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Appraisal of flood and coastal erosion risk management

A Defra policy statement

June 2009



 HM Government


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Department for Environment
Food and Rural Affairs

Department for Environment, Food and Rural Affairs
Nobel House
17 Smith Square
London SW1P 3JR
Telephone 020 7238 6000
Website: www.defra.gov.uk

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Defra Flood Management
Defra
Area 2D Ergon House
Horseferry Road
London
Tel: 020 7238 6239
Email: floodappraisal@defra.gsi.gov.uk

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Foreword



This Policy Statement is published at an important time for flood and coastal erosion risk management policy. The nationwide floods of summer 2007 brought sharply into focus how devastating flooding can be. Coastal erosion, although affecting far fewer people, causes permanent loss of land, and the homes and property built on it, to the sea.

Climate change is expected to significantly increase the risk of extreme weather events, such as those seen in 2007. Coastal erosion is expected to increase too due to a combination of sea level rise and increased storminess which will make it more difficult to defend the coastline in some areas. Where Government funds work to intervene in these natural processes, it must be in full recognition of the costs and benefits of doing so. Data must be gathered and interpreted consistently across the country to allow the right choices to be made, national priorities for investment to be determined, and to allow comparison with the Government's other priorities for taxpayer funding.

With the increasing threat of climate change and extreme weather we must be sure that maximum benefit is achieved with every £1 of taxpayers' money, and that we can be confident that the money could not be better spent elsewhere. The 2007 floods also emphasised that strong, co-ordinated action is needed to ensure that we are better prepared for flooding from all sources: including from rivers, the sea, from surface water and ground water – we are tackling that in the recently published draft Flood and Water Management Bill.

Our approach to appraisal will also meet these new demands. The future will require innovative, adaptive and integrated risk management solutions that meet social, environmental and economic objectives together. As now, the future will require us to spend public money in ways that are fair; fair to those that live and work in areas at risk and to the majority of taxpayers that do not.

This Policy Statement, read together with the Environment Agency's best practice implementation guidance on appraisal which is being published separately, will continue to ensure a robust approach to investment appraisal at an important time when the nature of future risks is becoming ever clearer.

A stylized, handwritten signature in black ink, consisting of several fluid, overlapping loops and a long horizontal stroke extending to the right.

Huw Irranca-Davies
Minister for the Natural and Marine Environment,
Wildlife and Rural Affairs
June 2009

Executive Summary

This Policy Statement sets out the principles that should guide decision making on the sustainable management of flood and coastal erosion risk in England. The operating authorities in England (the Environment Agency, local authorities, and internal drainage boards) are required to follow these principles when developing a case for investing taxpayers' money in flood and erosion risk management projects. The Policy Statement also sets out the risk-based context within which appraisal should take place.

This Policy Statement replaces the previous policy guidance set out in the Flood and Coastal Defence Project Appraisal Guidance (FCD PAG) Volumes 1-5 published between 1999 and 2001 (Reference 1).

This Statement has been produced following the '*Consultation on Defra policy statement on appraisal for flood and coastal erosion risk management*' which was published in Summer 2008. That attracted responses from 50 organisations and members of the public and we have developed this Statement to take account of those responses, as well as making links with other important policies such as sustainable development, the need to adapt to climate change, and building a fairer society. This Statement also reflects recently completed research on social justice issues and health and stress impacts as well as new information on issues such as agricultural land valuation and climate change impacts.

This Statement sets out why appraisal is necessary, and the principles and policies that should guide this work. In particular it emphasises the need to ensure that appraisals for all activity (whether strategic level plans or individual projects):

- Give more consideration to 'risk management' and 'adaptation', as opposed to only 'protection' and 'defence';
- Are undertaken consistently, transparently, with value for money in mind and in a way that complies with the Treasury guidance on appraisal and evaluation in central Government (The Green Book);
- Help achieve better social and environmental outcomes as part of sustainable development, both by considering a broader range of issues and by using a broader range of analysis techniques;
- Adopt a risk-based approach, whilst considering impacts within the whole of a catchment or shoreline process area.

More specific best practice guidance on how to undertake appraisals will be published shortly by the Environment Agency.

Chapter One: Introduction



Courtesy of the Environment Agency. The Summer 2007 floods at Tewkesbury.

Introduction

1.1 Scope

This Policy Statement covers the appraisal of flood and coastal erosion risk management (FCERM) at all levels, from high level plans at Catchment Flood Management Plan and Shoreline Management Plan level, through to strategies and schemes in individual areas and regions. The statement describes the appraisal of options to manage the risk from all sources of flooding and from coastal erosion, in order to justify Government funding.

The Policy Statement applies to any appraisal for the purpose of selecting preferred options for Government investment in flood and coastal erosion risk management. Throughout the statement, the word '*should*' is used to indicate a general policy requirement, whereas '*may*' indicates an approach which may be appropriate depending on the circumstances. Any legal requirement must always be met.

1.2 Background

This statement replaces appraisal policy in Flood and Coastal Defence Project Appraisal Guidance (FCDPAG) volumes 1-5 (Reference 1). The Environment Agency is leading the development of new best practice implementation guidance on how appraisal should be undertaken, in collaboration with Defra and other operating authorities. That guidance will explain how this policy should be delivered and will supersede the good practice aspects of FCDPAG volumes 1-5. Whilst much of FCDPAG remains relevant, developments over recent years justify this overall revision of appraisal guidance.

1.3 Policy context

A revision of appraisal policy was originally proposed in the Government's first response to Making Space for Water (Reference 2) which sought an integrated approach to flood and coastal erosion risk management. Chapter 2 sets out this context, in terms of policy and legislation, and defines the role of appraisal.

Further policy direction emerged recently through Sir Michael Pitt's review of the summer flooding in 2007 (Reference 3). Whilst not making explicit reference to appraisal guidance, the review addressed a number of issues relevant to it, including:

- Funding from all sources needs to be spent effectively.
- Support for the risk-based approach accompanied by a full range assessment of costs and benefits.
- The need for a long-term investment strategy to set out the investment needs for flood risk management in England within a policy framework for delivering long-term, sustainable flood and coastal erosion risk mitigation measures.

Public funding¹ for FCERM is provided by the Treasury and allocated by Defra and to local authorities, via formula grant, to support the delivery of Government strategic objectives as described in Public Service Agreements. (Reference 4).

¹ Public funding for the purposes of this policy statement means taxpayers' money invested in flood and coastal erosion risk management by the operating authorities. The Exchequer currently funds approximately 95% of flood and erosion risk management by operating authorities.

This Policy Statement supports all of Defra's current departmental strategic outcomes:

- A society that is adapting to the effects of climate change;
- A healthy, resilient, productive and diverse natural environment;
- Sustainable, low carbon and resource efficient patterns of consumption and production;
- An economy and a society that are resilient to environmental risk;
- Championing sustainable development;
- A thriving farming and food sector with an improving net environmental impact;
- A sustainable secure and healthy food supply;
- Strong rural communities; and
- A respected department delivering efficient and high quality services and outcomes.

1.4 Layout

The layout of this statement follows an order which broadly reflects the structure of the appraisal process. Chapter 2 covers the background to appraisal, including role, policy context and sustainable development.

Chapter 3 presents the strategic framework, showing how appraisal is structured into a hierarchy of plans, strategies and schemes. Chapter 4 covers the risk-based approach, including risk assessment and management. Particular attention is given to climate change and adaptation risks, as well as managing uncertainty.

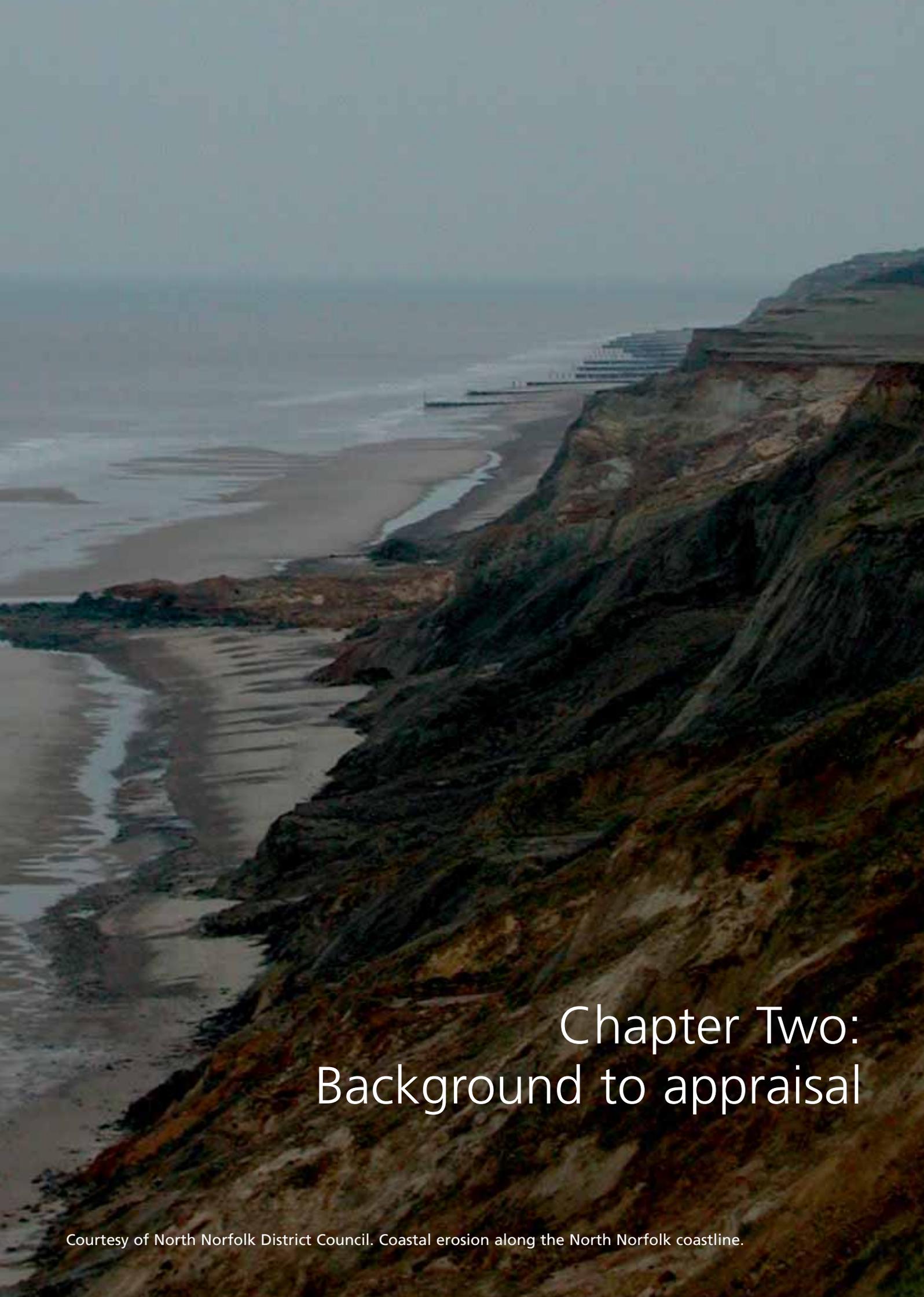
Chapter 5 covers the appraisal principles and is structured around the elements of the appraisal process, as shown in Table 1.1 below.

Table 1.1 Stages in the appraisal process	
1: Define the issue	<i>Define</i> the issue and consider the case for government intervention. Set SMART objectives if there is a case.
2: Develop, Describe and Value	<i>Develop</i> a full range of possible options, <i>describe</i> the options, and then <i>value</i> the positive and negative impacts of each of the options.
3: Compare and Select	<i>Compare</i> options in a systematic way and <i>select</i> the most effective and deliverable solution

Finally, Chapter 6 provides a commentary on public consultation and governance, with Chapter 7 setting out the legislative requirements.

1.5 Way forward

Following publication, the policies in this statement should be implemented by flood and coastal erosion risk management operating authorities. Supplementary Guidance Notes may be published from time to time to further expand or update Government appraisal policy. These may address feedback on how policy is being implemented, or future changes to wider policy such as the Treasury Green Book or Common Agricultural Policy. Supplementary guidance notes will be published on the Defra website (Reference 5).

An aerial photograph of a coastline showing significant coastal erosion. The image features a wide, sandy beach in the foreground, with a steep, eroded cliffside rising from the water's edge. The cliff face is layered and shows signs of weathering. In the distance, a pier or breakwater extends into the sea, and a large building is visible on the cliffside. The sky is overcast and grey.

Chapter Two: Background to appraisal

Courtesy of North Norfolk District Council. Coastal erosion along the North Norfolk coastline.

2.1 The role of appraisal in flood and coastal erosion risk management

Flooding and coastal erosion are natural processes with highly variable impacts across the country. Flood and coastal erosion risk management legislation is largely permissive in England. This means that there is no right to be protected from the effects of flooding or erosion and generally no entitlement to any particular standard of defence where risk management action is taken.

To take account of this variability and the permissive nature of its investment, Government promotes nationally consistent approaches to the assessment and management of flood and coastal erosion risk, rather than to set national standards for protection which would be inappropriate and unaffordable in some areas. Appraisal provides a structured approach for assessing the risk from flooding and coastal erosion in a given location, area or region, and for determining the most appropriate way of managing and ultimately reducing it.

This policy statement sets out the principles of appraisal for public policy and investment in flood and erosion risk management. The policy statement also sets out the context within which appraisal should take place. The context includes taking a risk-based approach that would normally fit in with wider catchment and shoreline management plan objectives/policy decisions to ensure that integrated and sustainable management approaches are identified and taken forward.

Appraisal should be consistent with the guidelines in HM Treasury's Green Book (Reference 6), and ensure that public investment in risk management activities is justified and that alternative options are properly considered. It is recommended that HM Treasury Green Book's Five Case Model (Reference 7) is referred to for managing appraisal within the context of wider programme and project management controls. The appraisal should also be proportionate to the complexity of the problem and the information required to demonstrate a decision.

A structured and systematic appraisal in line with this policy statement will be necessary to gain approval for expenditure on publically funded projects. There is usually a process for gaining such approval, although this will vary according to the cost of the project. Approval for Defra funding for operating authority projects is currently required by the Environment Agency's high level review processes².

Projects above the delegated threshold also require Defra and HM Treasury approval at the outline business case and full business case stages. A project appraisal report, based on an appraisal in line with this policy statement, will be necessary to support this. A flood/erosion risk management strategy (Chapter 3) is broadly consistent with the outline business case required by the Office of Government Commerce (OGC) Gateway 3, and a project appraisal report should provide a full business case for the purposes of OGC Gateway 4, where necessary.

2.2 Policy and legislative context

Flood and coastal erosion risk includes:

- Flooding from all sources including rivers, the sea, surface water, sewerage, groundwater and a combination of these sources.
- Coastal erosion caused by the sea but generally not other land stability issues.

² High level reviews are currently undertaken through Environment Agency's National Review Group or regional Project Approval Boards depending on the value of the project.

Where combinations of these risks occur, operating authorities should take a holistic approach and identify appropriate responsibility for managing the risk in collaboration with local authorities and sewerage undertakers.

The Government's aim from Making Space for Water (Reference 2) for flood and coastal erosion risk management is to manage risks in a sustainable way, by employing an integrated portfolio of approaches which reflect both national and local priorities, so as to:

- reduce the threat to people and their property; and
- deliver the greatest environmental, social and economic benefit, consistent with the Government's sustainable development principles.

Government currently provides the majority of funding for risk management activities in the form of Grant-in-Aid administered by the Environment Agency (EA). The EA has the main responsibility for delivering risk management from main rivers and the sea, as well as a supervisory role for all types of flooding and can allocate funding to other authorities. Sir Michael Pitt's Review (Reference 3) recommended that local authorities be given an enhanced role in the management of local flood risk, in collaboration with other operating authorities and sewerage undertakers. It is the Government's intention to clarify these roles in a new Act of Parliament, following pre-legislative scrutiny and public consultation in the Spring and Summer of 2009.

Ministers may, from time to time, set targets to specify the minimum expected outcomes at a programme level in return for Government investment (Reference 8). Decisions on the best mix of activities to deliver the desired outcomes will be left to the operating authorities who are best placed to make these judgements.

Appraisal should be consistent with flood and coastal erosion risk management policies and other government policies (see Chapter 7). The development of multi-objective schemes, which deliver a variety of benefits, is encouraged wherever possible. Other policies may offer opportunities as well as constraints. Appraisal should therefore address multiple objectives in partnership with other government departments, agencies, community or private sector activities (See Chapter 5). Operating authorities are responsible for ensuring that the flood and erosion risk management plans and projects comply with any legal requirements (see Chapter 7).

2.3 Sustainable development

Appraisal has an important role to play in ensuring that flood and coastal erosion risk management contributes to sustainable development. Appraisal undertaken in accordance with the principles below will help to support this contribution:

- Living within environmental limits;
- Ensuring a strong, healthy and just society;
- Achieving a sustainable economy;
- Promoting good governance;
- Using sound science responsibly.

Living within environmental limits. Flood and coastal erosion risk management has an enormous impact on many aspects of the human, natural, historic and cultural environment. In many coastal and river landscapes the environment is largely defined by measures that play a key flood and coastal erosion risk management (FCERM) role, such as walls and embankments. It is therefore important that appraisal of FCERM policies and projects takes full account of the environment and potential effects that policies and projects could have on the goods and services that it provides to society.

The impacts that different options have on the environment should be fully described and taken into account in appraisal. Opportunities to enhance the natural environment and improve its capacity to perform ecosystem services should be identified and the potential benefits valued. The objective should be to appraise the likely change (increase or decrease) in value resulting from different options.

Legislation and policy to protect particular aspects of the environment, such as natural and historic features, should be followed to ensure that FCERM does not breach critical environmental thresholds (see Chapter 7).

Ensuring a strong, healthy and just society. This principle ensures that flood and coastal erosion risk management contributes to maintaining the quality of the environment but also to promote social and intergenerational justice. Poorer people tend to suffer disproportionately from the effects of environmental degradation and future generations should not be denied the benefits that the environment provides.

The appraisal process should aim to deliver solutions that maximise the benefits for society as a whole. Due to the permissive nature of legislation and the variability of the risks, it is not possible to protect everyone to the same standard of defence³. However, social justice, fairness and equity should always be carefully considered in the appraisal process. Table 2.1 highlights some of the principles which may be adopted to support a socially just approach.

Achieving a sustainable economy. Appraisal should reveal the contribution that FCERM makes to building a strong, stable and sustainable economy. Public investment should aim to provide prosperity and opportunities for the community as a whole and an appraisal should provide an understanding of where social and environmental costs and benefits of different options fall. It should ensure that policies are oriented to gaining the maximum economic benefit for the country as a whole, avoiding cross subsidization and ensuring where possible that FCERM costs are borne by those that will benefit most from it.

Achieving a sustainable economy is not about maintaining everything as it is today. We need to adapt to future risks and changing markets, including making decisions about where it is no longer economically viable or sustainable to manage risks in the same way. Appraisal should reveal the most efficient allocation of resources at a national scale, understanding who gains and loses as a result, and provide information about how best to manage future flood and erosion risk.

Promoting good governance. Thorough and open appraisal is key to good governance. It should ensure that all stakeholders can be heard and have fair access to a transparent decision making process. This is synonymous with procedural justice. This approach to appraisal will help ensure that FCERM policy and investment is oriented towards gaining the maximum benefits for society as a whole rather than favouring any particular section of society. Appraisal should enable people to understand the choices, and why certain options are preferred, even if they don't agree with the choices or the decisions made.

³ To do so would mean offering a relatively low standard of defence throughout, with serious impacts on people, property and the landscape causing significantly more damage due to flooding and erosion.

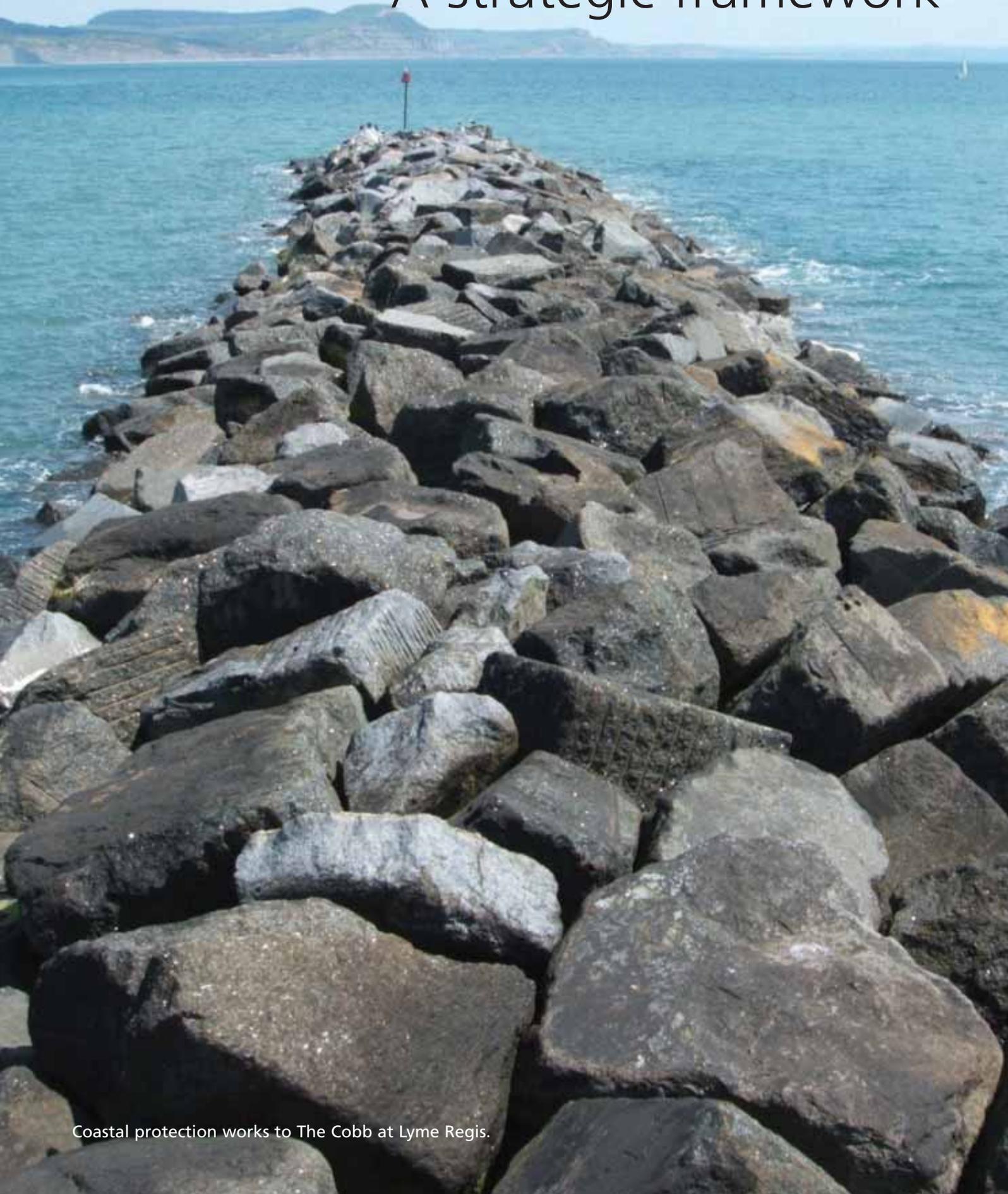
Using sound science responsibly. Appraisal should make best use of science, taking due care to take account of the evidence base arising from the Environment Agency, Defra and other government policy areas, where it leads to new and innovative thinking to build on existing policies.

Table 2.1 Principles to ensure a strong, healthy and just society

Broad Principles	Rationale
All impacts of different policy and investment options should be recognised in appraisal and where possible valued.	To ensure that no preferential treatment is given to certain types of costs or benefits which may accrue to different groups in society.
Costs and benefits should be disaggregated so that it is clear which sections of society are paying for and gaining from different options.	To seek contributions from private beneficiaries. To ensure that the poorest members of society are not indirectly subsidising wealthier beneficiaries
Distributional adjustments should be made, where appropriate, in line with official guidance.	To better understand whether there is evidence that the marginal utility of an extra pound to a poorer person is higher than that of a richer person in an appraisal area or across a catchment or shoreline, or across wider programme.
Capping or decision rules should be considered and applied consistently.	To ensure that a disproportionate level of benefit does not accrue in specific properties when benefits could be spread more fairly and efficiently across wider number of beneficiaries.
Vulnerability of people should be considered in appraisal including vulnerability to residual risks: e.g. where benefits may arise via flood warning, adaptation and resilience measures.	To ensure that social justice relates to not only the less wealthy, but also those who may be vulnerable to the risks, such as the elderly.
Procedural justice should be considered throughout.	To ensure fair and equitable access to the decision making process. Good stakeholder engagement and governance, as part of appraisal, are important aspects.
From time to time Government may set targets to encourage the delivery of flood and erosion risk management to specific sections of society for reasons of social justice.	To influence fairness through target setting across the programme. For example, the target for the current period which relates to reducing the risk in the most deprived areas.



Chapter Three: A strategic framework



A strategic framework

3.1 The strategic framework approach

Defra has encouraged the development of a strategic framework for flood and coastal erosion risk management based on Shoreline Management Plans (SMPs) and Catchment Flood Management Plans (CFMPs). These high-level plans should provide a framework, at a catchment or coastal process cell scale, for local risk management planning and decisions, including investment in structural and non-structural solutions to specific problems.

Appraisal has an important role to play at all levels in the strategic planning process from CFMP/SMPs (References 9 and 10) through strategies to local delivery plans (such as Surface Water Management Plans) and projects. The general principles of appraisal (Chapter 5) are the same throughout. However, the detail with which they are applied should be proportionate to the purpose, geographic scale and level of certainty appropriate to the decisions being informed.

It may not, for example, be always practicable or necessary to undertake a detailed cost benefit analysis of the alternative means of reducing flood risk to a particular area in a CFMP. However a basic assessment of the costs and benefits may be necessary to ascertain whether there is likely to be an economic case to maintain or improve standards of protection within an area.

It is important that high level plans should *inform and influence* local options and choices. However, they cannot wholly define local delivery decisions. For example, a CFMP may identify a management unit where it is not generally economic to maintain defences and therefore agree a policy of no active intervention. However, there may be certain assets within that area which warrant intervention through resilience or other local risk reduction measures. Project appraisal will be necessary to examine the case for such interventions by public bodies.

3.2 Stages in the strategic framework

Figure 3.1 presents the relationship between high-level plans, strategies and schemes and other planning initiatives. High-level plans should establish preferred policy options based on a strategic high-level assessment of risk and a sound understanding of catchment or coastal cell scale processes and risks over a long timeframe, normally 100 years. Appraisal has an important role to play in establishing the preferred approach for management units in high-level plans, as well as specific local investment options.

CFMPs and SMPs should form the large-scale holistic view of risk management requirements at the catchment or coastal process scale, beneath which more detailed strategies, where necessary, and local scale risk management activities should be developed.

Risk management approaches that are identified at the catchment or coastal cell scale as being particularly appropriate and sustainable in the long-term should feed down and inform more detailed plans. This should help identify viable opportunities for working with natural processes, developing collaborative projects, and streamlining the planning process. The strategic approach should also be the basis for apportioning impacts (benefits and costs) that are realised or incurred over the geographic area or period of time being considered.

3.3 Co-ordination with other planning initiatives

The development of Shoreline Management Plans and Catchment Flood Management Plans should be used to make early links with other relevant planning initiatives. In turn the findings from flood and coastal erosion plans should also influence other planning initiatives in an interactive cycle.

Examples of other relevant planning initiatives include:

- Regional Spatial Strategies and Local Development Documents;
- River Basin Management Plans;
- Surface Water Management Plans and Sustainable Drainage Plans;
- Targeting of agri-environment schemes, such as Environmental Stewardship and other land management initiatives;
- Green Infrastructure Networks.

This is not an exhaustive list. The important point is that connections and interdependencies should be considered at an appropriate strategic level and links made.



Courtesy of North Norfolk District Council. Coastal erosion issues require a joined-up approach to risk management and land use planning.

3.4 Responsibility for planning within the strategic framework

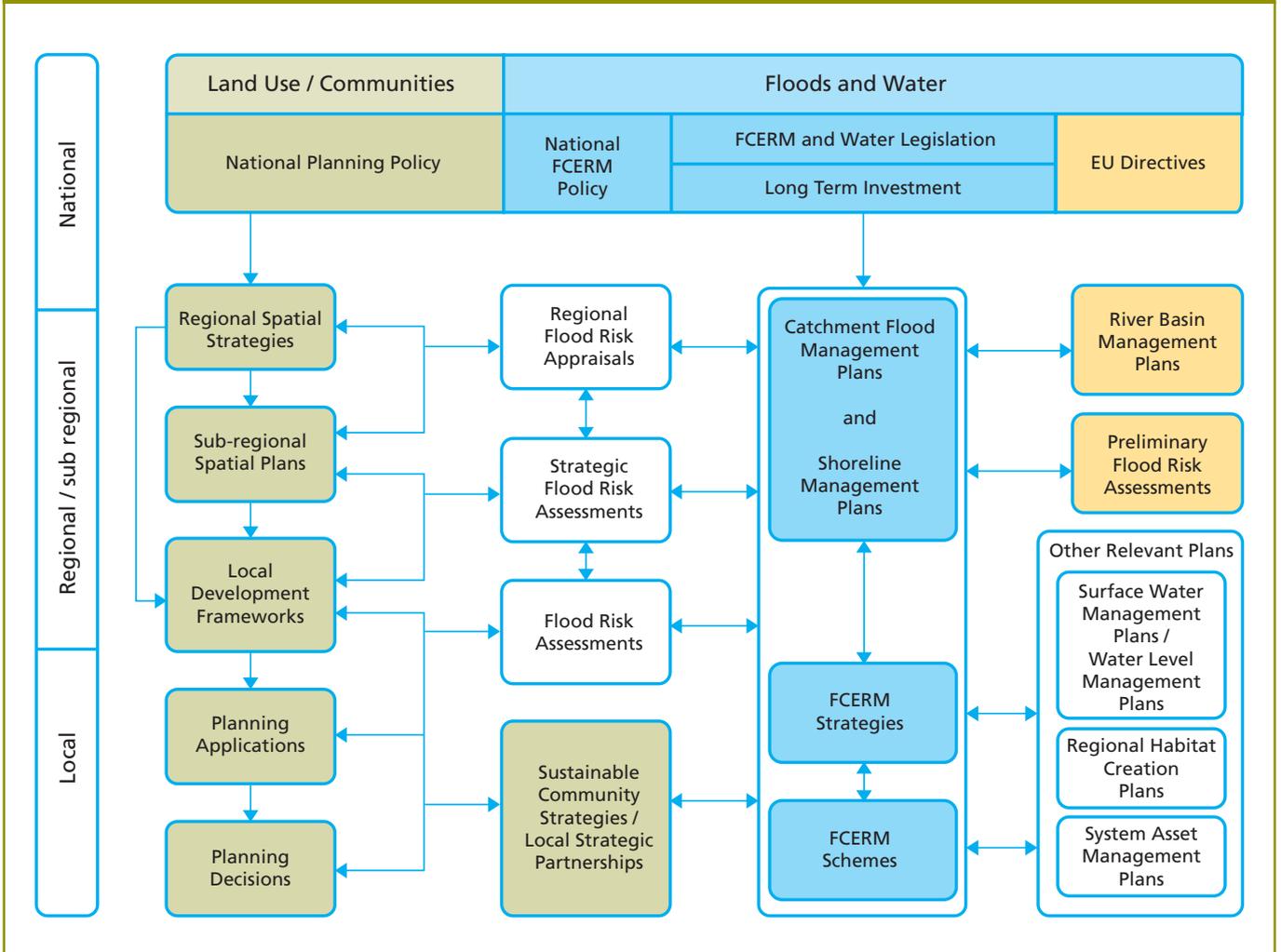
It will be the role of the relevant operating authorities to prepare flood or coastal erosion risk management plans.

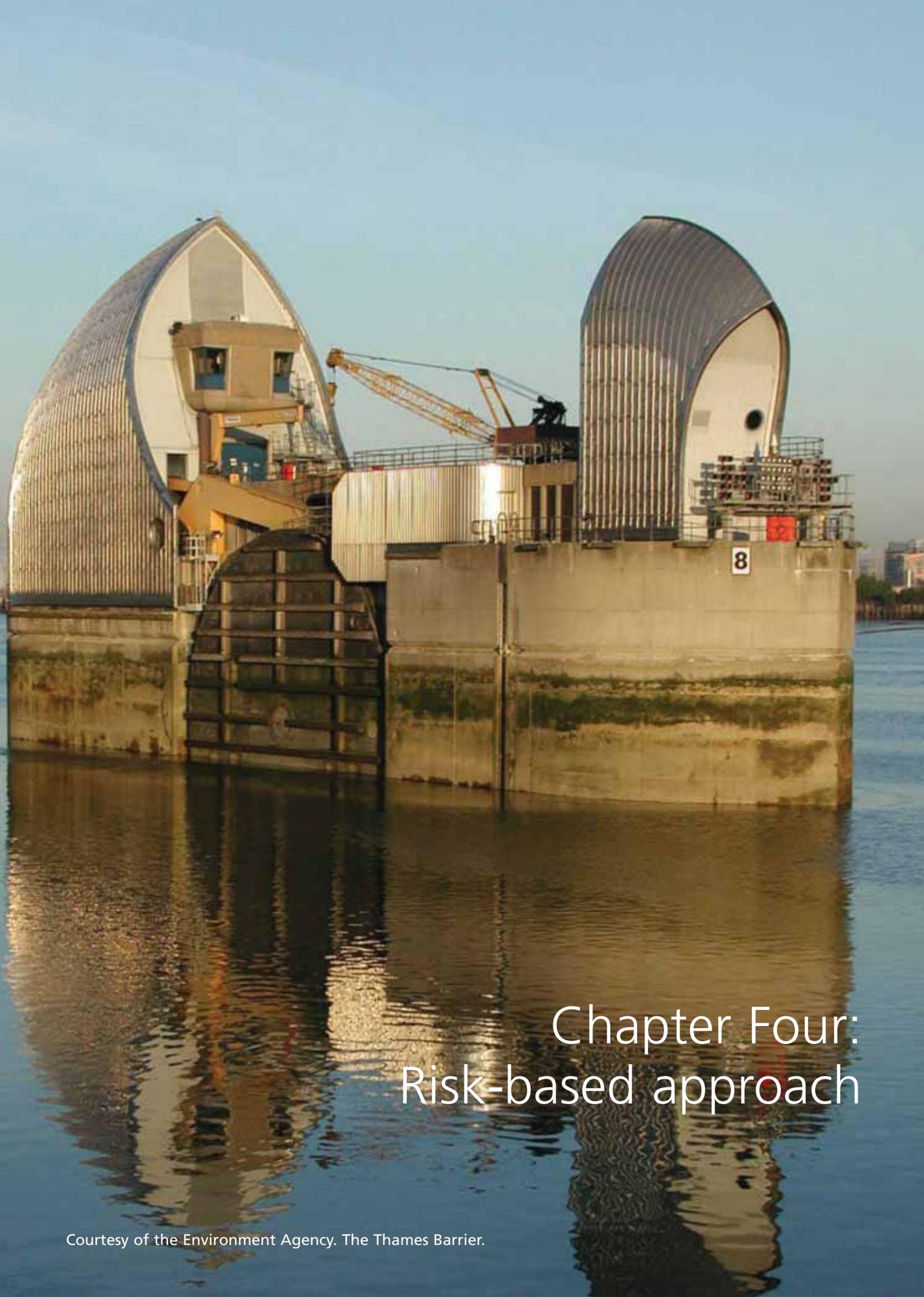
3.5 Periodic Review

High-level and strategic plans should be periodically reviewed, as appropriate.

A six-year review cycle is required for plans identified under the European Directive on the Assessment and Management of Flood Risks (Reference 11). This may be adjusted downwards if there is a need to take account of particular external factors or the timescales of specific changes are particularly short. A plan or strategy should be extended at the time of the review to maintain its time frame (e.g. a further 100 years from the review date for a 100-year strategy).

Figure 3.1: An indicative illustration of the relationship between high level plans, strategies, schemes and other planning initiatives.





Chapter Four: Risk-based approach

Risk-based approach

4.1 The risk-based approach

Approaches used to manage risk from flooding and coastal erosion events should take account of the characteristics of these intermittent, variable, highly uncertain and sometimes extreme natural phenomena. A risk-based approach should be taken involving the assessment and management of risk that considers both the consequences and probability of flooding and coastal erosion.

Risk = probability x consequence. Risk is a combination of probability and consequence. A risk-neutral approach should be taken to enable a consistent and objective comparison of different combinations of consequences and probability to be made between different locations. For example: a flood event causing low damages, but with a high probability of occurrence can be compared without bias to an event causing high damages, but with a low probability. There may be exceptions to this principle in limited cases such as those involving potentially very large losses or to provide greater consistency between different communities.

Timescales. According to the HM Treasury Green Book (Reference 5): *'Costs and benefits considered should normally be extended to cover the period of the useful lifetime of the assets encompassed by the options under consideration'*. There is growing evidence that climate change is contributing to increasing risk through rising sea levels and influencing volumes and patterns of rainfall. Flood and coastal erosion risk management should be planned over a long timeframe (often 100 years) with a view to retaining flexibility to manage changing risks over that period. Appraisal should assess the risks and how they may change over the whole life of a policy or project, including as a result of climate change.

Operating authorities should seek to fully understand risk and explore a broad suite of solutions that may give a range of longer-term benefits. Interventions and approaches that are not sustainable in the long-term should be avoided.

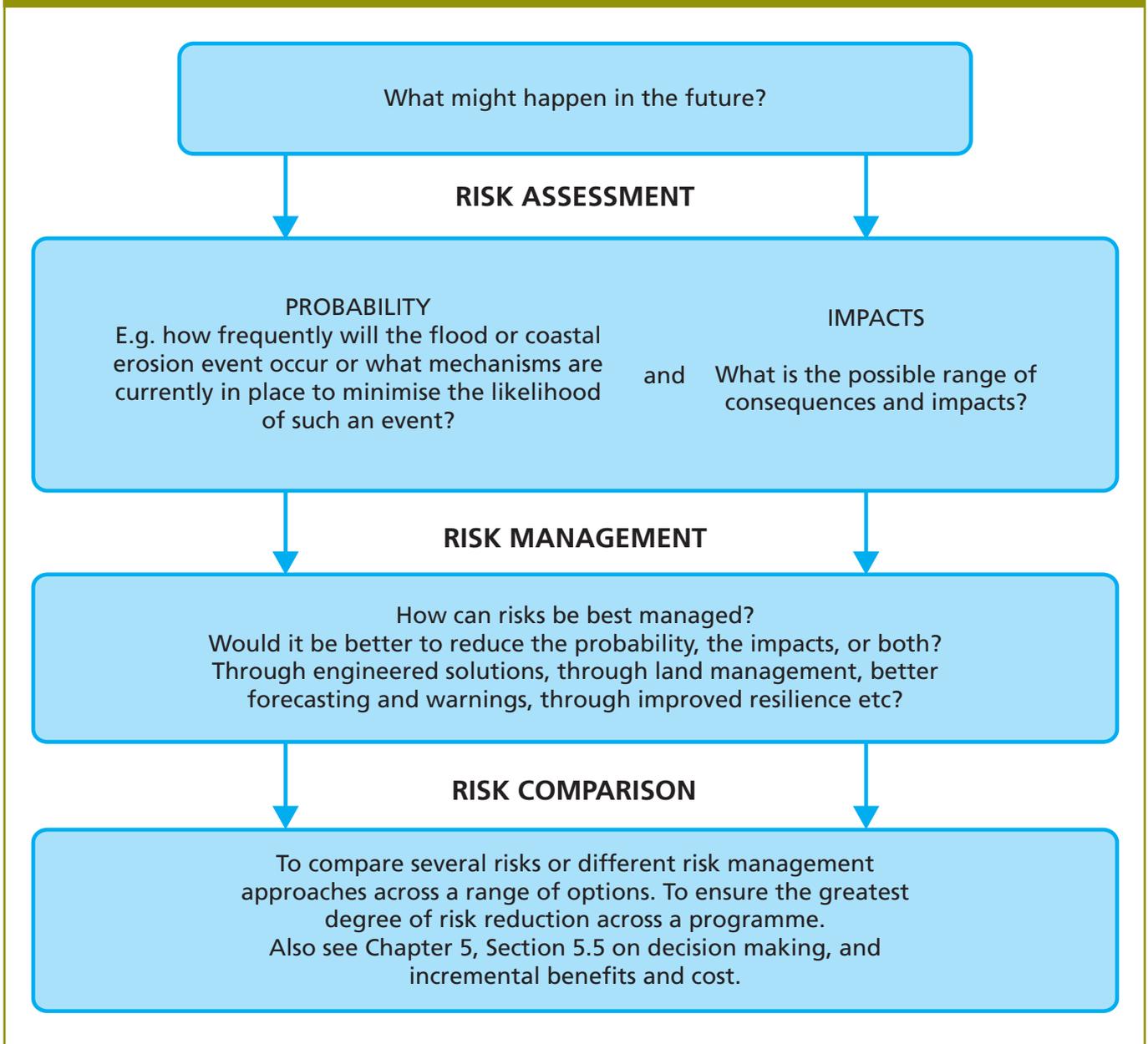
Operating authorities should make assessments of probability from past events and project forward using best available information on climate change and other uncertainties. As our understanding of these probabilities develops and as scenario modelling becomes more reliable, our guidance will be kept under review.

4.2 Risk assessment

National and regional flood risk assessments, undertaken by operating authorities, should provide information on levels of risk and a consistent basis for targeting more detailed assessments. Risk assessments should be regularly reviewed to provide an overview and the basis for justification of national funding levels. Where detailed assessments are carried out the results should be fed back into subsequent updates of the broader risk assessments at the regional or national level.

All types of risk (economic, social and environmental) should be assessed on a comparable basis using good practice approaches including the assessment of extremes. Figure 4.1 sets out the framework for the risk-based approach.

Figure 4.1 The risk-based approach



The risk-based approach should identify a range of measures to manage and reduce the risks and prioritise resources to deal with greatest risks first. However, it is not realistic to expect operating authorities to remove all the risks of flood and coastal erosion. Appraisal should quantify and take full account of residual risks. The risks are then compared across the FCERM programme to understand the overall balance of risks at the higher level (regional or national) to help ensure the greatest degree of risk reduction across the programme.

Assessment of probabilities and consequences. An appropriate range of probabilities and consequences (damages or positive impacts) should be assessed, taking into account the long-term social, economic, and environmental benefits and costs (See Chapter 5). Options for managing the risks may reduce the probability (e.g. by increasing embankment heights) or consequence (e.g. through resilience) of risk. Appraisal of combinations of these approaches and their timings may be necessary to find the most appropriate solution.

4.3 Risk management

The full range⁴ of risk management options and phasing of these should be considered to facilitate adaptation to future risks. Publically funded risk management measures should only be undertaken where justified through appraisal which meets the aims and objectives of flood and coastal erosion risk management policy and satisfies legislative requirements. The appraisal process is covered in more detail in Chapter 5. A useful reference point for further information on risk and risk management is the Office of Government Commerce web-site (Reference 12).

4.4 Managing residual risks

Risk management measures should include arrangements to deal with residual risks (for example, if design limits are exceeded by flood events). Operating authorities should consider any wider risks over longer timescales, to the environment, society or economy. For example, ensuring that appraisal of shorter-term activity, such as maintenance of important community defences, is undertaken in the context of wider strategic objectives for a catchment or shoreline and the wider impacts from climate change and development.

4.5 Climate change and adaptation risks

Potential climate change impacts are well documented and include sea level rise and increases in intensity, severity and frequency of coastal storms and rainfall affecting flooding in fluvial catchments and urban surface water systems. For example, the UK Climate Impacts Programme reported on the changes to relative sea level between the 1900s and 2000 based on tide gauge information and other sources, with the 1990s recording higher rates than that for the 20th century overall (Reference 13).

Appraisals should provide a consistent and risk-neutral approach to considering climate change impacts and should be open to a full range of different options which do not pre-judge as to how any risk may be managed⁵. Option selection will continue to depend on the costs and benefits of different options, residual risk, and the information that is available to plan for adaptation. These principles are echoed in Defra's supplementary guidance to operating authorities on climate change impacts (Reference 15), which will also be reviewed in the light of the latest projections of climate change for the UK⁶ (Reference 16).

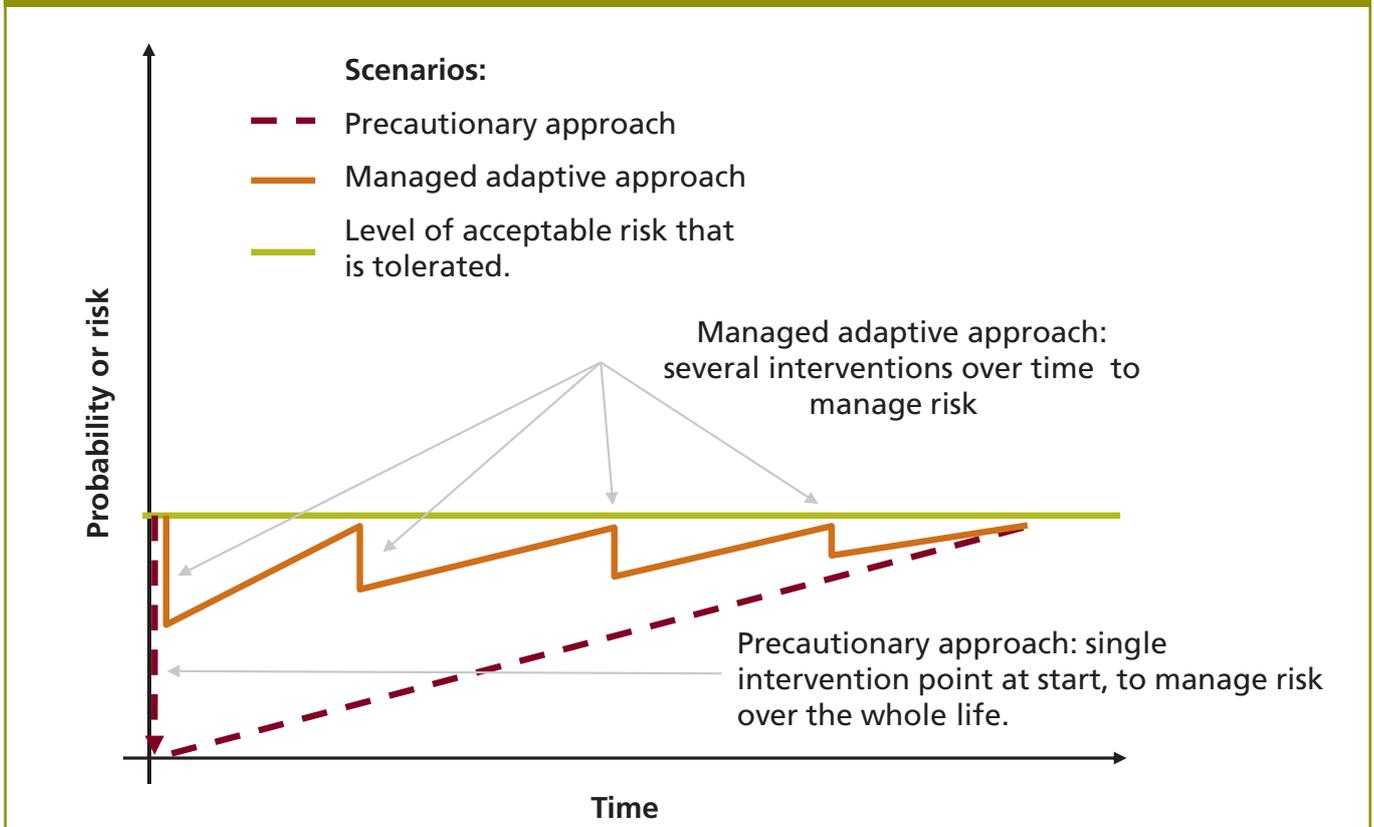
Defra's supplementary guidance also emphasised the appropriate use of a *managed adaptive* and *precautionary* approaches in appraisal, within the risk-neutral framework. These approaches are covered below and illustrated in Figure 4.2.

⁴ The full range of risk management options relates to the spectrum of potential measures: at the one end, managing high probability-low consequence events; at the other end, managing low probability-high consequence events. This range should also consider structural and non structural options.

⁵ For example, options that focus on high consequence-low probability events should not necessarily be favoured over options that manage lower consequence but high probability events.

⁶ Defra will review the latest UK climate projections data to fully understand what this means for appraisal and decision making. In the interim, existing guidance on climate change impacts should be referred to.

Figure 4.2 The precautionary and managed adaptive approach



The *managed adaptive* approach aligns with principles in *Making Space for Water*, which promotes a holistic and long term approach for flood and coastal management, and reinforces existing climate change policy on ‘no-regrets’ actions and longer term adaptation. The *managed adaptive* approach is appropriate in the majority of cases where ongoing responsibility can be assigned to operating authorities to track the change in risk and manage the changes through multiple interventions. This approach promotes flexibility in the appraisal options to respond to future change, during the whole life of a measure, as well as the uncertainties⁷.

The *precautionary* approach may be adopted where it is not possible to adapt with multiple interventions on a periodic and flexible basis. For some circumstances, future adaptation may be technically infeasible or too complex to administer over the long term, leaving options that consider the *precautionary* approach, perhaps with one-off intervention.

⁷ The decision pathway approach set out in the Thames Estuary 2100 plan is a good example of using flexibility in the options and in managing uncertainties.

4.6 Managing uncertainty

Uncertainty exists throughout appraisal, in:

- What the future may hold;
- Understanding natural processes;
- The quality of data that supports design and appraisal;
- The modelling of impacts.

Whilst this policy statement does not prescribe how to manage uncertainty, a number of principles should be considered:

- The management of uncertainty should be clearly presented in appraisal, showing what approaches have been used and how decisions have been influenced. Examples of approaches to manage uncertainty include: sensitivity testing of key parameters; event and fault trees; real options analysis; use of probability distributions instead of point estimates; and monte-carlo analysis.
- A 'no regrets' approach should be adopted where possible, where actions are worthwhile and justified without compromising future adaptation, whatever the extent of future climate change.
- Options that adopt the *managed adaptive* approach should be initially considered alongside options that take into account the precautionary principle and a *precautionary approach*, in an unbiased and open appraisal process.

Chapter Five: Appraisal principles



Courtesy of the Environment Agency.
The 2007 Floods caused extensive damage
to residential property in Oxford.

Appraisal principles

5.1 General principles

Appraisal is about gathering information and comparing options in a consistent way in order to: support good decision-making; avoiding bad decisions; as well as maximising the likelihood that in time the chosen approach with hindsight turns out to have been the right choice. Appraisal is necessary to justify Government investment in flood and coastal erosion risk management.

The appraisal process should be approached in an open, constructive and creative fashion as an aid to problem solving and finding the right solution, rather than as a formality or a burden that is necessary to gain funding for an already established preferred option. The appraisal process should point to how value for money can be maximised from any public investment. This is needed to help decision makers ensure that taxpayers' money is invested in those projects that will deliver the greatest benefits for society as a whole.

Throughout the appraisal process:

- The degree of detail considered should be proportionate to the complexity of the problem and the information required to reach and demonstrate a robust decision;
- Consequently the cost of the appraisal stage should be proportionate to the overall costs and issues associated with delivering the policy or project;
- The sensitivity of options to changes in cost and benefit assumptions should be tested at different stages of appraisal, to fully understand the uncertainties that exist in the analysis of options.

Any legal requirements which may influence the options should be fully considered throughout the appraisal process.

5.2 The appraisal process

All appraisals should, as a minimum, go through the following three-stage process⁸:

1: Define the issue	<i>Define</i> the issue and consider the case for government intervention. Set SMART objectives if there is a case.
2: Develop, Describe and Value	<i>Develop</i> a full range of possible options, <i>describe</i> the options, and then <i>value</i> the positive and negative impacts of each of the options.
3: Compare and Select	<i>Compare</i> options in a systematic way and <i>select</i> the most effective and deliverable solution

5.3 Stage 1: Define issues and set objectives

Objective setting. Objectives for a plan, strategy or project should be: in line with wider government policy and the HM Treasury Green Book (Reference 6); be SMART⁹; and include a realistic timetable for delivery. The objectives should be stated clearly and linked to the problem to be addressed. They should be established in dialogue with partners and stakeholders and should not be biased to favour or to marginalise any group. Objectives should reflect any opportunities to deliver multiple benefits, and avoid unintended or perverse consequences.

⁸ The three stages complement the HM Treasury's Green Book's steps of justifying action/rationale for intervention and setting smart objectives and options appraisal. The Treasury Green Book's steps of developing and implementing a solution and evaluation are steps that follow after the appraisal decision. As such this policy statement does not cover these steps.

⁹ SMART – Specific, Measurable, Achievable, Realistic, Timely.

When considering objectives for a project, the opportunity for delivering multiple outcomes and attracting funding from private beneficiaries and other sources should always be considered. Also see Section 5.5, which covers private funding and how appraisal may reflect the benefits to be gained from private beneficiaries.

Involving stakeholders. Stakeholders and potential partners should be involved early in helping to define the scope of the project and identify links with their objectives. There should be no assumption at the start of the project about the right solution or, indeed, whether public money should be invested in any particular scheme or at all.

Having understood the issues and the connections between flood and erosion management and others' objectives, opportunities to collaborate with potential private and public partners should be considered, to explore whether there may be value in delivering multiple benefit solutions. Possible private sources of funding and contributions should also be identified at this early stage, to reduce the potential cost of the final project to the taxpayer.

Statutory requirements. In a limited number of cases statutory requirements may give rise to the need for a project. In such cases meeting the minimum legal requirement should be a primary objective of the project. However, there are likely to be wider benefits associated with such projects and these should also be explored to see whether there is a case for doing more than the minimum legal requirement.

Proposals that are not, in themselves, driven by the need to meet legal requirements must still comply with any relevant legislation. The cost of doing so is part of the necessary cost of the options considered. For example, the appraisal process should consider the need to meet minimum health and safety standards for staff and members of the public. There is also a requirement to comply with environmental legislation, such as the European Water Framework Directive and the Birds and Habitats Directives. Meeting such requirements will always be necessary and should be considered from the outset.

Other legal requirements. Operating authorities should clarify early in the appraisal process whether any specific legal obligations apply and, if so, whether such requirements can be met or possibly rescinded. In all cases, legal requirements should be clearly defined by the relevant authority and not exaggerated.

Multi-objective projects. Flood and coastal erosion plans, strategies and projects should be encouraged to deliver across multiple objectives, where there are opportunities and synergies with other government objectives. Partner organisations should also be encouraged to manage flood and coastal erosion risk through projects that may have other primary aims.

Strategic context. Objectives should be established with reference to Government policy, plans, and relevant strategies. At a project level, appraisal should clearly reflect the relevant strategy or CFMP/SMP policy for the study area.

Environmental enhancements. The management of flood risk will impact on many aspects of the social, natural and historic environment. Operating authorities should manage flood and erosion risk in ways that will improve the social, natural and historic environment at the same time as reducing the risks to people and property, wherever possible. Opportunities to do more, while also cost-effectively reducing risk, should be promoted.

5.4 Stage 2: Develop, describe and value options

Developing options and describing the impacts

Appraisal Summary Tables should be used as a framework for systematically describing and valuing the positive and negative impacts of options. Impacts should be described in a systematic and, as far as possible, consistent way so that they can be quantified, valued and compared. More specific guidance on how this should be done will be provided by the Environment Agency. Spurious accuracy should be avoided in favour of a consistent risk-based approach. A framework for disaggregating the impacts should be considered at this stage.

Range of options. A wide range of options, including structural and non-structural solutions and those that can be adapted for future risks, should be considered both individually and in combination. This should include preferred options identified in more strategic plans (where relevant) and options that offer sustainable and flexible approaches to risk management. See Chapter 3, section 3.2 for more detail on strategic plans and their role.

Baseline option. A do-nothing or no active intervention option should always be considered so as to provide a consistent baseline against which to compare the benefits of possible interventions. This is also important because, in most cases, there is no legal requirement on Government to reduce risk and therefore the case for further intervention needs to be very seriously considered in the face of other calls upon public funds. A do minimum option should also be appraised even where a legal requirement means some action must be taken¹⁰. (However, where there is a legal requirement, the do minimum option will be the option that does the minimum that is necessary to meet the legal requirements.) This is to allow costs and benefits to be properly quantified and to make sure costs are not excessive.

Assess impacts. Having considered a wide range of possible solutions, the impacts (both positive and negative) of each option should be clearly described, quantified and, where possible, valued. This should include an assessment of residual damages on property, infrastructure and businesses (including agriculture)¹¹. This assessment should not be limited to impacts that can easily be measured in monetary terms. Other significant impacts such as on health and the environment should also be described and quantified.

Environmental appraisal techniques, using the structured methodology employed in a Strategic Environmental Assessment (Reference 17) or Environmental Impact Assessment should be utilised to describe the full range of impacts on the human, cultural, historic and natural environment of all options.

Whole life costs and appraisal timeframe. To reflect the nature of the investment over a long period of time, including future maintenance and adaptations, the whole life costs should be included in the assessment. An understanding of the dominant physical processes and the design life of any measures proposed should be the basis for determining an appropriate timeframe for appraisal (usually up to 100 years). An understanding of natural processes is important to ensure that the impacts of different options are properly appraised and opportunities to work with nature to reduce risk are identified.

Climate change impacts and adaptation. The impacts of climate change should be consistently taken into account, in accordance with the most up to date guidance (Reference 15).

¹⁰ Even where there is a legal requirement it is necessary for appraisal purposes to consider the do nothing option in order to understand the benefits of doing something and to consider the benefits of options that do more than the legal minimum. For example, this is necessary in cases where additional actions are needed to comply with the Water Framework Directive so that a view can be taken on whether costs might be disproportionate.

¹¹ Some mitigation measures may reduce risk leaving a residual probability and consequence, such as from extreme events. The importance of this must be considered. If the residual risk is too high to be accepted, then other mitigation measures should be considered.

The appraisal should reflect options that are sufficiently flexible to allow for future adaptation and any future changes to current predictions on climate change impacts.

Legal requirements. The costs and benefits of projects that are promoted principally to meet legal requirements should be assessed in accordance with the guidance on valuing the impacts, below. However, options that would clearly not meet the minimum legal requirement should be screened out at an early stage. The exception to this is that the do-nothing option should always remain in the appraisal to provide a consistent baseline against which to assess the costs and benefits of doing something. Where the costs of meeting the minimum legal requirements exceed the benefits, a cost effectiveness analysis should be made to ascertain the most cost-effective way of complying with legislation.

If a project is not promoted primarily to meet a legal objective, the cost of making it comply with any relevant legislation is part of the overall cost of the scheme. However, there will almost certainly be benefits associated with meeting such requirements and those impacts should also be valued on the benefits side of the appraisal.

Valuing the impacts



Courtesy of Government Office for Yorkshire and Humber. Loss of property and highway infrastructure at Aldbrough due to erosion.

Valuation. All costs and benefits should be valued in monetary terms, based on market prices, where possible, unless it is impractical or disproportionately expensive to do so. The objective of this is to provide a consistent way of comparing value for money of different options both at a project and a programme level.

As a rule, all benefits and costs in an appraisal should be based on *present-day* valuations in real terms, regardless of when that benefit or loss occurs in the appraisal period. This principle should ensure consistency in approach between all types of costs and benefits and between different schemes. This is intended to avoid speculation of future inflation rates or valuation changes.

Impacts (costs and benefits) which are not valued in monetary terms should always be described, quantified and brought into the appraisal through appraisal summary tables. They are often important and should not be ignored simply because they cannot easily be valued in monetary terms.

Multi criteria techniques, such as weighting and scoring, should be used to aid the systematic comparison of options where all of the impacts have not been captured in monetary terms. This is not an alternative to cost benefit analysis but an extension of it, to ensure that non-monetised impacts are adequately considered in the appraisal processes.

Where it is not practical to provide a monetary value for the full range of benefits, it may still be possible to value the difference between options for a particular benefit category. This will provide useful information in the decision-making process. The process should also provide an opportunity for decision makers to consider whether the additional costs of delivering outcomes, which are not valued in monetary terms, are proportionate to the costs involved.

Valuing impacts on property. For consistency in baseline assessments, current land uses and property occupancy should normally be considered to continue for the duration of the appraisal period. Implicit in this assumption is that values applied should be based on current values even when they apply to activities at some point in the future. This will ensure consistency across the valuation of different aspects even though it may not reflect the values that some assets may acquire in the future.

Usually permanent buildings which are at risk of total loss from flooding or erosion during the appraisal period should be valued at their current market value, excluding any adjustment in value for the erosion or flooding risk. Further details on valuations, including details on capping, will be provided by Environment Agency guidance for operating authorities.

Valuation impacts on land. The value assigned to land should normally be based on its current use. Where the total loss of agricultural land is being assessed, the valuation should be based on the current market value less adjustments for transfer payments. Where an assessment is being made of events that would have temporary impacts, the use of a gross margin (broadly defined as sales less variable costs) of agricultural output for relevant a period should generally be used to reflect the loss of productivity.

Defra will work with operating authorities to update guidance on agricultural land valuation when necessary. For example, to account for any economic change in the value of land or agricultural production brought about by changes in Common Agricultural Policy or HM Treasury guidance on adapting to climate change. Such updates would supersede Defra's current supplementary guidance (Reference 18).

Land used for recreational or environmental purposes should be valued on the basis of the damages or benefits that options would have on the ecosystem services that the land provides (Reference 19 and 20).

Brown field sites and other undeveloped areas should be valued on the basis of the damages that flooding or erosion would cause to the current use, not on their development potential. The reason for this is to preclude Government funding of works which would enable land to be developed for private gain. An exception to this is if there is full planning permission in place and it complies with PPS25 (Reference 21) in which case the valuation would be on the basis of the proposed land use. However, the developer would be expected to contribute in full towards the costs of reducing flood or coastal erosion risk to an acceptable level for the land concerned.

Valuation of ecosystem services. Where practical the environmental impacts should be assessed using an ecosystem services approach (Reference 19 and 20). This means valuing the environment according to the range of goods and services it provides to people and how these benefits might be altered by different options. Where any proposals change the ecosystem services provided, these changes should be assessed and quantified to give a value for the impact, thereby providing a comprehensive assessment of the impacts of all changes due to the different options.

Valuation flood warning benefits. The flood warning service in England is provided by the Environment Agency as part of a combined local and national service aiming to have comprehensive coverage where practicable.

Costs and benefits can be difficult to disaggregate to specific locations although the following general principles should apply:

- An allowance for the benefits and costs of existing flood warning services should be included in appraisal;
- A flood warning service is unlikely to be effective or feasible in the case of rapid response catchments where less than two hours warning can be given. This may be taken into account in the appraisal process as part of evaluating the social impacts;
- Where new flood warning services form part of a risk management option the costs and any additional benefits over those of existing services should be included in the appraisal. This might occur where flood warning and resilience measures are proposed to work together to reduce the consequences of flooding should it occur.

Standard approaches should be used for assessing impacts where possible to ensure consistency within and across different appraisals. Sources for such approaches currently include:

- 'The Benefits of Flood and Coastal Risk Management Manual'; FHRC, 2005; (Reference 22)
- Flood and Coastal Erosion Risk Management, Economic Valuation of Environmental Effects Handbook; Eftec, 2007; (Reference 23)
- Defra guidance on the appraisal of human related intangible impacts of flooding and distributional impacts; Defra, 2004; (Reference 24)
- Assessing and valuing the risk to life from flooding for use in appraisal of risk management measures; Defra, 2008; (Reference 25)
- The valuation of agricultural land and output for appraisal purposes; Defra, 2008; (Reference 19)

The impact of greenhouse gas emissions should be valued according to Government guidance, currently based on Defra guidance on the social cost of carbon.

Taxes and other transfer payments should be excluded from the appraisal of costs and benefits, as their net economic impact to society is zero.

Discounting techniques should be used, according to the latest HM Treasury Green Book guidance (Reference 6), to bring all costs and benefits to a present value based on a discounted accumulation of all the benefits and costs over the whole life of the intervention being considered. Proper account should be taken of any residual benefits beyond the anticipated scheme life and any sunk costs incurred before starting.

Corrections for optimism bias should be applied to the costs and works duration in line with HM Treasury Green Book supplementary guidance (Reference 26). The use of mitigating actions to reduce optimism bias should be applied consistently to all costs in line with guidance.

Disaggregation. Costs and benefits should be disaggregated showing the extent to which interested parties experience either an economic benefit or burden from different options. Disaggregation is also important in order to identify potential contributors and indicate the fairness of decisions to different groups. Recent research on Disaggregation presents this approach (Reference 27).

Distributional impacts (that is the effects of proposals on different sections of society) should always be considered and adjustments applied where necessary and practical (Reference 24). Such adjustments, sometimes known as distributional weights or equity multipliers, should not be made until benefits and costs have been disaggregated, to avoid double counting and to show the effect of the adjustment.

5.5 Stage 3: Compare the options and select the preferred approach

The information set out in the **appraisal summary table**, should provide a comprehensive assessment of the positive and negative impacts of all options. It should also make transparent which impacts have been valued in monetary terms and which have not, as well as revealing information about the distributions of costs and benefits of different options.

The screening of unviable options should reduce a long list to a shorter list of options. However, potentially viable options should not be dismissed just because some of the benefits may be difficult to describe. The best available environmental option and those with strong sustainable social benefits should remain in the appraisal process unless they are manifestly unviable. The reasons for the rejection of options should be clearly stated and recorded. Care should be taken to not unnecessarily screen out non-structural or adaptable options, especially where other options may not be sustainable in the longer term. Options that would clearly not meet the minimum legal requirement should be screened out at an early stage.

Transparent decision-making. Flood and coastal erosion risk management has to compete with other areas of public expenditure, and individual projects need to compete for funding with other possible FCERM interventions around the country. The aim of the programme is to deliver maximum benefit and obtain best value for money while also meeting any necessary legal requirements and policy goals.

The selection of the preferred option should be informed by an appraisal that captures all relevant impacts (costs and benefits) and uncertainties that could affect the choice of option. Projects are only economically worthwhile if the benefits exceed the costs (i.e. the ratio of benefits to costs is greater than 1). This should not be confused with affordability of an option. Affordability is a separate matter relating to availability of funds. Although in developing plans, strategies and projects, authorities will clearly need to consider affordability and potential sources of funding.

The goal of Government's investment in flood and coastal erosion risk management is to maximise the net present value (NPV) of interventions whilst achieving any targets that may be set for the programme as a whole. Cost benefit analysis will provide important information to support this goal.

However, decision making should be balanced and should make use of an appropriate combination of approaches (e.g. NPV, BCR and multi criteria approaches or other similar or relevant metrics) to arrive at a preferred option, and not necessarily depend on a single metric.

The disaggregation of costs and benefits should be used to enable the affected groups and impacts to be viewed transparently and aid the decision making process. Where contributions from beneficiaries are available, a further measure of economic efficiency, which complements the benefit-cost ratio, may also be used to evaluate such projects. The suggested additional metric is NPV / C_g ¹². This metric is important because it can present the effects of private expenditure in managing risk, and highlight any increases to marginal benefit cost ratio and net present value for wider society.

¹² Where Net Present Value (NPV) = (total present value of benefits minus the total present value of costs) and C_g = Costs to Government only. Please refer to operating authority guidance on approach.

The following types of analysis should be used as appropriate to compare and support **the selection of the preferred option**:

Cost-benefit analysis. If all significant impacts of options are satisfactorily expressed in monetary terms, the option with the highest BCR will usually be the most appropriate choice. Appraisal summary tables should still be used in such cases to add to the transparency of the decision making process. For example, to illustrate how impacts have been described and valued in the cost benefit analysis.

However, there will be cases where it is not practical to include all significant impacts into the cost-benefit equation. In such cases, **multi-criteria approaches**, such as weighting and scoring, should be used to complement the cost-benefit analysis. Where such non-monetary approaches are used in appraisal, there will still be an inferred benefit value and this should be made explicit in the appraisal report.

When using cost-benefit analysis and multi-criteria approaches together in appraisal, operating authorities should ensure that they are robustly and consistently applied in order to:

- Avoid double counting;
- Make appropriate and consistent use of discounting;
- Ensure a common baseline.

Cost-effectiveness analysis may be used in a limited number of situations, for example, where:

- There is a legal requirement to achieve a certain outcome and that outcome cannot be met through a project with a positive cost benefit ratio; or
- An option has been justified through the normal appraisal process and an intervention (such as investment in a like-for-like replacement of a sluice gate) is necessary to continue to deliver that option.

Incremental benefit-cost ratio. The incremental benefit-cost ratio (iBCR) may be used in the decision process. A key principle should be to retain a full understanding of the opportunity cost (where there is, at least, an extra pound of benefit for each additional pound of cost); and then ask whether greater benefits could be gained by investing the additional resources in an alternative project in another geographical area.

Thus, there may be a justifiable case for selecting a project which would provide a higher level of protection than that offered by the option with the highest benefit-cost ratio, *providing* that the overall ratio is adequate to represent good value for money, when compared with other investments. The role of iBCR in the selection process is therefore to provide information to ensure that the investment cannot be more effectively spent elsewhere in the FCERM programme.

The Environment Agency may publish guidance on such decision rules having agreed the principles with Defra.

Where the decision process leads to a preferred option that is not the optimum in monetarised benefit/cost terms, this should be clearly indicated in the appraisal report and a rationale given. In all cases, the distribution of the costs and benefits amongst different groups should be transparent.

Legal obligations. The option selected should always meet any legal obligations (see Section 5.4 and Section 7 on how these should be valued). Options which go beyond the essential legal requirements may be justified using the normal criteria discussed throughout this policy guidance.

Outcome measures. A suite of outcome measures for flood and coastal erosion risk management has been published by Defra and will be kept under review to improve the monitoring of outcomes in return for Government's investment in flood and erosion risk at a programme level. Ministers may set targets against some or all of these measures and provide a steer on priorities (Reference 8). Outcome measures and targets are intended to operate at the programme level and influence the prioritisation of projects for public investment rather than the appraisal of individual projects and policy options.



Chapter Six: Public consultation, governance and scrutiny

Courtesy of the Environment Agency. The Blyth Estuary, Suffolk, following a tidal surge.

6.1 Public participation and consultation

Operating authorities should ensure that arrangements are in place for effective public participation and consultation, and that procedures are adequate to demonstrate transparent decision making.

Opportunities for public participation should be incorporated into the appraisal process at appropriate stages from high level plans, such as CFMPs and SMPs, through strategies to schemes and projects. Engagement with interested parties should aim to gain a sound understanding of local issues and an appreciation of the concerns of individuals, communities and businesses potentially affected, as well as more strategic and national perspectives. Community and stakeholder participation and information should be used to help identify and develop options for risk management and gain an understanding of local people's preferences. Appraisal summary tables are a useful means of capturing this information to support appraisal.

Consultation. Formal and informal consultation should be undertaken in the development of plans and projects. This should enable stakeholders affected, including the community and statutory consultees, to make a meaningful contribution to the appraisal processes. Consultation should be coordinated and structured to enable interested parties to understand the decision making process. Legal consultation requirements, to do with the EU Environmental Impact Assessment and Strategic Environment Assessment Directives and the Floods Directive, should be used to inform policy and projects appraisal.

From the outset, it should be explained to communities and other beneficiaries that the availability of public funds for delivering flood and erosion risk management is dependent on national priorities for investment and how the project compares with the benefits achievable by investment in other parts of the country. However, it is equally important that people understand that constraints on public funds may not prevent beneficial local projects being developed, partly or wholly funded by local beneficiaries. This is subject to the impacts being acceptable to the whole community and such projects complying with any relevant regulations.

As part of the consultation process, the potential benefits and the beneficiaries should be clearly identified. This should enable stakeholders to understand the distribution of costs and benefits. It may also encourage contributions towards projects which could enable measures to be promoted that otherwise might not be afforded or allowed to proceed sooner. Such contributions should allow public funding to go further and deliver improved risk management in areas that otherwise would not benefit.

Transparency and communications. At a local level, information should be conveyed to stakeholders in a transparent way, using plain language to enable stakeholders to gain a better understanding of the appraisal decisions that affect them. The basis for flood and coastal erosion risk management decisions should be made available in the public realm, wherever possible.

Operating authorities should be accountable for the decisions they make and be transparent in the way they take and communicate these decisions. Operating authorities should therefore ensure informed consultation takes place as part of the appraisal process, and show clear procedures for involving interested parties.

6.2 Governance and scrutiny

Operating authorities should have in place effective and independent arrangements to assure the quality of the appraisal, approval processes and governance of decision making.

This should be achieved through openness in communications, greater stakeholder participation and publication of information and decisions in the public domain.

Operating authorities should undertake in-house quality assurance checks of all proposals and post project evaluation, as recommended by the HM Treasury, (Reference 7) to create a cycle of continuous learning and to understand where policy and delivery can improve. Defra may review a sample of appraisals after they have been approved at all levels in the strategic framework for the purposes of programme and policy evaluation and to monitor how they are following the principles in this statement.

Operating authorities should report on their performance and engage in feedback activities. Evaluation reports produced by operating authorities should be widely disseminated and published, where appropriate, to contribute to the knowledge base upon which future decisions will be taken.



An aerial photograph showing extensive coastal flooding. The water is a deep blue-grey color, inundating large areas of brown and green marshland. In the foreground, a residential area with houses and trees is visible, partially surrounded by water. The coastline is visible on the right side, with waves breaking onto a sandy beach. The overall scene depicts significant environmental impact from sea level rise or storm surge.

Chapter Seven: Legal requirements and related policy matters

Courtesy of Mike Page and provided by the Environment Agency. Flooding of coastal habitats at Dingle Marshes, Suffolk.

7.1 EU Policy and legislation

European Directive on the Assessment and Management of Flood Risks. All flood and coastal erosion risk management should comply with Directive 2007/60/EC of the European Parliament and of the Council for the Assessment and Management of Flood Risks (Reference 28).

The legislation requires a three stage approach to managing all types of flooding except flooding from sewerage systems which may be excluded:

1. A Preliminary Flood Risk Assessment to determine where significant flood risks are likely. The assessment must be completed by 2011 and this will feed into further decisions on risk management;
2. Mapping of significant flood risks by 2013; and
3. Preparation of plans to manage the risks by 2015.

There are requirements for co-ordination with River Basin Management Plans required under the Water Framework Directive and relevant interested parties.

As far as possible, operating authorities in England should use the existing arrangements to manage flood risk, including CFMPs and SMPs, to address the Directive's requirements. The appraisal of these plans will provide important information to help meet the requirements of the Directive.

Environmental Assessment. An Environmental Impact Assessment (EIA) is legally required for any flood management, land drainage or coast protection scheme that is likely to have a significant effect on the environment.

For high level plans and strategies a Strategic Environmental Assessment (SEA) should be carried out in line with the approach described in the Directive 2001/42/EC of the European Parliament and European Council *on the assessment of the effects of certain plans and programmes on the environment* (the SEA Directive) (Reference 17).

Such legally required assessments should inform the appraisal process and not be separate to it. This may involve gathering information on environmental impacts at an earlier stage than would be legally required for a formal environmental impact assessment.

Appraisal reports should clearly identify whether environmental assessment legislation is applicable and what steps have been taken to achieve compliance. Where a statutory EIA is not required, the appraisal report should confirm how the decision to not require an EIA has been made, publicised, and confirmed. This is particularly relevant where it is intended to deliver a project under permitted development powers.

Appraisals not supported by a statutory EIA or SEA will still need to show how environmental considerations (impacts, mitigation, enhancements etc) have been taken into account.

Water Framework Directive (WFD). All flood and coastal erosion risk management activity is required to comply with the Directive 2000/60/EC of the European Parliament and of the Council - the Water Framework Directive – which was transposed into English law in 2003 (Reference 29).

The Environment Agency is the competent authority for the implementation of the WFD in England alongside the Secretary of State. The WFD aims to protect the ecological status of inland and coastal waters. Flood and erosion risk management must avoid causing a deterioration in the status of water bodies and contribute to the achievement of objectives for water bodies, where appropriate.

A proportionate¹³ approach should be taken to satisfying these requirements. Appraisal should help reveal options for meeting the requirements and provide an assessment of the costs, thus informing decisions on where such costs are proportionate. Where flood and coastal erosion risk management activities have the potential to further the objectives of the Directive, this is encouraged either directly through flood management projects, or by multi-objective partnerships and projects.

European Birds and Habitats Directives. Appraisal should identify potential impacts (both positive and negative) of flood and erosion risk management options on designated sites and protected species noting that legal requirements must be met for sites or species designated under the Birds and Habitats Directives.

Before any plan or project that is likely to have a significant effect on a European site (e.g. Special Protection Area, Special Area of Conservation or Ramsar site) is authorised, the competent authority is legally required to make an *appropriate assessment* of the plan or project (unless it is directly connected with or necessary for the conservation management of the site). This assessment is to ascertain whether the plan or project will adversely affect the integrity of the site. The assessment of the impacts of alternative options in the appraisal process should inform this appropriate assessment which is required under the Conservation (Natural Habitats, &c.) Regulations 1994.

The competent authority is generally the authority that gives approval for the project, which will usually be the planning authority for projects requiring planning consent or the operating authority where the delivery work can be carried out under permitted powers.

Operating authorities are also required to:

- Take appropriate steps to avoid the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which European and Ramsar sites have been designated;
- Take any necessary compensatory measures when implementing plans or projects to ensure that the overall coherence of Natura 2000 is protected. This requirement arises where plans and projects are agreed by the Secretary of State despite having a potentially adverse effect on a European site (Special Protection Area or Special Area of Conservation) or a Ramsar site;
- Have regard for the requirements of the Habitats Directive in the exercise of their functions and, in relation to marine areas, to exercise their functions to secure compliance with the Directive's requirements.

¹³ The approach must ensure that, in undertaking operational or consenting activities, FCERM authorities should consider WFD and not do something that would lead to deterioration in water body status, unless justified under Art 4.7 WFD, which provides limited conditions for deterioration to take place.

7.2 Other relevant legislation

Domestic legislation likely to affect flood and coastal erosion risk management plans and projects includes the Town and County Planning Acts, and legislation relating to the protection of various aspects of the environment, including the Natural Environment and Rural Communities Act 2006, Wildlife and Countryside Act 1981, Monuments and Archaeological Areas Act 1979 and the Planning (Listed Buildings and Conservation Areas) Act 1990, as well as Health and Safety and Human Rights legislation.

This list is not exhaustive and different aspects of legislation will apply in different circumstances. Operating authorities should check what legislation is likely to affect any options considered and ensure that any costs of compliance are included in the appraisal.

7.3 Synergy with other government policies

Planning policy. Links between planning policy and flood risk management have been strengthened in recent years and Planning Policy Statement 25 (Reference 21) sets out a framework for delivering this.

There should be a two-way dialogue during the development of flood and coastal erosion risk management plans and Regional Spatial Strategies, Local Development Framework documents and Strategic Flood Risk Assessments. Flood and coastal erosion risks should influence long term redevelopment proposals as well as new developments.

Agriculture, rural development, biodiversity, landscape and forestry. Flood and coastal erosion risk management activity should support Government policy on agriculture, biodiversity, landscape, rural development, and forestry where possible. During planning phases, work with Government Offices, landowners, rural communities and other Government agencies, such as Natural England and English Heritage, should be undertaken to ensure identification of any opportunities for multiple objective projects. New approaches to managing risk, particularly resilience measures, land management measures which slow runoff and adaptation, may be suitable for dispersed rural or coastal communities.

Land management issues. Flood risk management activity should support Government policy on soils protection. Soils form an important element of the natural water cycle by storing and transferring rain water before it enters drainage channels and rivers. Maintaining or restoring good soil condition and ensuring that soils are not unnaturally eroded will help ensure that land management practices do not add to flooding problems, and could help alleviate them.

Soil condition effects on additional flooding are considered to be relatively small for major floods and at the catchment scale. Locally, soil condition can cause significant and more frequent flooding, soil erosion and sedimentation problems.

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Glossary of Terms

Adaptation Approach

The approach required to cost-effectively manage risks arising from climate or other change drivers such as shoreline evolution in the UK. The principle is to assess potential impacts by considering different future scenarios and then develop strategies, where appropriate, which enable society to adapt in a planned and appropriate manner and rate.

Benefit/Cost Analysis

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

CFMP Catchment Flood Management Plan

A high level plan recommending sustainable long term policies for flood risk management across a river catchment. The plan is based on a comprehensive understanding of flooding processes from all sources of flooding and an assessment of risk to people, property and the environment.

Climate change

Long term changes in climactic conditions caused by, for example, the release of greenhouse gases to the atmosphere from the burning of fossil fuels.

Do-nothing option / no active intervention

An option used in benefit/cost analysis to act as a baseline against which all other options are tested. It assumes that no action whatsoever is taken. In the case of existing works it assumes for the purposes of appraisal that operating authorities cease all maintenance, repairs and other activities immediately.

In the case of new works it assumes that there is no intervention, and natural and other external processes are allowed to take their course.

Economic Appraisal

An appraisal that takes into account a wide range of costs and benefits to society, including those that cannot readily be valued in monetary terms.

Ecosystems Services Approach

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

Environmental issues

Where environmental issues are referred to in this document, this term is used to encompass landscape/natural beauty, flora, fauna, geological or geomorphological features and buildings, air, water, human interests, sites and objects of archaeological, architectural or historical interest.

Environmental assessment

The process whereby the effects of a proposal, on the social, natural or historic environments are identified measured and assessed to determine their significance.

EIA / Environmental Impact Assessment

A process set out in European and domestic legislation that must be followed when proposing specific types of work, including most forms of flood and coastal erosion risk management where the environmental effects of the work are systematically considered and suggestions are made to mitigate any negative impacts.

Greenhouse gases

Naturally occurring gases, such as water vapour, carbon dioxide, nitrous oxide, methane and ozone, and man-made gases like chlorofluorocarbons, which absorb infrared radiation from the Earth and convert it into heat that is retained in the atmosphere for a period of time, and therefore contributes towards global warming.

Managed Realignment

The management of a process of establishing a new defence line, often set back from the existing position, with the aim of improving the long-term sustainability of the defence, or contributing to other aims such as habitat creation.

Marginal Utility

An economic term referring to the extra satisfaction derived from receiving an additional unit of goods or services.

MCA – Multi-Criteria Analysis

Techniques used to support decision making when there are a number of non-monetised or other impacts to be included in the cost-benefit analysis.

Natural processes

Working with natural processes means taking action to manage flood and coastal erosion risk by protecting, restoring and emulating the natural regulating function of catchments, rivers, floodplains and coasts. This could for example involve using farmland to temporarily store flood water, and the creation of washlands and wetlands to store flood water away from high risk areas. Managing upland areas, by for example, restoring degraded peatlands or blocking artificial drainage channels and reforesting floodplains will also help to slow run-off.

No-regrets action

Actions taken whose social, environmental and economic consequences are expected to be beneficial regardless of future uncertainties, such as through climate change.

Non-structural measures:

Flood and coastal erosion risk management interventions that are not 'built' solutions. For example, improved flood warning, emergency response plans, development control, changed maintenance arrangements.

Operating Authority

A body with statutory powers to undertake flood defence or coast protection activities, usually the Environment Agency, Local Authority or Internal Drainage Board.

Outcome measures

Measures of specific outcomes that operating authorities are expected to achieve, to demonstrate the delivery of the Government's stated policy aims and objectives for flood and coastal erosion risk management.

Post project evaluation

A procedure to review the performance of a project with respect to its original objectives and the manner in which the project was carried out.

Precautionary Principle

This requires that precautionary action should be considered to counter a potentially significant risk of damage to the environment even if the nature and scale of the risk is subject to some uncertainty. For example, action could be justified in accordance with the principle to limit the use of potentially dangerous materials even where scientific knowledge is not conclusive, if the balance of likely costs and benefits justifies it.

Present value

The value of a stream of benefits or costs when discounted back to the present time at a prescribed discount rate.

Project

In the context of flood and coastal erosion risk management a project usually relates to the implementation of works or a risk management intervention of some kind on the ground. It is normally the case that a project is identified as a consequence of a broad based investigation and has quite specific objectives. Stages of project development may include feasibility studies, detailed appraisal, delivery, and post project evaluation.

Risk

A combination of both the probability of an event occurring and the expected consequences if it does occur.

Risk assessment

An assessment of the risks inherent in a situation or from a hazard.

Risk neutral

Neither risk averse nor risk seeking nor with any prior view as to how any risk may be reduced

Sea level rise

The rise in sea levels relative to the land for any reason. Southern England has been sinking relative to sea level by several millimetres a year since the last Ice Age. Global warming can also cause sea-level rise through thermal expansion of the oceans and currently to a lesser extent from melting of the ice caps and glaciers.

SMP Shoreline Management Plan

A high level plan recommending long term and sustainable policies for flood and coastal erosion risk management for a length of coastline.

Strategic Framework

A planning structure which has been developed using strategic (high level) principles within which layers of consistent and interrelated plans and strategies can be developed.

Strategy Plan

A documented strategy which is developed from a strategic study into a problem and describes the course of action which has been determined to implement the preferred policy option in a specific area.

Sustainability

The degree to which flood and coastal defence solutions avoid tying future generations into inflexible and or expensive options for flood and coastal risk management. This will usually include consideration of inter-relationships with other defences, objectives and likely developments and processes within a catchment or coastal cell. It will also take account of long- term demands for non-renewable materials.

Sustainable development

Development which meets the needs of the present without compromising the ability of future generations to meet their own needs

Whole life costs

The total costs associated with a scheme for its full design and potential residual life span, taking proper account of all aspects of design, construction, maintenance and external impacts.

A particularly useful approach in helping to determine economic sustainability when used to compare the relative costs of long life schemes such as flood defences and where decisions between short term capital costs and long term maintenance costs need to be made.

**Nobel House
17 Smith Square
London SW1P 3JR
www.defra.gov.uk**

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