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Environment Agency Policy Brief

Environmental Infrastructure

We are the Environment Agency. It's our job to look after your environment and make it **a better place** - for you, and for future generations.

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The Environment Agency. Out there, making your environment a better place.

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Summary

Behind every community lies a network of essential environmental services, without which our homes and neighbourhoods would be uninhabitable. It provides clean water, handles our waste, drains our sewage and protects us from flooding, and is taken for granted by the public. As a consequence it does not always receive the attention it deserves. We believe that, without modernisation of delivery and increased investment, this environmental infrastructure will begin to fail, bringing greater risk to human health and a decline in environmental quality.

Accelerated development in the South and East of England, in particular, will stretch the capability of some environmental infrastructure to cope. Underlying this, the nation's existing environmental infrastructure is also in need of investment. In addition, our urgent need to reduce waste going to landfill requires major investment in alternative waste treatment and climate change is increasing the risk of extreme weather and flooding incidents.

This paper explores the possible policy responses to the pressures that environmental infrastructure is now under. The key areas to address are:

- **GETTING THE LOCATION RIGHT:** The need to avoid building homes in places that we will regret. Of particular concern is the location of housing in areas of flood risk and where water quality and water resources are already at or approaching environmental limits.
- **LONG TERM PLANNING FRAMEWORKS:** To ensure a long term planning framework exists for all types of environmental infrastructure.
- **DEMAND MANAGEMENT:** To promote more ways of managing and reducing the demand for new environmental infrastructure.
- **FUNDING DELIVERY SYSTEMS AND INCENTIVES:** Clear funding streams, with costs allocated to polluters, developers, consumers and the taxpayer on clear and defensible principles.

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1 Introduction

- 1.1. Behind every community lies a network of essential environmental services, without which our homes and neighbourhoods would be uninhabitable. It provides clean water, handles our waste, drains our sewage and protects us from flooding, and is taken for granted by the public. As a consequence it does not always receive the attention it deserves. We believe that, without modernisation of delivery and increased investment, this environmental infrastructure will begin to fail, bringing greater risk to human health and a decline in environmental quality.
- 1.2. The UK Government's response¹ to Kate Barker's Review of Housing Supply set out its aspiration to increase the rate of house building to 200,000 net additions per year (compared with the current rate of about 160,000 per year). In October 2006, the UK Government announced 29 New Growth Points (NGPs) in England where demand for housing is high. If all of the proposed growth is realised NGPs would contribute around 100,000 additional dwellings by 2016.
- 1.3. Accelerated development in the South and East of England, in particular, will stretch the capability of some environmental infrastructure to cope. Underlying this, the nation's existing environmental infrastructure is also in need of investment. There has been a historic legacy of under-investment and maintenance in public and private water and sewer capacity resulting in leakage, collapse, overloading and sewer flooding. In addition, our urgent need to reduce waste going to landfill requires major investment in alternative waste treatment and climate change is increasing the risk of extreme weather and flooding incidents.
- 1.4. Our assessment of the current state of environmental infrastructure (for water resources, waste water, waste and flood risk management) is presented in our 'Hidden Infrastructure: The Pressures on Environmental Infrastructure' report.
- 1.5. This paper explores the possible policy responses to the pressures that environmental infrastructure is now under. The key areas are:
 - **GETTING THE LOCATION RIGHT:** The need to avoid building homes in places that we will regret. Of particular concern is the location of housing in areas of flood risk and where water quality and water resources are already at or approaching environmental limits.
 - **LONG TERM PLANNING FRAMEWORKS:** To ensure a long term planning framework exists for all types of environmental infrastructure.
 - **DEMAND MANAGEMENT:** To promote more ways of managing and reducing the demand for new environmental infrastructure.
 - **FUNDING DELIVERY SYSTEMS AND INCENTIVES:** Clear funding streams, with costs allocated to polluters, developers, consumers and the taxpayer on clear and defensible principles.

¹ HMT, December 2005, 'The Government's Response to Kate Barker's Review of Housing Supply'.

2 Environment Agency Role

- 2.1. We provide, regulate and advise on environmental infrastructure. We therefore have a lot of experience and evidence on how it is planned for, funded, regulated and how it performs.
- 2.2. For example, we are the primary regulator for the water environment and competent authority for the implementation of the Water Framework Directive and Water Act. We regulate abstractions from, and discharges to, the water environment in England and Wales. Our Water Resources Strategy sets out a 25-year framework for planning for water demand and new resources and we are the environmental regulator of aspects of water company plans. We deliver flood risk management across England and Wales and input into the new system of Regional Spatial Strategies, Local Development Frameworks (Local Development Plans in Wales), and their associated Sustainability Appraisals. We provide data for and advise Waste Planning Authorities. We report on the state of the environment and have, as part of this work, carried out an assessment of the state of environmental infrastructure ('Hidden Infrastructure – the Pressures on Environment Infrastructure' report).
- 2.3. We are, therefore, uniquely placed to use our 'on the ground' experience and the evidence we have gathered to advise government and others on the future planning, funding and delivery of environmental infrastructure.

3 Getting the Location Right

There needs to be:

- Rigorous assessment, by Government, regional assemblies and local authorities, of the environmental impacts and the viability of infrastructure-dependent solutions before plans for housing growth are adopted.
- Rigorous application, by local government and developers, of planning policy guidance on development and flood risk (Planning Policy Statement 25 (PPS25), in particular the sequential and exception tests, and Planning Policy Wales and Technical Advice Note 15 (TAN15)) is essential to manage and reduce the risk of flooding and the potentially costly legacy on the public purse of maintaining defences and providing flood warning services.

- 3.1. Depending on where it is located and the standards to which it is built, planned new housing has implications for water resources, water quality, and flood risk, as well as waste management and air quality. As our understanding of climate change develops it is important that we don't build homes in places that we will regret.
- 3.2. It should not be assumed that it is always possible to manage the environmental impacts of housing growth through investment in new or expanded environmental infrastructure. Where growth threatens to exceed absolute environmental limits there may be barriers, in terms of cost effectiveness or the limits of current technology, which mean that growth is impossible to accommodate. Therefore rigorous assessment of the environmental impacts and the viability of infrastructure-dependent solutions is essential before plans for growth are adopted.
- 3.3. Of particular concern is the location of housing (and the infrastructure and services supporting housing) in areas of flood risk and where water quality and water resources are already fully committed.
- 3.4. Initial assessments of the recent NGPs (England) highlighted patterns of environmental constraints and demand for additional environmental infrastructure that are becoming commonplace in the south and east of England. The initial assessments highlighted that there was increased flood risk in 80% of cases, lack of sewerage capacity in 72% of cases and there were potential breaches of water quality standards in 62% of cases.
- 3.5. However, our early input and working closely with Government departments meant that some NGPs bids were modified, for example, to exclude some specific development sites in the floodplain. In other cases, there is agreement to undertake detailed studies to ensure the proposals address environmental concerns. These rigorous assessments should highlight where solutions can be found and areas where development within environmental limits and within existing (and planned) environmental infrastructure is not currently possible.
- 3.6. Our rivers and the sea are a precious natural resource. They need space to function and evolve. Floodplains are an environmental infrastructure that allows excess water to be stored safely in times of heavy rains, storms and floods. They also provide space and corridors for wildlife and people.

- 3.7. For flood risk management, location and long term planning are the key issues, especially if we are to adapt to the effects of climate change. Rigorous application of planning policy guidance on development and flood risk (England: PPS25, and Wales: Planning Policy Wales and TAN15) is essential to manage and reduce the risk of flooding and the potentially costly public legacy of maintaining defences and providing flood warning services.
- 3.8. The new PPS25 (England only) requires Local Planning Authorities (LPAs) to steer development to areas of lowest risk first (zones 1 and 2) and only after that should higher risk areas (zone 3) be considered. Where development is necessary in areas of higher flood risk, the new exception test aims to ensure that development and its occupants will be safe for the lifetime of development taking account of climate change. The exception test enables some development in flood zone 3 but only when no suitable alternative site is available in a lower flood risk zone. The test makes it clear that these wider arguments justifying development have to be very powerful - underlining that building in high risk flood zones is very rarely going to be the best option.
- 3.9. In exceptional cases, where development is necessary in higher risk areas, it should be located and designed so it is safe, with adequate escape and evacuation routes, allows its occupants to recover quickly, does not increase risk elsewhere, and where possible contributes to reducing flood risk overall.
- 3.10. As we plan and prepare for climate change we will need to adapt and find more sustainable ways of managing the increasing flood risk over 100-year time frames. We know that it will not be technically possible, environmentally acceptable or economically viable to prevent all floods. As the climate changes and increases the frequency of flooding, some communities may decide that they no longer wish to live in the floodplain. We will therefore need to consider ways to enable them to relocate to safer, more sustainable locations, which will restore the natural floodplain and make space for water. Opportunities to create safer, sustainable communities may arise with the redevelopment of parts of existing communities located in high flood risk areas. Or we may consider relocating communities to areas of low risk when existing assets such as homes, schools etc. need to be replaced. To ensure the right long term flood risk adaptation policies are developed, and that the mechanisms to deliver those policies are in place when they need to be, we must debate the long term sustainability of existing communities facing higher and higher levels of flood risk due to climate change.² The debate must go beyond those responsible for flood risk management, to those who are responsible for land use and community planning, such as the department for Communities and Local Government, the Welsh Assembly Government and local government.
- 3.11. The services and infrastructure necessary to support development, substations, telephone exchanges, emergency services, etc. should also be located away from areas of flood risk to ensure they are available in an emergency. Any infrastructure in place to reduce the risk of flooding must provide an acceptable level of risk for the lifetime of the development, taking on board the residual risks.

² Communities at high risk of flooding due to climate change are identified in Catchment Flood Management Plans (CFMPs) and Shoreline Management Plans (SMPs). CFMPs and SMPs develop complementary policies for long-term management of flood risk within the catchment / on the coast that take into account the likely impacts of changes in climate, the effects of land use and land management, deliver multiple benefits and contribute towards sustainable development.

- 3.12. At a regional scale, in England Regional Planning Bodies should undertake a Regional Flood Risk Appraisal (a Strategic Flood Risk Assessment by Local Authorities would be appropriate in Wales) to steer growth to locations outside of flood risk areas. However, where this is not possible, the Regional Spatial Strategy should contain policies to ensure that the proposed developments can be located and designed safely, and mechanisms and funding are in place to provide the required flood management infrastructure.

4 Long Term Planning Frameworks and Targets

Environmental infrastructure should have long term planning frameworks and be regularly reviewed to ensure that demographic trends, housing plans, economic projections, local resource availability, existing infrastructure capacity, the scope for demand management and the impacts of climate change are taken into account.

- Government, planners, developers, and infrastructure providers must ensure planning and design for housing and environmental infrastructure adapts to climate change.
- There should be 25 year planning for sewerage and wastewater infrastructure. Ofwat have already asked water companies to produce Strategic Direction Statements (SDSs) for the 2009 Periodic Review³. We would like these to become established good practice and for them to look beyond the usual 5-year business planning horizon.
- There should be better forecasting of housing development (that accounts for growth and growth point proposals) in Water Company plans.
- Government, regulators and infrastructure providers must ensure environmental infrastructure options align with other Government policy priorities, especially the need for action on climate change and greater energy efficiency. Governments should promote innovative infrastructure solutions that have minimal environmental impact.
- There needs to be long term integrated planning for urban flood management. A strategic body needs to lead this planning. Local authority led Surface Water Management Plans (SWMPs) should be developed.
- Ownership and responsibility for the maintenance of sustainable drainage systems (SUDS) should rest with a durable, accountable organisation that can be expected to have the financial capacity to meet its responsibilities in the longer term. Defra intends to consult on the issue of ownership and responsibility of SUDS and we are awaiting results from the integrated urban drainage pilots so we cannot take any firm views yet. One option would be to give responsibility to local authorities but we need to understand further the funding implications.
- Section 106 of the Water Industries Act 1991 (right of connection to a public sewer) should be amended (for both England and Wales) to encourage the use of SUDS.
- Water scarcity could be a material planning consideration. The UK and Welsh Assembly Governments should consider the feasibility of a sequential test for water scarcity in planning policy. It could then be incorporated in the forthcoming Planning Policy Statement on Climate Change (England) and in Wales within the proposed changes to Planning Policy Wales and Compendium on Planning and Climate Change.

- 4.1. The assessment of infrastructure needs should take into account local resource availability, the supply/ demand balance, existing infrastructure capacity and scope for demand management. The lead-in time for infrastructure must also be taken into account. In many cases the lead times are significant. For instance, planning for a reservoir can take up to 20-25 years and in excess of five years for large waste

³ The review of price limits for water companies.

infrastructure. Infrastructure provision has to be synchronised with rate of development.

- 4.2. Planning and design for housing and environmental infrastructure must adapt to climate change. This includes planning on longer-term horizons (for example we apply 100 year timeframes for flood risk management), choosing locations (for development and the supporting infrastructure and services) wisely, and incorporating resistant and resilient design features. Government (at all levels), planners, developers, and infrastructure providers all have a role to play in ensuring this occurs.
- 4.3. Much of the detailed analysis for environmental infrastructure requirements will be needed at a regional level to support Regional Spatial Strategies and for the updated Wales Spatial Plan. Planning authorities, the Welsh Assembly Government and Government Offices should ensure Regional Spatial Strategies and Local Development Frameworks (Local Development Plans in Wales):
 - Provide adequate environmental infrastructure that takes into account climate change mitigation and adaptation measures.
 - Account for demand management and limit the environmental impact of development (through policies for SUDS, flood storage etc.)
- 4.4. Local Authorities could prepare Infrastructure Delivery Plans for large developments (e.g. 3,000 to 5,000 homes) that could help to co-ordinate infrastructure planning and delivery. In addition, early and ongoing consultation with infrastructure providers needs to occur.

Planning for water resources, wastewater treatment and sewerage infrastructure

- 4.5. It is imperative that water companies get their housing forecasts right. Many companies have experience of actual housing growth undershooting government forecasts. They therefore generally rely on Regional Planning Guidance (and not direct forecasts from government). But this can be an imprecise exercise (e.g. there are timing problems - until exact numbers and locations are identified the impact on the water resource zone is difficult to assess). As a result (for water supply) an additional, unplanned for, quantity of 42 MI/d is required by 2016 for housing currently forecasted but excluded from the water companies plans. (A further 19% beyond the existing planned increase of 218 MI/d for Sustainable Communities.)⁴
- 4.6. The next round of 25 year Water Resource Management Plans (WRMPs) will become statutory in 2009. As part of the process of them, the Government, the Environment Agency and Ofwat will need to work with the water companies to ensure that the forecasted housing development is appropriately accounted for.
- 4.7. Housing growth, infiltration, supply/demand changes and climate change can, over time, eat into the capacity built into a sewer. Some of the existing assets are in poor states of repair. Some Sewage Treatment Works (STWs) are already at the limits of available technology for treatment and in some places environmental limits for water quality are being reached.

⁴ Water companies are statutory consultees on housing plans. Planning bodies will be statutory consultees on Water Company Water Resource Management Plans. This should create a better link between planning and housing forecasts with water resources plans.

- 4.8. In the South East, there are seven places where development will be limited by the capacity of STWs.⁵ Forty-five other works will need to operate to a higher standard to avoid harming the local environment.
- 4.9. Nearly 5,000 properties were flooded from sewers last year, just over half because of sewer blockage, collapse or equipment failure.⁶ And in 2005, water companies seriously polluted the environment 152 times, mostly because of problems with the sewers.
- 4.10. Ofwat have already asked water companies to produce SDSs for the 2009 Periodic Review. These statements will set out the water company's priorities for the next 5 years and beyond. Consumers, other groups and organisations water companies work with (including the Environment Agency and Ofwat) will be consulted on their content. We would like SDSs to become established good practice and for them to look beyond the usual 5-year business planning horizon.
- 4.11. Ofwat already encourages companies to plan to a 25-year time horizon when developing sewerage infrastructure.

"We encourage companies to prepare long-term plans to deal with changes in sewerage volumes. Companies plan to a 25-year horizon to accommodate growth in the water service, employing least-cost investment appraisal techniques. We encourage companies to plan to a similar time horizon when developing sewerage assets, employing best practice techniques within a similar least-cost framework to determine optimal solutions."⁷

- 4.12. A number of water companies consider long term plans "essential for the delivery of sustainability."⁸ Some water companies used a long-term planning approach to provide a robust argument for additional funding in the 2004 Periodic Review, e.g. Yorkshire Water.
- 4.13. Water companies should know and understand their assets and reduce the number of pollution incidents their assets cause. This can be achieved by ensuring, through capital maintenance expenditure, that:
- Combined Sewer Outfalls (CSOs) do not cause environmental pollution.
 - Satisfactory CSOs do not deteriorate to the point they cause an environmental impact.
 - The legacy of under investment in the public and private sewerage infrastructure resulting in poor fabric (leakage and collapse), illegal connections and hydraulic overloading of sewers causes no environmental impact.
- 4.14. An action plan to address operational and management issues in their sewerage systems, similar to the Drinking Water Inspectorate's Distribution Operations Maintenance Strategies (DOMS), should be developed for each company. The

⁵ Environment Agency (2006), 'Planning for growth and water quality in the south east v11 (FINAL)' This analysis does not include changing the treatment pathway e.g. pumping to alternative receiving waters, which itself may provide a solution but could involve prohibitive costs or be inconsistent with other policies e.g. climate change. The seven sites are Chickenhall (Eastleigh), Fullerton (Andover), Hailsham North, Hailsham South, Hogsmill Valley, Horsham and Newbury.

⁶ Ofwat, 2006, 'Levels of service for the water industry'.

⁷ From Ofwat PR04 policy document 'Setting price limits for 2005-10: Framework and approach'

⁸ From Ofwat's 'A sustainable water industry – To PR09 and beyond.' (October 2006, p.26)

Environment Agency would be happy to help all water companies develop these action plans.

- 4.15. We need to encourage water companies to develop a more integrated approach to planning linking the four sections of the water company business plan (Capital Maintenance, Supply-Demand balance (growth), Quality Enhancement (National Environment Programme) and Enhanced Service levels (sewer flooding)).
- 4.16. Water companies have, in the past, undertaken little long-term planning for sewer flooding. Sewer flooding is a symptom of overloaded sewers and urban development and therefore must be tackled in conjunction with capacity planning through the wastewater supply-demand balance. Therefore, the development of a long-term planning framework for the Supply-Demand balance, which looks at growth, sewer capacity and adaptation and mitigation of climate change should bring with it the long term planning required to address and reduce sewer flooding.
- 4.17. Key best practice guidance, such as the Sewerage Rehabilitation Manual, should form a basic minimum requirement for sewerage undertakers. The adoption of SUDS techniques should be an integral part of sustainable sewerage infrastructure maintenance and development.
- 4.18. New frameworks for long term planning for quality enhancement and enhanced service levels will need to be developed to influence future Price Reviews. Long term planning should ensure we are anticipating and planning for tighter standards, maintaining existing assets, identifying the need for new assets, improving resource efficiency, reducing chemical loads and planning for the impacts of climate change. For example, many sewage treatment works have been revisited in consecutive improvement programmes. We believe that better planning and helping water companies to look ahead at future environmental challenges will avoid short-lived alterations at treatment works and the associated interim additional costs. As such, long term planning may prove less expensive than the current situation.
- 4.19. The Environment Agency can help water companies understand existing obligations, obligations that are being actively discussed or challenged (e.g. through infractions and consent appeals) and potential new obligations from new legislation and /or new national targets. This will help inform water companies of the range of work that may be required. An envelope of work could be described using the Water Framework Directive, as requirements are likely to be stable until 2027. Beyond 2027, requirements can be identified through 'horizon scanning'.
- 4.20. Long term planning would enable water companies to better understand and manage their sewerage infrastructure assets and provide an improved integrated approach to planning for water and waste water. It should avoid a future peak in workload similar to that faced in the 1990s and also encourage wise spending of operating expenditure to extend the life of water company assets. It should therefore help strike the right balance between operating and capital expenditure.
- 4.21. 25 year planning for sewerage and wastewater infrastructure would complement 25 year planning in Water Resources and the 3 cycles of River Basin Planning. It would also be suitable for accommodating mitigation and adaptation planning for climate change and some engineering design timescales.
- 4.22. To help support this longer-term approach, the Environment Agency is working with water companies to produce a 'Water Sector Plan', which will set out a vision for a

sustainable water sector over the next 25 years. The Water Sector Plan will set out eight objectives for the water sector, to guide progress towards this vision. For example, “to deliver a high level of environmental performance that is sustainable through long term, integrated planning over a 25 year period or more”. Another relevant objective is “to take due regard of the impacts of climate change”. We already build climate change into our regulatory decision making but there is more that we can do. We welcome the opportunity to work closely with Ofwat and water companies to prioritise actions and deliver mitigation and adaptation actions.

Encourage innovative infrastructure solutions that have minimal environmental impact

4.23. We need to encourage innovative infrastructure solutions that have minimal environmental impact. For example traditional sewerage solutions, especially where retrospectively applied, can have a higher environmental impact than the problem that they are trying to resolve.

Urban flood risk

4.24. We need to deal with all forms of flooding so that, for example, surface water or sewerage does not flood properties while flood defences hold back water from other sources. A holistic, joined-up, and integrated approach is required to deal with the problems of flooding, especially in the urban context.⁹

4.25. A number of pilots have started that will test different approaches to integrated management and investigate who is best placed to lead in specific urban areas.¹⁰ This process will conclude in April 2008. However, we need not wait until 2008 to make progress on improving urban drainage management. The new planning framework affords an opportunity to take a more strategic view.

Surface Water Management Plans

4.26. Where flood risk management is an issue (which would be identified by the findings of the Regional or Strategic Flood Risk Assessments) local planning authorities should produce SWMPs. The new PPS25 encourages SWMPs to be developed as Supplementary Planning Documents within the Local Development Frameworks¹¹. Local planning authorities should be funded to do this.¹²

4.27. SWMPs should contain policy statements on managing flood risk and a local surface waters management plan. For example, policies to:

- Promote the use of (strategic) SUDS including clear guidance on who should be responsible for the adoption and ongoing maintenance of SUDS (and how this should be funded)¹³
- Encourage source control within the curtilage of the building and to manage surface water before it enters the drainage system.
- Protect watercourse corridors, avoid culverting, and promote the reopening of culverted watercourses.

⁹ Defra (Autumn 2004), Making Space for Water, <http://www.defra.gov.uk/environ/fcd/policy/strategy.htm>

¹⁰ These build on an initial scoping study which can be found at <http://www.defra.gov.uk/environ/fcd/policy/strategy/scoperev.pdf>

¹¹ PPS 25 <http://communities.gov.uk/index.asp?id=1504639>

¹² In the past they have been hampered by a lack of integrated funding. Ibid. p.16, The reform of local government finance should include any additional costs associated with planning for sustainable development.

¹³ Defra and DCLG are developing guidance on SWMPs.

- Deliver multiple benefits, such as the use of public realm/open space for recreation in addition to surface water drainage, attenuation and flood storage.

And maps and information on:

- Watercourses, corridors, aquifers, boreholes and other water features.
- Flood routes and areas of known surface water flooding, flood plain and flood risk areas.
- Soil types.
- The type and locations of principal SUDS infrastructure to service new development and to improve the environmental performance of drainage of existing urbanised areas.

4.28. SWMPs would be a material consideration in future development planning and could form part of or be reflected in Area Action Plans. SWMPs could also be a vehicle for integrating the requirements of the River Basin Management Plan¹⁴ into local development policies.

4.29. The Environment Agency should report on the implementation of SWMPs to ensure they are well integrated (and it should be funded to do so). SWMPs should be included in the final Planning Policy Statement

4.30. Best Practice Guide and in relevant supporting material for TAN15.

Sustainable approaches to drainage

4.31. The Environment Agency and others consider that “SUDS can have a major role in reducing the likelihood and adverse impact of flash flooding caused by run-off in heavy rain. They are now mandated in building regulations wherever technically viable. However, in the past, barriers to the adoption and maintenance of SUDS have constrained and disincentivised their design and implementation. Yet, the benefits to water quality, flood management, biodiversity and amenity space they can provide are widely recognised.”¹⁵

4.32. Ownership and responsibility for the maintenance of SUDS should rest with a durable, accountable organisation that can be expected to have the financial capacity to meet its responsibilities in the longer term. Defra intend to consult on the issue of ownership and responsibility of SUDs and we are awaiting results from the integrated urban drainage pilots so we cannot take any firm views yet. One option would be to give responsibility to local authorities but we need to understand further the funding implications. We would like to see the issue of ownership and responsibility for the maintenance of SUDS resolved as soon as possible.

Amend Section 106 of the Water Industry Act 1991

4.33. Section 106 of the Water Industry Act 1991 (right of connection to a public sewer) should be amended (for both England and Wales) to encourage the use of SUDS.

4.34. Currently this section gives property owners a right of connection to a public sewer. Water Companies therefore often insist that surface water sewers are provided in addition to SUDS. Options for reform include removing the right of connection and/or placing a duty on developers and others to use SUDS in preference to traditional piped solutions.

¹⁴ Prepared to meet the requirements of the Water Framework Directive.

¹⁵ HMT, December 2005, The Government’s Response to Kate Barker’s Review of housing Supply, para 5.16

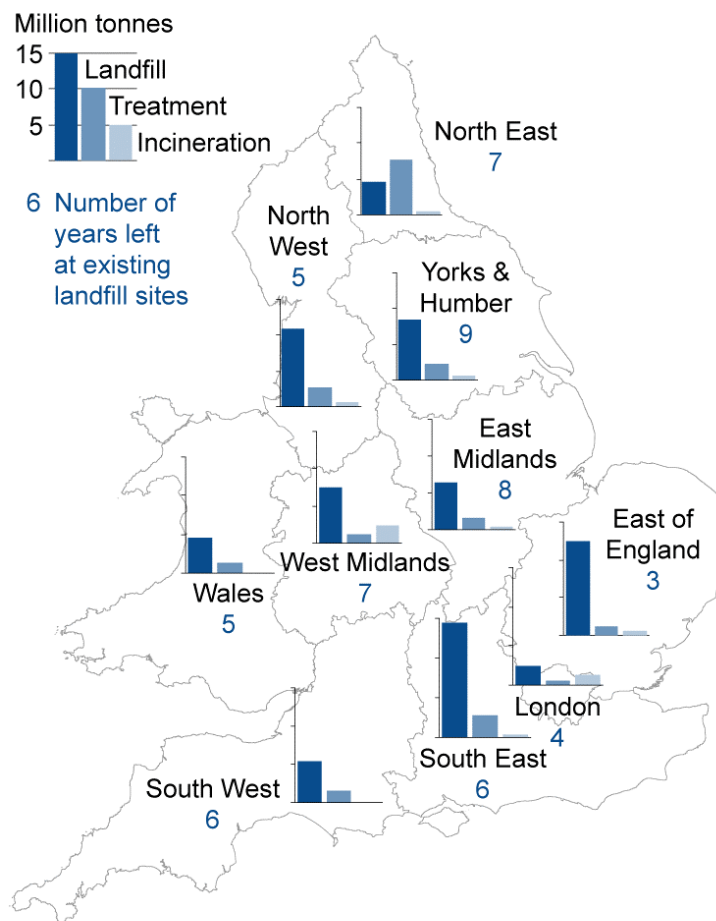
4.35. Alongside encouraging better solutions the infrastructure and connections to it need effective compliance monitoring and enforcement. This is particularly true of the surface water drainage system where there are extensive misconnections of dirty water to a system that is intended to only contain clean water.

Waste management

4.36. About 335 million tonnes of waste are produced in the UK each year. Household waste is growing at a rate of 1.5 per cent every year.¹⁶

4.37. Areas of housing growth are likely to face challenges with regards to waste management. Increasing populations will mean more domestic waste, leading to higher costs and potentially greater difficulty in diverting waste from landfill. This is of particular importance in the wider South East, where landfill capacity is under pressure.

Waste treatment and disposal by region, 2004/05



Source: Environment Agency

4.38. The construction industry throws away nearly 14 million tonnes of unused material each year.¹⁷ As such, the construction and demolition of waste associated with

¹⁶ Defra 2006, 'Review of England's Waste Strategy: A Consultation Document.'

¹⁷ WWF 2005, 'Investing in sustainability'. www.wwf.org.uk/filelibrary/pdf/investinsustainability.pdf

development increases the pressure, costs and need for more, suitable, waste management infrastructure (for recycling, recovery and disposal). Pressures are also increased by the commercial and industrial activity that accompanies new development.

- 4.39. Delivery of waste management infrastructure is problematic. There is a gap between what we have, what is needed to cope with the waste we generate, how we plan for it to be delivered and whether we are prepared to accept new infrastructure in our back yards. For example, the total capacity gap for the treatment of Municipal Solid Waste in 2012/13 for England is projected to be 20.1 million tonnes per annum.¹⁸ There were no major planning approvals for new waste management facilities in 2004/05.¹⁹ However, planning rules could change to support waste management infrastructure delivery.
- 4.40. We need solutions that go beyond predict and provide and get us on track for a zero waste culture. There must be more emphasis on waste reduction, re-use, recycling and recovery, and integrated, strategic planning for waste facilities. Planning rules and policies should also support re-use and recycling infrastructure delivery.
- 4.41. While this paper focuses on the infrastructure associated with housing growth, waste solutions should obviously address all waste streams not just municipal and construction waste. To support this Defra (and devolved bodies) must increase the data available on non-municipal waste.
- 4.42. Where new waste infrastructure is needed its planning needs to incorporate adaptation and impacts on climate change in terms of choosing types and location of facilities.

¹⁸ Assuming business as usual. From Defra, 2007, Waste Infrastructure Development Programme Action Plan <http://www.defra.gov.uk/Environment/waste/wip/widp/widp-actionplan.pdf>

¹⁹ Institute of Civil Engineers (2005) State of the Nation 2005

5 Demand management

Decisions on environmental infrastructure should always be informed by the potential for demand management and measures to reduce the need for infrastructure investment. But effective (and potentially effective) demand management options are not being applied as often as they should.

The Government should ensure the current (England only) consultation on water metering accelerates metering by -

- encouraging water companies to better use the discretionary powers they already have to introduce metering (such as on change of ownership).
- requiring companies in seriously water stressed areas to develop proposals for compulsory metering in their WRMPs.

The Government and Welsh Assembly Government should also:

- develop and encourage the introduction of targets driving the more efficient use of scarce water resources and to encourage water companies to minimise the amount of water they need to abstract from the environment.
- take forward proposals to regulate for water efficiency in new buildings by introducing a whole building performance standard (in litres/person/day) as well as water efficiency standards for particular fittings.

In addition, for those areas that secure growth point status, where there is evidence of water supply-demand stress or deficit, demand management for water should be piloted in

the new and existing stock. Variable charging for waste collection and other demand management options should also be piloted. Where feasible zero waste design and practice should be incorporated.

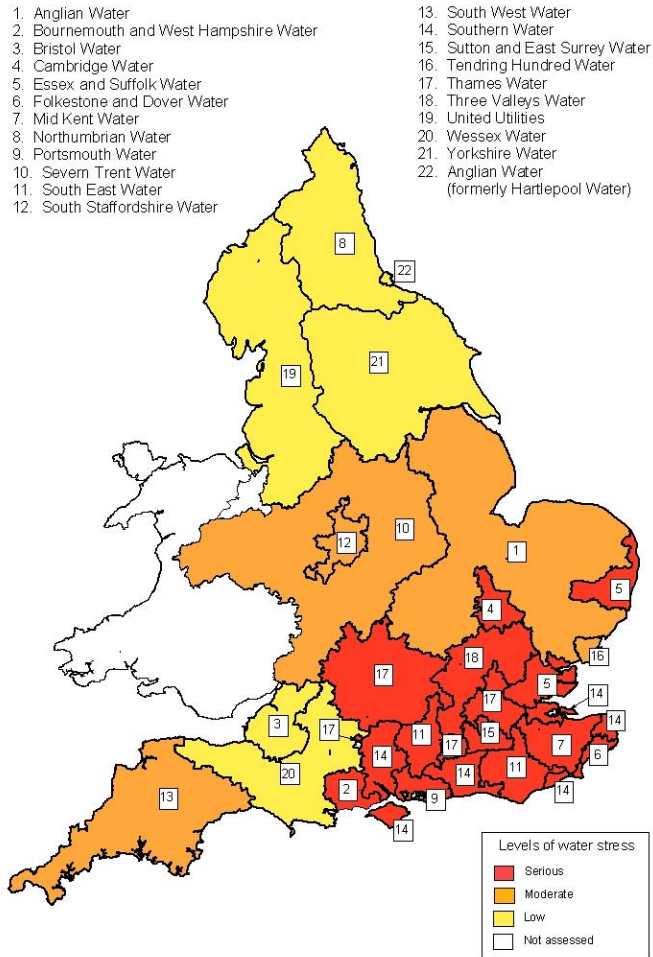
Spatial planning policies, strategies and plans should improve the resource efficiency of the existing housing stock to help limit the need for future infrastructure needs.

- 5.1. Decisions on environmental infrastructure should always be informed by the potential for demand management and preventative measures to reduce the need for infrastructure investment. But effective (and potentially effective) demand management options are not being applied as often as they should.

Efficient water use

- 5.2. Water is a finite, renewable resource. It is the Environment Agency's job to manage it. We allocate resources through a system of abstraction licences, reconciling the needs of society and the economy with those of the environment.

Map of water stress



5.3. In some parts of England a high density of population with a high, and growing, demand for water results in a high degree of stress on the water environment.²⁰ (See Map of Water Stress.) Across much of England and Wales we have already reached the limits of acceptable abstraction. In many locations we have already exceeded the limit. It will be very expensive to restore a sustainable balance.

5.4. Water companies in the South East expect household demand in the region to increase by about one fifth in 2030.²¹ Nearly three quarters of this additional demand is from new housing, but the amount of water each person uses is expected to rise too. At the moment we use about 150 litres of water per person every day, but in some parts of south east England this could increase to as much as 200 litres by

²⁰ Environment Agency, January 2007, 'Identifying areas of water stress', <http://www.environment-agency.gov.uk/yourenv/consultations/1690000/?version=1&lang=e>

²¹ From water companies' resource plans

2030.²² This unconstrained rise is not inevitable. Many of our European neighbours have lower rates of per capita consumption of water. For example, Denmark and Germany report household drinking water consumption of 129 and 132 litres per person per day respectively.²³

- 5.5. The demand for water created by new homes and the associated infrastructure could partly be met through improved standards of water efficiency in all new and existing buildings. Results of early work by the Environment Agency²⁴ indicates that 40 per cent of the extra demand for water in the South East of England could be catered for through tackling water efficiency in the existing homes, at a cost comparable to traditional water resource development schemes. Currently there are no levers to address water efficiency in existing buildings. The Government should examine options for encouraging householders to choose more water efficient products and appliances, including product labelling and possibly financial incentives in water stressed areas.
- 5.6. In the UK, water savings from household metering are between 10-15 per cent (with significantly larger peak demand savings)²⁵. Around 28 per cent of households are currently metered in England and Wales. This is rising by about 2 per cent per year. Metering should be accelerated where it is most needed. The case for metering is strongest in the South East of England where per capita consumption is highest and water resources are under the greatest stress.
- 5.7. Smart metering could enable water costs to be better signalled to consumers. For example, through variable tariffs, such as rising block tariffs that set higher prices for 'excessive' water use and/ or drought tariffs, for water use in times of scarcity. There may be advantages to multi-utility smart metering that should be explored. It is important that metered tariffs do not penalise consumers who have a low level of discretionary use, and that the Government provides appropriate protection for low income and vulnerable users.
- 5.8. Water companies can apply to the Secretary of State to designate a supply zone in their area as 'water scarce'. 'Water scarcity status' enables water companies to move more quickly towards higher rates of metering in water stressed areas. In March 2006, Folkestone and Dover became the first company to be designated water scarce. This will allow them to increase their metering rate from 40 to 90 per cent over the course of the next ten years.
- 5.9. We welcome the Government's recent consultation for progressing water metering in water stressed areas²⁶. In parallel, the Environment Agency has also produced a consultation on classifying areas of water stress in England and Wales²⁷. These two consultations present an opportunity for integrating proposals for compulsory metering in seriously water stressed areas in the statutory WRMPs currently being developed.

²² Ofwat 2006, 'Security of supply, leakage and the efficient use of water 2005-06'

²³ European Water Association Yearbook 2002, <http://www.ewaonline.de/pages/yearbook.htm>

²⁴ Entec, for the EA, 2005, 'Water Efficiency Analysis of South East England Rollout Options'.

²⁵ Herrington (2006), Critical review of relevant research concerning the effects of charging and collection methods on water demand, different customer group and debt. UK Water Industry Research

²⁶ Defra, January 2007, 'Consultation on metering in areas of serious water stress', <http://www.defra.gov.uk/corporate/consult/water-metering/consultdoc.pdf>

²⁷ Environment Agency, January 2007, 'Identifying areas of water stress', <http://www.environment-agency.gov.uk/yourenv/consultations/1690000/?version=1&lang=e>

- 5.10. Reducing leakage will help to ease pressure on existing resources. Leakage has decreased in the past 10 years because of increased investment, but about one fifth of the water we take from the environment for public water supply is still being lost through leakage, which is both wasteful of water and energy. The Environment Agency is currently conducting a joint review with Ofwat and Defra of leakage targets, looking at alternatives and options to take better account of social and environmental factors.
- 5.11. Supply pipe leakage is the water lost from the customer's pipework between the boundary of the property and the property itself. Supply pipe leakage accounts for about one third of total leakage and has continued to rise over the last five years. This rise in supply pipe leakage is an issue of concern and appears to demonstrate that the infrastructure is deteriorating.
- 5.12. While water companies have regulatory targets for reducing leakage, there are no equivalent targets for improving water efficiency. The Sustainable Buildings Task Group (2004)²⁸ and ippr (2006)²⁹ have proposed developing a water equivalent of the successful Energy Efficiency Commitment (an obligation on energy suppliers to meet targets for energy efficiency improvements).
- 5.13. There are various ways to approach such a target. One option is to develop a target that delivers improvements in the efficiency of water use. Another option is to develop a target that reduces overall water consumption – what is referred to as a 'water into supply target.' This option would give water companies the flexibility to opt for the most cost-effective means of meeting their targets through a mixture of action to reduce leakage, encouraging metering and other water efficiency options.
- 5.14. The Water Saving Group, under the direction of Ian Pearson (Minister of State at Defra), is currently studying the feasibility of such targets for England. The Welsh Assembly Government's Environment Strategy has committed to looking at alternative targets/ benchmarks. Defra's forthcoming 'Future Water' strategy could propose introducing regulatory targets from 2010 that could be accounted for in the next price review.

Planning and resource efficiency

- 5.15. The Government / Welsh Assembly Government should clarify how the planning system can be used to deliver better environmental standards in buildings, particularly in areas of environmental stress³⁰. It must continue to develop its planning policies to ensure that development is located in the right places and is constructed to standards that promote resource efficiency. Planning authorities should follow these policies and planning statements.

A sequential test for water scarcity

- 5.16. Water efficiency should be a material consideration for areas under water stress.
- 5.17. The Government should consider the merits of a sequential test for water scarcity analogous to the sequential test for flood risk. In the first instance, major new growth should be located in areas that are not currently – or are likely to be in the future – water-stressed (as identified by the Environment Agency, see paragraph 5.3.) If a development could not be located in the area of first preference (e.g. Zone 1) for

²⁸ In 'Better Buildings - Better Lives', available on the DTI website at <http://www.dti.gov.uk/files/file15151.pdf>

²⁹ ippr (2006) 'Every Drop Counts: Achieving greater water efficiency'

³⁰ From the Environment Agency's PPS3 (Housing) consultation response.

wider sustainability reasons and was proposed in an area of water scarcity (e.g. Zone 2, significant or Zone 3, serious water stress) then enhanced demand management would need to be applied. To support this, spatial plans in areas of water-stress should include policies requiring development to meet the higher levels of the Code for Sustainable Homes (CSH). (We are currently assessing the feasibility of linking levels of the CSH to the water company areas designated as being under 'significant' and 'serious' stress.)

- 5.18. In water-stressed areas, higher standards of water efficiency in new non-residential developments should also be required. A substantial step would be to also devise a mechanism that would allow or complement retrofitting water efficiency measures into existing buildings (in an equitable manner).

Waste

- 5.19. Evidence from overseas suggests that variable charging for household waste is one policy that could have a significant impact on overall quantities of household waste requiring disposal³¹. However, we need to ensure that alternative local infrastructure (e.g. for recycling) is in place, that we change public attitudes to waste and there is adequate funding for enforcement to tackle fly-tipping alongside it.
- 5.20. The principle behind variable charging, or 'pay as you throw', is that householders pay according to the amount of waste they throw away. Variable charging provides a stronger incentive to householders to reduce their residual waste through altering lifestyle and purchasing behaviour, waste minimisation, and diversion to more sustainable routes, e.g. greater separation for recycling or home composting. The variable element of any scheme can be varied considerably from only a small proportion on top of a flat rate charge to the whole charge.
- 5.21. Financial savings could be used to fund new reuse and recycling infrastructure and/or be rebated to householders.
- 5.22. The Environment Agency considers variable charging is most likely to be successful in areas with separate collections from individual households, where there is high availability of recycling options and where proactive education of householders emphasises the personal choices available.
- 5.23. If Ministers were to agree to allow waste charging, pilot schemes in areas of housing growth would be one way to help local authorities sustainably manage the increased waste produced in their area. Variable charging and other waste minimisation initiatives could be sold to communities on the basis that they could help reduce the reliance on disposal using landfill or incineration and that they contribute to greater recycling, something the public generally support. (However, there will remain a requirement for waste recycling facilities to be located, perhaps proximate to domestic housing.)
- 5.24. Retailers and suppliers could reduce the amount of waste arising, for example through 'choice-editing'³² the availability of wasteful products and services for consumers. The use of Site Waste Management Plans could help the construction industry manage waste correctly. These options can be pursued with or without variable charging.

³¹ Green Alliance and ippr (2006) 'A Zero Waste UK.'

³² The concept of 'choice editing' was proposed in the SDC/NCC (2006) report 'I Will, If You Will.'

Pilots

- 5.25. Results of our early work³³ indicates that 40 per cent of the extra demand for water in the South East of England could be catered for through tackling water efficiency in the existing homes, at a cost comparable to traditional water resource development schemes. Major new developments are opportunities for more creative thinking on water efficiency.
- 5.26. The Thames Gateway water study is an example of best practice. The Environment Agency is leading the feasibility study: Towards Water Neutrality in the Thames Gateway. It is jointly funded by the Environment Agency, Communities and Local Government and Defra. A sister project to the Thames Gateway low/zero carbon study, the water study will examine the feasibility of moving towards water neutrality - where total demand for water post development is equal to current demand pre-development - by 2016 and beyond.
- 5.27. The promotion of water demand management in the NGPs and other major developments would also drive the evidence base to demonstrate the cost effectiveness of specific demand management measures.
- 5.28. As above, waste charging pilot schemes in areas of housing growth would be one way to help those local authorities to manage the increased waste produced in their area more sustainably.
- 5.29. Pilots could also incorporate enhanced local recycling initiatives, provision of community 'bring' schemes, and community recycling projects, e.g. small-scale recycling/re-use schemes for furniture and white goods.
- 5.30. Waste recycling could be built into Infrastructure Delivery Plans for large developments (e.g. 3,000 to 5,000 homes) and design and practice for zero waste impact towns and cities should be incorporated if feasible.³⁴

³³ Entec, for the EA, 2005 Water Efficiency Analysis of South East England Rollout Options.

³⁴ One interpretation of zero waste is that it means zero waste to landfill. There are other wider definitions. Zero waste can build on the current recycling picture and drive waste prevention. It can include measures to stop things being discarded and education and product policy measures to persuade us to buy products that are easier to recycling, contain less packaging etc.

6 Funding delivery systems and incentives

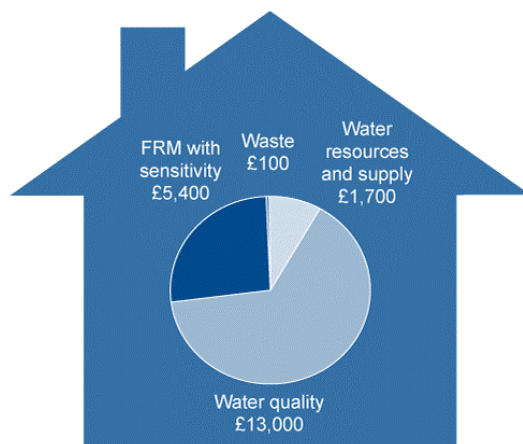
- Government, local authorities, developers and infrastructure providers need to ensure funding for environmental infrastructure is secured before housing development takes place. Funding needs to support innovation and long-term planning, including maintenance and renewal, and where possible deliver wider social and environmental benefits.
- Funding options for environmental infrastructure include section 106 obligations, planning gain, strategic infrastructure tariffs, reform of development connection charges for “water” removal, and potentially a fund like the community infrastructure fund for pump priming environmental infrastructure development.
- Assuming the appropriate long term planning is undertaken, investment in water supply and wastewater will generally be picked up through the water price review process.
- Investment in flood and surface water drainage is often not funded and a prime candidate for the funding options above. The UK and Welsh Assembly Governments should ensure that appropriate funding mechanisms are available to address the required investment in flood and surface water drainage for the lifetime of the development and local authorities should use them for this purpose.
- Taxation and incentives should support sustainable waste management options.
- Incentives for investment in technologies and integrated approaches to environmental infrastructure should be created to increase their uptake. These incentives could include grants, loans or fiscal incentives, such as Enhanced Capital Allowances. Incentives should be targeted to where infrastructure is most under stress and environmental impacts most serious. Programmes should be reconfigured to reflect this targeted approach.

- 6.1. Mechanisms to deliver local infrastructure funding need to be developed recognising the majority of environmental infrastructure funding sits within the private sector.
- 6.2. The costs that need to be factored in are often very location specific. For example, in the South East (where there are 7 sewerage treatment works at capacity³⁵) providing sewage treatment for the new housing proposed under the South East Plan will cost an estimated £7.5 billion over the next 20 years.³⁶

³⁵ Refers to existing technology, processes, and treatment pathways, including receiving waters.

³⁶ Environment Agency (2006), A strategy for provision of environmental infrastructure to meet the ends of the SE Plan.

Costs of Environmental Infrastructure per new house in the South East



- 6.3. For the South East Plan, the average cost³⁷ per house for flood risk management, water quality, water resources and waste infrastructure has been estimated.
- 6.4. Flood risk management is the term used for the activities undertaken to manage and reduce both the likelihood and consequences of flooding. The construction, replacement and management of assets, which can vary from a traditional flood defence wall or earth embankment to gates and barrier or flood storage areas and by-pass channels, generally manage the likelihood of a flood. They reduce the likelihood of a flood causing adverse consequences to people and property located within floodplains.
- 6.5. For flood risk management infrastructure, the most effective, cheapest and most sustainable option is to avoid and restore floodplains. Floodplains provide a natural system which can manage different flood events and provide a multi-use open space at other times e.g. wildlife habitat and amenity areas. Spatial planning policy advocates the safeguarding and restoration of these areas as an effective resource to reduce flood risk now and in the future.
- 6.6. Development in flood risk areas will cost more. The Environment Agency is currently working to a range between £14,000 and £53,000 per household for flood risk management assets e.g. flood defences. This range is higher than the South East Plan estimate because it is based on whole life costs including the initial capital cost of providing an asset, the cost of one replacement and the costs of maintenance (65 per cent of the initial capital cost). (See Appendix for the detailed assumptions).

³⁷ Estimated average environmental infrastructure cost per house built as part of the South East plan. Costs were based on 28,900 houses built every year until 2026 (the life of the SE Plan). Both capital and operational expenditure is included. Water quality and water resources costs include new infrastructure for water supply, wastewater and sewerage as well as operating, maintaining and renewing all existing infrastructure. Where existing flood defences need to be upgraded to provide an adequate standard of protection to both new and existing houses, the cost of these upgrades has been attributed to the new housing only. Occupancy is estimated as 2.33 people per household, falling to 2.13 by 2026. Figures have been rounded.

- 6.7. Within a development, the drainage system and also the setting of floor levels can also manage and reduce the likelihood of a flood. These measures are sometimes described as flood resistance techniques.
- 6.8. The management of consequences to reduce the impact of a flood and improve recovery post-flood is generally described as a resilience measure. They can be part of a building design, or can include measures such as flood warning and emergency planning to ensure that people are aware of the risk of flooding and take appropriate action.
- 6.9. All of the above need to be taken into account when you are considering locating development in areas at risk of flooding, particularly the costs. Developments in flood risk areas will cost more and this needs to be factored into the overall sustainability of the development for its lifetime.
- 6.10. How costs can vary:

Low or no cost	Medium cost	High cost
Avoid development in floodplains	Optimise on open spaces within a development to provide flood storage or flood flow routes	Construction of a new flood management asset e.g. wall or embankment
Apply the sequential test within PPS25 and ensure that vulnerable uses within a development are located in areas of low flood risk	Set floor levels of developments above flood level	Site conditions and space between the proposed development and the watercourse are restricted
	Design buildings to be flood resilient	No availability of flood warning
	Maintain an existing flood management asset for the lifetime of the development	Emergency planning difficult due to site access problems
	Site conditions and space enable ease of access and working conditions to improve an existing flood management asset or setback within the development	
	Utilise or restore an area on-site or upstream for flood storage	
	Ensure development is covered by flood warning and a flood plan	

- 6.11. Where new developments require the provision of environmental infrastructure (or benefit from existing infrastructure) the beneficiary should be expected to pay for any extra investment, including capital, and ongoing maintenance including climate proofing. For example, we would expect all water and wastewater investments to be paid for by water companies, recouped through the price review mechanism and infrastructure and connection charges.

- 6.12. The Treasury Green Book³⁸ prohibits the inclusion of future housing growth in the justification for flood management investment by an operating authority. Therefore flood management infrastructure required to support future housing growth should be fully funded by those promoting/providing the development. Funding for environmental infrastructure needs to be secured before housing development takes place. It needs to reflect the costs over the lifetime of a development, for example the cost of maintaining flood defences and subsequent renewal.
- 6.13. One area of infrastructure investment sometimes overlooked is drainage. As climate change becomes more significant, adequate surface drainage will become more important in order to protect developments, and the surrounding areas, from flood risk. There will be many calls on the revenue of Planning Gain Supplement, Section 106 agreements and any developer charges or tariffs, but it must be clear that drainage should be eligible for any or all of these, with guidance on their design and operation.
- 6.14. It is also imperative to resolve issues around ownership and responsibility for the maintenance of SUDS.
- 6.15. To help deliver the required investment in strategic environmental infrastructure a tariff could be placed on developers. The level of tariff could be set according to the load their development would create. The amount generated would be placed in a central fund that would contribute to the total infrastructure bill. This fund could be administered by the Local Authority or an autonomous “delivery vehicle” (through a contractual arrangement). An example of this scheme is the Milton Keynes Partnership. But even this “successful” scheme illustrates the difficulties in securing funding for environmental infrastructure given other competing and substantial infrastructure funding pressures, e.g. hospitals, transport and schools.
- 6.16. The funding should be available for drainage, flood risk management and waste infrastructure. It could also fund some retrofitting of water efficiency or waste minimisation programmes to offset infrastructure need.
- 6.17. To ensure that funding is available ahead of development a version of the Community Infrastructure Fund could become a recyclable fund for clawing back funds that unlock waste, water, waste water and drainage infrastructure to support housing growth across England.

Reform of Ofwat charges

- 6.18. For sewage treatment, drainage or water resources, Ofwat guidelines could be clarified to enable water companies to recoup more of the infrastructure costs from the developer.
- 6.19. Infrastructure charges are applicable for connections of domestic properties to water or sewerage services for the first time. The charge is a contribution towards the costs of developing local networks to serve these new customers. ‘Non-local’ infrastructure charges are payable by all customers through their water and sewerage bills. The infrastructure charge is in addition to possible connection, requisition and self-lay charges.

³⁸ HMT (2003) Green Book: Appraisal and Evaluation in Central Government. HMT: The Green Book.

- 6.20. Current infrastructure charges have not changed in real terms since they were set in PR94 (£239 in 2002-03 prices). Water and sewage services are charged at the same rate.
- 6.21. Higher usage supply pipes and water fittings increase the standard charge rate (using a system of Relevant Multipliers³⁹ and loading units) but developers fitting water-efficient devices do not get a discount on the standard charge.
- 6.22. In the case of sewerage, connections are made for both foul and surface drainage and developers face genuine alternatives for either service. However, the structure of the charging system makes no allowance for partial non-connection, where an alternative approach is used.
- 6.23. Two reforms could significantly sharpen the incentives for developers and improve the cost-reflectivity of environmental constraints:
- Infrastructure charges should vary by service and region. This would make the charge more cost-reflective and create better incentives to reflect the differences in environmental constraints by location and type.
 - Revising the Relevant Multipliers and loading units would influence developer's infrastructure choices encouraging water efficiency, lower water use and alternative wastewater management in new properties. This could be linked to the CSHs with government policy/guidance used to define appropriate loading units for water and wastewater use. Integration of the CSHs' objectives with existing instruments could also avoid complexity/additional regulatory burdens through the use of incentive mechanisms.
- 6.24. The 5 yearly price setting for water companies gives extra emphasis to short to medium-term planning for wastewater and sewerage infrastructure. A number of water companies cite the five-year payback cycle as a barrier to sustainable development because it fails to give the right incentives⁴⁰. There need to be incentives to invest in solutions that deliver multiple benefits and/or have a lighter environmental load. Price setting needs to be consistent with and support long term planning.

Waste

- 6.25. Proposed increases in the landfill tax should be accelerated to the point where landfill becomes more expensive than other more sustainable options. This is necessary to drive investment in new technologies.
- 6.26. Other fiscal incentives could be used to support more sustainable options, such as tax-breaks for recycling plants. Increased environmental standards for landfill sites and operator standards, e.g. through greater competency requirements, could also provide fiscal disincentives for disposal options.
- 6.27. The Landfill Allowance Trading Scheme applies to municipal waste, which in Britain is largely domestic waste. Quantitative limits could also be applied to commercial and industrial wastes. In many other countries this would also include considerable volumes of commercial waste collected by municipalities. There is

³⁹ This takes into account the type of property (those subject to Common Billing Agreements, those served by larger than standard supply pipes, e.g. commercial properties, and other properties), fitting and load factors. The Relevant Multiplier for "all other properties" is 1 and is linked only to water use, even for sewerage infrastructure charges.

⁴⁰ From Ofwat's 'A sustainable water industry – To PR09 and beyond.' (October 2006, p.26)

little justification for different economic treatment of similar wastes according to who produced it or who collects it.

Technologies

- 6.28. There is a growing number of technologies and approaches to environmental infrastructure that are integrated between media, for example:
- digesters that can treat sewage sludge and biodegradable waste to produce methane to generate heat or electricity;
 - combined heat and power plants can use waste as a feedstock;
 - SUDS that reduce flood risk, provide stormwater drainage services, improve water quality and can supplement the overall demand for water with non-potable water.
- 6.29. Systems like these that straddle traditional boundaries can often face regulatory or financial barriers because the full environmental benefits they deliver are not properly understood or valued.
- 6.30. The Government's Technology Strategy⁴¹ should increase funding to support innovation in this sector. A Knowledge Transfer Network should be established for environmental infrastructure, focused on innovations that have multiple benefits. Based on the findings and barriers identified in this work extra financial support should be provided to accelerate the uptake of such technologies. This support should be dependent on the stage of development of the technology, but should include funds for pilot schemes and demonstrations, investment capital, use of procurement to create early markets and a willingness to remove regulatory barriers.
- 6.31. The Business Resource Efficiency and Waste programme has a major role in increasing the resource efficiency of businesses to reduce their pressure and requirements for infrastructure. As the strategic regional co-ordinator for the use of these funds, Regional Development Agencies, should ensure that activities in under this programme are prioritised where infrastructure is most under stress and environmental impacts most serious.

⁴¹ <http://www.dti.gov.uk/innovation/technologystategy/tsb/index.html>

7 Conclusion

Without the modernisation of delivery and increased investment, environmental infrastructure (water supply, wastewater treatment, surface drainage, flood risk management and waste management infrastructure) will begin to fail. This will bring greater risk to human health and a decline in environmental quality.

Our key policy recommendations are:

1. To avoid building homes in places that we will regret. There should be:

- Rigorous assessment by Government, regional assemblies and local authorities of environmental impacts and the viability of infrastructure-dependent solutions before plans for housing growth are adopted.
- Rigorous application by local government and developers of planning policy guidance on development and flood risk.
Policy makers must also debate the long term sustainability of existing communities facing higher and higher levels of flood risk due to climate change. The debate must go beyond those responsible for flood risk management, to those who are responsible for land use and community planning, such as Communities and Local Government, the Welsh Assembly Government and local government.

2. To ensure a long term planning framework exists for all types of environmental infrastructure.

Government, planners, developers and infrastructure providers must ensure planning and design for housing and environmental infrastructure adapts to climate change.

Government, regulators and infrastructure providers must ensure environmental infrastructure options align with other Government policy priorities, especially the need for action on climate change and greater energy efficiency.

A key area to address is 25 year planning for sewerage and wastewater infrastructure. Ofwat will be asking water companies to submit SDSs for the 2009 Price Review. We would like these to become established good practice and for them to look beyond the usual 5-year business-planning horizon.

There should be:

- Better forecasting of housing development in Water Company plans that accounts for growth area and growth point proposals.
- Local authority led SWMPs should be developed.
- Early and ongoing consultation with infrastructure providers whenever major housing developments are being planned.

There needs to be long term integrated planning for urban flood management. A strategic body needs to lead this planning. To ensure there is good planning, it is also imperative for the UK and Welsh Assembly Governments to resolve issues around ownership and responsibility for the maintenance of SUDS and rights of connection into public sewers, including highways drainage.

Policy makers should consider the feasibility of introducing a sequential test for water scarcity analogous to the sequential test that already exists for flood risk. This could

help to steer development away from seriously water stressed areas and identify when enhanced water efficiency options are needed.

3. The UK and Welsh Assembly Governments need to promote policies to manage and reduce the demand for new environmental infrastructure. In particular:

- The acceleration of metering in water stressed areas.
- The potential use of targets to drive more efficient and sustainable use of water resources.
- To reiterate the need to regulate for water efficiency in new buildings.
- To pilot demand management options for water and waste in housing growth points and areas where there are opportunities to exemplify good practice.

4. Government, local authorities, developers and infrastructure providers need to ensure funding for environmental infrastructure is secured before housing development takes place. Not all environmental infrastructure costs are borne by the Exchequer. In the case of water and wastewater infrastructure, the funding sits within the private sector. We would like to see:

- Funding for environmental infrastructure supporting innovation and long term planning, including maintenance and renewal. For instance, the UK and Welsh Assembly Governments should ensure that appropriate funding mechanisms are available to address the required investment in flood and surface water drainage for the lifetime of the development.
- A wide range of funding mechanisms considered, including Section 106 planning agreements, the proposed Planning Gain Supplement and through the next 2009 Water Price Review.
- Reform of the charges that developers pay for connecting domestic properties to water and sewerage services for the first time. The charges could be designed to encourage more water efficient housing
- Taxation and incentives should support sustainable waste management options.

Appendix

The assumptions underlying the Environment Agency's range of between £14,000 and £53,000 per household for flood risk management assets:

We first considered the initial capital investment costs of a range of flood management schemes and divided the figure by the number of properties that benefited. (This in itself is difficult since the costs of schemes vary greatly in relation to their type e.g. earth embankment, sheet pile etc. and also any technical considerations such as access, which can increase the cost). The national work gave us an initial figure of £6-20k per house. (Please note that our advice to Region/Areas involved in negotiating planning gain/S106 is for them to speak to their local Flood Risk Management (FRM) asset management team to determine a 'local' starting point figure based on previous capital schemes.)

PPS25 (Annex G) states that it is the responsibility of those proposing the development to fully fund the FRM measures to ensure that a development is safe for its lifetime. For the lifetime figure of the development we use 100 years for residential and 60 years for commercial development (unless advised otherwise). During the lifetime of the development the flood management measure is likely to be replaced once. So the cost of one replacement must be factored in. We used the initial investment cost figure as a proxy.

Maintenance is also a key consideration to ensure the condition and reliability of any flood risk management measure. For the cost of maintenance we decided on a figure of 65% of the initial capital investment cost. This was based on what we as a business spend on maintaining FRM assets as a percentage of the overall asset value.

In summary, the total cost figure for an FRM asset is the sum of the initial capital cost multiplied by two (one replacement) plus the cost of maintenance.

Asset replacement and management is obviously not the whole flood risk management picture for developments in flood risk areas. In addition to this other costs for flood warning, flood awareness, emergency planning and response would need to be incorporated - i.e. 'soft' infrastructure. This cost has not been fully investigated. The only cost that is available is for flood warning. This equates to approx. £1k per house (based on the total cost of flood warning divided by the number of properties that benefit).

List of abbreviations

NGPs	New Growth Points
PPS25	Planning Policy Statement 25: Development and Flood Risk
TAN15	Technical Advice Note 15: Development and Flood Risk
SDSs	Strategic Direction Statements
SUDS	Sustainable Drainage Systems
WRMPs	Water Resource Management Plans
Ofwat	The Water Services Regulation Authority
SWMPs	Surface Water Management Plans
CSHs	Code for Sustainable Homes

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