

Managing the coast



Essex and South Suffolk Shoreline Management Plan

Non-technical summary of draft SMP – March 2010
Landguard Point to Colne Point

Contents

Introduction	2
What this booklet tells you	2
What is a Shoreline Management Plan (SMP)?	4
What is the draft SMP Stage?	5
Timetable for Essex and South Suffolk SMP	5
Project area overview	6
How the coast and the estuaries work	7
Why it is a special place	10
The role of shoreline management: finding the right balance	11
Summary of the draft plan: continuing to defend communities and giving more room to natural processes	14
The shoreline management plan in more detail	18
Management Unit A: Stour and Orwell	19
Management Unit B: Hamford Water	25
Management Unit C: Tendring Peninsula	28
Next steps	31
Glossary	32
Libraries in Essex and South Suffolk	35
Environment Agency and Council addresses	36

We have developed the Shoreline Management Plan (SMP) by following a set of principles agreed by all the organisations involved in the process. Some of these principles can be contradictory and this is one of the main challenges of shoreline management. It is unlikely, perhaps impossible, to fully achieve all the principles. So instead the SMP aims to provide the best achievable balance between the principles in the short, medium and long term. The short term refers to epoch 1, the medium term to epoch 2 and the long term to epoch 3. As a whole, this set of principles represents the balance of values to which the SMP aspires. The order of the principles does not indicate the order of importance.

- 1** To develop policies appropriate to the diverse character of the Essex and South Suffolk coast and the interaction between land and sea
- 2** To balance flood and erosion management with the assets and benefits that it protects
- 3** To seek opportunities for managing the shoreline through natural coastal processes and take full account of longshore and cross-shore impacts
- 4** To develop policies that are resilient against future changes and associated uncertainty
- 5** To provide time and information for communities, individuals and partner organisations to adapt to any anticipated coastal change
- 6** To support communities and sustainable development for the people living around the Essex and South Suffolk shoreline by managing the risk to community activities and infrastructure
- 7** To support and promote the social and economic values of the Essex and South Suffolk coast to wider society
- 8** To support conservation and enhancement of biodiversity and geodiversity
- 9** To contribute to maintaining and enhancing the evolving character of the coastal landscape
- 10** To support protection and promotion of the historic environment and its value for the heritage, culture and economy of the area
- 11** To support and enhance people's enjoyment of the coast by maintaining and enhancing access

Introduction

What this booklet tells you

This booklet tells you about the draft Shoreline Management Plan (SMP) for the coast and estuaries between Landguard Point (Felixstowe Port) and Colne Point, and how you can comment on the draft policies.

This is one of three booklets about the draft Essex and South Suffolk Shoreline Management Plan: the other non-technical summaries cover the areas from Colne Point to Bradwell; and from Bradwell to Southend-on-Sea. The final Essex and South Suffolk Shoreline Management Plan (SMP) will be a high-level policy document that has been agreed by all organisations involved in the management of coastal flood and erosion defences. This document is a non-technical summary of the full draft SMP. It presents the suggested long-term plan, based on a full appraisal of options against a wide range of criteria. Details of the timetable for producing the final plan appear on page 5.

This document aims to:

- inform, and get responses from, interested groups or individuals on our understanding of why and how coastal flooding and erosion might occur, and their effects on people, their use of the land and the environment
- obtain your views on the proposals for managing this section of the Essex and South Suffolk shoreline in the short, medium and long term.

In particular, we would like your comments on:

- the intent of management that we propose for each length of the coast
- the draft Strategic Environmental Assessment that we have prepared alongside the SMP. This is also out for consultation. It is included as Appendix L to the full draft SMP and can be found on the CD inside the back cover of this booklet.

Policy Definitions

Hold the Line (HtL)

Holding the defence line where it is now

Advance the Line (AtL)

Building new defences seaward of the existing defence line

Managed Realignment (MR)

Allowing or enabling the shoreline to move, with associated management to control or limit the effect on land use and environment. This can take various forms, all characterised by managing change, either technically, for land use or for the environment. For the Essex and South Suffolk SMP, two distinct types of Managed Realignment are relevant

No Active Intervention (NAI)

No further investment in coastal defences or operations

Public consultation

The Essex and South Suffolk SMP is out for public consultation from Monday 15 March to Friday 18 June 2010.

Both this summary document and the full draft SMP and appendices are available online at <https://consult.environment-agency.gov.uk/portal/re/flood/anglian/smp150310/consult>

They are also available for viewing at a number of local authority offices and the Environment Agency's offices within the plan area (addresses can be found at the back of this document). Copies can also be viewed in a number of libraries in the plan area (addresses given on page 35).

Further information about the public consultation can be obtained by emailing Essex_SMP@environment-agency.gov.uk, or by phoning the Environment Agency's National Customer Contact Centre on 08708 506 506* – Monday to Friday 8am to 6pm.

*Approximate call costs: 8p plus 6p per minute (standard landline). Please note charges will vary across telephone providers.

If you would like to comment on this consultation you can do so online at: <https://consult.environment-agency.gov.uk/portal/re/flood/anglian/smp150310/consult>

You will need to register before you can respond – this will only take a few moments.

Alternatively you can respond by:

- email: ian.bliss@environment-agency.gov.uk
- writing to: Ian Bliss, Essex and South Suffolk SMP consultation, Environment Agency, Icen House, Cobham Road, Ipswich IP3 9JD

by 4pm on Friday 18 June 2010.

What is a Shoreline Management Plan (SMP)?

A Shoreline Management Plan is a plan for managing flood and erosion risk for a particular stretch of shoreline over 100 years, looking at the short, medium and long term.

SMPs identify the best ways to manage coastal flood and erosion risk to people and the developed, historical and natural environment. They also identify opportunities where partners, stakeholders, communities and individuals can work together to manage and reduce flood and erosion risk. The objective of the SMP is a document that outlines the intent of management for the coast and estuaries of Essex and South Suffolk. The plan aims to achieve the best possible balance for all the features that have been identified as valuable by partners and stakeholders around the coast.

Approximately 10 years ago, the first suite of SMPs were completed for the entire length of the coastline of England and Wales. These SMPs are now being reviewed to take into account new information, data and legislation.

The draft plan describes the intent of shoreline management for the short term (up to 2025), the medium term (2026-2055) and the long term (2056-2105). These are referred to as epochs 1, 2 and 3 respectively. The intent for the medium and long term sets a vision for the future, but is based on our current knowledge and understanding. That is why SMPs are reviewed every five to 10 years.

The Environment Agency manages most of the flood defences between the Colne Estuary and Felixstowe Port. There are also a number of erosion defences managed by local authorities such as Tendring District Council. Isolated lengths of coast are managed by other stakeholders, for example private landowners.

In addition to these organisations, Natural England and English Heritage are involved to ensure that we are balancing the needs of the natural, historical and cultural environments around this coast. The coast, and the way it is managed, has strong interactions with a range of issues both landward and seaward of the defences. As a result it is imperative that these plans are developed in partnership and with input from coastal stakeholders and the public.

What is the draft SMP stage?

During this stage we prepare our draft plan and consult the public.

The draft SMP presents:

- an overview of the SMP area, looking at everything that matters for shoreline management. This includes technical elements such as the defences and the coastal processes. Equally important are the ‘softer’ elements: how do people use the land and the sea around the shoreline; what is the value of the area for wildlife and its heritage value; what is the role of the shoreline in the landscape; and how do all these aspects interact? We have translated this into the set of principles shown at the beginning of this document, which form the basis of the plan.
- an explanation of the role that shoreline management plays along each section of the coast. What would happen if we continue managing the defences as we do today, and what happens if we manage them differently? If we understand this, then we can identify the ‘big decisions’ that this SMP needs to make.
- an explanation of how we intend to manage the coastal defences in the short, medium and long term; what do we aim to achieve and what are the wider implications?

Timetable for Essex and South Suffolk SMP

SMP Stage	Details	Timing
Preparation of the draft plan	<ul style="list-style-type: none"> • Scoping • Assessments to support policy development • Policy development • Discussion with landowners who could be affected by policy changes 	June 2008 to February 2010
Public consultation	<ul style="list-style-type: none"> • Consult with people and organisations who have an interest 	15 March to 18 June 2010
Final SMP	<ul style="list-style-type: none"> • Review and incorporate consultation responses • Prepare Action Plan • Adoption and approval • Produce final SMP 	June to September 2010
Dissemination of final plan		September 2010 onwards
Monitor and review		Ongoing

Project area overview

The full SMP area is located in the east of England and covers the South Suffolk and Essex coast from Felixstowe Port (in Suffolk) to Two Tree Island (in the Thames). This booklet is one of three non-technical summaries of the main SMP document and is designed to give you an overview of the plan. It covers the area from Landguard Point (Felixstowe Port) to Colne Point; this includes the River Orwell up to Horseshoe weir and Handford sluice in Ipswich, and the River Stour up to the Cattawade barrage sluice, Hamford Water and the coastal frontage of Tendring.

In total, it includes over 100km of coast and estuary banks. Much of the shoreline is made up of embankments that protect low-lying land against flooding. There are also a number of stretches where the land is higher. Along the Orwell and Stour rivers these are generally undefended, but the high ground (cliff) frontage of the Tendring Peninsula is defended against coastal erosion.

Clacton-on-Sea is a coastal resort town that has a seafront that contains a beach, pier, promenade and other leisure and tourist amenities. Tourism also plays an essential part in the economy of the Tendring Peninsula. The Stour and Orwell are part of the Suffolk Coast and Heaths Area of Outstanding Natural Beauty; they are also used for a wide range of activities, the most prominent being the commercial shipping that takes place out of the ports at Felixstowe and Harwich. The low-lying areas included in this plan also provide important habitats for a range of birds, invertebrates and plants.

How the coast and the estuaries work

The coastal and estuarine processes in the area are complex and operate at various scales. At the largest scale, waves approaching the coast from the north-east move sediment around. This causes sediment to build-up at some locations, but sediment loss at others. The impact of the waves is strongly felt at the mouth of the estuaries, and the tidal flows also play a part in removal and redistribution of sediment.

Here we introduce and explain some of the key coastal and estuary processes in the Essex and South Suffolk SMP area. These have played an important role in developing the plan.

Intertidal areas: An estuary is the section of a river where it flows into the sea and is influenced by the tides. Estuary banks are typically wide, flat areas consisting of mud and silt that are sometimes dry, and sometimes under water. Similar areas are also found along parts of the open coast, for example in front of Dengie and Foulness. These are called 'intertidal areas' and are made up of mudflats and saltmarshes. The intertidal area is important because it stops waves reaching flood and erosion defences, and it is also a habitat for many rare plants and animals.

Coastal squeeze: Since the last Ice Age, around 12,000 years ago, the land in the east of England has been sinking slowly, while sea levels have generally been rising. This process is expected to continue and may be speeding up. The natural response of intertidal areas is to gradually move inland. Large areas of the estuaries and coastline in the Essex and South Suffolk SMP area are constrained by high ground and by man-made flood defences. This means that the saltmarshes and mudflats cannot move in a landward direction: they do lose area from their seaward edge, but they don't gain area on their landward edge. This is called 'coastal squeeze'. It puts pressure on the flood defences, which become more difficult to maintain, and it leads to loss of important habitats.

Estuary processes: At the outer and middle reaches of the estuaries erosion of the saltmarsh edge takes place. These sections are exposed to pressures from waves and tidal

flows. Some of the sediment eroded from the outer and middle reaches is transported by the tides into the inner estuary where siltation is taking place. As sea level rises and tidal flows speed up, there will be more erosion and coastal squeeze of saltmarsh in estuaries.

Where the estuary is constrained, the flood banks are under pressure. Widening the estuary on one bank loosens this constraint, so it will reduce the pressure on the opposite bank of the estuary.

On the other hand, widening the estuary in the upstream reaches can have a negative effect elsewhere in the estuary. It increases the tidal prism (the volume of water flowing in and out of the estuary with each tide). This means that more water has to pass through the outer reaches, and this can increase the pressure on the banks. As a result realignment will tend to be considered on the middle and outer reaches of estuaries.

Open coast processes: There are a number of exposed coastal frontages in the SMP area. These frontages experience the full force of waves from the North Sea with the strongest waves coming from the north-east. The wave energy moves sediment around the coast. Sediment tends to build up in certain areas where the wave and current energy is less. There can also be a loss of sediment where this energy is greater. This loss of sediment causes a loss of beaches, saltmarshes and mudflats and can cause undermining of coastal and flood defences.

Project area overview

We have divided the area into three Management Units (MU):

Management Unit A (Stour and Orwell rivers): from Landguard Point to the east of Felixstowe port along the north and south banks of the River Orwell, into the River Stour along the north bank and then back out along the south bank to Dovercourt, just south of Harwich. This management unit is a combination of an open coast and estuary frontage. The mouth of the River Stour and River Orwell is an exposed open coast frontage. The estuaries themselves are sheltered but affected by the tides. Where the estuaries' banks are low-lying, the area is defended by earth embankments. The majority of the settlements are not at risk from tidal flooding with the exception of the infrastructure at the ports of Harwich and Felixstowe. In front of the defences there are saltmarshes and intertidal flats which are mainly muddy but become more sandy towards the sea. Monitoring has shown that there has been an overall reduction of saltmarsh in the estuaries.

Management Unit B (Hamford Water): from Dovercourt to the Naze, covering the embayment of Hamford Water. This management unit is a combination of an open coast and estuary frontage. Dovercourt and the mouth of Hamford Water are exposed open coast frontages, whereas inside Hamford Water the processes are more similar to those seen in the estuaries. Within Hamford Water the land behind the earth embankments is low-lying and at risk of flooding, although there are no properties within this zone. In front of the defences there is saltmarsh and intertidal flats. Monitoring has shown that there has been an overall loss of saltmarsh within Hamford Water. Although the area is less constrained than other areas along the Essex coastline, the rate at which saltmarsh is being lost has been increasing. Along the Dovercourt frontage there are 15-metre-high London clay cliffs. The high ground is protected by beach control structures. In front of the cliffs the beach is sandy.

Management Unit C (Tendring Peninsula): from the Naze to Point Clear on the east bank of the River Colne. The Tendring Peninsula is an exposed open coast frontage. The land is generally high from the Naze to Clacton, consisting of sea cliffs made up of London clay. There are low-lying frontages in between the sea cliffs, which are intersected at Walton-on-the-Naze and Holland Gap. The Naze cliffs in the north of this management unit are currently undefended. Further to the south-west the high ground is protected by sea walls, sheet piling, promenades, wave return walls and beach control structures. In front of the defences is a narrow intertidal zone containing sand beaches with some shingle. From Clacton to Colne Point the land is low-lying and is protected by earth embankments and sea walls. Monitoring has shown that there is significant erosion at the tip of the Naze and at Jaywick. Erosion is caused by wave and tidal energy and landward constraints imposed by the defences and higher ground. This is further compounded by an overall lack of supply of sediment.



Felixstowe Port



Hamford Water



Clacton, and beach control structures at Jaywick (Courtesy of Mike Page)

Figure 1: Management Units for the Stour, Orwell, Hamford Water and Tendring Peninsula



Why it is a special place

The three Management Units (Stour and Orwell, Hamford Water and Tendring Peninsula) each have a very different character. One thing that they all have in common is their strong relationship with the sea.

There are various settlements on or near the shoreline, with their communities, range of public services, infrastructure and historic buildings and sites. Large parts of the defended areas are important for agriculture. The Stour and Orwell and Hamford Water are used for both commercial and recreational activities, particularly at the mouth of the Stour and Orwell where the ports of Harwich and Felixstowe are located and at the marinas on the Orwell and at Titchmarsh. People come to the area mainly for seaside and resort tourism and to some extent for wildlife-related tourism. There are large areas of tourist facilities at Clacton-on-Sea, Walton-on-the-Naze, Seawick and Jaywick. In addition there are a number of golf courses, particularly along the Tendring Peninsula frontage, as well as camping and caravanning sites. People are also drawn to the area for the recreation opportunities it provides, such as outdoor pursuits, country parks and nature reserves.

At the same time, the Stour and Orwell, Hamford and part of the Tendring Peninsula frontage has a unique environment. The intertidal mud and sand flats are home to a rich variety of animals and plants, which form a complex and unique system for the wildlife, in particular birds. A large number of invertebrates and shellfish live in the mud flats, and these provide food for large numbers of geese, waders and ducks throughout the year. The saltmarshes, low cliffs, historic grazing marshes, freshwater/brackish water transition and vegetated shingle area also support a wide and diverse range of nationally scarce plants, flora, fauna, invertebrates and migratory and wintering birds. This environment is protected by a range of national and international designations.

The cliffs along the frontage, particularly at the Naze, display a range of geologically important layers and fossils.

Along this frontage there are Martello towers, early 19th-century small defensive forts that have particular historic significance and landscape value. The Naze Tower is also an important historic landmark, which today contributes to tourism and the local economy.

The estuarine landscape of the Orwell and the northern frontage of the Stour is very distinctive. This area is part of the Suffolk Coast and Heaths Area of Outstanding Natural Beauty.

The role of shoreline management: finding the right balance

The draft SMP considers how the shoreline would respond to different management options and how these would affect the values and features that are characteristic for the Essex and South Suffolk SMP area, such as communities, agricultural land, tourism facilities and intertidal habitats.

We have assessed these impacts against a set of policy appraisal criteria and indicators. These criteria and indicators were developed for each Management Unit based on the principles for shoreline management in Essex and South Suffolk as on page 1 of this document and further explained in Appendix G (Draft Policy Appraisal of the full draft SMP). The text box below illustrates how we have done this.

Here we illustrate examples of the policy appraisal criteria, how they are linked to the general principles for shoreline management and how they have been assessed (indicators). Full details are provided in the main SMP document.

Principle: To balance flood and erosion management with the assets and benefits that it protects

Criteria: Level of flood and erosion risk to people and property

Indicator: Number of properties within the tidal floodzone or at risk from erosion compared to the current number

Principle: To provide time and information for communities, individuals and partner organisations to adapt to any anticipated coastal change

Criteria: Adequacy of time available for adaptation for communities, individuals and partner organisations

Indicator: Time (in epochs) available for each required process of adaptation, depending on the policy option

Principle: To support conservation and enhancement of biodiversity and geodiversity

Criteria: Impact on the achievement of management objectives for designated sites, keeping them in favourable condition

Indicator: Area of designated land lost/gained per epoch and scenario

The role of shoreline management: finding the right balance

Based on this, we have identified that the SMP has to deal with the following 'big decisions' for shoreline management:

- 1** For the coastal defences that protect seaside towns (such as Clacton and Harwich) against erosion, the question is how to sustain the vital role of the seafront for the character and economy of these towns. Holding the existing alignment protects existing features, but this can be difficult and it may have a negative effect on the beach and elsewhere along the shoreline.
- 2** For defences that protect any settlements or important infrastructure it is not realistic to stop defending against tidal flooding. For these defences, the 'big decision' is not whether, but how to achieve continued defence against flooding. The best solution could be to hold the existing line, but it could also be to move the defences landward.
- 3** For all other flood defences, the SMP has to ask the question whether continued defence is the best solution in the face of increasing pressures and the negative affects of coastal squeeze. Do the benefits that the defences bring outweigh their negative impacts and the effort and costs needed to sustain them?

These decisions have to take into account a range of factors:

- Some of the defences are under significant pressure. This can be from eroding channels, particularly where the estuaries' natural evolution has been constrained in the past by land reclamation.
- Loss of foreshore does not only threaten the flood defences, it can also threaten the environment by reducing the area and quality of intertidal habitats. Much of the intertidal area is protected by international designations and adds value to the local economy (even though it is very difficult to quantify this value). In many cases moving the defence landward would create new intertidal areas to replace those under threat.
- Pressures can also come from waves. Wave action can lead to undermining of defences and there is a risk of overtopping of the defences as wave heights increase as a result on the effects of climate change.

The role of shoreline management: finding the right balance

- The defended areas are important, even if they don't include settlements or key infrastructure. They are valuable for agriculture, access to the shoreline, and heritage assets. They also contain important freshwater habitats, some of which have international designations and add value to the local economy (although this can be difficult to quantify). In some cases, functioning of freshwater habitats depends on the intertidal habitats, and vice versa.

Finally, the SMP looks at the long term, but we only have limited knowledge about what will happen in the future. This is the case for coastal processes, and also for the value that society will place on the different features of the area. The SMP needs to make sure that the plan is both robust yet flexible in the face of these uncertainties.

These factors have been taken into consideration during the development of the Shoreline Management Plan.

We have started by using these considerations to identify which of four policies could be realistic for each of the SMP's frontages. For some of the frontages this has led to the conclusion that there is only one realistic option; for other frontages this identified which options need appraisal. These options typically represent the various sides of interest and all include the need to allow time for adaptation to major changes.

Policy Definitions

Hold the Line (HtL)	Holding the defence line where it is now
Advance the Line (AtL)	Building new defences seaward of the existing defence line
Managed Realignment (MR)	Allowing or enabling the shoreline to move, with associated management to control or limit the effect on land use and environment. This can take various forms, all characterised by managing change, either technically, for land use or for the environment. For the Essex and South Suffolk SMP, two distinct types of Managed Realignment are relevant
No Active Intervention (NAI)	No further investment in coastal defences or operations

Summary of the draft plan: continuing to defend communities and giving more room to natural processes

The overall plan for managing the Essex and South Suffolk shoreline is:

- to keep protecting all dwellings and key infrastructure against flooding and erosion;
- to protect all other values of the defended land as much as possible and for as long as possible, but where this is not possible, to allow sufficient time to adapt;
- to work with landowners to realign vulnerable flood defences that are currently under pressure from natural coastal processes to a more landward alignment. This will create a more sustainable approach to managing flood risk and natural processes;
- to identify where important intertidal and freshwater habitats may be under pressure and to consider where they need to be located and managed for future generations;
- to continue to allow natural shoreline evolution where possible, but enable local and sensible intervention where needed.

For most of the currently defended coast and estuaries, the intention is to continue to hold the existing line of flood and coastal defences throughout the short, medium and long term. For the ports of Felixstowe and Harwich, the expansions that are currently ongoing or under consideration are Advance the Line policies.

Summary of the draft plan

However, for a number of frontages, the SMP process has identified that the defences are under pressure from eroding channels or from wave attack, in the middle and outer reaches of the Orwell, in Hamford Water and along the Tendring frontage. This pressure is likely to increase. For these frontages a change of policy is desirable, by realigning the defences further inland would make them more sustainable in the long term (while continuing to protect all dwellings and key infrastructure). There are also defences under pressure where realignment is not seen as a realistic option because of overriding constraints. This can be because current defence land use is too important and needs the existing alignments.

This approach has identified a list of 31 policy development zones within the whole SMP area where the plan proposes managed realignment for flood defence frontages. In total, this is approximately 20 per cent of the total shoreline length in the SMP area, or 4.5 per cent of the area of the existing floodzone. Of these, there are 10 in the area from Felixstowe Port to Colne Point: two in epoch 1 (of which one is already in progress during the development of the SMP), five in epoch 2 and three in epoch 3.

The proposed timing of the realignments in the draft plan (short, medium or long term) aims to ensure that there is sufficient time for people, businesses and organisations to consider their options. It is important that there is time for adaptation to any change in the future, and that local people are involved in any new schemes to maximise the opportunities for reducing flood risk, enhance the environment and developing economic and social benefits through managed realignment schemes.

It should be noted that timing for realignment will be further considered during the public consultation phase, which will include key stakeholder involvement. This could mean that timing of realignment may be reconsidered and changed.

As stated before, where defences currently protect dwellings or key infrastructure, the location of the new alignments will ensure continued protection. The realignments will reduce flood risk by setting back vulnerable defences and, where appropriate, building new defences that may enhance the standard of flood protection to local communities. The design of the defences, beyond the SMP, will ensure an appropriate standard of protection.

Summary of the draft plan

Managed realignment works with natural processes to absorb large surge tide events and also create new intertidal habitats. The new realignments will affect the current land use as existing farming practices would not be possible at these locations. We are therefore working with the landowning community to establish how we can develop such projects. In addition some important freshwater habitats will also be affected and we will need to work closely with landowners and wildlife organisations to ensure new habitats can be created.

Where there are a number of frontages, typically where flood defences protect larger settlements, the intention of the SMP is to maintain or upgrade the standard of protection, including taking into account impacts of climate change. For the other frontages, the broad-scale analysis of the SMP is not sufficient to determine the appropriate standard of protection: more detailed analysis after the SMP is required. The SMP's Action Plan, which will be drawn up following the consultation of the draft SMP, will identify the timing, roles and responsibilities for this.

For most of the frontages that are currently undefended (parts of the Stour and Orwell estuary and the Naze), the intent is continue this approach throughout the short, medium and long term.

However, where erosion threatens important features, the intent is to allow site-specific management to limit erosion risk, as long as this has an acceptable effect on coastal processes. This includes the Naze Tower and various stretches along the Stour and Orwell.

There are also a number of undefended frontages where coastal change is starting to affect important features, and which need an integrated plan beyond the SMP. This concerns Wherstead, Pin Mill and Shotley Gate, all in the Orwell and Stour estuaries. The SMP's intent for these frontages is to establish a partnership approach for adaptation.

In general, it is important to note that developments in the medium and long term are difficult to predict. The SMP's Action Plan will identify the monitoring and research that are needed to inform the planned review of the SMP in five to 10 years' time.

Summary of the draft plan:

Where the Shoreline Management Plan proposes managed realignment of flood defences, the ambition of the partner authorities is to implement this policy with full landowner agreement. This also means that all landowners are allowed to hold their own defence line if they choose. New guidance has been developed at a national level (asset maintenance policy) and practical local guidance is available to landowners wishing to maintain their own defences within the plan frontage. Should everyone wish to hold the line, there will be consequences for the erosion and subsequent loss of local intertidal habitats through coastal squeeze. The Environment Agency is tasked with finding replacement habitat on behalf of landowners wishing to hold the line.

The Shoreline Management Plan will have to comply with the legal requirement from the Habitats regulations to mitigate or compensate for intertidal habitat loss caused by coastal squeeze (as discussed in the Appropriate Assessment, included as Appendix M in the full draft Essex and South Suffolk SMP).

In order for landowners, operating authorities or the Environment Agency to gain flood defence and coastal protection consents, some managed realignment of the coast is required to offset coastal squeeze.

As a result the partner authorities have worked – and will continue to work – with landowners to achieve the targets set by Habitats Regulations. However, this will be based on the willingness of landowners to enter managed realignment schemes. At this time we have identified the most vulnerable locations around the coast as potential managed realignment projects.

A situation could arise in the future where it is not possible to create sufficient intertidal habitat within the existing arrangements. The Essex and South Suffolk SMP identifies this as a potential risk that needs to be addressed at a national level and through further engagement with landowners locally after finalisation of the SMP.

The Shoreline Management Plan in more detail

This section describes the draft plan in some more detail, using maps to illustrate what the shoreline would look like in the short, medium and long term. Please find all of the maps for the Management Units inserted at the back of the document.

Management Unit A: Stour and Orwell

The intention for the Stour and Orwell is to support and enhance the natural evolution of the estuaries, while continuing to defend all existing dwellings and infrastructure, and facilitating adaptation or limited local intervention where needed. For most of the shoreline, the current management approach will be continued: holding the current alignment where there are defences, and continuing a No Active Intervention approach for high ground frontages. For some of the frontages however a change of approach is required.

Currently defended areas

The expansions currently ongoing or under consideration for both Felixstowe and Harwich Port constitute Advance the Line policies.

The frontages where the existing defences will continue to be held at their current alignment include Ipswich, parts of the Ports of Felixstowe and Harwich, the Harwich railway line and River Stour valley, plus a number of smaller currently defended areas.

However, at Trimley Marsh, Loom Pit Lake and Shotley Marshes which are important recreational and conservation areas the flood defences are under pressure from erosion and tidal wave action. A landward realignment at some time within the timescale of the SMP will create a more sustainable situation by reducing the pressure on the flood defences and will support the estuary to move towards a more natural system. All dwellings and infrastructure will remain protected, which will require construction of new defences in a more sustainable, sheltered position. The realignments will come at the expense of Grade 3 and 4 agricultural land, and partly designated freshwater habitat, but they will create new intertidal habitats and the opportunity to replace and expand the area of current freshwater interest. Reedbed habitats could be generated at this site. Realignment will have some impact on the historic environment, particularly near Shotley where tracts of historic grazing marsh and associated archaeological features will require finding suitable replacement habitat and recording as part of implementation of the plan. The footpaths on top of the sea banks to be breached will need to be sustained, for example through re-routing. The impact of the potential

The Shoreline Management Plan in more detail

realignments on tourism and recreation is difficult to quantify, and realignments can have both positive and negative impacts. All these impacts will be taken into account during project appraisal and scheme development, which will be carried out with full stakeholder involvement before any works start. In addition outputs from the SMP will link up with the Stour and Orwell Estuary Management Plan and their Stakeholder Forum.

The realignment at Shotley Marshes west is proposed for epoch 1, and we are currently working with the landowner as part of our Regional Habitat Creation Programme. The realignments at Trimley Marsh, Loom Pit Lake and Shotley Marshes east are proposed for epoch 2.

There are three frontages for which the SMP's broad-scale economic analysis supports an intent to maintain or upgrade the standard of protection, including taking into account impacts of climate change. These are Felixstowe Port, Ipswich and Manningtree. For all the other defended frontages, detailed analysis beyond the SMP is needed to determine the appropriate standard of protection.

Currently undefended areas

The frontages where the current No Active Intervention approach will be continued include large sections along both the Stour and the Orwell, particularly in the middle estuaries.

However, there are locations along both estuaries where erosion is affecting significant features. This concerns Orwell Park, Wrabness Beach and various sections of the Stour and Orwell Walk and other footpaths. For these frontages the intent is not to start holding the existing alignment: it would not be sustainable to work against the natural estuary processes. However, local intervention to limit erosion risk to features is acceptable if the impact on natural estuary evolution is minimised. This will require a localised assessment outside the SMP. The SMP will label this intent as a form of Managed Realignment. Note that there is only limited information on erosion processes in the Stour and Orwell; the SMP's Action Plan will identify the need for monitoring.

The Shoreline Management Plan in more detail

There are a number of currently undefended areas in the Stour and Orwell where coastal change is starting to affect important features, and which need an integrated solution. This concerns:

- Wherstead Road, where the frequency of closure due to flooding is likely to increase;
- Pin Mill, where the marina is at risk of erosion and there are a number of dwellings, including a Grade II listed building, just above the (current) floodzone;
- Shotley Gate, where the clifftop dwellings are at risk of cliff instability and possibly erosion.

The SMP's intent for these areas is to establish a process of co-operation between the partner organisations and all people and businesses with an interest in the area to develop a sustainable long-term solution, including funding opportunities. This solution may include limited local defences, but it is also likely to include adaptation or other measures. The SMP uses the label Managed Realignment for this intent.

The Shoreline Management Plan in more detail

Summary of Potential Policies

Draft policy	Now to 2025	2025 to 2055	2055 to 2105	What this means
PDZ A1 Felixstowe Port				
National SMP policy	Advance the Line	Hold the Line	Hold the Line	Continue protection of Felixstowe Port. The standard of protection will be maintained or upgraded.
PDZ A2 Trimley Marsh				
National SMP policy	Hold the Line	Managed Realignment	No Active Intervention	Managed realignment by breach of the existing defence while continuing flood defence to Felixstowe Port.
PDZ A3a Loom Pit Lake				
National SMP policy	Hold the Line	Managed Realignment	Hold the Line	The current line will be held in epoch 1. In epoch 2, Managed realignment by breach of the existing defence. No defence needed after that. The currently undefended section will remain undefended.
PDZ A3b Levington Creek				
National SMP policy	Hold the Line	Hold the Line	Hold the Line	The current line will be held throughout all epochs.
PDZ A4a Northern Orwell east				
National SMP policy	Managed Realignment	Managed Realignment	Managed Realignment	Local intervention to limit erosion risk to features is acceptable if the impact on natural estuary evolution is minimised.
PDZ A4b Northern Orwell west				
National SMP policy	No Active Intervention	No Active Intervention	No Active Intervention	No erosion expected, therefore no defences needed.
PDZ A5 Ipswich				
National SMP policy	Hold the Line	Hold the Line	Hold the Line	The current line will be held throughout all epochs. Ipswich will remain protected. The standard of protection will be maintained or upgraded.
PDZ A6 Wherstead				
National SMP policy	Managed Realignment	Managed Realignment	Managed Realignment	Integrated plan for adaptation to be determined through partnership approach; may include local defences.
PDZ A7a Southern Orwell west				
National SMP policy	No Active Intervention	No Active Intervention	No Active Intervention	No erosion expected, therefore no defences needed.

The Shoreline Management Plan in more detail

Draft policy	Now to 2025	2025 to 2055	2055 to 2105	What this means
PDZ A7b Southern Orwell east				
National SMP policy	Managed Realignment	Managed Realignment	Managed Realignment	Integrated plan for adaptation to be determined through partnership approach; may include local defences.
PDZ A8a Shotley Marshes west				
National SMP policy	Managed Realignment	Hold the Line	Hold the Line	Managed realignment by breach of the existing defence while continuing flood defence to all dwellings.
PDZ A8b Shotley Marshes east				
National SMP policy	Hold the Line	Managed Realignment	Hold the Line	Managed realignment by breach of the existing defence while continuing flood defence to the Marina and all dwellings and roads.
PDZ A8c Shotley Gate				
National SMP policy	Managed Realignment	Managed Realignment	Managed Realignment	Integrated plan for adaptation to be determined through partnership approach; may include local defences.
PDZ A9a,d,f Northern Stour – flood defence				
National SMP policy	Hold the Line	Hold the Line	Hold the Line	The current line will be held throughout all epochs.
PDZ A9b Northern Stour – not erosional				
National SMP policy	No Active Intervention	No Active Intervention	No Active Intervention	No erosion expected, therefore no defences needed.
PDZ A9c,e Northern Stour – erosional				
National SMP policy	Managed Realignment	Managed Realignment	Managed Realignment	Local intervention to limit erosion risk to features is acceptable if the impact on natural estuary evolution is minimised.
PDZ A10a,c,e Southern Stour – flood defence				
National SMP policy	Hold the Line	Hold the Line	Hold the Line	The current line will be held throughout all epochs. The standard of protection at Manningtree will be maintained or upgraded.
PDZ A10b,g Southern Stour – not erosional				
National SMP policy	No Active Intervention	No Active Intervention	No Active Intervention	No erosion expected, therefore no defences needed.

The Shoreline Management Plan in more detail

Draft policy	Now to 2025	2025 to 2055	2055 to 2105	What this means
PDZ A10d,f Southern Stour – erosional				
National SMP policy	Managed Realignment	Managed Realignment	Managed Realignment	Local intervention to limit erosion risk to features is acceptable if the impact on natural estuary evolution is minimised.
PDZ A11a Harwich Harbour				
National SMP policy	Advance the Line	Hold the Line	Hold the Line	The port expansion currently under consideration for Bathside Bay constitutes Advance the Line. The new line will then be held throughout all epochs to continue protection of Harwich Port.
PDZ A11b Harwich town				
National SMP policy	Hold the Line	Hold the Line	Hold the Line	The current line will be held throughout all epochs.

Management Unit B: Hamford Water

The overall intention for Hamford Water is to sustain and support the viability of communities, tourism and commercial activities while creating new intertidal habitats and focusing flood risk management on frontages where it is most needed. The policy to achieve this intent is to maintain flood defence to the majority of the defended land, including all dwellings and key infrastructure at risk of flooding, combined with a gradual increase of natural processes by realigning defences that are under pressure.

The frontages where the existing flood defences will continue to be held at their current alignment are south Dovercourt, Oakley Creek and Titchmarsh Marina.

However, at Little Oakley, Horsey Island, Devereux Farm and Walton Channel the defences are under pressure and a landward realignment will create a more sustainable situation by reducing the pressure from the channels on the defences and moving towards a more natural estuary with increase of tidal prism and intertidal area. For Walton Channel, the realignment could have a socio-economic benefit because the increased flow could help to sustain the navigation channel. All dwellings and infrastructure will remain protected, which will require moving some of the defences to a more sustainable sheltered position, possibly in the form of counter walls. The realignments will come at the expense of some Grade 2, 3 and 4 agricultural land. They will also affect partly designated freshwater habitats on Horsey Island and at Walton Channel, but they will also create new intertidal habitats. They will have an impact on the historic environment, particularly the landscape and archaeology of Horsey Island, which will require finding suitable replacement habitat and recording as part of implementation of the plan. The footpaths on top of the sea banks to be breached, particularly at Little Oakley, will need to be sustained, for example through re-routing. The impact of the potential realignments on tourism and recreation is difficult to quantify, and realignments can have both negative and positive impacts. This impact will be taken into account during project appraisal and scheme development, which will be carried out with full stakeholder involvement before any works start.

The Shoreline Management Plan in more detail

The realignment at Devereux Farm is proposed for epoch 1. The realignment at Little Oakley is proposed for epoch 2; the realignments at Horsey Island and the Walton Channel are proposed for epoch 3.

Little Oakley is currently planned as a realignment site for habitat compensation for the Bathside Bay Project (Port of Harwich). The realignment that the SMP proposes for Little Oakley includes the Bathside Bay compensation plus additional area. This is illustrated in the Policy Maps found inside the back cover of this booklet. The realignment that the SMP proposes in Kirby-le-Soken to Coles Creek is the same that is currently being developed within the Regional Habitats Creation Programme for the Devereux Farm project.

For south Dovercourt and Walton Channel, the SMP's broad-scale economic analysis supports an intent to maintain or upgrade the standard of protection, including taking into account impacts of climate change. For all the other defended frontages, detailed analysis beyond the SMP is needed to determine the appropriate standard of protection.

The cliffs at the Naze are the only frontage in this Unit that presently has a No Active Intervention policy. The intent of management is to continue this approach as much as possible, to sustain the geological interest of the fresh cliff face and the supply of sediment along the shoreline. However, the intent is to protect the southern end of the cliffs in order to extend the life of the Naze Tower whilst sustaining and supporting the geological interest. This is in line with the 'Naze Coastal Protection Scheme – Crag Walk Project'. The scheme is being developed by the Naze Protection Society in partnership with Essex Wildlife Trust and Tendring District Council.

The Shoreline Management Plan in more detail

Summary of Potential Policies

Policy development zone	Now to 2025	2025 to 2055	2055 to 2105	What this means
B1 South Dovercourt				
National SMP policy	Hold the Line	Hold the Line	Hold the Line	The current line will be held throughout all epochs. The standard of protection will be maintained or upgraded.
B2 Little Oakley				
National SMP policy	Hold the Line	Managed Realignment	Hold the Line	Managed realignment by breach of the existing defence while continuing flood defence to the dwellings, communities, roads and infrastructure south of Dovercourt and to the sewage works. It is possible that the realignment would occur in epoch 1 as part of the Bathside Bay project.
B3 Oakley Creek to Kirby-le-Soken				
National SMP policy	Hold the Line	Hold the Line	Hold the Line	The current line will be held throughout all epochs.
B3a Horsey Island				
National SMP policy	Hold the Line	Hold the Line	Managed Realignment	Managed realignment by breach of the existing defence while continuing flood defence to the south-west half of the island.
B4a Kirby-le-Soken to Coles Creek				
National SMP policy	Managed Realignment	Hold the Line	Hold the Line	Managed realignment by breach of the existing defence while continuing flood defence to Kirby-le-Soken.
B4b Coles Creek to the Martello Tower				
National SMP policy	Hold the Line	Hold the Line	Hold the Line	The current line will be held throughout all epochs.
B5 Walton Channel				
National SMP policy	Hold the Line	Hold the Line	Managed Realignment	Managed realignment by breach of the existing defence while continuing flood defence to all dwellings, the sewage works and the caravan park. The standard of protection will be maintained or upgraded.
B6a Naze Cliffs north				
National SMP policy	No Active Intervention	No Active Intervention	No Active Intervention	The shoreline will be allowed to develop naturally.
B6b Naze Cliffs south				
National SMP policy	Managed Realignment	Managed Realignment	Managed Realignment	The erosion process will be slowed down and managed.

Management Unit C: Tendring Peninsula

The overall intention for the Tendring Peninsula is to sustain and support its viability of the seaside towns and their communities, tourism and commercial activities. This means a continuation of the current management approach: holding the current alignment where there are defences. Although the defences are under pressure, holding the line is necessary to sustain the seafront which is essential to the viability of Walton-on-the Naze, Frinton-on-Sea and Clacton-on-Sea as coastal towns and the Tendring frontage as a whole. Working with communities will be encouraged in the gradual move to more sustainable flood risk management for the low-lying parts of the frontage.

At Holland Haven the defences are under pressure: a landward realignment will create a more sustainable situation by reducing the pressure on defences and moving towards a more natural coastal frontage. All dwellings and infrastructure will remain protected, which will require moving some of the defences to a more sustainable sheltered position. This realignment will come at the expense of Holland Haven Country Park and Frinton-on-Sea Golf Course. The realignment will create new intertidal habitats and opportunities for new forms of tourism and recreation. It will have some impact on the historic environment, due largely to archaeological potential in the realignment area, which will need recording as part of implementation of the plan. The footpaths on top of and toward the sea bank to be breached will need to be sustained, for example through re-routing. The impact of the potential realignment on tourism and recreation is difficult to quantify, and realignments can have both negative and positive impacts. This impact will be taken into account during project appraisal and scheme development, which will be carried out with full stakeholder involvement before any works start.

The Shoreline Management Plan in more detail

The realignment of Holland Haven is proposed for epoch 3. The policies for Walton-on-the-Naze, Frinton-on-Sea, Holland Haven and Clacton-on-Sea will be developed in more detail when the Clacton and Holland Haven strategy begins in 2010.

At Jaywick, the situation is very complex and sensitive. The flood defences have recently been strengthened and protect the communities of Brooklands, Grasslands and Jaywick village, plus important tourist facilities (caravan parks and golf club). However, the sea bank is under significant pressure, and sustaining it in the medium and long term will require significant investment, particularly in the eastern half of the policy development zone. Clearly, any change in the shoreline management approach would only be possible in combination with significant adaptation for the people and businesses in the area. The SMP's intent of management for Jaywick is to support the process that Tendring District Council and Essex County Council are carrying out through the Local Development Framework to develop a sustainable long-term solution. In the short term, the intent is to hold the existing frontline defences where they are now. This period up to around 2025 is the minimum time needed to allow the land use adaptation that may be needed. In the medium and long term, the best option is likely to be a mixture of land use changes, flood defences and incident management.

For Holland Haven, the SMP's broad-scale economic analysis supports an intent to maintain or upgrade the standard of protection, including taking into account impacts of climate change. For all the other defended frontages, detailed analysis beyond the SMP is needed to determine the appropriate standard of protection.

The Shoreline Management Plan in more detail

Summary of Potential Policies

Policy Development Zone	Now to 2025	2025 to 2055	2055 to 2105	What this means
C1 Walton-on-the-Naze and Frinton-on-Sea				
National SMP policy	Hold the Line	Hold the Line	Hold the Line	The current line will be held throughout all epochs.
C2 Holland Haven				
National SMP policy	Hold the Line	Hold the Line	Managed Realignment	Managed realignment by breach of the existing defence while continuing flood defence to the dwellings, roads and pumping station. The standard of protection will be maintained or upgraded.
C3 Clacton-on-Sea				
National SMP policy	Hold the Line	Hold the Line	Hold the Line	The current line will be held throughout all epochs.
C4 Seawick, Jaywick and St Osyth Marsh				
National SMP policy	Hold the Line	Hold the Line	Managed Realignment	The current line will be held in epoch 1. After 2025 continued adaptation will be needed re-directing residential settlement away from the flood risk zone while ensuring continued use of the area for leisure, recreation and tourism. After 2055 ensuring continued use of the area for leisure, recreation and tourism where possible linked with the development of new intertidal areas.

Next steps

We will assess all feedback to the draft SMP and take it into account as the plan is finalised, working with representatives and elected members from all partner authorities. The final SMP will then be submitted to all partner authorities for formal ratification or adoption. From that point on, the SMP will be the basis for the management of the shoreline, and a source of information for all organisations and people with an interest in the shoreline.

The final SMP will contain an Action Plan. This sets out what the Environment Agency, local authorities and all other partner organisations need to do to implement the plan. The actions will cover the development of flood and erosion defence strategies and schemes, typically led by the Environment Agency or coastal local authorities. But it will also include actions by local authorities, for example to incorporate the plan into the land-use planning system or to support adaptation of affected communities, businesses and organisations. There will also be an action for English Heritage and Natural England to advise and support the mitigation of historic and natural features where they affect shoreline management. There is a range of existing partnerships, such as for the management of the estuaries and coastal areas and for the National Association for Areas of Outstanding Natural Beauty (NAAONB), which will also have an important role in the implementation of the SMP and its Action Plan.

The Action Plan will be set up for use as a 'living' document, to enable management of the actions in the period up to the next SMP review, which is expected in five to 10 years' time.

Typical actions that we expect to include in the Action Plan are as follows:

- Next steps for implementation of short-term policies (especially where different from current policy): any further studies needed to confirm the policy; interaction with land-use planning; scheme development; working with landowners and other stakeholders.
- Specific need for study of refuse-filled walls or other contamination issues to determine feasibility of realignment.
- Monitoring and study to improve knowledge of estuary and coastal development to inform the next SMP policy development. This includes the development of intertidal habitats (quantity and quality).
- Actions with involvement from the planning authorities to prepare land-use adaptation needed as a result of proposed medium and long-term policies.
- The SMP identifies the need for a national approach to caravan parks behind coastal and estuary defences. The Action Plan needs to identify the steps needed to achieve this.
- The next SMP to review the plan in light of new knowledge and possibly new priorities.

Glossary

Adaptation

A change in the way that a feature, such as a community or a habitat, functions to fit a changed environment.

Advance the Line

Building new defences seaward of the existing defence line. This policy should be limited to those stretches of coastline where significant land reclamation is considered.

Area of Outstanding Natural Beauty (AONB)

A precious landscape whose distinctive character and natural beauty are so outstanding that it is in the nation's interest to safeguard it. AONBs were created by the legislation of the National Parks and Access to the Countryside Act of 1949.

Climate change

Long-term change in the patterns of average weather. Its relevance to shoreline management concerns its effect on sea levels, current patterns and storminess.

Coastal squeeze

The reduction in habitat area that can arise if the natural landward migration of a habitat (due to sea level rise) is prevented by the fixing of the high water mark, for example a sea wall.

Department for Food, Environment and Rural Affairs (Defra)

Government department responsible for flood management policy in England and Wales.

Epoch

This refers to a period of time. In the SMPs three epochs are defined – 0 to 20, 20 to 50 and 50 to 100 years from the present.

Erosion

The loss of land due to the effects of waves and, in the case of coastal cliffs, slope processes (such as high groundwater levels). This may include cliff instability, where coastal processes result in landslides or rock falls.

EU Habitats Directive

European legislation on the conservation of habitats.

Foreshore

Zone between the high water and low water marks.

Geomorphology/Morphology

The branch of physical geography/geology that deals with the form of the Earth, the general configuration of its surface, the distribution of the land, water, etc.

Heritage asset

A building, monument, site or landscape of historic, archaeological, architectural or artistic interest whether designated or not. Designated assets may be World Heritage Sites, Scheduled Monuments, Listed Buildings, Protected Wreck Sites, Registered Parks or Gardens, Registered Battlefields and Conservation Areas.

Historic Environment

All aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged, and deliberately planted or managed flora.

Hold the Line

Hold the existing defence line by maintaining or changing the standard of protection. This policy should cover those situations where work or operations are carried out in front of the existing defences (such as beach recharge, rebuilding the toe of a structure, building offshore breakwaters and so on) to improve or maintain the standard of protection provided by the existing defence line. Included in this policy should be other policies that involve operations to the back of existing defences (such as building secondary floodwalls) where they form an essential part of maintaining the current coastal defence system.

Hydrodynamic

The study of liquids in motion. In the context of the SMP: caused by water in motion.

Indicators

Used to support the appraisal of policies against criteria.

Integrated

An approach that tries to take all issues and interests into account. In taking this approach, managing one issue adds value to the way another is dealt with.

Listed building

A building or other structure officially designated as being of special architectural, historical or cultural significance.

Local Development Framework

A collection of local development documents that outlines how a local authority will manage planning in their area.

Longshore

Current moving parallel and close to the coastline.

Managed Realignment

Allowing or enabling the shoreline to move, with associated management to control or limit the effect on land use and environment. This can take various forms, depending on the nature of the shoreline and the intent of management to be achieved.

Mitigation

Practical measures taken to offset the impact of a policy on physical assets. The term mitigation has a specific meaning for particular types of physical asset:

Depending on wildlife, mitigation may be any process or activity designed to avoid, reduce or remedy adverse environmental impacts of the plan.

Depending on the historic environment, mitigation may be 'preservation by investigation' for archaeological features, or 'preservation by recording' followed by stage abandonment, demolition or re-location for listed buildings. There is no effective mitigation for the loss of historic landscapes.

Mudflat

Low-lying muddy land that is covered at high tide and exposed at low tide.

Natural processes

Those processes over which people have no significant control (such as wind and waves).

No Active Intervention

No investment in coastal defences or operations. It can apply to unprotected cliff frontages and to areas where investment cannot be justified, potentially resulting in natural or unmanaged realignment of the shoreline.

Policy

In this context, policy refers to the generic shoreline management options (No Active Intervention, Hold the Line, Managed Realignment and Advance the (existing) Line of Defence).

Policy Development Zone (PDZ)

A length of coastline defined to assess all issues and interactions to examine and develop management scenarios. These zones are only used to develop policy.

Principle

High-level statement agreed by partner authorities and used to develop the SMP.

Shoreline Management Plan (SMP)

A non-statutory plan that provides a large-scale assessment of the risks associated with coastal processes and presents a policy framework to reduce these risks to people and the developed, historic and natural environment in a sustainable manner over a 100-year time period.

Standard of Protection (SoP)

The level of protection that a flood or erosion defence provides. This is typically expressed as the frequency of the storm that the defence is expected to withstand. For example, a defence can have a standard of protection of 1 per cent per year. This means that it is expected to withstand a storm that has a 1 per cent probability of being exceeded in any given year. This is sometimes also referred to as the '1 in 100 year return period'.

Sustain

To undertake works to ensure that defences will be provided offering a similar standard of protection to that currently offered.

Tidal prism

The volume of water within an estuary between the level of high and low tide, typically taken for mean spring tides.

Tide

Periodic rising and falling of large bodies of water resulting from the gravitational attraction of the moon and sun acting on the rotating earth.

With Present Management

Policy scenario in which the present management of the whole shoreline is continued for the coming 100 years. Used in early stages of SMP development alongside a No Active Intervention scenario to analyse the role of shoreline management.

Libraries in Essex and South Suffolk

Bishops Park Library

Jaywick Lane
Clacton-on-Sea
CO16 8BE

Brightlingsea Library

New Street
Brightlingsea
Colchester
CO7 0BZ

Burnham-on-Crouch Library

103 Station Road
Burnham-on-Crouch
CM0 8HQ

Clacton Library

Station Road (opposite the Town Hall)
Clacton-on-Sea
CO15 1SF

Chelmsford Library

Market Road
Chelmsford
CM1 1LH

Felixstowe Library

Crescent Road
Felixstowe
IP11 7BY

Frinton Library

59 Old Road
Frinton-on-Sea
CO13 9DA

Great Wakering Library

16 High Street
Great Wakering
Southend-on-Sea
SS3 0EQ

Harwich Library

Upper Kingsway
Dovercourt
Harwich
CO12 3JT

Hockley Library

Southend Road
Hockley
SS5 4PZ

Holland Library

Public Hall Frinton Road
Holland-on-Sea
Clacton-on-Sea
CO15 5UR

Hullbridge Library

Ferry Road
Hullbridge
Hockley
SS5 6ET

Maldon Library

Carmelite House
White Horse Lane
Maldon
CM9 5FW

Manningtree Library

High Street
Manningtree
CO11 1AD

Rayleigh Library

132/4 High Street
Rayleigh
SS6 7BX

Rochford Library

8 Roche Close
Rochford
Essex
SS4 1PX

Southend Central Library

Victoria Avenue
Southend-on-Sea
Essex SS2 6EX

Walton Library

52 High Street
Walton-on-the-Naze
CO14 8AE

West Mersea Library

13 High Street
West Mersea
Colchester
CO5 8QA

Wivenhoe Library

104/6 High Street
Wivenhoe
CO7 9AB

Environment Agency and Council addresses

Babergh District Council

Corks Lane
Hadleigh
Ipswich
IP7 6SJ

Chelmsford Borough Council

Civic Centre
Duke Street
Chelmsford
CM1 1JE

Colchester Borough Council

Rowan House
33 Sheepen Road
Colchester
CO3 3WG

Environment Agency

Brook End Road
Chelmsford
CM2 6NZ

Environment Agency

Iceni House
Cobham Road
Ipswich
IP3 9JD

Environment Agency

Rivers House
Threshelfords Business Park
Inworth Road
Feering, Colchester
CO5 9SE

Ipswich Borough Council

Grafton House
15-17 Russell Road
Ipswich
IP1 2DE

Maldon District Council

Princes Road
Maldon
CM9 5DL

Rochford District Council

South Street
Rochford
SS4 1BW

Southend-on-Sea Borough Council

Civic Centre
Victoria Avenue
Southend-on-Sea
SS2 6ER

Suffolk Coastal District Council

Melton Hill
Woodbridge
IP12 1AU

Suffolk County Council

Endeavour House
8 Russell Road
Ipswich
IP1 2BX

Tendring District Council

Thorpe Road
Weeley
Clacton-on-Sea
CO16 9AJ

Tendring District Council

Town Hall
Station Road
Clacton-on-Sea
CO15 1SE

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