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Making space for water

Developing a new Government strategy for flood and coastal erosion risk management in England

A consultation exercise

July 2004

HM TREASURY
Office of the Deputy Prime Minister
Creating sustainable communities
Department for Transport
defra
Department for Environment Food and Rural Affairs

Making space for water

Developing a new Government strategy for flood and coastal erosion risk management in England

A consultation exercise

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Foreword

I am delighted to launch this consultation exercise as part of our preparation of a new Government-wide strategy for managing the risks from flooding and coastal erosion in England.

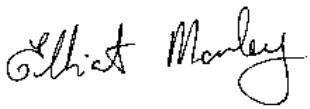
Anyone who has been personally affected by flooding will testify to the distressing and traumatic nature of these events which can also have significant economic and environmental impacts. Losses from coastal erosion, though more limited, are of course also devastating to the individual involved. A wide range of stakeholders have an interest and we have sought to involve them in developing this consultation document, in particular through our Flood Management Stakeholder Forum. This consultation document brings together the product of work to date and provides a further formal opportunity for all stakeholders to influence the future direction of the strategy.

Flooding events in the recent past have resulted in increased recognition of the risks in this area, and there is an increasing acknowledgement that those risks can never be entirely removed. In addition, on 22 April this year the Office of Science and Technology published the Foresight *Future Flooding* report. The report provided critical new analysis of the risks we face, including the high impact of climate change, and of the options for responding to them. The preparation of our new strategy gives us the opportunity to take full account of the Foresight findings.

The issues covered by this consultation are complex and range over a wide number of policy areas. I make no apologies for adopting such a holistic approach. One of the key emerging messages is that we need to take advantage of the contributions other Government policies can make to the management of flood and coastal erosion risk, and to recognise the two-way interaction between flood and coastal risk management policies and other Government policies. We also need to look holistically at all sources of flooding, in particular at how we can integrate drainage planning in urban areas – a theme highlighted by the Foresight *Future Flooding* report.

The holistic approach involves setting flood and coastal erosion risk assessment and management more fully in the context of sustainable development while continuing to adopt a strategic approach. This has led us to adopt *Making space for water* as the working title for the new strategy. This reflects the desire to manage the adverse consequences for people and the economy that can result from flooding and coastal erosion while achieving environmental and social benefits in line the aim of sustainable development.

I hope you will take this opportunity to help develop our policy for flood and coastal erosion risk management over the next 20 years.



Elliot Morley MP
Minister for Environment and Agri-Environment, Defra

Summary

Why a new strategy?

i. It has been 11 years since the last strategy and the time is now right for a new strategy that:

- Builds on work already carried out to take account of sustainable development and the Government's strategic priorities;
- Addresses the messages from the Foresight *Future Flooding* report, and reflects lessons learned from the flood events in the recent past;
- Addresses the challenges and pressures we are facing over the next century such as climate change, development pressures and rising levels of risk and cost;
- Highlights the need for a more integrated and holistic approach to the management of risk using a portfolio of measures.

The vision for a new strategy

ii. In summary, we want to allow space for water so that we can manage the adverse consequences for people and the economy that can result from flooding and coastal erosion while achieving environmental and social benefits in line with wider Government objectives.

The main themes

Risk management

iii. The consultation proposes that for assessing and managing risk there should be a strengthened framework that is strategic, multi-level and consistent, and which takes further account of environmental and social factors as well as of economic damage. Multi-criteria approaches will be developed further, as appropriate, to ensure that in the appraisal of potential schemes due consideration is given to those aspects that are not easily expressed in monetary terms. The consultation document suggests that Defra guidance might be made more user-friendly and effective as a decision-making support system. Following on from this, the document considers standards of protection and affordability, as well as ways for strengthening stakeholder involvement.

iv. In line with its integrated approach, the consultation addresses all forms of flooding including from sewers and groundwater. It asks for views on proposals for integrated drainage management to deal with the likely increase in the risks associated with intra-urban flooding. The development of trunk road design and maintenance guidance is proposed, and the risk management role of the rail network is also explored. Consideration is given to the role that individual parts of the road network might exceptionally play in managing some extreme events.

Strengthening the sustainable approach

v. The consultation proposes that flood management and coastal erosion solutions which work with natural processes to provide more space for water should be identified and pursued wherever possible. It also sets out the proposed approach to the realignment of defences. It suggests the putting in place of targets for wetland habitat creation to fulfil biodiversity commitments. The consultation also considers the proposed role of rural land management, and reinforces the need for water level management to play a role in bringing SSSIs into favourable condition.

Planning & building

vi. The Government is committed to ensuring that its land-use policy seeks where possible to reduce, and certainly not to add to, the overall level of flood risk. The consultation seeks views on the general approach, on possible action in the event of a significant reversal of the decline in the number of developments proceeding against the advice of the Environment Agency, and on options for the production of flood risk assessments. At the individual building level, the consultation considers issues concerning the incorporation of flood resilience and resistance measures into new and existing buildings, as a means of managing the consequences of flooding. While recognising the role that the Building Regulations can play for new buildings, it asks how owners of existing buildings can be encouraged to incorporate resistance and resilience measures. The consultation recognises the contribution these measures can make to developing sustainable communities.

Awareness

vii. The consultation highlights the importance of raising awareness of flood and coastal erosion risk issues amongst individuals, and how this should lead to more informed decision-making and a better understanding of risk. This should result in better management of consequences. The vital importance of flood warning systems in managing risk is covered. The impact of the Civil Contingencies Bill on emergency response is addressed.

Coastal issues

viii. Many of the issues facing those based on the coast are the same as those living inland. However the consultation recognises that some issues are exclusive to the coast. Risks and drivers in relation to the coast are examined and approaches to coastal management arrangements are also explored. The consultation looks at long-term strategic planning and decision-making processes such as Shoreline Management Plans.

Funding issues

ix. Comments are invited on what options Government should consider and what principles should inform that consideration.

How to respond to this consultation exercise

The purpose of this consultation document

This consultation document forms the core part of a 12-week consultation exercise which aims to seek views from all stakeholders with an interest in a broad range of flood and coastal erosion risk management issues. The proposals in this consultation document apply to England only.

Defra has been working together with other Government Departments and agencies and external stakeholder organisations to develop proposals for a new strategy for flood and coastal erosion risk management. The Flood Management Stakeholder Forum has members from a wide range of stakeholder organisations and has been fully engaged in the strategy development exercise.

This document explains our proposals and invites your contributions and comments. We will consider all responses in working up the final strategy.

References are provided as footnotes throughout the text. A series of supporting background papers and technical documents produced to accompany this consultation exercise are highlighted in the text and also summarised in the Further information section. These documents, background to this strategy development exercise and details of the Flood Management Stakeholders Forum are all available via the Defra webpages www.defra.gov.uk/environ/fcd/policy/strategy.htm.

A list of the stakeholder organisations that we have approached directly for views is at **Annex 1**. This is not an exclusive list and we welcome views from all interested parties.

This consultation follows the Government's consultation criteria, which are reproduced at **Annex 3**.

How to contribute

You are welcome to comment on all aspects of our proposals but there are some specific issues on which we would particularly value your input. These are presented as specific questions throughout the document and are also summarised below in the next section for your convenience.

The closing date for written responses to this consultation is **1 November 2004**. If you envisage difficulties in meeting this deadline, please contact the Flood Management Strategy Unit as below as soon as possible, who will do their best to accommodate you.

Responses should be sent to:

Making Space for Water Consultation
Flood Management Strategy Unit
Defra
Area 3D Ergon House
Horseferry Road
London SW1P 2AL

floodstrategy.consultation@defra.gsi.gov.uk

Telephone enquiries via the Defra Helpline 08459 335577.

Further electronic copies of this consultation paper are available from the Defra webpages via www.defra.gov.uk/environ/fcd/policy/strategy.htm. Further hard copies are available upon request from Defra Publications, Admail 6000, London, SW1A 2XX, telephone 08459 556000 or email defra@iforcegroup.com, by quoting the PB number on the back of this document.

In addition to responding to this consultation document, there are some other ways to contribute to this consultation exercise. Further details will be published on www.defra.gov.uk/environ/fcd/policy/strategy.htm.

Confidentiality

In line with Defra's policy of openness, at the end of the consultation period copies of the responses we receive may be made publicly available through the Defra Information Resource Centre, Lower Ground Floor, Ergon House, 17 Smith Square, London SW1P 3JR. The information they contain may also be published in a summary of responses.

If you do not consent to this, you must clearly request that your response be treated confidentially. Any confidentiality disclaimer generated by your IT system in email responses will not be treated as such a request. You should also be aware that there may be circumstances in which Defra will be required to communicate information to third parties on request, in order to comply with its obligations under the Freedom of Information Act 2000 and the Environmental Information Regulations.

The Information Resource Centre will supply copies of consultation responses to personal callers or in response to telephone or email requests (020 7238 6575, defra.library@defra.gsi.gov.uk). Wherever possible, personal callers should give the library 24 hours' notice of their requirements. An administrative charge will be made to cover photocopying and postage costs.

Comments about this consultation process

Any comments or complaints about the consultation process itself should be addressed to Sofia Rychlik-Hadley, Defra's Consultation Coordinator, Room 7D Nobel House, 17 Smith Square, London SW1P 3JR.

Consultation questions

Consultation questions are asked in each of the following sections of this document. To aid you in responding, a complete list of the questions asked is presented below, referenced by question number.

Section 3: Our vision and aim

3.1 Comments are invited on the draft vision for a new Government strategy for flood and coastal erosion risk management in England.

3.2 Comments are invited on the draft aim for a new Government strategy for flood and coastal erosion risk management in England.

Section 4: Assessing and managing the risk of flooding from rivers and the sea and of coastal erosion

4.1 Do you agree that as part of the agenda for implementing a robust and transparent system under this new strategy:

a. That we should continue with work to put in place a multi-level strategic framework for assessing risk in a nationally consistent way?

b. That the assessment of risk at all levels should take account not just of economic damage but of environmental and social factors as well?

c. That the assessment of risk should involve stakeholders at all levels?

d. That the national system of risk assessment should be the driver to secure the most cost-effective risk management action on flooding and coastal erosion, including prioritisation?

4.2 Do you agree that the methodology for dealing with scheme appraisals should be developed as proposed using multi-criteria approaches to take better account of non-quantifiable aspects?

4.3 Do you have any alternative approaches to suggest?

4.4 If you are a practitioner or have used the existing Defra guidance on scheme appraisal:

a. Do you have any comments on the general level of detail, format or presentation?

b. Do you find the guidance user-friendly and effective as a decision-making support system?

c. Have you any suggestions on how the format might be made more effective so that the guidance is easier to use and understand?

4.5 Views are requested on factors relevant to sustainable rural communities that might be included in multi-criteria approaches, and on any alternative approaches that might be adopted to take account of sustainable rural communities, whilst continuing to take appropriate account of urban communities.

4.6 Do you agree that the present approach to climate change is appropriate, and if not can you identify alternative approaches and the benefits that they would provide?

4.7 Do you agree that Defra should review its guidance to see if further encouragement can be given to the adoption of reversible and adaptable flood management and coastal erosion solutions? Can you identify ways in which those undertaking risk management activities can be given further encouragement to adopt resilient and adaptable flood management and coastal erosion solutions?

4.8 Do you agree that the current system of indicative standards should continue?

4.9 Do you have any modifications to propose? If so, please identify the benefits and how implementation of the changes should be funded.

4.10 Views are welcome on a recent research report regarding alternatives to the current approach that might provide more consistent standards within the same community.

4.11 Do you agree that the involvement of stakeholders in assessing risks and management options should be in the context of an agreed national framework?

4.12 Do you have comments on the suggested mechanisms for involving stakeholders at each level of risk assessment outlined above?

Section 5: Strengthening the sustainable approach: rural land use and managed realignment of floodplains and the coast

5.1 Do you agree that approaches that work with natural processes to provide more space for water should be identified and pursued wherever possible within the framework set out in Section 4?

5.2 Do you have comments on the proposed realignment policy?

5.3 Do you agree that targets for wetland habitat creation to fulfil Biodiversity commitments should be put in place?

Section 6: The role of rural land management

6.1 Do you have any comments on the proposed approach to rural land management?

6.2 Do you agree with the suggested approach of using water level management to bring SSSIs into favourable condition?

Section 7: Measures to reduce flood risk through land-use planning

7.1 Do you agree with the Government's general approach to managing flood risk through the land-use planning system? In particular, are there any other possible mechanisms for managing flood risk through the land-use planning system?

7.2 Do you agree that the Government should consider making a Direction in the circumstances outlined?

7.3 Do you have views on the arrangements described for flood risk assessments, and on whether any changes are needed? The options that might be considered could include:

a. *Retain the current arrangements.* The Environment Agency would continue to provide information to planning authorities as well as advice on flood risk. There would, however, be no obligation on planning authorities to include flood risk assessments as part of Regional Spatial Strategies and Local Development Frameworks, and therefore be no guarantee that flood risk would be adequately covered in strategies and frameworks, or that the Agency would have sufficient information available to give advice. Similarly at the level of individual development proposals there would be no guarantee that flood risk assessments would be produced.

b. *Make it a statutory requirement that Regional Spatial Strategies and Local Development Frameworks include flood risk assessments where they cover areas of flood risk, as defined by PPG 25.* This would require primary legislation and would impose extra costs on local authorities. However, it would ensure that flood risk was adequately covered in strategies and frameworks, and that adequate information was available to the Environment Agency.

c. *Make it a statutory requirement that individual planning proposals include flood risk assessments.* This would also require primary legislation and would impose extra costs on developers and local authorities. The benefits would be in ensuring that flood risk was always taken into account, and in providing adequate information to the Environment Agency.

d. *A combination of (b) and (c).*

Section 8: Integration of drainage management in urban areas

8.1 a. What kinds of actions do you think would be most effective in delivering more integrated management of drainage in urban areas?

b. Do you think action should be focussed on voluntary incentives or on compulsory requirements, or on a mixture of both?

c. Which end of the spectrum do you think action should be focussed on – less intervention or more intervention?

d. Do you have any suggestions for additional actions which might be included?

8.2 Comments are invited on the options for assigning lead responsibility as described in this Section.

8.3 If this consultation exercise shows support for the approach described in Option B in this Section, do you agree with the proposals that there should be piloting of Option B actions and that Defra should examine ways whereby it would fund the preparation of those pilots?

8.4 This Section and associated background paper, referenced in the text, sets out a number of issues and proposals concerning the implementation and management of sustainable drainage systems (SUDS), based on discussion with stakeholders. We would value your views on all of the issues raised, in particular regarding:

- the different options suggested to clarify ownership and responsibility of SUDS
- the legislative changes suggested to remove obstacles and disincentives to design and to implement more sustainable surface water drainage systems

Section 10: Flooding from groundwater

10.1 Defra has recently published an initial scoping study on flooding from groundwater which has yet to be peer-reviewed. All views and comments on the study and suggestions for further development are welcome.

10.2 Do you agree with the proposed priorities for further research on groundwater flooding? Are there any additional research priorities?

10.3 Do you agree that there should be better co-ordination and management of groundwater flooding risks in combination with other types of flooding? Who should be responsible for this? How should this work at the national, regional and local level? How should co-ordination and mitigation be funded?

10.4 Do you support more accurate, consistent record-keeping across England to monitor the frequency and occurrence of groundwater flooding events? Who should be responsible for this?

10.5 How could groundwater flooding risk be assessed in the context of the flood and coastal erosion risk management scheme appraisal system?

10.6 Should a national database be compiled to monitor rising groundwater in urban areas? Who should have responsibility for maintaining this?

10.7 Should parties involved in addressing urban groundwater rebound problems be required to commit to some kind of formal, long-term agreement? What shape could such an agreement take?

10.8 Views and comments on the issue of rising groundwater in former mining areas are welcome.

Section 11: Flooding of and from the transport network

11.1 How useful do practitioners find the Highways Agency guidance contained in *The Design Manual for Roads and Bridges* ? Do you think it addresses all concerns in relation to flooding and highway drainage?

11.2 Do you think that the production of guidance on the design and maintenance of non-strategic roads, and in particular their drainage systems, is necessary, and if so do you have views on who should produce and maintain this guidance?

11.3 Do you agree that the urban road network should be covered by proposals for integrated drainage management, and that it should be possible for those plans to include consideration of how roads might be used where appropriate for flood mitigation in extreme events?

11.4 Do you have suggestions on how the use of railway earthworks/structures as flood defences can be made more effective?

Section 12: Managing the consequences of flooding through flood resistance and resilience measures

12.1 Do you agree with the way the Government plans to take forward issues relating to flood resilience and resistance in new buildings built on the floodplain?

12.2 Views are sought on how you think owners of existing buildings can be encouraged to use flood resistance or flood resilience products.

12.3 Comments are invited on whether a quality scheme for surveyors in respect of flood repairs/resilience would be welcome and practicable.

Section 13: Raising awareness of flooding

13.1 How useful do you find the information currently available on flood risk, and how could it be improved?

13.2 Views are sought more generally on how you think awareness can be raised and sustained, particularly in those areas on the floodplain that have not experienced recent flooding and in areas at lower risk.

13.3 How aware are you of local flood activities in your area? What would you find helpful?

13.4 How aware are you of the activities of the Regional Flood Defence Committees?

Section 14: Flood warning systems and emergency responses

14.1 Should the Government undertake a review of whether greater account should be taken of the availability of flood warning services when appraising schemes? Any views on this issue are welcome.

14.2 How effective do you find flood warning services as currently provided? What would you find helpful?

Section 15: Coastal issues

15.1 Views are sought on the effectiveness of the current management arrangements for flood and erosion risks on the coast, compared to the possible alternative options described in Section 15. Any further suggestions for change, identifying the improvements and benefits that it would deliver, are invited.

15.2 Views are sought about the effectiveness of the Shoreline Management Plan process, in particular:

a. How useful are the outcomes of the process?

b. To what extent are the findings taken forward and implemented in practice?

c. Should more be done to monitor how the findings are taken forward?

d. Do you have any suggestions about supporting the Shoreline Management Plan process and how the outcomes are implemented in the future?

15.3 Views are sought on the structure and arrangements for Coastal Groups. Any proposals for supporting the work of Coastal Groups in the future are welcome.

15.4 Views are sought on the relationship between ICZM, strategic planning on the coasts and Shoreline Management Plans. In particular:

a. How could the findings of Shoreline Management Plans be better Integrated with the statutory planning system, especially local development plans?

b. How could the findings of Shoreline Management Plans be better integrated with other specific issues on the coast, such as biodiversity, land instability and regeneration?

c. How should Shoreline Management Plans be taken forward in the Context of the Water Framework Directive?

d. How could ICZM principles be used to best effect in the context of managing coastal flooding and erosion risks? In particular, what might the roles of Shoreline Management Plans, Coastal Groups, local authorities and planners be within an ICZM framework?

Section 16: Funding issues

16.1 Comments have already been received in respect of the Floodplain Development Charge as part of the Funding Review (2002) (see footnote 71). In light of the principles set out in this consultation and experience since 2002, do you have any additional comments?

16.2 Is there a role for Business Improvement Districts in the area of flood management services?

16.3 Would there be any value in different approaches to the Land Drainage Consent Scheme?

Annex 2: Initial Regulatory Impact Assessment (RIA)

The initial RIA provides an overview of possible risks, benefits and costs associated with the proposals in this consultation paper.

It is difficult to identify and quantify all possible impacts at this stage. We welcome all contributions and suggestions as part of your response to this consultation document.

Following this consultation period, full RIAs will be prepared at a later date for proposals which it is decided to take forward in the final strategy.

Section 1: Introduction: A new strategy

Introduction

1.1 This strategy development exercise is essentially about the management of risk in England. In England several thousand discrete areas can be identified as at risk of flooding from rivers and the sea, and several hundred coastal sites at risk of coastal erosion. These are highly variable in character. For example, for flood risk, areas range from the highly developed (and well protected) former tidal marshes in parts of central London through to towns and rural communities, highly productive agricultural land and sites with a few riverside fields of low grade agricultural land.

1.2 Many of these coastal and inland areas would be continually eroded or inundated with floodwater at regular intervals but for the major investment in man-made flood and coastal defence infrastructure, worth many billions of pounds, that has been made over the centuries. The continued and effective functioning of this infrastructure is essential to the continuation of current uses of the land and the built and natural environment in many parts of the country.

1.3 Some specific elements of the system may no longer be required to fulfil their original functions or may not be compatible with current expectations for management of the environment. However in most areas the maintenance, renewal and necessary extension of flood and coastal defences to meet the natural changes and societal demands of the next century will continue to be needed, and the issue is more how the aims set out in this strategy are to be achieved in the way such activity is carried out. For example, in some cases modifications to the system may be capable of delivering not only flood management but also water quality and biodiversity benefits.

Why have a new strategy?

1.4 The existing Strategy for Flood and Coastal Defence for England and Wales was published in 1993 by MAFF and the Welsh Office[1]. The Government wants now to look again at strategic issues, with the aim of producing a new strategy for England which covers the next 20 years or so. It is the intention that the new strategy should be reviewed regularly on a rolling basis after completion, so as to keep it up to date.

1.5 This consultation document is an important step in the preparation of the new strategy. Defra has taken the lead in preparing it, but it reflects the views of all those Government Departments and public-sector bodies that have an interest in flooding and coastal erosion. Defra has also had the benefit of an

[1] MAFF & the Welsh Office (1993), *Strategy for Flood and Coastal Defence for England and Wales,* PB 1471. Summary available at http://www.defra.gov.uk/environ/pubs/stratsum.htm. Full document available upon request from the Flood Management Strategy Unit (see earlier *How to respond to this consultation exercise* section).

input from the Flood Management Stakeholder Forum on which key stakeholder organisations are represented[2].

The link with Defra's aim and strategic priorities

1.6 The creation of Defra in 2001 was a key development. Defra's aim is sustainable development, and it is right to look again at flood and coastal erosion risk management activities to see if more can be done to take on board the principles of sustainable development. This relates particularly to the scope of the definition and calculation of flood risk, and to the arrangements for appraising and prioritising strategies and schemes to deal with that risk.

1.7 Managing the risks from flooding and coastal erosion is a key part of Defra's activities in the area of emergency preparedness for events which could have serious public health, economic and/or environmental impacts. These events impact on the quality of life in both urban and rural areas. Managing these risks and this emergency contingency for the Government also has the potential to make major contributions to other Government strategic priorities, such as Sustainable Communities, as well as at least two of Defra's five key areas of strategic priority, namely Natural Resource Protection and Sustainable Rural Communities.

1.8 The preparation of this new strategy provides the opportunity to examine how these contributions can be maximised while continuing to achieve the objective of managing flood and coastal erosion risks. The contribution of flood and coastal erosion risk management to Defra's strategic priorities can be direct, but also indirect by inputting into the achievement of other important outcomes desired by the Government.

The role of other Government policies

1.9 Increasingly there has been focus on the fact that the way other Government policies are implemented can affect the management of flood and coastal erosion risk. This new strategy will be Government-wide and covers the contribution those other policies, for example planning and development policy, can make to the management of flood and coastal erosion risk in England. The strategy also recognises that there is a necessary two-way interaction between flood and coastal erosion risk management policies and other Government policies. Many policies - such as sustainable development and Sustainable Communities - that are of importance to flood and coastal erosion risk management are cross-Governmental ones. The process of implementing this strategy will need to reflect developments in the Government's regional agenda[3].

[2] Further details of the Forum are available via http://www.defra.gov.uk/environ/fcd/policy/forum.htm.

[3] Further details are available via the Office of the Deputy Prime Minister (ODPM) website http://www.odpm.gov.uk/stellent/groups/odpm_regions/documents/sectionhomepage/odpm_regions_page.hcsp

1.10 The extent to which in a particular case the activity of managing flood and coastal erosion risks can contribute to wider Government priorities will depend on a number of factors such as the nature of the location where the risk needs to be managed. For example, in built-up urban areas restrictions such as limited space may limit the scope for innovative solutions. But we should always seek to identify ways of implementing solutions that achieve the primary objective of managing flood and coastal erosion risk but also make a contribution to the strategic priorities both of Defra and of the Government more generally.

Links between flood management and other water policies

1.11 The overall context of the link between flood management and other water policies was set out in the Defra document *Directing the Flow: Priorities for future water policy*[4], which drew attention to the need for more integration between the different strands of water policy and between water policy and other policy areas. Integration within water policy includes examining how flood management objectives might be promoted through activities primarily directed towards other water objectives, such as water quality and water resources. *Directing the Flow* contained two specific commitments relating to flood management's contribution to other water policy objectives, namely that Defra would:

- Continue to review and develop procedures to ensure that the selection and appraisal of options for flood management schemes allow sufficiently for multiple benefits, including those for water resources, water quality, sewer systems, and environmental protection and enhancement.
- Encourage the development of Catchment Flood Management Plans and other river catchment management plans that will progress the integrated consideration of all flood risk management matters at catchment level under the umbrella of the river basin management plans required under the Water Framework Directive.

Widening the scope with respect to flood risk management

1.12 Flooding occurs when natural or man-made drainage systems are overwhelmed by rainfall or high sea levels. Damage due to flooding can occur, for example, when river floodplains or coastal areas are used in ways that do not take sufficient account of the flood risk. This could include housing development, or inappropriate land management such as crop rotation that is intolerant of inundation. Flooding can be beneficial in some circumstances, for example where it creates wetland habitats for wildlife, thereby benefiting the environment.

[4] Defra (2002), *Directing the flow: Priorities for future water policy,* available in full from Defra Publications quoting PB7510 and http://www.defra.gov.uk/environment/water/strategy/pdf/directing_the_flow.pdf

1.13 Because of the existing legislative framework, Defra and the Environment Agency have traditionally focussed on flooding by rivers, the sea and tides as constituting the major sources of flood risk. Any complete assessment of overall flood risk needs to take account of all sources of flooding. It is therefore necessary to widen the scope to include:

- Flooding due to run-off from impermeable surfaces such as roads, car parks and buildings and from saturated, frozen or compacted soil surfaces. More detail is provided in later sections, including Section 8 and Section 11.

- Sewer flooding due to limitations on system capacity that restrict the ability to cope with the volume of water flow either at the point of entry or other parts of the system. More detail is provided in Section 9.

- Flooding from groundwater which arises when water stored or flowing in the ground exceeds the capacity of the aquifer. More detail is provided in Section 10.

1.14 All the different forms of flooding can occur in combination. For example, flooding from rivers and high groundwater levels can overwhelm the entry points of sewers.

1.15 Flooding from sources other than rivers and the sea can cause considerable disruption and distress. Such flooding can sometimes account for a high percentage of the damage to national assets caused by all types of flooding. For example, it has been estimated that in the prolonged flooding of autumn 2000 up to 40 per cent of the properties affected had been flooded from causes other than overflow from rivers. Recent work has estimated that some 100,000 properties a year may be affected by problems from private sewers.

The response to the Foresight Future Flooding Project

1.16 The Foresight report *Future Flooding* was published on 22 April 2004[5]. The Foresight programme is run by the Office of Science and Technology under the direction of the Government's Chief Scientific Adviser. Foresight uses science to produce visions of the future and to inform policy development. The Foresight Project took a long-term view covering the period 2030 to 2100 of the drivers of flood and coastal erosion risks, and possible policy responses. Although the timescale considered in this project is much longer term than that of this strategy exercise, the exercise provides the opportunity to start taking on board Foresight's conclusions. A separate action plan[6] has been prepared to take forward longer-term actions arising from the Foresight Project, and progress on that action plan will be reviewed every five years. The results of those reviews will where appropriate be reflected in the rolling reviews of this strategy.

[5]Foresight Flood and Coastal Defence Project (2004a),*Future Flooding,* Office of Science and Technology www.foresight.gov.uk
[6]Foresight Flood and Coastal Defence Project (2004b), *Future Flooding Action Plan,* Office of Science and Technology www.foresight.go.uk

The insurance industry

1.17 The insurance industry plays an important role in protecting individuals from the consequences of flooding. (Insurance is not usually available against the risk of coastal erosion.) By spreading risk, insurance allows people to obtain cover to protect themselves from occasional flood events. The United Kingdom is almost unique in offering flood cover as a standard feature of household and most business policies. Unlike much of Europe and the rest of the world, cover is widely available to the 24 million households in the United Kingdom. Increasingly, however, the premium rate paid by individuals will reflect the level of flood risk. The Association of British Insurers has published a statement of principles[7], the key features of which are:

- The industry will continue to provide flood cover as a standard feature under normal competitive market conditions for those protected to a standard where the annual probability of flooding is 1.3 per cent or better;
- The industry will continue to provide cover to existing policyholders where defences to a standard of 1.3 per cent or better will be in place by 2007;
- The industry will use its best efforts, on a case-by-case basis, in the case of existing policyholders where no such defences are planned.

1.18 In return the Association has said that it requires action from Government, in particular:

- Sustained expenditure on defences;
- Full implementation of guidance on the relationship between flood risk and development decisions;
- Improved flood risk mapping;
- Implementation of realistic solutions to the problems arising from sewer flooding.

The European dimension

1.19 Flood risk management is currently being discussed at the European Union level. A Communication on this issue was published in July 2004[8] and is due for further discussion during the forthcoming Dutch presidency. As work on this continues, the strategy will ensure that it takes account of any messages that emerge. The current emphasis of the Communication is on the importance of planning, flood risk mapping, research and stakeholder engagement; these themes are all consistent with this consultation and the current approach in England. Many Member States have experienced severe flooding problems in recent years and there will be scope for learning from

[7] Association of British Insurers (2003), *ABI Statement of Principles on the provision of flood insurance* http://www.abi.org.uk/Display/File/Child/228/Statement.pdf

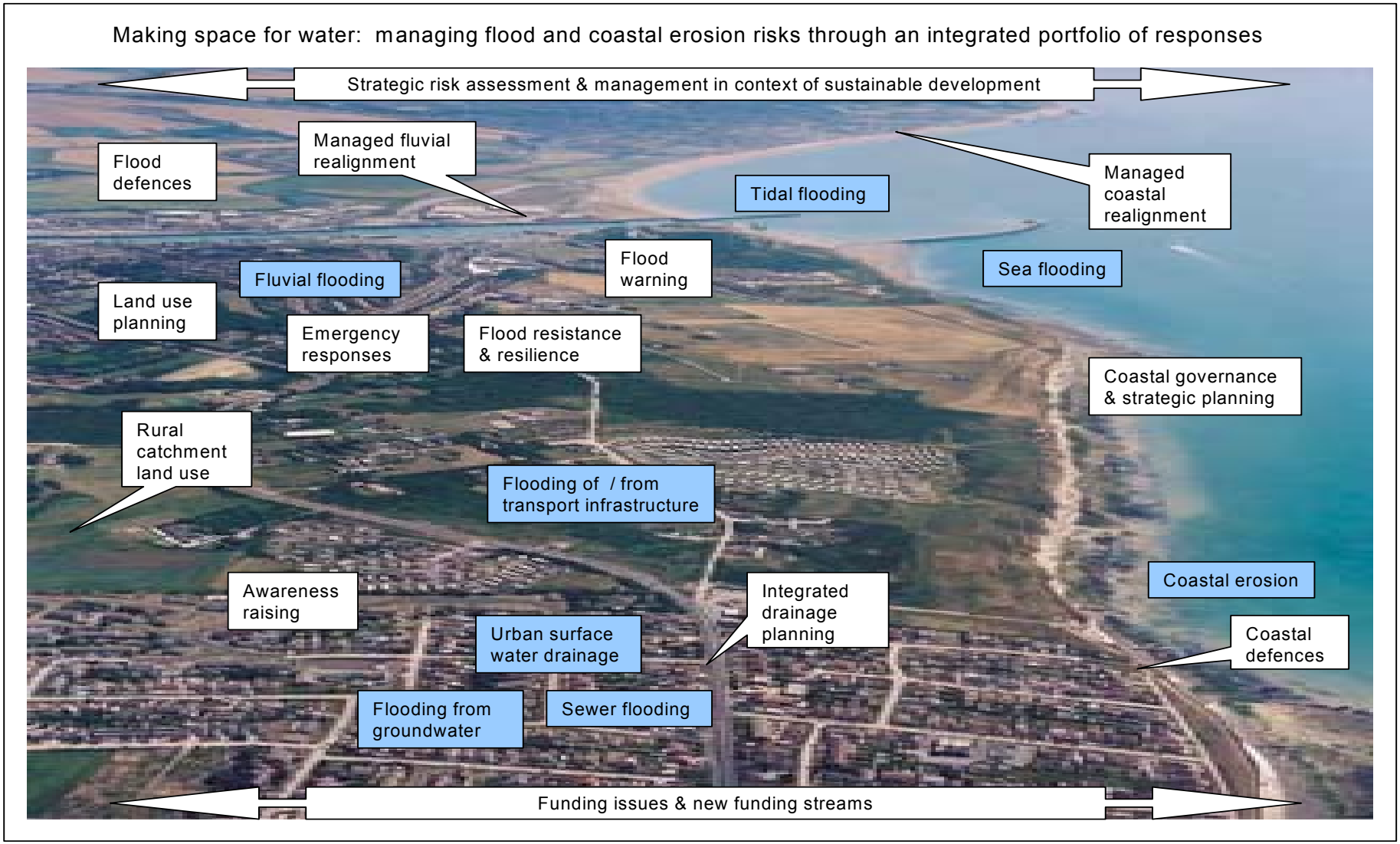
[8] The Commission's Communication is available via http://www.europa.eu.int/comm/environment/water/pdf/com_2004_472_en.pdf

experiences and practices elsewhere, irrespective of how the European proposals develop.

A broad range of risks and responses

1.20 The scope of this proposed new strategy, in terms of types of risks and the use of an integrated portfolio of responses, is illustrated in Figure 1 overleaf.

Figure 1: Proposed scope of a new strategy for flood and coastal erosion risk management



Section 2: The pressures we currently face

Drivers of flood and coastal erosion risk

2.1 The Foresight Future Flooding Project started from a baseline of knowledge that was already fairly advanced in a number of areas, for example the Defra and the Environment Agency joint Research and Development programme. This programme continues to further understanding of many aspects of flood and coastal erosion risk management.[9]

2.2 The Foresight *Future Flooding* report provided valuable information on the drivers that will influence flood risk in the future. This report has added significant value including in identifying the most important drivers of future flood risk at catchment and coastal scales. A driver is defined as any phenomenon, such as climate change or economic growth, that may change the state of the flooding system. The flooding system itself was characterised by Foresight in terms of sources (the meteorological phenomena such as rain or coastal storms which are the initial drivers), pathways (all the system of drainage routes by which water flows from the time it hits the ground to when it reaches the sea) and receptors (the people, land buildings and other facilities that are affected when inundated with floodwater or damaged by coastal erosion).

2.3 Managing flood and coastal erosion risk is largely a matter of managing the pathways by ensuring that there is enough space in both natural and man-made systems to allow water to flow or be temporarily stored during high flow events or wave energy to be dissipated during coastal storms at the shoreline. However it also extends to managing the receptors, for example through land use policy and through public awareness and flood warning to enable individuals to mitigate their losses when events occur.

2.4 Foresight pointed out that many of the drivers that could have the most impact are also the most uncertain, and that there is high uncertainty in the area of climate change predictions.

Climate change

2.5 The Earth's climate is changing. Global atmospheric temperatures have risen by about 0.6 °C over the last century, and all of the ten warmest years on record have occurred since 1990, including 1999, 2000, 2001, 2002 and 2003. The United Kingdom's climate has followed the global trend. Central England temperatures have risen by almost 1 °C over the last century.

2.6 As global greenhouse gas emissions continue to increase throughout the 21st century, the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)[10] also suggests that global temperatures will rise by between 1.4 to 5.8° C, and global mean sea levels by 9 to 88 cm, by 2100.

[9] Full details are available via http://www.defra.gov.uk/environ/fcd/research/default.htm.
[10] http://www.ipcc.ch/

2.7 Defra funded the development of climate change scenarios for the UK, based on climate modelling carried out by the Hadley Centre for Climate Prediction and Research. These scenarios were published in 2002[11]; they suggest:

- Average annual temperatures across the UK may rise by between 2° and 3.5° C by the 2080s.
- High summer temperatures will become more frequent and very cold winters will become increasingly rare.
- Winters will also become wetter and summers may become drier across all of the UK.
- Heavy winter precipitation will become more frequent, while the amount of snow could decline by 60 - 90 per cent by the 2080s.
- Extreme high water levels, which currently have a 2 per cent annual probability of occurring, could become 10 to 20 times more frequent at some east coast locations by the 2080s.

2.8 The United Kingdom's target under the Kyoto Protocol is to reduce its greenhouse gas emissions by 12.5 per cent below 1990 levels by 2008-2012. On top of this, the United Kingdom has a domestic goal to move towards a 20 per cent reduction in carbon dioxide emissions on 1990 levels by 2010. The 2003 Energy White Paper[12] announced the further intention of putting the United Kingdom on a path to cut carbon dioxide emissions by some 60 per cent by about 2050, with real progress by 2020.

2.9 In November 2000 the Government and the devolved administrations published the Climate Change Programme[13] which details a package of integrated policies that will help the United Kingdom achieve its Kyoto target and work towards our domestic goal. A review of the Programme will take place later this year. Latest projections suggest we are well on course to meet our Kyoto commitment, a conclusion that was also supported by an independent assessment by the United Nations Framework Convention on Climate Change.

2.10 Climate change is expected to have impacts across a range of water policies, including those relating to flooding, water resources and biodiversity over the longer term in England. A number of actions are in place to address these impacts. For example, the Environment Agency is ensuring that climate change implications are built into water resource forward planning, and the United Kingdom Biodiversity Action Plan and the England Biodiversity Strategy provide a policy framework to adapt to the long-term implications of climate change.

2.11 As far as flooding is concerned, climate change was one of the six driver categories considered by Foresight. The UKCIP02 climate change scenarios were used in the study. The scenarios include projected changes in levels of

[11] UK Climate Impacts Programme (2002), *Socio-economic scenarios for climate change impacts assessment: a guide to their use in the UK Climate Impacts Programme.* UKCIP, Oxford.
[12] http://www.dti.gov.uk/energy/whitepaper/index.shtml
[13] http://www.defra.gov.uk/environment/climatechange/cm4913/

precipitation, temperature and sea level associated with a range of future levels of greenhouse gas emissions. The primary impacts on flood risk will be from changes in precipitation, extreme sea levels and coastal storms. Secondary impacts from temperature changes will affect evaporation, plant moisture demands, soil moisture levels and the occurrence of snow and ice. Foresight identified the following major impacts:

- Increased coastal flood risk and erosion, especially in the South East, due to relative sea level rise, surges and storms, with the risk of coastal flooding possibly rising by between four and ten times over the next 100 years.

- Precipitation changes, and consequent increased risks of between two- and four-fold across the country; increased probability of river flooding in some areas especially in the North and West.

2.12 The Government will continue to pursue mitigation policies that aim to limit the extent of climate change through the control of greenhouse gas emissions, and thereby avoid the largest potential increases in flood risk. However, mitigation of climate change has little potential to reduce the predicted increase in flood risk by the middle of this century because of inertia (that is, time lags) in the climate system. It will be necessary to build in adaptation to the predicted climate change impacts over the coming decades. A key issue for this strategy is therefore how to make allowance for climate change in the arrangements for selecting schemes for the management of the risks from floods and coastal erosion. This is considered further in Section 4 below.

Other drivers at catchment and coastal scales

2.13 In addition to climate change, Foresight identified the following categories of drivers of future flood risk at catchment and coastal scales:

- *Increased catchment run-off*: rates will be affected by such factors as upstream urbanisation, rural land management and agricultural impacts

- *Changes in fluvial systems and processes*: this category covers issues like environmental regulation, river morphology and sediment supply; and river vegetation and conveyance

- *Changes in coastal processes*: in part driven by climate change factors such as increases in the height and direction of coastal waves; surges and relative sea level rise

- *Human behaviour*: this covers stakeholder behaviour and public attitudes and expectations

- *Socioeconomics*: this category covers a wide range of drivers including the level of damage caused to domestic and commercial buildings and their contents; the location, density and form of urban development (where there is the potential for conflict between flood risk considerations

and development pressures); the impacts on infrastructure; social impacts, and the influence of science, engineering and technology

Drivers in the urban environment

2.14 Foresight also identified drivers of flood risk that operate within the urban environment. Some of these are the same as those described above as operating at catchment and coastal scales. Others operate exclusively at the urban scale. These include:

- Changes in the management of land adjacent to the urban area that influence run-off into the urban area
- Processes associated with above-ground and overland surface flow in natural watercourses and man-made systems, including performance, maintenance and operation
- Sewer conveyance, blockage and sedimentation
- Flooding from external sources leading to loss of conveyance and serviceability in below-ground drainage systems
- Changes in the performance, condition and serviceability of urban drainage assets

A more detailed background paper about the physical drivers behind flood and coastal erosion risks is available as part of a package of further background and technical documents to accompany this consultation exercise via the Defra website www.defra.gov.uk/environ/fcd/strategy/policy.htm

The increase in flood risk

2.15 Flood risk is defined as a combination of probability (for example, an annual probability of flooding of 1 per cent or greater) and consequences (the damage that would result from a flooding event). Thus risk can increase if the probability remains the same but the consequences increase (for example, if more assets are located in the flood risk area) and vice-versa. Foresight examined the effect of these drivers on flood risk under four different future scenarios (which combine differing amounts of climate change and socio-economic change), and assuming a continuation of existing flood management policies. Foresight suggests that in the 2080s:

- The number of people in England at high risk from flooding might increase from 1.4 million at present to between 2.0 million and 3.3 million
- The expected annual economic damages in England to residential and commercial properties might increase from £0.9 billion to between £1.5 and £20 billion.

The increased costs of addressing the risk

2.16 Foresight suggests that to implement portfolios of responses in order to manage flood risk might require between about £22 and £75 billion of new engineering by the 2080s, depending on which of the four future Foresight scenarios is used. These costs would be spread over the intervening years, and might equate to a compound increase in flood risk management expenditure of between £10 million and £30 million per year over that period. Foresight gave as an example an estimate that in 20 years annual expenditure would need to be between £700 million and £1.1 billion, compared to about £500 million today. Although these are significant figures, in all but one of the Foresight scenarios the increase needed in annual spend would be at a growth rate which was less than the overall growth of the economy. It also needs to be stressed that the scenarios are working tools and do not represent predictions of the future.

2.17 A separate study, the National Assessment of Defence Needs and Costs (NADNAC)[14], with a much shorter time horizon than Foresight, has also been completed. The study was commissioned by Defra and is the latest study in an ongoing programme of work to estimate the costs and benefits of flood and coastal defences.

2.18 NADNAC estimated the quantifiable costs and damages associated with a number of different levels of investment based on assets at risk of flooding and coastal erosion as at the year 2000. The study assessed levels of investment required to achieve the most justified standards of defence over a 15-year period from the year 2000. The conclusions of this work indicate a need for year-on-year increases in investment over the period 2005 to 2015 that are similar to those suggested as being necessary over a much longer period by the Foresight Future Flooding Project.

[14] A summary report *National Assessment of Defence Needs and Costs for flood and coastal erosion management (NADNAC)* is available via the Defra webpages http://www.defra.gov.uk/environ/fcd/default.htm

Section 3: Our vision and aim

3.1 The analysis in the preceding two sections highlights a number of challenges for our future strategy which are explained further below.

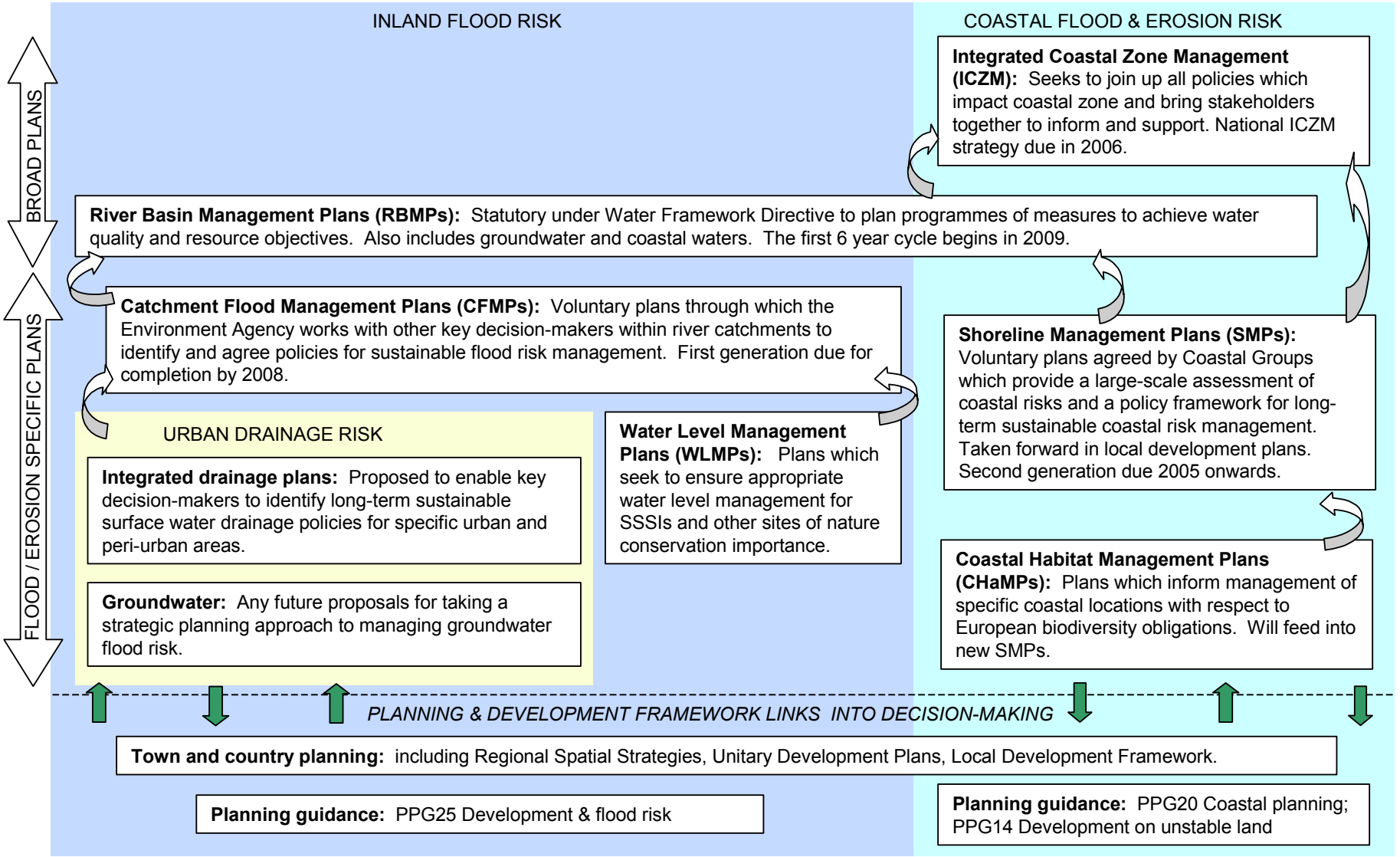
Need for a strategic and holistic approach

3.2 One is the extreme complexity of managing flood and coastal erosion risks, with many links to other policy areas and activities both at national and local level. The Government intends to continue with its strategic approach which aims to set flood and erosion risk management within the broader context of the catchment or shoreline as a whole. Account needs to continue to be taken of the effects action taken in one area may have on another, and of local issues. A logical matrix of plans needs to be developed which allows existing and new interdependencies to be recognised. The framework will need to be sufficiently flexible to cover sources of flooding other than rivers, the sea and tidal waters.

3.3 Defra, the Environment Agency, local authorities and other interested stakeholders will aim to complete by 2008 the programme of drawing up a first round of Catchment Flood Management Plans and a second round of Shoreline Management Plans. These will complement the River Basin Management Plans which will be drawn up under the Water Framework Directive. Catchment Flood Management Plans and Shoreline Management Plans will provide important information for River Basin Management Plans, particularly in providing information on the flooding processes for use in water quality studies and identifying the opportunities and constraints for considering impacts within a catchment.

3.4 Figure 2 overleaf illustrates the scope of these different types of plans and how they interact.

Figure 2: Scope of key strategic plans for flood and coastal erosion risk management



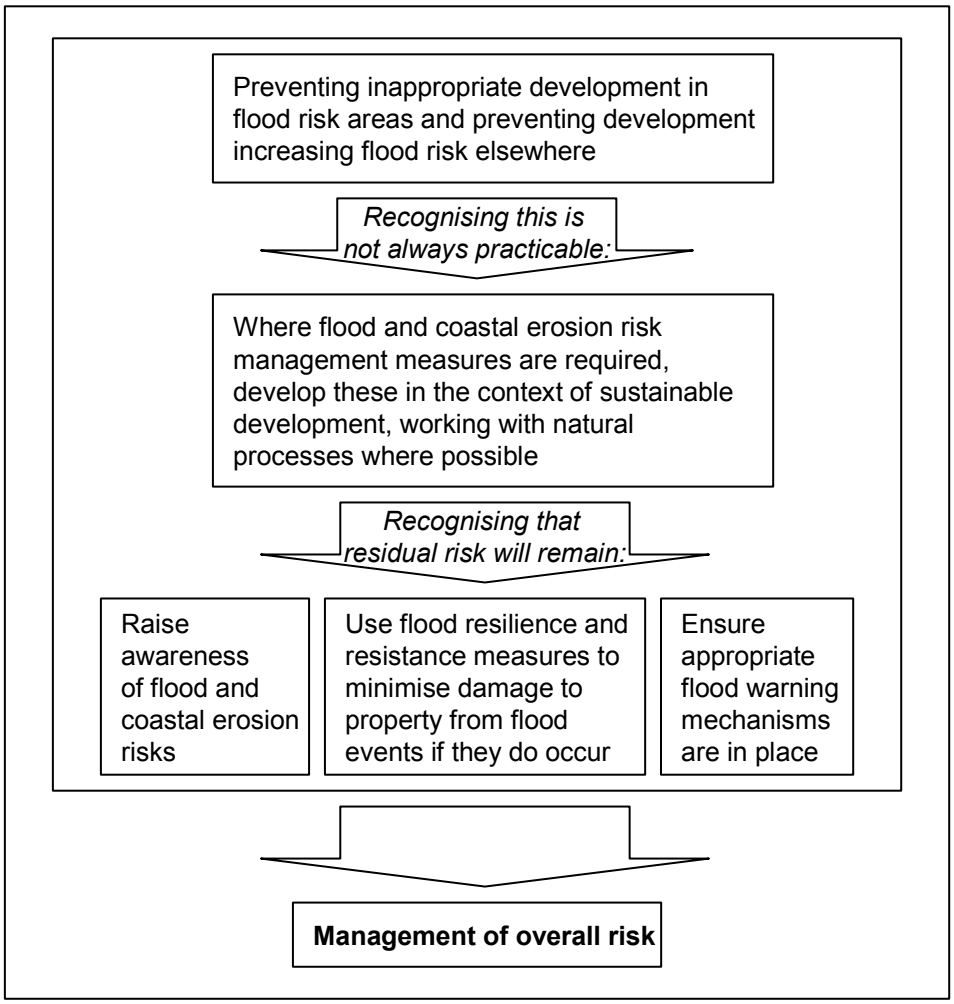
Strengthening the principles of sustainable development

3.5 This is a key challenge and has implications for the way we assess and manage the risk of flooding and of coastal erosion.

An integrated portfolio of responses

3.6 The Foresight Project concluded that a range of engineering and non-engineering measures need to be used in concert to manage flood and coastal erosion risk, and that this approach is likely to be the most cost-effective. Figure 3 illustrates this range of responses in general terms, all of which are discussed in more detail later in this consultation document.

Figure 3: A flowchart to illustrate the range of responses for addressing flood and coastal erosion risks



3.7 We need to build on what we have so far done to develop such an approach which is also necessary to promote sustainable development, in particular to achieve multiple objectives from the way we identify and implement solutions. Foresight identified realigning coastal defences as a key response in terms of effectiveness and sustainability. An integrated approach is also needed to reflect the strategic priorities of Defra, and the contribution flood and coastal

erosion risk management can make to other Government objectives. There is also scope for other Government policies to contribute to managing flood and coastal erosion risks.

The key role of land-use planning

3.8 Foresight identifies land-use planning as a key area that scored well in terms of effectiveness and sustainability across a number of the Foresight scenarios. Section 7 of the consultation document covers planning and development policy.

Flooding within urban areas

3.9 The Foresight project drew attention to the fact that, as well as facing flooding from rivers and the sea, our towns and cities can be flooded by local intense storms which can overwhelm drains and sewers. This strategy responds to this by including those other sources of flooding within the strategic scope for the first time. Section 8 outlines options for facilitating integrated urban drainage management so as to pull together the diverse responsibilities for different aspects of surface water drainage.

Who pays?

3.10 Risk cannot be removed completely, and the extent to which it can be managed depends not only on such factors as technical feasibility and stakeholder attitudes and behaviour, but also on the funding that is available.

3.11 Foresight suggests that extra expenditure will be needed by the 2080s to manage risks to acceptable levels. Expenditure will need to be focussed on those areas where it is most justified. It is envisaged that the Exchequer will continue to make a major contribution to funding, reflecting the benefit derived by society as a whole from flood risk management. But the general taxpayer cannot be expected to fund all of the expenditure.

3.12 It is already a well-established principle that where a development goes ahead in a flood risk area, the developer is responsible for fully funding the provision and future maintenance of any defences or other mitigation that is required because of a development. The Government will continue to implement this principle.

Uncertainty and the need for adaptability

3.13 Another important consideration is the uncertainty that surrounds a number of drivers, with Foresight pointing out that many of the most important drivers are also the most uncertain. It follows that risk management activities have to take account of this uncertainty, for example by ensuring that solutions put in place have a high degree of adaptability to allow them to cope with different future scenarios.

Our vision: what will the future look like after this strategy has been implemented?

3.14 What does all this mean for our vision of what the new strategy should achieve? Our vision is set out below. In summary, we want to allow space for water so that we can manage the adverse consequences for people and the economy that can result from flooding and coastal erosion while achieving multiple benefits in line with wider Government objectives.

Vision for a new Government strategy for flood and coastal erosion risk management in England

The concept of sustainable development will be firmly rooted in all flood risk management and coastal erosion decisions and operations. Full account will be taken of the social, environmental and economic pillars of sustainable development, and our arrangements will be transparent enough to allow our customers and stakeholders to perceive that this is the case. Account will also continue to be taken of long-term drivers such as climate change. Decisions will reflect the uncertainty surrounding a number of key drivers and will where appropriate take a precautionary approach. Decisions will be based on the best available evidence and science.

Flood and coastal erosion risk management will be clearly embedded across a range of Government policies, including planning, urban and rural development, agriculture, transport and nature conservation and conservation of the historic environment. Other relevant Government policies will also be fully reflected in the policies and operations of flood and coastal erosion risk management. There will be a mix of policies designed to minimise the creation of new risks (by the way development policy is implemented in areas of flood risk), to manage risk and to increase resistance and resilience. There will be a clear understanding and acceptance of the respective roles of the state and of individuals. The public will be more aware of flood and coastal erosion risks and empowered to take action themselves where appropriate.

There will be increased use of co-funding with other bodies and other schemes so as to secure sustainable and cost-effective flood and coastal protection while at the same time securing a greater overall contribution to sustainable development than would have been possible without co-operation. The true costs of providing flood and coastal defences will be reflected to a greater extent than at present in individual and commercial decision-making. Expenditure will be focussed so as to achieve value for money, and will be prioritised where necessary to reflect affordability.

There will be local input into decision-making, in particular through the preparation of Catchment Flood Management Plans and Shoreline Management Plans, within a context of national standards and nation-wide information on flood risks and prioritisation.

There will be a holistic approach to the assessment of options through a strong and continuing commitment to Catchment Flood Management Plans and Shoreline Management Plans, within a broader planning matrix which will include River Basin Management Plans prepared under the Water Framework Directive.

There will be transparent and measurable targets and performance indicators, in terms of managing risks to people, property and the environment, to ensure those responsible for delivering the strategy can be held to account.

The results of the strategy will be seen on the ground in the form of more flood management and coastal protection solutions working with natural processes. This will be achieved by making more space for water in the environment through, for example, appropriate use of realignment to widen river corridors and areas of inter-tidal habitat, and of multi-functional wetlands that provide wildlife and recreational resource.

Question 3.1: Comments are invited on this draft vision.

Aim

3.15 The future aim of the Government's strategy for flood and coastal erosion risk management might be summarised as follows.

Aim for a new Government strategy for flood and coastal erosion risk management in England

To manage the risks from flooding and coastal erosion in an integrated and holistic way, employing a portfolio of approaches, so as to reduce the threat to human life and property while furthering sustainable development and the strategic objectives of the Government; and to secure rational funding mechanisms that deliver appropriate levels of investment.

Question 3.2: Comments are invited on this draft aim.

Section 4: Assessing and managing the risk of flooding from rivers and the sea, and of coastal erosion

The nature of the risks

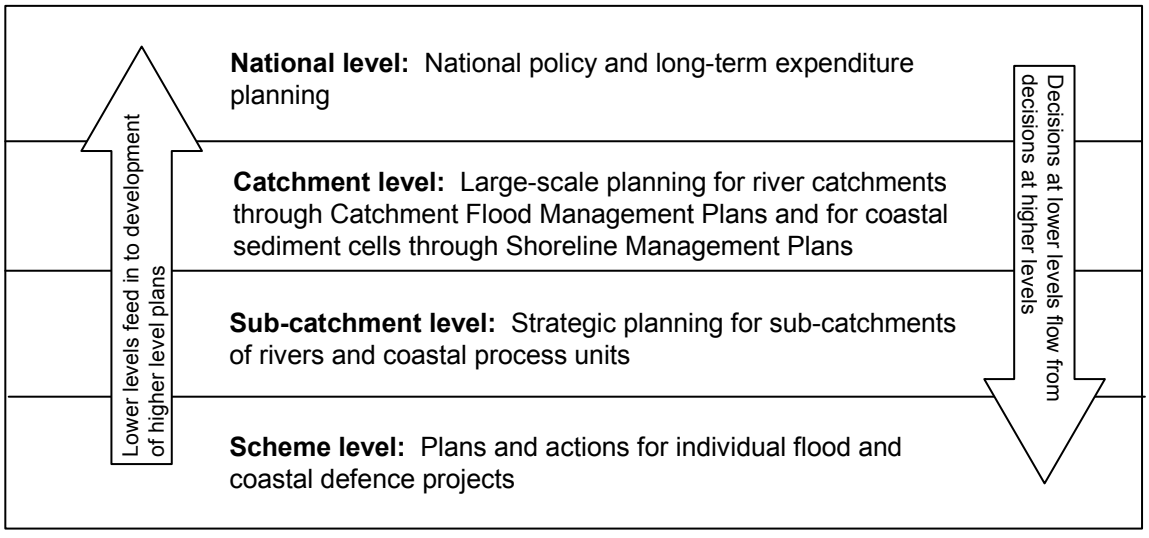
4.1 River and coastal flood events can be extreme, rare and unpredictable. Risk management must necessarily take place in a framework that takes account of probability. The framework needs to take account of changes over time, recognising that most flood and coastal management infrastructure will be expected to function effectively for 50-100 years or longer.

4.2 Risks from natural flooding events can be reduced but can never be eliminated. In assessing and managing risks it is important to balance the interests of individuals, the environment and wider society.

Levels at which risks are managed: the framework

4.3 Over the period of the strategy risks, both of flooding and of coastal erosion, will increasingly be managed at a number of different levels, namely as illustrated below:

Figure 4: Levels of risk management frameworks



4.4 Decisions at lower levels within this structure should flow from, and be consistent with, decisions at higher levels and at these higher levels the assessments need to be sufficiently robust to guide feasible and realistic implementation programmes. There is therefore a two-way flow of information. The contribution an individual river scheme, for example, will make to the relevant national, catchment and sub-catchment strategy will form a key part of its appraisal. This will allow a move away from a focus on

proposals for individual schemes, and how they compare with each other, to a focus on higher-level strategies which individual schemes serve to implement.

4.5 The framework set out in Figure 4 is already in place to some extent, and is beginning to provide improved strategic direction to flood and coastal erosion risk management. A key challenge for the strategy period is to strengthen the framework so that it delivers.

4.6 Assessment of risk will be a key driver of decision-making at all the levels set out in Figure 4, from national to individual projects.

How risk is assessed

4.7 If an approach along these lines is to work effectively, it is essential for risk to be assessed in a consistent way and at the right level of detail at all levels, and that the assessment methodology takes account of all three economic, environmental and social pillars of sustainable development.

4.8 At the national level, the Environment Agency is at present taking forward work to assess and map flood probabilities on a consistent national basis. These maps of flood probability will be used for a number of purposes, including the derivation of estimates of risk through a project on risk assessment for strategic planning. The estimation basis is currently one of damages to economic assets measured in monetary terms. This will need to be broadened over the lifetime of this strategy to take better account of environmental and social aspects. This will require the development of techniques that can take account of those environmental and social aspects that are not readily amenable to monetary valuation, as well as a broadening of the range of impacts that can be valued in monetary terms.

4.9 Defra, in common with other Government Departments, is developing approaches better to incorporate the principles of sustainable development into its policies. Whilst recognising that this is a very challenging agenda to deliver, Defra will work with the Environment Agency to apply these approaches and develop further methodologies for broadening existing flood risk assessment methods so that they become more holistic. Defra will also be undertaking work with coastal groups and researchers to extend the approach to coastal erosion risk.

4.10 This approach will need to involve all the levels set out in Figure 4 with risk assessments being increasingly refined at lower levels, and with that refinement feeding back into higher level refinements as well.

Involvement of stakeholders in assessing risk

4.11 While working within a consistent national framework for assessing risk, it is important that stakeholders have an input into the assessment of risk, particularly at more local levels. This input will serve to refine the risk assessment and will feed back into the national level assessment of risk. Finding a balance between the national framework and providing flexible

arrangements for local stakeholder input into decision-making will be key to the delivery of this strategy.

4.12 It is also important that stakeholders have an understanding of the consequences part of the risk assessment. This means that risk assessments must be expressed in ways that will promote understanding by all parties and enable all those affected to take appropriate decisions. This might be an individual deciding whether to purchase a property or invest in individual protection, or an insurance company evaluating its overall exposure to natural hazards. The arrangements for stakeholder involvement are discussed later in this Section, from paragraph 4.38 onwards.

New funding arrangements for the Environment Agency

4.13 The changes in funding arrangements announced by the Government in 2003, following a review of funding and administrative arrangements, and being implemented with effect from April 2004, place more responsibility for flood risk management on the Environment Agency and should facilitate the process of developing a consistent risk-based approach. Under the new arrangements the Environment Agency will receive most flood management funding direct from Defra as grant in aid. This will replace the previous arrangements under which most funding was obtained by a levy on local authorities (for which local authorities received funding support from central Government). The new arrangements will give the Agency more predictable funding streams and more flexibility to consider the most appropriate ways of spending money to manage risk, whether by regulatory action, new defences, maintenance of existing assets or other approaches to focus on areas of greatest risk. Defra will be working with the Environment Agency to put in place Output and Performance Measures, which will allow such flexibility and provide meaningful targets and transparent assessment of the Agency's performance in managing national risk and delivering best value for money.

4.14 Defra and the Environment Agency are working together to address the issues raised in the Gershon Efficiency Review[15] and will be following very best practices to ensure that outputs represent best value for money. The Environment Agency's efficiency strategy will be looking at a number of areas, including superior procurement (reducing the unit cost of goods), asset utilisation and delivery.

Risk-based prioritisation of action

4.15 More comprehensive, consistent and reliable assessments of risk will provide the driver for improved prioritisation of risk management actions. Areas of potential action could be prioritised by reference to the contribution that could be made to risk reduction, using a consistent national methodology for measuring risk. This would over time replace Defra's present scheme-based

[15] Gershon (2004), *Releasing resources to the front line: Independent review of public sector efficiency.* Available at http://www.hm-treasury.gov.uk/media//879E2/efficiency_review120704.pdf

prioritisation system[16] which is the current mechanism used to determine the relative priority to be given to a range of potential schemes, in order to make best use of available funding.

Further details about the current risk assessment and prioritisation procedures are available as part of a package of further background and technical documents to accompany this consultation exercise via the Defra website www.defra.gov.uk/environ/fcd/strategy/policy.htm

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Question 4.1: Do you agree that as part of the agenda for implementing a robust and transparent system under this new strategy:

a. We should continue with work to put in place a multi-level strategic framework for assessing risk in a nationally consistent way?

b. That the assessment of risk at all levels should take account not just of economic damage but of environmental and social factors as well?

c. That the assessment of risk should involve stakeholders at all levels?

d. That the national system of risk assessment should be the driver to secure the most cost-effective risk management action on flooding and coastal erosion, including prioritisation?

Widening the basis for assessing risk and appraising projects so that it takes further account of all three pillars of sustainable development: economic, environmental and social

4.16 Defra at present works to the fundamental principle that action to manage risk should only proceed if the benefits that will flow from that action are greater than the costs. This new strategy maintains that principle. There are, however, issues around how costs and benefits are measured.

4.17 Defra has published detailed guidance on the appraisal of potential schemes for the management of risk[17]. The aim is to provide a consistent basis for comparing the reduction in consequences a scheme would achieve with the costs of achieving that reduction. The guidance adopts the general approach that the positive and negative impacts of a scheme need to be expressed using a common value base. Money values are the commonly accepted base, and the approach in the current guidance is generally that this base

[16] http://www.defra.gov.uk/environ/fcd/policy/grantaid.htm#AnnexB
[17] This is the Project Appraisal Guidance (FCDPAG) series. Further details available from http://www.defra.gov.uk/environ/fcd/pubs/pagn/default.htm

should be used where possible, with appropriate monetary values (or acceptable surrogates) being encouraged for most flooding impacts, including environmental values and social values, for example those relating to human stress. Further guidance covering Defra's current policy on socio-economic equity in flood and coastal defence appraisal has recently been published[18].

4.18 Defra has long acknowledged that an approach to appraising schemes based solely on monetary values is rarely comprehensive. The present appraisal guidance encourages non-quantifiable factors (for example, intangible environmental or social benefits) to be taken into account in circumstances considered by the guidance to be appropriate. The challenge for the period of this strategy is to build on existing approaches so that there is a better framework for taking account of non-quantifiable impacts in practice, and to apply these to all levels of risk assessment. It is, however, essential that any new frameworks continue to provide a consistent basis for comparing risk and schemes on a national basis.

4.19 For scheme appraisals, Defra is currently sponsoring research into the development of multi-criteria approaches[19]. More formal adoption of these approaches will allow greater, and more consistent, account to be taken of non-quantifiable aspects of an environmental or social nature. It is likely that future multi-criteria approaches will include the use of appraisal summary tables to provide a general basis for summarising and comparing the impacts of all options. The basis needs to be transparent and consistent. It is likely that new approaches will need to be piloted before being rolled out more generally. In working on the new arrangements Defra will bear in mind the need for guidance on scheme appraisals to be understandable and user-friendly so that it can fulfil its purpose as an effective decision support system and working tool to be used by all practitioners.

Further details about the principles of project appraisal, including multi-criteria approaches, are available as part of a package of further background and technical documents to accompany this consultation exercise via the Defra website www.defra.gov.uk/environ/fcd/strategy/policy.htm

A further background paper explaining approaches to flood and coastal defence is available as part of a package of further background and technical documents to accompany this consultation exercise via the Defra website www.defra.gov.uk/environ/fcd/strategy/policy.htm

[18] Defra (2004), *Supplementary note to operating authorities: Reflecting socio-economic equity in appraisal: appraisal of human-related intangible impacts of flooding.* http://www.defra.gov.uk/environ/fcd/pubs/pagn/fcdpag3/default.htm

[19] Project reference FD2013. Further information available via http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=FJPProjectView&Location=None&ProjectID=10734#Description

Question 4.2: Do you agree that the methodology for dealing with scheme appraisals should be developed as proposed using multi-criteria approaches to take better account of non-quantifiable aspects?

Question 4.3: Do you have any alternative approaches to suggest?

Question 4.4: If you are a practitioner or have used the existing Defra guidance on scheme appraisal:

a. Do you have any comments on the general level of detail, format or presentation?

b. Do you find the guidance user-friendly and effective as a decision-making support system?

c. Have you any suggestions on how the format might be made more effective so that the guidance is easier to use and understand?

Sustainable rural communities

4.20 In the Strategy for Flood and Coastal Defence published in 1993 a priority was specifically given to urban areas over rural ones. This followed from the emphasis placed on the protection of human life and property, and hence on those parts of the country where large numbers of people live and work. That priority has already been removed from the system Defra uses to prioritise potential schemes, and schemes in rural communities are now evaluated on the same basis as urban ones.

4.21 It remains the case that because of the concentration of people and economic assets in urban areas it is often possible under the existing arrangements to justify higher standards of defence in more intensively developed urban areas compared to rural ones where there is less development. The Government's policy is to promote Sustainable Communities in both urban and rural areas, and it is therefore a question of ensuring a proper balance is struck. Deprivation issues arise, for example, in both urban and rural areas. Nevertheless, how flood management and coastal erosion solutions are implemented can impact on a number of areas relating to Defra's strategic priority of Sustainable Rural Communities. It therefore appears desirable that future arrangements for assessing risk and appraising options for dealing with that risk can adequately take account of the advantages and disadvantages relating to rural communities, including those that are not capable of being expressed in monetary terms.

4.22 It is also important to encourage and promote joint working between those responsible for flood management and the rural development agencies. Where undeveloped space is available (and this will often be in rural areas) there may well be significant benefits to the environment, the landscape, and consequently to human amenity and recreational activities, if rivers and floodplains are allowed to re-establish a more natural function with less management intervention.

4.23 In developing multi-criteria approaches Defra will continue to work on ways of better reflecting the costs and benefits to rural communities.

Question 4.5: Views are requested on factors relevant to sustainable rural communities that might be included in multi-criteria approaches, and on any alternative approaches that might be adopted to take account of sustainable rural communities, whilst continuing to take appropriate account of urban communities.

Climate change in risk assessment and project appraisal

4.24 The Foresight Flood and Coastal Defence Project has confirmed the conclusion of previous studies funded by Defra and others that climate change is a major driver of future flood and coastal erosion risk. The Government will continue its policy of encouraging measures to mitigate climate change while recognising that the long response times in the climate and ocean systems mean that mitigation actions will have little impact on drivers over the next half century.

4.25 Current Defra guidance on the consideration of climate change in project appraisal[20] aims to strike a balance between precaution and commitment of expenditure to potentially unnecessary works. It is also designed to encourage a consistent approach so that allocation of funds between projects is not biased by different approaches to precaution.

4.26 Since the 1980s guidance on project appraisal has recommended the use of allowances for rates of future sea level rise over the coming 50 years. These are intended to take account of both predicted global mean sea level change and continuation of long term geological land movements. Nevertheless, uncertainties remain in relation to the prediction of future extreme levels, largely due to potential changes in storm surge occurrence. Different climate models give very different predictions for the future development and propagation of surges around the coast and these differences are unlikely to be resolved in the near future.

4.27 In the case of flood risks from rivers and future offshore wave activity, the Defra guidance takes a somewhat different approach. This reflects the uncertainty in current predictions and recommends inclusion, in the sensitivity

[20] http://www.defra.gov.uk/environ/fcd/pubs/pagn/Climatechangeupdate.pdf

analysis applied to project appraisals, an assessment of the impact of progressively increasing peak river flow estimates over the period to the end of the century by up to 20 per cent to reflect both climate change and other considerations of uncertainty. For coastal projects, sensitivity testing of up to 10 per cent additional offshore wave height has more recently been recommended, although in most cases the main determinant of wave impact on coastal structures is the depth of water at the shoreline.

4.28 The Foresight Flood and Coastal Defence Project assumed a range of changes in river flood flows in different areas of the country ranging from reductions in some areas to significant increases elsewhere. More recent research has shown that the potential changes depend on a range of factors including geographic location and catchment scale.

4.29 All aspects of uncertainty should be recognised and climate change effects are likely to be different in different parts of the country. The current Defra position is that sensitivity testing (which should be part of a wider sensitivity analysis embracing other uncertainties in both the current analysis and future predictions) should enable project developers to consider whether alternative approaches are more or less resilient to potential change, and should provide a basis for promoting those solutions that are less sensitive to future uncertainty. Foresight has drawn attention to the fact that reversible and adaptable measures are likely to be more robust against future uncertainties. It is therefore appropriate to ensure that wherever possible the flood and coastal erosion risk management measures put in place can be upgraded or adapted in the future, should developments in knowledge make this necessary.

4.30 Defra and the Environment Agency will continue to sponsor research with a view to keeping all recommendations on climate change impacts under review as confidence in model predictions and understanding of the underlying processes improve.

4.31 Defra will also review its current guidance to see if amendments are needed further to encourage reversible and adaptable management measures. An example of this might be the provision of increased foundation widths to accommodate future raising of the height of defences.

Question 4.6: Do you agree that the present approach to climate change is appropriate, and if not can you identify alternative approaches and the benefits that they would provide?

Question 4.7: Do you agree that Defra should review its guidance to see if further encouragement can be given to the adoption of reversible and adaptable flood management and coastal erosion solutions? Can you identify ways in which those undertaking risk management activities can be given further encouragement to adopt resilient and adaptable flood management and coastal erosion solutions?

"Indicative" standards of protection

4.32 Defra publishes "indicative" target standards of protection, expressed in terms of the probability of flooding and coastal erosion, as an integral part of guidance on project appraisal[21]. The standards are not intended to be prescriptive or establish expectations for protection. They are intended to ensure that, in the interests of equity, there should be a less stringent test to achieve the lower standard for each broad land use category than to invest further funds in improvement within the range. They impose a higher test for improvements above the upper range. The actual standard of protection afforded by a particular scheme will depend on what is judged to be the most appropriate solution following a full appraisal of alternatives, including detailed comparison of costs and benefits for each option (both of which are to be measured in a way that reflects all three pillars of sustainable development). The approach is designed to achieve a more equitable and effective distribution of available funding to manage overall risk, and the end result in each situation may be actual thresholds of flooding that are lower or higher than the indicative standard for the land use in question.

4.33 The Government intends to review indicative standards in one respect. This reflects a recognition that the equating of standards for designated environmental areas with those for development is misleading. This will be reviewed in consultation with English Nature to reflect better the real vulnerability of such sites. The Government does not otherwise propose fundamental changes to the current arrangements on indicative standards.

4.34 The National Assessment of Defence Needs and Costs (see paragraphs 2.17-2.18 of Section 2) indicates that improving defences by 2015 to the higher indicative standard levels where justified would be likely to cost the equivalent of year-on-year increases of more than £15 million in real terms.

4.35 The indicative standards system relates to protection against the probability of flooding and coastal erosion events. Other sections of this consultation document set out proposals for managing consequences.

[21] This is contained in FCDPAG3: Economic appraisal. Available from Defra by quoting PB 4640 and via http://www.defra.gov.uk/environ/fcd/pubs/pagn/fcdpag3/default.htm

Question 4.8: Do you agree that the current system of indicative standards should continue?

Question 4.9: Do you have any modifications to propose? If so, please identify the benefits and how implementation of the changes should be funded.

Consistent standards within the same community

4.36 The present arrangements can result in actual standards of protection that are different for different parts of the same community. This is because a community may contain a number of different "flood cells". (These are defined as separate areas which are largely independent for the practical purpose of evaluating and managing flood risk. For example, one bank of a river in a town can be in a different flood cell than the other bank.) In the light of concerns about the equity of this approach, Defra and the Environment Agency have commissioned research to investigate alternatives to the current approach that might provide more consistent standards, and to identify the advantages and disadvantages of adopting such approaches. The project has explored these issues through a number of case studies focussed on areas where concerns about inconsistency have been raised in project appraisal.

4.37 The full report will shortly be available on the Defra webpages[22].

Question 4.10: Views are welcome on this report together with any suggestions for taking the work forward.

Involving stakeholders in the assessment of risk and the appraisal of scheme options

4.38 Stakeholder engagement and consultation is an essential part of the process for assessing risk and the options for managing it.

4.39 Risk assessment and examination of options for managing risk need to take place at the four levels set out in Figure 4 above. The lower and more local the level the more appropriate and feasible it becomes to produce more refined assessments that reflect economic, environmental and social realities.

[22] Defra/Environment Agency Flood & Coastal Defence R&D Programme (2004), *The advantages and disadvantages of adopting consistent standards for communities,* R&D technical report. Project reference FD 2009. Will be available via http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=FJPProjectView&Location=None&ProjectID=10467#Description

These refinements should in turn feed back into risk assessments at the higher levels. But the assessments should all take place within the nationally consistent framework.

4.40 Given that strategic planning for managing flood and coastal erosion risk will be part of the planning matrix which includes River Basin Management Plans (see Figure 2 in Section 3), it seems desirable that the arrangements for stakeholder involvement in the former are consistent with and complementary to those put in place for the latter. The Environment Agency are currently developing a Water Framework Directive public participation strategy, within a common European implementation framework, and Defra will work with the Agency to ensure that thinking on stakeholder involvement in flood and coastal erosion risk is taken forward in a way that produces joined-up arrangements and minimises the risk of "consultation fatigue". This will allow convergence over time between the existing flood management/coastal erosion consultation arrangements and those to be put in place under the Water Framework Directive.

4.41 There is also ongoing work to develop alternative stakeholder engagement models for Shoreline Management Plans, which will help further approaches to stakeholder engagement.

4.42 Subject to that ongoing work, a possible future framework for stakeholder involvement might be as illustrated overleaf in Figure 5.

Further background information about the principles of stakeholder engagement and consultation is available as part of a package of background and technical documents to accompany this consultation exercise via the Defra webpage www.defra.gov.uk/environ/fcd/strategy/policy.htm

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Question 4.11: Do you agree that the involvement of stakeholders in assessing risks and management options should be in the context of an agreed national framework?

Question 4.12: Do you have comments on the suggested mechanisms for involving stakeholders at each level of risk assessment?

Figure 5: A possible framework for stakeholder engagement in flood and coastal erosion risk management decision-making

Level of plan	Output	Purpose of output	Means of stakeholder engagement
National level	**National policy:** England-wide assessment of flood and coastal erosion risks and management arrangements	To inform high-level policies and levels of national funding	• Flood Management Stakeholder Forum: run by Defra for key stakeholder organisations • Meetings of Environment Agency's Regional Flood Defence Committees chairs • Meetings of the Coastal Forum: for Coastal Group chairs • National consultation exercise on the development of this new strategy • Subsequent national consultation exercises related to flood and coastal erosion risk management
Catchment level: river catchment / coastal sediment cell or sub-cell	**Regional policy:** Catchment flood / shoreline / estuary management plans	Define risk, identify regional priorities and management objectives, short and long term	• Regional Flood Defence Committees • Consultative fora led by Environment Agency, with involvement of local authorities and Internal Drainage Boards, and local interests • Coastal Groups
Sub-catchment level: Linked groups of major sub-catchments / coastal process units	**Appraisal of options:** Long-term strategy for the area	Further refinement of risk assessments and of management options	• Regional Flood Defence Committees • Consultative fora led by Environment Agency, with involvement of local authorities and Internal Drainage Boards, and local interests • Coastal Groups • Local stakeholder engagement fora
Scheme level: Management units / individual schemes	**Implementation:** Decisions on individual schemes	Further refinement of risk and selection of detailed management solutions	• Regional Flood Defence Committees • Consultative fora led by Environment Agency, with involvement of local authorities and Internal Drainage Boards, and local interests • Coastal Groups • Local stakeholder engagement fora

Other impacts of the Water Framework Directive on scheme selection and appraisal

4.43 The Water Framework Directive[23] is not only relevant to the arrangements for stakeholder involvement. Over the life of this strategy the Directive will play an increasing role, both in the case of new defences and in the maintenance or upgrading of existing defences. Although it is anticipated that many water bodies which are currently affected by flood or coastal erosion defences will be classed as "heavily modified", the effect on the water environment of both those works and proposals for new works will have to be considered by reference to the environmental objectives set under the Directive.

4.44 Where new flood or coastal erosion measures are needed, they may still be justifiable even where they would have significant adverse impacts on the water environment in relation to those objectives. For example, they may have an over-riding socio-economic benefit, such as the protection of human life or property. In such cases the Directive does allow for exceptions to be made to the objectives of "good ecological status" or "good ecological potential" that would otherwise apply.

4.45 It is clear, however, that such exceptions may be time-limited. The plans that must be established under the Directive - River Basin Management Plans - are subject to periodic review, and so in some cases the grounds for making exceptions for heavily modified water bodies may, at some point in the future, be found no longer to apply. The requirements of the Water Framework Directive will therefore always need to be considered when planning long-term flood and coastal erosion risk management measures.

4.46 The Directive will be a strong driver towards selecting solutions that work with the natural processes of rivers and the sea. Flood management is unlikely to be shown to have significant impact on chemical water quality except in instances such as dredging or maintenance where sediment is released. Greater significance is likely to be as a result of changes to the morphology (structure) of water bodies by channel works such as straightening, deepening, bank works, including flood walls and water level and flow management where these differ from the natural state. Changes in flow pattern (either greater peak flows or reduced base flows) can have a significant impact on quality and ecological potential.

4.47 The direction of current policies outlined in this strategy, towards working with natural processes and in sustainable ways should help flood management to be compatible with the objectives of the Water Framework Directive.

[23] http://www.defra.gov.uk/environment/water/wfd/index.htm

A further background note on the Water Framework Directive and flood and coastal erosion risk management is available as part of a package of further background and technical documents to accompany this consultation exercise via the Defra website
www.defra.gov.uk/environ/fcd/strategy/policy.htm

Section 5: Strengthening the sustainable approach: rural land use and managed realignment of floodplains and the coast

5.1 The previous section set out the general approach to the assessment and management of risk that is proposed for the new strategy. This section gives more detail on how we might build on what has been done to date, particularly in the context of rural land use and managed realignment, so that aspirations in relation to sustainable development are realised.

Making space for water

5.2 A more sustainable approach to flood and coastal erosion risk management requires a further move towards integrated portfolios of responses. More sustainable approaches to floodplain management in rural areas can help protect urban areas from flooding. On the coast, healthy intertidal habitats can help reduce the cost of protecting assets at risk.

5.3 The creation of wetlands and washlands, river corridor widening and river restoration have all been suggested as potential mechanisms for reducing flooding in the lower reaches of catchments. The use of constructed washlands in reducing flooding is well understood. The benefit of abandoning or removing river flood banks in rural areas as a mechanism for reducing flooding in other areas is less widely acknowledged. This may, however, be an important and cost effective mechanism in certain locations.

5.4 Setting back flood banks to allow a river more space can also be effective in reducing flood risk by increasing flow rates past sensitive sites. The flood benefits of river restoration techniques such as reintroducing meanders and variable bed morphology are less clear.

5.5 Flood management options that include setting back river banks or increasing flooding in rural floodplains often have an impact on farming. In recognition of this, the inundation grassland option of the Environmental Stewardship scheme[24] provides payments to farmers who accept additional flooding on their land. These payments can be made, for example, where river banks are set back or breached to allow more natural flooding regimes. The Environmental Stewardship scheme also includes a range of other wetland habitat creation options (for example, wet grassland, reed bed and swamp habitats) that may help in establishing washlands and other floodplain wetlands which may in turn assist in flood risk management.

5.6 Flood and coastal management and nature conservation are closely linked and interdependent. Works can have a major impact on coastal and river form which determines the habitats and species that can survive in any given location. In certain circumstances creating new habitat will provide flood management benefits, for example creating a new area of inundation

[24] http://www.defra.gov.uk/erdp/reviews/agrienv/default.htm#ESS

grassland, or a salt marsh habitat in front of realigned sea defences. A less interventionist approach to flood management and coastal protection together with more reliance on natural processes will best promote sustainable development. In this context, it is worth recalling that a good deal of the land in floodplains will once have been marsh or wetland. Although the nature of subsequent development and use may preclude a return to a fully natural system, realignment of river corridors and shorelines, and restoration of natural processes, will be a key option to be considered in all cases. In this way, flood management and coastal protection activities will make a contribution to:

- Maintaining the overall integrity of Natura 2000 and Ramsar sites
- The PSA target to have 95 per cent of SSSIs in favourable condition by 2010
- Delivering Biodiversity Action Plan targets
- Implementing the actions in the England Biodiversity Strategy.

5.7 Flood and coastal risk management activities at all levels will comply with the requirements of the Habitats and Birds Directives. Application of the Directive on Strategic Environmental Assessment will, in addition, ensure consideration of other important environmental issues such as the protection of heritage assets and landscape character.

5.8 Government funding for maintenance of existing defences will only take place where the costs are justified by the full range of benefits provided by the defences, within the framework set out in Section 4. The recent paper *Maintenance of uneconomic sea defences: a way forward* published by Defra in April 2004 clarifies Government policy[25].

5.9 In assessing costs and benefits we will take full account of archaeological and other heritage assets where these could be adversely affected by abandonment or realignment of defences. This is likely to be a particular issue in estuaries. The impacts and the options for mitigation will be fully considered in all cases where the issue arises.

A background note which discusses payments to individuals and relocation issues in relation to flood and coastal erosion risk management is available as part of a package of background and technical papers to accompany this consultation exercise via the Defra website www.defra.gov.uk/environ/fcd/strategy/policy.htm

Managing flood risk to agricultural land behind existing flood defences

5.10 From a broad national-level assessment, we estimate that up to 0.5 million hectares of agricultural land are currently behind potentially non-viable flood defences and are therefore possible candidate areas for restoration and

[25] This is available via http://www.defra.gov.uk/environ/fcd/policy/unecseadef.htm.

realignment policies[26]. The loss of agricultural land will enter into the assessment of such options, and will form part of the full range of consequences – which might also include environmental gain – which will be taken into account on a case-by-case basis, having regard to the three pillars of sustainable development. Decisions will also need to be reasonable insofar as their effect on the individuals directly affected are concerned, and individuals will be given adequate notice of the intention to cease public maintenance or to realign, as well as the opportunity to make representations.

5.11 Where a sea defence is abandoned and overtopping and breach of defences affects farmland, payments to offset income foregone may be available through the Environmental Stewardship agri-environment scheme. Through Environmental Stewardship, agri-environment payments will continue to be available to landowners who wish to create intertidal habitats through managed realignment. Good communication will be required between the Environment Agency, national and regional programming bodies and agri-environment advisers to ensure a strategic approach to agri-environment incentives which contributes effectively to delivery of sustainable defences.

Question 5.1: Do you agree that approaches that work with natural processes to provide more space for water should be identified and pursued wherever possible within the framework set out in Section 4?

Question 5.2: Do you have comments on the realignment policy proposed above?

Creating new, high quality habitats

5.12 Withdrawal of public maintenance of defences may not in itself lead to creation of new habitats. Where habitat creation is needed, we will seek to implement specific measures (such as land purchase or securing an agreement with the landowner).

5.13 Some coastal freshwater Natura 2000 sites are protected by sea walls. Withdrawal of public maintenance and realignment will not usually be appropriate options in such circumstances. However, in some cases it may be clear that continued protection of such sites is not sustainable. Where a decision to withdraw maintenance of - or to realign - a sea wall is likely to have adverse impacts on a Natura 2000 site, compensatory habitat will be created in compliance with the Habitats and Birds Directives. It will be appropriate also in some other cases to use managed realignment to create new intertidal habitats where existing intertidal habitats are lost due to

[26] This should be interpreted in the context of a total agricultural area in England of approximately 14 million hectares, of which about 1.3 million hectares falls within the indicative floodplain.

maintenance of existing defences. This may be necessary to comply with the requirements of the Birds Directive, and will contribute to Biodiversity Action Plan targets for habitat replacement, and to the PSA target to have 95 per cent of SSSIs in favourable condition by 2010. (See paragraph 5.6 above.) Identifying and purchasing land for these purposes can be time-consuming and difficult. The Government will therefore encourage a strategic approach to these activities through the establishment of Habitat Creation Programmes.

5.14 On rivers, setting back flood defences can create new wetland habitat if accompanied by appropriate land use changes. Alternatively, if considered as part of a flood protection solution flood defence benefits may be more substantial if riverbanks are raised to create a washland into which excess water is temporarily directed during floods. This may also create biodiversity benefits provided that the washland is designed and managed with wildlife in mind. Defra has produced, in agreement with other Governmental partners, a paper *Wetlands, Land Use Change and Flood Management - A Jointly Agreed Paper*[27] on the use wetlands and washlands can play in flood management activities. There is also a report available of a joint English Nature/Defra washlands project, entitled *Integrated Washland Management for Flood Defence and Biodiversity*[28]. This project illustrates the complex relationship between reinstating fluvial wetlands, flood storage washlands, biodiversity and flood risk management.

5.15 The adoption of realignment and restoration solutions for rivers and coasts will also make a contribution to meeting the objectives of the Water Framework Directive. (See paragraphs 4.43 to 4.47 of Section 4). The Directive is likely to require some work to return rivers and coasts to a more natural state, for example by improving the river channel profile and improving river margins by setting back defences.

5.16 Restoration of flood plains as part of flood management solutions is also likely to have beneficial effects for diffuse pollution in the context of the Government's Strategic Review of Diffuse Water Pollution from Agriculture. There is some emerging evidence wet meadows can be very efficient nitrate eliminators, and research is currently under way about the potential role of wet meadows in absorbing phosphorus. Unless water quality is adequate, wetland habitat creation will not result in better biodiversity.

Delivery and process

5.17 In order to ensure that flood management and coastal protection solutions consistent with the approach set out above are selected and implemented, it is proposed that the Environment Agency should put in place minimum targets for habitat creation in each of its region's annual programmes. These would set out how a contribution is to be made to Biodiversity Action Plan targets by specified habitat types (for example, salt marsh, reed bed, and wetland grassland). Minimum standards and targets for habitat creation would be

[27] This is available via http://www.defra.gov.uk/environ/fcd/policy/Wetlands/default.htm
[28] Further information available via http://www.silsoe.cranfield.ac.uk/iwe/projects/washlands/

agreed with the Environment Agency as part of the discussions on their Corporate Plan, and would be included in the output and performance measures linked with payment from Defra to the Agency of grant-in-aid for flood management.

Question 5.3: Do you agree that targets for wetland habitat creation to fulfil Biodiversity commitments should be put in place as proposed above?

5.18 A key element in the successful implementation will be the process outlined in Section 4 of this strategy. The process needs to have a firm focus on the need to give priority to finding solutions that manage flood and coastal erosion risk in a way that works with natural processes, promotes nature conservation and contributes to other Government objectives. Such solutions will not be possible in all cases, but the scope for them will always be actively considered. The Environment Agency will take on board the lessons from a pilot project currently looking at these issues in the Laver and Skell catchment, North Yorkshire.

5.19 The Laver and Skell catchment multi-functional pilot project at Ripon in North Yorkshire will consider how different funding streams can be used to provide wider benefits than can be justified through flood defence expenditure alone. The Project Officer will work with the Environment Agency, which is developing a traditional flood defence scheme to reduce flood risk in Ripon. This scheme includes the provision of upstream flood storage.

5.20 One issue to be investigated is whether agri-environment schemes that may reduce run-off rates can be targeted in the upper parts of the catchment, and whether this has a long-term impact on flow rates in the river. The possible role of afforestation in reducing flood risk in Ripon will also be considered.

5.21 Through the pilot project, we are hoping to learn which funding streams can help deliver more sustainable approaches to flood risk management, and whether wider biodiversity and amenity gains can be achieved through such an approach.

5.22 To deliver multi-functional schemes, all the potential funding streams - Governmental, non-Governmental and European - that could be brought into play will need to be considered. There are a wide variety of such funding streams. In addition to the potential sources of funding mentioned earlier, there will be a need to investigate funding from non-governmental bodies and from local authorities (for example, on amenity benefits). Public/Private Partnerships (PPP) may also be used in circumstances where it is considered that this would be advantageous.

5.23 We do not believe it is realistic to contemplate a merger of such streams at the national level. The precise mix of these separate funding streams can therefore only be determined on a case-by-case basis. Hence the need for the establishment of robust principles and a robust process in all cases.

Section 6: The role of rural land management

The present state of knowledge

6.1 The impact of rural land management is an area where research is on-going, including as part of the First Soil Action Plan for England published in 2004. As noted in the report of the Foresight project, a recent major research study showed that there is substantial evidence that current rural land management practices, such as cultivation practice, have led to increased surface runoff at the local scale. For example, work on maize has shown that simple straightforward changes to crop husbandry can dramatically reduce infield runoff as well as providing a range of other on-farm and environmental benefits.

6.2 The Foresight report noted, however, that there is a general absence or uncertainty of evidence of the impacts at the catchment scale. There is also a lack of knowledge of how small scale impacts combine at larger scales. It is likely that it will be difficult to observe any impact on flow rates and volumes unless there are either widespread changes in land management practices or changes are targeted at particularly harmful practices.

Promoting changes in land management practices where they can have an impact on local flood risk

6.3 The Government has included flood management as a secondary objective in its Environmental Stewardship scheme[29]. Under the scheme, options that contribute to flood management will be adopted where they contribute to one or more of the primary objectives of the scheme which relate to biodiversity, resource protection, landscape and the historic environment. For example, options designed to create new grassland habitat on existing arable land will reduce soil erosion and may well reduce runoff by improving water retention.

6.4 The new Single Payment under the Common Agricultural Policy (CAP) reform will be linked to cross compliance conditions to come into effect in 2005[30]. These include standards of Good Agricultural and Environmental Conditions in relation to protection of soils. The Government have decided on an evolutionary approach which will in due course move to the production by each farmer of risk-based soil management plans. We expect the plans to have the potential to result in local benefits for the control of water run-off from soils.

Other action

6.5 The Government will be monitoring the effects on flood risk management of the above measures and more generally of the Single Payment arrangements under the reformed Common Agricultural Policy, so as better to assess the

[29] http://www.defra.gov.uk/erdp/reviews/agrienv/default.htm#ESS
[30] http://www.defra.gov.uk/farm/capreform/index.htm

potential benefits of extensification for flood risk management. The Government will undertake further research into the role rural and management techniques might play in managing flood risk at catchment level. In the light of the outcome of that research, the Government will further review the position. In the meantime, where land management practices can form part of a flood management solution, and where funding is available under the schemes mentioned above, these will be encouraged. Where funding from these sources is not available, the Government does not at present propose that separate funding should be made generally available from flood management budgets. It does, however, leave open the possibility that funding might be available to encourage extensive land management techniques as part of any integrated drainage management pilot, should it be decided to proceed with such pilots. (See Section 8.)

6.6 Currently only limited quantification is available of the impacts of woodland creation on the management of flood risk. Where estimates have been made they suggest that a very significant proportion of a catchment would need to be planted to give a significant reduction in flood flows. There is also some evidence that carefully sited planting can have an effect on flow rates, and this will be considered when wider catchment management issues are being considered.

Question 6.1: Do you have any comments on the approach to rural land management proposed above?

Water level management plans

6.7 Water level management regimes have been developed over the years. In the first instance, floodplain wetlands were drained for agricultural purposes. By 1980, nearly all wetlands had been drained. More recently, operating authorities have sought to manage water levels in a way that is more sensitive to wildlife. Some wildlife habitats are critically dependent on local water levels, and more than 500 Sites of Special Scientific Interest (SSSIs) are at least partly dependent on water level management for their effective management.

6.8 Drainage of floodwater from agricultural land in the floodplain, and water level management for agriculture and nature conservation, will continue to be important issues in the future. In the past, the emphasis of water level management has been on reconciling these different interests. However, guidance issued in 2000 confirmed that nature conservation issues must be central to the plans for SSSIs.

6.9 Achieving favourable condition of SSSIs through water level management will often require changes in land-use. The wetland options in the Environmental Stewardship scheme are designed to encourage landowners to change water level regimes to benefit biodiversity, and close integration of the activities of

operating authorities and promoters of agri-environment schemes will be required to ensure favourable outcomes.

6.10 Water level management infrastructure such as pumps and sluices is often old and in need of replacement. When replacement is required in SSSIs, it will be important to ensure that design and future use are compatible with favourable condition of the site.

6.11 The Government will continue to provide guidance on water level management plans. Defra and English Nature are currently completing a report on Water Level Management Plans and favourable conditions of SSSIs, and the recommendations in this report will consider what further steps may be needed to contribute to the PSA target.

Question 6.2: Do you agree with the suggested approach of using water level management to bring SSSIs into favourable condition?

Section 7: Measures to reduce flood risk through land-use planning

7.1 The land-use planning system regulates development and the use of land in the public interest. It covers issues related principally to the location, layout and appearance of new development. Design issues not related to external appearance are matters for the Building Regulations. The Government is committed to ensuring that its development and planning policy seeks where possible to reduce, and certainly not to add to, the overall level of flood risk.

7.2 The Government has placed sustainable development at the heart of its vision for flood management and coastal protection. It has also placed sustainable development at the heart of the planning system through the Planning and Compulsory Purchase Act 2004. Flood risk is a key environmental factor of physical sustainability and the Government wants to ensure that there is continued integration of flood management issues into planning decisions, so that the optimum outcome is secured for sustainable development.

7.3 Over the period covered by this strategy there will continue to be a need to increase the overall housing stock. In February 2003 the Government [31]set out its ambition to deliver an additional 200,000 homes by 2016, over and above those then contained in national housing targets drawn up through Regional Planning Guidance. Much of this growth will be contained in the identified growth areas in London and the rest of the South East. These areas include the Thames Gateway and the three new growth areas of Milton Keynes/South Midlands, London-Stansted-Cambridge-Peterborough and Ashford. The Barker Review of Housing Supply[32] also concluded that the country's economic well-being could be improved by increasing the supply of housing, although consideration needed to be given to the associated environmental costs.

7.4 The Government's Sustainable Communities Plan recognises that, amongst other things, current and future potential flood risk must be addressed in order that the newly created communities are truly sustainable. In particular, it is important that the siting and design of all new developments factor in the need to improve flood resilience and allow for renewal of sustainable river's edge defences.

7.5 It is not appropriate to prevent all new developments in the mapped areas of flood risk. About 10 per cent of England - by land area, population and housing stock - is already within those areas. A significant proportion of the previously developed land suitable for housing and other regeneration and redevelopment is also within areas of higher flood risk. Extensive areas of

[31] ODPM (2003), *Sustainable Communities: Building for the future* http://www.odpm.gov.uk/stellent/groups/odpm_communities/documents/sectionhomepage/odpm_communities_page.hcsp

[32] Barker (2004), *Review of Housing Supply: Securing our Future Housing Needs, Final Report – Recommendations*, HMSO. http://www.hm-treasury.gov.uk/consultations_and_legislation/barker/consult_barker_index.cfm

land fall into high-risk zones, particularly in low-lying parts of eastern England, where alternative sites in zones of lower risk are not available for development. In such cases development may be needed to avoid social and economic stagnation or blight. The Government's aim is to ensure that development in flood risk areas takes place in a way that achieves the objectives relating to flood risk set out above.

The Government's approach to managing flood risk

7.6 Planning Policy Guidance (PPG) Note 25, published in July 2001[33], provides policy guidance on the consideration of flooding issues at all stages in the land-use planning process. It introduced a risk-based "sequential" test that gives priority to locating development in areas at lower risk of flooding. However, it recognises that there is much existing development within the high-risk zone (defined as areas where the annual probability of flooding is greater than 1 per cent and 0.5 per cent in the case of river and coastal flooding, respectively). PPG 25 advises planning authorities, when considering proposed developments in flood risk areas, to take account of the risks involved and to work towards ensuring that an appropriate minimum standard of protection will be in place for the lifetime of the proposed development. It advises that new housing should generally be protected against a flood with an annual probability of 1 per cent and 0.5 per cent for river and coastal flooding respectively.

7.7 PPG 25 is being reviewed over the next 6 to 12 months. The review is operating in parallel with this consultation exercise, and any stakeholder wishing to contribute to the review may do so by writing to:

PPG 25 Review Team
Office of the Deputy Prime Minister
Zone 4 / B2
Eland House
Bressenden Place
London
SW1E 5DU
minerals.waste@odpm.gsi.gov.uk
Please see the Planning homepage via www.odpm.gov.uk for more information.

7.8 The conclusions of this consultation exercise and of the resulting strategy will be taken on board in that review.

7.9 Monitoring of the operation of PPG 25 has shown that some development in high-risk zones, in particular housing development, has continued. Land-use change statistics from the Ordnance Survey indicate that over the last 5 years or so, about 9 per cent of the areal change to residential development, and

[33] Further information available via http://www.odpm.gov.uk/stellent/groups/odpm_planning/documents/sectionhomepage/odpm_planning_page.hcsp

about 11 per cent of new houses, were in flood-risk areas. (That is around the existing national proportions for those indicators.) This reflects in part the Government's policy of encouraging the re-use of previously developed land both as a tool of urban regeneration and to minimise the need for development of Greenfield land. For this reason and because of the Government's aims for the provision of increased housing, some development in flood risk areas will continue over the lifetime of the strategy. For example, most of the 120,000 houses proposed for the Thames Gateway will be sited in existing urban areas within flood-risk areas, as defined by PPG25.

7.10 Other things being equal, the siting of more properties in flood risk areas will increase the consequences should a flood occur, and thereby the overall level of flood risk. In order to achieve the aim of reducing, and certainly not adding to, the overall level of flood risk, the Government will seek to ensure that where developments take place in flood risk areas the risk is managed in ways that include:

- Putting in place, and maintaining for the lifetime of the development, protection measures to provide, as a minimum, the standards of protection specified in PPG 25. In deciding whether a higher standard of protection would be appropriate in some cases, the Government expects planning authorities to take account of the consequences should a flood event occur in spite of the protection measures;

- The provision of features, such as sacrificial areas, compartmentalisation arrangements, and other appropriate measures that can reduce the consequences of flooding should defences be breached or over-topped;

- The use of construction techniques that increase the flood-resistance and resilience of buildings. The Government has issued interim guidance on this. By lessening the degree of vulnerability to flooding these techniques and methods can reduce the consequences of flooding events if they occur. Section 12 discusses flood resilience and resistance measures in more detail.

Question 7.1: Do you agree with this general approach, and in particular are there any other possible mechanisms for managing flood risk through the land-use planning system?

The role of the Environment Agency

7.11 The Environment Agency plays a key role in managing flood risk. The Agency is a statutory consultee for some types of development and in some specifically defined situations, but this does not currently include areas of flood risk. The Government has recently reviewed the role of statutory consultees under the General Development Procedure Order 1995. The Office of the Deputy Prime Minister (ODPM) intends to consult on extending the Agency's statutory consultee role to all planning applications in areas

notified by the Environment Agency as at risk of flooding or likely to add to flood risk. This will ensure that the Agency has the opportunity to make any necessary representations on all cases of development in areas of flood risk. Currently there is no universal consultation in these cases despite advice in PPG 25 that it should take place. The creation of the statutory duty responds to this.

7.12 Flood risk is an important consideration in planning decisions. However, it is not the only consideration, and other material considerations may outweigh Environment Agency advice on flood risk. In such cases any adverse flooding impacts should be minimised. Nevertheless, the degree to which Agency advice is followed is a useful indicator of success in the management of flood risk.

7.13 Since the introduction of PPG 25, there have continued to be permissions granted against Agency advice, but both the number and proportion has reduced. The table below sets out the applications granted against Environment Agency advice for the years 2001/02 and 2002/03. These figures represent the number of applications not the total number of properties involved.

Figure 6: Planning applications granted against Environment Agency advice

Applications permitted contrary to Environment Agency advice*		
	2001-02	2002-03
1. Major applications**	50	24***
Of which		
Residential development	23	15
2. Minor applications	288	197

Notes:
** The figures in the table relate only to cases where notices of final planning decisions have been provided to the Environment Agency. Such notices are not always provided by planning authorities.*
*** Major developments are defined as developments in which the number of dwellings to be constructed is 10 or more, or the site area is equal to or greater than 0.5 hectares. Non-residential developments are defined as major if they involve a floor space equal to or greater than 1000m^2 or a site equal to or greater than 1 hectare.*
**** In 10 of these 24 cases the Environment Agency objected because no flood risk assessment had been submitted.*

7.14 The number of applications proceeding against the advice of the Environment Agency has therefore reduced. The Government will continue to monitor the figures. It is the Government's view that the Agency's advice should be given appropriate weight. However, other material considerations may be sufficient to outweigh flooding considerations in the interests of overall sustainable development. The Association of British Insurers have made it clear that it is

highly unlikely that insurance (and consequently mortgages) will be available for developments that proceed against the advice of the Agency, except at a level that could make them unaffordable to households. This is a powerful discipline on both house builders and those planning new communities.

7.15 However, if further monitoring indicates a significant reversal of the decline recorded above in developments proceeding against the Agency's advice, the Government will consider putting in place a standing planning Direction under article 14 of General Development Procedures Order 1995. This would provide, in cases where a planning authority proposes to proceed with approval of a development where there is a sustained objection from the Environment Agency, for reference to the First Secretary of State to decide whether it should be called in for determination by the First Secretary of State. Since call-in is not a trivial matter, this would provide a further discipline on stakeholders by ensuring that both the Agency's objections, and their consideration alongside other material considerations in local planning authority decisions, were soundly based. The Government consulted on the possibility of such a Direction when PPG 25 was being drawn up in 2001. The proposal received a mixed reception then and it was decided not to introduce it at that stage. The Government decided it would reconsider the issue in the light of evidence from the implementation of PPG 25.

Question 7.2: Do you agree that the Government should consider making a Direction as outlined above?

Flood risk assessments

7.16 The statutory Regional Spatial Strategies and Local Development Frameworks created under the new planning legislation need to take full account of current and future flood risks and incorporate the sequential approach envisaged in PPG 25. Those strategies and frameworks should be integrated with the flooding and coastal management planning arrangements (in particular, Catchment Flood Management Plans and Shoreline Management Plans) so that there is a full two-way interchange between the respective plan-making processes. Such interchange should ensure the best result for sustainable development. All levels of spatial and land-use plans will be submitted to Strategic Environmental Assessment which, in the case of the spatial strategies and the development frameworks, should include testing the development options they propose against relevant flood-risk scenarios.

7.17 Many local authority development plans already include appropriate flood-risk policies, which fully incorporate advice from the Environment Agency. In addition, a number of projects under the European INTERREG IIIB programmes with match-funding from ODPM are examining different aspects of the incorporation of flooding issues in spatial planning. Examples include projects involving work in Eastern and Southern England, the Parrett catchment in Somerset, and the Humber and Thames estuaries alongside the European partners to the projects.

7.18 The Environment Agency will continue to provide assistance to planning authorities. The Agency is currently preparing maps covering the flood zones defined in PPG 25. The Agency is also intending to produce maps showing the extent of flood defences and possibly the impacts of climate change. These will form important inputs into the preparation of Catchment Flood Management Plans, Shoreline Management Plans and the flood-risk assessments outlined below.

7.19 Those proposing development, whether local planning authorities through their local development frameworks or developers through planning applications, are advised in PPG 25 to assess the potential impacts of flooding on their development, and of their development on flood risk elsewhere. The Government has co-operated with other stakeholders in funding research by the Construction Industry Research and Information Association to produce guidance for the construction industry on development and flood risk, which includes a toolkit and technical guidance on flood-risk assessment. An ongoing Defra and Environment Agency research project is also aiming to develop a consistent approach and appraisal methodology for site-specific and strategic flood risk assessments[34].

7.20 The Planning and Compulsory Purchase Act 2004 includes the power to introduce a standard application form for all local planning authorities. ODPM has commissioned consultants to consider what should be included in a standard application form, in preparation for implementation of this power. The study is not yet complete and it will be the subject of separate consultation. However, emerging work identifies flood risk assessments as one of the supporting documents that could accompany the standard form which includes questions and guidance to ascertain whether such a flood risk assessment may be necessary. Inclusion of a flood risk assessment would not, however, be a statutory requirement, though the absence of a flood risk assessment would probably lead the Environment Agency to object to the application and might lead to a refusal of planning permission by the local planning authority.

[34] Further information is available via http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=FJPProjectView&Location=None&ProjectID=12015#Description. Project reference FD 2320.

Question 7.3: Do you have views on the arrangements described above, and on whether any changes are needed? The options that might be considered could include:

a. Retain the above arrangements. The Environment Agency would continue to provide information to planning authorities as well as advice on flood risk. There would, however, be no obligation on planning authorities to include flood risk assessments as part of Regional Spatial Strategies and Local Development Frameworks, and therefore be no guarantee that flood risk would be adequately covered in strategies and frameworks, or that the Agency would have sufficient information available to give advice. Similarly at the level of individual development proposals there would be no guarantee that flood risk assessments would be produced.

b. Make it a statutory requirement that Regional Spatial Strategies and Local Development Frameworks include flood risk assessments where they cover areas of flood risk, as defined by PPG 25. This would require primary legislation and would impose extra costs on local authorities. However, it would ensure that flood risk was adequately covered in strategies and frameworks, and that adequate information was available to the Environment Agency.

c. Make it a statutory requirement that individual planning proposals include flood risk assessments. This would also require primary legislation and would impose extra costs on developers and local authorities. The benefits would be in ensuring that flood risk was always taken into account, and in providing adequate information to the Environment Agency.

d. A combination of (b) and (c).

Paying for defences or other mitigation required under PPG 25

7.21 Where defences or other mitigation are required because of a development, the provision and future maintenance of such measures should be fully funded as part of that development. This helps to ensure that the true costs are borne by the developer and not passed on to society as a whole. The arrangements for this are set out in PPG 25.

Environment Agency procedures

7.22 In addition to the changes described above, the Environment Agency will be putting in place changes to its business planning and working procedures, as well as developing new tools, so as to add further value to its input into planning and development issues. The Agency will also be introducing new arrangements for analysing the quality of their input.

Section 8: Integration of drainage management in urban areas

The issue: potential benefits from integration

8.1 As identified in Section 1, flooding can occur from a number of sources: rivers, the sea and tides; run-off from impermeable surfaces and from saturated, frozen or compacted soil surfaces; sewers, and groundwater. All the different forms of flooding can occur in combination, and all can put pressures on the drainage systems, especially in built-up areas. Responsibility for addressing these various sources of flooding is spread over a number of bodies including the Environment Agency, local authorities, sewerage undertakers, highways authorities and private landowners. Furthermore some responsibilities can be unclear, for example in relation to sustainable drainage systems (see paragraph 8.28 below) and groundwater flooding (see Section 10).

8.2 This section addresses how there might be better co-ordination between the different bodies so as to achieve better overall management of "surface water" drainage. *Surface water drainage* is here defined as drainage of what is sufficiently clean as not on its own to count as sewage.

8.3 The Foresight Project on Future Flooding highlighted the risk of towns and cities being subject to localised flooding caused by the sewer and drainage systems being overwhelmed by sudden localised downpours. Foresight concluded that the potential damages could be huge, but also pointed to the great uncertainties surrounding this risk, and to the need to develop better modelling capabilities to predict flooding.

8.4 The case for integration of drainage does not rest only on the objective of better flood management. There are also potential benefits to water resource management, sewer flooding and to water quality, as discussed below. Addressing issues by reference to these different, but related outcomes is consistent with the integration aims of this strategy, as set out in Section 1. Consideration of co-ordination arrangements also needs to take account of new and more sustainable approaches to drainage, in particular sustainable drainage systems (SUDS).

Benefits for flood management, including sewer flooding

8.5 Flood risk, especially in built-up areas, can be managed most effectively if there is an understanding of the way floods arise and have an impact on the various drainage systems. Such an understanding should enable better use to be made of above ground pathways and storage for extreme events.

8.6 Although there is information available on the sewerage network, there is no comprehensive information currently available on the problems caused due to failures in the whole drainage system of a given region, and on the extent to which these could be mitigated by better co-ordination between responsible bodies. There is, however, evidence that drainage problems can cause

serious difficulties in particular localities, and there is also evidence of considerable support from practitioners for better integration of drainage management. This reflects a concern that the present arrangements may result in solutions being implemented which are sub-optimal from an economic, environmental, social and hydraulic viewpoint.

8.7 Better integration and management of drainage could also lead to a system of better information gathering, recording and provision. This would include work on better modelling for flood prediction purposes, to help fill the gaps in information identified by the Foresight project. The most pressing needs are:

- More complete records of the occurrence of flooding events from sources other than rivers, the sea and tides;

- Better information on flood risk from these sources to supplement the risk data being developed by the Environment Agency for river, sea and tide flooding, and to serve as a tool for prioritising actions to reduce risk; this might in due course lead to targets for reducing flood risk from sources other than rivers, the sea and tides.

- Examination of the feasibility of developing a more comprehensive flood warning system for flooding from sources other than rivers, the sea and tides; this would supplement the flood warning system in operation at present for river, sea and tide flooding.

8.8 Better drainage management could also help address sewer flooding (Sewer flooding is dealt with in more detail in Section 9.)

Benefits for water resource management

8.9 A second objective of more integrated drainage management is better utilisation of water resources. This is because there is considerable potential to recycle for further use water that is not sufficiently dirty to count as sewage. This could include harvesting relatively clean rainwater that runs off, for example, roofs of houses and hardstanding water. This could be used as a substitute for mains supplies or to recharge aquifers where appropriate to support baseflows in rivers or abstraction. The reuse of 'grey' water, for example as used for personal washing, may also have benefits in reducing volumes discharged to the fouls sewer. Its recycling depends, however, on its being kept separate from more polluted sewage flows.

8.10 Increased pressures from building development, as well as climate change, mean that better planning of water resources, and better conservation of water, are bound to become more significant objectives for the future.

Benefits for water quality

8.11 Thirdly, better drainage management can benefit water quality. Under the Water Framework Directive, River Basin Management Plans - with attendant programmes of measures - need to be completed across the country by 2009. A particular challenge in meeting the Directive's requirements is tackling diffuse pollution, from urban as well as agricultural sources.

8.12 Changes to drainage arrangements in any particular area can affect water quality either positively or adversely. For example, higher inputs of drained clean water into rivers or groundwater can reduce concentration of pollutants, which is beneficial; but certain diffuse urban, as well as agricultural, pollutants can make water quality problems worse. Defra has been consulting stakeholders informally about the different kinds of urban diffuse pollution and issued a consultation document on action to address agricultural diffuse pollution in June 2004[35].

Co-ordination of drainage: integrated drainage management

8.13 The Government believes that there is a need for better integration of the management arrangements for the drainage of surface water in built-up areas. The aim must be to achieve a more holistic approach in a given area, taking account of both above ground and below ground systems for draining surface water. These improved arrangements would need to be supported by hydraulic, ecological and economic analysis.

8.14 The improved arrangements would need to be consistent, and co-ordinated, not only with River Basin Management Plans and the overall strategic framework for identifying and dealing with flood risk, but also with local authorities' land use plans and other local and regional planning processes. (See Figure 2 which illustrates the matrix of plans and their relationship.) Developers, planners, and system designers would be able to use the improved arrangements to set a clear context for their thinking and decisions when selecting, specifying and implementing the most sustainable drainage system.

8.15 The improved arrangements would also take account of any relevant transport issues including, for example, where it might be appropriate to use selected roads as conduits for flood water to cope with extreme events. The arrangements could also take account of any flooding and water resource and water quality problems caused for the built-up area, for example by run-off from agricultural land, and pursue options for solving them.

How is better integration to be achieved?

8.16 There is a wide range of potential options for producing better integrated drainage management, but there are two possible high-level approaches:

[35] http://www.defra.gov.uk/environment/water/dwpa/index.htm

Option A: Leave it to the various responsible bodies (for example: the local authority, the local sewerage operator and the Environment Agency) to decide if and when to come together to establish ways of promoting an integrated approach to drainage management in problem areas. This approach would represent the lightest touch and would be based on voluntary initiatives by one or more of the local responsible bodies. There are some examples of cases where this approach has been productive, but its results at the national scale would be unpredictable and there could be no guarantee that the voluntary arrangements would be put in place where needed.

Option B: Central Government encouragement, facilitation or requirements aimed at securing more specific actions to achieve better integration of urban drainage management and thereby better urban flood risk management.

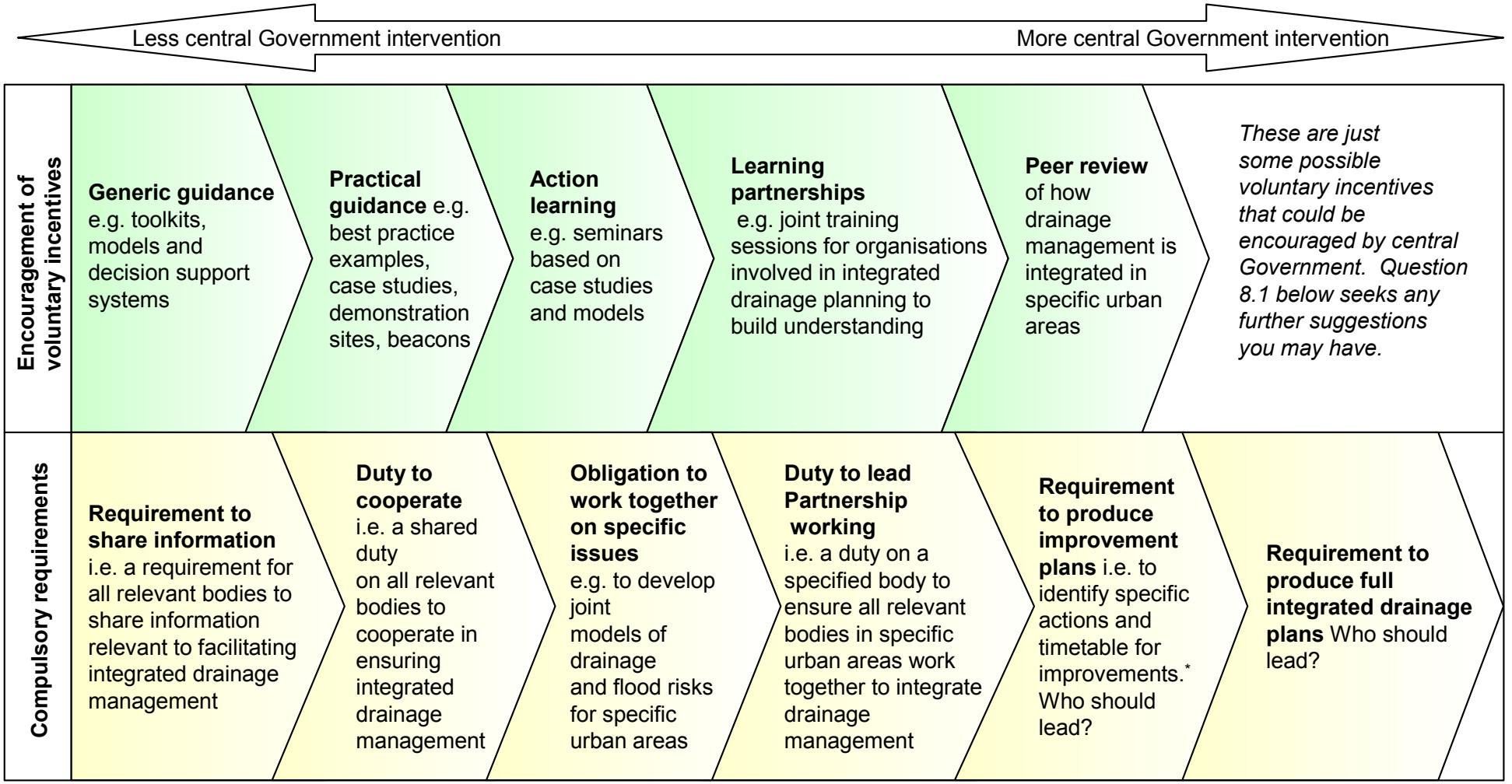
The Option B approach

8.17 The approach envisaged under Option B would go beyond that under Option A in that there would be some central Government involvement. However, the nature and extent of that involvement could fall anywhere in a fairly wide spectrum of possible approaches. The spectrum ranges from fairly light-touch interventions (such as the facilitation of voluntary partnerships, communication and engagement) to the putting in place of a compulsory framework which might include the drawing up of integrated drainage plans. (Clearly, responsible bodies might choose to put in place such plans on a voluntary basis under Option A, but Option B would imply central Government encouragement or requirements in relation to such plans.) It would be important that actions under Option B take place in a transparent framework that promotes local accountability for outputs expressed in terms of flood risk management and reduction – see second indent of paragraph 8.7 above. Actions under Option B would also need to promote behaviour that secures effective partnership working. Several source documents are available on partnership working. These include *Developing productive partnerships: a bulletin* published by the Audit Commission in 2002[36], and *Performance Management Framework: Local Strategic Partnerships* developed by the Neighbourhood Renewal Unit in the Office of the Deputy Prime Minister[37]. The spectrum of actions under Option B is illustrated in Figure 7 below.

[36] http://www.audit-commission.gov.uk/Products/NATIONAL-REPORT/FA9C615D-A528-4115-BBA0-6CDF8E7C60CC/DevelopingProductivePartnerships.pdf

[37] http://www.renewal.net/Documents/RNET/Policy%20Guidance/Performancemanagementframework.doc

Figure 7: A spectrum of possible approaches to integrated drainage management



* See the *Performance Management Framework* (paragraph 8.17)

Question 8.1:

a. What kinds of actions do you think would be most effective in delivering more integrated management of drainage in urban areas?
b. Do you think action should be focussed on voluntary incentives or on compulsory requirements, or on a mixture of both?
c. Which end of the spectrum do you think action should be focussed on – less intervention or more?
d. ***Do you have any suggestions for additional actions which might be included?***

Lead responsibility

8.18 A number of the options set out in Figure 7 would involve giving lead responsibilities to a specified individual body. It would be a key principle that the body or bodies that took on lead responsibility would need to liaise closely with all other interested bodies when producing the plans. In theory, options could include:

(i) The Environment Agency

8.19 The Environment Agency is a national body set up by statute with the capacity to develop and maintain expertise, and has several existing functions that are related, including for flood management and water quality and resources. It would be possible for the Agency to take a proactive regulatory approach to compliance if this were thought appropriate.

(ii) Sewerage undertakers

8.20 Sewerage undertakers are currently responsible for much piped surface water drainage, as well as for sewer systems – which in many places receive some surface water as well as foul water. Sewerage undertakers might be well placed to take the lead in managing an integrated approach to surface water drainage and sewer systems. On the other hand, they are private companies who might be able to exert only very limited influence on other land users and decision-makers. There might also be difficulties if private companies, funded by revenues from their customers, carried out Government functions which affect other land users and businesses.

(iii) Local authorities

8.21 Local authorities could take on the responsibility, on the basis that they have the main responsibility in their area for integration of the different local policy agendas involved, including land use planning, and are democratically accountable. On the other hand, a system under which individual local authorities dealt with drainage integration in their individual areas might make it more difficult to secure an appropriate level of national consistency. It is

likely that new expertise and experience would be required in the case of some local authorities. (In areas without unitary authorities, both counties and districts have an interest in urban drainage. If lead responsibility were taken on by local authorities the issue of whether county or district took the lead would need to be decided in the light of the circumstances in the urban area concerned.)

Discussions over the consultation period

8.22 Defra will, over the course of the consultation period, aim to hold discussions with the representatives of the bodies mentioned above and of other bodies with a direct interest, with a view to identifying possible options, and the pros and cons of each as well as the financial implications, so as to provide a firmer basis for deciding what if any are the viable options here.

Question 8.2: Comments are invited on the options for lead responsibility identified above.

Costs and funding

8.23 The cost of funding an Option B approach would depend on the precise actions or package of actions chosen. The costs of some measures might be relatively modest. As far as the option of integrated drainage plans is concerned, there is not at present sufficient information available to make an accurate assessment of what might be the total cost of producing such plans, but it could be considerable. Moreover the costs of measures which flowed from the integrated plans could also be expensive.

8.24 The arrangements for longer-term funding, assuming it were decided to proceed with an Option B approach, could be affected by a decision to designate a particular body as having lead responsibility. Long-term funding is likely to involve reassessments of spending priorities, with a rigorous approach paid to costs, benefits and distributional implications, as well as to the need to meet inescapable legal requirements, such as those under European Union Directives. The opportunity to reassess priorities on a strategic basis could be an important benefit of an Option B approach.

8.25 It would be premature to put forward in this consultation document proposals for what the long-term funding arrangements might be. However, the Government envisages that if, in the light of reactions to this consultation exercise, it is decided to proceed with actions as outlined for Option B the first tranche of such actions might be prepared on a pilot basis. Defra would propose to examine ways whereby it would itself fund those pilots, subject to any state aid clearance that may be required. The work on pilots would allow a better estimate to be made of the likely long-term funding requirement. This would in turn allow for more evidenced-based decisions about whether the costs would be justified by the potential benefits. The assessment of benefits would need to take account of what the Foresight *Future Flooding* report says

about the potentially huge increases in damages caused by flooding from the sewer and drainage systems, as well as of any refinements to the estimated levels of those risks made possible by the pilots exercise.

8.26 If the lessons from the programme of pilots supported wider roll-out, the funding arrangements would need to be re-considered at that stage and the options would be the subject of a separate consultation exercise.

8.27 There is substantial evidence that current rural land management practices, such as cultivation practice, have led to increased surface runoff at the local scale (see paragraph 6.1). This can affect urban areas. Changing undesirable land management practices could therefore form a key element of actions under Option B. Funding may be available from the sources identified in Section 6 to secure the necessary changes in land management practices. With respect to cases where it is not, or where land owners/occupiers are not sufficiently encouraged by funding from those sources, Defra will consider as part of work on the detailed funding arrangements for the pilot schemes whether separate funding might be made available to secure the aims of the pilot, and to test the contribution changes in land management practices might make to improvements in drainage. This might include land purchase in appropriate cases.

Question 8.3: If this consultation exercise shows support for an Option B approach, do you agree with the proposals that there should be piloting of Option B actions and that Defra should examine ways whereby it would fund the preparation of those pilots?

Sustainable Drainage Systems (SUDS)

8.28 Sustainable drainage systems (SUDS) constitute an approach to drainage which uses a wide range of techniques – for example rainwater harvesting, wetlands and swales – either alone or (more effectively) in combination to provide for a site a drainage solution that is more sustainable than conventional drainage. The SUDS approach has the potential to reduce flood risk, where appropriate capacity has been included in the design, while achieving multiple benefits in improvement water quality, recharging of groundwater, and enhancing the potential for biodiversity.

8.29 However, SUDS are only part of the issues which would need to be addressed as part of the improved integration of urban drainage. Their significance is likely to vary considerably from place to place. While in some areas they could make a significant difference to one or more of the aims of flood management, water resource management and water quality (most obviously, but by no means only, where significant new building development is planned) in other cases they may be less important than other measures, for example measures to encourage better recycling of rainwater or ‘grey’ water.

8.30 The performance of SUDS is, moreover, related to effective design and maintenance. There is much guidance already available on the technical options for making surface water drainage systems more sustainable.

8.31 An *Interim Code of Practice for SUDS* is due for publication in July 2004[38], which establishes a set of core standards and agreements between those public organisations with statutory or regulatory responsibilities relating to SUDS. This will provide a further step in ensuring that the potential of sustainable drainage systems to offer cost-effective solutions within the current legislative constraints is fully exploited. The code will help make the adoption and allocation of maintenance for SUDS more straightforward by promoting a clear, common understanding on SUDS requirements, so that those involved in design, planning and construction can implement systems that the organisation responsible for ongoing ownership and maintenance will be willing and able to adopt.

8.32 The responses to the consultation document *Framework for Sustainable Urban Drainage Systems (SUDS) in England and Wales* published in May 2003[39] suggested that current policy and legislation in relation to the ownership and ongoing maintenance of surface water drainage systems may not provide an adequate basis for ensuring implementation of more sustainable drainage systems. The issues that have been raised concern;

- Who should be responsible for the ownership of SUDS, for example the Environment Agency, sewerage undertakers or local authorities?

- Whether certain legislative changes would provide better incentives for their uptake, in particular:

    a. Modifying the current largely automatic right of connection of piped surface water drainage to the sewer system that now exists

    b. Linking the right of connection more closely with development control requirements

    c. Making it easier for those responsible for SUDS to discharge into water bodies without necessarily having to seek consent of riparian land owners, while preserving arrangements for their compensation

    d. Extending the scope of the Building Regulations, so that the requirement to keep surface water drainage separate from sewage applies where SUDS is a viable option.

8.33 The Government wishes to address these issues in a holistic way.

[38] This is due to be available via http://www.defra.gov.uk/environment/water/index.htm
[39] More information is available via http://www.environment-agency.gov.uk/yourenv/consultations/486641/?version=1&lang=_e

A further background paper provides more detail about the ownership, responsibilities and maintenance issues associated with SUDS, as raised recently by stakeholders. This is part of a package of further background and technical documents to accompany this consultation exercise available from the Defra website via www.defra.gov.uk/environ/fcd/policy/strategy.htm

8.34 The Government considers that further work is needed before deciding firmly what changes are desirable. This is in order to ensure;

b. that there is full integration between considering what changes are made on improved integration of drainage more broadly, as described above, and any changes in the management arrangements for SUDS; and

c. that the full implications of any changes are fully thought through, especially to avoid any unintended consequences or perverse incentives.

Question 8.4: The background paper referenced above sets out a number of issues and proposals concerning the implementation and management of SUDS, based on discussion with stakeholders. We would value your views on all of the issues raised, in particular regarding:

- ***the different options suggested to clarify ownership and responsibility of SUDS***
- ***the legislative changes suggested to remove obstacles and disincentives to design and to implement more sustainable surface water drainage systems***

Conclusions and next steps towards integrated drainage management

8.35 The Government is in favour in principle of a more integrated approach to drainage. It therefore proposes;

- To undertake a more detailed review of the issues involved, in the light of reactions to this consultation exercise;

- Subject to that review, to consider action on a pilot basis in selected areas;

- To review in more detail the case for changes to encourage the wider uptake of SUDS, taking into account in particular the linkages between action on SUDS, improved integration of drainage and wider flood risk management planning.

Section 9: Flooding from sewers

9.1 Flooding from sewers has given rise to an increasing level of concern and can be as, or more, distressing and disruptive than other types of flooding. The Government attaches a high priority to reducing the distress and disruption caused by flooding from sewers, both as it affects the interior of properties and as it affects external areas, as part of an integrated approach to flood management.

9.2 Section 8 set out options for the integration of drainage in built-up areas, including drainage through the sewer system. This section gives more detail on the nature of sewer flooding, and on actions under way or under consideration to address the problem.

9.3 The sewer system is concerned with the discharge of two different types of water

- Surface water, and
- Foul water.

9.4 In most new developments foul water and surface water are carried through separate systems, with foul water being passed for treatment in sewerage treatment works and surface water generally being dealt with on site or passed for direct discharge to watercourses. In most older systems the drainage network is combined.

9.5 Allocation of responsibility for a sewer depends on whether it is classified as "public" or "private". Prior to 1937 virtually all sewers were public sewers, that is, they were vested in local authorities. The Public Health Act 1936 allowed local authorities to choose whether or not to adopt new sewers. This effectively created the concept of “private sewers”. These are generally owned by, and the responsibility for maintenance rests with, the owner or owners of the property drained by the sewer. Legislation permits private sewers that meet specific standards of construction to qualify for adoption as public sewers. Public sewers are the statutory responsibility of sewerage companies. Sewerage companies are unable to restrict connections to the pubic sewer even where the system is likely to become overloaded as a result.

9.6 Flooding involving sewers can take various forms as follows:

- Events where surface water flooding, for example from rivers or blocked water courses (which may not be the responsibility of the sewerage company) affects the effective operation of the sewer system, either because water enters the system in ways for which it was not designed, or because the system is unable to discharge effectively. In such events flood water may become contaminated with sewage;

- Events of flooding from sewers where the system is no longer able to cope with the volume which it has to deal with, usually during storm events. The events may arise because of increased volumes of sewage from new developments, or from increased run-off from hard surfaces or highways. In some cases rising groundwater infiltrating into sewers can contribute to a reduction in their capacity, exacerbating flood risk;

- Flooding from sewers caused by operational failures, usually blockages but sometimes sewer collapses or pumping station failures.

9.7 Sewerage undertakers have a statutory responsibility to provide and manage the system of public sewers to ensure that their area is effectually drained. This duty is enforced by the sector regulator, Ofwat. In the course of 2002 and 2003 Ofwat consulted on what action should be taken to tackle problems of flooding from sewers. Significant investment is being paid for within current sewerage charges and companies are developing proposals for further investment in the period up to 2010. In their business plans companies have made proposals to secure future reductions in external and internal flooding from sewers. These proposals are being considered by Ofwat as part of the current review of price limits which is due to be completed in December this year. Ofwat is also discussing with sewerage undertakers issues relating to compensation of those who have suffered from sewer flooding, and to possible mitigation measures to help those at risk of flooding from this source.

Events in which the sewer system is prevented from operating properly because of surface water flooding

9.8 The immediate trigger for such events – surface water from whatever source – is external to the sewer system. One response might be to increase the design standard of the sewer, but it might be more appropriate to tackle the source of the surface water that triggers the problem – for example, flooding from a river. In some cases where there is regular surface flooding the consequential problems for the sewer system and the risk of pollution of floodwaters with sewage may be minimised by restricting entry capacities or fitting non-return valves but this will not be feasible for larger scale flooding. The causes of the problem and best solution in each case needs to be considered in the round. There have been cases where alleviation of the surface water flooding problem has brought to light problems with the sewer system itself which had not been previously identified.

Flooding from sewers due to inadequate capacity

9.9 Ofwat currently monitors the numbers of incidents and the numbers and properties at risk of internal property flooding. In 2002-3 some 11,600 properties were reported to be at risk of internal flooding at least once in ten years due to lack of capacity in the sewer network. Systematic data on the incidence of external flooding from sewers is beginning to be collected from 2003-4, as is data on the number of properties thought to be at risk of flooding between once in 10 and once in 20 years. Companies have developed

prioritisation processes based primarily on the frequency and severity of flooding to inform the development and management of their investment programmes. Their business plans included proposals to deal with a large proportion of the properties currently known to be at risk of flooding at least once in ten years because of hydraulic incapacity. Ofwat's draft determinations will be published later this year.

Operational failures for example blockages, sewer collapses and pumping station failures

9.10 Ofwat monitors internal flooding due to what it terms "other causes". In 2002-3 just over half the incidents of flooding from sewers were due to other causes and half due to hydraulic incapacity. However such events are by their nature difficult to predict and in the main should be one-off events, unlike capacity problems. A number of companies have included proposals in their business plans to reduce the occurrence of such flooding where they have identified risks of repeat flooding.

Private sewers

9.11 As far as private sewers are concerned, the Water Act 2003 includes an enabling power to allow transfer of private sewers to sewerage companies so that they become public sewers. The legislation offers sufficient flexibility to ensure that a sensible solution can be introduced following full consideration of a range of options. No decision on how to proceed has yet been taken. The Government will shortly publish a response to an earlier consultation exercise[40], together with a proposed way forward. Although consideration is being given to transferring ownership of private sewers to sewerage undertakers, it is possible that the chosen solution to the private sewers issue will encompass many of the options put forward in the consultation paper, including controls over building over private sewers, improved control of sewer maps and revised guidance on matters such as adoption.

9.12 It is important that potential purchasers of properties which have private sewers should be aware of that fact and therefore of the responsibilities they would be taking on in respect of those sewers. For this reason, water and sewerage undertakers are now asked to complete a new enquiry form. This provides more information about the sewers serving the property to prospective house buyers.

9.13 The Government believes it is vital to take account of sewer capacity issues in decisions relating to development and planning.

[40] http://www.defra.gov.uk/corporate/consult/sewers/index.htm

Section 10: Flooding from groundwater

Introduction

10.1 Concerns about flooding from groundwater in some areas of England have been raised by the Environment Agency, local authorities, the insurance industry and affected property owners. More recent issues relate to sudden rises in groundwater levels following heavy rainfall, but more general concerns about rising groundwater have been held for some time. Currently no national authority has a duty to address flooding from groundwater.

10.2 The extent and impact of flooding from groundwater has never previously been assessed or addressed on a national scale as part of Government flood risk management policy. Defra therefore commissioned an initial scoping study in 2003 to inform this strategy development exercise. The aims of this study were:

- to provide information on the broad scale and distribution of groundwater flooding in England
- to identify any current administrative responsibilities
- to identify types of mitigation measures available
- to make any recommendations which could be considered as part of the strategy development exercise

The full project report has been published as part of a package of further background and technical documents to accompany this consultation exercise available from the Defra website via www.defra.gov.uk/environ/fcd/policy/strategy.htm

10.3 The full report includes some high-level maps of occurrence and possible areas at risk. It is the product of close work with Defra, Environment Agency, local authorities, technical experts and other stakeholders to incorporate the broadest range of knowledge and views possible in the time permitted.

Question 10.1: This new initial scoping study has yet to be peer-reviewed. We welcome all views and comments on the scoping study and suggestions for further development

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10.4 Flooding from groundwater is a broad term that is often used to describe several different sources of flooding. The scoping study identified three broad categories as defined below:

- **Groundwater flooding:** This is also known as clearwater flooding and is caused by water originating from beneath the ground surface from permeable strata through a natural process, usually some time after periods of higher than average rainfall.

- **Rising groundwater in conurbations:** This is also known as urban groundwater rebound. It is caused by groundwater returning to its previously higher natural level after the cessation of abstraction for industrial purposes in urban areas.

- **Rising groundwater in former mining areas:** This is also known as mine water rebound. It is caused by groundwater returning to its previously higher natural level after the cessation of pumping in former mines.

10.5 The initial scoping study was confined to these types of flooding from groundwater and each is discussed in more detail below.

Groundwater flooding

10.6 Groundwater flooding can be distinguished from surface water flooding by its timing and duration – events typically last weeks rather than hours and tend to occur throughout the winter, often extending into spring and early summer.

10.7 The scoping study report analyses the characteristics of groundwater flooding in permeable catchments. It covers flooding arising from the emergence of groundwater in areas where water is not regularly seen and in areas remote from the recognised river network. The report found that groundwater flooding appears in general to be largely restricted to permeable hard rock aquifer areas and, in particular, to the surface outcrop of chalk where there are no overlying impermeable drift deposits. Chalk is particularly vulnerable to prolonged periods of high recharge leading to the development of very large groundwater heads as a result of its 'dual porosity' characteristics. This is explained further in the full report.

10.8 The study excludes fluvial flooding from permeable catchments, events arising from shallow permeable deposits, surcharged sewers or leaking water mains, and the inundation of floodplains by groundwater prior to rivers overtopping their banks.

10.9 Flooding of property usually results either because new property has been inappropriately sited or because, in the case of older property, the site drainage has been modified or the public drainage systems have not been maintained. In some cases floors have been lowered to increase ceiling heights and this has worsened the problem.[41] Historically, householders may have coped by having little furniture and stone floors, or cut-off drains which picked up water and diverted it around the property.

10.10 High groundwater levels around sewers and drains result in infiltration and can either cause sewer flooding or make the groundwater flooding more unpleasant due to contamination.

[41] Part C of the Building Regulations, including the proposed forthcoming amendments (see discussion of Building Regulations in Section 12) is relevant to the design of groundwater flooding resistance and resilience.

Occurrence

10.11 By looking at long-term records (over the last 100 years) in key permeable catchments, it appears from preliminary analyses that no significant groundwater flooding events occurred during the period from 1965 until 1988 in some places and as long as until 1993 in others. This is because of low groundwater levels, which seem to be due to climatic variability. There was a national trend of house construction during this period and a lack of drainage maintenance, which may have now led to an increased groundwater flooding risk for new properties. A generation of people were not aware of the risks until recent significant events in the 1990s.

10.12 Groundwater flooding events now occur in several areas of England. There are many recent examples of long-term flooding for several months and, in a few cases, the abandonment of properties. Notwithstanding the dry period described above in which no flooding was reported from chalk areas in southern England, localised groundwater flooding seems to be a relatively common phenomena in some locations with records suggesting a frequency of 1 in 7 years in the long term.

10.13 National records supplied by the Environment Agency suggest almost 500 properties were flooded from hard rock aquifers in the winter of 2000 - 2001. However the scoping study found this is likely to be a significant underestimate. Occurrences of groundwater flooding are often under-reported due to the absence of a Government authority being responsible for alleviation. Householders also perceive a negative impact of flood risk on property insurance premiums. Detailed reports from some Environment Agency local areas suggest the actual number of affected properties is much larger – 700 properties in Hampshire alone during 2000 – 2001. Records of fire service call-outs to flooded properties also suggest a significantly larger number of affected properties.

10.14 The Defra scoping study developed a predictive model as a first attempt to identify the number of properties potentially vulnerable to groundwater emergence and to map their geographical distribution. These are the properties that *may* be vulnerable to groundwater flooding, and it is important to realise that they are initial estimates. The full scoping study report includes caveats about them. For example, the very deep water tables mean that many properties on chalk will in reality be at no risk, and this would suggest that there might be an overestimation of the total number of properties potentially affected. With those caveats, the study estimates that approximately 1.7 million properties may be vulnerable in England, of which about 110,000 also fall within the 100-year indicative fluvial floodplain. Of those properties located in areas where groundwater could be expected to rise close to the surface in exceptionally wet winters, those most vulnerable are possibly 380,000 properties located on the exposed chalk aquifers of southern England where groundwater levels fluctuate widely. The actual risk to these properties depends on the construction details – the floor level compared with ground level and drainage details – and the numbers at actual risk are very difficult to assess at this stage.

Mitigation

10.15 Understanding of groundwater flooding is far from complete. The scoping study identified several areas for further research, including:

- Systematic recording of groundwater flooding areas, causes and extent in order to develop groundwater flood risk maps, in particular for areas overlying exposed chalk.
- Further investigation into the frequency of groundwater flooding, the assessment of damage caused by groundwater flooding and the costs of any possible mitigation options in order to help assess the potential benefits of any possible mitigation.
- A study to confirm that widespread groundwater flooding has not occurred outside permeable hard rock aquifers.

Question 10.2: Do you agree with these research priorities? Are there any additional research priorities?

10.16 The available evidence and application of the precautionary principle suggests that groundwater flooding is a significant risk in some areas of England. The Government recognises there is a need for clarity of responsibilities for groundwater flooding risk management and also a need to improve public awareness and understanding. The Government welcomes views on the following questions:

Question 10.3: Do you agree that there should be better co-ordination and management of groundwater flooding risks in combination with other types of flooding? Who should be responsible for this? How should this work at the national, regional and local level? How should co-ordination and mitigation be funded?

Question 10.4: Do you support more accurate, consistent record-keeping across England to monitor the frequency and occurrence of groundwater flooding events? Who should be responsible for this?

Question 10.5: How could groundwater flooding risk be assessed in the context of the flood and coastal erosion risk management scheme appraisal system?

Rising groundwater in conurbations

10.17 Rising groundwater in conurbations, or urban groundwater rebound, is the rise of groundwater levels in permeable strata from previous long-term lower levels, which were due to the abstraction of groundwater for public or industrial purposes, to the extent that there are now perceived risks to the built environment.

10.18 Rising groundwater is a cause for concern in urban areas because of a broad range of potential engineering and environmental impacts. These include weakening of building foundations, swelling and heaving of clays, leakage into basements and service ducts, increased drainage requirements, increased instability of excavations, contamination and water quality implications and surface and highway drainage implications. More details are given in the full scoping study report.

10.19 Some 15 sites in England are experiencing significant groundwater rebound, including urban conurbations such as London, Birmingham, Liverpool, Manchester, Coventry and Nottingham. Groundwater rises to reach an equilibrium or steady state. Once this is achieved the groundwater level stabilises, as has already been seen in some conurbations such as Wolverhampton. However, where the groundwater has found a discharge route in such circumstances this can cause concerns about the effects of the discharge on sewers and surface water channels.

10.20 The key issue is the engineering or environmental impact the groundwater rebound may have before reaching equilibrium. This has been monitored and addressed to different extents in different areas, depending on the assessment of risk and the cost and feasibility of potential solutions. Many of the solutions, which usually involve increasing groundwater abstraction rates in the affected areas, have been led by water companies. There are several success stories outlined in more detail in the full scoping study report, including London's GARDIT group.

10.21 There is no national authority in England with responsibility for addressing rising groundwater in conurbations and the problems this may cause. The Environment Agency agreed to monitor the situation in a few areas, including London, but has no direct responsibility for the consequences. Many of the mitigation measures currently in operation depend to a large extent on the continued goodwill and cooperation of the parties involved.

10.22 This Government strategy is not proposing any direct intervention to address groundwater rebound. However, there may be a case for asking the Environment Agency or another appropriate body to monitor the national situation, and to compile and review an up-to-date database of problems and solutions. There may also be a case for ensuring formal commitments are made by the parties involved to ensure continued protection of urban areas from groundwater rebound.

Question 10.6: Should a national database be compiled to monitor rising groundwater in urban areas? Who should have responsibility for maintaining this?

Question 10.7: Should parties involved in addressing urban groundwater rebound problems be required to commit to some kind of formal, long-term agreement? What shape could such an agreement take?

Rising groundwater in former mining areas

10.23 Former coal mines and metal mines are reported to be the types of mine at greatest risk of rising groundwater in England. The closure of a mine and the cessation of water pumping from the mine results in the re-saturation of the mine void by water as groundwater rebounds to its previous natural level.

10.24 Mine water rebound has been relatively well-documented in recent scientific literature. There are several associated environmental risks relating to water quality and also risks of localised flooding and subsidence.

10.25 The Coal Authority is responsible for monitoring rising groundwater levels in coal mines. Flooding resulting from discharges issuing from mines and mine subsidence have been identified as issues that need to be addressed. The Coal Authority has established a national monitoring programme and is examining a large number of case studies in agreement with the Environment Agency. This work aims to forecast the rate of rise of groundwater, the possible points of emergence and likely flooding risks. The Water Act 2003 includes powers to prevent or mitigate the effects of the discharge of water from coal mines.

10.26 This Government strategy is not proposing any additional measures to address rising groundwater in former mining areas. However, views and comments are welcome on this issue.

Question 10.8: Views and comments on the issue of rising groundwater in former mining areas are welcome.

Section 11: Flooding of and from the transport network

Introduction

11.1 Flooding of highways can cause significant disruption and inconvenience by making it difficult or impossible for highways to fulfil their function as arteries of transport. Highway flooding can also have an adverse impact on surrounding areas and properties and, if badly designed or built, highways have the potential to act as a barrier to the natural passage of excess waters. It is therefore important that the design and maintenance of highways, and in particular of the drainage systems associated with them, follow the best practice available so that the risk of flooding of and from highways is minimised. It is also important to set the flood risk management of highways in the context of the broader drainage area, whether it be urban or rural. This will allow consideration of the role of factors external to the highway (for example, run-off from agricultural land) which can be a flood risk for the highway. It will also allow consideration of how highways might play a role in managing extreme events in the drainage area.

Strategic roads

11.2 The Highways Agency is responsible for strategic roads (most motorways and main roads connecting cities), accounting for approximately 2 per cent of the road network. Strategic roads run in large part through rural areas. Guidance has been developed for these types of roads: *The Design Manual for Roads and Bridges*[42]. The design manual sets out standards for the design and maintenance of drainage systems, and includes advice on minimising and dealing with flood risk. The manual is updated on a regular basis, and will soon contain advice on assessing the impact on highways of run-off from the surrounding natural catchment, and on designing highways to deal with such flood risk. Future advice on the design of highway culverts and on the outfalls from highway drainage systems will address shortcomings identified as contributing to the flooding in autumn 2000[43].

Question 11.1: How useful do practitioners find this guidance? Do you think it addresses all concerns in relation to flooding and highway drainage?

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[42] Available on the Highways Agency web site via http://www.highways.gov.uk/business/tech_info.htm

[43] Santhalingam, S (2001) *Highways Agency response to flooding incidents on trunk road network during the floods of Autumn 2000*

Non-strategic roads

11.3 Individual local authorities are responsible for the construction, operation and maintenance of all roads not classified as strategic. Unlike strategic roads there is no mandatory advice tailored for non-strategic roads. The principal source of guidance is the *Code of Practice for Maintenance Management*[44]. Some of the strategic road guidance can be used, where appropriate, for non-strategic roads.

11.4 A Department for Transport policy document on the impacts of climate change on the transport network, entitled *The Changing Climate: Impact on the Department for Transport*[45], published January 2004, identifies the maintenance and design of urban roads as a key area that needs to be improved in order to deal with the impact of flooding.

11.5 In view of the importance of appropriately designed and managed urban road networks and related drainage systems in the managing of flood risk, the Local Government Association has agreed to liaise with the Highways Agency, individual local authorities and other relevant bodies to develop a guidance document covering the design and maintenance of non-strategic roads. Such a document would be a sister document to the design manual already in use for strategic roads, and would draw from that document as appropriate.

Question 11.2: Do you think that the production of such guidance on the design and maintenance of non-strategic roads, and in particular their drainage systems, is necessary, and if so do you have views on who should produce and maintain this guidance?

Relevance for integrated drainage management

11.6 The non-strategic roads that give rise to flooding concern will be predominantly in urban areas, and account needs to be taken of the wider drainage area during design. For example, the extent that surface water is generated from adjacent paved areas and buildings will be relevant to the design of urban road drainage. In the majority of cases there is no separate road drainage system in the urban area, and run-off from roads is one part of the surface water whose drainage falls to the responsibility of sewerage operators through the sewerage system.

11.7 It is therefore proposed that urban transport planning issues should form a key part of the integrated drainage management proposals in this consultation document (see Section 8).

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[44] Available from the Institution of Highways & Transportation, published July 2001.
[45] Available on the DfT web site (www.dft.gov.uk) under science and research pages (research reports).

11.8 Integrated drainage management partnerships or plans could also specify where it might be appropriate to designate individual roads for use in severe events as flood corridors to move water away, thereby helping to avoid damage to property. Such roads would need to be designed for this purpose, for example by raising curb levels. Other possible design features might help reduce the downstream impact of flood water on the sewerage system, for example by allowing scope in particularly intense rainfall events for retaining water on the margins of carriageways for temporary periods (e.g. by restricting drain inlet capacity). Such measures might involve some interruption to the transport function of the local road system, and it would be for the integrated drainage arrangements to review and determine the locations and circumstances where that inconvenience would be justified by the flood mitigation benefits.

Question 11.3: Do you agree that the urban road network should be covered by integrated drainage management proposals, and that it should be possible for these to include consideration of how roads might be used where appropriate for flood mitigation in extreme events?

Railways

11.9 Flooding of parts of the rail network can cause significant inconvenience and disruption by preventing stretches of rail from fulfilling their function. Correct design and maintenance of embankments and associated drainage systems are vital if such disruption is to be avoided where possible. Moreover some parts of the rail network have a flood alleviation or coast protection role and need correct monitoring and maintenance to ensure that they do not fail in this role during an extreme event.

Rail Maintenance

11.10 Network Rail is responsible for the upkeep of track and associated structures. It has a map of flood hotspots, which it uses to predict where trouble will occur and to target maintenance. Network Rail has an incentive to ensure the proper upkeep of track and associated drainage as failure to maintain track correctly leads to compensation for train operators if disruption occurs. In times of flooding, the rail network can provide a vital communications link when parts of the road network are overwhelmed.

Railways as flood and coastal defences

11.11 The rail network has a significant role to play in flood alleviation: more than a hundred miles of mainline track runs along the coast of England. Network Rail is responsible for the upkeep of any rail embankments that act as physical coastal defences. The organisation has taken both a short and long-term approach to the management of these. An assessment of all coastal defences has been carried out and those deemed to be of significant risk to rail traffic have specific action plans to deal with the problems including, if

necessary, line closure. All defences receive annual structural and three-yearly underwater inspections. While it is important that the maintenance of these structures is considered in relation to the rail network, their primary function, it is also important that any wider role in relation to the alleviation of flooding or control of erosion in the area covered is also considered. The Government recognises, however, that the construction and maintenance required in relation to the rail and flood defence roles that these structures perform may be different and will explore further how best this dual role can be facilitated (see paragraph 11.15).

11.12 Network Rail will shortly commission work on developing Coastal & Estuarine Management Strategies with the aim of developing a long-term approach to the management of these defences. Once completed, it is likely to take two to three years to have them fully in place across the country.

11.13 Some inland railway earthworks, including some associated with disused lines, also form de facto defences in times of flood.

11.14 In such cases the relevant operators will be fully involved in the development of relevant strategic plans relating to flood risk.

11.15 The Government will investigate further with relevant interested parties the arrangements for the use of railway earthworks/structures as flood defences in those circumstances where others apart from the rail network benefit.

Question 11.4: Do you have suggestions on how the use of railway earthworks/structures as flood defences can be made more effective?

11.16 Major road and rail infrastructure situated at critical points in river valleys or along coasts can have a major influence on the scope for long-term adaptation and managed realignment of coasts, estuaries and rivers to achieve more sustainable solutions. Such considerations will be taken into account in long term infrastructure planning and when major reconstruction or rebuilding is being considered. Shoreline Management Plans and Catchment Flood Management Plans will be instrumental in identifying locations which require such consideration.

Section 12: Managing the consequences of flooding through flood resistance and resilience measures

12.1 There are two aspects to managing the risk to buildings from floodwater – resistance and resilience. Resistance measures are aimed at keeping water out of a building or at least minimising the amount that enters whilst resilience measures are aimed at facilitating the recovery of buildings following a flooding event.

A further background paper explaining approaches to flood and coastal defence, including flood resistance and resilience, is available as part of a package of further background and technical documents to accompany this consultation exercise via the Defra website www.defra.gov.uk/environ/fcd/strategy/policy.htm

Flood resilience and resistance standards for new buildings

12.2 Section 7 deals with measures to reduce flood risk through land-use planning.

12.3 Where development on the floodplain does take place it is important that developers ensure that the building is sufficiently resilient to minimise risk:

- Risk is determined by reference to both probability and consequence, and it is therefore important that the consequence implications of any new development are fully addressed and measures taken to reduce/manage them.

- It is assumed that new buildings can have a life span of at least 60 to 70 years in the case of dwellings and at least 40 years for other building type; during that time the risk to the property from flooding may increase. Moreover, despite the presence of site defences, buildings can still be overwhelmed by exceptional flooding events.

12.4 The Government issued interim non-statutory guidance on development on the floodplain following concerns raised by the Environment, Transport and Regional Affairs Committee. The booklet, *Preparing For Floods*[46], provides a significant amount of information on flood resistance and resilience but the booklet is advisory and does not oblige developers to incorporate flood resilience into new buildings.

12.5 Making a building flood resilient will minimise the impact of a flooding event. Flood resilience measures can cover a range of procedures such as locating electrical sockets at mid level rather than floor level, using treated wood and

[46] ODPM (2002), *Preparing for floods: interim guidance for improving the flood resistance of domestic and small business properties.* http://www.environment-agency.gov.uk/commondata/105385/dtlr_guide.pdf

wall boarding and installing non-return valves in plumbing. Flood protection products provide temporary protection from floodwater and can be used in those places where defences are not possible, or to provide additional protection in those areas with defences. There are a number of products on the market that can act as a barrier against floodwater and if used correctly can be more effective than sandbags at protecting a building. The typical types of products on the market are flood boards, air brick covers and flood "skirts". These products are used to provide a temporary seal around doors, windows and the lower part of a building's exterior wall. To be fully effective they usually require advance warning of flooding.

12.6 Flood resistance and resilience measures can provide a range of benefits including protecting a building from flooding during minor events, reducing the considerable health impacts from a flood (minimising mould and untreated sewage backing up through toilets for example) and reducing general damage to a property, thereby helping to manage the risk by reducing the financial consequences of an event.

12.7 Insurance companies are keen to see these types of measures incorporated into new developments and are likely to look more favourably on any development that includes them.

Building Regulations

12.8 Developers are obliged to follow Building Regulations (governed by the Building Act 1984) when constructing a new building or significantly altering an existing one. These give advice on what procedures to follow and types of materials to use during construction. Under the Act the scope of the Building Regulations is limited to securing the health, safety, welfare and convenience of persons in or about buildings. In the past it was thought that flood resilience and resistance could not be covered under the Regulations, as the view was that these measures were principally concerned with protection of property. (See the *Government's Response to the Second Report in Session 2000-01 of the Environment, Transport and Regional Affairs Committee*[47]).

12.9 It is now widely accepted that the impact on the health of a householder from a major flooding event can be considerable. Various studies have shown a range of problems including gastrointestinal illnesses and mental health problems. As part of work on this strategy the Government has reviewed the position and has taken further legal advice. It has concluded that Building Regulations can and should be used to ensure flood resistance and resilience is included within new buildings.

12.10 There are indeed already provisions within the current Building Regulations that could contribute towards making a building flood resilient and resistant.

[47] The Committee report is available via http://www.publications.parliament.uk/pa/cm200001/cmselect/cmenvtra/64/6402.htm. The Government response is available via http://odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_606694.hcsp

The revised Part H (2002)[48], drainage and waste disposal, recommends the use of anti-flooding valves in areas where there is surcharging of drains or sewer flooding. Off-set connections are advised in buildings that have basements.

12.11 The revised Part C[49], site preparation and resistance to contaminants and moisture, cover sub-soil drainage to reduce groundwater pressure, ground floor designs to resist water pressure and access to voids beneath floors to permit inspection and cleaning.

Future changes to the Building Regulations

12.12 A research programme has been commissioned that will evaluate the relative benefits of flood resistant and flood resilient construction. This work is likely to take about two years. The project will look at improving the flood resistance of buildings through improved materials, method and details. The project's timescale is due to the testing requirements in relation to drying out of flooded test buildings.

12.13 In the light of the results of the ongoing research the Government is committed to looking at the existing Regulations, and will amend accordingly to ensure that appropriate flood resilience is incorporated. A guidance booklet explaining what is required from those building on the flood plain will be produced subsequent to this. The Government will be looking into risk-based approaches for the utilisation of flood resistance and resilience measures in new buildings.

12.14 The Government is of the opinion that on completion of a building, the developer should include information in the buyer's pack outlining what measures have been taken. This information will be useful for resale and when taking out insurance.

Question 12.1: Do you agree with the way the Government plans to take forward issues relating to flood resilience and resistance in new buildings built on the floodplain?

Sustainable Buildings Task Group

12.15 The Sustainable Buildings Task Group was established in late 2003 to identify how Government and industry could improve the quality and sustainability of new and refurbished buildings. It looked at areas where there might be a significant need to improve the quality of buildings to deliver higher standards of environmental performance in support of sustainable development in new communities, including in relation to flooding. *Better buildings – better lives:*

[48] Building Regulations Part H is available via www.odpm.gov.uk
[49] Building Regulations Part C is available via www.odpm.gov.uk

The Sustainable Task Group Report[50] was published in May 2004 and contains a number of recommendations in relation to flood resilience. Issues of particular concern were planning and incorporating appropriate flood resilience measures in new buildings. The report acknowledges that flood resilience has an important role to play in making buildings more sustainable.

Improving flood resistance and resilience of existing buildings

12.16 Building regulations do not apply to existing buildings and it is up to owners of these properties to decide whether they wish to make their buildings more flood resilient. Incorporating flood resilient measures can be expensive, but some cost can be spread by updating a property through the course of normal improvements and repairs. For example, if a property needs rewiring it is an option to rewire so that sockets are at mid-wall level. In view of this extra expense, property owners are likely to base any decision on using flood resilient materials or techniques on the probability and level of flooding that they face.

12.17 The Sustainable and Secure Buildings Bill, which is due to gain Royal Assent in the Autumn, should allow Building Regulations to address other aspects of sustainability than allowed under current legislation. The Bill should give new powers to make Regulations for the purposes of protecting and enhancing the environment, facilitating sustainable development and prevention and detection of crime. Once the Bill becomes law the Government may consider whether it might be possible and desirable to use the Bill in the context of flood resilience, for example so as to require the taking of flood resilience measures at the same time as owners carry out major repairs. The powers within this Bill are enabling, and any proposal to use them in this way would be subject to full public consultation.

Flood protection products

12.18 Recognising how difficult it can be for the consumer to work out which flood protection products are effective, a certification scheme supported by the British Standards Institute has been developed. The scheme awards a BSI *Kitemark* to suitable products, indicating to consumers that the product has met a certain quality standard. Performance standards have been developed for three types of products: removable products for doors and airbricks, flood skirts; and temporary free standing barriers. The Government encourages manufacturers to seek *Kitemark* approval, as this is a useful way of ensuring public confidence in their product.

[50] The report and background on the Task Group, including membership and the detailed Government response when published can be found at http://www.dti.gov.uk/construction/sustain/sbtg.htm

12.19 The Government has issued more detailed guidance on flood protection products, which can be found on the Environment Agency's website[51] and in the advice guide *Flood Products*[52].

Financial assistance

12.20 The Government is of the view that, in general, individual building owners should be responsible for improving the flood resilience of their buildings. The benefits for the owner are substantial: lower repair costs following an event, fewer health implications and continued insurance.

12.21 However, the Government recognises that low income, vulnerable households in high risk areas may not be able to afford the flood protection products/resilience measures considered above. They may also be the least likely to be able to cope with a major flooding event. In July 2002 the Government, through The Regulatory Reform (Housing Assistance) (England & Wales) Order[53] gave local authorities more flexibility to decide how they would provide home improvement grants, loans, help and advice to the most vulnerable within their areas. In view of the chronic health problems caused by flooding and long-term damage done to properties, the Government would encourage local authorities in high-risk areas to consider requests for assistance with flood protection/resilience products as a matter of course alongside other more traditional requests.

Insurance

12.22 Insurers can and do have a role to play in encouraging building owners to make their buildings more resilient. When a claim is made following a flood event, the owner usually claims like for like in terms of repairs. Many insurance companies are being more flexible and paying out to the level of the like product but allowing the owner to use more expensive flood resilient products, the owner paying the difference between the two. Insurers are also well placed to incentivise uptake of flood protection products by offering lower premiums to those who install and use them.

Question 12.2: Views are sought on how you think owners of existing buildings can be encouraged to use flood resistance or flood resilience products.

12.23 It is clear that following a flood event, householders experience considerable distress. This can be compounded by a difficulty in finding experienced, quality surveyors and builders to survey and repair the building. The

[51] Environment Agency's *Preparing for a flood webpages* http://www.environment-agency.gov.uk/subjects/flood/351186/351222/?version=1&lang=_e

[52] CIRIA and the Environment Agency (2003), *Flood Products: Using Flood Protection Products – a guide for homeowners.* http://www.environment-agency.gov.uk/subjects/flood/351186/351222/483622/484713/?version=1&lang=_e

[53] Available via http://www.legislation.hmso.gov.uk/si/si2002/20021860.htm

Government has launched the Quality Mark Scheme[54] to provide consumers with access to a register of suitably qualified trades people who work in the domestic repair, maintenance and repair sector. However, the Scheme is relatively new and has only registered limited numbers of firms to date in certain parts of the country. Consumers can check with this or other similar schemes to see if registered firms can undertake the work. The Office of Fair Trading also publishes guides on choosing and finding a builder[55]. It may also be difficult to find reliable advice for those in risk areas seeking to make their properties more resilient in advance of any event.

12.24 In order to support the provision of Home Information Packs (see 13.8) Government is discussing a scheme with professional bodies in construction to develop the training and registration of Home Surveyors. If it is proved possible to develop such a scheme for Home Surveyors, it could be further developed to serve as a means for providing an approved list of flood repair and flood proofing advisers.

Question 12.3: Comments are invited on whether a quality scheme for surveyors in respect of flood repairs/resilience would be welcome and practicable.

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[54] http://www.qualitymark.org.uk (0845 300 80 40)
[55] OFT (2002), *Need a plumber or builder…?* A step by step guide on getting things done to your house and organisations that can help. www.oft.gov.uk

Section 13: Raising awareness

Introduction

13.1 Information on flooding, flood risk and actions that individuals can take plays an extremely important role in flood risk management. In particular it can lead to better management of the consequences should a flood event occur and has the potential to reduce the impact on the individuals affected. For the system to work effectively, the public needs to understand and to act on the advice and information given.

13.2 General public awareness of the risk of flooding, the consequences and how to deal with it has in the past been very low. Environment Agency national public awareness campaigns have been run since 1999 to increase awareness of the risk of flooding among those who live, work and travel in flood-prone areas, to encourage people to take practical action to prepare, and to provide sources of further information and support. It is still the case that householders are sometimes totally unaware that they live in an area that may flood. The infrequent nature of flooding makes it a challenge to ensure sustained awareness and preparedness.

13.3 Opinion surveys[56] indicate that public awareness of flooding is high after periods when there has been considerable flooding reported in the media, but falls off even after one flood-free year. Awareness of flood risk is highest amongst those who have experienced flooding. This group is also the most likely to take steps to prepare in advance for flooding. Raising awareness amongst those who live on the floodplain but have never experienced flooding is a particular challenge, and they are unlikely to be receptive to messages regarding measures to take.

Availability of information: the Environment Agency

13.4 The Environment Agency provides a variety of information regarding flood risk and flood risk management services. The main sources of information are Floodline, the Environment Agency web site, flood warning services and flood mapping.

13.5 The Environment Agency runs annual flood awareness campaigns funded by central Government and through Flood Defence Committees. To date these have focussed on those at highest risk of flooding. However, in order to achieve Environment Agency and Government targets, it is important to communicate directly with all those at risk of flooding (approximately 1.9 million homes and businesses). The 2004 flood awareness campaign will begin to target properties where either community or broadcast flood warning arrangements exist, alerting people to the warning systems for their area as well as educating them about appropriate steps they should take to prepare

[56] National Awareness surveys conducted by BRMB International – further information is available on the Environment Agency's *Preparing for a flood web* pages as referenced in Section 12.

for flooding. The advice they receive on steps to take to prepare needs to be appropriate for their level of risk (e.g. for lower risk it might be appropriate to be aware of the warning arrangements whereas higher risk properties should have developed a flood plan).

13.6 The Environment Agency provides a focal point for information about flooding on its web site and through its local-rate 24-hour phone number called *Floodline* (0845 988 1188). This provides information regarding any current flood warnings in place, what steps to take in advance and after a flood and further general information on flooding and other contacts. Feedback on the *Floodline* service has indicated that most people who suffer from flooding would like a one-stop point of contact for all their concerns whether they are Environment Agency or local authority led. Trials are taking place in a number of locations[57].

13.7 The Environment Agency has developed a look-up tool on its web site called *What's in my backyard?* which enables the public to input their postcode to find out a range of environmental information regarding their area. The information includes whether the property is on the floodplain and is accompanied by a detailed general explanation of what the floodplain means to those who live or work on it. A new online flood map is due in Autumn 2004 as part of a five-year programme to improve mapping techniques and products, which will indicate levels of risk for a local area and where flood defences or structures reduce the risk. Local Environment Agency and local authority offices have copies of the flood maps and these are available for public inspection.

Question 13.1: How useful do you find the information currently available on flood risk, and how could it be improved?

Question 13.2: Views are sought more generally on how you think awareness can be raised and sustained, particularly in those areas on the floodplain that have not experienced recent flooding and in areas at lower risk.

Home Information Packs

13.8 The Government has recently consulted on the contents of Home Information Packs proposed to be introduced throughout England and Wales from 2007[58]. These will be a pack of documents that bring together a wide range of

[57] Trials are taking place in partnership with 29 local authorities in Cambridgeshire, Devon and Hertfordshire. Further details can be found on the Environment Agency's Floodline web pages via www.environment-agency.gov.uk

[58] The consultation document and response are both available via www.odpm.gov.uk/stellent/groups/odpm_housing

information of interest to those considering purchasing a home. The results of the consultation have indicated a preference for flood risk information to be one of the areas covered in the packs.

13.9 Information for buyers regarding flooding is not new. Purchasers currently have the option to commission an environmental survey on the property they are considering buying and this report typically includes flooding. However this is not a mandatory requirement of the conveyancing process. The Government considers that it is important that all home buyers have access to information regarding the flood risk of the property that they are contemplating buying, as this should enable them to make a more informed decision. The Government feels, however, that it is important that the information is specific to the property, balanced, clear and unambiguous.

Making sense of information

13.10 It is important that flood risk information is set in context, to avoid under- or over- estimation of the potential problems faced by any given property on the floodplain. A number of basic measures will be sensible for all people in flood risk areas. These include awareness of the flood warning arrangements, making sure that important documents are not stored in basements or on ground floors and awareness of emergency procedures. Further measures, such as installation of flood resistant or resilient products, will be influenced by individual perceptions of risk in relation to the cost for each individual property. It is here that the role of information becomes very important in allowing householders to make a full and rounded decision on what they are prepared to spend and what level of risk they are comfortable with.

Getting more involved

National Flood Forum and flood action groups

13.11 It is important that those at risk of flooding as well as people who have had personal experience of flooding take steps to ensure that they are aware of the issues and get involved in their area. The most common means of doing this is to join or start a flood action group, of which there are over 50 in England already. The main national body that represents the views of these groups is the National Flood Forum. The Forum is involved in raising awareness both locally and nationally and provides assistance to these local groups and others considering setting up their own organisation. The National Flood Forum and local action groups play an important role in raising awareness in flood prone areas through joint Environment Agency and other partner events such as Flood Fairs, awareness days and conferences.

Flood Defence Committees

13.12 The Environment Agency is legally required to carry out most of its flood defence functions through Regional Flood Defence Committees. Membership of these committees includes appointments by the Secretary of State for Environment, Food and Rural Affairs of individuals with interest and

experience in related matters. Advertisements for these posts, when they become vacant, can be found through a range of sources including national papers and the Defra web site.

13.13 The public can also attend Regional Flood Defence Committee meetings as observers.

Question 13.3: How aware are you of local flood activities in your area? What would you find helpful?

Question 13.4: How aware are you of the activities of the Regional Flood Defence Committees?

Coastal erosion

13.14 It is important that individuals and businesses are aware of the potential of any given stretch of coastline to be at risk of coastal erosion. This should enable businesses and individuals to make more informed decisions and plan more effectively. The Government considers that Shoreline Management Plans are the most appropriate vehicles for this and some already have this information as an output. The statutory planning system also has an important role to play in terms of implementing the outputs of Shoreline Management Plans.

13.15 As with information regarding flood risk, it is important that the information provided is clear and set in context. Once this information is available, it should be readily accessible to the public. Individuals can also get involved at a local level through voluntary Coastal Groups, of which there are several based around England. These can be a useful way of finding out what is happening of relevance in the local area and of getting more actively involved (see Section 15).

Section 14: Flood warning systems and emergency responses

Flood warning

14.1 Flood warning is the provision of advance warning of conditions that are likely to cause flooding to property and potential risk to life; the Government views it as one of the most important means of reducing the risk of flooding by reducing consequences.

14.2 The main purpose of flood warning is to save life by allowing people, support and emergency services time to prepare for flooding. The secondary purpose is to reduce the effects and damage of flooding. This might include moving property to a safer location such as upstairs or putting in place temporary measures to prevent floodwater entering properties such as flood boards or sandbags. In addition flood warning informs operating authorities who need to take action such as closing floodgates or other control structures in advance of flooding conditions.

14.3 Flood warnings are sent out through a number of mediums such as telephone, radio, television and the Environment Agency website. In some locations there are local flood wardens. The Agency is required by Defra to have public flood warning plans in place to show the coverage and service. It is important to note that it some instances such as upland areas it may not be viable to provide flood warning services, apart from very general warnings, due to the short lead time. The Government is considering undertaking a review of whether greater account should be taken of the lack of flood warning when appraising schemes.

A further background paper about flood warning and forecasting is available as part of a package of further background and technical documents to accompany this consultation exercise via the Defra website www.defra.gov.uk/environ/fcd/strategy/policy.htm

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Question 14.1: Should the Government undertake a review of whether greater account should be taken of the availability of flood warning services when appraising schemes? Any views on this issue are welcome.

14.4 The success of flood warning depends on a number of factors as follows: coverage; reliability; availability of population at risk to receive a warning; ability of public at risk to act upon a flood warning; and effectiveness of action taken. If any one of the factors fails then the effectiveness of the system is breached. The importance of flood warnings in defended areas is considerable as the consequences of flooding, through overtopping or breaches, in areas where people are not accustomed to or prepared can be

significant. In such cases flood warning needs to work closely with local authority emergency planning.

Flood warning systems in the future

14.5 The Environment Agency already uses risk assessment techniques to determine the level of flood warning service to provide. In line with the strongly risk-driven approach advocated in this document, the Agency will be examining ways further to develop those risk-based techniques. Developments might include:

- Combined risk assessment techniques that consider not only flood depth, frequency and consequence but also other factors such as water velocity (which poses additional risk to life) and building vulnerability (from structural failure or type such as bungalows)

- Techniques to distinguish between the ability of flood warning and built defences to reduce risk, and to assess what measures are most appropriate in different risk areas; this would allow a joined-up approach at the design and option stage of investigating solutions

- More use of methods that take account of modern lifestyles such as mobile phone text and e-mail

- More refined operational targets.

14.6 The Environment Agency has prepared a new ten-year Flood Warning Investment Strategy which was approved by Government in April 2004.

14.7 The current flood warning service covers coastal and fluvial flooding, but not other forms such as flooding from sewers or groundwater. The Government will explore whether it is feasible and cost effective to develop a warning service in relation to intra-urban flooding, which would complement the proposals for integrating urban drainage management in Section 8.

Question 14.2: How effective do you find flood warning services as currently provided? What would you find helpful?

Emergencies

14.8 Under the Civil Contingencies Bill[59] the Environment Agency's existing permissive powers to maintain a warning system would be supplemented by a duty to provide information and advice to the public if an emergency is likely to occur or has occurred.

[59] http://www.publications.parliament.uk/pa/cm200304/cmbills/014/2004014.htm

14.9 Under resilience arrangements for emergencies of all descriptions, Departments must follow the “Lead Department” requirement. This involves the Department designated as the one with lead responsibility for the particular emergency to draw up plans providing for effective central coordination, if needed, across central and local Government, Agencies and other partners in the event of a major event. Defra’s Lead Department Plan for river and coastal flooding events will reflect the new requirements of the Civil Contingencies Bill. In particular this will place new responsibilities on a new Regional, multi-disciplinary, tier of responders in the event of a serious flood; and include powers to declare a state of emergency at the local level where additional powers are necessary and urgent if a serious flood is likely or has happened.

14.10 The Environment Agency and other local responders regularly test their preparedness for flood events and the programme includes serious flood events where regional and national coordination is needed. Local advice surgeries are instigated following floods to assist communities in the process of recovery.

Reservoir Flood Plans

14.11 The safety of large raised reservoirs and their dams is subject to the regulatory regime set out in the Reservoirs Act 1975. For this purpose a large raised reservoir is one designed to hold or capable of holding more than 25,000 cubic metres of water above the natural level of adjoining land. Very high standards of safety are maintained through the Act's requirements of constant supervision and periodic detailed inspection by specialist civil engineers appointed for the purpose by the Secretary of State. The safety regime enshrined in the 1975 Act is being enhanced by changes made through the Water Act 2003. This came about largely because of the uncertainties over the future implications of climate change and rainfall patterns. The 2003 Act amends the Reservoirs Act by giving the Secretary of State/Welsh Assembly Government a power to direct reservoir owners to prepare flood plans setting out the action they would take in order to control or mitigate the effects of flooding likely to result from an escape of water from the reservoir. Defra intends to consult on the way in which the direction-making power will be used and the matters to be addressed in such a plan.

Section 15: Coastal issues

Introduction to flooding and erosion risks on the coast

15.1 Several of the issues discussed in previous sections of this consultation paper are relevant to both inland and coastal areas. These include Section 4 on assessing and managing risk and Section 5 on a more sustainable approach, particularly as regards managed realignment. This section focuses on two specific issues relating to the coast:

- governance arrangements
- long-term strategic planning and decision-making.

15.2 The Flood and Coastal Defence Funding Review consultation exercise in 2002 sought views on the governance and organisational arrangements, and in particular whether responsibilities for flood management and coastal protection should be further integrated. This generated a mixed response, with maritime local authorities keen to retain their existing responsibilities. The Delivery Plan for implementing the conclusions of the Funding Review includes a commitment to reviewing the position in 2007. The questions raised in this consultation exercise on the new strategy will help inform this review.

15.3 **It follows that examination of the specific coastal issues covered in this section may need to be pursued over a longer timescale than other parts of this strategy; this strategy exercise provides the opportunity to begin the process.**

15.4 **The Government has no preferred view on the issues raised below at this stage.**

The mix of risks and drivers on the coast

15.5 The shoreline of England is about 3,000 kilometres long. It has some 900 kilometres of man-made defences, primarily to combat **coastal erosion**. There are some 1,000 kilometres of defences intended primarily to control **sea flooding**. The remaining 1,000 kilometres or so of shoreline are natural frontages such as cliffs. Both flooding and erosion can occur individually or in combination along stretches of coastline.

15.6 Less than 100,000 properties with a current estimated value of some £8 billion are in areas that, without protection, could be eroded in the next century. In comparison, more than one million properties are at risk of sea and tidal flooding, and these have an estimated capital value of some £130 billion. Many urban and industrial areas are concentrated on coasts and estuaries, contributing significantly to the country's GDP. The coastal economy supports almost one million jobs, sustains an important tourist industry and is important for the regeneration of coastal towns. At least a third of England's coastline is

designated for its scenic or natural beauty and 24 per cent of the coastal fringe is ecologically important salt marsh.

15.7 The expected results of climate change on the coast include rising sea levels, potential changes in wave direction and intensity, changes in rainfall and possibly more extreme storm events. The recent Foresight *Future Flooding* report estimates that these changes could increase the risk of inundation from the sea by between four and ten times. Even small sea level rises and changes in wave direction could change the pattern of erosion and deposition, increasing rates of coastal erosion in some areas. The Defra-funded Futurecoast project[60] has brought together the best available scientific advice to promote understanding of the future development of the whole coastline in response to such changes over the next century. It is hoped to review in around 2010 whether Futurecoast should be updated. The Foresight Project also identified development on the tidal floodplain as a significant driver of increased risk in the future.

15.8 Sea flooding can often have a greater impact on property than freshwater flooding – salt water is more damaging to the built environment and can reduce the productivity of agricultural land for many years following flooding events.

15.9 Coastal erosion should be viewed in the context of the long-term dynamic nature of coastal processes which are part of the continuing process of adjustment and energy dissipation at the boundary between the land and the sea. Material that is eroded from one section of the coast can be transported to form part of a beach, salt marsh or mudflat somewhere else in a continuous process of erosion and accretion. It is important that management approaches recognise the underlying natural processes and work with them as much as possible. The longer term sustainability of some defences and links with environmental benefits are discussed in Section 5.

15.10 Land instability is another issue associated with dynamic coastlines. For example, cliff instability often needs to be addressed in order to reduce risks and lengthen the life of coastal defences.

15.11 Many coastal cliffs are of considerable geological interest which often depends on a continuing process of erosion and fresh exposure. That and the need to preserve sediment sources for downdrift frontages can produce conflicts between those wishing to preserve cliff-top land and property and the more dispersed community which gains from continuing erosion. The strategic framework for coastal management described later in this Section provides the means of resolving such conflicts.

[60] http://www.defra.gov.uk/environ/fcd/research/futurecoast.htm

The current management arrangements on the coast

15.12 Institutional responsibilities and funding arrangements for flooding and erosion on the coast are as follows:

- **Environment Agency**: has no responsibility for coastal erosion but has permissive powers to undertake flood management works on the coast. The Environment Agency is also responsible for issuing flood warnings on the coast. The Storm Tide Forecasting Service provides a primary wave and tidal surge forecasting service which feeds into this process.

- **Local authorities**: have permissive powers under the Coast Protection Act 1949 to protect against coastal erosion and inundation from the sea. Local authorities also have permissive powers under the Land Drainage Act 1991 to address flooding issues, including from the sea and tides.

- Funding for both the Environment Agency's and local authorities' works on the coast comes primarily from Defra in the form of grant in aid. Expenditure on specific schemes must be justified under Defra's prioritisation system. This is used to prioritise all Defra expenditure on defences against flood and coastal erosion in order to make best use of available funding.

- **Private landowners**: Landowners, including the railway industry, large industrial installations, the National Trust and private individuals, own significant lengths of the coast. These landowners generally fund their own coastal erosion and flood risk management measures and the maintenance of these. Such measures require consent from the relevant local authority and must comply with planning regulations. Proposals are also seen by Coastal Groups in the context of Shoreline Management Plans. (See paragraph 15.24 onwards.)

15.13 There are therefore some overlapping responsibilities for coastal flooding and erosion management:

- Both the Environment Agency and local authorities have powers to address flooding in coastal areas. In some areas of England the majority of works to address coastal flooding are undertaken by the Environment Agency; in others the majority is undertaken by local authorities. There are also many examples of where the Environment Agency and local authorities have worked successfully in partnership to provide flooding and coastal erosion protection in specific local areas.

- Local authorities have powers under both the Coast Protection Act and the Land Drainage Act. Where coastal erosion and sea flooding problems occur together, as is relatively common, local authorities tend to use the Coast Protection Act because both issues can then be addressed in the same grant application to Defra. However, where a scheme or coastal strategy includes shoreline frontage not covered by schedule 4 of the Coast Protection Act, for example some estuaries and

marinas, local authorities often depend on recourse to the permissive powers in the Land Drainage Act.

Changing the current management arrangements

15.14 The current strategic Shoreline Management Plan framework for managing coastal issues is designed to facilitate appropriate co-ordination and joined-up operation between those with responsibilities for flood and erosion risk management on the coast. As a minimum, there is a case for clarifying the roles undertaken in practice by different authorities in different regions of the England. However, a case also remains for considering whether the institutional arrangements could be simplified.

15.15 Coastal erosion risk is arguably very different from flood risk in terms of probability and consequence. In contrast with most flood losses, coastal erosion causes an irreplaceable loss of land and property at the site of the erosion. Concerns have been expressed about whether the way that loss is valued when appraising potential schemes provides an accurate representation of the true costs. Currently, non-risk market values are used as the basis for economic loss calculations. The timing and extent of coastal erosion and geotechnical land instability at the coast is often difficult to predict, and most coastal defences postpone rather than prevent the loss.

15.16 Streamlining or separating the institutional responsibility and funding for coastal erosion from that for coastal flooding might allow the different types of risk to be managed separately allowing better account to be taken of their separate nature. On the other hand, many coastal schemes implemented by local authorities have both flooding and erosion control functions. It is important that these synergies and the achievement of multiple objectives is not prejudiced by any change to the current arrangements.

15.17 Some possible alternative arrangements are outlined below which result in four possible options for future coastal management arrangements:

Option A: Maintaining the existing arrangements
Option B: Giving the Environment Agency responsibility for all flooding issues on the coast
Option C: Giving a national authority responsibility for all flooding and erosion issues on the coast
Option D: Giving local authorities responsibility for all flooding and coastal erosion issues on the coast

15.18 As emphasised above in paragraphs 15.3 and 15.4, the Government has no preference at this stage for any one particular option over the existing system. Some of the key advantages and disadvantages of each option for change are outlined below to help inform the debate, although this is in no way intended to be an exhaustive list and it is hoped that this consultation exercise will help to further clarify these.

Option B: Giving the Environment Agency responsibility for all flooding issues on the coast

15.19 This option would remove the overlap of powers between the Environment Agency and local authorities with respect to flooding on the coast by giving all flooding responsibilities to the Environment Agency. Local authorities would retain powers with respect to coastal erosion. Some of the advantages and disadvantages of such an arrangement are below:

Advantages:

- This could facilitate an entirely separate grant-in-aid budget for coastal erosion works undertaken by local authorities with a separate prioritisation system. This in turn could further the Environment Agency's ability to maximise cost-effective use of their flood defence grant-in-aid towards capital expenditure on reducing flood risk.
- Coastal Groups, working on Shoreline Management Plans, would ensure that the flood and coastal erosion risks are considered together in creating joined-up, strategic, sustainable plans for the coastal areas.

Disadvantages:

- Flooding and erosion often occurs together and the issues can be difficult to separate. It can therefore be difficult to define schemes as addressing primarily one or the other.
- Such an arrangement would need flexibility to ensure that local authorities and the Environment Agency are able to work together in specific areas.
- Some legislative changes, for example to the Coast Protection Act, are likely to be needed.
- There may be concerns about ensuring sufficient, joined-up local engagement and understanding.

Option C: Giving a national authority responsibility for all flooding and erosion risks on the coast

15.20 This option would transfer powers to address all flood and erosion risk management issues on the coast to one authority in England. This could be the Environment Agency or a new body specifically created for this purpose. Local authorities would still be involved in coastal issues through the Shoreline Management Plan process and representation on Coastal Groups.

Advantages:

- There would be greater public clarity about responsibilities for addressing flood and erosion issues on the coast. A single national authority would be most accountable and transparent.
- It would remove regional anomalies in the balance of responsibilities between the Environment Agency and local authorities.
- Such an arrangement could facilitate the prioritisation of expenditure on capital works with the greatest benefit and enable optimal use of grant-in-aid.

Disadvantages:

- Local authorities are often best-placed to deliver multiple objectives from coastal schemes, often linking to local regeneration and amenity benefits, for example.
- Local authorities are also able to take advantage of European and other funding sources for such multiple-objective schemes that are likely to be unavailable to any national authority.
- There may be concerns about ensuring sufficient, joined-up local engagement and understanding.
- There are questions about how responsibilities for managing risks to coasts roads and railways would work within such a framework.
- Some legislative changes are likely to be needed.

Option D: Giving local authorities responsibility for all flooding and coastal erosion issues on the coast

15.21 Another way to streamline responsibilities could be for the Environment Agency to transfer their work on coastal defences to local authorities, whilst retaining coastal flood warning and other supervisory duties. Coastal Groups could provide a forum for ensuring the Environment Agency and other Government agencies remain sufficiently engaged in decision-making.

Advantages

- There would be public clarity about primary responsibilities for flood and coastal defences on the coast, although there would need to be strong partnership working and understanding between local authorities sharing coastal sediment cells.
- Local authorities could build on their existing strengths in developing joined-up approaches to planning in the coastal zone, by linking coastal defences to wider objectives such as tourism and regeneration.
- Local authorities could maximise best use of other funding sources, for example from the European Union, as well as Defra grant-in-aid for coastal schemes.
- This option would perhaps facilitate the greatest level of local stakeholder engagement in decision-making.

Disadvantages:

- Local authorities would need to continue to operate within a consistent national framework and are likely to need considerable support in decision-making.
- There is a risk that this option could affect the wider aspiration in this strategy to work towards more efficient prioritisation of expenditure on flood and coastal erosion risk management on a national basis based on a consistent framework for assessing risks according to sustainable development principles (see Section 4).
- There would need to be clear understanding of the relationship between local authorities' responsibilities for coastal flood risk management and the Environment Agency's responsibilities on coastal flood warning and other supervisory duties.

15.22 The current consultation copy of English Nature's Maritime Strategy *Our coasts and seas – a 21st century agenda for their recovery, conservation and sustainable use*[61] touches upon coastal governance and sustainable coastal management. It calls for a widely shared vision and emphasises the importance of a long-term view of coastal change. The Government hopes that the development of this Maritime Strategy will help inform future decision-making.

15.23 Defra is a partner in an ongoing research project run by the Tyndall Centre for Climate Change Research, together with English Nature and the North Norfolk District Council, entitled *Living with a changing coastline: exploring new forms of governance for sustainable coastal futures*. The project aims to scope possible new patterns of coastal management to create sustainable coastal futures in terms of effective stakeholder engagement, value for money and technical, environmental and social robustness. It is hoped that the outcomes of this project will also contribute to the debate on this issue.

Question 15.1: Views are sought on the effectiveness of the current management arrangements for flood and erosion risks on the coast, compared to the possible alternative options described above. Any further suggestions for change, identifying the improvements and benefits that it would deliver, are invited.

Strategic and integrated coastal planning

15.24 Given the mix of landowners, responsibilities, drivers and issues on the coast, joined-up strategic planning is essential to deliver sustainable coastal management. Several planning frameworks are relevant:

Shoreline Management Plans and Coastal Groups

15.25 Guidance on preparing Shoreline Management Plans was first published by MAFF and Welsh Office in 1995. The plans provide large-scale assessment of the risks for discrete lengths of coastline based on coastal processes (*sediment cells* or *sub-cells)* and a policy framework for sustainable management of these risks. They identify the combination of policies that are likely to be feasible and acceptable over the next 50 years, set in a longer term context of 100 years or more.

15.26 The development of Shoreline Management Plans requires joined-up working between different organisations and interests on the coast across administrative boundaries. The Government has encouraged the formation of

[61] English Nature (2004). *Our coasts and seas: a 21st century agenda for their recovery, conservation and sustainable use,* consultation draft. http://www.english-nature.org.uk/science/coasts_and_seas/default.asp

voluntary Coastal Groups[62] since the early 1990s to bring together different authorities and stakeholders in developing individual Shoreline Management Plans. A single operating authority is nominated as the lead for each plan to assume overall responsibility for production of the plan. The Coastal Groups also engage other maritime local authorities, the Environment Agency and other coastal landowners and interest groups, including representatives from Network Rail, the Highways Agency, port authorities, environmental organisations and local stakeholder groups.

15.27 Public consultation and examination of proposals are critical parts of the process of developing Shoreline Management Plans. Their effectiveness relies on stakeholder engagement and buy-in to the development process such that planning authorities are able to incorporate the outcomes into statutory plans. It is essential that all interested parties are engaged in the process – not just local authorities and the Environment Agency, but also local interest groups and local coastal landowners including the transport industry and companies with vulnerable installations.

15.28 The first generation of plans were completed between 1995 and 2000. A review of strengths and weaknesses of these plans was published in 2000[63]. Lessons learned were taken forward in the publication of revised *Shoreline Management Pans: a guide for coastal defence authorities*[64] in 2001.

15.29 Research has since been ongoing to develop further advice on stakeholder engagement and models for participation. Following consultation on interim guidance during 2003[65] *Procedural Guidance for Production of Shoreline Management Plans* is due for finalisation and publication in late 2004. The guidance is currently being tested in three pilot areas during the production of second-generation Shoreline Management Plans. The final guidance will inform the production of second-generation Shoreline Management Plans throughout England from 2005 onwards.

15.30 Shoreline Management Plans and Coastal Groups do not have a statutory basis. However, many local authorities have taken forward the recommendations into Local Plans. The Government hopes that even more of the second-generation of Shoreline Management Plans will be taken forward in this way.

[62] www.defra.gov.uk/environ/fcd/policy/coastalgroups.htm
[63] Defra & Environment Agency R&D, *Review of existing SMPs around the coastline of England and Wales,* Project reference FD1703. http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=FJPProjectView&Location=None&ProjectID=8962#Description
[64] Defra (2001) *Shoreline Management Plans: a guide for coastal defence authorities,* PB 5519 http://www.defra.gov.uk/environ/fcd/pubs/smp/revisedsmpguidancefinal.pdf
[65] Defra (2003), *Procedural guidance for the production of Shoreline Management Plans: interim guidance* http://www.defra.gov.uk/corporate/consult/smpguidance/index.htm

Question 15.2: Views are sought about the effectiveness of the Shoreline Management Plan process, in particular:

a. How useful are the outcomes of the process?
b. To what extent are the findings taken forward and implemented in practice?
c. Should more be done to monitor how the findings are taken forward?
d. Do you have any suggestions about supporting the Shoreline Management Plan process and how the outcomes are implemented in the future?

Question 15.3: Views are sought on the structure and arrangements for Coastal Groups. Any proposals for supporting the work of Coastal Groups in the future would be welcome.

Coastal Habitat Management Plans

15.31 Coastal Habitat Management Plans (CHaMPs) have been developed for some specific coastal locations in England to ensure that coastal management meets European biodiversity obligations with respect to protection of Special Protection Areas (SPAs) and Special Areas of Conservation (SACs). The recommendations of CHaMPs will inform subsequent Shoreline Management Plans and the choice of preferred management options for each relevant section of the coast.

Water Framework Directive

15.32 The Water Framework Directive applies to all waters, including estuaries and coastal waters up to one nautical mile from the shore. It is therefore likely to play an increasing role both in the case of planning new coastal defences and maintaining existing defences.

Integrated Coastal Zone Management (ICZM)

15.33 Integrated Coastal Zone Management (ICZM) is a process which seeks to join up the different polices that have an effect on the coast whilst bringing together stakeholders to inform, support and implement these policies. The eight principles of ICZM are:

- a broad overall perspective
- a long-term perspective
- adaptive management
- local specificity
- working with natural processes

- involving all the parties concerned
- support of relevant administrative bodies
- using a combination of instruments.

15.34 A European Union Recommendation on ICZM was adopted in 2002. This proposed that Member States should conduct a national stocktake to analyse which actors, laws and institutions influence the planning and management of their coastal zones. Based on this evidence, Member States should then develop a national strategy to implement ICZM.

15.35 The results of the United Kingdom's stocktake exercise were published in April 2004[66]. The next step is to begin developing a strategy for ICZM, due by early 2006. This will be taken forward in the context of the Government's response to other reviews looking at management of the wider marine environment such as the Review of Marine Nature Conservation[67] and the Review of Development Control in Coastal Waters[68]. The Government will take a decision on whether new marine legislation is needed, and what form this should take, once these reviews have been completed. The Government would wish to consult on any proposed changes before bringing forward any legislation.

15.36 Flood and erosion risk management issues on the coast are important elements of ICZM and it is hoped that this initiative will help secure commitment and stakeholder involvement in the Shoreline Management Plan process.

Planning Policy Guidance: Coastal Planning (PPG 20) and Development on Unstable Land (PPG 14)

15.37 Planning authorities are currently guided by PPG 20 on Coastal Planning which was published in 1992[69]. The guidance highlights the large scale over which natural coastal processes operate and the need for coastal local planning authorities to work together. The guidance recognises the fact that few developments require a coastal location and follows the precautionary principle. New development should not generally be permitted in areas which would need expensive coastal protection works. The guidance also acknowledges the need to consider the shoreline as a whole and the impact that such works may have on the wider coastal environment – planning permission is required for all new coastal protection works.

15.38 Scope for accommodating land uses and activities which do require a coastal location, for example tourism and recreation facilities and development which

[66] Further information is available via www.defra.gov.uk/environment/marine/iczm/index.htm
[67] Available at http://www.defra.gov.uk/wildlife-countryside/ewd/rmnc/
[68] Available via http://www.dft.gov.uk/stellent/groups/dft_shipping/documents/page/dft_shipping_505276.hcsp
[69] Department of Environment (1992), *Planning Policy Guidance 20: Coastal Planning.* More information available via http://www.odpm.gov.uk/stellent/groups/odpm_control/documents/contentservertemplate/odpm_index.hcst?n=3434&l=3

requires access to the sea, should form part of planning authorities strategic approach to coastal management.

15.39 PPG 14 on Development on Unstable Land[70] is also relevant to coastal planning. This guidance advocates that unstable land is identified at an early stage in the planning process in order that undesirable consequences such as property damage, personal distress to occupants and degradation of the physical environment are minimised.

15.40 There are no current Government plans to review PPG 20 or PPG 14 in the immediate future.

Question 15.4: Views are sought on the relationship between ICZM, strategic planning on the coast and Shoreline Management Plans. In particular:

a. How could the findings of Shoreline Management Plans be better integrated with the statutory planning system, especially local development plans?

b. How could the findings of Shoreline Management Plans be better integrated with other specific issues on the coast such as biodiversity, land instability and regeneration?

c. How should Shoreline Management Plans be taken forward in the context of the Water Framework Directive?

d. How could ICZM principles be used to best effect in the context of managing coastal flooding and erosion risks? In particular, what might the roles of Shoreline Management Plans, Coastal Groups, local authorities and planners be within an ICZM framework?

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[70] Further information available via http://www.odpm.gov.uk/stellent/groups/odpm_control/documents/contentservertemplate/odpm_index.hcst?n=3416&l=3

Section 16: Funding issues

16.1 The Exchequer currently provides nearly all funding for flood management services, either directly or through central funding support for expenditure by Local Authorities. The Government has consulted on the idea of a Floodplain Development Charge to contribute to the cost of flood and coastal defence, and received support for this option in the 2002 Consultation (*The Flood and Coastal Defence Funding Review*[71]).

16.2 The Government is considering whether or not there is a case for any refinements of its approach to funding flood and coastal defence. In the face of rising flood risk, defences need to be provided in a more efficient and sustainable way. Maintaining and improving our flood defences benefits the public in general, by protecting existing communities and thereby mitigating pressure on scarce land resources, and through reduced financial costs and economic losses in the future. It also directly benefits businesses and homeowners on the flood plains.

16.3 Whilst most of the focus in this Section is on funding flood risk management services, it should be noted that these considerations will generally apply in relation to funding coastal erosion risk management services.

16.4 A number of proposals in this paper would have resource implications and delivery of these may bring extra costs. The amount that Government spends will depend on affordability and might also involve some reform of the funding regime. (See section 4.14)

16.5 This section therefore sets out a number of options that could form part of a flexible strategy for funding flood protection and coastal erosion risk management.

What is currently in place?

16.6 Flood Defence Grant in Aid was introduced for the Environment Agency on 1 April 2004. This replaced the previous capital grants to the Agency, which had been awarded on a project-by-project basis and, in large part, the levies that the Agency raised from local authorities. This reform of the grant system was one of the main outcomes of the Flood and Coastal Defence Funding Review of 2002 and it is hoped that it will provide greater certainty of funding for the Agency, allow better strategic planning and targeting of expenditure on flood risk reduction and a streamlining of approval processes. The success of this shift in the balance towards more national funding will be reviewed in 2007.

[71] Further details on the Flood and Coastal Defence Funding Review can be found via http://www.defra.gov.uk/environ/fcd/studies/fundrev.htm

16.7 The Government has increased the amount of national funding available for flood and coastal erosion risk management services in recent years, as summarised below:

2002-03	2003-04	2004-05	2005-06
£408m	£432m	£478m	£564m

Funding principles

16.8 The Government consulted on funding principles for flood and coastal defence in 2002. Following this, the Government is considering whether or not any new funding schemes should be guided by the polluter pays principle that typically informs Government policy on the environment. In the context of flood and coastal erosion risk, this principle may have non-funding related implications as well. However, in the context of flooding risk it can be difficult to attribute harm to individual polluters.

Polluter Pays

Those who increase the probability of flooding

16.9 Precipitation is not directly attributable to a polluter. Where persons living on or owning river banks contribute to the flood risk, for example by failing to carry out maintenance of watercourses on their land, the Government considers that the most appropriate remedy is for the relevant authorities to use any powers under flood defence legislation to enforce the correct remedial action. As part of the strategy the Government will be considering whether the powers of operating authorities are sufficient.

16.10 While the Environment Agency (and other operating authorities) have powers to facilitate their own works, many third parties carry out works which have the potential to increase flood risk but which only become apparent once the problem occurs. In the future, operating authorities will take a more proactive and preventative approach to all aspects of their work. The Government intends to review the effectiveness of existing consenting regimes to manage flood risk in the future, and whether additional or revised powers are appropriate. The review will consider operating costs, degree of cost recovery achieved and integration with other flood risk management controls.

Those who develop property in the floodplain

16.11 There are already arrangements in place to require developers to bear the cost of any flood mitigation arrangements needed and their maintenance (see paragraph 3.12 of Section 3).

A charge on new development

16.12 The Flood and Coastal Defence Funding Review of 2002 put forward the idea of a Floodplain Development Charge (FDC) for consultation. The FDC would be paid by developers in recognition of the benefits that developments might

get from existing flood risk management services such as flood warning, research, advice and any defences for the at risk area. The charge would be in addition to the requirement under planning arrangements that developers also build any site-specific flood defence and mitigation measures.

16.13 The FDC would be payable by developers on completion of their properties and could be raised as a flat rate per residential and/or commercial property or be varied by size or value of the property. Subject to legal considerations, there could be a differential rate between development on Brownfield and Greenfield sites.

16.14 The FDC satisfies the conditions for new funding streams stated above. The range of pre-existing flood management services that Government provides allows developers to build on the floodplain with a lower flood risk than would exist in the absence of these services. As such, these existing flood risk management services will help to provide developers with a viable commercial location, from which they can generate revenue through the construction of either domestic or commercial buildings. The Government's provision of these services also goes some way to enabling the developer to obtain insurance for their development.

16.15 The FDC also meets with the 'polluter pays' principle, since developments will add to flood risk by increasing the value of assets that are potentially exposed to damage by flooding. Developments are therefore likely to give rise to increased future costs of flooding.

16.16 Arguments (originally voiced during the Funding Review consultation) against the FDC include the concern that it may conflict with the Government policy to develop Brownfield sites. This could be mitigated through a differential charge. It might also be seen as focusing unfairly on new developers who already have to meet extra flood defence costs arising through planning obligations, whereas existing properties escape with no charge despite benefiting from the services.

16.17 The formal incidence of the charge would be on the developer. Homebuyers would not be likely to bear the cost because new houses have to be competitively priced in the market where the existing stock is normally very much larger than the flow of new properties. So, as with other charges on developers, the Government expects that ultimately it will be landowners bringing forward plots for development that will bear the cost.

16.18 The level of any charge, and its possible variation, would need to be consistent with the achievement of the Government's development policies. Payment might also reduce the amount that developers had available for contributing towards other areas through existing Section 106 agreements and the proposed new Planning-gains Supplement (PGS.)

16.19 The Barker Review of Housing Supply (see Section 7) included the recommendation that the Government introduce a charge that captured some of the development gains that landowners benefit from, to ensure that local

communities share in the value of development planning, and that this charge could be varied locally to reflect any additional social or environmental costs of development. The Government is committed to working with stakeholders to design a workable and effective PGS as part of a package of reforms to improve housing supply, and will report back on progress by the end of 2005.

16.20 Some respondents to previous consultations have argued that individuals and businesses benefiting directly from flood management or coastal erosion services should contribute more to the cost of these services. The Government would welcome further views on the FDC proposal in the context of this consultation on how it might be operated in practice. We would welcome views on any alternative funding proposals that you would see to be appropriate.

16.21 The Government therefore seeks views on options for funding, and on what principles the Government should use to inform any decisions on reform of funding. Following the outcome of this consultation, there will be further consultation on any options the Government considers to be appropriate.

Question 16.1: Comments have already been received in respect of the FDC as part of the Funding Review (2002) (see footnote 71 above). In light of the principles set out in this consultation and experience since 2002, do you have any additional comments?

Business Improvement Districts (BIDs)

16.22 The Government introduced Business Improvement Districts in the Local Government Act 2003 as part of its long-term strategy to encourage local businesses and Government to work together to achieve improvements in their local area. The aim will be to give local authorities greater freedom to use business rates for improvements in their area and also give businesses a more democratic input into these decisions. The system is currently at the pilot stage and consultation on proposed draft legislation took place earlier this year.

16.23 While the suggested focus on improvements has tended to be on areas such as extra street cleaning services or security measures and general town centre improvements, there is no limit in principle to the scope of the plans. There would therefore be potential for local authorities and businesses to use this facility to raise additional money for specific flood management services, for example temporary flood barriers, where they were both minded to do this and if it was considered to be a key area of concern.

Question 16.2: Is there a role for BIDS in this area?

Land Drainage Consent Scheme

16.24 The Land Drainage Consent Scheme is administered by the Environment Agency. If consent has been given through the planning system for new or additional drainage, drawings are submitted to the Environment Agency who log them and may request alterations. There is currently a flat rate charge of £50 for this service regardless of the size of the development.

Question 16.3: Would there be any value in different approaches to the Land Drainage Consent Scheme?

Multiple benefit schemes

16.25 Section 5.22 addresses the issue of identifying potential sources of funding to contribute towards schemes where there are wider benefits than flood alleviation, such as amenity and biodiversity gains. Trials are already taking place on this basis. The Government will monitor the results of these trials and seek to ensure that in the development of funding for new schemes, appropriate attention is paid to ensure that all possible sources are considered.

Section 17: Next steps

17.1 Following the close of this consultation period on 1 November 2004, the Government will carefully consider all responses to this consultation exercise when taking forward the development of this new strategy for flood and coastal erosion risk management for England.

17.2 It is hoped to publish the new strategy in early 2005 in response to this consultation exercise. The new strategy will include a delivery plan for further work to take forward proposals and a commitment to evaluate progress and review the strategy on a regular basis.

17.3 It is emphasised that, in the context of many of the proposals contained in this document, this consultation exercise represents the first step in a decision-making process that will continue into the implementation phase of the final strategy. Further consultation and Regulatory Impact Assessments will be required to take forward several of the specific proposals outlined in this consultation document.

17.4 Latest updates on progress will continue to be available via http://www.defra.gov.uk/environ/fcd/policy/strategy.htm.

Further information

A package of further background and technical documents to accompany this consultation exercise are available from the Defra website via www.defra.gov.uk/environ/fcd/strategy/policy.htm, including:

- Physical drivers behind flood and coastal erosion risks
- Flood and coastal erosion risk assessment and prioritisation
- The principles of flood and coastal erosion project appraisal, including multi-criteria approaches
- The principles of stakeholder engagement and consultation in flood and coastal erosion risk management
- Payments to individuals and relocation issues in relation to flood and coastal erosion risk management
- Approaches to flood and coastal defence, including flood resistance and resilience
- Sustainable drainage systems
- Defra groundwater flooding scoping study for England
- Background note on the Water Framework Directive and flood and coastal erosion risk management
- Flood warning and forecasting

Further information about all aspects of flood and coastal erosion risk management policy in England is available via the Defra Flood Management website www.defra.gov.uk/environ/fcd.

The Environment Agency website provides further information about managing flood risks, including flood warning, via www.environment-agency.gov.uk

The Office of the Deputy Prime Minister (ODPM) website provides details of planning guidance, housing policy, Building Regulations and other relevant issues via www.odpm.gov.uk.

Glossary

Appraisal
The process of defining objectives, examining options and weighing up the costs, benefits, risks and uncertainties before a decision is made.

Biodiversity action plan
A national action plan for a key habitat or species, approved by Government, as part of the overall UK Biodiversity Action Plan.

Coastal defence
A term used to encompass both coastal protection against erosion and sea defence against flooding.

Coastal squeeze
The process by which coastal habitats and natural features are progressively lost or drowned, caught between coastal defences and rising sea levels.

Coastal erosion
The loss of land or encroachment by the sea through a combination of wave attack and, in the case of coastal cliffs, slope processes (e.g. high groundwater levels). This may include cliff instability, where coastal processes result in the periodic reactivation of landslide systems or promote rock falls.

Cost-benefit analysis
Comparison of present value scheme benefits and costs as part of an economic appraisal. The cost-benefit ratio is the total present value benefits divided by the total present value costs.

Economic appraisal
An appraisal that takes into account a wide range of costs and benefits, generally those which can be valued in money terms.

Environmental Impact Assessment
The specified process for undertaking the environmental appraisal when a proposed scheme is covered by The Environmental Impact Assessment (Land Drainage Improvement Works) Regulations 1999 or other Regulations implementing EC Directive 85/337, and the amending EC Directive 97/11.

European site
Any site that has been designated as a site of international nature conservation importance either as a Special Protection Area (SPA), a Special Area of Conservation (SAC) or a Ramsar Site.

Flooding
Refers to inundation by water whether this is caused by breaches, overtopping of banks or defences, inadequate or slow drainage of rainfall, underlying groundwater levels or blocked drains and sewers.

Habitats Directive
EC Directive 92/43 on the conservation of natural habitats and of wild fauna and flora. The Conservation (Natural Habitats & c.) Regulations 1994 transpose the Habitats Directive into UK Law.

Intangibles
Those costs, benefits and risks that are difficult to quantify but which are nevertheless relevant for the decision-making process.

Operating authority
A body with statutory powers to undertake flood defence or coast protection activities, usually the Environment Agency, local authorities and internal drainage boards.

Participation
The process whereby people and/or organisations take part in decision making process.

Ramsar site
An internationally important wetland, designated under the Convention on Wetlands of International Importance especially as Wildfowl Habitat (Ramsar, Iran 1971). As a matter of Government policy, such sites are afforded the same protection as those designated under the EU Habitats and Birds Directives.

Residual risk
The risk which remains after risk management and mitigation. It may include, for example, risk due to very severe storms (above design standard) or risks from unforeseen hazards.

Sediment cell
A length of coastline and its associated near shore area within which the movement of coarse sediment (sand and shingle) is largely self-contained. Interruptions to the movement of sand and shingle within one cell should not affect beaches in an adjacent sediment cell.

Sediment sub-cell
A sub-set of a sediment cell within which the movement of coarse sediment (sand and shingle) is relatively self-contained. The sediment sub-cell is, in many cases, likely to provide the appropriate basis for the development of Shoreline Management Plans.

Site of Special Scientific Interest (SSSI)
A site notified under the Wildlife and Countryside Act 1981 because it is of special interest by reason of the flora, fauna, geological or physiographical features.

Special Area of Conservation (SAC)
An internationally important site designated under the EU Habitats Directive. A cSAC is a candidate site, but is afforded the same status as if confirmed.

Special Protection Area (SPA)
An internationally important site designated under the EU Wild Birds Directive. A pSPA is a proposed site, but is afforded the same status as if confirmed.

Stakeholder
A person or organisation with an interest in, or affected by, the policies produced.

Tangibles
Those costs and benefits, which can be related to specific items of loss or expenditure, are straightforward to quantify and for which there are accepted methods of evaluation.

Transparency
Ensuring that decisions and decision-making processes are recorded in ways that make it possible to track the reasoning behind decisions, and that these records are accessible to those having a legitimate interest in the decisions.

Annex 1: List of consultees

All local authorities in England
All regional Government Offices in England
All Regional Development Agencies in England
All water companies in England
All Flood Defence Committees in England
All Coastal Groups in England
All Members of Parliament for England

Action for Communities in Rural England
Association of British Insurers
Associated British Ports
Association of Consulting Engineers
Association of Drainage Authorities
Association of Inland Navigation Authorities
Association of Insurance and Risk Managers
Association of Metropolitan Authorities
Association of Municipal Engineers
Association of National Park Authorities

Babtie Group Ltd
Binnie, Black and Veatch
Bovis Construction Ltd
Bovis Homes Ltd
British Aggregates and Construction Materials Industry
British Association of Colliery Management
British Chamber of Commerce
British Ecological Society
British Geological Survey
British Ports Association
British Standards Institution
British Water
British Waterways
Broads Authority
Bryant Group plc
Building Design Partnership
Building Research Establishment

Campaign for the Renewal of Older Sewerage Systems
Centre for Coastal and Marine Sciences
Centre for Ecology and Hydrology
Centre for Land Use and Water Resources
Chartered Institute of Building
Chartered Institute of Housing
Chartered Institution of Water and Environmental Management
Coal Authority
Confederation of British Industry
Confederation of UK Coal Producers
Construction Industry Research and Information Association
Consumers Association
Council of Mortgage Lenders
Council for National Parks
Council for the Protection of Rural England
Country Land and Business Association
Countryside Agency
County Surveyors' Society

Economic and Social Research Council
English Heritage
English Nature
Entec UK Ltd
Environment Agency
Environment Council

Federation of Small Businesses
Forestry Commission
Forum for the Future
Friends of the Earth

Geological Society

Halcrow plc
Health & Safety Executive
Heritage Coast Forum
Highways Agency
HM Land Registry

House Builders Federation
Housing Corporation
HR Wallingford
Hutchison Ports (UK) Ltd

Inland Waterways Association
Institute of Ecology & Environmental Management
Institute of Environmental Management & Assessment
Institution of Environmental Sciences
Institute of Estuarine and Coastal Studies
Institute of Fisheries Management
Institute of Grassland and Environmental Research
Flood Hazard Research Centre, Middlesex University
Institution of Civil Engineers

Jacobs Gibb Ltd
John Laing Construction Limited
Joint Nature Conservation Committee

Land Use Consultants
Lewes Flood Action
Local Government Association

Marine Conservation Society
MARINET – Friends of the Earth Local Coastal Network
Maritime and Coastguard Agency
Met Office
Mott MacDonald Group
National Association of Estate Agents
National Association of Fisheries and Angling
National Association of New Home Owners
National Environment Research Council
National Farmers Union
National Flood Forum
National House Building Council
National Housing Federation
National Council for Housing and Town Planning
National Sewerage Association
National Trust
Network Rail

Office of Water Services

Planning Inspectorate
Planning Officers Society
Port of London Authority

Royal Geographical Society
Royal Institution of Chartered Surveyors
Royal Society for the Protection of Birds
Royal Institute of British Architects
Royal Town Planning Institute
Rural Development Commission

Scottish Environment Protection Agency
Sewers for Adoption Review Group
Sewer Renovation Federation

Town and Country Planning Association

UK CEED
UK Major Ports Group Limited
UK Water Industry Research

Water UK
Water Voice
Welsh Assembly Government
Wildfowl and Wetlands Trust
Wildlife Trusts
Woodland Trust
World Wide Fund for Nature
WRc

The following Government Departments and Agencies are represented of the high-level Programme Board which is steering this strategy development exercise:

- Cabinet Office
- Department for Environment, Food and Rural Affairs
- Department for Trade and Industry: Office of Science and Technology's Foresight Flood and Coastal Defence Project
- Department for Transport
- Environment Agency
- HM Treasury
- Office of the Deputy Prime Minister
- Prime Minister's Office

Annex 2: Initial Regulatory Impact Assessment

Making space for water: developing a new strategy for flood and coastal erosion risk management for England

Initial Regulatory Impact Assessment (RIA)

This initial RIA provides an overview of possible risks, benefits and costs associated with the proposals in this consultation paper.

It is difficult to identify and quantify all possible impacts at this stage. We welcome all contributions and suggestions as part of your response to this consultation document.

Following this consultation period, fuller RIAs will be prepared at a later date for proposals which are taken forward.

Purpose and intended effect of measure

The objective

1. The new strategy for flood and coastal erosion risk management will update the existing Strategy for Flood and Coastal Defence in England and Wales which was published by MAFF and the Welsh Office in 1993. The new strategy will be for England only.

2. The proposed new strategy aims to manage the risks from flood and coastal erosion through a variety of integrated measures, in order to reduce the threat to human life whilst furthering the Government's aims and strategic objectives, particularly sustainable development.

3. More specifically, key objectives of the new strategy are:
   - To set the strategic direction for flood and coastal erosion risk management policy for the next 20 years or so, in the light of drivers such as climate change, development pressures and socio-economic change
   - To develop a mix of policies designed to minimise the creation of new risks, to manage risks and to increase resistance and resilience when events do occur
   - To enable flood and coastal erosion risk management activities to make a greater contribution to sustainable development by:
     - Taking a holistic approach to looking at all sources of flooding and coastal erosion and looking at the impacts of policies across Government
     - Looking at defining risks to better reflect social and environmental impacts as well as economic impacts

- Working with natural processes wherever possible and to encourage a mixture of funding to achieve multiple benefits from flood and coastal erosion risk management measures.
- To develop a clear understanding and acceptance of the respective roles of Government and individuals. The public will be more aware of flood and coastal erosion risks and empowered to take action themselves where appropriate.
- To further improve local democratic input into decision-making, in particular through the development of future Catchment Flood Management Plans and Shoreline Management Plans, within the context of national standards and information.

4. The strategy will impact on all those who have an interest in flood and coastal erosion risk management – those who deliver flood and coastal erosion risk management services, those who live or work in an area affected by flooding or coastal erosion and industries with an interest in this area.

The background

5. There are over 1.6 million properties on the floodplain in England and more than 3.5 million people at risk from flooding. It is estimated that if there were no defences in place, annual average damages of more than £3bn would occur – this does not include disruption to business[72]. The major floods of 1953 saw the loss of 300 lives. Since then the Government has worked to ensure that loss of life is avoided. The major floods of Autumn 2000 saw no loss of life, but approximately 9,000 properties were flooded, some more than once. A further 30,000 properties were close to being flooded and if there had been no defences in place at all, around 200,000 to 300,000 properties would have been flooded.

6. It is not possible or desirable to prevent all flooding, nor simply to move people away from flood and coastal erosion risk areas. Floodplains and coastal areas provide considerable economic, social and environmental benefit to people and businesses located there. A large part of London is on the floodplain as is Lincolnshire. There are a number of significant conurbations along the coast including Merseyside.

7. What is more appropriate is that we ensure we are *Making space for water.* In addition to the direct benefits to individuals and businesses in the floodplain, there is benefit to the national economy from providing flood and coastal erosion risk management services to these places, and provision of defences is based on a cost-benefit analysis that takes account of factors such as health and environmental impacts as well as economic damages to property.

[72] Taken from ongoing Defra studies: National Assessment of Assets at Risk of Flooding & Coastal Erosion in England & Wales (2001) and National Assessment of Defence Needs & Costs (2004). Figures include damages to property, agricultural land and transport infrastructure.

8. The Government currently spends approximately £500m/year on the provision of flood and coastal erosion risk management services, focused mainly on flooding from rivers and seas. Between October 2000 and June 2003, for example, 385 capital works projects including flood warning ones were approved at a total value of £510m. It should be noted, however, that capital works form only part of the expenditure on flood and coastal erosion risk management.

9. Defra has overall policy responsibility for flood and coastal erosion risk management in England. Operational responsibility in England is split between the Environment Agency, who are responsible for flooding from 'main rivers' and the sea and also exercise a general supervisory duty, and other operating authorities – local authorities and others with powers under the Land Drainage Act and the Coast Protection Act.

10. The 1993 Strategy for Flood and Coastal Defence was the first formal Government strategy document on this subject and outlined the main principles that the provision of services should follow. It focused on flood warning services, river and coastal flooding and the provision of defences that met a cost benefit analysis and where possible provided environmental benefit.

11. Although the 1993 strategy has never been formally reviewed until now, it has been built upon since its publication. For example flood warning services have been further developed covering 1.16m households on the floodplain; further work has taken place to take account of environmental needs and to work with natural processes; and our understanding of the possible effects of climate change has improved.

12. The Flood and Coastal Defence Funding Review, which concluded in 2003, recommended several funding and administrative changes in order to streamline processes. The delivery of the conclusions of this Review is now well underway and there are commitments to undertake further evaluation in the future.

13. Many additional drivers have arisen since 1993. Key priorities include:
    - the concept of sustainable development and what this means in the context of flood and coastal erosion risk management;
    - increased development pressures particularly in the south-east;
    - revised planning guidance on development and flood risk (PPG25); and
    - increased recognition and understanding of the importance of surface water drainage in influencing flood risk in urban areas.

14. The recent publication in April 2004 of the Foresight *Future Flooding* report has raised the profile of many of these issues that will influence flooding over the next 30 to 100 years.

15. It has been recognised for many years that climate change will have a significant impact on flooding and coastal erosion. The primary drivers of changes in flood and erosion risk will be changes in normal and extreme sea

levels and coastal storms; changes in precipitation and temperature will also affect river flooding, other natural and man-made drainage systems and coastal land stability. There may be some regional differences, with the south and east coasts more vulnerable to sea level change (due to long term land movements) and the north and west possibly more vulnerable to increased precipitation, though there is great uncertainty attached to these forecasts.

Risk assessment

16. The Government defines flood and coastal erosion risk in terms of probability x consequence[73]. Flood and coastal erosion risks are different and are introduced separately below.

17. The current situation incorporates substantial and significant flood and coastal erosion risk management measures. There have been great advances since the 1953 floods. There has been a continued research and development programme and new techniques and technologies have been incorporated over time into the current system. However, it is worth considering that the current risk assessment methods reflected below are very much focused on economic damages (because the main consequences that can be quantified are economic). Non-economic consequences are very important but less amenable to quantification; as a result they tend to be treated separately from the risk assessment. This may not be the best approach for ensuring that all social and environmental risks are fully considered and arguably produces a conservative estimate of the true level of risk.

Flood risk

18. The risk to human life is low under the current flood risk management arrangements. There are currently over 1.6 million properties at risk from river and coastal flooding and approximately 81,700[74] from intra-urban flooding (where heavy downpours overwhelm urban drainage systems) from rain events of the size of a 1 in 10 year probability of occurrence. Properties valued at over £3.5bn are at risk. This does not take into account the potential 250,000 properties that may be at risk from groundwater flooding.

19. Flood risk maps provide an indication of the probability of flooding in specific areas. Most flood events are relatively short in duration and water returns to normal levels after a few hours or a few days. An exception to this is

[73] Probability is the chance that an event will occur, which may be modified by flood defences or other measures. Consequences relate to people, the natural and built environments, and are often quantified through damages to property which can provide a proxy for other issues such as loss of life and social impacts. Consequences can also be modified through flood warning or resilience measures. Thus if the probability of a flood event is 5 per cent per year and the consequence is damage valued at £20,000, the risk will be £1,000 per year. Since any of a range of different flood events with different probabilities and different consequences could occur in any year, appraisals need to consider the full range of events and combine the results to provide an expected or average annual damage.

[74] Taken from OST Foresight *Future Flooding* report – the figure represents the UK and so the England figure will be less.

groundwater flooding, which can last several weeks or even months. There are frequently consequences from all sources of flooding in terms of damage to property and infrastructure, illness and stress to those involved and disruption to services. Current research suggests that the value of losses is dominated by damage and destruction of property.

20. Currently it is estimated that without any flood management services, the average annual damages from flooding would be more than £3bn: with current spending levels and with current approaches this is cut by two-thirds.

21. This represents the current level of risk – a number of drivers mean that risk will continue to rise. Climate change will lead to changes in precipitation and tidal levels. The consequence of flooding will rise; as national wealth rises so will individual wealth and so the value of assets will continue to rise. Without management of these factors, the level of risk will continue to rise. If measures are not taken to address the drivers outlined above, the average annual damages will keep rising.

Coastal erosion risk

22. Approximately 92,000 properties with a nominal value in 2004 of £7.6 billion are currently at risk of coastal erosion. Coastal erosion usually results in permanent damage or loss of property but can usually be forecast reasonably far in advance. Other consequences include stress to those involved, impacts on the social cohesion of coastal communities and implications for tourism and other economies dependent on the coastal zone.

23. Coastal erosion is predicted to continue and even accelerate in some areas of England in the future due to a combination of glacial rebound, sea level rise and possible increases in storminess.

Drivers for rising risk

Economic:

24. The Foresight *Future Flooding* report [75] has suggested that with maintenance of current flood and coastal erosion management infrastructure, the total risk in economic terms could increase 2 to 20 fold by 2080, across a broad range of future climate and socio-economic scenarios. This is largely due to the increased frequency of extreme events and the increases in development and wealth in risk areas. The changes in economic risk would be reflected in changes in exposure for people and the natural environment. Key issues for control of this risk in the future are the way in which flood management infrastructure is maintained and developed recognising that the areas most at risk in the future are those that already depend on defences today.

[75] Office of Science and Technology (2004), Foresight *Flood and Coastal Defence Project: Future Flooding* Executive Summary found at: www.foresight.gov.uk.

Environmental:

25. The potential for increased frequency of intense rainfall events could put particular pressures on urban drainage systems. This may result in more surface water drainage problems and sewer flooding events. Changes in rainfall patterns may also affect the frequency of groundwater emergence, which can also lead to flooding.

26. Coastal squeeze is the process by which coastal habitats and natural features are progressively lost, trapped between defences and rising sea levels. Compensatory habitat is not always available because of other existing land uses. Without appropriate planning and management, future sea level rise is likely to result in decreased stability and sustainability of ecologically important coastal habitats such as salt marsh, and lead to increased rates of loss.

27. Sea level rise and increased storminess may benefit some fluvial and coastal habitats but are likely to increase threats to other habitats which depend on defence from flooding or coastal erosion. Many of these defended habitats are statutorily protected, for example under the Habitats Directive or the Birds Directive. Government has a Public Service Agreement (PSA) target to bring 95 per cent of Sites of Special Scientific Interest (SSSIs) into favourable condition by 2010.

Legal:

28. The Water Framework Directive will play an increasing role. Although it is anticipated that many water bodies which are currently affected by flood or coastal erosion defences will be classed as Heavily Modified Water Bodies, the effect on the water environment of both existing defences and proposals for new works will be required to be considered by reference to the environmental objectives set under the Directive.

29. Failure to ensure that future flood and coastal erosion risk management activity complies with these requirements could ultimately result in multiple European infringement proceedings and heavy non-compliance fines. This threat and the possibilities for challenge that it adds may increase costs of project development.

30. The European Union issued a Communication on Flood Risk Management in July 2004, which is due to be discussed further during the Dutch presidency.

Organisational:

31. A number of different departments and bodies are responsible for different areas that have an impact on flood and coastal erosion risk management. For example planning (future development pressures) is covered by ODPM (policy) and local authority planning bodies and the Environment Agency in terms of environmental risks. Responsibility for urban drainage rests with a number of different bodies, such as sewerage operators and local authorities. Without an integrated approach to solutions that involves all interested parties, perhaps along similar lines to the Shoreline Management Plan (SMP) process on the coast, management of the risks may not be sustainable.

32. Failure to take account of sustainable development and the need for sustainable communities will lead to policy that is at odds with the rest of Government policy and may lead to solutions that are not sustainable in the future, having unforeseen impacts in both social and environmental terms.

Options

33. Three options for future flood and coastal erosion risk management are presented below.

Option A: Do nothing. This option considers the implications of continuing to base the strategic direction of flood and coastal erosion risk management on the existing Strategy for Flood and Coastal Defence published in 1993.

Option B: Do minimum required legally. This option removes any public expectations or Government commitments and considers the implications of just complying with relevant legal requirements in relation to flood and coastal erosion risk management.

Option C: Develop a new strategy for flood and coastal erosion risk management on the basis of this consultation paper. This option considers the impact of the new strategy compared to alternatives.

Option A is not realistic (as noted above policy has already moved beyond this in a piecemeal basis) but is provided as a base case to compare against other options.

Option A: Do nothing – maintain the existing policy

34. The 1993 strategy represented a forward-looking approach to flood and coastal erosion risk management when it was developed and has proved a useful tool for furthering work in this area. If we continue with the current strategy, focus will remain very much on flooding from rivers and the sea plus coastal erosion. This would be ignoring other types of flooding from groundwater, direct flooding from intense rainfall, flooding from sewers and other drivers and rising risks highlighted in the Foresight work. Evidence suggests that up to 40 per cent of flood insurance claims were located outside the floodplain in the 2000 floods. This is not to suggest that these other forms of flooding are not currently being dealt with at all: water and sewerage operators have duties in relation to sewer flooding, both statutory and through their arrangements with Ofwat; local authorities will respond to the results of pluvial flooding; the Environment Agency and other bodies may respond to groundwater flooding, but this is not the case in all areas.

35. Government policy on sustainable development had not been fully developed when the 1993 strategy was written. In addition, the strategy focuses very much on what Defra and its delivery agents can deliver and does not consider in detail what needs to be done by other parts of Government, business and industry and individuals at risk.

36. In summary Option A carries the risk that, by continuing with a strategy which is somewhat outdated, although there may not be significant consequences in the short term, the opportunity is lost to plan now in advance of rising risks and prepare for and reduce the impact of the consequences in the longer term.

Option B: Do minimum required legally

37. The Government's powers in relation to providing flood and coastal erosion risk management measures are permissive. This means that there is no explicit statutory obligation to provide defences for the protection of human life, property and infrastructure, nor therefore is there a statutory right to levels of protection. This option considers the impact of Government and operating authorities withdrawing from all flood and coastal erosion risk management activities other than those that they are legally obliged to carry out in relation to the following:
    - Requirements in relation to the Water Framework Directive - including maintenance of existing defences in order to ensure the objectives of this Directive are not compromised
    - Requirements under the Habitats Directive to provide compensatory habitats for those lost due to encroaching coastline
    - Requirements to protect other statutory designations in relation to habitats
    - Proposed requirements for the Environment Agency to provide flood warning information to the public under the current Civil Contingencies Bill
    - Obligations on water and sewerage operators in relation to sewer flooding
    - Requirements to provide disaster plans for times of emergency.
    - Contractual obligations, for example between operating authorities and contractors
    - The scope of the Human Rights Act and the need to provide sufficient notice and right of appeal against any potential impact on an individual's property rights.

38. There are significant risks associated with this option in terms of loss of human life and economic damage to property, infrastructure and businesses from flood and coastal erosion events. There would be associated political fallout. There is an expectation of a certain minimum level of public service in England, in relation to flood and coastal erosion risk management measures, which this option would probably not provide.

Option C: Cover all issues in relation to flood and coastal erosion risk management as addressed by the new strategy

39. Option A (Do nothing) above is to some extent a hypothetical scenario because flood and coastal erosion risk management practices have already evolved over the past decade to take account of some of the issues that the new strategy seeks to address, such as sustainable development and the management of consequences. A range of issues are covered in the

consultation document on the new strategy on which views are sought – it should be emphasised that firm proposals will be subject to the outcome of the consultation exercise. This option will be refined therefore in subsequent versions of this RIA as the strategy develops. The main areas are as follows:

i. To embed further the concept of sustainable development in flood and coastal erosion risk management by developing mechanisms over time for assessing flood and coastal erosion risk by taking more explicit account of environmental and social factors as well as of economic costs and benefits. Suggested methods to do this include development of a nationally consistent framework that uses techniques such as multi-criteria analysis and improved techniques for expressing social and environmental costs in quantifiable terms. This is a challenging agenda and the important issue is to ensure the environmental and social costs and benefits are adequately reflected in decision-making whether or not they can be quantified. Other methods include: better stakeholder participation in the appraisal of schemes and assessment of risks; and consideration of rural communities and indicative standards.

ii. Further implementation of ways of working with natural processes including options to:
    - Restore natural processes
    - Realign river corridors and shorelines. This will also make rivers and coasts more sustainable and resilient for the future
    - Remove Government funding for the maintenance of defences where this is no longer justified. This may help facilitate working with natural processes.

iii. Integrated portfolio of responses including:
    - Land-use planning: restatement of the Government's commitment to ensure that development and planning policy does not add to flood risk; options regarding the production of flood risk assessments including whether they should be made compulsory; consideration of using call-in if significant number of developments take place against Agency advice
    - Integration of drainage management in urban areas: options include the piloting of integrated drainage management partnerships and plans to achieve better coordination of surface water drainage with a view to identifying lead responsibilities and funding arrangements in the longer term. This will raise questions about the piloting of such proposals, lead responsibility and funding arrangements
    - Flood resistance and resilience measures incorporated in new and existing buildings: suggestions include review of the Building Regulations to incorporate more flood resilience measures; encouragement of the incorporation of flood resilient and resistant products in existing buildings; and encouragement of local authorities to consider requests for assistance in relation to these in areas of high risk (alongside other requests)

- Handling flooding of and from the transport network: suggestions include the production of guidance for design and maintenance of non-strategic (urban) roads, covering drainage systems in particular; including the road network in integrated drainage plans; and making more effective use of railway earthworks/structures as flood defences
- Coastal issues: suggestions for improving coastal management and funding arrangements, with associated changes to identifying and prioritising risks on the coast; how to ensure effective implementation of Shoreline Management Plans; and links with Integrated Coastal Zone Management
- Raising awareness: suggestions include providing information on flood risk information in proposed Home Information Packs; how individuals can get more involved, and whether information on national and local flood risk is sufficient
- Flood warning services: update on plans from the Environment Agency's ten-year Flood Warning Strategy.

40. Public awareness and information will be critical to managing expectations. There is a risk that the emphases on sustainable development, improving economic efficiency of expenditure and seeking multiple benefits will result in a public perception of an unwelcome shift away from protection. Presentation and justification of future levels and types of flood and coastal erosion risk management need to be set in the context of past experience and therefore future public expectation.

41. New risk assessment procedures may result in a distribution of funding that is different to the present one. This should provide overall benefit in terms of delivering a public service that is value for money, but there is a risk of negative public perceptions in some areas of England.

42. Increased transparency in the decision-making process will be a key part of the new strategy in order to address these issues. Efficient targeting should produce greater risk reductions.

Costs and benefits

Assumptions

43. A number of assumptions have been made regarding flood and coastal erosion risk management:
    - There is a public good in the provision of these services (through contribution to general national wealth, access to services and amenity value)
    - New development on the floodplain will continue
    - The value of national assets will rise
    - The public will be unwilling to accept high levels of risk

- No additional national funding will come from Government. (This is because we cannot forecast what future spend of successive Governments will be.)
- People will continue to want to live near coasts and rivers.

44. Environmental and social costs and benefits are extremely difficult to quantify in relation to flood and coastal erosion risk management. Although it is hoped that the proposals in the new strategy will go some way to improve quantification of environmental and social costs and benefits, this is a very ambitious agenda. The most important issue is to ensure that all environmental and social costs and benefits are identified, described fully and considered in decision-making, even where quantification is not practicable. Tools such as Integrated Policy Appraisal (IPA) and the rural-proofing checklist help with this process and have been applied to the new strategy.

Business sectors affected

45. In general businesses will be affected to a degree by any flood and coastal erosion risk management proposals contained within the strategy either as a result of their activities or through location, i.e. if sited in an at risk area. It should be recognised that some costs to businesses may be passed on to customers, either generally or through price rises. It is difficult at this stage to anticipate the costs to general businesses as these will vary depending on location and the mix of solutions chosen to deal with problems in their area, but where we have been able to identify potential costs we have included them in the assessment. As part of the consultation on the RIA, however, we welcome views from those businesses who feel they may be affected by any of the new proposals.

46. The Multi-Coloured Manual[76], a tool used to assess costs in appraisal selection, makes some attempt to quantify the impact of flooding on non-residential properties on the floodplain. Four main damage components have been identified: building structure, fabric and services; fixtures and fittings; moveable equipment; stock (or raw materials/work in progress/finished goods as appropriate). These components will vary to some extent depending upon the type and size of the properties concerned, and similarly will vary in their susceptibility to flood damage. The table below shows estimated financial losses from sales/business for non-manufacturing companies resulting from a river flood of various depths (and no flood warnings), less any deferred trade.

e.g.	0.5 m	1.0m	1.5m	2.0m
High Street shop	£25,200	£72,600	£84,700	£120,100
Supermarket/ hypermarket	£241,300	£778,500	£1,785,400	£4,913,200

47. We have also identified some business sectors that may have a greater interest in the proposals through their activities.

[76] The Benefits of Flood and Coastal Defence: Techniques and Data for 2003, Flood Hazard Research Centre, Middlesex University

Insurance industry

48. The insurance industry is affected by any decisions in relation to flood and coastal erosion risk management. 806 insurance companies are authorised, either by the UK or by another European Economic Area member, to carry on insurance business in the UK. About 70 per cent of these can carry out general business (such as motor, household and commercial insurance). The largest ten property insurers account for 85 per cent of the market. Decisions made that have an impact on risk will affect insurers to some degree, either allowing them to offer more policies or less, depending on the direction taken.

49. The Association of British Insurers has been consulted during the development of the consultation and is a member of the Stakeholder Forum.

Engineering companies

50. There were approximately 105 coastal and river engineering companies in England in 2002 and these vary in size from major companies, to those that are just one person. Several of these could be involved in flood and coastal erosion risk management consultancy. These represent less than 1 per cent of the construction sector in England, and therefore it is most unlikely that the sector will be significantly impacted by the strategy.

Construction industry

51. There were 146,774 private construction companies in England in 2002, employing approximately 869,000 people. The structure of the industry in England is unclear, but if take GB as a whole approximately 94 per cent of companies employ 13 or less workers, while approximately 1 per cent employ 80 or more people. Current development turnover is approximately £60bn/year and development on the floodplain accounts for less than 10 per cent of the total. Therefore it represents turnover in the order of £4-6bn/year.

52. Those industries involved in building or developing may be affected by planning changes and the introduction of flood resilience products and techniques for buildings on the floodplain. The costs of flood resilience products may be higher than conventional products, although as the practice becomes more routine, the prices should reduce to reflect this. It should be noted, however, that once the research has been carried out, any proposed amendments to the Building Regulations will be subject to a separate consultation which will outline in more detail the specific costs and benefits to the construction industry.

53. Changes to the Building Regulations would impose a non-recurring cost on builders, building control bodies, designers etc. as they would have to acquaint themselves with the new provisions and where necessary to invest in appropriate professional and technical training. A cost of £3.5 million is likely to occur in the first year. This allows for key personnel attending training events. However this should be considered as a general business expense in

keeping staff up to date to avoid liability for defective work and to maintain the ability to deliver a quality product.

54. Developers should find that insurers and buyers will look more favourably on those developments that have appropriate flood resilience. In terms of planning, most suggestions relate to the appropriate application of the current system so should not be an additional burden on developers.

Water companies and sewerage undertakers

55. There are 21 statutory undertakers in England, 12 companies providing clean water only services, and 9 providing water and sewerage services. The companies have a statutory duty to maintain and extend the public sewer network so as to ensure that their areas are effectually drained. The strategy refers to the need for effective integration of the management arrangements for dealing with sewer flooding and intra-urban flooding. This could affect both types of company.

56. Companies already plan for maintenance and development of their water and sewerage networks to meet current and future demand. In doing so they consult with other interested parties and take account of local development plans. They set out, in business plans and water resource plans, investment which is reflected in water and sewerage bills when Ofwat reviews prices every five years. Any requirement that companies be given responsibilities in respect of drainage and flood prevention which go beyond the public networks would lead to additional costs. To the extent that more integrated management leads to reduced demands on the water or sewerage networks in future there may be potential long term benefits. Much of this benefit may arguably be deliverable under the existing legal framework.

Agricultural industry

57. There were about 100,000 major agricultural holdings in England in 2003. Agricultural small businesses may be affected where decisions are made that it is uneconomic to continue publicly to maintain defences. However, this should not represent a significant number, and in some cases farmers may be able to claim support through agri-environment schemes subject to availability. There may be some transfer of costs to the private sector, and this may reduce efficiency by piecemeal approach to maintaining at the private level.

58. The National Farmers Union and the Country Land and Business Association have been consulted during the development of the consultation and are members of the Stakeholder Forum.

Tourism industry

59. The English tourism industry employed 1.7 million people in 2001 and generated over £31bn in terms of spend by tourists (UK and foreign). By the very nature of tourist operations (shops, accommodation, restaurants etc), a

significant number will be small businesses. These businesses will be affected both in terms of the benefits that will arise from the amenity and environmental benefits of some of the proposals, and in terms of measures to address urban flooding. Some may also be affected by decisions taken in relation to withdrawal of defences. There will also be ancillary businesses, such as shops, that will be affected by any increase or fall in visitor numbers. The impacts will depend on geographical location.

Benefits

Economic

Option A

60. It is difficult to estimate precisely what the benefits would be if we followed the 1993 strategy. As realisation of benefits depends in part on the amount of money available to spend. In 2003 the Government spent £429.8m and realised estimated average annual benefits in the order of £1,300m.

Option B

61. If the Government withdrew from spending on flood and coastal erosion risk management services other than in those areas in which it was legally obliged, it is unclear how much money would be saved. It would, however, be a significant proportion of its annual spend in this area.

Option C

62. Depending on the choices made, the benefits would differ and it is difficult at this stage to make a firm estimate. It is worth noting that some of the options mentioned in the strategy may lead to no greater benefits, but potentially a redistribution of these, particularly if there is no additional budget. If Government spending continued at around £500m, the minimum benefits from flood management services would be in the order of £1.5bn and approximately 30,000 houses/year would be protected. However, this would be a starting point and further benefits would be realised from several of the options included in the strategy either in the short or longer term.

63. There will be long term benefits in more integrated approaches to drainage, which it is difficult to quantify currently as further work is needed in this area, although it is expected to be considerable. Long term benefits should also occur from the development of guidance for urban road design and maintenance. The two measures should help minimise the impact of intra-urban flood events when they occur. Redistribution of activity and greater coordination should also lead to greater efficiencies.

64. There will also be benefits from the production of flood risk assessments for all development on the floodplain, as this should ensure that the most appropriate development takes place and appropriate mitigation of the risk is considered.

65. The new strategy will have sustainable development at its heart, and in the long term the solutions should represent the most acceptable in terms of economic, social and environmental needs.

66. There are benefits associated with the use of flood resilient and resistant materials as the cost of restoring a property that has been inundated can be cut significantly if measures have been taken. For new-build houses the benefits will be felt both by developers and owners. Developers should find that their development will be easier to sell, as mortgage companies and insurance companies are likely to be more willing to provide mortgages and insurance on those new-build properties on the floodplain that have appropriate flood resilience. However, perception will be a key issue here. Owners of new-build properties that have been flooded should find recovery costs to be significantly lower than if the steps had not been taken.

67. For existing buildings, there are savings to be made if repairs are carried out using flood resilient products. In addition to the savings made in repair costs following a flood event, property owners should see benefits in relation to insurance (either through continued provision or lower premia). Estimates produced by the Association of British Insurers[77] suggest that a three bedroom semi-detached house with the measures outlined below would save between £12,000 - £15,000 per flood on repairs:

Measure	**Costs saved each deep (to 1m) flood**	**Costs saved each shallow (to 5cm) flood**
Replace floor including joists with treated timber.	£2,735	£2,735
Replace gypsum with water resistant	£3,375	£3,375
Replace doors, windows & frames water resistant	£5,150	£2,450
Mount boiler on wall	£700	£700
Move washing machine to 2nd floor	£400	£400
Replace oven with raised built under type	£350	£350
Move electrics well above likely flood level	£400	-
Move service meters well above likely flood level	£850	£300
Replace chipboard kitchen/bathroom units with plastic	£1,550	£1,550
Total	£15,510	£11,860

68. Proposals in relation to coastal governance and strategic planning should lead to long term efficiencies, although the precise level of benefit is difficult to quantify at this stage. Better targeting of expenditure in the context of long term sustainability and strategic planning should provide better value for money.

69. A summary table of the benefits and costs of Option C is at Appendix 1.

[77] ABI factsheet "Flood Resilient Homes – What homeowners can do to reduce flood damage" April 2004 http://www.abi.org.uk/Display/File/Child/228/Flood_Resilient_Homes.pdf. Other options can be chosen that would lead to different results.

Environmental

Option A

70. All projects are encouraged to adopt solutions that enhance the environment in a way that is compatible with the alleviation of flooding and coastal erosion. If internationally protected habitats are damaged as a result of flood and coastal erosion risk management activities, the Government is required to recreate compensatory habitat elsewhere.

71. Catchment Flood Management Plans and Shoreline Management Plans encourage consideration of wider environmental consequences of activities in specific areas.

72. Further work is required to quantify the benefits derived. It is likely that of the options presented, Option A will provide the least environmental benefit.

Option B

73. This option may provide environmental benefit for two reasons. First, many of the current legal obligations relate to European environmental legislation. Secondly, ceasing to manage flood and coastal erosion risks except where legally obliged creates a situation in which it is more likely that large areas of floodplain and coast return to natural processes over the long term.

Option C

74. In addition to the benefits from Option A, this option involves much more proactive use of flood and coastal erosion management to ensure that environmental benefit is derived from projects. It actively encourages multi-benefit schemes and looks to improve symbiosis with natural processes. One of the benefits would be to contribute, where appropriate, to increasing the amount of wetland and other Biodiversity Action Plan habitats. Another may be to contribute towards preservation of heritage assets.

75. The proposal to link Catchment Flood Management Plans, and the stakeholder engagement process for developing these, to the Water Framework Directive's River Basin Management Plan process over time will provide wider strategic environmental benefit. It is anticipated that this proposal will be covered by England's public participation strategy on the Water Framework Directive. Where rural land management is identified as contributing to flood risk in Catchment Flood Management Plans, many measures may also provide benefit for diffuse pollution.

76. Improved integration of drainage management can lead to benefits in relation to both water resource management and water quality.

Social

Option A

77. Any measures to manage flooding and coastal erosion will have social benefits in terms of prevention of loss of life, health and access to services and places of work. Individuals will have a wider choice of where to live in

England. Many flood management schemes also have amenity benefit e.g. enhanced beaches, improved access to river and coastal areas, more extensive wetlands and wildlife habitats and other improvements. Some of these benefits are difficult to quantify in monetary terms.

Option B

78. The withdrawal of flood and coastal erosion risk management services would be unlikely to have any social benefits. It might be argued that with no defences, individuals would make the rational choice to relocate to areas with less risk, thus helping to minimise the increase in damages and the cost in terms of health etc. There might also be amenity benefits from some of the flooded sites.

Option C

79. In addition to the benefits mentioned in option A, additional benefits should occur for a number of reasons. Greater health benefits should accrue when the focus on flooding is broadened to all types, as sewer flooding represents a particular health hazard. Steps such as encouraging the use of more flood resistant and resilient materials should help minimise stress as buildings recover more quickly from flood events and will also have health benefits in some circumstances. Taking the most sustainable approaches to flood risk management should ensure longer term satisfaction with options chosen, as win-win solutions are chosen where possible. Measures to improve awareness and increase stakeholder participation should mean that individuals become more involved in the process, enabling them to make more informed decisions in relation to management of their own risk and how much they are willing to accept.

80. Improved integration of drainage management should ensure that individuals have a better idea of responsibilities in this area and who to contact when an event occurs. This should reduce the stressful nature of such incidents. Equally, proposals in relation to coastal issues should lead to improved clarity of the roles and responsibilities on the coast, leading to social and community benefits. Coastal proposals should also lead to improved transparency in decision making.

81. The production of urban road maintenance and design guidance may have benefits in relation to reducing health hazards that can occur with urban flooding. Improved maintenance may also lead to reduced disruption on roads following a flood event.

Costs

Economic

Option A

82. Government spend on flood and coastal erosion risk management services has been increasing over the past 11 years. In 2003 total costs[78] were Government spend of £429m plus average annual damages (AAD) in the order of £1bn. Foresight estimates that water and sewer companies currently spend £320m/year on intra-urban flooding with estimated average damages of £270m, making a total cost of £590m. However, this is an area that is under-explored. In the future the AAD may rise significantly as development increases and the impacts of climate change are felt.

Option B

83. If Government withdrew from providing most flood and coastal erosion risk management services, over a period of time defences would deteriorate and the estimated average national damages would triple to over £3bn. This figure could rise steadily in the short term as the value of national assets increase, further development takes place and the impact of climate change is felt. There will also be costs to businesses, as they will suffer disruption either in terms of access to their facilities or as a result of staff days lost when staff homes are flooded. It is unclear what these costs would be but they would likely be substantial. Annual costs may then decline slightly in the longer term as those living on the floodplain made the choice to move out and/or, as a result of the known risk, avoided buying expensive goods. The process of adjustment would involve significant resource costs and write-off of current assets.

Option C

84. Government spend on flood and coastal erosion risk management in 2004-05 will be £477.9m, while estimated residual annual damages are £1,040m, giving a total sum of £1,517.9m. Foresight estimates that sewerage companies currently spend £320m/year on intra-urban flooding with estimated average damages of £270m, giving a total sum of £590m. However, this is an area that is under-explored. In the future the average annual damages may rise significantly as development increases and due to climate change.

85. In the short term there will also be costs associated with pilots for integrated drainage schemes. These are estimated at approximately £0.5m/pilot. In the longer term there may be costs to take forward these proposals. These will depend on outcome of the pilots. There will also be costs related to the creation of the roads guidance, although these should be small in relation to expenditure on other aspects of road/rail infrastructure. There may also be costs related to training needs following the publication of guidance if recommended approaches differ considerably from current practices.

[78] Costs are the sum of investment in defences and management plus costs of damage borne by individuals, insurers, other businesses and public infrastructure etc.

86. In the short term some of the measures to restore natural processes and realign river corridors and shorelines may lead to higher costs. In the longer term costs should fall if truly natural alignments can be achieved.

87. There are costs associated with the use of flood resilient and resistant materials. Estimates produced by the Association of British Insurers suggest that it would cost approximately £11,115 extra to install the following measures to a three bedroom semi-detached house if carried out in the ordinary course of repairs or following a flood event:

Measure	**Extra cost**
Replace floor including joists with treated timber.	£520
Replace gypsum with water resistant	£2,925
Replace doors, windows & frames water resistant	£4,670
Mount boiler on wall	£150
Move washing machine to 2nd floor	£200
Replace oven with raised built under type	£200
Move electrics well above likely flood level	£300
Move service meters well above likely flood level	£500
Replace chipboard kitchen/bathroom units with plastic	£1,650
Total	£11,115

88. Based on attendance levels at training seminars for the changes to the Building Regulations that came into effect in April 2002, the cost of training related to one part of the Building Regulations has been estimated at £3.5 million. This cost will tend to occur in year one and includes both external training and in-house training often using materials from seminars and workshops. This cost is considered to be a general business expense. Good employment practices recommend that at least 1 per cent of the employer's wage bill should be spent on training. Professional institutions that include designers, building control surveyors and project managers in their membership require that at least 20 hours per year are spent on continuing professional development. This indicates that employers in the construction industry should be spending at least £7.5 million per year on training. Knowledge of the Building Regulations is a core skill for all building designers and supervisors. Spending the equivalent of about half the minimum yearly training expenditure target on awareness of changes to the Building Regulations is not considered to be excessive.

89. There would be costs related to the production of flood risk assessments. They should not be disproportionate to the benefits arising. There will also be costs in relation to appraisals, project development and consultations etc.

90. Some potential changes to coastal management arrangements may result in increased costs. At this stage it is unclear how much higher costs would be, relative to potential gains in the long term. There may also be costs associated with maintaining public flood awareness, depending on whether any changes of approach are suggested. Again this should deliver long-term gains.

91. Costs relating to the Environment Agency Flood Warning Strategy are in the order of £30m/year.

Environmental

Option A

92. There is an environmental opportunity cost in terms of missed potential to provide the additional environmental benefits that may be accrued in Option C by taking a more holistic approach to assessing costs and benefits, aiming to work with natural processes wherever possible and by further encouraging partnership-working to secure multiple objectives. While the 1993 strategy encouraged taking more account of environmental needs, the new strategy is much more proactive in this area.

Option B

93. Ceasing to provide flood and coastal erosion risk management measures in many areas may alter water bodies and decrease habitat value, amenity value and landscape character. Wetland or drained areas that depend on water level management schemes may also be adversely affected.

Option C

94. Of the options presented, Option C is likely to provide the least environmental cost in the context of applying sustainable development to flood and coastal erosion risk management activities.

Social

Option A

95. Those individuals living in areas affected by intra-urban or groundwater flooding will suffer stress and health problems related to this type of flooding. They will be unclear who to approach about these issues. If drivers such as climate change and development steadily increase the risk of such incidents, this could lead to social disquiet. It would also significantly impact upon access to services in urban areas.

Option B

96. As defences deteriorated more properties would be susceptible to flooding and corresponding health and stress problems. There would also be more potential for loss of life. There would be less choice of where to live and areas on the floodplain could become “ghettos” as property became unsellable and those on low income found themselves unable to move away. As insurance premia rise, householders in low income groups would find it difficult to afford it, and so would have to face the full cost of any damages. This would lead to significant areas of declining housing stock and potential social disquiet.

97. Individual property owners would be more likely to take steps themselves to protect their property. As these measures would not be taken in the context of a national or local strategy, they could impact on others (neighbours and downstream) and potentially worsen the consequences of a flood event. This

could result in social disquiet and a rising number of common law cases being brought, potentially overloading the courts.

Option C

98. There may be choices to be made in terms of where funding of defences take place and a redistribution of activities. Some properties that were previously defended may find themselves no longer benefiting. This would be a redistribution of the costs rather than additional costs, apart from any costs incurred in informing those affected of the change. There may also be a decision taken to stop protecting areas not justified by the cost-benefit comparison. This will primarily involve agricultural land and would have an impact on an affected farmer's way of life.

99. There may be costs as steps are taken to make individuals more aware of the risks of flooding. In those areas where there is a high risk, insurance premia may rise and house prices may fall if steps have not been taken to manage the risk. This could lead to stress amongst those individuals if not handled correctly.

100. Greater stakeholder involvement will involve greater cost in terms of both time spent and provision of facilities and extra documentation etc.

101. A summary table of the benefits and costs of Option C is at Annex 1.

Issues of equity and fairness

102. It is unlikely that any individual or business would be disproportionately affected by the new strategy, as its aim is to ensure that the most sustainable choices are made. The costs should not be disproportionate, as the benefit far outweighs the cost (between 3:1 and 5:1).

The Small Firms' Impact Test

103. *As part of the consultation process we will be consulting with a range of Small and Medium-Sized Enterprises (SMEs) to ensure that their interests and concerns are fully covered. As this process develops we will update this section with details of firms consulted and their views. These will ultimately filter into the body of the RIA as it progresses from initial to full RIA. If you are a small business and think that you will be affected by the proposals contained within the consultation, please send your views to* floodstrategy.consultation@defra.gsi.gov.uk.

Competition assessment

104. To be completed.

Enforcement and sanctions

How will the proposal be enforced?

105. Most flood and coastal erosion risk management legislation is permissive. There is no requirement to carry out most measures. Many of the options will be for the relevant operating authorities to implement through strengthened guidance. Many arrangements will be voluntary. In the case of Building Regulations, the measures would be enforced by building officers. Some operating authorities have consenting powers in relation to planning, drainage etc. There are already some statutory duties in relation to urban drainage.

Who will enforce this legislation?

106. As mentioned above much of the legislation would be permissive – operating authorities would enforce any relevant measures where appropriate. Ofwat enforces sewerage operators' statutory sewerage duty under s94 of the Water Industry Act.

Will the legislation impose criminal sanctions for non-compliance?

107. Not as currently envisaged.

Consultation

Within government

108. Consultation has taken place within Defra and with the following other Government Departments and bodies, through a high-level Programme Board for the strategy development exercise, working groups on specific items and general correspondence:

- HM Treasury
- ODPM
- DfT
- DTI
- Environment Agency
- Local Government Association
- Highways Agency
- OST
- Cabinet Office
- No 10
- OFWAT

Public Consultation

109. Defra has established a Flood Management Stakeholder Forum to provide an opportunity for a broad range of stakeholder organisations to contribute to emerging policy issues. The Forum has met about quarterly during the

strategy development exercise and has discussion the scope of the strategy and progress on specific issues during this period. Membership of the Forum and all previous papers are available via http://www.defra.gov.uk/environ/fcd/policy/forum.htm.

110. This initial RIA is part of a full public consultation document which outlines and seeks views on all the proposals for a new strategy for flood and coastal erosion risk management.

111. In the future, further specific consultation exercises may be required as part of policy development processes identified in the delivery plan for the final strategy after this is launched in early 2005.

Monitoring and review

112. The consultation document proposes that the new strategy should be formally reviewed at least every five years.

Summary and recommendation

113. To be completed after this consultation exercise.

Appendix 1: Summary table to illustrate key benefits and costs of Option C over and above Options A and B

Option C		
Key policy area	**Benefits**	**Costs**
Further embedding principles of sustainable development in decision-making: broadening the assessment of costs and benefits through multi-criteria analysis techniques; improving role of stakeholder participation; role of indicative standards (Section 4).	More formal adoption of these approaches will allow greater, and more consistent account to be taken of non-quantifiable aspects of an environmental or social nature – this may lead to some redistribution of benefits as greater account taken of other less tangible aspects. May also lead to longer-term efficiencies. Overall value for money should improve as a result of encouraging multiple-objective schemes. Multiple-objective schemes will often provide additional environmental benefits e.g. for biodiversity or water quality. Linking planning and stakeholder involvement with Water Framework Directive processes should lead to greater synergies and wider strategic environmental benefit. Rural land management techniques could also help tackle diffuse pollution. Longer term satisfaction with options chosen as win-win solutions. Greater individual involvement in the process, enabling better understanding of risk faced and how much willing to accept. Improved environmental equity. Multiple-objective schemes will often provide additional social benefits e.g. regeneration or amenity value.	Costs attributable to the research and in implementing the new approaches in operating authorities (training etc.) Risk that changes to decision-making process and greater stakeholder engagement could result in higher costs, but this is unlikely because greater stakeholder participation and consideration of wider costs and benefits should enable decisions which are acceptable to all to be made more efficiently. With any redistribution of benefits, there will be those who find themselves no longer benefiting – there may be costs in relation to informing them of the changes.
Working with natural processes: restoring natural processes where appropriate; realigning river corridors and shorelines; removing government funding for maintenance of defences where no longer justified (Sections 5 & 6).	Higher level of benefits from existing expenditure through the redistribution of expenditure to those areas where justified. Long term benefits if restored to natural processes. Increase in wetlands and other BAP habitats. May also be wider benefits for water quality and water resources. Assist in meeting targets under the Water Framework Directive cost effectively. Amenity value of restored natural environments e.g. wetlands.	Short term higher costs related to some measures to restore natural processes and realignment, including possible purchase of compensatory habitats. Risk of habitat loss due to coastal squeeze but sites designated under European legislation will require compensatory habitat provision. Disbenefits may arise for those who find themselves involved in realignment schemes or where government funding for maintenance of defences is removed.

Option C		
Key policy area	**Benefits**	**Costs**
Land-use planning: proposals to strengthen requirements for assessing flood risk in relation to new developments e.g. flood risk assessments and use of call-in powers (Section 7).	By ensuring appropriate development and mitigation of risk there should be long term benefits through more cost effective solutions. Communities planned on these principles should be more sustainable.	Costs related to production of flood risk assessments. Administrative costs of the call-in process
Integrating drainage management in urban areas: including partnership arrangements and pilots for integrated drainage plans, proposals for addressing groundwater flooding. (Sections 8, 9 & 10).	Improved partnership working should result in greater efficiencies. Improved management of flood risks in urban areas. Likely to be flood risk and water quality benefits from better urban drainage. Clearer responsibilities for sustainable drainage systems should encourage their creation with associated urban environment benefits. Greater health benefits as particular health hazards relating to urban flooding, especially flooding from sewers, are reduced. Reduced stress for individuals, as should have clearer idea of responsibilities and who to contact.	Short term costs related to funding of pilots. Longer term costs depend on how integrated drainage management is taken forward.
Urban road maintenance & design guidance (Section 11).	Difficult to quantify long term benefits, but should result in efficiencies. If leads to reduced flood risks for roads, may result in less disruption to businesses etc. Likely to be flood risk and water quality benefits from better road maintenance and design. Benefits in context of helping to reduce health hazards relating to urban flooding. In some instances will lead to reduced disruption on roads following an event.	Small initial cost to develop guidance. May lead to further training needs. May be costs in the longer term in relation to implementing new maintenance and road design measures.

Option C		
Key policy area	**Benefits**	**Costs**
Flood resistance & resilience in new and existing buildings (Section 12).	Considerable benefits for developers and buyers in terms of insurance, mortgage availability. Existing property owners should experience benefits, level of which dependent on risk of repeat flooding. Should help minimise stress as buildings recover more quickly from effects. Health benefits from installing some products, such as non-return valves.	Costs in relation to training, although would be consider part of ongoing professional development. Costs in relation to installing resilient or resistant materials & products. Likelihood of use would be in relation to risk faced, therefore not disproportionate.
Awareness raising: ways for public to get more involved and to raise awareness of risk (Section 13).	Greater awareness of risk may result in taking more steps at individual level to protect against consequences, therefore leading to a reduction in the economic consequences of a flood event. Greater individual involvement in the process, enabling better understanding of risk faced and how much willing to accept.	May result in extra costs if new measures are recommended to raise awareness. However, may also be redistribution to more effective methods. As individuals become more aware, insurance premia in high risk areas may rise and house prices may adjust to take account of this if steps have not been taken to manage risks.
Coastal Issues: possible alternative governance suggestions and ways to ensure effective strategic planning (Section 15).	May lead to long term efficiencies. Better targeting of expenditure in context of long-term sustainability and strategic planning will provide better value for money. Streamlining or separating the institutional responsibility and funding for coastal flooding might allow different types of risk to be managed separately allowing better account to be taken of their separate nature. May help facilitate working with natural processes as above. Improved transparency in decision-making, public engagement in a long-term vision and clarity in roles and responsibilities on the coast will result in social and community benefits.	Depending on consultation outcome, may be costs in relation to establishing different governance arrangements.

Annex 3: The Government's six consultation criteria

1. Consult widely throughout the process, allowing a minimum of 12 weeks for written consultation at least once during the development of the policy.

2. Be clear about what your proposals are, who may be affected, what questions are being asked and the timescale for responses.

3. Ensure that your consultation is clear, concise and widely accessible.

4. Give feedback regarding the responses received and how the consultation process influenced the policy.

5. Monitor your department's effectiveness at consultation, including through the use of a designated consultation co-ordinator.

6. Ensure your consultation follows better regulation best practice, including carrying out a Regulatory Impact Assessment if appropriate.

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