water management; and CIRIA C635 and C738,

Designing for exceedance. The majority of publications are here. Some are free to download.

The RSPB and WWT have produced guidance for local authorities and developers (Sustainable Drainage Systems - Maximising the potential for people and wildlife) on realising the benefits for biodiversity and urban green space from SuDS systems.

8.4 Valuing the environment

The Economics of Ecosystems and Biodiversity (TEEB) is a global initiative focused on drawing attention to the economic benefits of biodiversity including the growing cost of biodiversity loss and ecosystem degradation. TEEB presents an approach that can help decision-makers recognise, demonstrate and capture the values of ecosystem services and biodiversity.

The biodiversity strategy for England (Biodiversity 2020: A strategy for England's wildlife and ecosystem services) sets out the strategic direction for biodiversity policy for the next decade on land (including rivers and lakes) and at sea. It sets a priority action to establish more coherent and resilient ecological networks that safeguard ecosystem services for the benefit of wildlife and people.

8.5 National Ecosystem Assessment

The UK National Ecosystem Assessment (UK NEA) is the first analysis of the UK's natural environment in terms of the benefits it provides to society and continuing economic prosperity. It was part of the Living With Environmental Change (LWEC) initiative involving many government, academic, NGO and private sector institutions. It commenced in mid-2009 and reported in June 2011. Published reports include a synthesis of the key findings and the technical report which covers freshwaters (openwaters, wetlands and floodplains) in chapter 9.

8.6 Flood Risk

Environment Agency flood maps

The Environment Agency's Flood Map for Planning (from Rivers and the Sea) shows the probability of flooding not taking defences into account. This is to help implement the National Planning Policy Framework.
The interactive Flood Hazard Maps show the risk of flooding from rivers and the sea, from surface water and from reservoirs and include the extent, depth and velocity of flood water for a number of scenarios.

The Risk of Flooding from Rivers and the Sea map takes defences into account to show the actual likelihood of flooding. The Risk of Flooding from Surface Water Map was created at a national scale using assumptions around local drainage. However, through working with LLFAs, the Environment Agency has incorporated local information and verification to ensure the maps are as accurate as possible. The Risk of Flooding from Reservoirs Map models the extent of flooding in the unlikely event that a reservoir fails.

'Managing flood and coastal erosion risks in England' report

The 'Managing flood and coastal erosion risks in England' second annual report highlights the challenges and achievements in flood and coastal erosion risk management in England from 1 April 2012 to 31 March 2013.

The report highlights include:

- The scale of risk, and what steps are being taken to manage them
- The impacts of the significant flooding during 2012-13
- Developments and innovations during the year
- The environmental benefits achieved in flood and coastal erosion risk management schemes
- How Risk Management Authorities have worked together to reduce risk and responded to the significant flooding of 2012-13

This report explains how the Environment Agency tackles the risk of flooding in England. It includes the causes of flooding in England and the range of activities underway to manage flood risk, and an overview of the EA's strategy and policy framework and the key organisations that it works with to protect people and property from flooding.

The report shows that:

- 2.4 million properties in England are at risk of flooding from rivers or the sea
- There are also an estimated 3.8 million properties susceptible to surface water flooding
- Around one million of these are also at risk of flooding from rivers or the sea

As well as providing more detailed information on where the greatest risks are, the report also shows that a sizeable part of the nation's important infrastructure and public services are in flood risk areas. For example, over 55 per cent of water and sewage pumping stations/treatment works are in flood risk areas, with 34 per cent at significant risk.

The Local Government Association (LGA) Knowledgehub

The Local Government Association (LGA) Knowledgehub contains comprehensive information on managing flood risk for local authorities in terms of both spatial planning and flood risk management responsibilities under the Flood and Water Management Act. The website contains a comprehensive e-library on flooding and flood-related issues.

9. Glossary

Abstraction of water – the process of taking water from any source. Most abstracted water is treated to produce drinking water or used for irrigation.

Amenity – a general term used to describe the tangible and intangible benefits or features associated with a property or location that contribute to its character, comfort, convenience or attractiveness.

Attenuation/detention of water – the process of slowing down the rate of flow, usually to reduce peak flow downstream.

Blue Corridors – connected overland flow paths and water storage areas designed to utilise natural hydrological processes to minimise urban flooding, provide public open space, enhance biodiversity and improve access. Also known as blue/green corridors.

Biodiversity – all species of life on earth including plants and animals and the ecosystem of which they are all part.

Catchment – a catchment is an area with several, often interconnected water bodies (rivers, lakes, groundwater and coastal waters). Catchments can exist at many scales. However a good practical basis for defining catchments for integrating water planning and spatial planning are the Management Catchments that the Environment Agency uses for managing availability of water for abstraction (available here). These are the starting point for the Catchment-based approach for delivering a better quality water environment in England.

Combined sewer – a combined sewer is a type of sewer system that collects sanitary sewage and stormwater runoff in a single pipe system. Combined sewers can cause serious capacity issues when heavy rain reduces the capacity in the sewers for foul water.

Combined Sewer Overflow – is the discharge of foul and storm water from a combined sewer system directly into a river, stream, lake, or ocean. These can cause serious water pollution problems.

Detention basins – surface storage basins or facilities that provide flow control through attenuation of stormwater runoff. They also facilitate some settling of particulate pollutants. They are normally dry and in certain situations the land may also function as a recreational facility. However, basins can also be mixed, including both a permanently wet area for wildlife or treatment of the runoff and an area that is usually dry to cater for flood attenuation.

Ecology – the study of environmental systems, particularly the relations of organisms to one another and to their physical surroundings.

Floodplain – area of land that borders a watercourse, an estuary or the sea, over which water flows in time of flood, or would flow but for the presence of flood defences where they exist.

Flood storage – the temporary storage of excess runoff or river flow in ponds, basins, reservoirs or on the floodplain during a flood event.

Grampian conditions – a planning condition attached to a planning permission that prevents the start of a development until off-site works have been agreed and the network upgraded ahead of the development being occupied.

Greenfield land – land which has not been developed before, other than for agriculture or forestry buildings or buildings associated with parks, recreation grounds and allotments.

Green infrastructure – a network of protected sites, nature reserves, green spaces, waterways and greenway linkages (including parks, sports grounds, cemeteries, school grounds, allotments, commons, historic parks and gardens and woodland). It offers opportunities to provide for a number of functions, including recreation and wildlife as well as landscape enhancement.

Green roof – Green roofs comprise a multi-layered system that covers the roof of a building or podium structure with vegetation cover/landscaping. The roof is likely to consist of an impermeable layer, a susbstrate or growing medium and a drainage layer (although not all green roofs require a drainage layer). Green roofs are designed to intercept and retain precipitation, reducing the volume of runoff and attenuating peak flows.

Hydromorphology - a term used in river basin management to describe the hydrological and geomorphological processes and attributes of rivers, lakes, estuaries and coastal waters.

Infiltration – the soaking of water into the ground.

Local Development Framework – the collective term for the whole package of planning documents which are produced by a local planning authority to provide the planning framework for its area.

Main rivers – watercourses designated as such on statutory main river maps held by the Environment Agency and Defra and can include any structure or appliance for controlling or regulating the flow of water in or out of a channel. The Environment
Agency has permissive powers to carry out maintenance and improvement works on these rivers.

Ordinary Watercourse – an Ordinary Watercourse is defined as any watercourse not identified as a main river on maps held by the Environment Agency and Defra.

Peak flow – the maximum flow rate of water in a river during a particular period.

Pervious surface – can be either porous or permeable.
Porous surfacing is a surface that infiltrates water across the entire surface.
Permeable surfacing is formed of material that is itself impervious to water but, by virtue of voids formed through the surface, allows infiltration through the pattern of voids.
Pervious surfaces provide a surface suitable for pedestrian and/or vehicular traffic, while allowing rainwater to infiltrate through the surface and into underlying layers.
The water can be temporarily stored before infiltration to the ground, reused, or discharged to a watercourse or other drainage system. Surfaces with an aggregate sub-base can provide good water quality treatment.

Rainwater harvesting – collecting rainwater from roofs and hard surfaces and storing it for various uses. If designed appropriately, rainwater harvesting systems can also be used to reduce the rates and volumes of runoff.

Runoff – the flow of water over the ground surface. This occurs if the ground is impermeable or saturated, if rainfall is particularly intense, or if surface water drainage systems exceed their capacity and overflow.

Sustainable drainage systems – a sequence of management practises and control structures often referred to as SuDS, designed to drain water in a more sustainable manner than some conventional techniques. SuDS processes are designed to replicate natural drainage systems which improve water quality and amenity as well.

Strategic roads – motorways and trunk roads (nationally significant A-roads). Local authorities are responsible for highway drainage on local roads.

Swales – Swales are shallow, broad and vegetated channels designed to store and/or convey runoff and remove pollutants. They may be used as conveyance structures to pass the runoff to the next stage of the treatment train and can be designed to promote infiltration where soil and groundwater conditions allow.

Water Cycle – the cycle of processes by which water circulates between the earth's oceans, atmosphere, and land, involving precipitation as rain and snow, drainage in streams and rivers, and return to the atmosphere by evaporation and transpiration.

Water services infrastructure (WSI) – the infrastructure needed to manage water resources. WSI includes: storage provision (e.g. reservoirs); systems for abstraction from reservoirs, rivers and aquifers; raw water treatment; major transfer pumping stations and pipelines to local areas of demand; local water supply distribution infrastructure; additional infrastructure to control surface water runoff in urban areas; local drainage and storage infrastructure; wastewater networks and treatment facilities; and the receiving watercourses.

10. Acronyms

ABI – Association of British Insurers
BAP – Biodiversity Action Plans
CaBA – Catchment Based Approach
CIRIA – Construction Industries Research Association
CSO – Combined sewer overflow
DCLG – Department for Communities and Local Government
Defra – Department for Environment, Food and Rural Affairs
DPD – Development Plan Document
EA – Environment Agency
FCERM – Flood and Coastal Erosion Risk Management
FIELD – Farming and Integrated Local Delivery Advisers
FRA – Flood Risk Assessment
FWMA – Flood and Water Management Act (2010)
IDB – Internal Drainage Board
LDF – Local Development Framework
ILD – Integrated Local Delivery Framework
LEP – Local Enterprise Partnerships
LGA – Local Government Association
LLFA – Lead Local Flood Authority
LPA – Local Planning Authority
LWEC – Living With Environmental Change
NaFRA – National Flood Risk Assessment
NEA – National Ecosystems Assessment
NPPF – National Planning Policy Framework
NPPG – National Planning Practice Guidance
Ofwat – The Water Services Regulation Authority
PES - Payment for ecosystem services
PFRA – Preliminary Flood Risk Assessment
RDPE – Rural Development Programme for England
RELU – Rural Economy and Land Use
RWH – Rainwater harvesting
RSPB – Royal Society for the Protection of Birds
SAB – Sustainable Drainage Systems Approving Body
SEP – Strategic Economic Plans
SSSI – Sites of Special Scientific Interest
SFRA – Strategic Flood Risk Assessment
SPD – Supplementary Planning Document
SuDS – Sustainable Drainage Systems
SWMP – Surface Water Management Plan
TCPA – Town and Country Planning Association
TEEB – The Economics of Ecosystems and Biodiversity
UPM – Urban Pollution Management
WaSC – Water and Sewerage Companies
WFD – Water Framework Directive
WSI – Water Services Infrastructure
WSUD – Water Sensitive Urban Design
WWT – Wildfowl and Wetlands Trust

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