

THE SEVERN ESTUARY SHORELINE MANAGEMENT PLAN

THE NON-TECHNICAL SUMMARY

- PREFACE -

This is the Non-Technical Summary of the Shoreline Management Plan (SMP) for the Severn Estuary. The SMP has been initiated by the Severn Estuary Coastal Group with the encouragement of both the Department for Environment, Food and Rural Affairs and the National Assembly for Wales. The area covered by the SMP, from Lavernock Point and Brean Down up to Haw Bridge, is shown on Figure 1.

Planning for coastal defence involves a complex web of issues and responsibilities. It not only has to account for the human pressures for activity and development at the coast, but also for dynamic and diverse natural environments. If coastal defence is to be sustainable, a regional perspective on the factors causing coastal change is vital in developing management strategies and related planning policies. These strategies and policies are intended to enhance our ability to respond to changing conditions (such as sea-level rise) whilst continuing to provide appropriate protection of life and property.

Traditionally, coastal defence measures have been undertaken either to protect a new development, for improvement of agricultural land, or on a reactive basis to protect existing land use. The long history of defence from erosion and flooding has both enabled the use of land on the margins of the estuary for development and agriculture, and has reduced the flexibility of the shoreline to adapt naturally through continued erosion or accretion. The dynamic nature of the estuary environment has meant that protection of one section may have had unintended effects on adjoining areas of the shoreline, resulting in remedial defence works elsewhere.

The Department for Environment, Food and Rural Affairs (DEFRA)¹ and the National Assembly for Wales (NAW)² have identified the need for a regional strategy when assessing the requirements for coastal defence which also takes account of other shoreline interests. Shoreline Management Planning will develop a sustainable strategy for coastal defence in the Severn Estuary. It will also help to inform the statutory planning process and the wider-ranging coastal zone management process.

The Aim of the Shoreline Management Plan is to provide the basis for sustainable coastal defence policies within the Severn Estuary and to set objectives for the future management of the shoreline.

Sustainable coastal defence policies need to take account of the inter-relationships between defences, developments and processes within the Estuary, and they should avoid as far as possible tying future generations into inflexible and expensive options for defence.

The text of this Non-Technical Summary Document has been derived from (and is therefore consistent with) the text of the full Shoreline Management Plan (SMP) volumes. The SMP volumes can be inspected by arrangement with the planning department or the coastal engineering department of your local authority. Contact names and addresses are given in this summary document.

¹ formerly the Ministry of Agriculture, Fisheries and Food (MAFF)

² formerly the Welsh Office (WO)

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1. INTRODUCTION

1.1 The Severn Estuary Shoreline Management Plan

- 1.1.1 This is the Non-Technical Summary of the Shoreline Management Plan (SMP) for the Severn Estuary.
- 1.1.2 The SMP has been initiated by the Severn Estuary Coastal Group with the encouragement of both the Department for Environment, Food and Rural Affairs and the National Assembly for Wales. The area covered by the SMP, from Lavernock Point and Brean Down up to Haw Bridge, is shown on Figure 1.
- 1.1.3 *The Aim of the Shoreline Management Plan is to provide the basis for sustainable coastal defence policies within the Severn Estuary and to develop objectives for the future management of the shoreline.*
- 1.1.4 *Sustainable coastal defence policies need to take account of the inter-relationships between defences, developments and processes within the Estuary, and they should avoid as far as possible tying future generations into inflexible and expensive options for defence.*
- 1.1.5 The understanding of natural coastal processes (tides, currents, waves and sediment movement) in the estuary is fundamental to the preparation of sustainable strategies for coastal defence. The preparation of the SMP has involved the collection and analysis of information on coastal processes and also on the developed and natural environment in so far as they may interact with coastal defence strategies. The SMP sets out the objectives and strategy for the future management of coastal defences, developed in consultation with interested parties. The regional perspective provided by the SMP will help to ensure that schemes which are implemented to meet local coastal defence needs are not incompatible with estuary processes and do not have an unplanned adverse effect on the coastline elsewhere in the region.
- 1.1.6 The SMP provides a framework for shoreline management decisions: it identifies *management objectives* and preferred *strategic shoreline management options* for coastal defence which will enable the subsequent studies to be undertaken for the development of site-specific schemes.
- 1.1.7 The Shoreline Management Plan (Main Report) comprises the following documents, which are held by the members of the Coastal Group:

Volume 1	Data, Issues and Objectives	<i>Provides an estuary-wide perspective on the issues which affect coastal defence strategy.</i>
Volume 2	Strategic Shoreline Management Options.	<i>Provides local information and assessment of shoreline management strategies.</i>
<i>Sub-divided as:</i>		
Volume 2.1		Lavernock Point to the Wye
Volume 2.2		The Wye and the Avon to Haw Bridge
Volume 2.3		The Avon to Brean Down

1.2 The Severn Estuary Coastal Group

- 1.2.1. The Severn Estuary SMP has been initiated and led by the **Severn Estuary Coastal Group** which includes the Coastal Defence Authorities and operating authorities which have major responsibility for management of the coastline within the area. Development of the SMP is being led by North Somerset Council.
- 1.2.2. The funding members of the Severn Estuary SMP are:

Caldicot and Wentlooge Levels Drainage Board South Gloucestershire IDB Vale of Glamorgan Council Monmouthshire County Council City of Bristol Forest of Dean District Council The Environment Agency Wales The Environment Agency - Midlands Region The Environment Agency -South West Region Newport County Borough Council The Countryside Council for Wales Gloucestershire County Council South Gloucestershire Council North Somerset Council Cardiff County Council

- 1.2.3 English Nature is a full member of the Severn Estuary Coastal Group and DEFRA Taunton Region (FCDD), the National Assembly for Wales, the Severn Estuary Strategy and other interested organisations are represented as observers.

Adjacent SMP's

- 1.2.6 SMP's for the adjacent coastline are:
 - Bridgwater Bay to Bideford Bay SMP (North Devon and Somerset Coastal Group)
 - Swansea Bay SMP (Swansea Bay Coastal Group)

1.3 Related interests and issues

- 1.3.1 Whilst the SMP focuses on coastal defence, it takes account of a wide range of other issues in so far as they may interact with coastal defence. These issues include
- the protection of urban areas, industry, commercial activity and agricultural land
 - conservation of the natural environment
 - conservation of our heritage and archaeology
 - access, recreation and enjoyment of the estuary
- 1.3.2 The shoreline management planning process therefore provides a means by which organisations which have an interest in the estuary can inform the coastal defence authorities about their particular aspirations and objectives. Equally, it provides a means to inform the *statutory planning process* and related *coastal zone planning* about how sea-level rise and other natural and human induced factors may affect the coastline and about the priorities of the coastal defence authorities.
- 1.3.3 Therefore, the SMP is an important component of the wider planning process around the estuary. It will be referred to by the Severn Estuary Strategy and should be taken into account when preparing statutory local plans.

1.4 Preparation, Consultation, Adoption and Review of the Plan

- 1.4.1 The SMP has been prepared by Gifford Associated Consultants on behalf of (and in discussion with) the Severn Estuary Coastal Group. The consultants comprise:

Gifford and Partners Consulting Engineers
Project management, coastal defences, plan preparation

GeoData Institute Multi-Disciplinary Research and Consultancy
Marine sediment dynamics, coastal ecology, historic evolution, natural and developed environment, data collection and digital data handling, land use

ABP Research & Consultancy Coastal Physical and Numerical Modellers
Numerical modelling and assessment of coastal processes and future scenarios

Peter Fraenkel Maritime Consulting Engineers
River process analysis

Adams Hendry Chartered Town Planners and Environmental Consultants

- 1.4.2 There has been formal consultation with selected consultees based on drafts of the SMP document. The final version of the SMP document has then been prepared by the consultants, for adoption by the members of the Coastal Group. Further details of the consultation process are provided in the SMP Volume 1 Section 1.
- 1.4.3 We emphasise that the Shoreline Management Plan should be a “living” document that evolves in response to coastal requirements and the result of coastal research and other information. The objective is to achieve a dynamic and responsive planning process and not a static plan. The adoption of the SMP is a stage in that process, not the end of it. It is intended that systems of data management and consultation will be established which will lead to an update of the SMP document itself every few years.

1.5 Guidance for the Preparation of Shoreline Management Plans

- 1.5.1 The Department for Environment, Food and Rural Affairs (DEFRA) and the National Assembly for Wales (NAW) have encouraged the Coastal Defence Authorities of England and Wales to develop a strategic approach to management of the shoreline. To facilitate this, the coastline has been sub-divided into a number of coastal cells and sub-cells based on an analysis of coastal processes and in particular on the movement of sediment along the coastline. The boundaries of the sediment cells generally coincide with prominent headlands or the mouths of estuaries which interrupt the movement of sand and shingle along the coast. A shoreline management plan (“SMP”) is currently being prepared (or has been completed) for every coastal sub-cell around the coastline of England and Wales. Whilst the initial series of SMP’s have generally each dealt with one or two sediment sub-cells, (being of more manageable size), it is envisaged that SMP’s will ultimately be amalgamated to cover an entire sediment cell.
- 1.5.2 Shoreline Management Plans involve the collection and analysis of information on coastal processes and on the developed and natural environment relating to a length of shoreline. They set out the objectives and strategy for the future management of that shoreline, developed in consultation with interested parties. Guidance on the development of Shoreline Management Plans is provided in “Shoreline Management Plans - A guide to coastal defence authorities”, which was prepared by the former Ministry of Agriculture, Fisheries and Food (whose duties now lie with DEFRA), the former Welsh Office (whose duties now lie with the National Assembly for Wales), the Association of District Councils, English Nature and the National Rivers Authority, and was published by MAFF in May 1995. This is referred to hereafter as “*the MAFF/WO Guidance*”.

1.6 The SMP and Statutory Development Plans

1.6.1 The MAFF/VO Guidance (1995) recognises that SMP’s will need to take their place within a framework of plans compiled by other organisation with responsibilities in the region:

“Shoreline Management Plans are one of a number of initiatives which affect the coast... Although they have no statutory status, Plans may be useful in informing decision on Structure, Local and Unitary Development Plans” (paragraph 1.4).

1.6.2 The following table compares SMP’s and development plans:

Development Plans	Shoreline Management Plans
· Deal with all land uses.	· Deal with coastal defence issues.
· Have a statutory time horizon of up to 20 years.	· Have a longer term horizon of up to 100 years; are reviewed periodically (typically about every 5 years).
· Cover County, Unitary Authority or District Council areas.	· cover the coast or estuary, boundaries are defined primarily by geomorphology.
· Must be prepared by statute.	· Preparation is encouraged by DEFRA and the National Assembly for Wales.

1.6.3 Whilst SMP’s and development plans differ in fundamental respects (subject matter, timescale, geographical coverage and statutory significance), they should be mutually supportive.

1.6.4 At any one time both the statutory development plans and the SMP will be at varying stages in the ongoing process of review. Both types of plan will be on differing review cycles and it will inevitably be the case that each will be regularly examining coastal issues afresh. There will thus be a leapfrogging of plans. As each development plan is reviewed, reference to the current SMP will enable authorities to take account of the SMP Management Objectives and Strategies. Conversely, an SMP review will need to take account of the changing statutory planning policies for the coast.

1.6.5 There is a particularly important respect in which development plans can assist in the process of shoreline management planning and that is in the presentation of coastal defence issues to the public and in the testing of public views on such matters. SMP’s raise contentious issues, particularly where an option of *Retreat* is put forward. If SMP’s are to meet the objective for putting forward sustainable defence options then such possibilities must be considered on certain stretches of coast. Development plans are required by statute to be drawn up in consultation with the public and have well-established consultation procedures. They should also take account of the wider issues of coastal zone management and sustainability. Depending on the development planning process, either in the shorter term or the longer term it may be possible to reduce the constraints to sustainable shoreline management which are presented by some instances of development, planning consents or infrastructure at the coast.

1.7 Strategy Plans

1.7.1 DEFRA and the National Assembly for Wales have set out a strategic approach to the planning of flood defence, land drainage and coast protection works. This envisages a hierarchy of plans:

Higher level plans	The wider planning framework	<i>International, national, regional</i>
	Shoreline Management Plans, LEAPs	<i>Regional flood and coastal defence</i>
	Strategy Plans	<i>Process Unit or Management Unit flood or coastal defence strategy</i>
Local schemes	Scheme design and appraisal	<i>Local</i>

1.7.2 Strategy Plans will not necessarily be required for every part of the coastline. Where they are prepared, Strategy Plans will constitute a layer of assessment which is intermediate between the high level plans (i.e. the SMP) and the design and appraisal of specific coastal defence schemes. The preparation of Strategy Plans will continue on from the completion of the SMP. They will appraise the coastal defence strategy in more detail and will confirm or amend the preferred Strategic Shoreline Management Option for the appropriate management units.

1.8 Monitoring and Research

- 1.8.1 Recommendations are made in the SMP Volume 2 for a programme of Research and Monitoring which would have specific benefits to shoreline management within Severn Estuary. Several such initiatives have been and are currently in progress, being undertaken by the maritime operating authorities, ports, universities and other agencies. Some monitoring is (or needs to be) undertaken continuously year-on-year, such as tide gauge monitoring. Others studies have limited duration: for example the Bristol Channel Marine Aggregates Study, or the initial data gathering for the Gwent Levels Foreshore Management Plan.
- 1.8.2 In addition to the monitoring and research outlined in the SMP Volume 2, there is a wide range of research that is relevant to shoreline management but is managed by agencies or departments who are not primarily concerned with coastal defence or ports. These include:
- land drainage
 - nature conservation and ecology
 - archaeology and heritage
 - development planning and related economics and sociology
 - renewable energy
 - climate change
- 1.8.3 Co-ordination and liaison between research bodies is essential to avoid duplication of effort, to achieve a broader common understanding of estuary processes and to assess the implications of human intervention in those processes.
- 1.8.4 It is recommended that the Severn Estuary Coastal Group should:
- have a leading role in promoting and co-ordinating those types of monitoring and research which are directly related to shoreline management and coastal defence;
 - liaise with respect to other related initiatives on the estuary, either by direct communication with the bodies involved, or by liaison with ASERA and the Severn Estuary Strategy.
- 1.8.5 The Coastal Group could consider establishing small steering sub-groups of its members to steer or liaise on particular areas of research and monitoring.
- 1.8.6 The Coastal Group should decide what types of monitoring and research are either:
- appropriate for it to promote directly, or
 - are best done by other organizations, with liaison by the Coastal Group.

1.9 Implementation of the SMP

- 1.9.1 Proposals for activities to implement the SMP are made by the consultants in the SMP Volume 2. These proposals are advisory and may be adopted, amended or set aside by the Coastal Group as it sees fit.
- 1.9.2 The proposed activities include:
- The approval and adoption of the SMP Document by Coastal Group members
 - Arrangements for consultation, communication and co-ordination of shoreline management activities with interested organizations and individuals
 - The relationship between the SMP and Development Plans
 - The co-ordination of research and monitoring activities on the Estuary
 - The co-ordination of data management for the Estuary
 - The preparation of Scheme Strategy Plans, where they are appropriate
 - The review and update of the SMP Documents.
- 1.9.3 Figure 2 (below) outlines the consultants' proposals for implementation and review of the SMP.
- 1.9.4 Figure 3 (below) outlines the consultants' proposals for organisation of the SMP management.

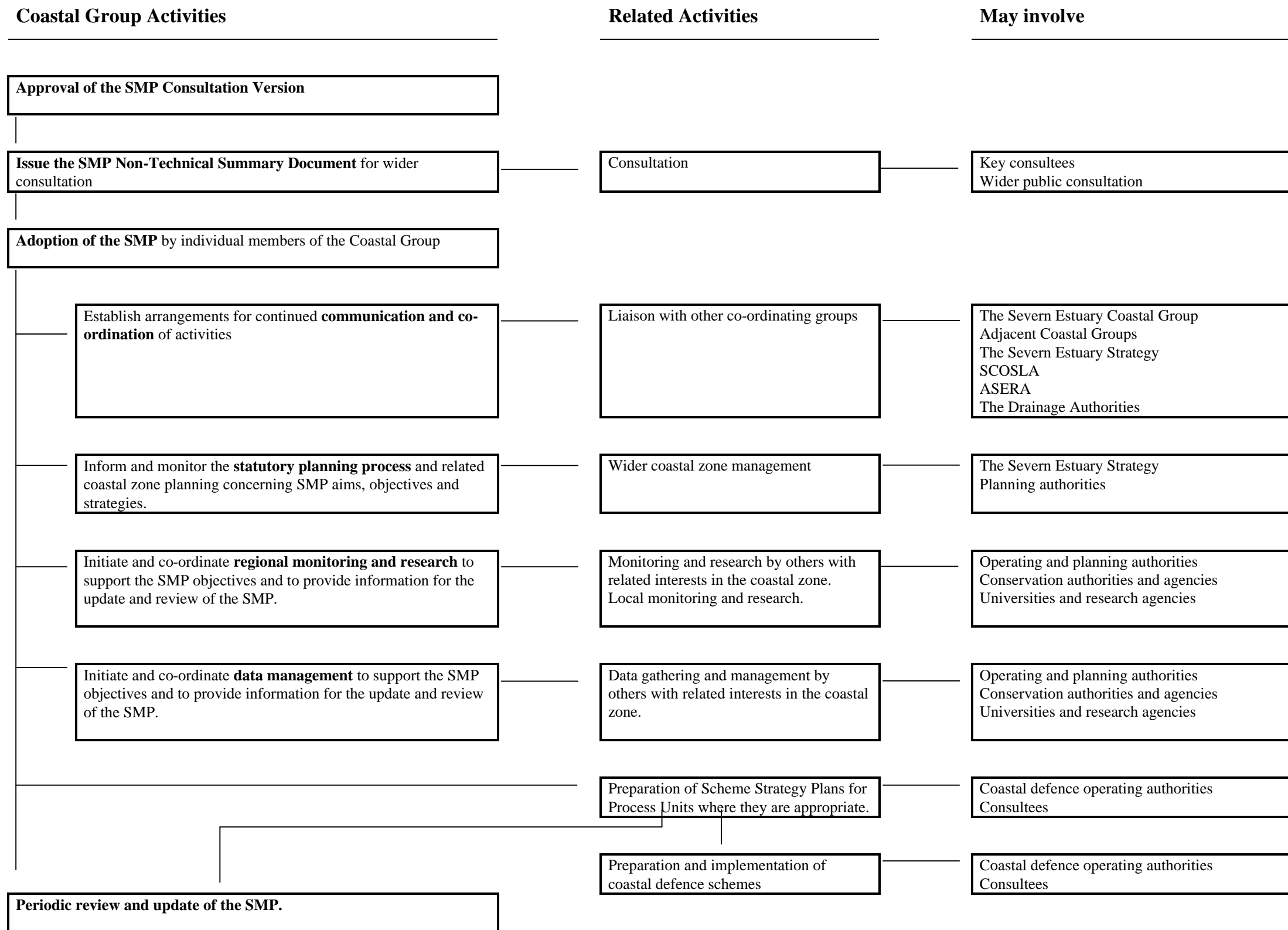


Figure 2 Implementation and Review of the SMP

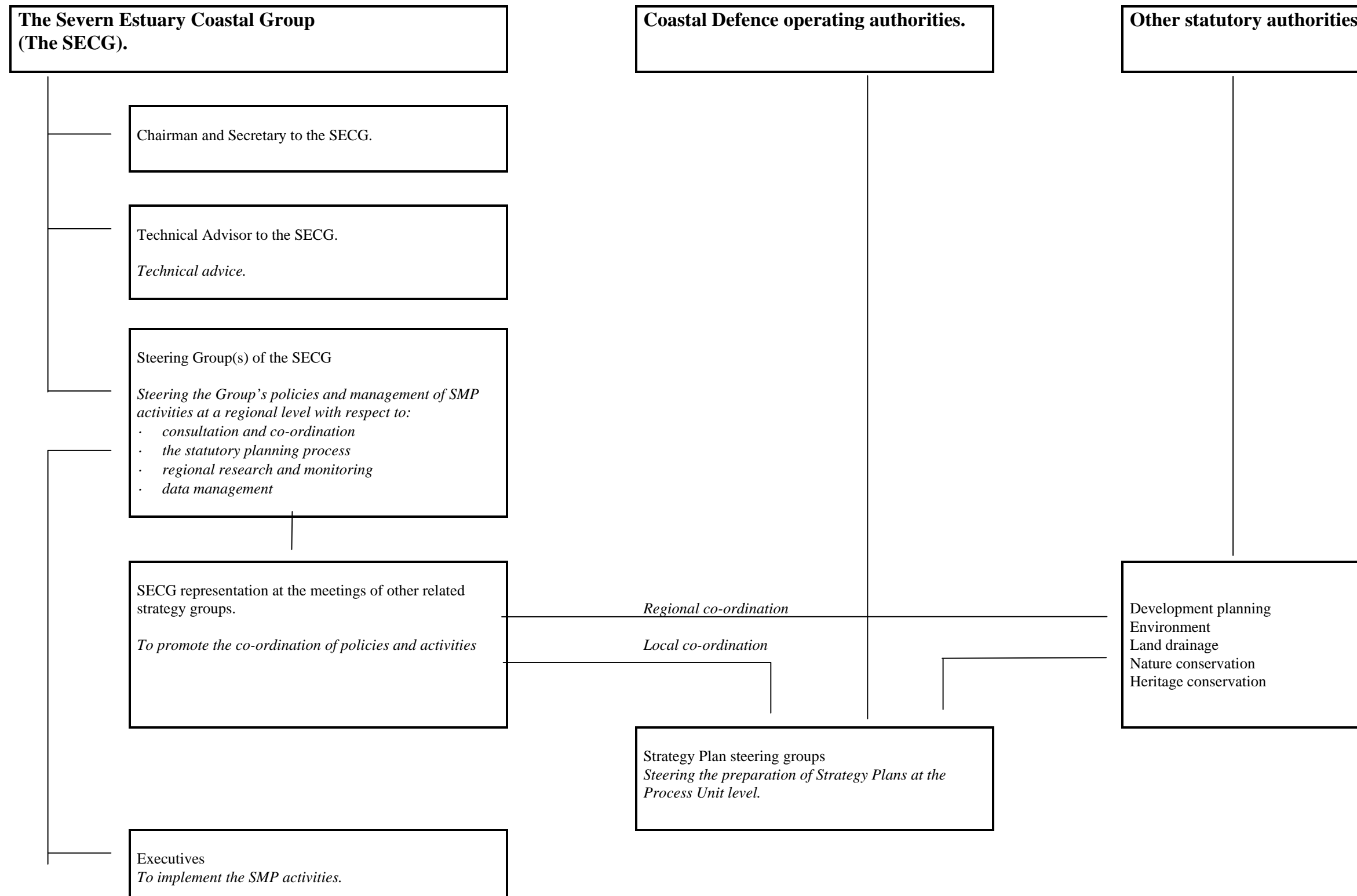


Figure 3 Proposed organisation of the SMP management

1.10 Holders of the SMP Report Volume 1 & 2

Coastal Group Members

Neighbourhood and Housing Services, Bristol City Council, Brunel House, St Georges Road, Bristol BS1 5UY
Highway Maintenance HQ, Cardiff County Council, Brindley Road, Leckwith, Cardiff CF11 8TX
Engineering Services, Forest of Dean District Council, Council Offices, High Street, Coleford, Glos GL16 8GH
Environment Department, Gloucestershire County Council, Shire Hall, Gloucester GL1 2TH
Environment Directorate, Monmouthshire County Council, County Hall, Cwmbran NP44 2XN
Highway Services, North Somerset Council, Kings Court, 87-89 High Street, Nailsea, Somerset BS48 1AW
Engineering Consultancy, South Gloucestershire Council, Elliott Buildings B to E, Broad Lane, Yate BS37 7ES
Engineering Design and Procurement, Vale of Glamorgan Council, The Alps, Wenvoe, Cardiff CF5 6AA
Lower Severn Drainage Board, Waterside Buildings, Oldbury Naite, Thornbury, South Glos BS35 1RF
Caldicot and Wentlooge Levels Drainage Board, Queens Chambers, 2 North Street, Newport NP20 1JZ
English Nature - Somerset Team, Roughmoor, Bishops Hull, Taunton TA1 5AA
Countryside Council for Wales, Unit 4, Castleon Court, St Mellons, Cardiff CF3 0LT
Environment Agency (Wales), Abacus House, St Mellons, Cardiff CF3 0EY
Planning Strategy, Environment Agency (South West), Rivers House, East Quay, Bridgwater, Somerset TA6 4YS
Strategic Planning and Improvement, Environment Agency (Midlands), Riversmeet House, Tewkesbury, Gloucestershire GL20 8JG
Development and Leisure Directorate, Stroud District Council, Council Offices, Ebley Mill, Stroud, Gloucestershire GL5 4UB
Newport County Borough Council, Civic Centre, Newport NP9 4UR

Others

DEFRA, Taunton Divisional Office, Quantock House, Paul Street, Taunton, TA1 3NX
Severn Estuary Strategy, University of Wales, PO Box 907, Cardiff CF1 3YP
Blackdown Consultants, Unit 1, Georges Farm, West Buckland, Wellington Somerset TA21 9LE
National Assembly for Wales, Environmental Division (2), Cathays Park, Cardiff CF1 3NQ
English Nature, South West Region, Roughmoor, Bishop's Hull, Taunton, Somerset TA1 5AA

1.11 Organisations with responsibilities at the coast

The following are organizations with responsibilities for management of coastal defences, drainage and/or nature conservation at the coast. Further details are available in the organisations' publications and websites.

Department for Environment, Food and Rural Affairs (DEFRA) and the National Assembly for Wales (NAW)

- Are responsible for Government Policy, guidance and provide grant aid towards capital works and preliminary studies. Their approval is necessary for coastal defences.

The Environment Agency

- Has powers to undertake coastal defences against flooding (termed 'sea defence' or 'tidal defence'), in accordance with the Water Resources Act 1991 and Environment Act 1995.
- Has powers to undertake sea defences under legislation laid down in the Land Drainage Act 1991.
- Produces 'LEAPs' (Local Environment Agency Plans), successors to the NRA's catchment management plans (which covered fluvial flood defence among other things).

Local Authorities

- Have powers to undertake coastal protection works in accordance with the Coast Protection Act 1949. Maritime local authorities are empowered to construct and improve coastal protection works with the benefit of government grant aid, although County Councils (where not unitary) are expected to contribute financially. These powers are generally limited to the open coast: Schedule 4 of the Act states the boundaries to the provision of coastal protection works carried out under the Act (typically at the river mouths).
- Local Authorities have powers to undertake sea defences under legislation laid down in the Land Drainage Act 1991.

Local Planning Authorities

- Control development in areas of flood risk under the Town and County Planning Legislation with advice from the Environment Agency.

English Nature (EN) and the Countryside Council for Wales (CCW)

- Advise on conservation implications of flood defence strategies and schemes which might affect SSSIs.
- Give relevant authorities advice to establish management schemes for marine Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) designated under the Habitats and Birds Directive.

Crown Estate and the Swansgrove Estate

- Have protective management and ownership of areas of the coast and of the seabed.

Internal Drainage Boards (IDBs)

- Enable occupation and farming in areas which would otherwise be flooded. Provide flood defence measures in internal drainage districts under Land Drainage Act 1991.

Port and Harbour Authorities

- Have statutory responsibilities and powers relating to their ports, harbours and navigation channels.

The National Trust

- Has protective management and ownership of areas of the coast..

Wildlife Trusts

- The Avon Wildlife Trust and the Wildfowl and Wetlands Trust have protective management and ownership of areas of the coast.

1.12 Glossary and Abbreviations

Accretion	The accumulation of sediments, deposited by natural fluid flow processes, usually related to the coastal accumulation of sands, muds or gravels that extent the line of the coast seawards.
Advance the line	The coastal defence policy which, by intervention, moves the current line of defence seawards.
Alluvium	Sediments laid down by rivers and estuaries.
ASERA	Association of Severn Estuary Relevant Authorities - an association of authorities established to co-ordinate the management of the pSAC.
AWT	Avon Wildlife Trust
Back-ditch	The ditch running behind the coastal defences that supports a freshwater or brackish community and contributes to the drainage of the hinterland.
Backshore	Coastal zone above the general level of tidal influence, but affected by the highest astronomical tides.
Bathymetry	Mapping of the offshore, intertidal elevations and water depths.
Beach renourishment	Placing additional sand or shingle on a beach, thus increasing its capacity to resist wave action.
Beach steepening	The differential retreat rates between low water mark and high water marks which indicate where the beach is flattening or steepening.
Brackish	Water and wetland habitats that are partially saline.
CADW	Royal Commission for Ancient and Historic Monuments in Wales
Cambrian	Period of geological history dating from c 500M years before present.
Carboniferous	Period of geological history dating from 345-350 M years before present, when the Coal Measures, sandstones, siltstones, limestones and shales were laid down.
Catchment management plan	The Environment Agency plans which provide a comprehensive framework for addressing all the Environment Agency's functions, including flood defence, within the catchment of a main river.
CCW	Countryside Council for Wales.
ChaMPs	Coastal Habitat Management Plans
Circular 30/92	The Joint Circular on Development and Flood Risk, from the Department of the Environment (Circular 30/92), MAFF (Circular FD 1/92) and the Welsh Office (Circular 68/92), dated 16 December 1992 and cancelled in 1998.
Coastal and river process units	Each process unit is defined as having broadly coherent natural coastal processes (e.g. relating to waves, currents and sedimentation).
Coastal Sediment Cell and Sub-Cell	A length of coastline and its associated near shore area within which the movement of coarse sediment (sand and shingle) is largely self-contained. The boundaries of the cells are typically features such as major headlands and estuary mouths which tend to inhibit the movement of sand and shingle along the coast. The boundaries of sub-cells are similar features which may inhibit the movement of coarse sediment along the coast, but to a lesser degree.
Coastal defence	Provide protection from coastal erosion and/or tidal flooding; they may be man-made or natural e.g. seawall or shingle bank.
Coastal plain	Description of an estuary type.
Coastal processes	Physical factors such as waves, tides, currents, sea level rise and the movement of sediment, which can change the shape of the estuary.
Coastal response	Changes to the coastline resulting from coastal processes (e.g. erosion, flooding).

Coastal squeeze	The process by which coastal habitats and natural features are progressively lost or drowned, caught between coastal defences and rising sea levels.
Coastal zone management plan	Plans through which local authorities and others implement planning objectives for an area of the coast, which deal with a range of issues such as landscape management, development, recreation and conservation..
Conceptual sediment model	A description of the understanding of the sediment sources, sinks and transport routes and rates within the coastal zone.
Cross-shore Defence Line	Perpendicular to the shoreline. Typically, the top of coastal defence works (e.g. a seawall or the crest of an embankment) or if there are no defence works, the face or crest of a natural feature (e.g. a cliff face or the crest of a shingle ridge).
DEFRA	The Department for Environment, Food and Rural Affairs, which has assumed many of the responsibilities and powers of the former Ministry of Agriculture, Fisheries and Food.
Designation	The selection or specification of a site meeting identified conservation/quality values - applies to nature conservation, landscape, heritage etc. e.g Site of Special Scientific Interest,
Devensian	Period of the last glaciation which commenced some 65,000 years before present.
Devonian	Period of geological history dating from 400M years before present.
Do Nothing	Coastal defence policy where there is no flood or coastal defence activity.
EA	Environment Agency.
Ebb	Period when tide level is falling.
Embankment	A raised bank of clay and earth to keep out flooding (and also including banks to enhance deposition and land claim within the warping-up process).
EH	English Heritage
EN	English Nature
Erosion	The loss of sediments from either hard or soft coasts.
Fetch	Distance over which a wind acts to produce waves (also termed fetch length).
Flandrian	Geological period since the last glaciation.
Flooding	Refers to inundation by water whether this is caused by breaches, overtopping of banks or defences, or by inadequate or slow drainage of rainfall or underlying groundwater levels. Flooding due to blocked drains and sewers or the escape of water from a water supply service will usually be the responsibility of the local water company and does not fall within the scope of the Shoreline Management Plan.
Flood Plain	All land adjacent to a watercourse or the coast over which water flows in time of flood or would flow but for the presence of flood defences where they exist.
Flood Risk Area	Areas of low-lying land which have been identified by the Environment Agency as having potential risk of tidal flooding with a return period of up to 200 years. In many areas the tidal flood risk is controlled by sea defences.
Foreshore	The intertidal area between high and low water.
GCR	Geological Conservation Review Site.
Geomorphology	The study of landforms and landforming processes.
Geoarchaeology	The study of past environments and land by interpreting evidence preserved in sediments
HAT	The Highest Astronomical Tidal level.
Hinterland	Used here to describe the area behind the shoreline.
Hold the Line	Coastal defence policy that maintains the defence line in its current position.
Holocene	The present period which is represented by a warm which follows the Pleistocene.

HWM	High Water Mark	Palaeo	Suffice denoting old or ancient (palaeoenvironment = ancient environment).
Integrated Coastal Zone Management	The co-ordination of the policies of the various organisations and agencies in the coastal region, in order to resolve conflict and achieve a sustainable balance between the various uses of the coast.	Pleistocene	Geological period covering from 1.64 million years ago to 10,000 years ago, a period of glaciation prior to the Holocene.
Intertidal	Area of the shore between mean high water and mean low water (cf. foreshore).	Process unit	Sub section of a coastal cell which may be distinguished from adjacent process units by a classification of coherent natural processes.
Intertidal platform	Rock-based erosional bench usually fronting cliffs within the intertidal zone.	PPG20	Planning Policy Guidance on Coastal Planning issued by the Department of the Environment and the Welsh Office, dated September 1992; cancelled as far as it relates to Wales in 1996.
Isostatic	Relating to the levels of land due to loading.	PPG25	Planning Policy Guidance on Development and Flood Risk issued by the Department of the Environment, Transport and the Regions as a Consultation Paper in April 1995. Will supersede DoE Circular 30/92.
Jurassic	Geological period from 195-200M years ago.	PSAC	possible Special Area of Conservation.
LAT	The Lowest Astronomical Tidal level.	PU	Process Unit.
LEAP	Local Environment Agency Plan: A plan which sets out the means by which the Environment Agency can contribute to the sustainable development and management of the natural and physical resources of a local area as defined by its river catchment.	Quaternary	Geological period encompassing the Pleistocene and recent periods.
Levels	Extensive areas of low-lying land which have been reclaimed from the estuary and are now defended from tidal flooding.	R&D	Research and Development.
Lias	Grey clays and shales from the late Jurassic period.	Ramsar	Ramsar sites are statutory areas identified under the Ramsar Convention (the Convention on wetlands of international importance especially as waterfowl habitat).
LIDAR	Airborne laser scanning of topography, currently in development for coastal zone monitoring.	RCHME	Royal Commission on historic Monuments in England
Limestone	Bedded rocks of calcium carbonate often containing fossils.	Realignment	Management of the shoreline to enable it to change its alignment in response to coastal processes.
Littoral movement	The movement of sediments such as silt, sand and shingle (by waves and currents) along a shoreline.	Recent	Period of geological history following the Pleistocene to the present day.
Longer term	Up to 100 years time.	Reef	Offshore deposits created by organisms which lay down calcareous structures.
Longshore	Parallel and close to the shoreline.	Reen	Channel within the Levels which acts as part of the drainage system.
Low lying land	Land area around the estuary defined by the inland boundary of estuarine alluvium: the former flood plain of the estuary.	Relative Sea Level Rise	An increase in the mean level of the sea relative to the land, typically associated with climatic change and movements of the earth's crust.
LWM	Low Water Mark	Relict deposits	Sediments laid down during a sequence of events which no longer prevail (e.g. Holocene deposits laid down during the retreat of the ice)
Macrotidal	Regions experiencing tidal ranges of greater than 4m	Residual life	The timescale for which any coastal defence is likely to remain effective.
MAFF	Ministry of Agriculture, Fisheries and Food.	Retreat the line	The coastal defence policy, which by intervention, moves the defence line landwards.
Managed retreat	The option to set the defence line back behind the existing line of coastal defence.	Return period	The return period of an extreme event is usually expressed in years. For example, an event with a return period of 50 years has a probability of 1 in 50 of being exceeded in any given year. There can be no guarantee that such an event will not be exceeded more than once in 50 years.
Management Unit	A length of coast managed in accordance with a selected Strategic Shoreline Management Option. The length of shoreline will have coherent characteristics in terms of coastal processes and land use.	Rhyne or Rine	Channel within the low-lying area of the Levels which acts as part of the drainage system.
Mean sea level	The average level of the sea over a period of approximately 12 months, taking account of all tidal effects but exclusive of surge generated by meteorological effects.	Run-up	The upper level reached by a wave on a beach or coastal structure, relative to still water level.
MHWS	The Mean High Water Spring tidal level.	Schedule 4 Boundaries	Schedule 4 of the Coast Protection Act 1949 states the boundaries within which the operating authorities have powers to undertake coastal protection works in accordance with the Act, and with the benefit of government grant aid. These powers are generally limited to the open coast: the boundaries are typically at the river mouths.
MHWN	The Mean High Water Neap tidal level.	SCOSLA	Standing Conference of Severnside Local Authorities.
MLWN	The Mean Low Water Neap tidal level.	Sediments	Materials such as shingle, sand, silt and clay, which may be moved about by the waters of the estuary, or be deposited on the bed and shoreline of the estuary.
MLWS	The Mean Low Water Spring tidal level.	Sediment Budget	Description of the quantity and sources, sinks and transport of sediments.
Microtidal	Regions experiencing tidal ranges of less than 2m	Sediment Cell or sub-cell	See Coastal Sediment Cell.
MU	Management Unit.	SES	Severn Estuary Strategy. Contact: Ms J Brown, Severn Estuary Strategy, University of Wales, PO Box 907, Cardiff CF1 3YP.
Nature conservation	Protection of the abundance and diversity of habitats and species, whilst accepting the dynamic nature of the environment and therefore allow change.	Set Back	Retreat the Line, by intervening to move the defence line landwards.
NAW	The National Assembly for Wales		
Nearshore	Area adjacent to the coast which is affected by coastal processes.		
NRA	National Rivers Authority (now superseded by the Environment Agency).		
Offshore	Area adjacent to the coast where processes only indirectly affect the coastline.		
Operating authority	A body with statutory powers to undertake flood defences or coast protection activities, usually the Environment Agency, a maritime District Council or Internal Drainage Board.		

Shale	Compacted muds often with a characteristic laminar structure.
Shallow water	Water of a depth where surface waves are noticeable affected by bed topography. Generally, this implies water depths equal to less than half the wavelength.
Shoaling	Decrease in water depth or transformation of wave profile as they propagate inshore.
Shoreline	Used here, the line of the coast which represents the line of defence whether natural or artificial.
Shoreline Management Plan	A shoreline management plan is a document which sets out a strategy for coastal defence for a specified length of coast taking account of natural coastal processes and human and other environmental influences and needs.
Shorter term	Typically up to 30 years time. this corresponds to the notional residual life of many coastal defences which have recently been built or improved.
Silurian	Geological period dating from 440 M years before present.
SMP	Shoreline Management Plan.
SPA	Special Protection Area.
SSMO	Strategic Shoreline Management Options.
SSSI	Site of Special Scientific Interest.
Standard of Service	The standards (in terms of height and the expected frequency of flooding) to which a stretch of coastline is defended by a structure.
Still water level	Average water surface elevation at any instant, excluding local variation due to waves and wave set-up, but including the effects of tides, surges and long period seiches.
Storminess	The severity and frequency of gales and storms.
Strategy Plan	Coastal defence strategy documents which may be prepared for management units or process units.
Strategic Shoreline Management Option (SSMO)	Coastal defence management strategy i.e. Do Nothing, Advance, Retreat or Hold the existing defence line.
Surge	Changes in water level due to meteorological forcing (wind, high or low barometric pressure) resulting in a difference between the recorded water level and that predicted using harmonic analysis. Surges may be positive or negative.
Sustainability	The concept that in meeting its own requirements society does not compromise the ability of future generations to meet theirs.
Sustainable Schemes	Schemes which take account of the inter-relationships with other defences, developments and processes within a coastal sediment cell or sub-cell, and which avoid as far as is possible, tying future generations into inflexible and expensive options for defence.
Terrace	A depositional or erosional form forming a bench within the valley at levels above the existing channel produced by a complex of valley cut and fill..
Tertiary	Geological time period from 70M years ago.
Thalweg	The line of maximum water velocity within an open channel.
Tidal current	The movement of water associated with the rise and fall of the tides.
Tide	The periodic rise and fall in the sea level resulting from the gravitational attraction of the sun and the moon.
Triassic	Geological time period dating from around 225M years ago.
Turbidity	The loss of clarity produced by suspended sediments in the water.
UDP	Urban Development Programme.
Warping-up	A process of artificially increasing the rate of sedimentation on low-lying areas as part of land claim from the sea.

Water Level Management Plan	A plan which provides a means by which the water level requirements for a range of activities in a particular area, including agriculture, flood defence and conservation, can be balanced and integrated.
Wave period	The time taken for two successive wave crests or troughs to pass the same point.
WO	The former Welsh Office, whose duties now lie with the National Assembly for Wales.

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2. AIMS, ISSUES AND OBJECTIVES

2.1 Introduction

2.1.1. In this section, the Aims and Management Objectives of the Shoreline Management Plan are set out.

2.1.2 *The Aims* represent the overall purpose of shoreline management and coastal defence.

The *Management Objectives* provide guidance on how the Aims should be achieved.

2.2 Aims

2.2.1 The Aim of the Government’s Flood and Coastal Defence Policy is:

“To reduce risks to people and the developed and natural environment from flooding and coastal erosion by encouraging the provision of technically, environmentally and economically sound and sustainable defence measures”.

[Reference: MAFF and Welsh Office Strategy for Flood and Coastal Defence in England and Wales (1993)]

2.2.2. The Aim of the Shoreline Management Plan is:

To provide the basis for sustainable coastal defence policies and to set objectives for the future management of the shoreline. Sustainable coastal defence policies need to take account of the inter-relationships between defences, developments and processes within the Estuary, and they should avoid as far as possible tying future generations into inflexible and expensive options for defence.

2.3 Shoreline Management Objectives

2.3.1. The Shoreline Management Objectives provide strategic guidance on how the Aims should be achieved.

2.3.2. These Management Objectives have been labelled as follows:

G1, G2, G3 etc.:	General Management Objectives: these are the primary objectives for shoreline management planning in the estuary.
T1, T2, T3 etc.:	Topic Objectives: these concern particular issues and supplement the General Management Objectives.

2.3.3. These Objectives have been established, following consultation with the Coastal Group and with other consultees. They concern the provision of coastal defence on the estuary (i.e. the measures to protect against erosion and flooding by the sea) and the policy issues which are associated with this. Whilst it is not the purpose of Shoreline Management Objectives to resolve the wider issues of coastal zone planning (which are addressed by the Severn Estuary Strategy), they do take account of wider issues where they interact with coastal defence policy. Furthermore, the Shoreline Management Objectives are intended to help to inform the coastal community about the strategies for coastal defence.

2.3.4. Further information which summarises the reasons for these objectives is provided in the SMP Report Volume 1.

Table 2.1: General Management Objectives

G1	To assess whether coastal defences provide an appropriate level of defence to life and property consistent with Government strategy.
G2	To ensure that the preferred Strategic Shoreline Management Options are based on sound economic and technical principles.
G3	To develop sustainable Strategic Shoreline Management Options that are consistent with the dominant coastal and river processes and with environmental conservation values.
G4	To take account of potential opportunities for enhancement of landscape, amenity, heritage conservation and the local economy when planning coastal defence.
G5	To work towards an integrated estuary management approach that takes due account of coastal defence and process issues, by close liaison with other relevant organisations and within the context of the Severn Estuary Strategy.
G6	To inform the statutory planning process (and related coastal zone planning) concerning coastal defence issues and strategies.
G7	To encourage a greater public awareness and understanding of coastal defence issues.
G8	That coastal defence authorities should adopt the Severn Estuary Shoreline Management Plan and should then agree a programme and procedure for its update and review in accordance with MAFF/WO guidance.

Table 2.2 Topic Objectives

T1	To assess the upstream, downstream and cross-estuary influences of shoreline management activities on coastal evolution and with regard to the international conservation values and duties identified by the Habitats and Birds Directive.	T15	To promote research into the interaction of shoreline management activities with the natural environment.
T2	To consider the scope for adaptation of defences in response to changes in process or land-use.	T16	To explore opportunities for managed retreat to provide new areas of intertidal and foreshore habitat in compensation for coastal squeeze, recognising the dynamic nature these coastal systems.
T3	To assess the condition and performance of coastal defences.	T17	To recommend the maintenance and enhancement of the integrity of the existing coastal geological exposures through appropriate design where defence works are needed and to maintain the active processes in those GCR sites designated for the dynamic process interest.
T4	To develop foreshore management strategies where appropriate in the estuary.	T18	<u>To seek to ensure that the potential impacts of proposed developments on natural coastal processes at the coastline should be considered in any environmental assessment.</u>
T5	To identify and stimulate research into coastal processes by highlighting practical needs, so as to inform subsequent updates of the SMP and assist in local strategy planning.	T19	To take account of port interests, <u>the rights and requirements of maintenance of navigation</u> for commercial and recreational use in the planning of coastal defence schemes.
T6	To promote the co-ordination of research effort around the estuary and to identify or convene a group capable of providing such co-ordination.	T20	To assess the implications of the Bristol Channel Marine Aggregates Study within shoreline management planning.
T7	To keep the policy and technical implications of sea-level rise and global climatic change on coastal defences under review and to promote increased understanding of the rates and implications of process changes.	T21	To take account of the requirements for dredging activities when developing coastal defence strategies within the Severn Estuary and consider the potential impacts that dredging activities may have on the shoreline and on coastal defences.
T8	To promote monitoring of intertidal land levels so as to identify trends in coastal evolution and inform management actions.	T22	To advise the regulatory authorities of the long term shoreline management implications of landfill adjacent to the estuary on coastal defence strategy, to resist inappropriate tipping, and to contribute to policies for control of contaminants at or adjacent to the shoreline.
T9	To encourage research into methods of maintaining the width of intertidal frontage, where appropriate, in response to erosion, sea-level rise and possible increased storminess.	T23	To take account of agriculture and fisheries interests in the planning of coastal defence schemes.
T10	Where it is necessary to accommodate coastal change and subject to assessment of the implications for the human and natural environments: to plan for retreat or realignment of the coastal defences as an option for the shorter or longer term.	T24	To consider recreational access requirements and recreational development potential when planning coastal defences, taking account of the nature conservation objectives of the area.
T11	To promote an integrated approach to the management of sea defences, coast protection and land drainage measures so as to attempt to deliver a sustainable strategy which works with coastal and estuarine processes.	T25	To ensure the effective consideration of the archaeological and heritage conservation within the development of the coastal defence and shore protection strategies.
T12	To take full account of the draft conservation objectives for the Severn Estuary as a possible Special Area of Conservation (pSAC) European Marine Site, <u>SPA/Ramsar and SSSIs</u> and to seek to avoid adverse impacts on sites of ecological or geological interest.	T26	To promote the co-ordination, maintenance and update of archaeological information from around the estuary to provide specific input to the development of defence strategies that recognise the high archaeological and heritage potential of the area.
T13	To maintain links with the plans for nature conservation and to contribute advice on shoreline management issues to the development of policy for nature and geological conservation.	T27	To take account of planning policy and planning guidance in the development of shoreline management strategy.
T14	To promote methods of management of shoreline habitats that will sustain characteristic flora and fauna and provide increased resource for feeding, roosting and breeding estuarine birds.	T28	To take account of LEAPs when developing the Severn Estuary SMP.

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3. PROCESS UNITS, MANAGEMENT UNITS AND STRATEGIC SHORELINE MANAGEMENT OPTIONS

3.1 Process Units

3.1.1. For the purposes of the Shoreline Management Plan, the Estuary has been divided up into twenty-two *Process Units*. Each Process Unit has broadly coherent characteristics in terms of coastal processes. For example a process unit may be an embayment between headlands, such as Weston Bay, or a sub-estuary such as the River Wye. Figure 1 provides an overview of the locations of the Process Units.

3.1.2 The SMP Volume 2 contains twenty-two *Process Unit statements*.

- These provide an overview of the coastal processes affecting coastal defence strategy within the unit.
- They also provide information on the statutory planning context for the process unit.

3.2 Management Units

3.2.1 Each Process Unit has then been sub-divided into *Management Units*. Each Management Unit has broadly coherent characteristics, primarily in terms of the land use and related issues. For example, the boundaries of the unit may correspond to the boundaries of an urban area at the coast, or to the boundaries of land at risk of tidal flooding.

3.2.2 It is emphasised that the Management Units do not necessarily correspond to administrative or defence scheme boundaries; they are defined with regard to coastal resources and natural coastal processes, in accordance with the MAFF/WO Guidance.

3.2.3 *The Management Unit Statements* are sub-sections within each Process Unit Statement. These summarise the assessment of issues related to coastal defence, leading to the definition of a *preferred Strategic Shoreline Management Option* for each management unit.

3.3 Strategic Shoreline Management Options

3.3.1 For each Management Unit, four Strategic Shoreline Management Options are assessed, in order to establish a preferred option (or options):

- | | |
|-------------------------|--|
| <i>Do Nothing</i> | - carry out no coastal defence activity |
| <i>Hold the Line</i> | - maintain the defence in its current position |
| <i>Advance the Line</i> | - by intervention, move the defence seawards |
| <i>Retreat the Line</i> | - by intervention, move the defence landwards |

These options are set out in the MAFF/WO Guidance (1995), and they are discussed below.

Timescales for Strategic Options

3.3.2 In cases where the preferred Strategic Option differs from existing management practice, it will be necessary to establish a procedure and timescale for achieving the transition, and to undertake the studies which are necessary to develop shoreline management in accordance with the preferred Option.

3.3.3 As an indication, the timescales for the implementation of Strategic Options may be broadly classified as:

- Shorter term : up to 30 years
- Longer term : up to 100 years' time

3.3.4 Because of existing constraints, the Strategic Option for the shorter term for many of the units may be *Hold the Line*. Such existing constraints include:

- the notional residual life of existing coastal defences
- the presence of development and infrastructure behind the defences
- the current lack of a robust framework for developing and implementing retreat or realignment
- the need to develop scientific understanding.

3.3.5 Furthermore, it may not be appropriate to define one particular option even in the immediate short term. The most appropriate option may only be apparent when further studies are undertaken. The SMP will, however, identify any inappropriate options in this case.

3.3.6 Alternative Strategic Options may be identified for many of the units for the longer term. For example, a unit where *Hold the Line* is the preferred option for the shorter term might have a proposed option of *Retreat the Line* in the longer term.

The Defence Line

3.3.7 The "existing defence line" is typically the continuous crest of coastal defence works, for example:

- a seawall
- the crest of an embankment or revetment

or, if there are no defence works, it is the face or crest of natural features, for example:

- a cliff face
- the crest of a shingle ridge
- a river bank (nominally at the High Water Mark).

Do Nothing

3.3.8 The *Do Nothing* option does not involve any coastal defence activity. For instance, where there are existing coastal defence works, these would not be maintained or repaired; the shoreline would be allowed to develop without any further intervention

3.3.9 The *Do Nothing* option is applicable to many undeveloped sections of the coast, particularly where there are hard cliffs.

- 3.3.10 *Do Nothing* may also be a longer term option following the implementation of *Retreat the Line* to higher ground.
- 3.3.11 *Do Nothing* may require monitoring and research, for example of erosion, in order to determine when assets would become at risk.
- 3.3.12 Maintenance of footpaths, safety fences or signboards (which are not coastal defence activities) may be undertaken, to the extent that they do not significantly conflict with the defence strategy.

Hold the Line

- 3.3.13 *Hold the Line* typically requires intervention such as the construction and maintenance of seawalls and embankments.
- 3.3.14 Schemes involving beach recharge and/or offshore breakwaters are also classed as *Hold the Line* where these techniques are used to increase protection to the existing defence line rather than to advance it: the waterline advances, but the defence line remains fixed.
- 3.3.15 On some lengths of the shore, there has been a trend of accretion that has made intervention unnecessary in recent times. However, *Hold the Line* may be the preferred strategy where a back-stop wall needs to be maintained and/or where the accretional trend may not persist.
- 3.3.16 This option is relevant to sections of the coast which have significant development, infrastructure or archaeological remains close to the shoreline or within flood hazard zones.
- 3.3.17 The *Hold the Line* strategy should allow a tolerance of several metres on the position of the back-stop defence (eg seawall) so as to allow local schemes to be optimised. For instance, it may be desirable to straighten kinks in the defence line, or to introduce an access route or berm; the adoption of *Hold the Line* should not preclude this.
- 3.3.18 *Hold the Line* may also include a possibility to increase (“improve”) the existing standard of defence, for example by raising and/or widening the defence structure. Alternatively, it may be appropriate either to maintain the existing defence standard, or to reduce it. A reduction of the flood defence standard implies acceptance of a greater frequency of flooding or wave overtopping; in some cases this may have environmental benefits in creating a saline or brackish habitat behind the defence.

Retreat the Line

- 3.3.19 *Retreat the Line*, as distinct from *Do Nothing*, involves active intervention and is also referred to as *Managed Retreat*, *Realignment* or *Set Back* (these terms are often used interchangeably). Types of *Retreat* are discussed below.
- i) In low-lying areas *Retreat* may be a preferred response to trends of sea-level rise, coastal erosion and/or to create a saline wetland habitat. The retreat must often be “managed” to ensure continuing defence of life and property: this can involve creation of a new tidal defence line some distance back, and the breach or removal of the existing defences. A more radical step would be to remove defences and allow flooding to the margins of higher ground; however existing land-use would generally prevent this option. The flooding of low-lying land can also attenuate the peaks of the tidal or freshwater flows in fluvial reaches, thus reducing the risk of flooding elsewhere: this is a natural effect of water meadows and saltmarsh.

- ii) Where there has been a long term trend of foreshore erosion in front of a fixed defence (eg a seawall or embankment), *Set Back* may be appropriate. This could involve construction of a new fixed defence at some distance back, possibly removal of the old fixed defence and management to stabilise the foreshore. This could provide opportunities to re-establish a more stable foreshore profile and to provide a berm or access route in front of the fixed defence. By widening the foreshore, its natural dynamic response to storms may be promoted, enabling it to function more effectively as a coastal defence. This option might be viable where there is land available, where the advantages of foreshore widening are found to out-weigh the loss of land use and where the existing fixed defences are life-expired. For example, *Set Back* has been carried out by the EA near Kingston Seymour: where the traditional seawall has been replaced by an earth embankment set back some 40m from the old defence line, thus creating a berm which reduces wave action on the embankment and which may develop as saltmarsh.
- iii) On the upper Severn, between Awre and Gloucester, *Set Back* may be undertaken as a strategy to widen the river corridor. This could involve:
- construction of a new flood defence embankment set back behind the existing one, possibly using materials reclaimed from the existing one;
 - or alternatively, retreat to higher ground, possibly with construction of new defences locally around residential properties on the margins of the low-lying land;
 - abandonment or minimal maintenance of the existing embankment;
 - acceptance of more frequent flooding in front of the new defences.

This may have the following benefits:

- the natural floodplain areas would be retained and where practicable restored in order to fulfil their natural function (Objective of *the Environment Agency Policy and Practice for the Protection of Floodplains*)
- consequent reduction in the height of the river flood hydrograph
- potential reduction in the length of flood banks to be maintained.

- iv) *Realignment* also implies an element of retreat, but more accurately describes management of the shoreline to enable it to change its alignment in accordance with natural coastal process. This allows some latitude for the shoreline to evolve (accrete or erode) in accordance with natural processes, but requires continued management of coastal features such as dunes to prevent risk to life or property.
- v) *Managed Retreat* of eroding cliffs may be necessary where there is insufficient development to justify *Hold the Line*, or where geological exposures need to be maintained, but where there is too much risk to life or property inherent in *Do Nothing*. In this case, *Managed Retreat* means the implementation of measures to control the rate of cliff erosion, and possibly measures to stabilise the cliff. This may be the appropriate strategy to reduce the rate of erosion but not eliminate it.

- 3.3.20 It is emphasised that *Retreat* should not be implemented without a thorough examination of - and consultation on - all relevant issues: coastal processes, land use and development, recreational use, heritage conservation and environmental conservation and enhancement. It should be recognised however, that a rigid *Hold the Line* strategy may not always be most favourable to landowners or residents in the longer term: development planning policies should seek to reduce the constraints in areas where retreat or realignment are identified as potentially advantageous.

Advance the Line

3.3.21 *Advancing the Line* by intervention to move the coastal defences seaward has been practiced around the Severn Estuary over the last 4000 years.

3.3.22 The apparent trends of erosion and sea level rise, together with the environmental objectives to maintain the area of inter-tidal habitats, suggest that this option will not be generally appropriate in the Severn Estuary in the future.

3.3.23 Specific local projects may be proposed which entail *Advancing the Line*. These may include the construction of barrages, reclamation of land for port facilities or residential development, coastal waste disposal sites, or the proposed Severnside Airport. Such proposals, if and when they arise, should be subject to an environmental assessment which takes account of their potential impact on coastal processes and morphology.

3.3.24 Potential adverse impacts of Advance the Line include:

- defences located closer to deep water and in more onerous wave environment
- previously mobile bed sediments may be “locked up”, preventing natural sequential change in the estuary
- changes to the alignment of the coastline are likely to modify patterns of currents and sedimentation and affect the distribution of erosional and accretional trends
- potential loss of inter-tidal and sub-tidal habitats may not be adequately compensated

Table 3.1: Indication of the issues which can influence the choice of Strategic Shoreline Management Options

Option	Appropriate for:	Adopt where:	Notes
<i>Do Nothing</i>	Undeveloped coast, or coast with obsolete development or infrastructure.	Existing or planned land use does not justify the cost of defence; or where the defences are causing unacceptable consequences elsewhere; or where the environment conservation designation requires Do Nothing.	
<i>Hold the Line</i>	Existing development	There are important man-made assets present.	May also be appropriate for satellite or ribbon development, depending on value when protected and cost of protection.
	Infrastructure	Present and cannot be moved.	Coastal infrastructure is often sited to take advantage of the combined land and sea resource; any impacts on the adjacent coast and the estuary must be accounted for .
	Future planning allocation	Infrastructure or development planned which can justify the need for and cost of protection.	Current planning guidance discourages development in areas subject to coastal flooding or erosion except where a coastal location is essential.
	Conservation sites	Protection is essential to the conservation interest of the site.	This needs careful consideration of how the site would evolve if it were reconnected or exposed to an open and active shoreline. Nature conservation may benefit from dynamic process change.
<i>Advance the Line</i>	Future planning allocations	Development must use coastal frontage or requires direct access to sea.	Likely to have significant impacts on remainder of management unit, adjacent units and possibly the whole estuary.
	Advancing shoreline	Coast is advancing and value of reclaimed land is greater than any protection costs and there is no attendant negative impact on adjacent coast.	Great care is needed to ensure that this is a long term trend and that enclosing a sediment sink is not to the net detriment of the system.
<i>Retreat the Line</i>	Conservation Sites	Protection is detrimental to conservation interests and could be improved by adopting a retreat line.	May need to be managed as a single stepped or progressive change depending on the conservation interests.
	Retreating shoreline	Foreshore is eroding and land value is less than the cost of continued protection.	For this to be a worthwhile option there may also be a nature conservation benefit or at least no loss.
	Mobile natural features	A feature moves with time, often in a cyclic pattern.	Providing room to move is particularly appropriate in the vicinity of nesses, spits, tidal inlets, estuary margins.
	Floodplain	Set back of the flood defences can restore the natural function of the floodplain.	

Note: this table is indicative of the sorts of issues which may generally influence the selection of the preferred Strategic Shoreline Management Option. Within any particular Management Unit the preferred option is to be based on sound economic, technical and environmental principles, and taking account of specific local issues.

THE PROCESS UNITS, MANAGEMENT UNITS AND STRATEGIC SHORELINE MANAGEMENT OPTIONS

Introduction

The following pages summarise:

- The Process Units

Within each process unit:

- The Management Units

Within each management unit:

- The Strategic Shoreline Management Options.

Further information about each of these is provided in the main SMP Volume 2.

The maps are black and white copies of colour originals. The full text and colour maps can be inspected by contacting one of the holders of the SMP, who are listed in Section 1.10 above.

The Process Units

PU1	Penarth
PU2	Cardiff Bay
PU3	Wentlooge
PU4	River Usk
PU5	Uskmouth
PU6	Caldicot Levels
PU7	The Severn Crossings
PU8	River Wye
PU9	Beachley to Lydney Point
PU10	Lyney Point to Tites Point
PU11	Tites Point to Hock Cliff
PU12	Hock Cliff to Longney Pool
PU13	Longney Pool to The Weirs
PU14	The Weirs to Haw Bridge
PU15	New Passage to Portishead
PU16	River Avon
PU17	Portishead to Clevedon
PU18	Kingston Seymour
PU19	Middle Hope
PU20	Sand Bay
PU21	Weston Bay
PU22	The Holms

PROCESS UNIT 1 PENARTH

General Description

The Penarth process unit extends 4.6km from Lavernock Point in the south to the southern end of the Cardiff Bay Barrage in the north. The southern boundary marks the southern limit of the Severn Estuary SMP (on the Welsh side). The northern boundary at Penarth Head marks a transition from the cliff coastline at Penarth Head to Cardiff Bay and the Barrage (PU2).

The majority of the east facing unit has a soft cliff coastline of Triassic mudstone, with the exception of the low-lying frontage at Penarth esplanade. There are extensive areas of intertidal rock exposures fronting Ranny Bay and Penarth Head. The foreshore includes a wave-cut rock platform, which is partially covered by shingle in the vicinity of Penarth Pier. There is evidence of slow cliff line retreat and erosion of the shingle beach. The process unit is subject to international and national statutory conservation designations and is within the Severn Estuary possible Special Area of Conservation.

Land use is largely residential, commercial and recreational from Penarth Head to the southern end of Cosmeston. The Penarth frontage is mostly defended, whilst the cliffs by Cosmeston are largely undefended. The coastline south of Cosmeston is mostly undeveloped and undefended. Cardiff Grounds spoil site is located offshore two miles east of Penarth Head.

The unit is not designated a flood risk area; however the low-lying frontage of Penarth is prone to flooding due to waves overtopping the defences in storm conditions. Risks from coastal erosion and cliff instability are currently thought to be low because cliff erosion rates are low and in undefended areas the cliff top is largely undeveloped.

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS
for
PENARTH PROCESS UNIT

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 1/1	Lavernock Point to Cliff Road, Penarth	This unit has a lias cliff coast with recreational and residential areas to the north and agriculture and countryside to the south. There are important geological and nature conservation interests.	Do Nothing	Do Nothing <i>(provisional option)</i>	Do Nothing <i>(provisional option)</i>
MU 1/2	Penarth: Cliff Road to The Kymin	This unit has a low-lying shore with a wave cut platform. Land use is primarily residential, with nature conservation at the southern end.	Hold the Line	Hold the Line	Hold the Line
MU 1/3	Penarth Head	This unit has a Jurassic and Triassic rock cliff coast with intertidal rock exposures in front. The land use is residential with nature conservation interest at the shoreline.	Hold the Line	Hold the Line or Retreat the Line <i>(by control of cliff erosion)</i>	Hold the Line or Retreat the Line <i>(by control of cliff erosion)</i>

Management Unit 1/1 Lavernock Point to Cliff Road, Penarth.

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p><i>The preferred (provisional) strategy for the shorter term and the longer term.</i></p> <p>The unit is presently mostly undefended. The cliff top at the southern end of the unit is undeveloped and the cliff erosion rate is low. Great value is put on the continuing erosion of the cliffs which lie within a SSSI and GCR site. <i>Do Nothing</i> is therefore (provisionally) the preferred strategy for the shorter and longer terms.</p> <p>This provisional strategy should be kept under review subject to the results of monitoring and research of cliff erosion and review of the estimated timescale over which residential developments may become at risk.</p>
<i>Hold the Line:</i>	<p>There are no existing defences at the southern end of the unit. At the northern end residential development and infrastructure are set back from the cliff edge: they do not require protection from coastal erosion. <i>Hold the Line</i> is not appropriate for this site whose conservation value depends on continuing erosion.</p>
<i>Retreat the Line:</i>	<p>Current rates of erosion are generally low. Residential development and infrastructure are not threatened by cliff erosion, therefore there is not sufficient benefit to be gained by controlling the rate of retreat of the cliffs. This conclusion should be kept under review depending on the result of research and monitoring of cliff erosion and consequent review of the estimated timescale over which housing developments may become at risk.</p>
<i>Advance the Line:</i>	<p><i>Advance the Line</i> would be in direct conflict with the nature conservation interests and is not appropriate here.</p>

Management Unit 1/2 Penarth: Cliff Road to The Kymin.

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p>Would increase the risk of erosion and flooding to the developed low-lying frontage of Penarth and is therefore not a viable strategy.</p>
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and the longer term.</i></p> <p>This is the preferred strategy for both the shorter and longer term in order to defend the existing urban development and infrastructure which is located directly behind the existing defence line.</p>
<i>Retreat the Line:</i>	<p>Is not a viable strategy due to the presence of infrastructure and urban development close behind the existing defence line. Currently, the foreshore appears to be eroding slowly and there is no strong case for retreat in response to coastal processes.</p>
<i>Advance the Line:</i>	<p>Is not an appropriate strategy with regard to coastal processes, landscape value or beach amenity; nor is it considered beneficial for coastal defence purposes. Depending on the type of construction, the proposal to construct a new car park to replace the existing derelict multi-storey car park may constitute a local <i>Advance</i> (although the overall strategy in the unit would remain <i>Hold</i>): the potential impact on coastal processes should be assessed.</p>

Management Unit 1/3 Penarth Head

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would lead to a risk of uncontrolled erosion affecting residential areas located on Penarth Head which are currently defended. Therefore this option is not viable.
<i>Hold the Line:</i>	<p><i>This is the preferred overall strategy for the shorter term and the longer term.</i></p> <p><i>Hold the Line</i> is the preferred overall strategy for the shorter and longer term which is required to defend the urban residential area on Penarth Head from erosion and instability of the cliff. Within an overall strategy of <i>Hold the Line</i>, no specific measures may be required locally where the rates of erosion or risk of instability do not threaten public safety or assets either in the shorter or longer term. Where a threat is indicated, depending on the results of <i>research and monitoring</i>, then engineering measures are required either to <i>Hold the Line</i> or to control the rate of erosion.</p>
<i>Retreat the Line:</i>	<p><i>This is the alternative to Hold the Line where development is sufficiently far from the cliff edge to avoid being threatened.</i></p> <p>Controlling the rate of erosion of cliffs in front of existing development may be considered locally as an alternative to <i>Hold the Line</i> where development is set back sufficiently far from the cliff edge to allow this.</p>
<i>Advance the Line:</i>	<i>Advance the Line</i> would be in direct conflict with the nature conservation interests and is unlikely to be appropriate here.

PROCESS UNIT 2 CARDIFF BAY

General Description

The Cardiff Bay process unit extends 1.67km from Penarth Head in the south to Cardiff Flats in the north. It corresponds to the frontage, impoundment and hinterland of the Cardiff Bay Barrage. The unit originally comprised a drowned tidal inlet backed by the Cardiff Levels. Much of the present frontage and hinterland now stands on 'made ground' as a result of extensive reclamation in historical times. To the south lies the Penarth process unit (PU 1) and to the north lies the Wentlooge Levels process unit (PU 3).

The south-east facing embayment has recently been impounded by the Cardiff Bay Barrage, which has been constructed across the mouth of the bay between Queen Alexander Dock and Penarth Head. The city of Cardiff stands behind the barrage to the north-east of the bay at the confluence of the rivers Taff and Ely.

Prior to construction of the Barrage, Cardiff Bay had a large expanse of tidal flats, the majority of which were above mean tidal level, and the nearshore zone had saltmarsh in places. Cardiff Bay is subject to international and national statutory conservation designations, but is outside the Severn Estuary possible Special Area of Conservation.

Land use within the unit is varied. There are scattered pockets of nature conservation at the shoreline alongside port related and other industrial zones. There are large areas of infrastructure and residential areas dissected by small areas of open space. The bay also includes numerous wastewater outfalls.

Cardiff Bay has experienced dramatic changes to the coastline, largely through the industrialisation of the shoreline, port development from the 1840's, the reclamation of the foreshore and the infilling and channelisation of the rivers Taff and Ely. The River Taff and the River Ely, which discharge into Cardiff Bay, are significantly affected by the closure of the Cardiff Bay Barrage. The barrage affects the flow in both rivers (making them non-tidal) and this is likely to influence the deposition of sediment within the enclosed bay. The barrage both impounds water within the bay and also serves a flood defence structure which can be closed to exclude the highest tides in the estuary from the bay. The normal impounded water level will be 4.5m (± 0.5 m) ODN, controlled by sluices. Navigational access from the Severn Estuary is via locks. The crest level of the lock gate at the barrage line is 9.0mODN which exceeds the predicted 200 year extreme tidal level. Cardiff Docks lie on the east side of the bay near the mouth of the River Taff and are approached through a dredged navigation channel.

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS

for

CARDIFF BAY PROCESS UNIT

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 2/1	Cardiff Bay	The Cardiff Bay Barrage has impounded the bay and it forms the new coastal defence line. Construction of the barrage has, to a large extent, separated the processes of the estuary from those within the bay. The bay frontage and hinterland is mainly urban, with residential, commercial, industrial and port-related land use. There are sites of nature and heritage conservation.	Hold the Line	Hold the Line	Hold the Line

Management Unit 2/1 Cardiff Bay.

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would negate the recent investment in the Cardiff Bay Barrage and the associated policies for urban regeneration; and would increase flood risk to low-lying urban areas. Therefore this is not a viable option.
<i>Hold the Line:</i>	<p><i>This is the preferred strategy for the shorter term and the longer term.</i></p> <p>Policy priorities have been established for urban regeneration and investment for the long term prosperity of Cardiff. The impoundment of Cardiff Bay has been considered to be a key factor in this, resulting in the recent completion of the Barrage. Therefore <i>Hold the Line</i> is considered to be the preferred policy in the shorter term and the longer term.</p>
<i>Retreat the Line:</i>	Would negate the recent investment in the Cardiff Bay Barrage and the associated policies for urban regeneration. Therefore this is not a viable option.
<i>Advance the Line:</i>	Construction of the Cardiff Bay Barrage has implemented a major <i>Advance</i> of the defence line. Further <i>Advance</i> is unlikely to be economically justified and would be likely to have adverse impacts on coastal processes, the natural environment and possibly on navigation. It is not therefore a viable option.

PROCESS UNIT 3 WENTLOOGE

General Description

The Wentlooge process unit extends 18.05 km from Cardiff Flats in the south to the right bank (looking downstream) of the River Usk in the north. The western boundary relates to the northern limit of the Cardiff Bay Barrage and the Cardiff Bay process unit (PU2), however the made ground of Cardiff Bay continues north into this unit until the shoreline adjacent to the City of Cardiff. The southern boundary relates to the mouth of River Ebbw and the south-western limit of the River Usk process unit (PU4).

The process unit is subject to international and national statutory conservation designations and is within the Severn Estuary possible Special Area of Conservation.

The majority of the unit is low-lying, with the exception of the area between Cardiff Flats and Pengam Moors located southwest of the City of Cardiff.

Land use within this unit is varied. At the south of the unit there are port-related and other industries and infrastructure. To the east of Queen Alexandra Docks there is nature conservation at the shoreline with waste tips in the hinterland. North of Cardiff there is nature conservation at the shoreline, with agriculture and countryside backed by zones of industry. There are also scattered residential and tourist areas.

Cardiff Levels are now almost completely obscured by industrial and engineering infill which occurred as part of the 19th century dock development and the later expansion of the Queen Alexandra Docks. When dock development occurred the foreshore of Cardiff Flats was excavated and infilled to a width of between 600-800m for over 2.4 km along the coast.

The unit has a low-lying foreshore composed of muddy Holocene marine and estuarine alluvium covering relatively wide intertidal flats. The coastline between the Rhymney River, east of Cardiff, and the mouth of the River Usk is backed by low-lying ground called the Wentlooge Levels, which are protected by flood embankments. Intertidal mudflats are exposed around low water to a distance of approximately 1.6 km offshore. A continuous earth embankment which is reinforced in places by revetments of blockstone and rock armour, concrete walls and concrete wave return structures, defends the Levels. The heights of the defences vary depending on the exposure to tides and waves, width of saltmarsh and height of foreshore.

Saltmarsh is an important feature within this unit. Comparison of historic and present day records suggest a steady rates of loss from the 1800's to 1949 which has accelerated to the present day, as seen at Rumney Great Wharf. The cross-sectional profile at Wentlooge shows a narrow and relatively steep upper saltmarsh. Further downstream at Rumney, the profile is also narrow and steep on the upper part of the inshore section. The top is approximately 1.5 m below mean high water level and confirms the lowering upper zone levels with distance downstream. There is an indication that at Rumney the tidal flat has been lowered by some 3 m over the last 70 years, confirming that the area is undergoing significant erosion.

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS *for* WENTLOOGE PROCESS UNIT

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here. Units 3/5 to 3/7, which cover the coastal frontage of the Wentlooge Levels, have similar characteristics with regard to their geology and predominantly agricultural land use. Strategically, the defences are interdependent, since they all defend the levels which do not have internal flood compartments. It was considered, however, that the frontage should be sub-divided. The boundaries of these management units have decided primarily on the basis of the width of saltmarsh on the foreshore, which relates to local coastal processes, which has (and will continue to) influence the upgrading of particular defences, and relates to the natural environmental interest.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 3/1	Cardiff Flats	The unit includes port and other industry, with infrastructure and open space which are located on made ground and estuarine alluvium. Mud flats and the Orchard Ledges front the shoreline.	Hold the Line	Hold the Line	Hold the Line
MU 3/2	North of Cardiff Flats to Pengam Moor	The unit has varied land use. There are industrial areas, land fill, sewage works and residential areas. These are mainly located on made ground, backed by estuarine alluvium and fronted by mud flats and ledges at the shoreline.	Hold the Line	Hold the Line	Hold the Line
MU 3/3	River Rhymney	This unit is within the low lying areas of the Cardiff and Wentlooge Levels; extensively developed areas of Cardiff are in the hinterland. At the shoreline there is a varied land use of industry, commerce and land fill sites.	Hold the Line	Hold the Line	Hold the Line
MU 3/4	Rumney Great Wharf	This unit is within the low-lying estuarine alluvium of the Wentlooge Levels, fronted by Rumney Great Wharf. The hinterland has waste tips, agriculture and infrastructure	Hold the Line	Hold the Line or Retreat the Line	Hold the Line or Retreat the Line
MU 3/5	Peterstone Great Wharf	This unit is within the low-lying estuarine alluvium of the Wentlooge Levels, fronted by Peterstone Great Wharf. The area is mainly agricultural, with scattered residential areas, infrastructure and recreational land use.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line
MU 3/6	Peterstone Gout to east of Outfall Lane	This unit is within the low-lying estuarine alluvium of the Wentlooge Levels. The area is mixed agricultural, with scattered residential areas, infrastructure and recreational facilities including fish lakes and Peterstone golf course.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line
MU 3/7	East of Outfall Lane to New Gout	This unit is within the low-lying estuarine alluvium of the Wentlooge Levels. The coastal area is mainly agricultural, with scattered residential areas and infrastructure. Inland are urban residential and industrial areas of Duffryn.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line
MU 3/8	River Ebbw (west bank)	This unit is within the low-lying estuarine alluvium of the Wentlooge Levels. The coastal area is mainly agricultural, with scattered residential areas and infrastructure. Inland are urban residential and industrial areas of Duffryn.	Hold the Line	Hold the Line or Retreat the Line	Hold the Line or Retreat the Line

Management Unit 3/1 Cardiff Flats.

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would increase the risk of flooding and erosion of important industrial and infrastructure developments which are currently defended. <i>Do Nothing</i> is therefore not a viable strategy.
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and (provisionally) for the longer term.</i></p> <p>The priorities for this unit are linked to Cardiff Bay and to the investment and regeneration for the long term prosperity of Cardiff. In the shorter term and (provisionally) in the longer term, <i>Hold the Line</i> is the preferred strategy in order to defend the existing developments located close to the shoreline.</p> <p>However, in the longer term, the results of <i>monitoring and research</i> may show that it is necessary to modify this strategy in response to coastal processes whilst maintaining an appropriate standard of defence.</p> <p>Depending on the manner in which it continues to be implemented and managed, <i>Hold the Line</i> may conflict with coastal processes and environmental interests in the estuary: previously it has involved reclamation and some tipping on the foreshore. In the longer term coastal erosion and predicted relative sea level rise may increase the exposure of the defences. <i>Monitoring and research</i> of coastal processes on the foreshore are recommended to investigate the implications of this strategy in the longer term.</p>
<i>Retreat the Line:</i>	This is not currently a viable strategy due to the presence of substantial developments and infrastructure close to the existing defence line. It may also require measures to treat, contain or remove landfill materials at the shoreline.
<i>Advance the Line:</i>	Is not an appropriate strategy with regard to coastal processes or nature conservation; nor is it considered beneficial for coastal defence purposes.

Management Unit 3/2 North of Cardiff Flats to Pengam Moors.

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would increase the risk of flooding and erosion of urban residential areas, industry and infrastructure developments which are currently defended. <i>Do Nothing</i> is therefore not a viable strategy.
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and (provisionally) for the longer term.</i></p> <p>The priorities for this unit are linked to Cardiff Bay and to the investment and regeneration for the long term prosperity of Cardiff. In the shorter term and (provisionally) in the longer term, <i>Hold the Line</i> is the preferred strategy in order to defend the existing developments located close to the shoreline.</p> <p>However, in the longer term, the results of <i>monitoring and research</i> may show that it is necessary to modify this strategy in response to coastal processes whilst maintaining an appropriate standard of defence.</p> <p>Depending on the manner in which it continues to be implemented and managed, <i>Hold the Line</i> may conflict with coastal processes and environmental interests in the estuary: previously it has involved reclamation and some tipping on the foreshore. In the longer term coastal erosion and predicted relative sea level rise may increase the exposure of the defences. <i>Monitoring and research</i> of coastal processes on the foreshore are recommended to investigate the implications of this strategy in the longer term.</p>
<i>Retreat the Line:</i>	This is not currently a viable strategy due to the presence of substantial developments and infrastructure close to the existing defence line and the presence of landfill materials in the backshore zone.
<i>Advance the Line:</i>	<p>This is not an appropriate strategy with regard to coastal processes or nature conservation; nor is it considered beneficial for defence of the existing land.</p> <p>However this strategy is being proposed for construction of a peripheral relief road. Whether the strategy is viable and sustainable within the broader context of <i>coastal zone management planning</i> should be tested through the statutory planning process. An <i>Appropriate Assessment</i> under the <i>EC Habitats Directive</i> may be required. It is likely that both an environmental assessment and the development of design criteria for <i>Advance</i> would require detailed local modelling and evaluation of coastal processes.</p>

Management Unit 3/3 River Rhymney

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would increase the risk of flooding of urban residential areas, industry and infrastructure developments which are currently defended. <i>Do Nothing</i> is therefore not a viable strategy.
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and (provisionally) for the longer term.</i></p> <p>The defences on the right bank of the Rhymney (looking downstream) are set back in places, allowing the river some scope to evolve. The left bank is now largely constrained by the presence of residential development, infrastructure and the Lamby landfill site.</p> <p>In the shorter term and (provisionally) in the longer term, <i>Hold the Line</i> is the preferred strategy in order to defend the existing residential, industrial and infrastructure developments. Development of the Peripheral Distributor Road on the right bank would also promote this option.</p>
<i>Retreat the Line:</i>	This is not a viable strategy due to the presence of substantial developments and infrastructure and landfill close to the existing defence line.
<i>Advance the Line:</i>	<p>Is not an appropriate strategy with regard to coastal processes or nature conservation; nor is it considered beneficial for coastal defence purposes.</p> <p>May affect a short section of the upper sections of the tidal channel of the Rhymney depending on the construction details of the Peripheral Distributor Road.</p>

Management Unit 3/4 Rumney Great Wharf

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would increase the risk of flooding of extensive low-lying agricultural land including residential areas, industry and infrastructure developments which are currently defended. <i>Do Nothing</i> is therefore not a viable strategy.
<i>Hold the Line:</i>	<p><i>The preferred strategy (provisionally) for the shorter term and for the longer term.</i></p> <p>Provisionally in the shorter term and in the longer term, <i>Hold the Line</i> is the preferred strategy in order to defend the existing low-lying agricultural land including residential areas, industry and infrastructure developments.</p> <p>The viability of this strategy, particularly into the longer term, is dependent on coastal process trends. These include the current trend of coastal erosion on this frontage and the effects of predicted relative sea level rise and changes in storminess. The strategy may also depend on the feasibility of stabilising the foreshore. These issues are the subjects of ongoing <i>monitoring and research</i> within the Gwent Levels Foreshore Management Plan.</p>
<i>Retreat the Line:</i>	<p><i>The alternative (provisional) strategy for the shorter term and the longer term.</i></p> <p>Currently, the foreshore is eroding. If this trend continues there will be a recurrent need to increase and reinforce the defence embankment in order to <i>Hold the Line</i>.</p> <p>In the longer term, depending on the results of <i>monitoring and research</i>, it may be appropriate to consider some <i>set back</i> of the defences in order to create an adequate width of foreshore, to achieve a more economically and environmentally sustainable defence.</p>
<i>Advance the Line:</i>	Is not an appropriate strategy with regard to coastal processes or nature conservation; nor is it considered beneficial for coastal defence purposes.

Management Unit 3/5 Peterstone Great Wharf

Management Unit 3/6 Peterstone Gout to east of Outfall Lane

Strategic Shoreline Management Options: Summary

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p>Would increase the risk of flooding of extensive low-lying agricultural land including residential areas, industry and infrastructure developments which are currently defended. <i>Do Nothing</i> is therefore not a viable strategy.</p>
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and (provisionally) for the longer term.</i></p> <p>In the shorter term and (provisionally) in the longer term, <i>Hold the Line</i> is the preferred strategy in order to defend the existing low-lying agricultural land including residential areas, industry and infrastructure developments.</p> <p>The viability of this strategy into the longer term is dependent on coastal process trends, particularly the rates of erosion of the salt marsh, and the effects of predicted relative sea level rise and changes in storminess. The strategy may also depend on the feasibility of stabilising the foreshore. These issues are the subjects of ongoing <i>monitoring and research</i> being carried out for the Gwent Levels Foreshore Management Plan.</p>
<i>Retreat the Line:</i>	<p><i>The alternative (provisional) strategy for the longer term.</i></p> <p>In the longer term, if the foreshore were to erode at rates equivalent to those on Rumney Great Wharf, and depending on the results of <i>monitoring and research</i>, it may be appropriate to consider some <i>set back</i> of the defence line in order to create an adequate width of foreshore, and thus to achieve a more economically and environmentally sustainable defence.</p> <p>For these options to be viable there will be a need to restrict development within the floodplain and to promote strategic withdrawal of existing assets from the set back area over the longer term.</p>
<i>Advance the Line:</i>	<p>Is not an appropriate strategy with regard to coastal processes or nature conservation; nor is it considered beneficial for coastal defence purposes.</p>

<i>Do Nothing:</i>	<p>Would increase the risk of flooding of extensive low-lying agricultural land including residential areas, industry and infrastructure developments which are currently defended. <i>Do Nothing</i> is therefore not a viable strategy.</p>
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and (provisionally) for the longer term.</i></p> <p>In the shorter term and (provisionally) in the longer term, <i>Hold the Line</i> is the preferred strategy in order to defend the existing low-lying agricultural land including residential areas, industry and infrastructure developments.</p> <p>The viability of this strategy into the longer term is dependent on coastal process trends, in relation to the stability of the foreshore, and the effects of predicted relative sea level rise and changes in storminess. These issues are the subjects of ongoing <i>monitoring and research</i> being carried out for the Gwent Levels Foreshore Management Plan.</p>
<i>Retreat the Line:</i>	<p><i>The alternative (provisional) strategy for the longer term.</i></p> <p>In the longer term, if significant foreshore erosion were to develop, and depending on the results of <i>monitoring and research</i>, it may be appropriate to consider some <i>set back</i> of the defence line. This would provide the potential for a wider foreshore and hence and thus achieve a more economically and environmentally sustainable defence.</p> <p>For this option to be viable there will be a need to restrict development within the floodplain and to promote strategic withdrawal of existing assets from the set back area over the longer term.</p>
<i>Advance the Line:</i>	<p>Is not an appropriate strategy with regard to coastal processes or nature conservation; nor is it considered beneficial for coastal defence purposes.</p>

Management Unit 3/7 East of Outfall Lane to New Gout.

Management Unit 3/8 River Ebbw (west bank).

Strategic Shoreline Management Options: Summary

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would increase the risk of flooding of extensive low-lying agricultural land including residential areas, industry and infrastructure developments which are currently defended. <i>Do Nothing</i> is therefore not a viable strategy.
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and (provisionally) for the longer term.</i></p> <p>In the shorter term and (provisionally) in the longer term, <i>Hold the Line</i> is the preferred strategy in order to defend the existing low-lying agricultural land including residential areas, industry and infrastructure developments.</p> <p>The shoreline has been fairly stable during the last 100 years, with blockstone placed along the edge of the high level marsh. The viability of <i>Hold the Line</i> into the longer term is dependent on coastal process trends, particularly changes in foreshore levels which may result from predicted relative sea level rise and changes in storminess. These issues are the subjects of ongoing <i>monitoring and research</i> being carried out for the Gwent Levels Foreshore Management Plan.</p>
<i>Retreat the Line:</i>	<p><i>The alternative (provisional) strategy for the longer term.</i></p> <p>Currently, the foreshore is largely stable or in places accreting.</p> <p>In the longer term, if the foreshore were to erode, and depending on the results of <i>monitoring and research</i>, it may be appropriate to consider some <i>set back</i> of the defence line in order to create an adequate width of foreshore, and thus to achieve a more economically and environmentally sustainable defence. A former line of sea bank is evident behind the existing sea wall and embankment.</p>
<i>Advance the Line:</i>	Is not an appropriate strategy with regard to coastal processes or nature conservation; nor is it considered beneficial for coastal defence purposes.

<i>Do Nothing:</i>	Would increase the risk of flooding of extensive low-lying agricultural land including residential areas, industry and infrastructure developments which are currently defended. <i>Do Nothing</i> is therefore not a viable strategy.
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and (provisionally) for the longer term.</i></p> <p>Provisionally in the shorter term and in the longer term, <i>Hold the Line</i> is the preferred strategy in order to defend the existing low-lying agricultural land including residential areas, industry and infrastructure developments.</p>
<i>Retreat the Line:</i>	<p><i>The alternative (provisional) strategy for the longer term.</i></p> <p><i>Set Back</i> may be considered in the longer terms within a strategy of widening the tidal channel corridor for purposes of nature conservation. This would allow shortening of the embankment length and the continued colonisation of higher saltmarsh and brackish habitats and provide an area that can flood safely. This might involve:</p> <ul style="list-style-type: none"> • maintaining the existing flood defences but with minimum expenditure and constructing new <i>set back</i> defences behind them; or • moving the existing defences and ditch back to a shorter <i>set back</i> defence line • accepting the risk of increased frequency of flooding to pasture in front of the <i>set back</i> defence line due to a reduced defence standards and possible increase in sea level; • maintaining the defence of residential property and infrastructure to an appropriate standard. <p>Specific measures may be taken locally to promote wetland habitat as part of a policy of <i>Managed Retreat</i>.</p>
<i>Advance the Line:</i>	Is not an appropriate strategy with regard to coastal processes or nature conservation; nor is it considered beneficial for coastal or tidal river defence purposes.

**PROCESS UNIT 4
RIVER USK**

General Description

The River Usk process unit extends from the mouth of the Usk in the south, upstream to Caerleon in the north. The southern boundary lies between the Wentlooge Levels and Newport docks, at the confluence of the Ebbw and the Usk, across to the promontory at Uskmouth Power Station. The tidal limit of the Usk extends upstream, 29km to the weirs at Newbridge-on-Usk. The River Usk is a meandering tidal river channel incised through Devonian sandstone and mudstone. The river is bounded by extensively developed land and open spaces with flood protection. There is a dredged navigation channel into Newport Docks.

Land use is varied. Downstream there is port-related industry and commercial use; upstream there are the substantial urban and residential areas of Newport and Caerleon, and extensive areas of agriculture and countryside.

The unit has a number of international, national and local conservation designations in place and is part of the candidate Special Area of Conservation within the River Usk and a short length of the lower section lies within the Severn Estuary pSAC/SPA/Ramsar site.

Upstream reaches of the Usk north of Newport meander through meadow with low clay embankments providing defences in places. Locally, masonry walls provide erosion protection next to building and bridge abutments. The reaches of the River Usk through Newport are mainly channelled between masonry, concrete and steel sheet pile walls. Downstream of the Transporter Bridge there are some defence embankments with vegetated marsh foreshore locally on the inside bends of the river.

The left bank (looking downstream) of the River Usk and its associated hinterland lies entirely within a flood risk area. The land lying between the right bank of the River Usk and left bank of the River Ebbw is not within the flood risk area. However at the south of the unit, the right bank of the River Ebbw lies within the flood risk area.

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS
for
RIVER USK PROCESS UNIT

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 4/1	Ebbw River (right bank) to the Transporter Bridge.	This unit is on the right bank of the Usk (looking downstream) and also includes the east bank of the River Ebbw up to the weirs. A waste tip, docks, port related industry and related infrastructure are located on the low-lying alluvium which is fronted on the inside of the Usk meander by accreting saltmarsh.	Hold the Line	Hold the Line	Hold the Line
MU 4/2	Transporter Bridge to the M4 (right bank)	This unit is on the right bank of the Usk. It includes urban residential and industrial areas of Newport, the M4 bridge and other major infrastructure. The unit is located on low lying estuarine alluvium.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line
MU 4/3	The M4 to Caerleon (both banks).	This unit is on the right and left banks of the Usk. It includes residential and open space areas of Newport and Caerleon. The river meanders across an alluvial plain however, there are harder Devonian rocks at the river bank.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line
MU 4/4	M4 to Spytty Pill (left bank)	This unit is on the left bank of the River Usk. Urban residential and recreational areas are dissected by major infrastructural routes and are located on an alluvial geology.	Hold the Line	Hold the Line	Hold the Line
MU 4/5	Spytty Pill to Uskmouth Power Station (left bank).	The unit is on the left bank of the River Usk. There are important industrial and urban residential areas, with agriculture and countryside in the inland. This unit is located on low-lying alluvium.	Hold the Line	Hold the Line	Hold the Line

**Management Unit 4/1 River Usk (Right Bank):
Ebbw River to the Transporter Bridge.**

**Management Unit 4/2 River Usk (Right Bank):
Transporter Bridge to the M4 bridge.**

Strategic Shoreline Management Options: Summary

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would increase the risk of erosion or instability to the margins of the waste tip and the port-related developments which are currently defended: Therefore <i>Do Nothing</i> is not a viable overall strategy.
<i>Hold the Line:</i>	<i>The preferred strategy for the shorter and longer term.</i> This is the preferred overall strategy for both the shorter and longer term in order to defend the existing port-related development, industry and infrastructure.
<i>Retreat the Line:</i>	Is not a viable strategy due to presence of substantial port-related development close to the existing line of defence.
<i>Advance the Line:</i>	Is not an appropriate strategy with regard to estuary processes and the natural environment; nor is it considered beneficial for coastal defence purposes.

<i>Do Nothing:</i>	Would increase the risk of tidal flooding, erosion or instability to urban areas and infrastructure which are currently defended: Therefore <i>Do Nothing</i> is not a viable strategy.
<i>Hold the Line:</i>	<i>The preferred strategy for the shorter and longer term.</i> This is the preferred overall strategy for both the shorter and longer term in order to defend the existing urban development, industry and infrastructure.
<i>Retreat the Line:</i>	Is not a viable strategy due to presence of substantial infrastructure and urban development close to the existing line of defence.
<i>Advance the Line:</i>	Is not an appropriate strategy with regard to estuarial processes and the natural environment; nor is it considered beneficial for coastal defence purposes.

**Management Unit 4/3 River Usk (both banks):
M4 bridge to Caerleon Bridge.**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding of land which is currently defended.
<i>Hold the Line:</i>	<i>This is the preferred strategy for the shorter term.</i> This is currently the preferred strategy required to defend residential areas.
<i>Retreat the Line:</i>	<i>This is the alternative provisional local strategy for the longer term.</i> Retreat may be considered locally in the longer term if and when the existing defences would require renewal, within a strategy of widening the river corridor. This might involve: <ul style="list-style-type: none"> · Set Back of the defence line; · maintaining the existing flood defences but with minimum expenditure; · accepting the risk of increased frequency of flooding to agricultural land due to a reduced defence standards and possible increase in sea level; · local defence of residential property and infrastructure to an appropriate standard.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

**Management Unit 4/4 River Usk (left bank):
M4 Bridge to Spytty Pill.**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would increase the risk of tidal flooding, erosion or instability to urban areas and infrastructure which are currently defended: Therefore <i>Do Nothing</i> is not a viable strategy.
<i>Hold the Line:</i>	<i>The preferred strategy for the shorter and longer term.</i> This is the preferred overall strategy for both the shorter and longer term in order to defend the existing urban development, industry and infrastructure.
<i>Retreat the Line:</i>	Is not a viable strategy due to presence of substantial infrastructure and urban development close to the existing line of defence.
<i>Advance the Line:</i>	Is not an appropriate strategy with regard to estuarial processes and the natural environment; nor is it considered beneficial for coastal defence purposes.

Management Unit 4/5 River Usk (left bank): Spyttly Pill to the Uskmouth Power Station.

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would increase the risk of erosion or instability to the margins of the developments which are currently defended: Therefore <i>Do Nothing</i> is not a viable overall strategy.
<i>Hold the Line:</i>	<i>The preferred strategy for the shorter and longer term.</i> This is the preferred overall strategy for both the shorter and longer term in order to defend the existing development, industry and infrastructure.
<i>Retreat the Line:</i>	Is not a viable strategy due to presence of substantial development close to the existing line of defence.
<i>Advance the Line:</i>	Is not an appropriate strategy with regard to estuary processes and the natural environment; nor is it considered beneficial for coastal defence purposes.

**PROCESS UNIT 5
USKMOUTH**

General Description

The Uskmouth process unit extends 5.96km from Uskmouth Power Station (AES Fifoots Point PS) in the west to Gold Cliff in the east. The western boundary is at the mouth of the River Usk. The eastern boundary marks the transition from low lying alluvium to the Jurassic Lias cliffs at Gold Cliff. The land use within this unit includes nature conservation at the shoreline, backed by industry at the western end of the unit, and agriculture at the eastern end.

The unit has a number of international, national and local conservation designations in place and is part of the possible Special Area of Conservation within the Severn Estuary.

The unit lies entirely within a flood risk area, being at the western end of the Caldicot Levels. It has a low-lying backshore with extensive flood embankments, fronted by wide intertidal mudflats. There are areas of saltmarsh along much of the shoreline, particularly between Nash Breakwater and Goldcliff Pill. The low-lying Levels are mainly defended by a clay embankment with concrete wave return walls, blockstone revetment and rock armour. The saltmarsh foreshore has experienced significant localised erosion and accretion over the last 100 years.

There is an environmental compensation scheme within most of the low-lying land in this unit by the Cardiff Bay Development Corporation to create wetlands habitats on the Caldicot Levels between Uskmouth and Gold Cliff.

The Llanwern Steelworks which lie inland are dependent on the primary sea defences.

INSERT PROCESS UNIT MAP

**MANAGEMENT UNITS
for
USKMOUTH PROCESS UNIT**

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 5/1	Uskmouth Power Station (AES Fifoots Point PS) to Saltmarsh Farm	The unit is at the western end of the Caldicot Levels, on the eastern side of the mouth of the Usk, and the land is low-lying. Land use is partly agricultural with small settlements. There are also important industry, infrastructure and residential developments inland. There is a wetland compensation area at the coast.	Hold the Line (locally Retreat the Line)	Hold the Line	Hold the Line or Retreat the Line
MU 5/2	Saltmarsh Farm to Gold Cliff	The unit is at the western end of the Caldicot Levels and the land is mostly low-lying, except to the east at Gold Cliff. It is fronted by saltmarsh and mud flats. Land use is mainly agricultural with small settlements. There are also important industry, infrastructure and residential developments inland. There is a wetland compensation area at the coast.	Hold the Line	Hold the Line (or locally Retreat the Line)	Hold the Line or Retreat the Line

Management Unit 5/1 Uskmouth Power Station to Saltmarsh Farm.

Strategic Shoreline Management Options: Summary

Do Nothing:

Would increase the risk of flooding of extensive low-lying agricultural land including residential areas, industry and infrastructure developments which are currently defended. *Do Nothing* is therefore not a viable strategy.

Hold the Line:

The preferred strategy for the shorter term and (provisionally) for the longer term.

In the shorter term and (provisionally) in the longer term, *Hold the Line* is the preferred strategy in order to defend the existing low-lying agricultural land including residential areas, industry and infrastructure developments.

The viability of this strategy into the longer term is dependent on coastal process trends, and the possible effects of predicted relative sea level rise and changes in storminess. The strategy may also depend on the feasibility of stabilising the foreshore. These issues are the subjects of ongoing *monitoring and research* being carried out for the Gwent Levels Foreshore Management Plan.

Hold the Line is likely to remain the preferred option on the frontage local to the Uskmouth Power Station as long as it remains operational.

Retreat the Line:

The alternative (provisional) strategy for the longer term.

In the longer term, if the foreshore were to erode, and depending on the results of *monitoring and research*, it may be appropriate to consider some *set back* of the defence line in order to create an adequate width of foreshore, and thus to achieve a more economically and environmentally sustainable defence.

For these options to be viable there will be a need to restrict development within the floodplain and to promote strategic withdrawal of existing assets from the set back area over the longer term.

It would also be necessary to assess and treat, contain or remove any significantly contaminated soils or fill.

Advance the Line:

Is not an appropriate strategy with regard to coastal processes or nature conservation; nor is it considered beneficial for coastal defence purposes.

Management Unit 5/2 Saltmarsh Farm to Gold Cliff

Strategic Shoreline Management Options: Summary

Do Nothing:

Would increase the risk of flooding of extensive low-lying agricultural land including residential areas, industry and infrastructure developments which are currently defended. *Do Nothing* is therefore not a viable strategy.

Hold the Line:

The preferred strategy for the shorter term and (provisionally) for the longer term.

In the shorter term and (provisionally) in the longer term, *Hold the Line* is the preferred strategy in order to defend the existing low-lying agricultural land including residential areas, industry and infrastructure developments.

The viability of this strategy into the longer term is dependent on coastal process trends, and the possible effects of predicted relative sea level rise and changes in storminess. The strategy may also depend on the feasibility of stabilising the foreshore. These issues are the subjects of ongoing *monitoring and research* being carried out for the Gwent Levels Foreshore Management Plan.

Retreat the Line:

The alternative (provisional) strategy.

In the longer term, if the foreshore were to erode, and depending on the results of *monitoring and research*, it may be appropriate to consider some *set back* of the defence line in order to create an adequate width of foreshore, and thus to achieve a more economically and environmentally sustainable defence.

Local retreat to a secondary defence line may also be feasible in either the shorter or longer term to the east of Goldcliff Pill, as part of the creation of the wetland reserve in this area, if this were considered to provide environmental enhancement.

For these options to be viable there will be a need to restrict development within the floodplain and to promote strategic withdrawal of existing assets from the set back area over the longer term.

It would also be necessary to assess and treat, contain or remove any significantly contaminated soils or fill.

Advance the Line:

Is not an appropriate strategy with regard to coastal processes or nature conservation; nor is it considered beneficial for coastal defence purposes.

PROCESS UNIT 6 CALDICOT LEVELS

General Description

The Caldicot Levels process unit extends 14.71km from the Gold Cliff promontory in the south-west to the southern side of Sudbrook Point in the north-east. The south-western boundary relates to a rocky outcrop south-east of Gold Cliff at the eastern limit of the Uskmouth process unit (PU5). The north-eastern boundary relates to the transition from the low-lying alluvial plain of the Caldicot Levels to the Old Red Sandstone headland of Sudbrook in the Severn Crossings process unit (PU7). The Caldicot Levels process unit is a south-east facing low-lying foreshore composed of muddy Holocene marine and estuarine alluvium. There is a relatively wide intertidal region with an expanse of intertidal sandbanks and saltmarsh.

The Unit has a number of international, national and local conservation designations and is part of the possible Special Area of Conservation within the Severn Estuary. It also contains a number of bird roosting and nesting sites.

The primary land use close to the coastline is agriculture. There are small settlements near the coast, with a few areas assigned to nature conservation along the shoreline. Inland there are larger urban areas. There is important infrastructure, including a main railway line, power lines and the M4 and M48 motorways. The eastern industrial area of Newport lies at the south-western end of the unit. At the north of the unit the Second Severn Crossing approach road and the Severn Tunnel viaduct and abutment are backed by the residential and industrial zones of Caldicot and Sudbrook. The entire unit is designated as a flood risk area. The backshore is almost entirely below the MHWS level and is therefore defended by a continuous clay embankment located on former marsh surfaces and this is typically reinforced by a concrete sea wall and rock revetment (except at the north-eastern end). The intertidal mud and sand banks and the saltmarsh foreshore dissipate wave energy and hence wave heights are lowered at the defence line.

Saltmarsh located north of Magor Pill and extending to Caldicot Pill has shown a long term trend of erosion and a retreat of MHW of up to 140m over the last 100 years.

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS

for

CALDICOT LEVELS PROCESS UNIT

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 6/1	Gold Cliff to Cold Harbour Pill	The unit includes an extensive low-lying area of the Caldicot Levels. Land use is agricultural at the coast, with small settlements. There is important industry and infrastructure inland. The unit is fronted by sand and mudflats.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line
MU 6/2	Cold Harbour Pill to West Pill	The unit includes an extensive low-lying area of the Caldicot Levels. Land use is agricultural at the coast, with small settlements. There is important infrastructure inland. The unit is fronted by an mudflats and saltmarsh.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line
MU 6/3	West Pill to West of Sudbrook Point	The unit includes a low-lying area of the Caldicot Levels. Land use is agricultural at the coast, with small settlements. There are important infrastructure and urban areas inland. The unit is fronted by mudflats and saltmarsh.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line

Management Unit 6/1 Gold Cliff to Cold Harbour Pill

Strategic Shoreline Management Options: Summary

Do Nothing: Would increase the risk of flooding of extensive low-lying agricultural land including residential areas, industry and infrastructure developments which are currently defended. *Do Nothing* is therefore not a viable strategy.

Hold the Line: **The preferred strategy for the shorter term and (provisionally) for the longer term.**

In the shorter term and (provisionally) in the longer term, *Hold the Line* is the preferred strategy in order to defend the existing low-lying agricultural land including residential areas, industry and infrastructure developments.

The viability of this strategy into the longer term is dependent on coastal process trends and the possible effects of predicted relative sea level rise and changes in storminess. The strategy may also depend on the feasibility of stabilising the foreshore. These issues are the subjects of ongoing *monitoring and research* being carried out for the Gwent Levels Foreshore Management Plan.

Retreat the Line: **The alternative (provisional) strategy for the longer term.**

In the longer term, if the foreshore were to continue to erode, and depending on the results of *monitoring and research*, it may be appropriate to consider some *set back* of the defence line in order to create an adequate width of foreshore, and thus to achieve a more economically and environmentally sustainable defence.

For these options to be viable there will be a need to restrict development within the floodplain and to promote strategic withdrawal of existing assets from the set back area over the longer term.

Advance the Line: Is not an appropriate strategy with regard to coastal processes or nature conservation; nor is it considered beneficial for coastal defence purposes.

Management Unit 6/2 Cold Harbour Pill to West Pill.

Strategic Shoreline Management Options: Summary

Do Nothing: Would increase the risk of flooding of extensive low-lying agricultural land including residential areas, industry and infrastructure developments which are currently defended. *Do Nothing* is therefore not a viable strategy.

Hold the Line: **The preferred strategy for the shorter term and (provisionally) for the longer term.**

In the shorter term and (provisionally) in the longer term, *Hold the Line* is the preferred strategy in order to defend the existing low-lying agricultural land including residential areas, industry and infrastructure developments.

The viability of this strategy into the longer term is dependent on coastal process trends, taking into account the current trend of erosion seaward of the marsh, and the possible effects of predicted relative sea level rise and changes in storminess. The strategy may also depend on the feasibility of stabilising the foreshore and on the influence of Palaeo-channels in the Wentloog deposits. These issues are the subjects of ongoing *monitoring and research* being carried out for the Gwent Levels Foreshore Management Plan.

Retreat the Line: **The alternative (provisional) strategy for the longer term.**

In the longer term, depending on future trends of erosion of the marsh front, and depending on the results of *monitoring and research*, it may be appropriate to consider some *set back* of the defence line in order to create an adequate width of foreshore, and thus to achieve a more economically and environmentally sustainable defence.

For these options to be viable there will be a need to restrict development within the floodplain and to promote strategic withdrawal of existing assets from the set back area over the longer term.

Advance the Line: Is not an appropriate strategy with regard to coastal processes or nature conservation; nor is it considered beneficial for coastal defence purposes.

Management Unit 6/3 West Pill to west of Sudbrook Point.

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p>Would increase the risk of a severe flood to an extensive area of land including residential and agricultural areas that are currently defended. <i>Do Nothing</i> is therefore not a viable strategy.</p>
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and (provisionally) for the longer term.</i></p> <p>The saltmarsh had a period of erosion during the 1920's to the 1940's, since when trends have tended to be accretional along much of the frontage. Recent expenditure on new defences indicates it is economical to <i>Hold the Line</i> in the shorter term, at least for the residual life of the existing defences. <i>Hold the Line</i> does not conflict with coastal processes or environmental interests at present. <i>Monitoring and research</i> of coastal processes on the foreshore is recommended to investigate whether this option will be sustainable in the longer term.</p> <p>Therefore, in the shorter term <i>Hold the Line</i> is the preferred strategy in order to defend the existing settlements and industrial and agricultural land use. In the longer term, it may perhaps be necessary to modify this strategy in response to coastal processes.</p>
<i>Retreat the Line:</i>	<p><i>The alternative (provisional) strategy for the longer term.</i></p> <p>Currently, the foreshore appears to be generally stable or accreting and there is not an over-riding case for retreat in response to coastal processes in the shorter term, and possibly not in the longer term either. However, in the longer term, depending on the results of <i>monitoring and research</i>, it may be appropriate to consider some retreat or realignment of the defences in order to accommodate coastal processes, whilst continuing to ensure adequate flood defence.</p>
<i>Advance the Line:</i>	<p>Advance the Line is not an appropriate strategy with regard to coastal processes, environmental or landscape values; nor is it considered beneficial for coastal defence purposes.</p>

**PROCESS UNIT 7
THE SEVERN CROSSINGS**

General Description

The Severn Crossings process unit encompasses both banks of the Severn Estuary. Looking downstream, the right bank extends 7.50km from Sudbrook Point in the south to Beachley in the north and the left bank extends 5.95km from Aust Rock in the north to New Passage in the south. The process unit relates to the constriction of the estuary between the promontories of Subbrook and Redwick/New Passage (downstream) and Beachley and Aust (upstream). There are rock exposures offshore, notably the English Stones, and the estuary is restricted to a single navigable channel (The Shoots, downstream).

The unit has international and national statutory conservation designations and is within the Severn Estuary possible Special Area of Conservation.

Both shorelines include extensive areas of low-lying land. Land use is mainly agricultural with small settlements. The Severn Road Bridge is at the upstream end of the unit and both the Second Severn Crossing and the Severn rail tunnel are at the downstream end.

The Shoots has locally scoured depths in excess of 10m and an area with extensive drying banks. Around the Severn Bridges, the river is obstructed by rocks, which create high turbulence through the tide. The flood tide divides at Beachley Point, with one branch flowing into the River Wye and the other continuing upstream. Current velocities can reach 6 knots (c.3m/s). Throughout this unit the strength and direction of the tide is greatly affected by covering and uncovering of the banks and rock areas, and, to a lesser extent, fresh water flows from rivers. There is little or no slack water in the main channels and the tide may be running in opposing directions through the turn of the tide.

Right bank (looking downstream)

The Sudbrook headland comprises low sandstone cliffs which are protected locally by sea walls, embankments with revetment and the abutment of the Second Severn Crossing. Mathern Oaze inter-tidal flats have remained stable or expanded over the last 100 years. The shoreline has also been stable with only local or small scale change. The Beachley headland comprises hard rock outcrops, and low marl cliffs which are protected locally by sea walls, with some saltmarsh at the base of the cliffs.

Left bank (looking downstream)

Littleton Warth to Aust Warth including Aust Cliff is located on higher ground. Aust Cliff is the location for the foundation structures of the Severn Road Bridge.

The land between Aust Warth to New Passage is low-lying and is therefore dependent on a series of embankments and sluices for flood defence. Saltmarsh has colonised the foreshore and intertidal zone. Lower saltmarsh provides a shallow sloping foreshore. Higher saltmarsh is backed by an embankment which protects sheep-grazed pastureland behind. A road runs behind the marsh. Landward of the road is a secondary bund around Cake Gout Pill and sluice where accretion of saltmarsh has buried former bank protection works. The saltmarsh in this area clearly shows former surfaces of the Northwick and Rumney formations.

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS
for
THE SEVERN CROSSINGS PROCESS UNIT

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 7/1	Sudbrook Point to Black Rock	This unit comprises an Old Red Sandstone cliff with a narrow band of saltmarsh and exposed rock on the foreshore. The headland contains the viaduct for the Severn Tunnel; land use is residential and agricultural.	Do Nothing , locally Hold the Line	Do Nothing, locally Hold the Line or Retreat the Line	Do Nothing, locally Hold the Line or Retreat the Line
MU 7/2	Black Rock to Thornwell	This unit is a low-lying agricultural area. A railway runs along the unit from Portskewett in the south to Thornwell in the north. Electricity pylons within the area of low-lying land transmit the major supply to South and mid Wales. The foreshore comprises saltmarsh and mudbanks.	Hold the Line or Do Nothing	Hold the Line or Retreat the Line	Hold the Line or Retreat the Line
MU 7/3	Beachley Point	This unit extends around Beachley Point, from the left bank of the mouth of the River Wye to the offshore outcrops of Hen and Chicken Rock in the north. The land use by the MoD is mainly residential and recreational. Beachley Point is a limestone peninsula and includes an abutment for the Severn Road Bridge.	Do Nothing	Do Nothing	Do Nothing
MU 7/4	Aust Cliff to Old Passage	This unit comprises the Jurassic cliffs of Aust Cliff upon which the western approach to the Severn Road Bridge has been built. The unit includes a saltmarsh and rock outcrop foreshore and intertidal zone.	Do Nothing, locally Hold the Line	Do Nothing, locally Hold the Line	Do Nothing, locally Hold the Line
MU 7/5	Old Passage to New Passage	This unit comprises the low-lying area of Aust Warth. The unit is bounded by offshore rock outcrops of Aust Cliff at the north and English Stones at the south of the unit. The land use is primarily agricultural.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line.

**Management Unit 7/1 Sudbrook Point to Black Rock
(right bank of the Severn).**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p><i>This is the preferred overall strategic option for the shorter term and the longer term.</i></p> <p>Along most of the shoreline there are no defences and there is no development which would justify protection. <i>Do Nothing</i> is therefore the preferred overall option, for the shoreline that is currently undefended.</p> <p>Locally, however, there are assets which require protection as noted below.</p>
<i>Hold the Line:</i>	<p><i>This option is required locally to protect infrastructure in the shorter term and longer term.</i></p> <p>The existing defences to the cliff at Sudbrook are required locally to protect the headworks to the Severn Tunnel.</p>
<i>Retreat the Line:</i>	<p><i>The alternative option locally for the shorter term and longer term.</i></p> <p>In this context, <i>Retreat</i> is considered to the management of the foreshore and the cliffs to reduce the rate of erosion. This option may be appropriate locally where properties would be threatened in the longer term but where <i>Hold the Line</i> may be unsustainable.</p>
<i>Advance the Line:</i>	<p>Is not appropriate with regard to coastal processes or natural environment interests.</p>

**Management Unit 7/2 Black Rock to Thornwell
(right bank of the Severn).**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p>Would increase the risk of uncontrolled flooding to agricultural land and to an industrial area that are currently defended. Therefore <i>Do Nothing</i> is not a viable strategy.</p>
<i>Hold the Line:</i>	<p><i>This is the provisional option for the shorter term and for the longer term.</i></p> <p>There is existing industrial development at the north eastern end of the unit that requires flood defence measures. The electricity pylons which transmit a major supply to South and Mid Wales also require defence from flooding. Land to seaward of the railway line is largely undeveloped and is unlikely in itself to justify substantial defence expenditure.</p> <p>The foreshore has generally remained stable or has expanded over the last 100 years, with some intervention by tipping and by placing blockstone to stabilise the shoreline. However there are local areas of erosion. If the overall stability predominates, then maintenance or adaptation of existing defences may prove most economical. <i>Hold the Line</i> is considered unlikely to conflict significantly with coastal processes or environmental interests at present, but may do in the longer term if greater coastal erosion were to occur.</p> <p>A detailed appraisal is currently being undertaken by the Environment Agency into the options for defence measures for this frontage. Subject to the outcome of this appraisal, then <i>either Hold the Line</i> or <i>Retreat the Line</i> or some local realignment may be confirmed.</p> <p><i>Monitoring and research</i> should be undertaken to support assessment of the preferred strategies for the shorter and the longer term.</p>

CONTINUED OVERLEAF

MANAGEMENT UNIT 7/2 CONTINUED FROM PREVIOUS PAGE

Retreat the Line: *This is the alternative (provisional) option for the shorter term or the longer term.*

When the residual life of the existing defences is expired, then *Managed Retreat* either to the railway line or to high ground (c.9.5m contour) should be considered in order to reduce the length of the defences.

This might involve:

- minimal maintenance of the existing defence line consistent with a lower standard of defence against flooding;
- construction of a new defence line beside the railway north-west of St. Pierre Pill to defend development on low-lying land to the north-west;
- construction of local flood defences between areas of higher ground inland south-east of St. Pierre.

Advance the Line: Is not appropriate with regard to coastal processes or natural environment interests.

Management Unit 7/3 Beachley Point

Strategic Shoreline Management Options: Summary

Do Nothing: *The preferred strategy for the shorter term and the longer term.*

The unit is presently mostly undefended and the cliff erosion rate is low. *Do Nothing* is therefore the preferred strategy for the shorter and longer terms.

Hold the Line: Development and infrastructure are mainly set back from the cliff edge: they do not require protection from the slow rate of coastal erosion. *Hold the Line* is not therefore appropriate.

Retreat the Line: Current rates of erosion are generally low. It is not anticipated that development and infrastructure would be threatened by erosion in the shorter or longer terms, therefore there is not sufficient benefit to be gained by controlling the rate of retreat of the cliffs.

Advance the Line: *Advance the Line* would conflict with the nature conservation interests and is not appropriate.

**Management Unit 7/4 North of Aust Cliff to Old Passage
(left bank of the Severn)**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p><i>This is the preferred overall strategic option for the shorter term and the longer term.</i></p> <p>Along most of the shoreline there are no defences and there is no development which would justify protection closely adjacent to the cliff edge. <i>Do Nothing</i> is therefore the preferred overall option, for the shoreline that is currently undefended. This strategy maintains the cliff exposures of GCR value.</p> <p>Locally, however, there are assets which require protection as noted below.</p>
<i>Hold the Line:</i>	<p><i>This is the preferred strategy locally to the Severn Road Bridge and developments at Old Passage.</i></p> <p>Local <i>Hold-the-Line</i> is be required to protect the existing assets but the defences measures should be responsive to monitoring of cliff and saltmarsh.</p>
<i>Retreat the Line:</i>	<p>This is not an appropriate strategy for the short or longer term in the area of Aust Cliff. It would tend to conflict both with the need to defend infrastructure locally and with the GCR values of the cliff exposures.</p>
<i>Advance the Line:</i>	<p><i>Advance the Line</i> would conflict with the nature conservation interests and is not appropriate.</p>

**Management Unit 7/5 Old Passage to New Passage
(left bank of the Severn).**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p>Would increase the risk of uncontrolled flooding of extensive low-lying agricultural land including residential areas and infrastructure, which are currently defended. <i>Do Nothing</i> is therefore not a viable strategy.</p>
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and (provisionally) for the longer term.</i></p> <p><i>Hold the Line</i> is the preferred strategy in order to defend the existing low-lying agricultural land including residential areas and infrastructure.</p> <p>The viability of this strategy, particularly into the longer term, is dependent on coastal process trends. The foreshore has been stable or accreting, so no change in strategy is currently needed. The evolution of the foreshore should be subject to <i>monitoring and research</i>.</p>
<i>Retreat the Line:</i>	<p><i>The alternative (provisional) strategy for the longer term.</i></p> <p>The foreshore has been stable or accreting. However, if an erosional trend were to develop, perhaps as a result of predicted relative sea level rise and changes in storminess, and if it were not possible to stabilise the foreshore, then it may become appropriate to consider <i>set back</i> of the defences. This would be done to maintain adequate width of foreshore, to achieve a more economically and environmentally sustainable defence.</p>
<i>Advance the Line:</i>	<p>Is not an appropriate strategy with regard to coastal processes or nature conservation; nor is it considered beneficial for coastal defence purposes.</p>

**PROCESS UNIT 8
THE RIVER WYE**

General Description

The River Wye process unit extends from the mouth of the Wye upstream to Tintern Abbey and Bigsweir Bridge, which marks the tidal limit and upstream extent of the SMP coverage. The river flows through predominantly carboniferous limestone geology with Triassic sandstone outcropping at the upstream extent of the unit and at the river mouth. There are also areas of 'made ground' flanking parts of the river throughout the unit.

The unit has a number of international, national and local conservation designations. In particular, parts of the Wye are a candidate or possible Special Area of Conservation. The middle reaches of the right bank of the River Wye and its hinterland are also listed as an Area of Outstanding Natural Beauty.

The Wye is constrained over the majority of its length by high ground with narrow flood plains. The banks of the Wye are largely undefended, but there are some embankments to low-lying land with stone revetments. The meander bends are constrained by bedrock and have changed little in the last 100 years.

There is significant urban development and infrastructure within the unit, in particular the town of Chepstow. The majority of the land within the River Wye process unit is not at risk of tidal flooding risk due to the high ground and narrow flood plains of the river catchment. There are however small low-lying areas near the mouth the River Wye.

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS

for

THE RIVER WYE PROCESS UNIT

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 8/1	Chepstow, from Thornwell to Alcove Wood (right bank).	The boundaries of the unit relate to the south and north extent of the urban development at Chepstow. Land use is varied with urban residential, commercial and open space areas intersected by rail and road routes. The geology is mixed and the conservation value is high.	Do Nothing, Hold the Line locally	Do Nothing, Hold the Line locally	Do Nothing, Hold the Line locally
MU 8/2	Alcove Wood to Tintern Abbey (right bank) and Tintern Abbey to Chapel House Wood (left bank).	This unit comprises a largely undeveloped area north of Chepstow and Sedbury. The unit comprises both banks of the Wye and extends north to the upstream extent of the SMP coverage and the tidal limit of the river.	Do Nothing, Hold the Line locally	Do Nothing, Hold the Line locally	Do Nothing, Hold the Line locally
MU 8/3	Chapel House Wood to Sedbury Sewage Works (left bank).	This unit comprises the urban areas of Tutshill at the north of the unit and Sedbury at the south of the unit. The land use is mainly urban, with nature conservation at the bank and agriculture inland. The motorway intersects the unit.	Do Nothing	Do Nothing	Do Nothing
MU 8/4	Sedbury Sewage Works to north Beachley (left bank).	This unit relates to the low-lying agricultural and countryside areas south of Sedbury. At the south of the unit there is an extensive area of recreation and industry, which leads onto the headland of Beachley.	Do Nothing	Do Nothing	Do Nothing

Management Unit 8/1 River Wye (right bank): Chepstow, from Thornwell to Alcove Wood.

**Management Unit 8/2 River Wye (both banks):
on the right bank from Alcove Wood to Tintern Abbey;
on the left bank from Tintern Abbey to Chapel House Wood.**

Strategic Shoreline Management Options: Summary

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p><i>The preferred strategy for the shorter term and provisionally for the longer term</i></p> <p>The unit is currently undefended and is at low risk to erosion due to the hard geology constraining the course of the river channel.</p> <p>Great value is put on conserving the existing habitats and this is likely to require minimum intervention in natural processes. <i>Do Nothing</i> is therefore the preferred strategy for the shorter term and provisionally for the longer term, depending on the rate of erosion and consequent risk to development and assets.</p>
<i>Hold the Line:</i>	<p><i>The provisional strategy locally for low-lying areas.</i></p> <p>May be appropriate to defend low-lying areas from flooding.</p>
<i>Retreat the Line:</i>	<p>Current rates of erosion are low. There is no significant conservation benefit to be gained by controlling the rate of retreat.</p>
<i>Advance the Line:</i>	<p>May conflict with natural processes and nature conservation interests and is not appropriate here.</p>

<i>Do Nothing:</i>	<p><i>The preferred overall strategy for the shorter term and the longer term.</i></p> <p>The unit is mostly undeveloped and is at little risk to erosion and flooding due to the hard geology constraining the course of the river channel.</p> <p>Great value is put on conserving the existing habitats and this is likely to require minimum intervention in natural processes. <i>Do Nothing</i> is therefore the preferred strategy for the shorter and longer terms.</p>
<i>Hold the Line:</i>	<p><i>The provisional strategy locally for the shorter term and the longer term.</i></p> <p>Subject to more detailed appraisal, flood defences may be required to defend the settlements and Abbey site locally at Tintern and Brockweir.</p>
<i>Retreat the Line:</i>	<p>Current rates of erosion are low. There is no significant conservation benefit to be gained by controlling the rate of retreat.</p>
<i>Advance the Line:</i>	<p>May conflict with natural processes and nature conservation interests and is not appropriate here.</p>

Management Unit 8/3 River Wye (left bank): from Chapelhouse Wood to Sedbury STW.

Management Unit 8/4 River Wye (left bank): from Sedbury STW to north Beachley.

Strategic Shoreline Management Options: Summary

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p><i>The preferred strategy for the shorter term and the longer term.</i></p> <p>The unit is currently undefended and is at low risk to erosion due to the hard geology constraining the course of the river channel.</p> <p>Great value is put on conserving the existing habitats and this is likely to require minimum intervention in natural processes. <i>Do Nothing</i> is therefore the preferred strategy for the shorter and longer terms.</p>
<i>Hold the Line:</i>	<p>The risk to infrastructure and development near the bank is thought to be low due to the slow rate of erosion of the hard geology; therefore <i>Hold the Line</i> is not appropriate.</p>
<i>Retreat the Line:</i>	<p>Current rates of erosion are low. There is no significant conservation benefit to be gained by controlling the rate of retreat.</p>
<i>Advance the Line:</i>	<p>May conflict with natural processes and nature conservation interests and is not appropriate here.</p>

<i>Do Nothing:</i>	<p><i>The preferred strategy for the shorter term and the longer term.</i></p> <p>The unit has low-lying land which is mostly undeveloped and is currently privately defended to a low standard against tidal flooding.</p> <p>Great value is put on conserving the existing habitats and this is likely to require minimum intervention in natural processes. <i>Do Nothing</i> is therefore the preferred strategy for the shorter and longer terms.</p>
<i>Hold the Line:</i>	<p>There are no significant assets at risk which require defence, therefore <i>Hold the Line</i> is not appropriate for this site.</p>
<i>Retreat the Line:</i>	<p>The present embankment is considered to be ineffective, therefore the <i>Retreat</i> option is not relevant.</p>
<i>Advance the Line:</i>	<p><i>Advance the Line</i> may conflict with natural processes and nature conservation interests and is not appropriate here.</p>

**PROCESS UNIT 9
BEACHLEY TO SHARPNESS**

General Description

The Beachley to Sharpness process unit includes both banks of the Severn. The right bank (looking downstream) is 16.10km long from Beachley in the south to Lydney Point in the north. The left bank is 16.50km long from south of Sharpness Docks in the north to Littleton Warth in the south.

The unit lies between the two constrictions in the width of the estuary at Beachley/Aust and at Lydney/Sharpness. Offshore, there are large intertidal sand banks and rock exposures which influence the low tide channel.

The process unit is subject to international and national conservation designations in place and is within the Severn Estuary possible Special Area for Conservation.

Both banks have extensive areas of low-lying land behind (with the exception of the cliff line between Beachley and Pillhouse Rocks). The low-lying land is generally defended against flooding by a system of earth bunds.

Land use is predominantly agricultural with associated settlements. Oldbury and Berkeley power stations are located on the left bank.

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS for BEACHLEY TO SHARPNESS PROCESS UNIT

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 9/1	Beachley to Sedbury Cliffs (right bank of the Severn)	This unit has a coastline bounded by two rock outcrops of Beachley Head Marls and Sedbury Triassic lias cliffs. Land use is mainly agricultural with the town of Sedbury in the hinterland. The narrow saltmarsh and cliffs are presently eroding.	Do Nothing	Do Nothing	Do Nothing or Retreat the Line
MU 9/2	Sedbury Cliffs (right bank of the Severn)	This unit has cliffs fronted by mudflats and exposed bedrock. Land use is mainly agricultural. There is a railway line on an embankment inland.	Do Nothing	Do Nothing	Do Nothing
MU 9/3	Sturch Pill to Guscar Rocks (right bank of the Severn)	Low-lying estuarine alluvium is bounded by rock outcrops at the north and south of the unit. A narrow zone of eroding marsh fronts the shoreline and the agricultural land is located on reclaimed land and the higher terrace. A flood risk area is located in the hinterland of Pillhouse Rocks at Sturch Pill. There is a railway line on an embankment inland.	<u>Do Nothing or (provisionally) Hold or Retreat the Line</u>	<u>Do Nothing or (provisionally) Hold or Retreat the Line</u>	<u>Do Nothing or (provisionally) Hold or Retreat the Line</u>
MU 9/4	Guscar Rocks to Lydney Harbour Mouth (right bank)	The low-lying estuarine alluvium is fronted by a rapidly eroding marsh. The unit is backed by the railway line and at the north of the unit an industrial zone flanks the harbour entrance.	<u>Hold the Line</u>	<u>Hold the Line</u>	<u>Hold the Line or Retreat the Line</u>
MU 9/5	South of Sharpness docks to Berkeley Pill (left bank of the Severn)	The unit is mainly agricultural with nature conservation at the shoreline. The higher areas of Sharpness and its related industrial zone flank the low lying alluvium. Berkeley Pill and the northern extent of Berkeley Power Station mark the southern extent of the unit.	<u>Hold the Line</u>	<u>Hold the Line</u>	<u>Retreat the Line</u>
MU 9/6	Berkeley Power Station (left bank of the Severn)	This unit corresponds to the site of Berkeley Power Station. The shoreline is low lying and there are outcrops of harder geology offshore (Black Rock). The hinterland is mainly agricultural land.	<u>Hold the Line</u>	<u>Hold the Line</u>	<u>Hold the Line or Retreat the Line (locally)</u>
MU 9/7	South of Berkeley Power Station to Chapel House (left bank)	This unit has low lying estuarine alluvium and glacial sands. Saltmarsh at the foreshore is eroding at the northern end of the unit and accreting to the south. The intertidal rock exposures of Hills Flats are located offshore along the majority of this unit. Land use is mainly agricultural.	<u>Hold the Line</u>	<u>Hold the Line</u>	<u>Hold the Line or Retreat the Line</u>
MU 9/8	Chapel House to south of Oldbury Power Station (left bank)	This unit includes Oldbury Power Station and agricultural land in the hinterland. A tidal reservoir and the offshore rock exposures of The Ledges front the unit.	<u>Hold the Line</u>	<u>Hold the Line</u>	<u>Hold the Line or Retreat the Line</u>
MU 9/9	Oldbury to Littleton (left bank)	This unit has low lying estuarine alluvium. Littleton Warth which is presently accreting fronts the shoreline. Oldbury Lake are the intertidal rock exposures. At the south of the unit Littleton Pill marks the southern boundary. At this location there is a small industrial estate. Land use is mainly agricultural.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line

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**Management Unit 9/1 Hen and Chickens Rock to Sedbury Cliffs.
(right bank of the Severn)**

**Management Unit 9/2 Sedbury Cliffs
(right bank of the Severn) .**

Strategic Shoreline Management Options: Summary

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p><i>The preferred strategic option for the shorter term and (provisionally) for the longer term.</i></p> <p>Currently, the foreshore is stable and erosion rates at the cliffs are low. Therefore <i>Do Nothing</i> is currently the preferred option, but should be kept under review depending on future trends of erosion. This strategy does not conflict with coastal processes or with environmental interests.</p>
<i>Hold the Line:</i>	<p><i>The alternative (provisional) option for the longer term.</i></p> <p>The southern part of the unit contains residential development and infrastructure which could be at risk if erosion were to occur. Therefore <i>Hold the Line</i> may need to be considered as an option in the longer term.</p>
<i>Retreat the Line:</i>	<p><i>The alternative (provisional) option for the longer term.</i></p> <p>The unit contains residential development and infrastructure which could be at risk if erosion were to occur. Therefore <i>Retreat the Line</i> by controlling the rate of erosion of the cliffs may need to be considered as an option in the longer term.</p>
<i>Advance the Line:</i>	<p>Is not appropriate with regard to coastal processes or natural environment interests.</p>

<i>Do Nothing:</i>	<p><i>The preferred strategic option for the shorter term and for the longer term.</i></p> <p>Currently, there are no defences and there is no development which would justify protection. <i>Do Nothing</i> is therefore the preferred option. This strategy does not conflict with coastal processes or with environmental interests.</p>
<i>Hold the Line:</i>	<p>Is not appropriate since there is no development which would justify protection. The introduction of defences would conflict with coastal process and environmental objectives.</p>
<i>Retreat the Line:</i>	<p>Is not appropriate since there are currently no defences to retreat, nor is there justification for controlling the rate of cliff erosion.</p>
<i>Advance the Line:</i>	<p>Is not appropriate with regard to coastal processes or natural environment interests.</p>

**Management Unit 9/3 Sturch Pill to Guscar Rocks
(right bank of the Severn).**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p><i>The preferred strategy for the shorter term and (provisionally) for the longer term.</i></p> <p>There are currently no formal defences against erosion or flooding of low-lying land. There are few developments or assets at risk of flooding, therefore it is unlikely that major flood defence measures would be justified with respect to economic criteria. This strategy does not conflict with coastal processes or environmental interests.</p>
<i>Hold the Line:</i>	<p><i>The alternative (provisional) option locally in the shorter term or the longer term.</i></p> <p>May be required to protect the railway embankment locally against erosion and instability, depending on the results of <i>monitoring and research</i>.</p>
<i>Retreat the Line:</i>	<p><i>The alternative strategic option for the shorter or longer term.</i></p> <p>This is an alternative option, depending on the results of <i>monitoring and research</i>, which might involve:</p> <ul style="list-style-type: none"> • retreat to the c.9.5m contour (would require no specific defence measures); • continued flooding of low-lying land around the railway embankment; • local measures to control flood risk to the A48; • investigation of possible “soft” engineering measures to stabilise the foreshore; • possible measures to protect the railway embankment and under-bridges.
<i>Advance the Line:</i>	<p>Is not appropriate with regard to coastal processes or natural environment interests.</p>

**Management Unit 9/4 Guscar Rocks to Lydney Harbour Mouth.
(right bank of the Severn)**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p>Would increase the risk of uncontrolled flooding to a large area of agricultural land and to an industrial zone that are currently defended. Therefore <i>Do Nothing</i> is not a viable strategy.</p>
<i>Hold the Line:</i>	<p><i>The preferred overall strategic option for the shorter term and (provisionally) for the longer term.</i></p> <p>The existing defences, which are mostly set back from the foreshore, mostly have long residual life and defend a large area of low-lying land. <i>Hold the Line</i> is therefore the preferred strategy in the shorter term and (provisionally) in the longer term.</p> <p><i>Hold the Line</i> does not seriously conflict with coastal processes or environmental interests at present. <i>Monitoring and research</i> is recommended to investigate whether this option will be sustainable in the longer term.</p> <p>In the longer term, it may be necessary to modify the strategy in response to coastal processes.</p>
<i>Retreat the Line:</i>	<p><i>The alternative (provisional) strategy for the shorter term (locally) or for the longer term (overall).</i></p> <p>The existing defences are mostly set back from the foreshore and have long residual life. However, in the longer term, depending on the results of <i>monitoring and research</i>, it may be appropriate to consider some retreat or realignment of the defences in order to accommodate coastal processes, whilst continuing to ensure adequate flood defence.</p> <p>Locally around Cone Pill, where the existing defences have low residual life, <i>Retreat</i> is currently being considered, which would reduce the length of defences and increase the width of foreshore.</p>
<i>Advance the Line:</i>	<p>Is not appropriate with regard to coastal processes or natural environment interests; nor would it be beneficial for coastal defence purposes.</p>

Management Unit 9/5 South of Sharpness to Berkeley Pill (left bank of the Severn).

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would increase the risk of uncontrolled flooding to a large area of low-lying land including settlements that are currently defended. Therefore <i>Do Nothing</i> is not a viable strategy.
<i>Hold the Line:</i>	<p><i>The preferred strategic option for the shorter term and (provisionally) for the longer term.</i></p> <p>The existing defences, which are mostly set back from the foreshore, have long residual life and defend a large area of low-lying land. <i>Hold the Line</i> is therefore the preferred strategy in the shorter term and (provisionally) in the longer term.</p> <p><i>Hold the Line</i> does not seriously conflict with coastal processes or environmental interests at present. <i>Monitoring and research</i> of coastal processes on the foreshore is recommended to investigate whether this option will be sustainable in the longer term.</p> <p>In the longer term, it may be necessary to modify the strategy in response to coastal processes.</p>
<i>Retreat the Line:</i>	<p><i>The alternative (provisional) strategy for the longer term.</i></p> <p>The existing defences have considerable residual life. However, in the longer term, depending on the results of <i>monitoring and research</i>, it may be appropriate to consider some <i>Set Back</i> of the defences in order to accommodate coastal processes.</p> <p><i>Set Back</i> to high ground (c.10.0m contour) may be considered in the longer term. This might involve:</p> <ul style="list-style-type: none"> • minimal maintenance of the existing defence line consistent with a lower standard of defence against flooding; • construction of a new defence line between Berkeley Pill and high ground to the north-east.
<i>Advance the Line:</i>	Is not appropriate with regard to coastal processes or natural environment interests; nor is it beneficial for coastal defence purposes.

Management Unit 9/6 Berkeley Power Station. (left bank of the Severn)

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would increase the risk of uncontrolled flooding around Berkeley Power Station and to a large area of low-lying land including residential areas that is currently defended. Therefore <i>Do Nothing</i> is not a viable option.
<i>Hold the Line:</i>	<p><i>The preferred strategic option for the shorter term and (provisionally) for the longer term.</i></p> <p>The existing defences defend Berkeley Power Station and a large area of low-lying land, and have significant residual life. <i>Hold the Line</i> is therefore the preferred strategy in the shorter term and (provisionally) in the longer term.</p>
<i>Retreat the Line:</i>	<p><i>The alternative strategy locally for the longer term.</i></p> <p>Not currently viable due to the presence of Berkeley Power Station; it might be considered in the longer term depending on decommissioning and absence of contaminants. There may be scope for local <i>Retreat</i> at the south side of Berkeley Pill in the longer term, co-ordinated with a strategy for <i>Retreat</i> in MU9/5 to the north.</p>
<i>Advance the Line:</i>	Is not appropriate with regard to coastal processes or natural environment interests.

Management Unit 9/7 South of Berkeley Power Station to Chapel House. (left bank of the Severn)

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would increase the risk of uncontrolled flooding to a large area of agricultural land and residential areas that are currently defended. Therefore <i>Do Nothing</i> is not a viable strategy.
<i>Hold the Line:</i>	<p><i>The preferred strategic option for the shorter term and (provisionally) for the longer term.</i></p> <p>The existing defences, which are mostly set back from the foreshore, have long residual life and defend a large area of low-lying land. <i>Hold the Line</i> is therefore the preferred strategy in the shorter term and (provisionally) in the longer term.</p> <p><i>Hold the Line</i> does not seriously conflict with coastal processes or environmental interests at present. <i>Monitoring and research</i> of coastal processes on the foreshore is recommended to investigate whether this option will be sustainable in the longer term.</p> <p>In the longer term, it may be necessary to modify the strategy in response to coastal processes.</p>
<i>Retreat the Line:</i>	<p><i>The alternative (provisional) strategy for the longer term.</i></p> <p>The existing defences have long residual life. However, in the longer term, depending on the results of <i>monitoring and research</i>, it may be appropriate to consider some <i>Set Back</i> of the defences in order to accommodate coastal processes.</p> <p><i>Set Back</i> of the defences should be considered north of Severnside Farm in order to maintain a width of saltmarsh in front of the defences.</p> <p>More detailed assessment in the longer term is required to establish the viability of this option.</p>
<i>Advance the Line:</i>	Is not appropriate with regard to coastal processes or natural environment interests; nor is it beneficial for coastal defence purposes.

Management Unit 9/8 Chapel House to south of Oldbury Power Station. (left bank of the Severn)

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would increase the risk of uncontrolled flooding around Oldbury Power Station and to a large area of agricultural land and residential areas that are currently defended. Therefore <i>Do Nothing</i> is not a viable option.
<i>Hold the Line:</i>	<p><i>The preferred strategic option for the shorter term and (provisionally) for the longer term.</i></p> <p>The existing defences defend Oldbury Power Station and a large area of low-lying land, and have significant residual life. <i>Hold the Line</i> is therefore the preferred strategy in the shorter term and (provisionally) in the longer term.</p>
<i>Retreat the Line:</i>	<p><i>The alternative strategy for the longer term.</i></p> <p>Not currently viable due to the presence of Oldbury Power Station and small developments adjacent to the existing defence line; it might be considered in the longer term depending on decommissioning and absence of contaminants.</p>
<i>Advance the Line:</i>	Is not appropriate with regard to coastal processes or natural environment interests.

**Management Unit 9/9 Oldbury to Littleton.
(left bank of the Severn)**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p>Would increase the risk of uncontrolled flooding to a large area of agricultural land and residential areas that are currently defended. Therefore <i>Do Nothing</i> is not a viable strategy.</p>
<i>Hold the Line:</i>	<p><i>The preferred strategic option for the shorter term and (provisionally) for the longer term.</i></p> <p>The existing defences, which are mostly set back from the foreshore, mostly have long residual life and defend a large area of low-lying land. <i>Hold the Line</i> is therefore the preferred strategy in the shorter term and (provisionally) in the longer term.</p> <p><i>Hold the Line</i> does not seriously conflict with coastal processes or environmental interests at present. <i>Monitoring and research</i> of coastal processes on the foreshore is recommended to investigate whether this option will be sustainable in the longer term.</p> <p>In the longer term, it may be necessary to modify the strategy in response to coastal processes.</p>
<i>Retreat the Line:</i>	<p><i>The alternative (provisional) strategy for the longer term.</i></p> <p>The existing defences mostly have considerable residual life. The shoreline is currently stable. As long as this trend continues, <i>Retreat</i> need not be considered in detail. However, in the longer term it might be necessary to consider <i>Set Back</i> of the defence line if erosion of the foreshore were to develop.</p> <p>More detailed assessment, depending on the results of <i>monitoring and research</i>, is needed to establish the viability (or otherwise) of this option for the longer term.</p>
<i>Advance the Line:</i>	<p>Is not appropriate with regard to coastal processes or natural environment interests.</p>

**PROCESS UNIT 10
SHARPNESS TO PURTON**

General Description

The Sharpness to Purton process unit includes both banks of the Severn. Looking downstream, the right bank extends 6.10km from Lydney Point downstream to Wellhouse Rock upstream, and the left bank extends 3.78km from Cotterday Hole upstream to Sharpness Docks downstream. The unit relates to the significant reduction in width of the estuary between Sharpness and Tites Point. The shorelines on both banks of this process unit have been fairly stable for the last 100 years.

The majority of this process unit does not lie within a flood risk area, except for low-lying land at Purton, west of Tites Point (left bank). The unit comprises mainly Devonian mudstone cliffs with outcrops of Jurassic mudstone cliffs at the northern extent of the unit (at Purton and Cotterday Hole).

The process unit has a number of international, national and local conservation designations in place and is part of the possible Special Area of Conservation within the Severn Estuary.

Right bank (looking downstream)

At the south of the unit, the lock gate at the mouth of Lydney Harbour canal is currently derelict; a weir with sluices has been constructed in the lock. From Lydney Harbour to Cliff Farm there is a natural cliff coast. The railway embankment within the unit is protected by a sea wall. Where the railway runs close to the shoreline at Gatcombe, there is a risk of localised flooding to a small number of houses.

Left bank (looking downstream)

The left bank (looking downstream) is a mainly undefended coast with localised embankments and walls present, and docks at Sharpness.

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS *for* SHARPNESS TO PURTON PROCESS UNIT

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 10/1	Lydney Harbour to Cliff Farm (right bank of the Severn)	An intertidal rock platform and nearshore sands front this mudstone cliff line. The majority of The unit is mainly undeveloped at the coast; A railway and the town of Lydney are located inland.	Do Nothing	Do Nothing	Do Nothing
MU 10/2	Cliff Farm to Wellhouse Rock (right bank of the Severn)	The unit comprises the area of Wellhouse Bay. The railway is located close to the shore. Fronting the railway embankment is a rocky foreshore with gravels and sands. The unit is utilised for agriculture and there are scattered residential areas throughout.	Hold the Line	Hold the Line	Hold the Line
MU 10/3	Wellhouse Rock to Poulton Court (right bank of the Severn)	This unit comprises the area of Gatcombe Bay. The railway is located close to the shore through this unit. The unit is predominantly agricultural with small residential areas.	Hold the Line	Hold the Line	Hold the Line
MU 10/4	Tites Point to south of Ridge Sand (left bank of the Severn)	This unit has a cliff coastline fronted by the two sand banks of Waveridge Sand in the north and The Ridge Sand in the south. The Gloucester and Sharpness Canal is located close to the shore. Inland, the land is mainly agricultural with small settlements. There is low-lying land at the north of the unit by Purton.	Hold the Line	Hold the Line	Hold the Line
MU 10/5	Sharpness (north) (left bank of the Severn)	This small unit has a rocky shoreline with sands in the nearshore area. The unit has port-related industry and infrastructure of Sharpness, with agriculture and small residential areas inland.	Hold the Line	Hold the Line	Hold the Line
MU 10/6	Sharpness (west) (left bank of the Severn)	This unit has a rocky shoreline, with Sharpness Docks at the southern end of the unit. The land use is related to Sharpness Docks and therefore comprises port related industry and infrastructure although there are also agricultural and small residential areas at the coast and inland.	Hold the Line (locally) Do Nothing (locally)	Hold the Line (locally) Do Nothing (locally)	Hold the Line (locally) Do Nothing (locally)

Management Unit 10/1 Lydney Harbour to north of Cliff Farm (right bank of the Severn).

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<i>The preferred strategic option for the shorter term and the longer term.</i> Currently, there are no defences to the cliff coast and there is not sufficient development close to the cliffs to justify protection. <i>Do Nothing</i> is therefore remains the preferred option for the shorter and longer terms. This strategy does not conflict with coastal processes or environmental interests.
<i>Hold the Line:</i>	Is not appropriate since there is no development which would justify protection. The introduction of defences would conflict with coastal process and environmental objectives.
<i>Retreat the Line:</i>	Is not appropriate since there are currently no defences to retreat, nor is there justification for controlling the rate of cliff erosion.
<i>Advance the Line:</i>	Is not appropriate with regard to coastal processes or natural environment interests.

Management Unit 10/2 Cliff Farm to Wellhouse Rock (right bank of the Severn)

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	This option would be viable only if the existing railway line were relocated inland.
<i>Hold the Line:</i>	<i>The preferred option for the shorter term and for the longer term.</i> This is the preferred option which is required to protect the existing railway line from coastal erosion. This strategy does not conflict significantly with coastal processes or with environmental interests.
<i>Retreat the Line:</i>	Not viable, due to the location of the railway line close to the shoreline.
<i>Advance the Line:</i>	Is not appropriate with regard to coastal processes or natural environment interests.

**Management Unit 10/3 Wellhouse Rock to Poulton Court.
(right bank of the Severn)**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable due to local risks of localised flooding and erosion and to the location of the railway line close to the shoreline.
<i>Hold the Line:</i>	<p><i>The preferred option for the shorter term and for the longer term.</i></p> <p>This is the preferred option which is required to protect the existing railway line from coastal erosion. It does not significantly conflict with coastal processes or with environmental interests.</p> <p><u>Monitoring of the rates of change should be used to establish the risk of erosion to this shoreline.</u></p>
<i>Retreat the Line:</i>	Not viable, due to the location of the railway line close to the shoreline.
<i>Advance the Line:</i>	Is not appropriate with regard to coastal processes or natural environment interests.

**Management Unit 10/4 Tites Point to south of Ridge Sand.
(left bank of the Severn)**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable due to the risk of breaching the Gloucester and Sharpness Canal which is located directly behind the defence line.
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and the longer term.</i></p> <p>This is the preferred option which is required to protect the bank of the Gloucester and Sharpness Canal from coastal erosion and tidal inundation. It does not significantly conflict with coastal processes or with environmental interests.</p> <p>Within the context of this overall strategy, it may not be necessary to implement defence measures where there is currently no threat of erosion or flooding. <i>Monitoring and research</i> are recommended to investigate the potential for erosion in the longer term.</p>
<i>Retreat the Line:</i>	Not viable, due to the location of the Gloucester and Sharpness Canal which is located directly behind the defence line.
<i>Advance the Line:</i>	Is not appropriate with regard to coastal processes or natural environment interests.

**Management Unit 10/5 Sharpness (north)
(left bank of the Severn).**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable due to the risk of breaching the Gloucester and Sharpness Canal which is located directly behind the defence line.
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and the longer term.</i></p> <p>This is the preferred option which is required to protect the bank of the Gloucester and Sharpness Canal from coastal erosion and tidal inundation. It does not significantly conflict with coastal processes or with environmental interests.</p> <p>Within the context of this overall strategy, it may not be necessary to implement defence measures where there is currently no threat of erosion or flooding. <i>Monitoring and research</i> are recommended to investigate the potential for erosion in the longer term.</p>
<i>Retreat the Line:</i>	Not viable, due to the location of the Gloucester and Sharpness Canal which is located directly behind the defence line.
<i>Advance the Line:</i>	Is not appropriate with regard to coastal processes or natural environment interests.

**Management Unit 10/6 Sharpness (west).
(Left Bank of the Severn)**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p><i>The preferred strategy for the shorter term and the longer term, local to Sharpness Point.</i></p> <p>Not viable overall, due to the presence of port-related industry and infrastructure. However, this option is viable southwards from Sharpness Point to the edge of the dock development where there are currently no defences and no assets threatened by erosion.</p>
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and the longer term, in the vicinity of the docks.</i></p> <p>This is the preferred option which is required to protect the port-related industry and infrastructure from erosion and tidal inundation.</p>
<i>Retreat the Line:</i>	Not generally viable, due to the location of the port. – but could be applied over sections of the shoreline where port infrastructure does not preclude this option.
<i>Advance the Line:</i>	Is not appropriate with regard to coastal processes or natural environment interests.

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PROCESS UNIT 11 TITES POINT TO HOCK CLIFF

Deleted: Within the unit the High Water Marks, Low Water Marks and shoreline on both banks have been fairly stable for the last 100 years.

General Description

The Tites Point to Hock Cliff process unit includes both banks of the River Severn. Looking downstream, the right bank extends 4.08km from the shoreline adjacent to Hagloe House (downstream) to Awre (upstream) and the left bank extends from the south of Hock Cliff (upstream) to Tites Point (downstream). The downstream boundary relates to the great increase in the width of the estuary upstream of Titees Point. The upstream boundary relates to the transition from the more open estuary with long fetches in this unit to the meandering tidal river in process unit 12 (upstream).

The process unit has a number of international, national and local conservation designations. The upstream limit of this unit is close to the upstream limit of the Severn Estuary possible Special Area of Conservation and SSSI. The downstream boundary of this unit is at the upstream end of the area designated as the Severn SPA and Ramsar site. The unit includes the Slimbridge Wildfowl Trust Reserve.

Historic map-based evidence suggests considerable variation in the location and extent of offshore banks and bars. Despite these changes the position of the high water mark has remained relatively stable over much of the reach, although there are more marked changes within the left bank of the channel.

Right bank (looking downstream)

Between Brims Pill to The Priory at Northington there are intermittent earth embankments on top of the river bank. The promontory has a steep-sided bund with timber and stone projecting on the foreshore. The land is generally above extreme tidal level, but there is low-lying land at the mouth of Bideford Brook and at the inside of the meander east of Awre.

Left bank (looking downstream)

The entire left bank frontage is low-lying. The area comprises recent estuarine alluvium backed by older estuarine alluvium and at the upstream end of the unit there is an extensive nearshore and offshore area of mud. The area includes a series of warths, from Saul Warth at the upstream end of the unit to The Warth (including The Dumbles and New Grounds) at the south of the unit. The route of the Gloucester and Sharpness Canal backs the warth areas. Between Hock Cliff to the Royal Drift and Tites Point, an earth embankment along much of its length, with local sea wall backs the natural shoreline. There are several rock groynes (cribs) at the downstream end. There is an accretional trend between Middle Point and Tites Point breakwaters, whilst the mud bank adjacent to Frampton has tended to erode or remain relatively stable. Water for Bristol is abstracted and treated at Purton Water Treatment Works.

INSERT process unit MAP

**MANAGEMENT UNITS
for
TITES POINT TO HOCK CLIFF PROCESS UNIT**

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 11/1	Poulton Court to Whitescourt, Awre (right bank of the Severn)	This unit is characterised by a change from a terrace strata and rocky nearshore to low lying alluvium in the flood plain area of Awre. Brims Pill is located at the transition between the two geologies. Land use is mainly agricultural. A railway line and the settlements of Blackney and Awre are inland.	Do Nothing	Do Nothing	Do Nothing
MU 11/2	Whitescourt to Hayward (right bank)	This unit relates to the northern limit of this Process Unit. The northern boundary marks the transition to the narrower meandering river reaches. The unit is low-lying and is largely undeveloped with small settlements inland on higher ground.	Hold the Line	Hold the Line or Retreat the Line	Retreat the Line
MU 11/3	Hock Ditch to Frampton Breakwater (left bank)	This unit also relates to the northern limit of this Process Unit. The low-lying estuarine alluvium frontage is fronted by saltmarsh, with sands on the nearshore. The land use is mainly agricultural and residential with associated infrastructure. The Gloucester and Sharpness Canal runs along the inland boundary of the low-lying land.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line
MU 11/4	Frampton Breakwater to The Dumbles (left bank)	This unit has an estuarine floodplain frontage. The shoreline is fronted by saltmarsh with sands in the nearshore zone. The unit includes low-lying agricultural land, the Slimbridge Wildfowl Trust and the Gloucester and Sharpness Canal.	Hold the Line	Hold the Line or Retreat the Line	Hold the Line or Retreat the Line
MU 11/5	The Royal Drift (left bank)	This unit has a low-lying estuarine frontage. The settlement of Purton, a water treatment works and reservoirs, and the Gloucester and Sharpness Canal are located near the coast. Agricultural land and small settlements are on higher ground inland.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line

**Management Unit 11/1 Poulton Court to Whitescourt, Awre.
(right bank of the Severn)**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<i>The preferred overall strategic option for the shorter term and for the longer term.</i> This is the preferred overall option in the shorter and longer terms, due to the absence of a substantial flood risk area or assets at risk from erosion. It does not conflict with coastal processes or with environmental interests.
<i>Hold the Line:</i>	Not generally appropriate due to the presence of high ground which is mostly undeveloped. Economic appraisal by the Environment Agency indicates that expenditure on flood defence measures locally at Brims Pill would not be economically justified.
<i>Retreat the Line:</i>	Not appropriate due to the presence of high ground which is mostly undeveloped.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

**Management Unit 11/2 Whitescourt to Hayward.
(right bank of the Severn)**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding of land which is currently defended.
<i>Hold the Line:</i>	<i>This is currently the preferred strategy.</i> This is currently the preferred strategy to defend agricultural land from flooding.
<i>Retreat the Line:</i>	<i>This is the alternative strategy for the shorter term or the longer term.</i> Retreat to high ground (c.10.3mOD contour) should be considered in the shorter and longer terms when the existing defences reach the end of their life, within a strategy of widening the river corridor. This might involve: <ul style="list-style-type: none"> • either abandoning the existing defences, or maintaining them but with minimum expenditure; • accepting the risk of increased frequency of flooding to agricultural land due to lower defence standards and the predicted increase in relative sea level; • local defence of residential property to an appropriate standard. <p>This would not conflict with coastal process or conservation issues.</p>
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

**Management Unit 11/3 Hock Ditch to Frampton Breakwater.
(left bank of the Severn)**

**Management Unit 11/4 Frampton Breakwater to The Dumbles
(left bank of the Severn).**

Strategic Shoreline Management Options: Summary

Strategic Shoreline Management Options: Summary

Do Nothing: Not viable, due to the risk of uncontrolled flooding of land which is currently defended.

Do Nothing: Not viable, due to the risk of uncontrolled flooding of land which is currently defended.

Hold the Line: *This is currently the preferred strategy for the shorter term and (provisionally) for the longer term.*

Hold the Line: *This is currently the preferred strategy for the shorter term and (provisionally) for the longer term.*

This is currently the preferred strategy to defend low-lying land from flooding. The existing defences have considerable residual life. This strategy does not significantly conflict with coastal processes or with environmental interests in the shorter term, but it may lead to further coastal squeeze in the longer term

This is currently the preferred strategy to defend low-lying land from flooding. The existing defences have considerable residual life. This strategy may conflict with coastal processes (i.e erosion) north of The Dumbles either in the shorter or the longer term. Therefore *research and monitoring* of coastal change are recommended. *Coastal squeeze* may affect environmental interests.

Retreat the Line: *This is the alternative strategy for the longer term.*

Retreat the Line: *This is the alternative strategy for the shorter or longer term.*

Retreat towards the edge of the Gloucester and Sharpness Canal and to higher ground at the northern end of Saul Warth (c.10.3mOD contour) should be considered for the longer terms when the existing defences reach the end of their life. This strategy could be required in order to accommodate coastal change, depending on the results of *research and monitoring*.

Set back of the defence line north of The Dumbles should be considered for the shorter or longer terms when the existing defences reach the end of their life. This strategy could be required in order to accommodate coastal change, depending on the results of *research and monitoring*.

It might involve:

It might involve:

- construction of a new defence line inland of the existing one;
- either abandoning the existing defences, or maintaining them but with minimum expenditure;
- accepting the risk of increased frequency of flooding to agricultural land due to lower defence standards and the predicted increase in relative sea level.

- construction of a new defence line inland of the existing one;
- either abandoning the existing defences, or maintaining them but with minimum expenditure;
- accepting the risk of increased frequency of flooding to agricultural land due to lower defence standards and the predicted increase in relative sea level.

This would not conflict with coastal processes; implications for conservation issues would require further assessment.

The potential interactions with coastal process and conservation issues would require further assessment.

Advance the Line: Is not appropriate with regard to river processes or natural environment interests.

Advance the Line: Is not appropriate with regard to river processes or natural environment interests.

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**Management Unit 11/5 The Royal Drift
(left bank of the Severn).**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding of land which is currently defended.
<i>Hold the Line:</i>	<p><i>This is currently the preferred strategy for the shorter term and (provisionally) for the longer term.</i></p> <p>This is currently the preferred strategy to defend low-lying land and assets from flooding. The existing defences have considerable residual life. This strategy is unlikely to conflict with coastal processes or environmental interests in the shorter or the longer term</p>
<i>Retreat the Line:</i>	<p><i>This is the alternative strategy for the longer term.</i></p> <p><i>Set back of the defence line could be considered for the longer terms when the existing defences reach the end of their life. This could be required in order to accommodate coastal change, depending on the results of research and monitoring. However, this unit currently appears to be relatively stable.</i></p> <p>This option would not conflict with coastal processes; <u>potential impact on</u> conservation issues <u>would require further assessment.</u></p>
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

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**PROCESS UNIT 12
HOCK CLIFF TO LONGNEY POOL.**

General Description

The Hock Cliff to Longney Pool process unit includes both banks of the River Severn. The right bank extends from Hayward (downstream) to Cowleys Elm (upstream), whilst the left bank extends from Longney Pool (upstream) to the south of Hock Cliff (downstream). The downstream boundary relates to the transition from the more open estuary with long fetches in unit 11 (downstream) to the meandering tidal river in this unit. The upstream boundary relates to the transition from predominantly sandy shoals in this unit to finer sediments in unit 13 (upstream).

The process unit has national conservation designations in place at particular locations. The downstream boundary of this unit is close to the upstream limit of the Severn Estuary possible Special Area for Conservation and the Upper Severn Estuary SSSI.

Right bank (looking downstream)

Low-lying land is mostly defended by earth embankments which are located on (or set back from) the river banks. There are some areas of undefended high ground, with local embankments and walls. The urban development of Newnham is built on a cliff and there is concern about erosion taking place by the church. From Newnham to Broad Oak and Garden Cliff there is an earth embankment in front of low-lying land with localised masonry and concrete walls, and stone has been placed to protect the banks from erosion. Upstream of this reach, the frontage between Garden Cliff and Cowley's Elm includes a continuous earth embankment which protects low-lying land behind. At Lower Dumball there is a tendency toward accretion of sediments whereas Upper Dumball is stable and from Dumball to Rodley bank the area fluctuates between accretion and erosion.

Left bank (looking downstream)

This bank is characterised by low-lying alluvium and sedimentary deposition environments. At the upstream end of the unit, there is potential for erosion as it is on the outside bend of the river meander. A wall has therefore been constructed at Epney to protect the road. The low-lying area around Arlingham between Milton End and Hock Cliff is also protected.

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS *for* HOCK CLIFF TO LONGNEY POOL PROCESS UNIT**Strategic Shoreline Management Options – Summary**

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 12/1	Hayward to Northington Farm (right bank).	This unit is on the inside of the meander bend and has low lying alluvium with a sand nearshore. The unit is mainly undeveloped with agricultural land.	Hold the Line	Hold the Line or Retreat the Line	Hold the Line or Retreat the Line
MU 12/2	Northington Farm to Portlands Nab (right bank).	This unit is on the outside of a meander bend, constrained by a Triassic and Jurassic marl strata. Land use is mainly agricultural, with small settlements.	Do Nothing	Do Nothing (generally) or Hold the Line (locally)	Do Nothing (generally) or Hold the Line (locally)
MU 12/3	Portlands Nab to the downstream boundary of Newnham (right bank).	This unit has marl strata located on the outside of a meander bend. Land is agricultural with a railway line close to the backshore.	Do Nothing	Do Nothing (generally) or Hold/Retreat the Line (locally)	Do Nothing (generally) or Hold/Retreat the Line (locally)
MU 12/4	Newnham and Broadoak (right bank).	This unit is on the outside of a meander bend. The shore is a marl cliff line which is prone to erosion. The settlements of Newnham are at the south and Broadoak at the north end of the unit. Development and a road are located close to the shoreline.	Hold the Line	Hold the Line	Hold the Line
MU 12/5	Broadoak to the upstream end of Garden Cliff (right bank).	This unit comprises low-lying estuarine alluvium until the Strand when the geology changes to the Triassic mudstones of Garden Cliff. The unit is on the outside of a meander bend. The unit is mainly undeveloped close to the shore.	Hold the Line, locally Do Nothing	Hold the Line, locally Do Nothing	Hold the Line, locally Do Nothing
MU 12/6	The Dumballs (right bank).	This unit includes the low-lying estuarine alluvium of the Lower and Upper Dumballs. The unit is on the inside of a meander band. There are small settlements and a road inland. The main land use is agricultural.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line
MU 12/7	Longney Crib to Priding Wick Court (left bank).	The unit comprises Jurassic strata fronted in part by low-lying estuarine alluvium. The unit is on the outside of the meander bend. Land use is mainly agricultural but also includes the settlements of Epney, Upper Framilode and Priding, with a road close to the shoreline.	Hold the Line	Hold the Line	Hold the Line
MU 12/8	Priding Wick Court to Longmarsh Pill (left bank).	The unit has mainly low-lying estuarine alluvium to the west, with higher ground to the east. The unit lies mainly on the inside bend of a meander, although the low-water channel runs close to the shore in places. The low-lying land is mainly agricultural but with a small settlement. Other settlements (Arlingham, Milton End) are located on higher ground.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line
MU 12/9	Longmarsh Pill to Hock Ditch (left bank).	This unit includes the cliffed area of Hock Cliff.	Do Nothing	Do Nothing	Do Nothing

**Management Unit 12/1 Hayward to Northington Farm
(right bank of the Severn).**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding of land which is currently defended.
<i>Hold the Line:</i>	<p><i>This is currently the preferred strategy.</i></p> <p>This is currently the preferred strategy to defend agricultural land from flooding.</p>
<i>Retreat the Line:</i>	<p><i>This is the alternative strategy for the shorter term or the longer term.</i></p> <p>Retreat to high ground (c.10.3mOD contour) should be considered in the shorter and longer terms when the existing defences reach the end of their life, within a strategy of widening the river corridor. This might involve:</p> <ul style="list-style-type: none"> · either abandoning the existing defences, or maintaining them but with minimum expenditure; · accepting the risk of increased frequency of flooding to agricultural land due to lower defence standards and the predicted increase in relative sea level; · local defence of residential property to an appropriate standard. <p>This would not conflict with coastal process; it would require more detailed assessment of conservation issues.</p>
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

**Management Unit 12/2 Northington Farm to Portlands Nab
(right bank of the Severn).**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p><i>The preferred overall strategy for the shorter term and the longer term.</i></p> <p>This is the preferred option in the shorter and longer terms, due to the absence of a substantial flood risk area or assets at risk from erosion. However, local defences may be required with this overall strategy. This strategy does not conflict with coastal processes or environmental interests.</p>
<i>Hold the Line:</i>	<p><i>The provisional local option where existing development could be at risk of flooding.</i></p> <p>Not required due to the presence of high ground which is mostly undeveloped. Flood defences may however be maintained locally at Bullo.</p>
<i>Retreat the Line:</i>	Measures to reduce the rate of erosion of the banks are not required due to the lack of development close to the shore and the rising ground inland.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

Management Unit 12/3 Portlands Nab to the downstream boundary of Newnham (right bank of the Severn).

Management Unit 12/4 Newnham and Broadoak (right bank of the Severn).

Strategic Shoreline Management Options: Summary

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<i>Provisionally the preferred strategic option for the shorter term and the longer term.</i>
	This is the preferred option in the shorter term and possibly the longer term, due to the absence of flood risk or assets at risk from erosion. This does not conflict with coastal processes or environmental interests.
<i>Hold the Line:</i>	<i>An alternative option locally if the railway becomes threatened by erosion.</i>
	Depending on the results of <i>research and monitoring</i>, this option may be considered if the railway is threatened by coastal erosion. Alternatively, relocation of the railway might be considered.
<i>Retreat the Line:</i>	<i>An alternative option locally if the railway becomes threatened by erosion.</i>
	Depending on the results of <i>research and monitoring</i>, this option may be considered if the railway is threatened by coastal erosion. In this context, <i>Retreat</i> would involve measures to control and reduce the rate of erosion of the cliff adjacent to the railway. Alternatively, relocation of the railway might be considered.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding and erosion of residential and commercial land and the A48.
<i>Hold the Line:</i>	<i>The preferred option for the shorter term and the longer term.</i>
	This is the preferred option in the shorter and longer terms to defend the existing urban development and infrastructure from flooding and erosion. This does not adversely affect conservation interests, but may constrain the evolution of the channel.
<i>Retreat the Line:</i>	Not viable, due to the proximity of development and infrastructure to the defence line.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

Management Unit 12/5 Broadoak to the upstream end of Garden Cliff (right bank of the Severn).

Management Unit 12/6 The Dumballs (right bank of the Severn).

Strategic Shoreline Management Options: Summary

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<i>The preferred option locally at Garden Cliff.</i> This option is not generally viable, due to the risk of uncontrolled flooding of small residential areas and the A48. It is, however, the preferred option locally at Garden Cliff, to maintain the geological interest of the SSSI.
<i>Hold the Line:</i>	<i>The preferred overall option for the shorter term and (provisionally) the longer term.</i> This is the preferred option in the shorter and longer terms to defend the existing settlements and infrastructure from flooding and erosion. This does not conflict with environmental interests, nor does it significantly conflict with natural coastal processes.
<i>Retreat the Line:</i>	May not be feasible within the cliffed sections (Garden Cliff) and would conflict with conservation interests.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding of land which is currently defended.
<i>Hold the Line:</i>	<i>The preferred strategy for the shorter term and (provisionally) the longer term.</i> This is the preferred strategy required to defend, small settlements, associated minor roads and agricultural land from flooding. This strategy may constrain the evolution of the estuary and its floodplain in the longer term; however there is no direct conflict with environmental interests.
<i>Retreat the Line:</i>	<i>The alternative strategy for the longer term.</i> Managed Retreat to high ground (c.10.4mOD contour) may be considered in the longer term within a strategy of widening the river corridor. This might involve: <ul style="list-style-type: none"> · maintaining the existing flood defences but with minimum expenditure; · accepting the risk of increased frequency of flooding to agricultural land due to a reduced defence standards and possible increase in sea level; · construction of bunds between high ground to limit the extent of flooding; · local defence of residential property to an appropriate standard.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

**Management Unit 12/7 Longney Crib to Priding Wick Court.
(left bank of the Severn)**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding and erosion of residential and agricultural land and infrastructure.
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and the longer term.</i></p> <p>This is the preferred option in the shorter and longer terms to defend the existing developments and infrastructure from flooding and erosion. This strategy may constrain the evolution of the estuary and its floodplain in the longer term. There is no significant conflict with environmental interests.</p>
<i>Retreat the Line:</i>	Not viable, due to the proximity of development and infrastructure to the defence line.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

Management Unit 12/8 Priding Wick Court to Longmarsh Pill. (left bank of the Severn)

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not generally viable due to the risk of uncontrolled flooding of the agricultural area which is currently defended.
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and (provisionally) for the longer term.</i></p> <p>This is currently the preferred strategy to defend the agricultural area from flooding. It may constrain the evolution of the estuary and its floodplain in the longer term; however it does not directly conflict with environmental interests.</p>
<i>Retreat the Line:</i>	<p><i>The alternative strategy for the longer term.</i></p> <p>Retreat to high ground (c.10.3mOD contour) may be considered in the longer term within a strategy of widening the river corridor. This might involve:</p> <ul style="list-style-type: none"> · maintaining the existing flood defences but with minimum expenditure; · accepting the risk of increased frequency of flooding to agricultural land due to a reduced defence standards and possible increase in sea level; · local defence of residential property to an appropriate standard. <p>Alternatively, Retreat by set back of flood embankments and regrading of channel slopes may provide a strategy for reducing risk of flooding and erosion in vulnerable sections of the unit.</p>
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

**Management Unit 12/9 Longmarsh Pill to Hock Ditch
(left bank of the Severn)**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<i>The preferred overall strategy for the shorter term and the longer term.</i> This is the preferred option in the shorter and longer terms, due to the absence of a substantial flood risk area or assets at risk from erosion. This strategy does not conflict with coastal processes or environmental interests.
<i>Hold the Line:</i>	Not required due to the presence of high ground which is mostly undeveloped.
<i>Retreat the Line:</i>	Measures to reduce the rate of erosion of the banks are not required due to the lack of development close to the shore.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

**PROCESS UNIT 13
LONGNEY POOL to THE WEIRS**

General Description

The Longney Pool to The Weirs process unit includes both banks of the River Severn, with extensive areas of low-lying land. The right bank (looking downstream) extends from Cowleys Elm downstream to Maisemore Weir upstream, whilst the left bank extends from Llanthony Weir upstream to Longney Pool downstream. The upstream boundaries at Maisemore Weir and Llanthony Weir are the limit of normal tidal flows on the Severn, although the weirs are overtopped by high Spring tides. The downstream boundary relates to the transition from predominantly sandy shoals in PU12 (downstream) to finer sediments in this unit.

The process unit has specific areas with international, national and local conservation designations

From Lower Parting to Upper Parting

The western channel is the main flood route. The eastern channel is the navigation channel and has lock-gate connection to the Gloucester and Sharpness Canal. Both channels have weirs which prevent saline intrusion upstream in normal conditions but Maisemore Weir on the western channel is occasionally overtopped by high spring tides. The rural reaches up to the weirs are defended by earth bunds.

Right bank (looking downstream)

From Cowley's Elm to Bollow there is undefended high ground and from Bollow to Denny Hill there is a continuous earth embankment to defend low-lying land. At Denny Hill, higher ground spans the hinterland and backshore area. At Minsterworth there is an earth embankment defending the low-lying land; there is a bund inland to Highcross farm to protect Minsterworth when Minsterworth Ham is flooded. Continuing upstream, the shoreline from Highcross Farm to Lower Parting includes a continuous earth bund on the bank which defends the low-lying land behind. This structure is designed to be overtopped in order to flood Minsterworth Ham on the rare joint occurrence of extreme tidal influence with high fluvial flow.

Left bank (looking downstream)

From Lower Parting to Netheridge Sewage Treatment Works there is a continuous embankment. The low-lying flood plain flanking the inside meander bend has been significantly raised by a Gloucester City Council landfill scheme. Between Netheridge Sewage Treatment Works and Weir Green stone has been placed to control erosion on the outside of the meander bend. Adjacent to this section is Weir Green to Wicks Green which has low-lying land defended by a continuous earth bund on top of the bank. From Elmore Back to Wicks Green the low-lying land is defended by a continuous earth bund on top of the bank. There is a pumping station at Wicks Green. A continuous earth embankment on top of the riverbank defends the reach from Wicks Green to Bush Crib.

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS

for

LONGNEY POOL TO MAISEMORE PROCESS UNIT

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 13/1	Rodley to Bollow (right bank of the Severn)	This unit has a recent estuarine alluvium foreshore backed by Jurassic strata. Land use is agricultural with small settlements and minor roads inland.	Do Nothing	Do Nothing	Do Nothing
MU 13/2	Bollow to Hartland's Hill (right bank)	This unit has undeveloped low-lying estuarine alluvium with woodland on a sharp meander bend at the Noard's. There are small settlements and a major road inland on higher ground.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line
MU 13/3	Hartland's Hill to Denny Hill (right bank)	This unit relates to a straight reach comprising low-lying estuarine alluvium flanked by Triassic strata. There are small settlements and a major road close to the shore, with mainly agricultural land inland. A railway runs along the margins of the low-lying land by Oakle Street.	Hold the Line	Hold the Line	Hold the Line
MU 13/4	Denny Hill to Minsterworth (right bank)	Generally higher ground but with low-lying estuarine alluvium at each end of the unit. There are small settlements and a major road close to the shore, with mainly agricultural land inland.	Hold the Line	Hold the Line	Hold the Line
MU 13/5	Minsterworth Ham (right bank)	This unit has extensive low-lying recent estuarine alluvium. It is mainly agricultural land with a few farm properties. It lies within a large meander.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line

[Continued overleaf]

Unit	Location	Description	Existing	Shorter term	Longer term
MU 13/6	Moorcroft to the Lower Parting (right bank)	This unit has extensive low-lying recent estuarine alluvium. Land use is agricultural and undeveloped. A railway runs along the inland boundary of the low-lying land. The Severn divides at the Lower Parting.	Hold the Line	Hold the Line or Retreat the Line	Hold the Line or Retreat the Line
MU 13/7	Lower Parting to Maisemore Weir (west channel)	There is low-lying recent estuarine alluvium on both sides of the channel. There is development, with major road and rail infrastructure.	Hold the Line	Hold the Line	Hold the Line or locally Retreat the Line
MU 13/8	Llanthony Weir to the Lower Parting (east channel)	There is low-lying recent estuarine alluvium on both sides of the channel. This is the navigation channel to the City of Gloucester. The unit is developed with residential and industrial areas.	Hold the Line	Hold the Line	Hold the Line
MU 13/9	Lower Parting to Rea (left bank of the Severn)	The reach comprises a wide meander bend located on recent estuarine alluvium and backed by Jurassic and Triassic mudstone geology. The unit is developed, with industry, land fill, residential areas and infrastructure.	Hold the Line	Hold the Line	Hold the Line
MU 13/10	Rea to Windmill Hill (left bank)	This unit has higher ground, with Jurassic and Triassic mudstones, and forms the outside of a large meander bend. Agriculture and the residential areas of Riversmead, Stonebench, Elmore and Weir Green and related roads are located close to the shore.	Hold the Line, locally Do Nothing	Hold the Line, locally Do Nothing	Hold the Line, locally Do Nothing
MU 13/11	Windmill Hill to east end of Elmore (left bank)	This unit is located on the inside of a meander bend. Land is low-lying recent estuarine alluvium, mainly undeveloped with agriculture.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line
MU 13/12	Elmore (left bank)	Land is low-lying estuarine alluvium with the small settlement of Elmore located close to the shore.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line
MU 13/13	West end of Elmore to Wicksgreen (left bank)	Land is low-lying recent estuarine alluvium backed by higher Jurassic geology. There are small settlements on the margins of the low-lying land. Land use is largely agricultural.	Hold the Line	Hold the Line	Retreat the Line
MU 13/14	Wicksgreen to Longney Crib (left bank)	Land is low-lying recent estuarine alluvium backed by higher Jurassic geology. There are small settlements on the margins of the low-lying land. Land use is largely agricultural. A bund separates the low-lying land in this unit from that in unit 13/13.	Hold the Line	Hold the Line	Retreat the Line

**Management Unit 13/1 Rodley to Bollow
(right bank of the Severn)**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<i>The preferred strategy for the shorter term and the longer term.</i> Currently, there are no defences and there is no development at risk which could justify protection. <i>Do Nothing</i> does not conflict with coastal process or conservation issues and remains the preferred option for the shorter and longer terms.
<i>Hold the Line:</i>	<i>Hold the Line</i> would constrain the natural evolution of the channel and is not required because there is no development to at risk.
<i>Retreat the Line:</i>	Is not appropriate because there is currently no formal line of defence.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

**Management Unit 13/2 Noard's Point: Bollow to Hartland's Hill.
(right bank of the Severn)**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding of land which is currently defended.
<i>Hold the Line:</i>	<i>The preferred strategy for the shorter term.</i> This is currently the preferred strategy required to defend agricultural land and a small residential area from flooding. This does not significantly affect conservation interests, but may constrain the evolution of the channel and its floodplain.
<i>Retreat the Line:</i>	<i>The alternative strategy for the longer term.</i> <i>Managed Retreat</i> to high ground (c.10.5mOD contour) may be considered in the longer term within a strategy of widening the river corridor, when the existing defences would otherwise become due for renewal. This might involve: <ul style="list-style-type: none"> · maintaining the existing flood defences but with minimum expenditure; · accepting the risk of increased frequency of flooding to agricultural land due to a reduced defence standards and possible increase in sea level; · local defence of residential property and infrastructure to an appropriate standard.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

**Management Unit 13/3 Hartland’s Hill to Denny Hill
(right bank of the Severn)**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding and erosion of small settlements and a major road (A48).
<i>Hold the Line:</i>	<i>The preferred strategy for the shorter term and for the longer term.</i> This is the preferred option in the shorter and longer terms to defend the existing small settlement and infrastructure from flooding and erosion. This does not adversely affect conservation interests, but may constrain the evolution of the channel and its floodplain.
<i>Retreat the Line:</i>	Not viable, due to the proximity of development and infrastructure to the defence line.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

**Management Unit 13/4 Denny Hill to Minsterworth
(right bank of the Severn)**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding and erosion of settlements and a major road (the A48).
<i>Hold the Line:</i>	<i>The preferred strategy for the shorter term and for the longer term.</i> This is the preferred option in the shorter and longer terms to defend the existing settlements and infrastructure from flooding and erosion. This does not adversely affect conservation interests, but may constrain the evolution of the channel and its floodplain.
<i>Retreat the Line:</i>	Not generally viable, due to the proximity of development and infrastructure to the defence line. Locally there is potential for <i>set back</i> of a few metres if this were necessary in the longer term.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

**Management Unit 13/5 Minsterworth Ham
(right bank of the Severn)**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding of land which is currently defended.
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term.</i></p> <p>This is currently the preferred strategy required to defend agricultural land associated farms on low-lying land around Minsterworth Ham from flooding. This does not adversely affect conservation interests, but may constrain the evolution of the channel and its floodplain. A bund inland at Highcross Farm defends Minsterworth from flooding from Minsterworth Ham.</p>
<i>Retreat the Line:</i>	<p><i>The alternative strategy for the longer term.</i></p> <p>The provision of a new defence line inland may be considered within a strategy of widening the river corridor. This might involve:</p> <ul style="list-style-type: none"> · maintaining the existing flood defences but with minimum expenditure; · accepting the risk of increased frequency of flooding to agricultural land due to a reduced defence standard and possible increase in sea level; · local defence of residential property to an appropriate standard. <p>This strategy would, in effect, be an extension of the current strategy of allowing the Ham to flood on high tides combined with high fluvial flows, whilst providing appropriate defence to currently existing residential development.</p>
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

**Management Unit 13/6 Moorcroft to the Lower Parting
(right bank of the Severn).**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding of land which is currently defended.
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term.</i></p> <p>This is currently the preferred strategy required to defend agricultural land from flooding, and also to defend properties on low-lying land to the south. . This does not adversely affect conservation interests, but may constrain the evolution of the channel and its floodplain.</p>
<i>Retreat the Line:</i>	<p><i>The alternative strategy for the shorter term or the longer term.</i></p> <p>The provision of a new defence line inland may be considered within a strategy of widening the river corridor. This might involve:</p> <ul style="list-style-type: none"> · maintaining the existing flood defences but with minimum expenditure; · accepting the risk of increased frequency of flooding to agricultural land due to a reduced defence standard and possible increase in sea level; · continuity of defences with those for Minsterworth Ham (MU13/5).
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

**Management Unit 13/7 Lower Parting to Maisemore Weir
(on the west channel)**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding and erosion of land which is currently defended.
<i>Hold the Line:</i>	<p><i>The preferred overall strategy for the shorter term and) for the longer term.</i></p> <p>This is currently the preferred strategy required to defend the existing developments and infrastructure from flooding and erosion. This does not adversely affect conservation interests, but may constrain the evolution of the channel and its floodplain.</p>
<i>Retreat the Line:</i>	<p><i>The alternative local strategy for the longer term.</i></p> <p>Local <i>set back</i> of the defence line on the right bank south of Over may be considered within a strategy of widening the river corridor at the same time as in unit 13/6. This might involve</p> <ul style="list-style-type: none"> • construction of a new defence bund inland of the existing one south of Over; • maintaining the existing flood defences but with minimum expenditure; • accepting the risk of increased frequency of flooding to agricultural land due to a reduced defence standard and possible increase in sea level. <p>Realignment of the channel north of Maisemore in the vicinity of the weir and the Upper Parting (PU14) could be considered in order to increase the discharge of high fluvial flows down the western channel.</p>
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

**Management Unit 13/8 Llanthony Weir to the Lower Parting
on the east channel**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding and erosion of land which is currently defended.
<i>Hold the Line:</i>	<p><i>The preferred strategy for both the shorter term and the longer term.</i></p> <p>This is currently the preferred strategy required to defend the existing developments and infrastructure from flooding and erosion. This does not adversely affect conservation interests, but may constrain the evolution of the channel and its floodplain.</p>
<i>Retreat the Line:</i>	There is little scope or benefit to be gained by <i>Retreat</i> in this unit.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

**Management Unit 13/9 Lower Parting to Rea
(left bank of the Severn).**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding and of land which is currently defended.
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and probably the longer term.</i></p> <p>This is currently the preferred strategy required to defend the existing waste tip, the edge of the sewage treatment works and associated minor roads from flooding and erosion. This does not adversely affect conservation interests, but may constrain the evolution of the channel and its floodplain.</p>
<i>Retreat the Line:</i>	This option is prevented by the presence of the waste tip in the floodplain
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

**Management Unit 13/10 Rea to Windmill Hill
(left bank of the Severn)**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p><i>The preferred strategy locally where assets are not at risk of erosion or flooding, in both the shorter term and the longer term.</i></p> <p>This strategy is generally not viable, due to the risk of uncontrolled local flooding and erosion to small settlements and the minor road which runs close behind the bank. However it is locally viable either where there are no significant assets at risk (downstream of Weir Green and upstream of Lower Rea).</p>
<i>Hold the Line:</i>	<p><i>The overall preferred strategy for the shorter term and for the longer term.</i></p> <p>This is the preferred option in the shorter and longer terms to defend the existing small settlements and associated minor road from flooding and erosion. Within this overall option, <i>Do Nothing</i> is viable on reaches where there is no threat of erosion or significant assets at risk. <i>Hold the Line</i> does not adversely affect conservation interests, but may constrain the evolution of the channel and its floodplain.</p>
<i>Retreat the Line:</i>	Not viable, due to the proximity of development and infrastructure to the defence line.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

Management Unit 13/11 Windmill Hill to the eastern end of Elmore (left bank of the Severn).

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding of settlements and land which are currently defended.
<i>Hold the Line:</i>	<i>The preferred strategy for the shorter term and (provisionally) for the longer term.</i> This is currently the preferred strategy required to defend agricultural land and to defend settlements in the adjacent units from flooding across low-lying land. <i>Hold the Line</i> does not adversely affect conservation interests, but may constrain the evolution of the channel and its floodplain.
<i>Retreat the Line:</i>	<i>The alternative (provisional) option for the longer term.</i> <i>Retreat to high ground (10.5mOD contour) should be considered for the longer term within a strategy of widening the river corridor. This might involve:</i> <ul style="list-style-type: none"> • maintaining the existing flood defences but with minimum expenditure; • accepting the risk of increased frequency of flooding to agricultural land due to a reduced defence standard and possible increase in sea level; • construction of flood defence bunds locally to defend settlements in adjacent cells from flooding overland.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

Management Unit 13/12 Elmore (left bank of the Severn)

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding of settlements land which are currently defended.
<i>Hold the Line:</i>	<i>The preferred option for the shorter term and (provisionally) for the longer term.</i> This is the preferred option which is required to defend the residential area and agricultural land. Within a strategy to widen the river corridor, it would be necessary to increase the defences around Elmore.
<i>Retreat the Line:</i>	<i>The alternative (provisional) option for the longer term.</i> <i>Retreat to high ground (10.5mOD contour) should be considered for the longer term within a strategy of widening the river corridor. This might involve:</i> <ul style="list-style-type: none"> • maintaining the existing flood defences but with minimum expenditure; • accepting the risk of increased frequency of flooding to agricultural land due to a reduced defence standard and possible increase in sea level; • construction of flood defence bunds locally to defend settlements in adjacent cells from flooding overland.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

Management Unit 13/13 The western end of Elmore to Wicksgreen (left bank of the Severn)

Management Unit 13/14 Wicksgreen to Longney Crib (left bank of the Severn)

Strategic Shoreline Management Options: Summary

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding of settlements and land which are currently defended.
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and (provisionally) for the longer term.</i></p> <p>This is currently the preferred strategy required to defend agricultural land and to defend settlements in the adjacent units from flooding across low-lying land. <i>Hold the Line</i> does not adversely affect conservation interests, but may constrain the evolution of the channel and its floodplain.</p>
<i>Retreat the Line:</i>	<p><i>The alternative (provisional) option for the longer term.</i></p> <p><i>Retreat to high ground (10.5mOD contour) should be considered for the longer term within a strategy of widening the river corridor. This might involve:</i></p> <ul style="list-style-type: none"> • maintaining the existing flood defences but with minimum expenditure; • accepting the risk of increased frequency of flooding to agricultural land due to a reduced defence standard and possible increase in sea level; • construction and/or maintenance of flood defence bunds locally to defend settlements in this cell and adjacent cells from flooding overland.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding of settlements and land which are currently defended.
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and (provisionally) for the longer term.</i></p> <p>This is currently the preferred strategy required to defend agricultural land and to defend settlements in the adjacent units from flooding across low-lying land. <i>Hold the Line</i> does not adversely affect conservation interests, but may constrain the evolution of the channel and its floodplain.</p>
<i>Retreat the Line:</i>	<p><i>The alternative (provisional) option for the longer term.</i></p> <p><i>Retreat to high ground (10.5mOD contour) should be considered for the longer term within a strategy of widening the river corridor. This might involve:</i></p> <ul style="list-style-type: none"> • maintaining the existing flood defences but with minimum expenditure; • accepting the risk of increased frequency of flooding to agricultural land due to a reduced defence standard and possible increase in sea level; • construction and/or maintenance of flood defence bunds locally to defend settlements in this cell and adjacent cells from flooding overland.
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

PROCESS UNIT 14

THE WEIRS to HAW BRIDGE

Maisemore Weir (on the West Parting) and Llanthony Wier (on the East Parting), to Haw Bridge.

General Description

The Weirs to Haw Bridge process unit includes both banks of the River Severn. The unit extends from the two half-tidal weirs at Maisemore and Llanthony (downstream), to Haw Bridge (upstream). The west and east channels of the River Severn bifurcate north of Alney Island. The west channel is the main flood channel and the east channel has been the navigation channel through the city of Gloucester. The upstream boundary of the process unit marks the upstream limit of the Severn Estuary SMP, at Haw Bridge. This is regarded as the furthest upstream that estuarine sediments have been found. The unit is essentially a fluvial reach with only rare tidal influence.

This process unit has been considered within the Severn Estuary SMP because of the process interactions between this mainly fluvial reach and the estuary downstream of the weirs.

However, because the reach is considered to be primarily fluvial rather than estuarine, definition of Strategic Shoreline Management Options for this unit is not required. Therefore Management Units have not been defined for the unit either.

The unit has a number of international, national and local conservation designations.

INSERT PROCESS UNIT MAP

**PROCESS UNIT 15
NEW PASSAGE to PORTISHEAD**

General Description

The New Passage to Portishead process unit extends 10.73km from New Passage in the north to the Old Pier, Portishead in the south. The north-eastern boundary of the unit marks the transition from the low-lying saltmarsh-fronted shoreline of the Severn Crossings process unit (PU7) to the offshore rocky exposures of English Stones. The south-western boundary of unit marks a transition from the low-lying shoreline of Portbury Wharf to the cliff coast of the Portishead to Clevedon process unit (PU17). The unit is a north-west facing embayment; the shoreline is generally fronted by intertidal mud, sand or gravel banks, and also by saltmarsh. The River Avon (PU16) is at the south-western end of the unit.

The unit has a number of international, national and local conservation designations and is part of the possible Special Area of Conservation within the Severn Estuary.

The unit has extensive areas of low-lying land (the Severn Levels) which are defended from tidal flooding by continuous defences.

The land use is varied: there are considerable areas of port-related industry, other industry and infrastructure backed by countryside and scattered residential areas inland. At the north of the unit there is considerably more agriculture and countryside with residential areas, although industry is still prominent. There is important infrastructure including a railways, motorways, major roads, the Severn Tunnel and the approach viaduct to the Second Severn Crossing.

The Binn Wall protects the area of New Passage to Severn Beach from flooding. The wall has been increased in height with the addition of a concrete wave return wall on the central section. To the south of the Binn Wall there is a lower section of a blockwork and concrete revetment backed with a concrete promenade and clay bund. From Severn Beach to Mitchell's Salt Rhine there is an intermittent embankment with stone placed locally defending low-lying land. The frontage is partly protected by offshore inter-tidal banks and by the saltmarsh of Chittening Warth. The coastal railway embankment provides some flood defence but is punctuated by under-bridges. The chemical works has tipped material at the north end of the warth and has placed rubble on the upper foreshore. Within the unit there are localised embankments and walls, and rock/stone/rubble placed along the frontage, defending low-lying land. In addition clay embankments defend the low-lying land at Portbury Wharf which is undergoing substantial redevelopment. There is spoil ground north of Portishead, which is used on the ebb tide only.

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS
for
NEW PASSAGE TO PORTISHEAD

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 15/1	New Passage to the north end of Severnside Works	An extensive low-lying area (levels) with rock outcrops exposed on the foreshore. The area comprises open countryside with a large amount of infrastructure including the Second Severn Crossing, the Severn Tunnel and M4 and M5 motorways. The area also includes the residential area of Severn Beach.	Hold the Line	Hold the Line	Hold the Line or locally Retreat the Line
MU 15/2	Severnside Works to Mitchell’s Salt Rhine	A low-lying area: saltmarsh is located seaward of Chittening Wharf and the hinterland includes agricultural and industrial areas and infrastructure.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line
MU 15/3	Mitchell’s Salt Rhine to Avonmouth Pier	A low-lying shoreline backed by a considerable area of port related industry. The shoreline comprises estuarine alluvium and made ground.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line
MU 15/4	Portbury Pier to west of the Old Pier, Portishead	A port related industrial area built on estuarine alluvium and made ground. The backshore has an area of nature conservation. The hinterland is largely countryside with some industry, infrastructure and urban residential areas.	Hold the Line	Hold the Line (locally Retreat the Line)	Hold the Line (locally Retreat the Line)

Management Unit 15/1 New Passage to the north end of Severnside Works

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p>Would increase the risk of flooding and erosion of important residential and infrastructure developments, and of an extensive area of agricultural land, which are currently defended. <i>Do Nothing</i> is therefore not a viable strategy.</p>
<i>Hold the Line:</i>	<p><i>The preferred overall strategy for the shorter term and for the longer term.</i></p> <p>The existing defences have significant residual life which may be extended by continued management. <i>Monitoring and research</i> of coastal processes on the foreshore are recommended to investigate the implications of this strategy in the longer term.</p> <p>This is the preferred overall strategy for both the shorter and longer term in order to defend the existing residential developments, infrastructure and extensive agricultural land.</p> <p>However, in the longer term, the results of <i>monitoring and research</i> may show that it is necessary to modify this overall strategy in response to coastal processes whilst maintaining an appropriate standard of defence.</p>

<i>Retreat the Line:</i>	<p><i>The alternative strategy at the south end of the unit (provisionally) for the longer term.</i></p> <p>This is not a viable strategy in most of the unit due to presence of substantial infrastructure and residential development close to the existing defence line.</p> <p>However, at the south end of the unit, <i>Set Back</i> may be a more sustainable option in the longer term in response to coastal processes. It is therefore recommended that policies which would reduce the constraints to <i>Set Back</i> in the longer term should be considered. This would eventually require the relocation of the existing road and rail infrastructure and would only be relevant in the context of a broader policy of <i>Set Back</i> including the adjacent unit 15/2.</p> <p><i>Monitoring and research</i> of coastal processes on the foreshore are recommended to investigate the implications of this strategy for the longer term.</p>
<i>Advance the Line:</i>	<p>Is not an appropriate strategy with regard to coastal processes, landscape value or nature conservation; nor is it considered beneficial for coastal defence purposes.</p>

Management Unit 15/2 Severnside Works to Mitchell’s Salt Rhine

Strategic Shoreline Management Options: Summary

Do Nothing: Would increase the risk of flooding and erosion of important industrial and infrastructure developments, and of an extensive area of agricultural land, which are currently defended. *Do Nothing* is therefore not a viable strategy.

Hold the Line: *The preferred strategy for the shorter term and (provisionally) for the longer term.*

The existing defences have significant residual life which may be extended by continued management. *Hold the Line* does not seriously conflict with coastal processes or environmental interests in the estuary at present, but may do in the longer term due to coastal erosion and predicted relative sea level rise. *Monitoring and research* of coastal processes on the foreshore are recommended to investigate the implications of this strategy in the longer term.

In the shorter term and (provisionally) in the longer term, *Hold the Line* is the preferred strategy in order to defend the existing industrial developments, infrastructure and extensive agricultural land.

However, in the longer term, the results of *monitoring and research* may show that it is necessary to modify this strategy in response to coastal processes whilst maintaining an appropriate standard of defence.

Retreat the Line: *The alternative strategy (provisionally) for the longer term.*

This is not currently a viable strategy due to the presence of substantial industrial development and infrastructure close to the existing defence line.

However, *Set Back* may be a more sustainable option in the longer term in response to coastal processes. It is therefore recommended that policies which would reduce the constraints to *Set Back* in the longer term should be considered. This would eventually require relocation of the existing industry, road and rail infrastructure.

Monitoring and research of coastal processes on the foreshore are recommended to investigate the implications of this strategy for the longer term.

Advance the Line: Is not an appropriate strategy with regard to coastal processes, landscape value or nature conservation; nor is it considered beneficial for coastal defence purposes.

Management Unit 15/3 Mitchell's Salt Rhine to Avonmouth Pier

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would increase the risk of flooding and erosion of important industrial and infrastructure developments, urban residential area, and of an extensive area of agricultural land, which are currently defended. <i>Do Nothing</i> is therefore not a viable strategy.
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and (provisionally) for the longer term.</i></p> <p>In the shorter term and (provisionally) in the longer term, <i>Hold the Line</i> is the preferred strategy in order to defend the existing port and industry and infrastructure located close to the shoreline.</p> <p>However, in the longer term, the results of <i>monitoring and research</i> may show that it is necessary to modify this strategy in response to coastal processes whilst maintaining an appropriate standard of defence.</p> <p>Depending on the manner in which it continues to be implemented and managed, <i>Hold the Line</i> may conflict with coastal processes and environmental interests in the estuary: previously it has involved reclamation and some tipping on the foreshore. In the longer term coastal erosion and predicted relative sea level rise may increase the exposure of the defences. <i>Monitoring and research</i> of coastal processes on the foreshore are recommended to investigate the implications of this strategy in the longer term.</p>

<i>Retreat the Line:</i>	<p><i>The alternative strategy (provisionally) for the longer term.</i></p> <p>This is not currently a viable strategy due to the presence of substantial industrial development and infrastructure close to the existing defence line.</p> <p>However, <i>Set Back</i> may be a more sustainable option in the longer term in response to coastal processes. It is therefore recommended that policies which would reduce the constraints to <i>Set Back</i> in the longer term should be considered. This would eventually require removal of some existing industrial assets and infrastructure.</p> <p><i>Monitoring and research</i> of coastal processes on the foreshore are recommended to investigate the implications of this strategy for the longer term.</p>
<i>Advance the Line:</i>	Is not an appropriate strategy with regard to coastal processes, landscape value or nature conservation; nor is it considered beneficial for coastal defence purposes.

Management Unit 15/4 Portbury Pier to west of the Old Pier, Portishead

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would increase the risk of a severe flood to the port-related developments and is therefore not a viable strategy. However, it may be viable to abandon the Sea Commissioners' Bank which lies in front of the main tidal defences as noted below.
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and the longer term for the primary defence embankments.</i></p> <p>This is the preferred strategy for both the shorter and longer term for the main defences in order to defend the existing port-related developments from flooding and erosion.</p>
<i>Retreat the Line:</i>	<p><i>A possible strategy in front of the main defence line in the shorter term or the longer term.</i></p> <p>It is not viable to retreat the main defences due to the presence of substantial port-related development.</p> <p>It may, however, be viable to abandon the Sea Commissioners' Bank which lies in front of the main tidal defences, thus increasing the coastal margin which would be subject to tidal flooding and wave action. This would impact on nature conservation behind the Bank by increasing its exposure to the estuary.</p>
<i>Advance the Line:</i>	Is not an appropriate strategy with regard to coastal processes, or environmental values; nor is it considered beneficial for coastal defence purposes.

**PROCESS UNIT 16
RIVER AVON**

General Description

River Avon process unit extends from the mouth of the Avon (from Avonmouth Pier on the north side to Portbury Pier on the south side) upstream to Netham Weir. Netham Weir is the normal tidal limit, although it is overtopped by high Spring tides.

The unit includes several areas which have conservation designations, of international, national or local importance. In particular, the possible Special Area of Conservation within the Severn Estuary extends upstream of the Avonmouth Bridge.

The land use within this unit is varied. At the mouth of the Avon there are docks with substantial port related industry and infrastructure on both banks up to the M5 Avonmouth Bridge. On the right bank of the river (looking downstream) there is a mix of open space and residential areas. Major urban areas of the City of Bristol and its historic docks are located around the upstream end of the unit. On the left bank (looking downstream) there are open spaces and residential areas.

The unit has a number of dock walls and riverbank defences due to the extensive port, industrial, urban and infrastructure developments along the Avon. These are owned and/or maintained by a variety of different bodies including Bristol City Council, Bristol Port Company, The Environment Agency and private riparian landowners. There are also considerable lengths of the river which cut through rocky high ground and are undefended.

There are several low-lying areas which are defended from tidal flooding. Land use in these areas is mainly open countryside, recreational land, port, industrial or commercial land; the edges of some residential areas are also defended.

Upstream of the Royal Portbury Dock the unit is outside the Schedule 4 boundary for Coast Protection works under the Coast Protection Act (boundary at Latitude 50° 29' 40").

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS

for the

RIVER AVON

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 16/1	River Avon (right bank): Avonmouth Pier to Netham Weir	This unit extends covers the right bank of the Avon from its mouth at Avonmouth Pier to the normal tidal limit at Netham Weir in Bristol. The underlying geology and overlying land use is varied within the unit, with port-related industry located on made ground and residential areas located on Devonian and Carboniferous geology interspersed by glacial sands and gravels.	Hold the Line	Hold the Line	Hold the Line
MU 16/2	River Avon (left bank): Netham Weir to south of Burgh Walls	This unit relates to the urban area of Bristol south of the Avon on the left bank downstream of Netham Weir, which is located on a mixed geology of alluvium and glacial materials.	Hold the Line	Hold the Line	Hold the Line
MU 16/3	River Avon (left bank): Burgh Walls to Chapel Pill	This unit relates to an area that is mainly undeveloped on the Avon's left bank. It is largely open space with important nature conservation interests. There is Devonian and Carboniferous geology interspersed by glacial sands and gravels.	Do Nothing	Do Nothing	Do Nothing
MU 16/4	River Avon (left bank): Chapel Pill to Portbury Pier	This downstream unit on the left bank of the Avon includes both residential areas and port-related industry. The geology is mixed, including estuarine alluvium.	Hold the Line	Hold the Line	Hold the Line

**Management Unit 16/1 River Avon (right bank):
Avonmouth Pier to Netham Weir**

**Management Unit 16/2 River Avon (left bank):
Netham Weir to south of Burgh Walls.**

Strategic Shoreline Management Options: Summary

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would increase the risk of tidal flooding, erosion or instability to industrial, residential and urban areas and infrastructure which are currently defended: therefore <i>Do Nothing</i> is not a viable overall strategy.
<i>Hold the Line:</i>	<i>The preferred strategy for the shorter term and for the longer term.</i> This is the preferred overall strategy for both the shorter and longer term in order to defend the existing urban development, industry and infrastructure.
<i>Retreat the Line:</i>	Is not a viable strategy due to presence of substantial infrastructure and urban development close to the existing line of defence.
<i>Advance the Line:</i>	Is not an appropriate strategy with regard to estuary processes and the natural environment; nor is it considered beneficial for coastal defence purposes.

<i>Do Nothing:</i>	Would increase the risk of tidal flooding, erosion or instability to industrial, residential and urban areas and infrastructure which are currently defended: therefore <i>Do Nothing</i> is not a viable overall strategy.
<i>Hold the Line:</i>	<i>The preferred strategy for the shorter term and for the longer term.</i> This is the preferred overall strategy for both the shorter and longer term in order to defend the existing urban development, industry and infrastructure.
<i>Retreat the Line:</i>	Is not a viable strategy due to presence of substantial infrastructure and urban development close to the existing line of defence.
<i>Advance the Line:</i>	Is not an appropriate strategy with regard to estuary processes and the natural environment; nor is it considered beneficial for coastal defence purposes.

**Management Unit 16/3 River Avon (left bank):
Burgh Walls to Chapel Pill**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<i>The preferred overall strategy for the shorter term and the longer term.</i> The value of land and infrastructure that are potentially at risk is insufficient to justify significant defence expenditure
<i>Hold the Line:</i>	As above
<i>Retreat the Line:</i>	As above.
<i>Advance the Line:</i>	Is not an appropriate strategy with regard to estuary processes and the natural environment; nor is it considered beneficial for coastal defence purposes.

**Management Unit 16/4 River Avon (left bank):
Chapel Pill to Portbury Pier**

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would increase the risk of flooding and erosion to residential areas and port-related developments which are currently defended: therefore <i>Do Nothing</i> is not a viable strategy.
<i>Hold the Line:</i>	<i>The preferred strategy for the shorter term and the longer term.</i> This is the preferred overall strategy for both the shorter term and the longer term in order to defend the existing port-related developments and infrastructure.
<i>Retreat the Line:</i>	Is not a viable strategy in the shorter term due to presence of residential and port-related developments close to the existing line of defence.
<i>Advance the Line:</i>	Is not an appropriate strategy with regard to estuary processes and the natural environment; nor is it considered beneficial for coastal defence purposes.

**PROCESS UNIT 17
PORTISHEAD to CLEVEDON**

General Description

Portishead to Clevedon Process Unit extends 12.1km from Portbury Docks in the north-east to Wains Hill in the south-west. The unit is a cliff-lined north-west facing shoreline with a narrow intertidal width. The north-eastern boundary of the unit near the Old Pier to the west of Portbury Docks marks the transition from the cliff coast in this unit to a low lying shoreline of estuarine alluvium which then extends to Avonmouth (PU16 and PU15). The south-western boundary of this unit marks the southern limit of the rocky cliffs and wave cut platform at Wains Hill.

This unit has several conservation designations of international, national and local importance. In particular, it is part of the possible Special Area of Conservation within the Severn Estuary.

The land use is varied: there are extensive areas of agricultural land; the urban areas of Clevedon and Portishead include residential, tourist, commercial and industrial land use and the north of the unit has port related land use next to the mouth of the Avon.

The majority of the unit comprises a cliff coast which is largely undefended, though local masonry protection is evident. The cliffs have hard rock geology which is resistant to erosion. Erosion rates do vary through the unit according to local geological and geomorphological factors. The cliff top development backing Clevedon Bay is protected by an extensive sea wall structure up to 8m in height.

Salthouse Bay and Woodhill Bay have the only low-lying land at potential risk of flooding within this unit. Salthouse Bay was formerly a muddy depositional environment but was closed off by a sea wall, encompassing a Marine Lake. Kilkenny and Woodhill Bays are fronted by saltmarsh up to 130m wide and the Low Water Mark has moved seaward in this area. The low lying area of Woodhill Bay is defended against flooding by a masonry sea wall and causeway, with localised walls built to defend individual properties. The majority of properties are located on raised ground and between them and the causeway is a freshwater lake.

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS
for
CLEVEDON PROCESS UNIT

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 17/1	Old Pier, Portishead to Portishead Point	The unit has hard geology cliffs with wave cut platform. The land use is influenced by its proximity to Portbury docks to the east. There are a few properties set back from the cliff line.	Do Nothing	Do Nothing	Do Nothing, locally Retreat the Line (provisional option)
MU 17/2	Woodhill Bay	The embayment of Kilkenny and Woodhill is low-lying and fronted by a rocky shoreline which has been colonised by saltmarsh. The residential areas are located away from the flood risk zone.	Hold the Line	Hold the Line	Hold the Line
MU 17/3	Kilkenny Bay to Redcliff Bay	The unit has cliffs of hard rock geology. The cliff top land use is varied with residential areas, agriculture, pasture, recreation and tourist area.	Do Nothing	Do Nothing, locally Retreat the Line (provisional option)	Do Nothing, locally Retreat the Line (provisional option)
MU 17/4	Redcliff Bay to Ladye Point	The cliff coast continues through the unit and cliff top development includes small residential areas with pockets of recreation and tourism.	Do Nothing	Do Nothing	Do Nothing
MU 17/5	Clevedon	The limestone cliff continues through the majority of the unit, but is intersected by a low-lying alluvial area at Salthouse Bay. The development of Clevedon is located within this unit.	Hold the Line locally Do Nothing	Hold the Line locally Retreat the Line or Do Nothing	Hold the Line locally Retreat the Line or Do Nothing

Management Unit 17/1 Old Pier Portishead to Portishead Point

Management Unit 17/2 Woodhill Bay

Strategic Shoreline Management Options: Summary

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p><i>The preferred strategy for the shorter term and the longer term.</i></p> <p>The unit is presently undefended. The cliff top is undeveloped and the cliff erosion rate is low. Great value is put on conserving the existing habitats and the geological exposures of the GCR site, and this requires continuation of natural coastal processes. Do Nothing is therefore the preferred strategy for the shorter and longer terms.</p>
<i>Hold the Line:</i>	<p>There are no existing defences and there are no significant assets which require protection. <i>Hold the Line</i> is not appropriate for this site whose conservation value depends on continuing erosion.</p>
<i>Retreat the Line:</i>	<p><i>A provisional strategy locally for the longer term where there is development set back from the cliff edge.</i></p> <p>Current rates of erosion are low. There is no significant conservation benefit to be gained by controlling the rate of retreat. However, controlling the rate of erosion of cliffs locally in front of existing development may be considered as an alternative to Do Nothing, subject to results of detailed economic and environmental appraisals.</p>
<i>Advance the Line:</i>	<p>Advance the Line would be in direct conflict with the nature conservation interests and is not appropriate here.</p>

<i>Do Nothing:</i>	<p>Would ultimately lead to the deterioration of causeway the road on top. It would increase the risk of uncontrolled flooding to the recreational area and to the margins of residential properties which are currently defended. This is therefore not a viable strategy.</p>
<i>Hold the Line:</i>	<p><i>The preferred strategy for the shorter term and (provisionally) for the longer term.</i></p> <p>Hold the Line does not seriously conflict with coastal processes or environmental interests at present. Monitoring and research of coastal processes on the foreshore is recommended to investigate whether this option will be sustainable in the longer term.</p> <p>Therefore, in the shorter term, and provisionally in the longer term (subject to monitoring and research), Hold the Line is the preferred strategy in order to defend the existing road and recreational land use.</p>
<i>Retreat the Line:</i>	<p>Currently, the foreshore appears to be stable and there is not an overriding case for retreat in response to coastal processes in the shorter term, and possibly not in the longer term either.</p>
<i>Advance the Line:</i>	<p>Advance the Line is not an appropriate strategy with regard to coastal processes; nor is it considered beneficial for coastal defence purposes.</p>

Management Unit 17/3 Kilkeny Bay to Redcliff Bay

Strategic Shoreline Management Options: Summary

Do Nothing: *The preferred overall strategy for the shorter and for the longer term.*

The unit is presently undefended except for local defences mainly to protect the coastal path. The cliff erosion rate is low. Great value is put on conserving the existing habitats and the geological exposures of the GCR site, and this requires continuation of natural coastal processes. *Do Nothing* is therefore the preferred overall strategy for the shorter term and in the longer term.

Hold the Line: There are no existing defences except locally and there are no significant assets which require protection in the shorter term. *Hold the Line* is not appropriate for this site whose conservation value depends on continuing erosion.

Retreat the Line: *The alternative (provisional) strategy locally for the shorter and longer terms.*

Current rates of erosion are low. There is no significant conservation benefit to be gained by controlling the rate of retreat. However, *monitoring and research* of cliff erosion is recommended to investigate whether properties are threatened.

It may be necessary (subject to the results of *monitoring and research*, and supported by detailed economic and environmental assessment) to consider measures to control the rate of erosion of the cliffs (whilst maintaining the geological exposures), before residential properties become at risk.

Advance the Line: *Advance the Line* would be in direct conflict with the nature conservation interests and is not appropriate here.

Management Unit 17/4 Redcliff Bay to Ladye Point

Strategic Shoreline Management Options: Summary

Do Nothing: *The preferred strategy for the shorter term and for the longer term.*

The unit is presently undefended. The cliff top is undeveloped and the cliff erosion rate is low. Value is put on conserving the existing habitats and this requires continuation of natural coastal processes. *Do Nothing* is therefore the preferred strategy for the shorter and longer terms.

Hold the Line: There are no existing defences and there are no significant assets which require protection in the shorter term. *Hold the Line* is not appropriate.

Retreat the Line: Current rates of erosion are low. There is no significant conservation benefit to be gained by controlling the rate of retreat.

Advance the Line: *Advance the Line* would be in direct conflict with the nature conservation interests and is not appropriate here.

Management Unit 17/5 Clevedon

Strategic Shoreline Management Options: Summary
Do Nothing:

The preferred local strategy for the undeveloped cliffs.

Do Nothing would lead to a risk of uncontrolled flooding and erosion affecting recreational and residential areas at Salthouse Bay, and the urban frontage at Clevedon Bay, which are currently defended. This option is not viable at these locations.

However, where there is hard resistant geology with no significant assets at risk of erosion, as at Wains Hill and Church Hill, this is locally the preferred strategy.

Hold the Line:

The preferred overall strategy for the shorter term and for the longer term.

Hold the Line is the preferred overall strategy for the shorter and longer term which is required to defend sections of the central urban frontage of Clevedon from flooding and erosion.

Within an overall strategy of ***Hold the Line***, no specific measures are required to the cliffs where the rates of erosion or risk of instability do not threaten public safety or assets. Where a threat is indicated, then engineering measures may be required either to ***Hold the Line*** or to control the rate of erosion. It is recommended that *monitoring and research* of cliff erosion is undertaken at these locations.

Retreat the Line:

The alternative option where there is development set back from the cliff edge.

Controlling the rate of erosion of cliffs in front of existing development may be considered as an alternative to ***Hold the Line***.

Advance the Line:

Advance the Line would be in direct conflict with the nature conservation interests and is not appropriate here.

PROCESS UNIT 18 KINGSTON SEYMOUR

General Description

Kingston Seymour process unit extends 6.66km from Wains Hill in the north to St Thomas Head in the south. Wains Hill marks the transition from the cliff coast of Clevedon Process Unit (PU17) to a low-lying shoreline of estuarine alluvium which then extends to St Thomas Head (PU19).

A number of rivers and pills discharge into this unit. The Blind Yeo discharges into Clevedon Pill, which is located directly south of the southern residential district of Clevedon. Moving southwards, Kingston Pill discharges just north of the Saltings (Sea Wall Farm), the Congresbury Yeo River enters Woodspring Bay directly north of Wicks Warth and The River Banwell enters the southern end of Woodspring Bay, at the southern limit of Wicks Warth.

The Kingston Seymour Process unit has a number of international, national and local conservation designations. The unit is part of the possible Special Area of Conservation within the Severn Estuary and includes bird roosting and nesting sites.

There is extensive area of low-lying land which is defended against tidal flooding by a system of embankments, fronted by lower and upper saltmarsh which varies in width. The low-lying land is served by a complex system of drains, the rivers and tidal sluices.

The land use is mainly agricultural, with associated small areas of residential properties and infrastructure. There are residential areas further inland, including Kingston Seymour and the southern area of Clevedon, which are potentially at risk of tidal inundation across the low-lying land.

The defences at Wicks Warth were refurbished after a severe overtopping event in 1981. There has been large scale modification of the backshore embankment. The heavily engineered bund is faced with stones and a bitumen grouting and this is fronted with a line of block stone. In the hinterland there is a grassed earth bund which acts as a secondary defence. To the north, Blakes Sea Wall was also improved after 1981. This work included the construction of a 40m wide berm which replaced the previous sea wall structure. Block stones face the berm. Kingston Seymour defences have been improved to a higher standard of defence against flooding. This has been accomplished by the construction of a clay bank seaward of the previous defence line. Other defences along this frontage comprise a pitched stone revetment with secondary earth defence bunds to the landward side, bitumen revetments and sections of block stone aligned to the erosional saltmarsh face with secondary earth bunds behind.

A number of sluices operate within this unit, however Kingston Pill has outflanked its sluice and the Blind Yeo Sluice has recently been replaced. The banks of the Congresbury Yeo have also suffered instability. Proceeding a bankslip on the south bank of Blakes Pool, the Environment Agency has now set back the embankments 100-150m from the channel centreline.

Although foreshore accretion has been noted in the vicinity of Clevedon Pill, the general trend over the past 100 years is for erosion within the majority of the bay, associated with a net loss of saltmarsh. There is little infrastructure on the immediate hinterland,

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS
for
KINGSTON SEYMOUR PROCESS UNIT

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 18/1	Wains Hill to St Thomas Head	The unit contains an extensive area of low-lying land. Land use is mainly agricultural, with small residential areas and the M5 motorway located in the hinterland.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line

Management Unit 18/1 Wains Hill to St Thomas Head

Strategic Shoreline Management Options: Summary

Do Nothing: Would increase the risk of severe flooding to extensive areas of low-lying agricultural land, residential areas and infrastructure. *Do Nothing* is therefore not a viable strategy.

Hold the Line: *The preferred strategy for the shorter term and (provisionally) for the longer term.*

The existing defences have significant residual life which may be extended by continued management. *Hold the Line* does not seriously conflict with coastal processes or environmental interests at present, but may do in the longer term due to coastal erosion and sea level rise. Monitoring and research of coastal processes on the foreshore is recommended to investigate whether this option will be sustainable in the longer term.

Therefore, in the shorter term, *Hold the Line* is the preferred strategy in order to defend the existing residential development and agricultural land use.

However, in the longer term, the results of *monitoring and research* may show that it is necessary to modify this strategy in response to coastal processes whilst maintaining an appropriate standard of defence.

Retreat the Line: *The alternative strategy (provisionally) for the longer term.*

In the longer term, if monitoring and research shows that erosion is reducing the width of intertidal mud flats and saltmarsh on the foreshore, it would be appropriate to consider further *set back* of the defences.

Such a strategy could be more sustainable since it would reduce *coastal squeeze* and maintain the width of the intertidal mud flats and saltmarsh which reduce wave action at the defence embankments.

Advance the Line: Is not an appropriate strategy with regard to coastal processes or nature conservation; nor is it considered beneficial for coastal defence purposes.

**PROCESS UNIT 19
MIDDLE HOPE**

General Description

The Middle Hope process unit extends 4.74km from St Thomas Head to Sand Point. The unit boundaries are defined by the seaward limits of the carboniferous limestone headlands in the west and east. The unit has steep cliffs, with a narrow rocky intertidal area. The central section, the area of Middle Hope, comprises a 2.4km ridge which rises to a height of 43m. To the rear of the ridge is low lying estuarine alluvium.

The unit is subject to international and national statutory conservation designations and is within the Severn Estuary possible Special Area of Conservation. The land use is primarily agricultural, with open countryside and a few scattered residential dwellings.

There is no low-lying land within the unit. The unit has low rates of coastal erosion, due to the presence of resistant steep cliffs of hard rock geology, and there is are no significant assets at risk.

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS

for

MIDDLE HOPE PROCESS UNIT

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 19/1	St Thomas Head to Sand Point	This unit comprises a headland with hard carboniferous limestone geology. The headland is undeveloped and is a National Trust reserve.	Do Nothing	Do Nothing	Do Nothing

Management Unit 19/1 St Thomas Head to Sand Point

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p><i>The preferred strategy for the shorter term and for the longer term.</i></p> <p>The unit is presently undefended. The cliff top is undeveloped and the cliff erosion rate is low. Great value is put on conserving the existing intertidal and cliff habitats, and the cliff exposures: this requires continuation of natural coastal processes. <i>Do Nothing</i> is therefore the preferred strategy for the shorter and longer terms.</p>
<i>Hold the Line:</i>	<p>There are no existing defences and there are no significant assets which require protection. <i>Hold the Line</i> is not appropriate for this site whose conservation value depends on continuing natural coastal processes.</p>
<i>Retreat the Line:</i>	<p>Current rates of erosion are low. There is no significant conservation benefit to be gained by controlling the rate of retreat, and any control measures would be likely to adversely affect the intertidal habitats.</p>
<i>Advance the Line:</i>	<p>Advance the Line would be in direct conflict with the nature conservation interests and is not appropriate here.</p>

**PROCESS UNIT 20
SAND BAY**

General Description

The Sand Bay process unit extends 6.7km from Sand Point in the north, to Birnbeck Island in the south. These headlands at each end of the bay comprise hard rock geology of carboniferous limestone. The bay faces westwards and it has a wide intertidal area of sandbanks and mud flats, which dry out to a line between the headlands. Sand dunes form the backshore and form part of the line of sea defence. There is a large saltmarsh at the northern end of the bay.

The process unit is subject to a number of international, national and local statutory and non statutory conservation designations. It is within the Severn Estuary possible Special Area of Conservation.

There is residential development behind the road which backs the dune system. There are sections of tourist land use, with caravan sites and a holiday camp. Agricultural land is located inland of the developed area. At the north and south of the unit are nature conservation areas. The low-lying residential and agricultural land is defended against flooding by a wide beach and dune system which overlies a low revetment.

The bay appears to have remained generally stable over the last 100 years, although with erosion at the southern end and accretion at the northern end. A major beach renourishment scheme using imported sand was undertaken in 1983. Parts of the dunes have been stabilised by fencing and gabions. There has been coastal erosion at the south of the bay where wave attack was eroding the cliff face and placing the coastal toll road at risk. Rock has been placed to protect the cliff at this location.

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS
for
SAND BAY PROCESS UNIT

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 20/1	Sand Point to Middle Hope car park	This unit comprises a headland with hard carboniferous limestone geology, a saltmarsh foreshore. The headland is undeveloped and is a National Trust reserve.	Do Nothing	Do Nothing	Do Nothing
MU 20/2	Middle Hope car park to south Kewstoke	This unit comprises a wide sandy beach backed by a dune system, with low-lying land behind. There are a coastal road, residential properties and caravan sites behind the dunes, with agricultural land inland.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line
MU 20/3	South Kewstoke to Birnbeck Island	This unit comprises a mainly hard rock headland which is mostly undeveloped. There are residential areas to the east. A toll road follows the coast towards Birnbeck Island.	Do Nothing (locally Hold the Line)	Do Nothing (locally Hold the Line)	Do Nothing (locally Hold the Line or Do Nothing)

Management Unit 20/1 Sand Point to Middle Hope car park

Management Unit 20/2 Middle Hope car park to South Kewstoke

Strategic Shoreline Management Options: Summary

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<i>The preferred strategy for the shorter term and for the longer term.</i> The unit is presently undefended. The cliff top is undeveloped and the cliff erosion rate is low. Great value is put on conserving the existing habitats which lie within a SSSI site, and this requires continuation of natural coastal processes. The fronting saltmarsh is currently accreting or in equilibrium and the preferred strategy allows continued natural evolution. <i>Do Nothing</i> is therefore the preferred strategy for the shorter and longer terms.
<i>Hold the Line:</i>	There are no existing defences and there are no significant assets which require protection. <i>Hold the Line</i> is not appropriate for this site whose conservation value depends on continuing erosion.
<i>Retreat the Line:</i>	Current rates of erosion are low. There is no significant conservation benefit to be gained by controlling the rate of retreat.
<i>Advance the Line:</i>	Advance the Line would be in direct conflict with the nature conservation interests and is not appropriate here.

<i>Do Nothing:</i>	Would increase the risk of a severe flood to the low-lying residential area of Kewstoke and an extensive area of agricultural land that are currently defended. <i>Do Nothing</i> is therefore not a viable strategy.
<i>Hold the Line:</i>	<i>The preferred strategy for the shorter term and (provisionally) for the longer term.</i> Currently, the foreshore appears to be stable, as does the dune system which presently defends the low-lying land, subject to continued management. <i>Hold the Line</i> does not seriously conflict with coastal processes or environmental interests at present. <i>Monitoring and research</i> of coastal processes on the foreshore is recommended to investigate whether this option will be sustainable in the longer term. Therefore, in the shorter term <i>Hold the Line</i> is the preferred strategy in order to defend the existing residential development and agricultural land use. In the longer term, it may perhaps be necessary to modify this strategy in response to coastal processes.
<i>Retreat the Line:</i>	<i>The alternative (provisional) strategy for the longer term.</i> Currently, the foreshore appears to be generally stable and there is not an over-riding case for retreat in response to coastal processes in the shorter term, and possibly not in the longer term either. However, in the longer term, depending on the results of <i>monitoring and research</i> , it may be appropriate to consider some retreat or realignment of the defences in order to accommodate coastal processes, whilst continuing to ensure adequate flood defence.
<i>Advance the Line:</i>	Advance the Line is not an appropriate strategy with regard to coastal processes, landscape value or beach amenity; nor is it considered beneficial for coastal defence purposes.

Management Unit 20/3 South Kewstoke to Birnbeck Island

Strategic Shoreline Management Options: Summary
Do Nothing:

The preferred overall strategy for the shorter term and for the longer term.

The unit is presently mainly undefended. The cliff top is mainly undeveloped and the cliff erosion rate is low. Great value is put on the continuing erosion of the cliffs at Spring Cove which lie within a SSSI and GCR site. *Do Nothing* is therefore the preferred overall strategy for the shorter and longer terms.

Within this overall strategy, there is however a requirement to continue providing local protection to the toll road. *Monitoring and research* of coastal processes on the foreshore and at the cliff are recommended to investigate whether this option will be sustainable in the longer term.

Hold the Line:

The preferred local option to protect a short section of the coast road in the shorter term and (provisionally) in the longer term.

For the majority of the unit current rates of erosion are low, the cliff top is mainly undeveloped, therefore *Hold the Line* is generally inappropriate.

However, a short section of soft cliff is currently protected from erosion adjacent to the toll road. *Hold the Line* on this section is therefore appropriate for the shorter term. In the longer term however it may be more appropriate to *Retreat* on this particular section of coast, depending on the results of *monitoring and research*.

Retreat the Line:

The alternative local option to protect a short section of the coast road in the longer term.

Current rates of erosion are low. There is no conservation benefit to be gained by controlling the rate of retreat.

However, for the short section of soft cliff which is currently protected adjacent to the toll road, *Retreat* should be considered as an option in the longer term, depending on the results of *monitoring and research*.

Advance the Line:

Advance the Line would be in direct conflict with the nature conservation interests and is not appropriate here.

**PROCESS UNIT 21
WESTON BAY**

General Description

The Weston Bay process unit is 8.37km long, the boundaries being defined by the hard rock headlands of Birnbeck Head in the north and Brean Down in the south. The unit is a westward facing bay with a wide mud intertidal area and a sandy foreshore. At the southern end of the process unit the River Axe discharges into the Severn between Uphill and Brean Down. The unit extends up the River Axe as far as the tidal limit of Brean Cross sluice.

The process unit is subject to international and national statutory conservation designations and is within the Severn Estuary possible Special Area of Conservation. The River Axe is an important bird roosting and nesting site.

The Weston-Super-Mare frontage is an urban development with considerable residential, commercial, recreation and tourist interests. This developed frontage has structures built for defence against erosion and flooding. At Weston Promenade there is a vertical masonry and concrete sea wall with a wide sandy beach foreshore. There is frequent minor flooding of the promenade, highway and properties' cellars nearby.

Uphill lies to the south of the main Weston-Super-Mare frontage. Behind a wide compacted sandy beach is a large relict dune formation, which acts as a defence to the golf course and residential area behind. Uphill is defended to the south against flooding by an embankment, by Uphill sluice and by high ground.

Flanking the banks of the Axe are the extensive low-lying areas of Brean and Bleadon Level which are defended from tidal flooding from the Axe by a system of embankments. These areas mainly have improved pastureland or rough grazing, with higher saltmarsh along the banks of the River Axe. The east bank of the Axe and the area leading to Uphill is used for recreation.

At Brean Down Farm there was a breach of the defences in 1989; the defences have recently been upgraded as part of a scheme which addressed the defence of the whole peninsular. At Uphill Pill an embankment located 5-10m from the edge of the tidal channel defends low lying land. The defences of Uphill have been upgraded following severe flooding in 1981. The embankment on the west side of the Axe has recently been strengthened with earth as part of the Brean Sea Defence Scheme.

The banks of the Axe have low slope stability, hence it has been suggested that the sides of the low water channel should be protected. Wessex Water are developing a sewage treatment works for Weston Super Mare on Bleadon Level to the east of the Axe, a high ring bank will defend the works. The scheme includes the creation of a wetland area and reedbeds for final treatment.

There has been a small amount of *managed retreat* at the mouth of the Axe to the east side of Brean Down. Avon Wildlife Trust has purchased fields on the east bank of the Axe, west of Windmill and Walborough Hill, with proposals to return them to saltmarsh. The Environment Agency is undertaking hydrodynamic assessments of this proposal.

Brean Down is a high headland with cliffs; it has hard geology with undeveloped countryside. It contains archaeological sites and is conserved by the National Trust

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS
for
WESTON BAY PROCESS UNIT

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 21/1	Weston-super-Mare	The unit comprises the main tourist and residential areas of Weston-Super-Mare and is fronted by a wide sandy beach and sea walls. There is a small harbour and marine lake at its northern end.	Hold the Line	Hold the Line	Hold the Line
MU 21/2	South Weston-super-Mare to Uphill	This unit comprises a residential area and golf course. The foreshore is a wide sandy beach, which is used for recreation. A steep faced dune system is stabilised by vegetation and protects the land behind. There is low-lying improved pasture and saltmarsh to the south.	Hold the Line	Hold the Line	Hold the Line or Retreat the Line
MU 21/3	River Axe	The Axe is a meandering river which flows through the low-lying alluvial plains of Bleadon Levels. The area is mainly undeveloped and used for rough grazing. It also includes the southern margins of the urban area of Uphill.	Hold the Line (locally Retreat the Line)	Hold the Line (locally Retreat the Line)	Hold the Line (locally Retreat the Line)
MU 21/4	Brean Down	This unit comprises a hard rock headland which is undeveloped.	Do Nothing	Do Nothing	Do Nothing

Management Unit 21/1 Weston-super Mare

Management Unit 21/2 South Weston-super-Mare to Uphill

Strategic Shoreline Management Options: Summary

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Would increase the risk of a severe flood to the urban area of Weston-super-Mare and is therefore not a viable strategy.
<i>Hold the Line:</i>	<i>The preferred overall strategy for the shorter term and for the longer term.</i> This is the preferred strategy for both the shorter and longer term in order to defend the existing urban development and infrastructure.
<i>Retreat the Line:</i>	Is not a viable strategy due to presence of substantial infrastructure and urban development. Currently, the foreshore appears to be stable and there is no strong case for retreat in response to coastal processes.
<i>Advance the Line:</i>	Is not an appropriate strategy with regard to coastal processes, landscape value or beach amenity; nor is it considered beneficial for coastal defence purposes.

<i>Do Nothing:</i>	Would increase the risk of a severe flood to the residential area of Uphill and to the southern residential area of Weston-super-Mare and is therefore not a viable strategy.
<i>Hold the Line:</i>	<i>The preferred overall strategy for the shorter term and (provisionally) for the longer term.</i> Currently, the foreshore appears to be stable, as does the dune system which presently defends the golf course and residential area, subject to continued management. <i>Hold the Line</i> does not seriously conflict with coastal processes or environmental interests at present. <i>Monitoring and research</i> of coastal processes on the foreshore and at the dunes are recommended to investigate whether this option will be sustainable in the longer term. Therefore, in the shorter term <i>Hold the Line</i> is the preferred strategy in order to defend the existing urban development and recreational land use. In the longer term, it may perhaps be necessary to modify this strategy in response to coastal processes, depending on the results of <i>monitoring and research</i>.
<i>Retreat the Line:</i>	<i>The alternative (provisional) option for the longer term.</i> Currently, the foreshore appears to be stable and there is not an over-riding case for retreat in response to coastal processes in the shorter term, and possibly not in the longer term either. However, in the longer term, and depending on the results of <i>monitoring and research</i>, it may be appropriate to consider some retreat or realignment of the defences in order to accommodate coastal processes, whilst continuing to ensure adequate flood defence.
<i>Advance the Line:</i>	Advance the Line is not an appropriate strategy with regard to coastal processes, landscape value or beach amenity; nor is it considered beneficial for coastal defence purposes.

Management Unit 21/3 River Axe

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	Not viable, due to the risk of uncontrolled flooding of extensive areas of land which are currently defended.
<i>Hold the Line:</i>	<p><i>The preferred overall strategy for the shorter term and for the longer term.</i></p> <p>This is currently the preferred overall strategy for the main defence line which is required to defend residential developments and also agricultural land, infrastructure and camping areas, to standards appropriate to the particular land use.</p> <p>Within this overall strategy there is scope for local <i>managed retreat</i> and <i>set back</i> to widen the river corridor.</p>
<i>Retreat the Line:</i>	<p><i>The preferred option for local lengths of embankment for the shorter term and for the longer term, within the overall strategy of Hold the Line.</i></p> <p><i>Set Back</i> may be considered in the shorter and longer terms within a strategy of widening the river corridor. This would allow the continued colonisation of saltmarsh and provide an area that can flood safely in front of the main defence line. This might involve:</p> <ul style="list-style-type: none"> • maintaining the existing flood defences but with minimum expenditure and constructing new <i>set back</i> defences behind them; or • moving the existing defences back to a <i>set back</i> defence line • accepting the risk of increased frequency of flooding to pasture in front of the <i>set back</i> defence line consistent with appropriate defence standards and possible increase in sea level; • local defence of residential property and infrastructure to an appropriate standard. <p>Specific measures may be taken locally to promote wetland habitat as part of a policy of <i>Managed Retreat</i>.</p>
<i>Advance the Line:</i>	Is not appropriate with regard to river processes or natural environment interests.

Management Unit 21/4 Brean Down

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<p><i>The preferred strategy for the shorter term and for the longer term.</i></p> <p>The unit is presently undefended. The cliff top is undeveloped and the cliff erosion rate is low. Great value is put on the continuing erosion of the cliffs which lie within a SSSI and GCR site. <i>Do Nothing</i> is therefore the preferred strategy for the shorter and longer terms.</p>
<i>Hold the Line:</i>	There are no existing defences and there are no significant assets, other than the Brean Down Fort, which would require protection. <i>Hold the Line</i> is not appropriate for this site whose conservation value depends on continuing erosion.
<i>Retreat the Line:</i>	Current rates of erosion are low. There is no significant conservation benefit to be gained by controlling the rate of retreat.
<i>Advance the Line:</i>	Advance the Line would be in direct conflict with the nature conservation interests and is not appropriate here.

**PROCESS UNIT 22
THE HOLMS**

General Description

The Holms process unit comprises the two small islands of Flat Holm and Steep Holm which are located at the southern boundary of the Severn Estuary SMP. Flat Holm has 2km shoreline length and is 26m at its highest point. The island lies between Lavernock Point on the Welsh coastline and Brean Down on the English coastline. Steep Holm lies 4km south of Flat Holm, it has a shoreline of 2km and is 72m at its highest point. The two islands are formed of carboniferous limestone.

The process unit is subject to international and national statutory conservation designations and is within the Severn Estuary possible Special Area of Conservation. Flat Holm is mainly undeveloped and has nature conservation interests. The unit also includes a fog horn station and navigational facilities. Steep Holm is mainly undeveloped and has a Nature Research Centre.

The Holms do not lie within a flood risk area and there is low risk due to erosion because of their hard rock geology.

INSERT PROCESS UNIT MAP

MANAGEMENT UNITS
for
THE HOLMS PROCESS UNIT

Strategic Shoreline Management Options – Summary

The preferred Strategic Shoreline Management Options are assessed in the Management Unit Statements which are presented on subsequent pages, and are summarised here.

Unit	Location	Description	Existing	Shorter term	Longer term
MU 22/1	Flat Holm	This unit comprises a hard rock island which is mainly undeveloped.	Do Nothing	Do Nothing	Do Nothing
MU 22/2	Steep Holm	This unit comprises a hard rock island which is mainly undeveloped.	Do Nothing	Do Nothing	Do Nothing

Management Unit 22/1 Flat Holm

Management Unit 22/2 Steep Holm

Strategic Shoreline Management Options: Summary

Strategic Shoreline Management Options: Summary

<i>Do Nothing:</i>	<i>The preferred strategy for the shorter term and for the longer term.</i> The unit is presently undefended. The island is mainly undeveloped and the shoreline erosion rate is low. <i>Do Nothing</i> is therefore the preferred strategy for the shorter and longer terms.
<i>Hold the Line:</i>	There are no existing defences and there are no significant assets which require protection. <i>Hold the Line</i> is not appropriate for this site.
<i>Retreat the Line:</i>	Current rates of erosion are low. There is no significant conservation benefit to be gained by controlling the rate of retreat.
<i>Advance the Line:</i>	Advance the Line would be in direct conflict with the nature conservation interests and is not appropriate here.

<i>Do Nothing:</i>	<i>The preferred strategy for the shorter term and for the longer term.</i> The unit is presently undefended. The island is mainly undeveloped and the shoreline erosion rate is low.. <i>Do Nothing</i> is therefore the preferred strategy for the shorter and longer terms.
<i>Hold the Line:</i>	There are no existing defences and there are no significant assets which require protection. <i>Hold the Line</i> is not appropriate for this site.
<i>Retreat the Line:</i>	Current rates of erosion are low. There is no significant conservation benefit to be gained by controlling the rate of retreat.
<i>Advance the Line:</i>	Advance the Line would be in direct conflict with the nature conservation interests and is not appropriate here.