



Essex and South Suffolk Shoreline Management Plan 2

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PUBLIC CONSULTATION

The Essex and South Suffolk SMP went out for public consultation from 15th March to 28th June. We produced three summary documents covering the Stour, Orwell and Tendring frontage, the Colne Blackwater and Mersea Island frontage and the last one covering the Dengie, Roach, Crouch and Southend frontage so that everyone with an interest in the plan could easily see which policies we are proposing for each part of the coast. The summary documents contained a CD with the full draft SMP and all appendices, for those who would like to see the information we have used to select the draft policies.

The documents were available for viewing at some of the District/Borough Council Offices and a number of libraries within the plan area.

All the comments received can be found in the consultation register in Appendix B in Annex Ba.

Overview of SMP development process

The development of SMPs follows the principles and processes set out in the Shoreline Management Plan guidance issued by Defra in March 2006. The Defra SMP guidance identifies six stages in which the SMP is drafted (Stages 1 to 3), consulted upon (Stage 4) and finalised (Stages 5 and 6). Diagram A illustrates this process with the timelines for the Essex and South Suffolk SMP.

Structure of the Shoreline Management Plan Document

The Shoreline Management Plan consists of a plan document and a set of accompanying Appendices. The plan document is aimed at a wide audience, such as an elected member of a relevant authority or interested member of the general public. The plan document is intended to be as concise as possible, without missing out important details. The aim of the plan document is to justify the policies and to identify their implications. Information about alternative policies that were considered is included in the appendices.

The structure of the plan document including the Appendices is illustrated in Diagram B. More detail regarding the information held in each appendix can be found in section 1.6.

Diagram A - Overview of SMP development process

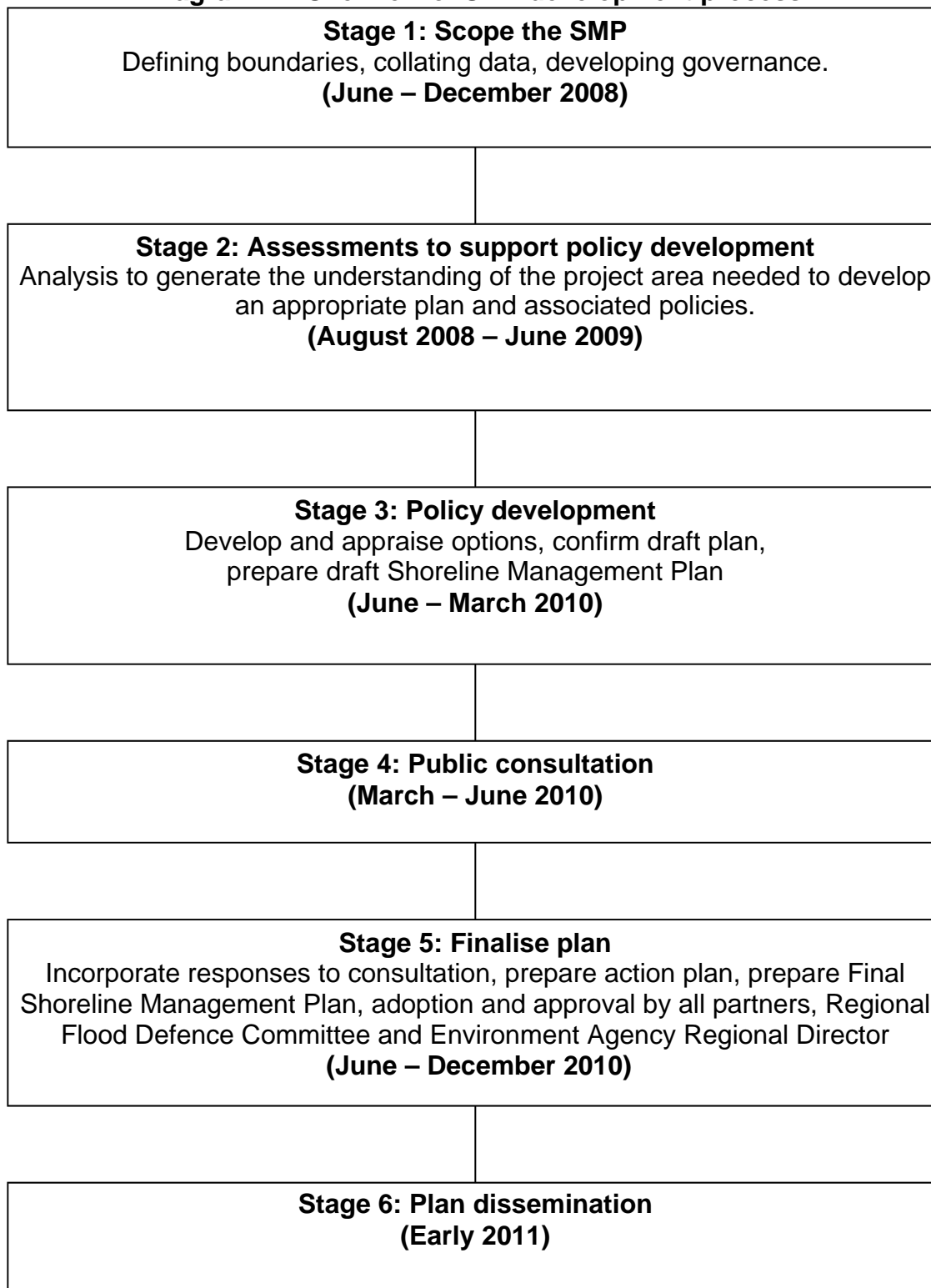
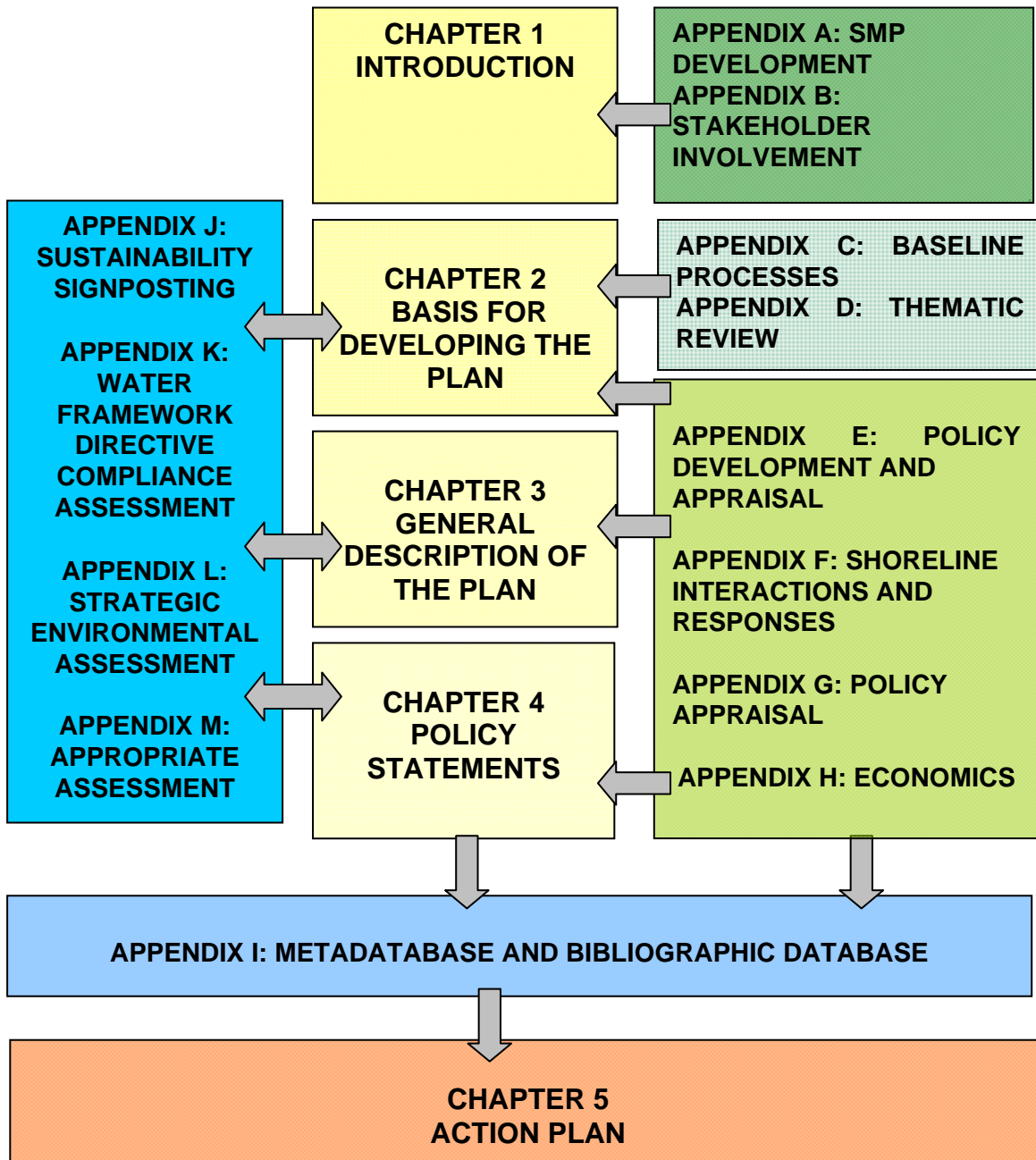


Diagram B - Structure of the Shoreline Management Plan Document



Glossary of terms

Term	Definition
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 (AtL)	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.
Agricultural land classification	GIS dataset that provides an assessment of the quality of agricultural land as a Grade from 1 (best quality) to 5 (poorest quality). The dataset used in this Shoreline Management Plan has been produced by the Ministry of Agriculture, Fisheries and Food in 1988.
Appropriate Assessment (or Habitats Regulations Assessment) (AA)	Appropriate Assessment is the process to support a decision by the 'Competent Authority' as to whether the proposed plan or project would have an adverse effect on the integrity of any European site (designated under the EU Habitats or Birds Directives). Appropriate Assessment is required for a plan or project, which either alone or in combination with other plans or projects, is likely to have a significant effect on a European site and is not directly connected with or necessary for the management of the site.
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 them. AONBs were created by the legislation of the National Parks and Access to the Countryside Act of 1949.
Baseline scenarios	Concept used in developing a SMP to illustrate the role of shoreline management by assessing the effect of two extreme management approaches: no active intervention and with present management, for all frontages and all epochs.
Bathymetry	Bed level topography of a water body
Beach nourishment	Artificial process of replenishing a beach with material from another source.
Benefit cost ratio	The ratio between the value of the benefits that a section of defence protects and the cost of maintaining that defence over the period of the SMP. This is used to assess the economic viability of a proposed policy.
UK Biodiversity Action Plan (BAP)	This sets out a programme for conserving the UK's biodiversity through targets for a range of specific habitats with the aim of reducing loss of biodiversity.
Brackish water	Freshwater mixed with seawater.

Term	Definition
Breaker zone	Area in the sea where the waves break.
Chart Datum (CD)	Reference water level for navigation, generally a low tidal level.
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.
Competent Authority	For the purposes of the Habitat Regulations the expression "competent authority" includes any Ministry, government department, public or statutory undertaker, public body of any description or person holding a public office. The expression also includes any person exercising any function of a competent authority in the United Kingdom.
Condition grade (CG)	Indicator based on visual inspection of flood defence condition, ranging from condition grade 1 (very good) to 5 (very poor).
Department for Food, Environment and Rural Affairs (Defra)	Government department responsible for flood management policy in England and Wales. Incorporates the former Ministry of Agriculture, Fisheries and Food.
Defra procedural guidance	Guidance produced by Defra to provide a nationally consistent structure for producing future generation Shoreline Management Plans.
Downdrift	In the direction of longshore movement of beach materials.
Dwellings	A house, flat or other place of residence. In the terminology of the SMP and its economic viability calculations, this excludes temporary accommodation such as caravan parks.
Ebb dominance	Estuaries or channel reaches that display an ebbing tide (seaward movement of water) that is faster in velocity and short in duration than the flooding tide. Ebb dominant estuaries tend to flush sediment seawards from their entrance channels.
Ecosystem	Organisation of the biological community and the physical environment in a specific geographical area.
Environmental impact assessment (EIA)	Detailed studies that predict the effects of a development project on the environment. They also provide plans for mitigating any significant adverse effects.

Term	Definition
EU Bathing Water directive	The aim of this directive is to protect public health and the environment from fecal pollution at bathing waters. It sets a number of microbiological and physio-chemical standards that bathing waters must either comply with ('mandatory' standards) or endeavour to meet ('guideline' standards).
EU Habitats directive	European legislation on the conservation of habitats.
Facies	Specific characteristics of a body of rock.
Feature	Something tangible that provides a service to society in one form or another or, more simply, benefits certain aspects of society by its very existence and is usually found in a specific place.
Fetch	Area of water over which waves are generated by the wind.
Flood dominance	Estuaries or channel reaches that display a flooding tide (landwards movement of water from the sea) that is faster in velocity and shorter in duration than the ebbing tide. Flood dominant estuaries tend to infill their entrance channels by continually pushing coastal sediment landward.
Foreshore	Zone between the high water and low water marks.
Gabion	A cage filled with rock used to stabilise the shoreline against erosion.
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.
Groyne	Shore protection structure built perpendicular to the shore and designed to trap sediment.
Habitats Regulations Assessment (HRA)	Habitat Regulations Assessment is the process to support a decision by the 'Competent Authority' as to whether the proposed plan or project would have an adverse effect on the integrity of any International site. Habitats Regulations Assessment is required for a plan or project, which either alone or in combination with other plans or projects, is likely to have a significant effect on a European site and is not directly connected with or necessary for the management of the site.
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.
Hinterland	Area landward of the shoreline.

Term	Definition
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 (HtL)	Hold the existing defence line by maintaining or changing the standard of protection.
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.
Infrastructure	The basic physical and organisational structures and facilities (e.g. buildings, roads, power stations) needed for the operation of a society
Integrated	An approach that tries to takes all issues and interests into account.
Geographical Information System (GIS)	A database of information which is geographical orientated, usually associate with an associated visual system. A system that integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information.
Listed Building	A building or other structure officially designated as being of special architectural, historical or cultural significance.
Local Development Framework (LDF)	A collection of local development documents that outlines how a local authority will manage planning in their area.
Local Nature Reserves	A statutory designation for sites established by local authorities in consultation with Natural England (formerly English Nature). These sites are generally of local significance and also provide important opportunities for public enjoyment, recreation and interpretation.
Longshore	Current moving parallel and close to the coastline
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, depending on the nature of the shoreline and the intent of management to be achieved.
Mean sea level	Average height of the sea surface over a 19-year period.
Mean high water	The average of all high waters observed over a sufficiently long period (approximately 19 years).
Mean low water	The average of all low waters observed over a sufficiently long period (approximately 19 years).

Term	Definition
Mitigation	<p>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:</p> <ul style="list-style-type: none"> • For wildlife, mitigation may be any process or activity designed to avoid, reduce or remedy adverse environmental impacts of the plan. • For 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
Natura 2000	An ecological network of protected areas in the EU (SPAs under the Birds directive and SACs under the Habitats directive).
Natural Processes	Those processes over which people have no significant control (such as wind and waves).
National Flood and Coastal Defence Database (NFCDD)	National database for managing flood risk management asset data. This database has been provided by the Environment Agency.
National property dataset	GIS dataset that provides information on the location and type of properties in England and Wales. This includes the value of properties based on 2005 values.
National Nature Reserves (NNR)	A statutory designation by Natural England (formerly English Nature). These represent some of the most important natural and semi-natural ecosystems in Great Britain and are managed to protect the conservation value of the habitats that occur on these sites.
No Active Intervention (NAI)	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.
No-regret policies	Policies that don't have irreversible negative implications.
Objective	A desired state to be achieved in the future. An objective is set, through consultation with key parties, to encourage the resolution of an issue or range of issues.

Term	Definition
Offshore zone	Extends from the low water mark to a water depth of about 15 metres (49 feet) and is permanently covered with water.
Ordnance Datum (OD)	Elevation used on ordnance survey maps for deriving height. In the UK this is mean sea level in Newlyn, Cornwall measured between 1915 and 1921.
Outfall Structure	Man-made object designed to control the outlet of a river, drain or sewer where it discharges into a body of water.
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.
Policy scenario	A combination of policies selected against the various feature/benefit objectives for the whole SMP frontage.
Present value (PV)	The value of a stream of benefits or costs when discounted back to the present day. For this SMP the discount factors used are the latest provided by Defra for assessing schemes, that is 3.5 per cent for years 0-30, 3.0 per cent for years 31-75 and 2.5 per cent thereafter.
Principle	High level statement agreed by partner authorities and used to develop the SMP.
Prograding	When the shoreline is developing and building seaward by accumulation or deposition.
Ramsar site	Designated under the Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat, 1971. The objective of this designation is to prevent the progressive encroachment into, and the loss of, wetlands.
Registered parks and gardens	Parks and gardens registered for their historic value so they are considered in the planning process. Local planning authorities must consult English Heritage where planning applications may affect these sites.
Rapid Coastal Zone Assessment Survey (RCZAS)	Surveys of the heritage assets on England’s coast that were initiated by English Heritage to improve knowledge and understanding.
Regulated Tidal Exchange	A form of saltmarsh creation that allows the controlled inundation of previously defended land with saline water, using a combination of pipes and sluices.
Residual life	Period of time until a defence has deteriorated to a state in which it no longer performs its function.

Term	Definition
Special Area of Conservation (SAC)	This designation aims to protect habitats or species of European importance and can include Marine Areas. SACs are designated under the EU Habitats directive (92/43/EEC) and will form part of the Natura 2000 site network. All SACs are also protected as SSSIs, except those in the marine environment below mean low water (MLW).
Scheduled Ancient monument	A statutory designation under the Ancient Monuments and Archaeological Areas Act 1979. This act, building on legislation dating back to 1882, provides for nationally important archaeological sites to be statutorily protected as scheduled monuments.
Setback	Prescribed distance landward of a coastal feature (for example the line of existing defences).
Shellfish Waters directive	Aims to protect or improve shellfish waters in order to support shellfish life and growth. It sets physical, chemical and microbiological water quality requirements that designated shellfish waters must either comply with ('mandatory' standards) or endeavour to meet ('guideline' standards).
Shoreline Management Plan	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.
Special Protection Area (SPA)	A statutory designation for internationally important sites, set up to establish a network of protected areas of birds. SPAs are designated under the EU Birds directive (79/409/EEC)
Special Site of Scientific Interest (SSSI)	A statutory designation under the Wildlife and Countryside Act 1981. Notified by Natural England (formerly English Nature), representing some of the best examples of Britain's natural features including flora, fauna, and geology.
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.
Storm surge	A rise in the sea surface on an open coast resulting from meteorological forcing (wind, high or low barometric pressure) during a storm.

Term	Definition
Strategic Environmental Assessment (SEA)	SEA provides a systematic appraisal of the potential environmental consequences of high-level decision-making (i.e. plans, policies and programmes). By addressing strategic level issues, SEA aids the selection of the draft options, directs individual schemes towards the most appropriate solutions and locations and helps to ensure that resulting schemes comply with legislation and other environmental requirements.
Sustainability Appraisal (SA)	A Sustainability Appraisal is as a systematic and iterative appraisal process, incorporating the requirements of the Strategic Environmental Assessment. The purpose of the Sustainability Appraisal is to appraise the social, environmental and economic effects of the strategies and policies in a Local Development Document from the outset of the preparation process.
Swell	Waves that have travelled out of the area in which they were generated.
Tidal prism (or tidal diamond)	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.
Topography	Configuration of a surface including its relief and the position of its natural and man-made features.
Transgression	The landward movement of the shoreline in response to a rise in relative sea level.
Water table	The upper surface of groundwater. Below this level, the soil is saturated with water.
Wave direction	Direction from which a wave approaches.
Water Framework Directive (WFD)	A European Directive that aims to establish a framework for the protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater.
Wave refraction	Process by which the direction of approach of a wave changes as it moves into shallow water.
With Present Management (WPM)	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.

List of abbreviations and acronyms

Organisations directly involved in SMP

BDC	Babergh District Council
CBC	Chelmsford Borough Council
CBC	Colchester Borough Council
EA	Environment Agency
ECC	Essex County Council
EH	English Heritage
IBC	Ipswich Borough Council
MDC	Maldon District Council
NE	Natural England
RDC	Rochford District Council
RFDC	Regional Flood Defence Committee
SBC	Southend-on-Sea Borough Council
SCC	Suffolk County Council
SCDC	Suffolk Coastal District Council
TDC	Tendring District Council

External/Other organisations

AW	Anglian Water
BASC	British Association for Shooting and Conservation
BE	British Energy
ASM	Asset Systems Management (EA)
CAF	Corporate Affairs (EA)
CLA	Country Landowners and Business Association
CLG	Department for Communities and Local Government
CSO	Catchment Sensitive Officers (EA)
S&DP	Strategic & Development Planning (EA)
Defra	Department for Environment, Food and Rural Affairs
EDF	EDF Energy
EERA	East of England Regional Assembly
EU	European Union
EWT	Essex Wildlife Trust
FRB	Fisheries, Recreation and Biodiversity (EA)
FCRM	Flood and Coastal Risk Management (EA)
Ops Del.	Operations Delivery (EA)
FWAG	Farming and Wildlife Advisory Group
HHA	Harwich Haven Authority
IDB	Internal Drainage Board
LSP	Local Strategic Partnership
MCC	Managing Coastal Change
NEAS	National Environmental Assessment Service
NFU	National Farmers' Union

NT	National Trust
OS	Ordnance Survey
QRG	Quality Review Group
RHCP	Regional Habitat Creation Programme (EA)
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yacht Association
SWT	Suffolk Wildlife Trust
WT	Wildlife Trust

SMP Groups (Consultation)

CSG	Client Steering Group
EMF	Elected Members Forum
KSG	Key Stakeholder Group

Plans/Strategies/Studies & Assessments

AA	Appropriate Assessment
CFMP	Catchment Flood Management Plan
CHaMP	Coastal Habitat Management Plan
ICZM	Integrated Coastal Zone Management
LDF	Local Development Framework
MSfW	Making Space for Water
NI 188	National Indicator 188 (Climate change)
NI 189	National Indicator 189 (Flood Risk)
PPG	Planning Policy Guidance
PPS25	Planning Policy Statement 25
RBMP	River Basin Management Plan
RCZAS	Rapid Coastal Zone Assessment Survey
RFRA	Regional Flood Risk Appraisal
RSS	Regional Spatial Strategy
SA	Sustainability Appraisal
SAMP	System Asset Management Plans
SEA	Strategic Environmental Assessment
SFRA	Strategic Flood Risk Assessment
SMP	Shoreline Management Plan
SNS2	Southern North Sea Sediment Transport Study
TE2100	Thames Estuary 2100
UKCP	United Kingdom Climate Programme (formally UKCIP, United Kingdom Climate Impact Programme)
WFD	Water Framework Directive
WLMP	Water Level Management Plan

Special interest sites

AONB	Area of Outstanding Natural Beauty
LNR	Local Nature Reserve

NNR	National Nature Reserve
SAC	Special Areas of Conservation
SM	Scheduled monument
SPA	Special Protection Area
SSSI	Site of Special Scientific interest

Technical terms

AOD	Above Ordnance Datum
AtL	Advance the line
BAP	Biodiversity Action Plan
BCR / B - C Ratio	Benefit cost ratio
FWD	Flood Warnings Direct
GIS	Geographical Information System
HtL	Hold the Line
HWM	High water mark
IROPI	Imperative reasons of overriding public interest
LiDAR	Light detection and ranging
MR	Managed realignment
NAI	No active intervention
NFCDD	National flood and coastal defence database
NPD	National property dataset
OA	Operating authority
ODN	Ordnance Datum Newlyn
OWF	Offshore wind farms
PDZ	Policy Development Zone
PV	Present value
SAR	Synthetic aperture radar
SOP	Standard of protection
WPM	With present management

1 Introduction

1.1 The Shoreline Management Plan

A Shoreline Management Plan (SMP) is a high-level policy document in which the organisations that manage the shoreline set their long-term plan. The SMP aims to identify the best ways to manage flood and erosion risk to people and to the developed, historic and natural environment. It also identifies opportunities where shoreline management can work with others to make improvements.

We developed a draft version of this SMP, which was out for public consultation from 15th March to 28th June 2010. The consultation generated a wide range of responses from the people and organisations with an interest in the shoreline of Essex and South Suffolk. We have considered these in developing this final version of the plan (see Appendix B in Annex Ba).

Throughout the development of the SMP the partners have aimed to:

- inform and get responses from all 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;
- consider the views of all interested groups and individuals on the approach for managing the shoreline of Essex and South Suffolk in the short, medium and long term.

The SMP is an important part of the Department of Environment, Food and Rural Affairs (Defra) strategy for managing flooding and coastal erosion. This strategy has two key aims:

- to reduce the threat of flooding and erosion to people and their property;
- to benefit the environment, society and the economy as far as possible, in line with the Government's 'sustainable development principles'. These are standards set by the UK Government, the Scottish Executive and Welsh Assembly Government for a policy to be sustainable, and they are as follows:
 - Living within environmental limits
 - Ensuring a strong, healthy and just society
 - Achieving a sustainable economy
 - Using sound science responsibly
 - Promoting good governance

Figure 1-1 provides an overview of the SMP area and the management units used throughout this document.



Figure 1-1 Management units of Essex and South Suffolk SMP

As shown in Figure 1-2, the SMP is the highest-level planning stage of Defra's strategy for flood and coastal defence. The SMP sets high-level policies, which are then implemented through delivery plans (such as strategies and asset management plans) and subsequently by projects and actions (such as schemes).

About ten years ago, a first round of SMPs was completed for the entire length of the coastline of England and Wales. The first SMP for this shoreline was completed in 1997. The revised SMP (SMP2) builds on the first round of plans, taking into account updated information collected, changing circumstances and revised geographical boundaries.

The SMP describes our intent of management for the shoreline of Essex and South Suffolk that achieves the best possible and achievable balance of all the interests around the coast, for the next 100 years. In the first instance, this intent of management is about the management of the shoreline and its flood and erosion defences. Any projects to change and improve flood and erosion defences would be developed by the Environment Agency and the maritime local authorities, in close partnership with all stakeholders. These projects also have to go through the Local Authorities' planning process. There is of course also a strong relationship with social, economic and environmental activities and values around the shoreline. SMP policies are therefore not driven purely by flood and coastal defence economics, because it is impossible to quantify all the impacts of shoreline management. However, chosen policies need to be realistic, especially in the short term. In the UK there is no statutory responsibility on anyone to provide or maintain flood and erosion defences. The Environment Agency and the maritime local authorities only have powers to do so, and they need to work within the limited budgets available. Therefore implementing SMP policies will depend on funding being available; this may be from the national flood and coastal erosion risk management budget, but it could also come from other national sources, or from local and/or third-party funding.

The SMP is a high level document. Where capital schemes are required to implement a particular policy in the plan, these will be included in Environment Agency or Local Authority investment Plans. The majority of funding is likely to be sought through central Government, via the Environment Agency. Other funding may be sought more locally through local levies which are where first tier local authorities contribute an annual levy to the Anglian (Eastern) Regional Flood Defence Committee. Where there are private frontages like Felixstowe Port, investment will continue to be the responsibility of the operator.

Costs of 'holding the line' of a frontage are extremely variable. For example a sheltered estuary embankment with salt marsh frontage may require minimal maintenance such as annual vegetation cutting. This may be in the order of tens

of pounds per hundred metres. An exposed estuary frontage which may require more significant work such as annual repositioning of concrete blocks can cost tens of thousands of pounds per hundred metres. On the exposed coast, capital replacement of coastal defences can cost in the order of £1 Million per hundred metres.

The SMP does not make decisions about land use and environmental values, but it does set one of the parameters within which coastal land use and the coastal environment will function. The SMP has therefore been developed through a partnership approach between the Environment Agency, the local and unitary authorities, Essex and Suffolk County Councils, Natural England and English Heritage, as well as organisations that have an interest or responsibility in coastal management. The SMP has used other partners' documents as evidence during its development. Similarly, all partner authorities intend to take full account of the SMP in their decisions. For example, the SMP is a key piece of evidence informing the preparation of the local authorities' Local Development Frameworks, including Minerals and Waste Development Documents, produced by County Councils and Unitary Authorities. These are statutory documents that plan for the long term future of each local authority area, including the coast, by allocating land use and setting policies against which planning applications are considered. Figure 1-2 illustrates the role of SMPs in land-use planning. The figure also illustrates the link with other water management plans such as the recently published River Basin Management Plan for Anglian region. Section 1.5 explains how the SMP takes account of this and other related plans and procedures. The SMP supports the delivery of Integrated Coastal Zone Management (ICZM) principles, which attempts to 'join up' the different policies which have an effect on the coast as well as bringing together stakeholders from local to national levels.

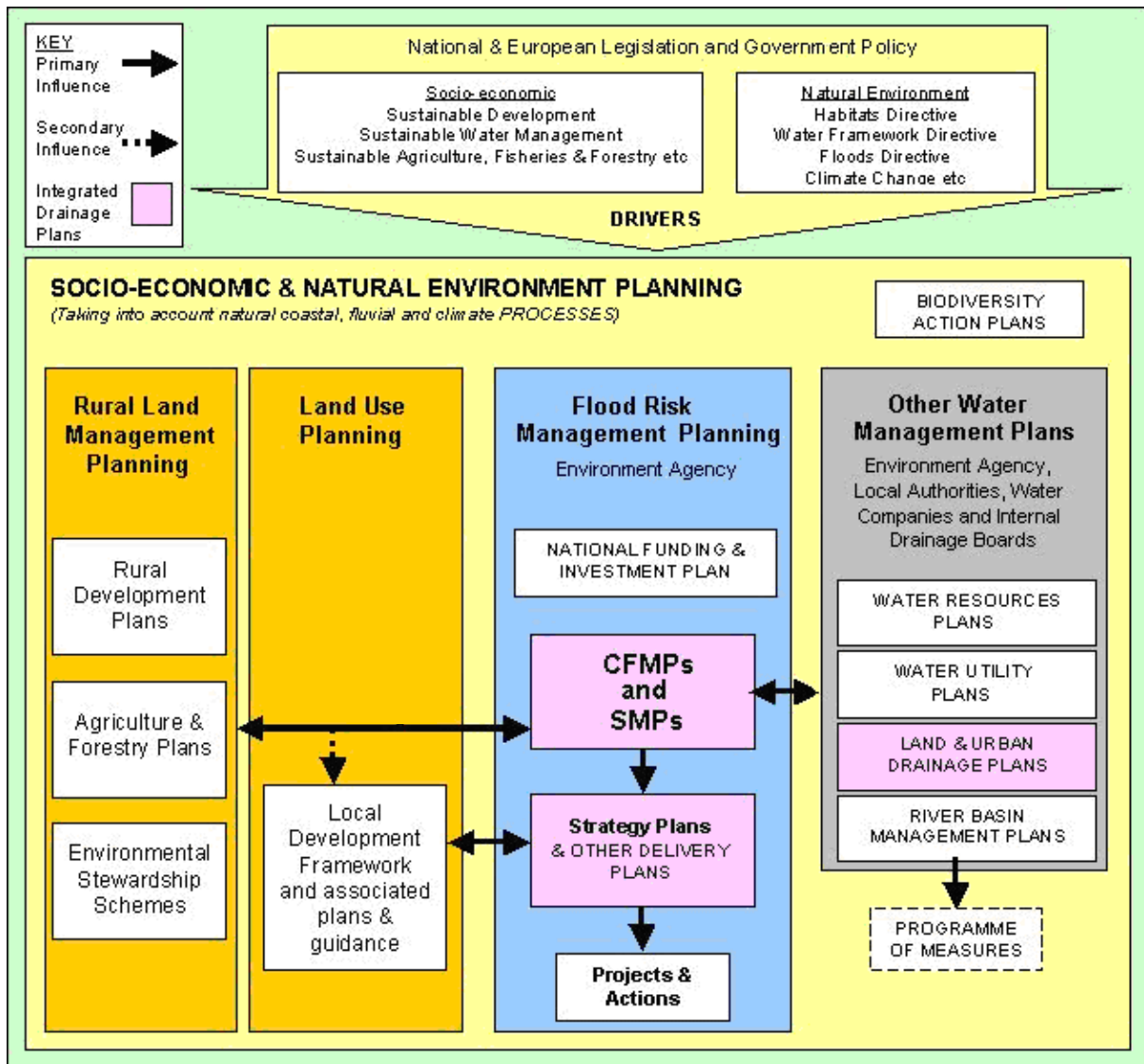


Figure 1-2 Role of SMPs within the wider planning framework

The central decision in the SMP concerns the intent of management: i.e. deciding what we want to achieve through managing the shoreline. This intent of management is typically described in terms of the effect of shoreline management on land use and environment. It describes what we want to achieve through managing the shoreline. However, for use in coastal flood and erosion management, the intent of management has to be translated into one of four policies that describe the actual management of the shoreline itself:

- **Hold the Line (HtL)** – means holding the existing defence line by maintaining or changing the standard of protection. The role of the standard of protection is explained further in the next paragraph.
- **Advance the Line (AtL)** – means 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.
- **Managed Realignment (MR)** – means 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. All are characterised by managing change, not only technically (where management can mean breaching, building and maintaining defences) but also for land use and environment (where management can mean helping or ensuring adaptation). For the Essex and South Suffolk SMP, two distinct types of Managed Realignment are relevant. For frontages that are currently undefended, MR means that the SMP allows local and limited intervention to limit the risks, as long as negative impacts are minimised. For frontages that currently have flood defences, MR means realigning the flood defences to a more landward location; this could also be implemented gradually, for example via regulated tidal exchange.
- **No Active Intervention (NAI)** – means 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.

Section 4.1 describes in more detail what these policies can mean in practice. The first three policy options usually involve defences. The policies do not imply any particular standard of protection to be provided. They could be implemented by maintaining or by changing the standard of protection. This is typically a decision that is taken beyond the scope of the SMP (see Text box below). However, for some frontages the broad-scale analysis of the SMP gives sufficient confidence about the benefits and costs. For these frontages, the SMP does state an intent to maintain or upgrade the standard of protection, including taking into account impacts of climate change. This is explained further in section 3.3. It is important to note that further studies are needed to confirm the policy before any individual scheme is progressed. In addition there will be on-going interaction with landowners, other stakeholders, and any change will be subject to relevant planning regulations. Finally, the SMP will be reviewed over its lifetime to take into account new data and information, which will ultimately feed directly into the next round of Shoreline Management Plans, which will be produced in approximately ten years. These issues are also addressed in Chapter 5 (Action Plan), which forms an integral part of the final Essex and South Suffolk SMP. This SMP needs to identify the intent of management and associated policy for

each section of the shoreline, over the short, medium and long term up to 2105. All SMPs use the following three time periods, which are referred to as epochs:

- epoch 1 (short term): now till 2025;
- epoch 2 (medium term): 2026 – 2055;
- epoch 3 (long term): 2056 – 2105.

For the later epochs, as uncertainty increases, the intent of management and associated policies will be less fixed. Shoreline management planning is an ongoing process, so SMPs are reviewed as new information and knowledge becomes available. This review normally happens every five to ten years.

What the SMP does *not* cover

The text box below lists some of the things that Shoreline Management Plans do not cover, with reference to the processes and documents that do deal with these issues.

- Setting the standard of protection of defences and determining the interventions needed to implement the policies: these will be determined in more detailed studies beyond the SMP, for example System Asset Management Plans or Strategy studies.
- Guarantee funding of policies: the SMP aims to develop realistic policies, but more detailed studies such as Project Appraisal are needed to ascertain the availability of funding, from national, local or third party budgets.
- Alignments of any new defences and measures to mitigate the impacts of policies: the SMP identifies these where relevant, but they will be developed in detail in later stages, particularly in the design of schemes. This can include realignment of footpaths, mitigating impacts on the historic environment, etc. These processes in their own right will include consultation and will require all relevant permissions.
- Land use planning: this happens through the local authorities' Local Development Frameworks; they use the SMP as evidence to identify areas at risk.
- Management of habitats: the SMP can play an important role in influencing the future of habitats where these depend on coastal processes. However, all designated habitats have their own management plans and / or objectives which provide the basis for site management, including the impact of the habitats on designated species.

1.2 Project area

The project area is the section of shoreline for which the SMP describes the plan and sets the policies. For the Essex and South Suffolk SMP this extends from Landguard Point (the eastern boundary of the port of Felixstowe) in the north to Two Tree Island (just west of Southend) in the south. Chapter 2 provides a characterisation of the project area and explains how the character of the area has played a vital role in the development of the plan.

The exact locations of the two 'open coast boundaries' are:

- northern boundary – at the start of Felixstowe port docks, near Landguard fort. This is the southern boundary of the Suffolk SMP so there is no gap or overlap between the two SMPs.
- southern boundary – on the mainland, the boundary is at the eastern end of Hadleigh marshes, at the limit of the defences managed by Southend-on-Sea Borough Council. The SMP project area also includes the whole of Two Tree Island (Figure 1-4). This island is divided administratively between Southend-on-Sea Borough Council and Castle Point Borough Council, although Southend-on-Sea Borough Council owns the freehold of the entire island.

The southern boundary at Two Tree Island was selected following liaison between the Environment Agency and the Thames Estuary 2100 (TE2100) project team. The result is an overlap of the SMP and TE2100 study areas between Shoeburyness and Two Tree Island. This overlap was allowed so that issues related to coastal/estuarine erosion could be looked at. These boundaries represent a change from the original SMP which extended from the River Mardyke in the Thames estuary to Lawford in the Stour estuary.



Figure 1-3 Felixstowe Port - northern boundary



Figure 1-4 Two Tree Island – southern boundary

The SMP area also includes the estuaries of the rivers Roach, Crouch, Blackwater, Colne, Stour and Orwell, and the tidal inlet of Hamford Water. The ‘upstream boundaries’ of the SMP in the estuaries have been selected to match the downstream boundaries of the East Suffolk Catchment Flood Management Plan (CFMP), the North Essex Catchment Flood Management Plan and the South Essex Catchment Flood Management Plan (Figure 1-6). The exact locations of the estuary boundaries are:

- Orwell estuary – Horseshoe weir and Handford Sluice in Ipswich
- Stour estuary – the Cattawade barrage sluice
- Colne estuary – the Colne barrier at Wivenhoe
- Blackwater estuary – the weirs at Beeleigh falls, Maldon
- Crouch estuary – the Battles bridge at Battlesbridge
- Roach estuary – the Stambridge Mills and Sutton Bridge at Rochford

In practice, this means that the SMP develops shoreline management policies up to and including the outfall structures, taking into account their role in protecting the river valleys against tidal flooding. The role of the outfall structures as a downstream boundary for the rivers has been included in all three CFMPs. These plans include the issue of tide-locking where high tide levels limit river outflow which can cause river flooding inland.

The CFMP policies apply to all properties and infrastructure in the flood plain inland from the river outfalls. The CFMPs’ policies for this area are:

North Essex CFMP

Lower Blackwater - policy 3

Colchester - policy 4

Coastal streams - policy 2

Harwich - policy 3

Clacton and Jaywick - policy 3

Heybridge - policy 5

South Essex CFMP

Rural Dengie tidal -policy 2

Southend / Rayleigh policy 5

East Suffolk CFMP

Suffolk Coast and Heaths - policy 2

Ipswich and suburbs -policy 5

Explanation of the CFMP policies:

- policy 2 – reduce flood risk management. The area is at low to moderate risk of river flooding which means that it is generally possible to reduce existing flood risk management actions
- policy 3 - continue existing/alternative actions -Areas of low to moderate flood risk where we are generally managing existing flood risk effectively
- policy 4 - take action to sustain current level of flood risk -Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change
- policy 5 - take further action to reduce flood risk -Areas of moderate to high flood risk where we can generally take further action to reduce flood risk

The North Essex, South Essex and East Suffolk CFMPs were published in 2010. A non-technical summary and post-adoption statement are available to download from the Environment Agency's website at <http://www.environment-agency.gov.uk/research/planning/114303.aspx>. The SMP has taken the policies in this CFMP into account in developing the shoreline management policies.



Figure 1-5: Essex and South Suffolk SMP2 area

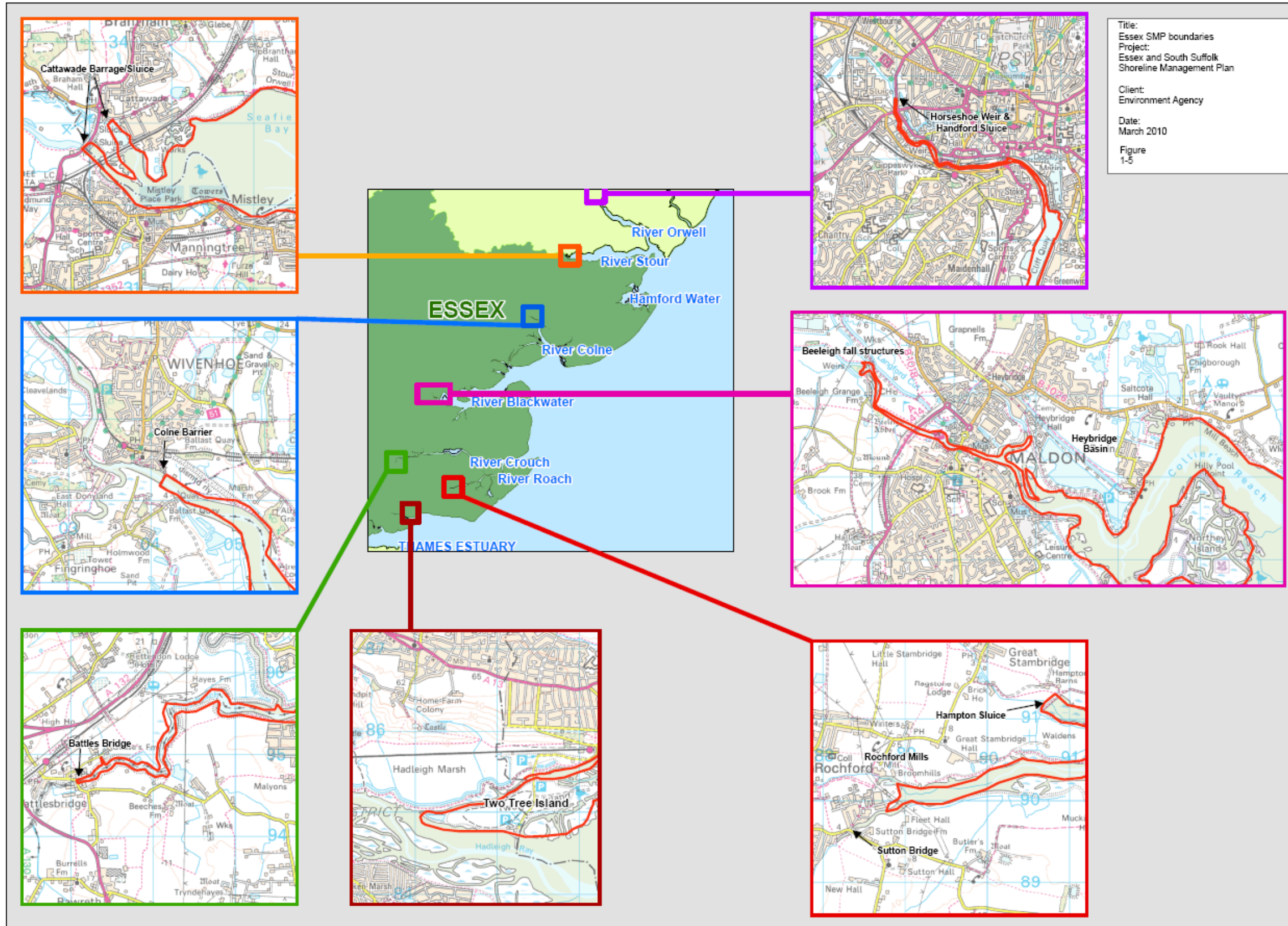


Figure 1-6: Essex and South Suffolk SMP2 tidal boundaries

A much wider area has been taken into account in developing the plan. This study area includes everything that can influence shoreline management, and everything that can be influenced by it. This study area covers much of the North Sea, the rivers up to at least their tidal limit, the whole area within the tidal floodzone, and to some extent also the hinterland and further afield that has links to all the features in and around the Essex and South Suffolk shoreline.

1.3 Developing the SMP

1.3.1 Organisations involved

The SMP has been developed in partnership with all relevant authorities. These include the authorities that manage the shoreline, planning authorities, statutory stakeholders and other organisations which have a relevant interest or responsibility. These organisations have been involved through both officers and elected members.

The SMP is the long-term plan of the authorities that manage the shoreline. For the Essex and South Suffolk SMP this concerns:

- the Environment Agency (who manage most of the flood defences in the area);
- Tendring District Council (who manage the high ground shoreline between Walton and Clacton);
- Southend Borough Council (who manage the high ground shoreline and flood defences between Shoeburyness and Two Tree Island).

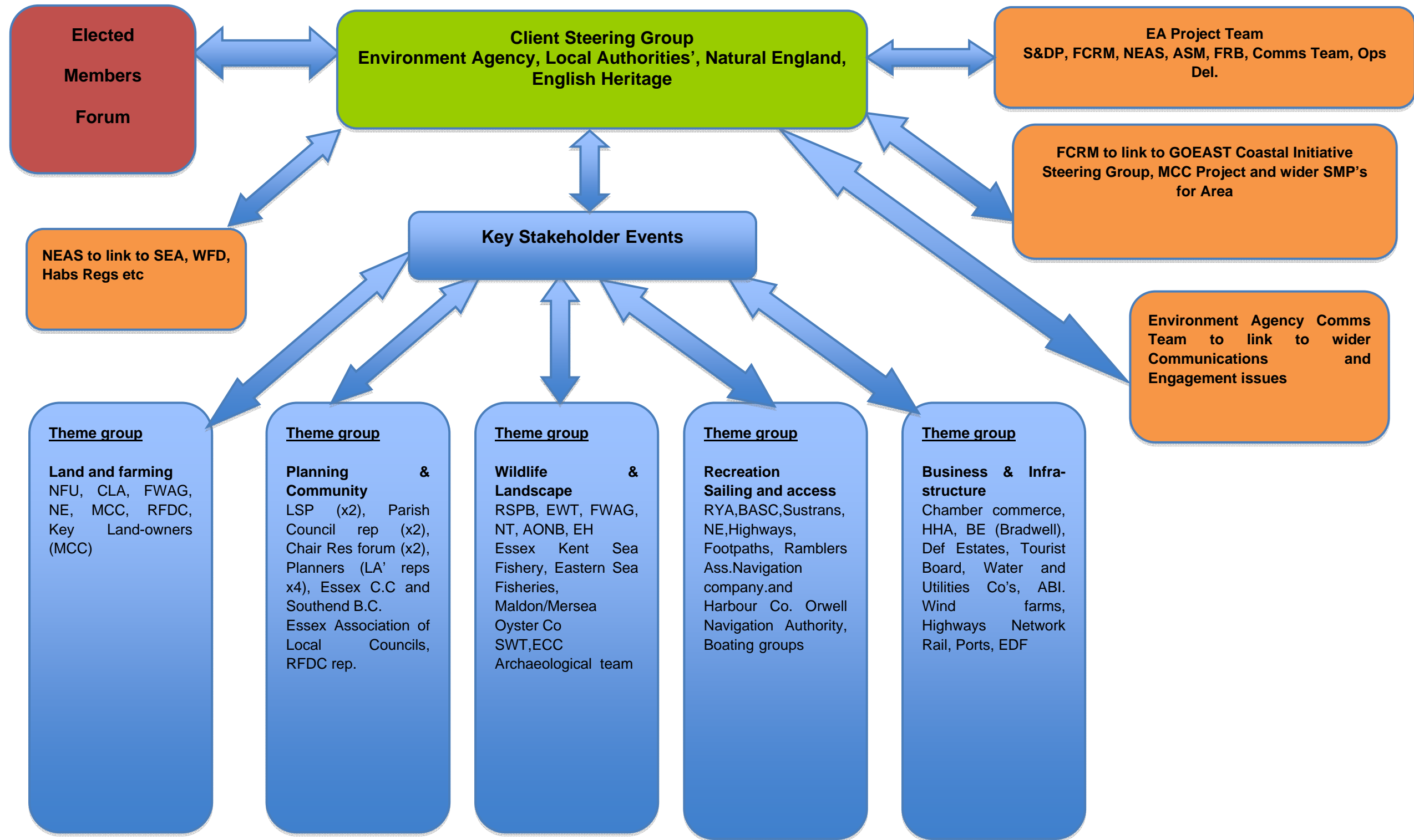
Interaction between the SMP and land-use planning is essential, so all planning authorities have been involved as full partners. This involves the following nine local authorities and two county councils:

- Suffolk Coastal District Council
- Ipswich Borough Council
- Babergh District Council
- Tendring District Council (as well as their role as a shoreline management authority for part of their coastline)
- Colchester Borough Council
- Maldon District Council
- Chelmsford Borough Council
- Southend-on-Sea Borough Council (as well as their role as a shoreline management authority for part of their coastline)
- Rochford District Council
- Essex County Council
- Suffolk County Council

The statutory stakeholders for the Strategic Environmental Assessment (see section 1.5) are:

- Natural England
- English Heritage

Figure 1-7: : Essex & South Suffolk Shoreline Management Plan Structure



1.3.2 Stakeholder involvement

Appendix B contains a detailed account of the way in which we have involved stakeholders in developing the Essex and South Suffolk SMP. The process of developing this SMP has been led by the organisations listed above (the Client Steering Group). We have also involved members from the local authorities, county councils and the Environment Agency's Regional Flood Defence Committee in the Elected Members' Forum. These representatives have scrutinised the SMP process from the start, and have provided a way for these authorities to influence the draft and final plan.

We have developed a stakeholder engagement approach using the 'Building Trust with Communities; Working with Others' approach, based on Environment Agency Staff Guidance. However, given the very large numbers of stakeholders within the SMP boundary area, we have had to carry out further stakeholder analysis to make sure we reach those who represent large groups of individuals or organisations. For the initial stages of evidence gathering and verifying data we engaged with those key stakeholders who represent significant numbers of people or groups with the most at stake around the Essex and South Suffolk coast, and its hinterland. We held meetings for these key stakeholders to inform them of the SMP review and to involve them in identifying the themes and issues they value around the Essex and South Suffolk coast. These groups have also been able to consider our evidence and add local information and perspectives that have helped to shape the draft and final plan.

As we started to determine draft policies we engaged on a more local basis with those groups and individuals most likely to be affected by a change in management policy. This was to make sure that any change in policy was explained fully and that those affected had the opportunity to ask questions on a one-to-one basis. This helped us to give them support and advice in understanding their role in managing changes at the coast.

It is an essential part of engagement to ensure that everyone potentially affected, both directly and indirectly, feels involved in and informed of what is happening to their coast. It is vital that we secure maximum participation in the public consultation, and that we enable all those who want to be involved, to get involved through a method that is appropriate and relevant to them. As part of our stakeholder mapping in preparation for the public consultation and owing to the large geographical nature of this SMP, we used a professional communications research company to further map out the community, organisations and businesses. As part of this work we particularly looked at what strands of diversity needed particular care. Our research indicated that in our public consultation we needed to ensure that we consider age, faith, race, those

who are less able, hard to reach communities (Travellers) second home owners and tourists.

Using the information we collected we planned out our programme of publicity and engagement for the public consultation. Using our evaluations and feedback we undertook a review mid-way through the consultation to make sure that we had a fully representative view from the broader community and also held additional events and meetings to maximise involvement. Summary documents for this research are included.

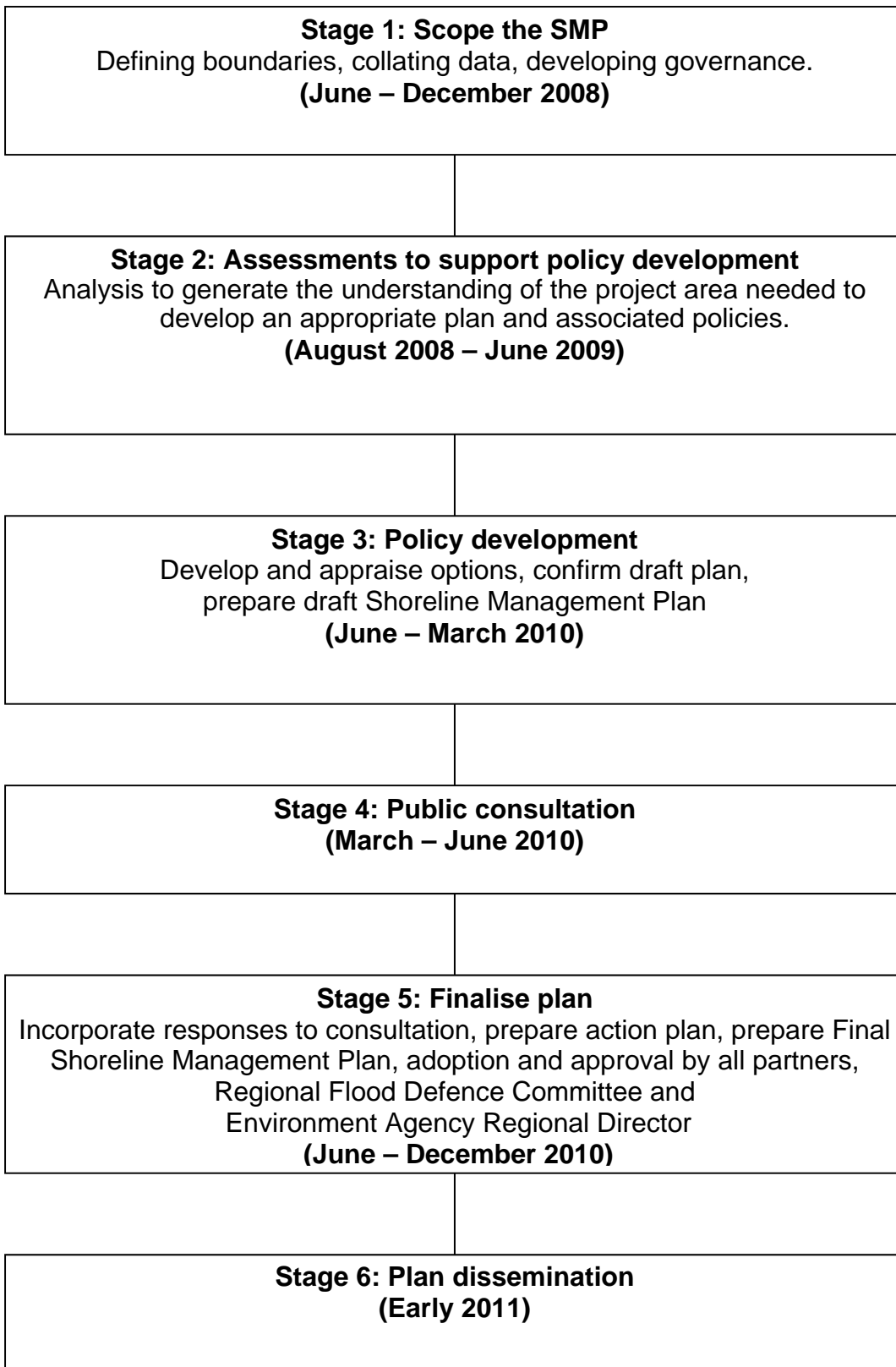
In addition to our commitment to address equality and inclusion we have been transparent and accountable. We have been able to respond efficiently to requests under the Freedom of Information Act as well as independent inspection.

To engage wider audiences we held drop-in sessions and produced newsletters and press briefings. These ensure that the public and other stakeholders were aware of the plan review and were updated about progress and how to get involved through the public consultation.

All feedback received during and after the public consultation can be found in Appendix B. We have also produced a consultation table which is a catalogue of all comments received and if relevant indicates where they have been addressed in the main document or appendices. This can also be found in Appendix B.

1.3.3 Overview of SMP development process

The development of SMPs follows the principles and processes set out in the Shoreline Management Plan guidance issued by Defra in March 2006. The Defra SMP guidance identifies six stages in which the SMP is drafted (Stages 1 to 3), consulted upon (Stage 4) and finalised (Stages 5 and 6). The flow diagram below illustrates this process with the timelines for the Essex and South Suffolk SMP.



Appendix A contains more detailed information about how the SMP has been developed (stages 1, 2 and 3).

The final plan will be adopted by the EA Regional Director, following adoption by the partner authorities that manage coastal defences (Southend and Tendring) and ratification by all other partner organisations.

1.4 Principles for shoreline management of the Essex and South Suffolk coast

The development of the SMP has been based on a set of principles agreed among all organisations involved in the process. Some of these principles can be, by their nature, contradictory and this is one of the main challenges of shoreline management. It is unlikely, or even impossible, to satisfy all these principles fully everywhere so the SMP aims to provide the best achievable balance between the principles over the short, medium and long term. As a whole, this set of principles represents the balance of values to which the SMP aspires. The order of these principles below does not indicate the order of importance.

The principles have been used as a framework for developing policy appraisal criteria, to score and assess the impact locally of the various policy options for different stretches of the coast within the SMP area. The principles and associated criteria are presented in Table 1-1. Appendix E describes how these have been used to arrive at the SMP's policies.

Table 1-1: Essex and South Suffolk SMP principles and criteria

Principle	Criterion
To develop policies appropriate to the diverse character of the Essex and South Suffolk coast and its dynamic interaction of land and sea	Impact of policy package on the diverse character of the Essex and South Suffolk coast
	Impact of policy package on dynamic interaction of land and sea
To balance flood and erosion management with the assets and benefits that it protects	Number of properties (including businesses) within the tidal floodzone or at risk from erosion compared to the current number
	Judgement based on input about future opportunities

Principle	Criterion
To seek opportunities for managing the shoreline through natural coastal processes and take full account of longshore and cross-shore impacts	Use of natural processes (saltmarsh, longshore interaction)
	Positive and negative impact on other frontages
	Cross-shore impact on near shore activities
To develop policies that are resilient against future changes and associated uncertainty	Sensitivity of the policies to different assumptions for the main uncertainties.
To provide time and information for communities, individuals and partner organisations to adapt to any anticipated coastal change	Adequacy of time available for adaptation for communities, individuals and partner organisations
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	Impact on infrastructure
	Impact on socio-economic activities
	Impact on public services (including schools, hospitals and emergency services)
	Impact on communities
	Impact on deprived communities
To support and promote the social and economic values of the Essex and South Suffolk coast to wider society	Impact on socio-economic features of regional, national or international significance

Principle	Criterion
To support conservation and enhancement of biodiversity and geodiversity	Impact on the achievement of management objectives for designated habitats and species, keeping them in favourable condition (including no significant loss of extent or populations)
	Impact on the achievement of national and local Biodiversity Action Plan (BAP) targets, both within designated sites, undesignated sites, mosaic habitats and within the wider coastal countryside
	Impact on the achievement of management objectives for designated geological sites, keeping them in favourable condition
To contribute to maintaining and enhancing the evolving character of the coastal landscape	Impact on the character of the coastal landscape, including consideration of geological, geomorphological, historical environment and cultural features, and the role of settlements in the landscape
To support protection and promotion of the historic environment and its value for the heritage, culture and economy of the area	Impact on historic environment and its wider value
To support and enhance people's enjoyment of the coast by maintaining and enhancing access	Impact on access to and along the coast

1.5 Compliance with procedures

This SMP takes full account of the requirements of a number of important related fields. The SMP's inclusion of general sustainability criteria has been demonstrated through a signposting exercise based on the Sustainability Appraisal (SA) process. This is included in Appendix J. Compliance with the EU's Water Framework Directive is assessed in Appendix K. The SMP has been developed through a parallel and integrated process with a Strategic Environmental Assessment (SEA, related to the associated EU Directive), and an Appropriate Assessment (AA, related to the EU's Habitats Directive). These are provided as stand-alone documents in Appendices L and M respectively.

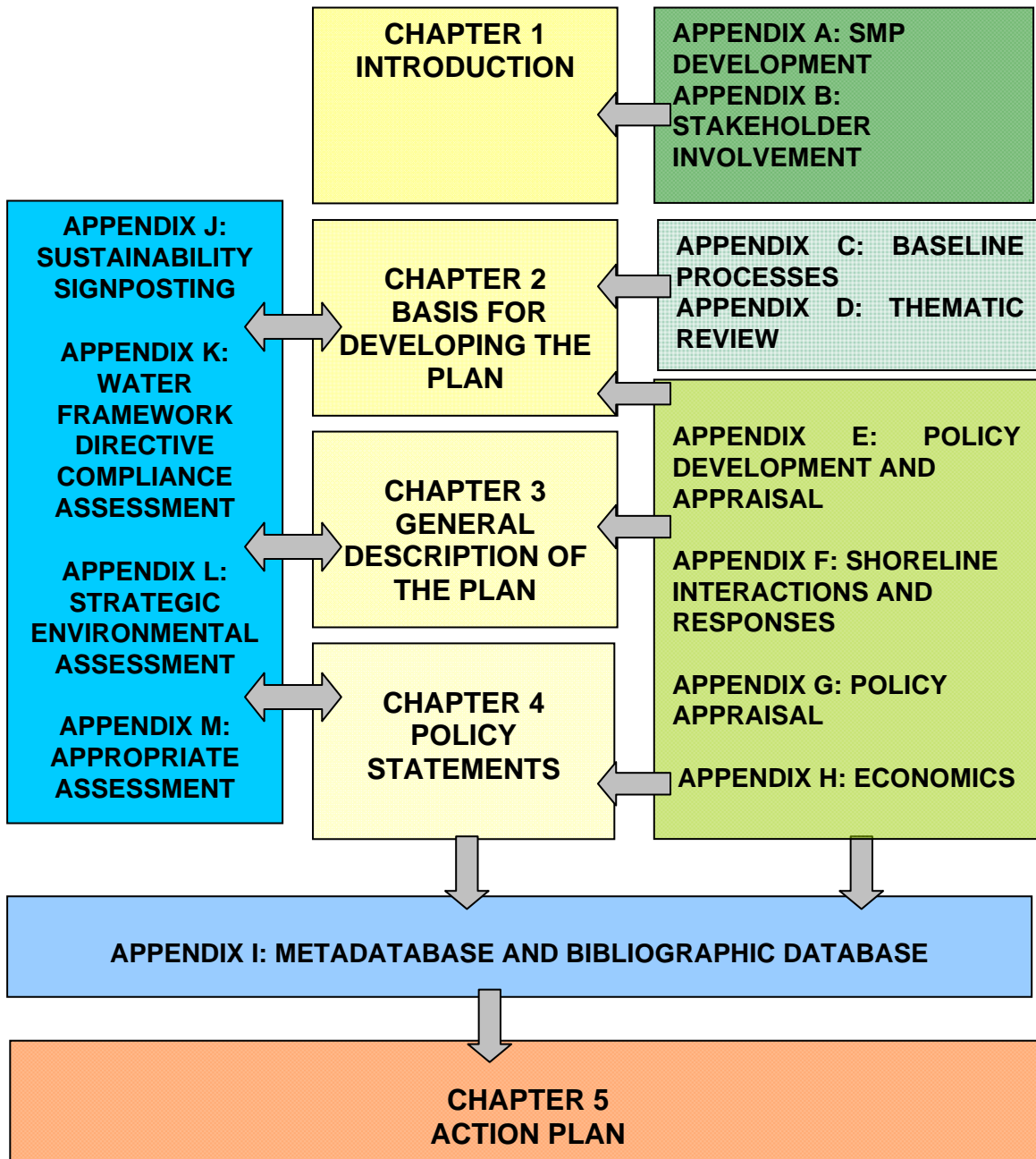
An Equality Impact Assessment has been undertaken as part of the engagement strategy for this SMP. The Equality Impact Assessment has ensured that everyone potentially affected, both directly and indirectly, feels involved in and informed of what is happening to their coast. More information on the Equality Impact Assessment and its findings can be found in Appendix B.

1.6 Structure of the Shoreline Management Plan

The Shoreline Management Plan consists of a plan document and a set of accompanying Appendices. The plan document is aimed at a wide audience, such as an elected member of a relevant authority or interested member of the general public. The plan document is intended to be as concise as possible, without missing out important details. The aim of the plan document is to justify the policies and to identify their implications. Information about alternative policies that were considered is included in the appendices.

The structure of the plan document including the Appendices is illustrated in the flow diagram below and explained in the following paragraph in more detail.

Figure 1-8 Structure of the SMP



Chapter 1 introduces the plan and is supported by the following appendices:

- Appendix A – explaining the different stages and tasks undertaken in the SMP process including graphics and diagrams to explain the logic of the SMP development;
- Appendix B – explaining how stakeholders have been involved in the development of the plan.

Chapter 2 provides the technical background, data and evidence which has formed the basis for the development of the plan. The following appendices support Chapter 2:

- Appendix C (Baseline processes) – explaining our understanding of the coastal and estuary processes and evolution of the Essex and South Suffolk coast;
- Appendix D (Thematic review) – describing land use and environmental values, including structured tables that describe the significance of each feature for shoreline management.

Throughout Chapter 2 there are references to Appendices E (Policy development and appraisal); F (Shoreline interactions and responses); G (Policy Appraisal) and H (Economics).

Chapters 3 and 4 describe the plan and policies. Chapter 3 provides a high level summary, the overall reasoning behind the plan, and the implications of the plan and policies. Chapter 4 then goes into more detail by providing the policy statements for each management unit, supported by four policy maps illustrating the present-day situation, epoch 1, epoch 2 and epoch 3. The following Appendices support the description of the plan and policies and provide further background:

Appendix E gives a detailed description of the Policy Development and Appraisal process. It sets out the principles, criteria and indicators, including a description of the agreed approach, characterisation, criteria and indicators per frontage. It then describes the policy development process and provides further information to illustrate the approach.

Appendix F describes the impact on coastal and estuary evolution of two baseline management scenarios; this has been used to develop an understanding of the role of shoreline management in the SMP area, as a starting point for policy development. All data and results are presented in structured tables,. This appendix also provides the reasoning behind the identification of coastal risk areas, which includes the assessment of the coastal defences, and the flood and erosion risk per management unit. The following maps supporting the plan can be looked up in Appendix F:

- Coastal risk maps;
- Coastal defence maps (residual unmaintained defence life);
- Coastal flood risk maps;
- Coastal erosion risk maps.

Appendix G (Policy Appraisal) contains the detailed Policy Appraisal Tables for the selected policies.

Appendix H (Economics) provides a high-level assessment of the economic justification of the policies: are they viable, marginally viable or challenging. The Appendix also explains the method and approach behind the economic assessment.

Appendix I provides an overview of all data sources used in developing the SMP.

The SMP's inclusion of general sustainability criteria is demonstrated through a signposting exercise based on the Sustainability Appraisal (SA) process. This is included in Appendix J. Compliance with the EU's Water Framework Directive is assessed in Appendix K. The SMP has been developed through a parallel and integrated process with a Strategic Environmental Assessment (SEA, related to the associated EU Directive), and an Appropriate Assessment (AA, related to the EU's Habitats Directive). These are provided as stand-alone documents in Appendices L and M respectively.

Finally, Chapter 5 (Action plan) gives an overview of the specific activities that the partner organisations have agreed for implementing the plan and policies.

The main SMP document is a technical report intended for use by operating authorities, planning authorities and statutory bodies in managing flood and coastal risk. We have also produced a non-technical summary, which is a short and easier to understand version of the main document. For this reason, it only contains information that is included in the main document itself, and not in any of the appendices. The non-technical summary document is aimed at a wider audience than the main document and is intended for wider public use.

2 Basis for developing the plan

This chapter describes the background of the Shoreline Management Plan:

- Section 2.1 - provides a technical description of the coastal processes and coastal defences.
- Section 2.2 - describes land use and the environment around the shoreline.
- Section 2.3 - illustrates the role of shoreline management by describing what would happen to the Essex and South Suffolk shoreline in two extreme management scenarios: No Active Intervention throughout the area up to 2105, or continuing present management throughout the area up to 2105.
- Section 2.4 - builds on this information to identify the 'big decisions' that this SMP needs to make about the management of the Essex and South Suffolk shoreline.

Management of the shoreline combines technical elements with 'softer' elements. The SMP aims to use coastal processes and defences to achieve the best possible balance between all relevant uses of the land and the environment.

2.1 Coastal Processes and Coastal Defences

2.1.1 Introduction

The Essex and South Suffolk SMP2 covers a length of about 550 kilometres between Felixstowe Port in the north and Southend – Two Tree Island in the south. The Essex and South Suffolk coastal frontage comprises the sediment sub-cell number 8 in the national numbering system (until recently called 3d), with a south-west to north-east orientation.

The project area has an unusual coastline formed by a series of estuaries and tidal inlets – Stour and Orwell, Hamford Water, Colne and Blackwater, Crouch and Roach and the Thames – interrupted by discrete lengths of open coast – Walton-on-the-Naze to Colne Point, the Dengie peninsula and the Maplin/Foulness shore.

Most of the estuarine areas are dominated by muddy intertidal flats and saltmarshes. In areas of open coast there are a range of coastal features including London Clay sea cliffs and shingle, sandy and muddy beaches. Many of these coastal features are designated for their national and international importance

Overall, the coastline is mainly low-lying. The land up to a level of approximately OD+5m is at risk of coastal flooding; in the vast majority of cases this is currently

protected by flood defences. The 'tidal floodzone' is typically up to 2km wide, but it is up to about 5km wide in Dengie, Foulness and in some of the river valleys, and protected by earth clay flood embankments with seaward-facing revetment works or sea walls together with groynes. Flood embankments, revetted and unrevetted embankments, can be found in estuarine and coastal environments such as Colne, Bradwell, Dengie and Foulness. Sea walls (reinforced concrete) can be found protecting shingle and sandy beaches of the Tendring peninsula (Figure 2-1) and the coastline from the Naze and Clacton-on-Sea. Foreshore intertidal areas, including saltmarshes and mudflats, function as soft defences as they absorb incoming wave energy.



Figure 2-1 Coastal defences along the Tendring peninsula

A full assessment of the coastal processes in the Essex and South Suffolk SMP area is included as **Appendix C**. A brief summary is provided in the following sections.

2.1.2 Key processes

There are a number of key physical processes occurring around the Essex and South Suffolk shoreline. It is necessary to have an understanding of these processes throughout the development of this plan.

These processes depend on the shape of the coast (largely defined by the geology), hydrodynamic pressures (including wave pressure, tidal flows and volumes), sediment availability (mainly from the North Sea) and man-made influences (flood defences, coastal defences and dredging). The defences reduce the natural evolution of the frontages but they are also undermined by the hydrodynamic pressures.

The north-easterly waves form a prominent hydrodynamic pressure shaping exposed frontages such as the Stour and Orwell estuary mouth, Dovercourt, Hamford Water mouth, Tendring peninsula, Mersea Island and the mouth of the Colne and Blackwater. They move sediment around, which leads to accretion in front of some frontages and to erosion in front of others. Where there is accretion, this can help saltmarsh or mudflats to become established, and these can function as a 'soft' form of coastal defence. Where there is erosion, this can cause loss of beaches and intertidal areas (mudflat and saltmarsh) and lead to undermining of defences.

The Stour and Orwell, the Colne and the Roach and Crouch estuaries show similar behaviour with an overall loss of saltmarsh area. Those estuaries are confined by geology and flood defences that limit the landward evolution of intertidal areas. The waves and tidal flows cause erosion of the seaward edge of the intertidal areas. However, the intertidal areas are growing at the inner estuaries. The Blackwater estuary (Figure 2-2) and Hamford Water are less constrained, but they show the same trends of overall saltmarsh loss and growth of the inner estuary creeks.



Figure 2-2 Old Hall Marsh, Blackwater estuary

Tendring, Mersea and Southend are beach frontages with a mixture of shingle, sand and muddy shores. Here the main process is loss of beach material due to wave and tidal pressures (seawards) and landward constraints imposed by coastal and flood defences and higher ground. Lack of sediment availability (partly due to cliff protection, typically at the seaside towns) contributes to beach loss.

Foulness and Dengie are coastal intertidal flats. In both areas there is accretion taking place on the extensive mudflats, however, there is some erosion of saltmarsh along the Foulness and Great Wakering frontages. This is currently resulting in undermining of the coastal defences and puts the frontages at risk.

As well as these large-scale processes, there is a range of factors that determine smaller-scale processes, including anthropogenic factors such as navigation dredging and boat wash/jet ski erosion.

2.1.3 Geology and Geomorphology

This section provides a basic understanding of the geology and geomorphology of the Essex and South Suffolk SMP area. It describes the underlying geology of London clay, the deposition of sand and gravels on top of the London Clay during the Pleistocene, and finally the deposition of mud and sand during the Holocene. A more detailed overview of the geology and geomorphology of the Essex and South Suffolk coast is provided in Appendix C.

The underlying geology of the Essex and South Suffolk coast is London Clay from the Lower Eocene (49 to 56 million years ago). London Clay is a marine formation made up of stiff grey-blue clay which is weathered to brown (Figure 2-3). This formation is exposed in cliffs along the Essex and South Suffolk coast, including the Naze, Stour and Orwell.

Overlying the London Clay is a sequence of sands and gravels deposited in the Pleistocene (from 2.5 million to 12,000 years ago). The Pleistocene deposits include crag. This is characterised by shelly, friable sand and is exposed at Walton-on-the-Naze. Another example are the terrace gravels, a series of medium to coarse-grained flood plain sediments, probably deposited in the early Pleistocene covering much of the present-day nearshore zone. Those deposits and materials were generated by ice advances during the Pleistocene. There is evidence to suggest that the River Thames often switched position during the Pleistocene and may have flowed east and northeast during the late Pleistocene with a mouth at the location of the present Blackwater Estuary.

During the Pleistocene the Essex and South Suffolk coast experienced a series of sea-level changes that are largely responsible for the present-day shape of the land. Some of the present-day channel shapes, particularly estuaries, would have formed during periods of ice advance and sea level fall, when London Clay formations were severely eroded by fluvial channels through repeated ice advance.

The Holocene sediments, deposited from 12,000 years ago to the present day, are made up of the subtidal sands, intertidal sands and muds and freshwater peats overlying the London Clay or the Pleistocene sands and gravels.



Figure 2-3 London Clay formations, the Naze

The end of the last Ice Age, around 20,000 years ago, was the start of a period of rapid sea level rise. Sands and gravels were moved into the newly-formed estuarine channels and deposited as linear, sub-tidal banks, which are aligned with the dominant tidal currents (NE to SW direction).

The rise in sea level during the Holocene was not a continuous process. It has been marked by a series of transgressive (relative sea level rise) and regressive (relative sea level fall) phases. During regressive phases the inner estuaries and upper shore areas would have changed from saline to freshwater conditions in which peat would have been deposited. Throughout Essex these freshwater conditions can be traced with a marked level at around 4,500 years before present. This regressive phase does not seem to be present in the Holocene geological record of the Stour and Orwell region. This has been attributed to a more rapid tectonic sinking of this region (Brew, 1990) or low sediment supply (Brew et al., 1992).

This geology is of national importance and the following sites are designated as Sites of Special Scientific Interest for their geological interest: The Stutton Cliff (part of the Stour Estuary SSSI), The Naze, Holland-on-Sea Cliff, Clacton Cliffs

and Foreshore, The Cliff, Burnham-On-Crouch, as well as The Blackwater Estuary SSSI, which is designated for both its biological and geological interest.

2.1.4 Recent geomorphological development

Post-glacial sea level rise has produced a sequence of deposits containing a wide variety of archaeological and past environmental remains. The process of sea level rise has neither been uniform nor continuous and it is these fluctuations in sea level rise that have had a considerable effect on the historic use of the Essex and South Suffolk coast (further information provided in Appendix C).

Repeated sea level changes caused widespread flooding of Iron Age settlements and agricultural lands. Consequently, in places, Romano-British inhabitants protected their land from flooding. Later reclamation was, in particular, associated with the maintenance of grazing land by monastic communities and increased markedly in scale and type through the later middle ages before reaching its peak during the 18th and 19th centuries. Over the last 2,000 years, about 42 per cent of what was originally intertidal land is estimated to have been reclaimed. The removal of such a high proportion of the intertidal area has had huge effects, including a decrease in estuarine channel area, which has led to higher water speeds and increased bed-scour. Consequently, the estuaries are deeper than naturally stable channels.

In addition to sea level rises, changes in sea level have also included regression periods (i.e. relative sea level fall). Between approx. 1650 AD and 1850 AD there was a fall in sea level associated with a phase of global cooling known as the Little Ice Age. During this period, the seaward movement of saltmarshes was at its height and it is likely that the overall area of saltmarsh increased (Figure 2-4).



Figure 2-4 Saltmarsh and mudflat formations, Blackwater estuary

A natural seaward extension of other coastal landforms also seems to have occurred during the Little Ice Age. The more prominent spits and bars, consisting of carbonate shell fragments and silica gravels, such as Landguard Point, Colne Point and Foulness Point became more exposed during this period. Previously, these spits and bars had provided shelter to saltmarsh areas during lower sea levels. Since sea levels have risen, the ridges have either eroded or have rolled landwards leaving the saltmarsh to develop on the foreshore with limited shelter. Colne Point is one of the remaining bar systems, with a series of shingle ridges extending 2.5 kilometres northwards into the Colne estuary. The spit appears to be the remains of a series of shingle ridges that originally extended from Walton to Colne Point but these probably disappeared during the 19th century as a result of ongoing sea level rise (further information provided in Appendix C).

2.1.5 Contemporary processes and geomorphology

Figure 2-7 shows that sea levels have been rising since around 1900. The most relevant contemporary geomorphological processes along the Essex and South Suffolk coast and estuaries concern the evolution of the intertidal area (saltmarsh and mudflat) in response to this sea level rise. This has been a great concern over the past couple of decades, and is a very important factor for shoreline management in the coming years. The intertidal area is a natural part of estuaries and embayments. It provides natural protection against waves and

currents, which means it acts as a natural flood and erosion defence. In addition the intertidal area is an internationally important habitat, which gives it a protected status. The natural response of saltmarsh to sea level rise is to migrate in a landward direction. If this landward migration is blocked by natural high ground or by flood defences, then this is referred to as 'coastal squeeze'. If saltmarsh is being lost in an area, then a managed realignment of the flood defence can be an appropriate response: this moves the defence away from the natural pressures to a more sustainable location and can lead to re-creation of saltmarsh, with its benefits for habitats and flood defence (see Figure 2-5 for an example of this).

For these reasons, it is important for the development of the SMP to understand the ongoing losses and gains of saltmarsh and mudflat and associated uncertainties. This section sets out our current understanding, with reference to Appendix C for a more detailed explanation. Section 2.1.7 sets out how we have used this information to make predictions about future losses and gains of intertidal areas. Appendix F also contains specific information about the frontages that are under pressure as a result of intertidal developments.

Monitoring of saltmarsh change in the SMP area has taken place since 1973 using a range of techniques including aerial photographs, GIS and field calibration. For the open coast, the Environment Agency's Coastal Trend Analysis reports are an important source of information; they are based on monitoring since 1991. Appendix C provides more details on these data sources, and this shows that calculating and predicting losses and gains of saltmarsh and mudflats is not a straightforward task and the resulting numbers should be used with extreme caution.

A general conclusion is that the Essex and South Suffolk estuaries are generally losing saltmarsh. Data on mudflat losses and gains is inconclusive; however, the Coastal Trend Analysis report suggests that mudflats are accreting at Dengie and Foulness. Table 2-1 lists the average loss of saltmarsh per year based on available assessments. There are important caveats for the use of these rates, which is further explained in the Appropriate Assessment (Appendix M) and addressed in the Action Plan:

- these are measured loss rates, which may not all have been caused by coastal squeeze or the presence of defences;
- some more recent data show different trends (but these are difficult to quantify); this means there is large uncertainty;
- the data are based on the area within the designated Special Protection Areas (SPAs); there are no quantitative data for Foulness.

The majority of these figures are taken from the saltmarsh surveys completed in the 1970s, 1980s and 1990s which were conducted over number of years. This is currently the best available data regarding saltmarsh losses. Natural England began a new survey into saltmarsh extent in Essex during SMP development. When the results become available early in 2011 they will provide a new baseline for further intertidal habitat monitoring as set out in the Action Plan. Any new data will be shared with stakeholders and will feed into further decision making following completion of the SMP.

Table 2-1 Saltmarsh erosion rates based on monitoring (from Essex CHaMPS, 2003)

Area	Monitoring period	Saltmarsh area (ha)*	Average loss per year	
			ha	%
Stour and Orwell	1988–1997	161	6.3	3.9%
Hamford Water	1988–1998	614	14.4	2.3%
Colne	1988–1998	670	5.6	0.8%
Blackwater	1988–1997	670	7.0	1.0%
Dengie	1988–1998	409	2.7	0.7%
River Crouch	1998–2000	276	10.4	3.8%
River Roach	1998–2000	113	0.7	0.6%
Benfleet and Southend	1988–1998	135	1.4	1.0%
Total		3048	48.5	1.6%

*This is the area present in the last year of the listed monitoring period



Figure 2-5 Intertidal habitats in Wallasea, Crouch and Roach estuaries

2.1.6 Coastal Defences

The frontline of coastal and estuarine frontages throughout the Essex and South Suffolk SMP2 study area is protected by a range of defences including grassed earth embankments; earth embankments reinforced by block work, grouted stone, ragstone, so-called 'Canewdon' blocks and open stone asphalt; sheet piling walls and reinforced concrete seawalls. Many frontages are defended by a mixture of several of these structures. The SMP is concerned mainly with the frontline defences. However, in certain sections of the shoreline, secondary defences include counterwalls and earth embankments.

Most of the defences in Essex, Stour and Orwell are revetted earth embankments. These embankments provide protection to low-lying coastal floodplains, grazing marshes and agricultural land and also to settlements in Jaywick, Brightlingsea, Maldon, Maylandsea, St Lawrence, Burnham-on-Crouch, North Fambridge, South Woodham Ferrers, South Fambridge, Paglesham, Wakering and some settlements in Southend.

Grassed earth embankments are often placed in a sheltered position such as inner estuaries and channels, creeks or as secondary defences. Sheet piling is used in quays, marinas, ports and sections of erosional frontages such as Clacton and Southend.

Erosional frontages protecting the communities in Harwich, Frinton, Clacton, Southend and sections of Mersea Island are protected by a combination of concrete sea walls, promenades, wave return walls and beach control structures (timber and concrete groynes and breakwaters).

Currently undefended frontages include the soft cliffs in the Stour and Orwell estuaries, the Naze Cliffs and other frontages where the defences run into higher ground.

The condition of flood and coastal defences is regularly checked by those who manage them, including the Environment Agency, local authorities and private owners. Such inspections allow the determination of the condition of the defence and its 'unmaintained estimated life'. This estimates the time it would take for the defence to fail in the extreme scenario that the defence would stop being managed (a 'no active intervention' scenario).

This information is needed to determine the effect that shoreline management has (elaborated in section 2.3). Furthermore, the role of the coastal processes in undermining or improving the function of the defences has also been considered. A table showing the results of this assessment is in **Appendix F**. The overall conclusions are discussed below.

The lowest unmaintained life (0 to 10 years) can be found in the continuous line of defence in Trimley Marshes, Frinton, Clacton and Mersea. This means that, if maintenance was halted on these defences in 2009, it is expected they would gradually deteriorate and become ineffective sometime between now and 2019. Defences in the Walton channel, Bradwell, Foulness, Potton and Rushley islands have an estimated unmaintained life of 11 to 20 years. They are also under pressure from coastal processes (including wave action and tidal flows).

A continuous line of defence with a relatively long unmaintained estimated life (31 to 40 years) can be found in Orwell, Hamford, the Colne, Blackwater and the inner Crouch. This means that, if they did not receive any maintenance from today (2009), they would still continue to provide some protection up to 2040 to 2049.

Figure 2.6 shows the distribution of flood defence and coast protection across the Essex and South Suffolk SMP2 area.

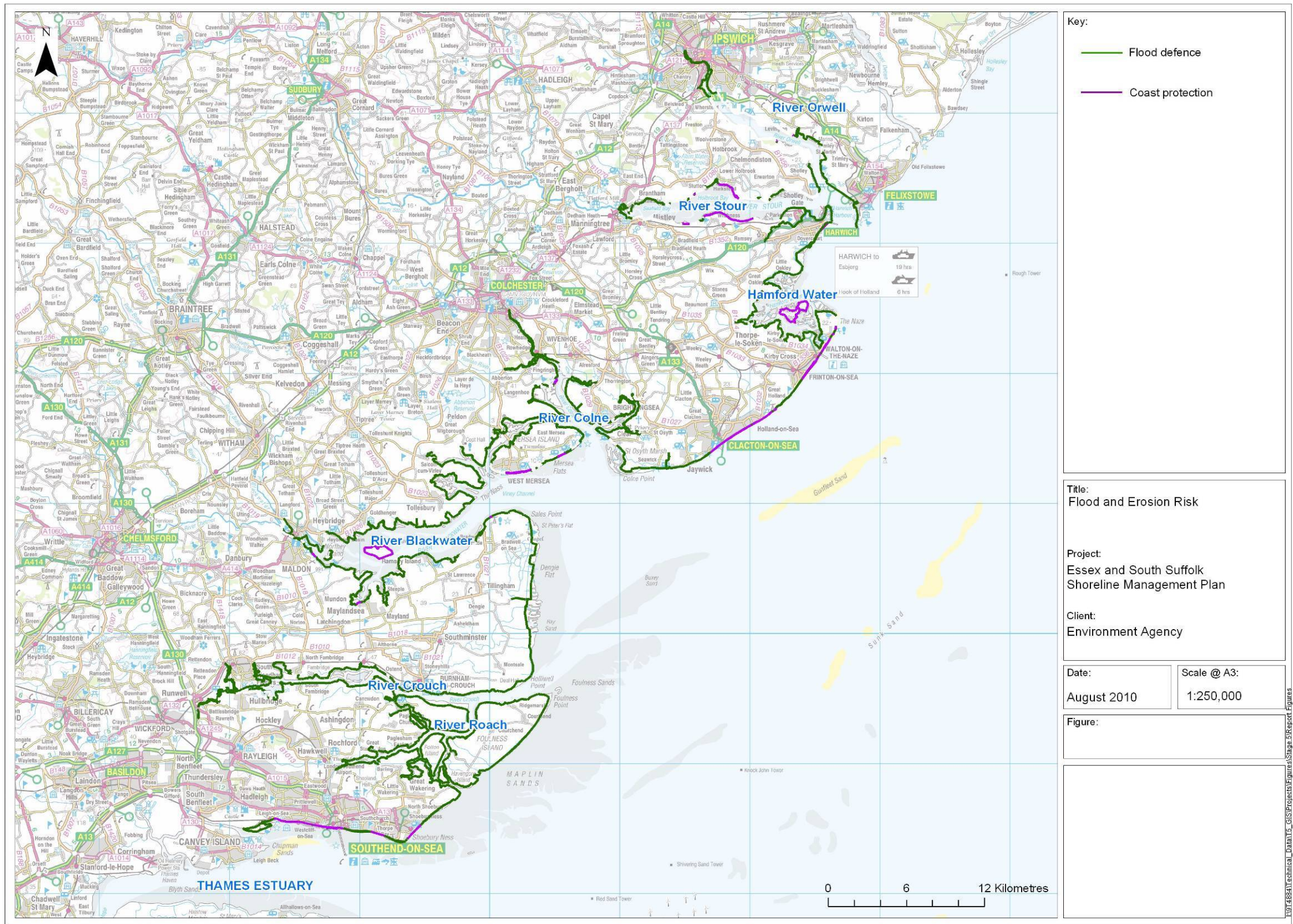


Figure 2-6 Flood defence and coast protection in the Essex and South Suffolk SMP area

Flood defences reduce the likelihood of flooding, but they cannot prevent it completely. In the recent past there have been examples of storm events that have led to damage and breach of the defences along the Essex and South Suffolk coast. The most significant event was on 31 January and 1 February 1953. This event was the greatest storm surge recorded for the North Sea. Coastal defences from Yorkshire down to the Thames were breached. Table 2-2 summarises the main historic events affecting the SMP area caused by flooding from the sea.

Table 2-2 Historic flood events

Date	Description	Areas affected	Consequences
31 Jan to 1 Feb 1953	Exceptionally high tide – combination of spring tide and a full north-westerly gale – North Sea surge	Entire coastline. Regional disaster	Canvey Island – whole island inundated, 58 people died. West Thurrock and Purfleet – most large industrial sites flooded. Tilbury – 2,500 houses and a fire station flooded. Jaywick – 37 people drowned, 700 made homeless. Ipswich – 700 homes and more than 580 commercial properties affected.
1978	Minor tidal event	Eastwick Battery	Sea wall failed and farmland flooded.
February 1983	Minor tidal event	Ipswich	Highest level since 1953.
November 2005	Minor tidal event	Little Wakering Wherstead	Minimal damage. The Strand flooded.
16 December 2005	Tidal event	Manningtree Mersea Island South Woodham Ferrers Wherstead	Garages flooded. Car park flooded. Gardens flooded. B1456 road flooded.

Date	Description	Areas affected	Consequences
March 2007	Minor tidal event	Maldon Wherstead Ipswich	Boat yards and yacht pond flooded. The Strand flooded. Various roads around the docks affected.

The whole SMP is covered by a community based flood warning system and these warnings are provided by Floodline and Flood Warnings Direct (FWD). Following the introduction of the opt out registration to FWD take up of the warning service in the SMP area is in the region of 80%. Tidal warnings are provided 12 hours in advance of high water to allow those at risk to take appropriate action. Operation Watermark is also taking place in March 2011 which will help evaluate the flood warning system for this area.

2.1.7 Future External Development

Climate change (natural and man-made) is causing sea levels to rise. This rate has been between one and two millimetres a year since 1900. However, there is great uncertainty about the future rate. Global temperatures are rising and this is causing water to expand and land ice to melt. Also, the coast of south east England is still sinking as a rebound effect of the melting of the ice of the last Glacial. The sinking land adds to the overall sea level rise. Rates of this relative sea level rise are uncertain, but it is essential that this SMP takes into account the possibility of increasing sea level, whatever the cause. This is known as applying the precautionary principle. The Defra guidance provides values for sea level rise for the three epochs. These are the values that have been used in all SMPs when assessing future shoreline response and in the more measured assessments of intertidal habitat loss. These Defra guidance values are shown in Table 2-3. These values suggest a total sea level rise of 1.1 metres by the end of epoch 3 (2105).

The UK Climate Impacts Programme published an update of its projections in 2009 (UKCP09). This emphasised the importance of the issue, and also highlighted the uncertainty about the actual rates by presenting a range of possible futures. The rates used in the SMPs fall within the range that UKCP09 predicts. In the SMP, we have assessed the impact of slower and faster changes through sensitivity analysis, see **Appendix E**.

As well as sea level rise, it is likely that there will also be increased storminess. There are currently no long-term datasets available to identify specific trends in when storms happen, but the sensitivity of this plan to increased storminess has to be taken into account

The key to taking into account the effects of sea level rise, climate change and the associated effects and the great uncertainties associated with the values, will be to establish 'no regret' decisions for the shorter term, but at the same time emphasising the need to start preparing for change.

Figure 2-7 Recorded Sea Level Rise (Proudman Oceanographic Laboratory)

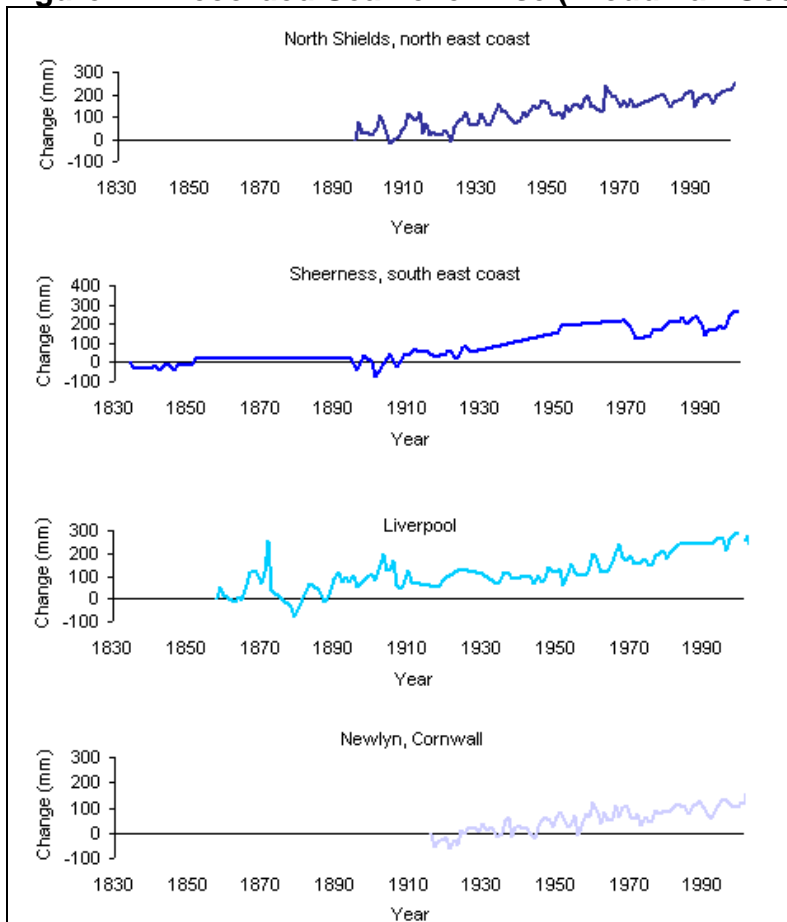


Table 2-3 Defra (2006) sea level rise guidance

Time period	Net sea level rise (millimetres a year)	Total sea level rise (millimetres)	Cumulative sea level rise (millimetres)
Epoch 1 (2009 to 2025)	4.0	64	64
Epoch 2 (2025 to 2055)	8.5	255	319
Epoch 3a (2055 to 2085)	12.0	360	679
Epoch 3b (2085 to 2105)	15.0	450	1,129

As described in section 2.1.5, the evolution of the intertidal area in the coming years is an important driver for shoreline management. The Coastal Habitat Management Plans (the Essex CHaMP from 2003, the Suffolk CHaMP from 2003 and the Thames Estuary CHaMP from 2008) contain predictions of saltmarsh evolution up to 2050, based on a range of techniques. However, given the uncertainty that surrounds the current rates (see section 2.1.5) and the important role of these rates in policy development, we only have sufficient confidence in the data to assume that the current overall rate of loss of approximately 48.5 hectares per year (see Table 2-1) will continue up to the end of epoch 1 (short term, up to 2025). This is seen as a conservative estimate. For the later epochs, rates of loss could be faster as a result of accelerating sea level rise, or could slow down due to other processes, but more information is needed to confirm this.

With the increasing drive for renewable energy, and the current construction of large wind farms, it is also important to consider the potential effect of those developments on the geomorphology and overall coastal processes functioning of the Essex and South Suffolk shoreline. Recent research has shown that effects of the construction of wind farms occur only around the foundations of the structures with some temporary effects during actual building and the laying of cables. There are no known cumulative effects with regard to the coastal or seabed processes. For offshore dredging, before a licence can be given, the potential effects are assessed in terms of sediment processes, hydrodynamics and water quality. If any effects were to be felt along the coastline, dredging would not be allowed to take place.

Finally, the possibility of a barrier or barrage in the outer Thames Estuary has been raised in the course of the development of the SMP. The Thames Estuary 2100 project reports indicate that this may be a realistic option in the long term, beyond 2070. Depending on the location of such a barrier or barrage there could be impacts on the shoreline within this SMP area. These would have to be addressed in the development of the barrier or barrage, and included in future reviews of the SMP.

2.2 Land Use and Environment

2.2.1 Introduction

This section aims to provide an overview of the land use and environment throughout the SMP area. It also discusses possible future changes. The description distinguishes 10 so-called 'management units'. These are used throughout the SMP document and are shown in Figure 1-1.

The full theme review, on which this section is based, is in **Appendix D**. The theme review identified all features relevant to the SMP, including the benefits, issues and specific objectives associated with each feature.

2.2.2 Management Unit A: Stour and Orwell Estuaries

Most of the land surrounding the estuaries falls outside the tidal flood risk zone. Notable exceptions are parts of Ipswich town, the ports of Harwich and Felixstowe with their ferry services, cargo shipping and the Petrochem Carless refinery. Also, there are properties along the estuaries that fall within the tidal flood risk zone. Other communities include those of Shotley Gate, Brantham, Lawford, Manningtree and Mistley on the Stour. On the Orwell there is Levington, Nacton, Freston, Woolverstone and Chelmondiston. The railway line on the southern side of the Stour could become at risk at several places in the future, while the B1458 road at The Strand, Wherstead is already at risk. Most of the flood zone, however, is characterised by agricultural land. There are sewage treatment works on both the Stour and Orwell that discharge treated waste water into the rivers. Industry at Ipswich and Cattawade also falls within the tidal flood risk zone. Along the Orwell there are numerous marinas, golf courses, and camping and caravan sites that are at risk. In addition, the Royal Hospital School near Holbrook and the HMS Ganges museum at Shotley marina could be adversely affected.



Figure 2-8 Stour and Orwell estuary mouth – view from the Naze

The Stour and Orwell estuaries (Figure 2-8) are of international environmental importance, comprising extensive mudflats, low cliffs, saltmarsh and small areas of vegetated shingle on the lower reaches. The estuaries provide habitats for an important assemblage of wetland birds and internationally important numbers of wintering and passage wildfowl and waders. The site also holds several nationally scarce plants and British Red Data Book invertebrates.

In the Orwell estuary, the Nacton Cliff has the best exposures of the Harwich Formation ('London Clay') in Suffolk - with geological structures clearly visible. The Cattawade Marshes SSSI lies at the head of the Stour estuary and is situated between the freshwater and tidal channels of the River Stour. These grazing marshes – with associated open water and fen habitats – are of major importance for the diversity of their breeding bird community. This includes species that have become less common throughout lowland Britain as a result of habitat loss. The Stutton Cliff, also in the Stour Estuary SSSI, is of geological interest due to its deposits rich with fossils of mammals including lion, straight tusked elephant, horse, giant deer and bison. The Harkstead Cliff has important exposures of Harwich Formation and interglacial deposits.

The Harwich Foreshore SSSI yields the only fossil flora attributable to the lowest division of the Eocene London Clay. Its composition is typical of the formation and specimens are abundant. Association of the plants with ash bands within the clay may help correlations elsewhere in the basin as they form useful marker horizons. This is a recently-discovered site with great research potential.

The estuarine frontages of the Orwell and the northern frontage of the Stour are part of the Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB). The AONB extends from the northern side of the Stour estuary, west to

Ipswich and north as far as Kessingland. It is likely the AONB boundary will be extended south to include the Stour estuary and its southern banks within the life of this SMP. The landscape of the AONB is an intricate mosaic of shingle beaches, crumbling cliffs, marshes, estuaries, heathland, forests and farmland (Countryside Commission 1993). There have been a number of landscape character assessments of the area since then, all of which detail the characteristic landscape types of the protected area. The Stour and Orwell estuaries together with their hinterland fringes are quintessential landscapes of the Suffolk Coast and Heaths AONB. They are different from other landscapes in the area and are very much part of what gives the AONB its sense of place and its uniqueness. It is for this reason that coastal changes will have a profound impact on the landscape character of this AONB within the Essex and South Suffolk SMP's area.

A range of finds, from worked flints to hulks and at least one Saxon timber fish-trap, which highlight the long history of human exploitation of the estuary have been recorded within the inter-tidal area of the Stour Estuary. Quays, landing places and wrecks survive clustered around the historic ports of Manningtree and Mistley; jetties and other timber structures may be found along the length of the estuary.

A project is underway to construct a tidal barrier at the New Cut in Ipswich by the Environment Agency in partnership with Ipswich Borough Council and Haven Gateway Partnership. The barrier will be a single rising radial gate, similar to the gates in the Thames Barrier. Ipswich's barrier will be 20 metres wide and will be built in the mouth of the New Cut, being the most cost effective location to build it and having the least impact on the environment. In its fully closed upright position it will provide defence against significant storm surge events.

2.2.3 Management Unit B: Hamford Water

There are some settlements within the tidal flood zone, including areas of Dovercourt, Little Oakley, Beaumont, Kirby-Le-Soken and Walton-on-the-Naze. (Figure 2-9). Most of the area within the floodplain is agricultural land, with some exceptions including the EPC Groupe UK Bramble Island and a number of individual rural properties. The B1414 crosses the tidal flood zone at Beaumont Quay and the B1043 is at risk near Kirby-le-Soken. Titchmarsh marina is also in the tidal flood risk zone.



Figure 2-9 Hamford Water

The cliffs at The Naze have the highest erosion rates in the SMP area of 1.8 metres a year. This creates a risk to the sewage treatment works, John Weston Nature Reserve and properties north of Walton-on-the-Naze. It also puts the Naze Tower at risk, an important landmark of historic value.

Hamford Water has been designated a National Nature Reserve, Ramsar site and Site of Special Scientific Interest (SSSI). It is a large, shallow estuarine basin made up of tidal creeks and islands, intertidal mud and sand flats and saltmarsh. These support rare plants and internationally important species and populations of migratory waterfowl. The site is of international importance for breeding little terns and wintering dark-bellied Brent geese, wildfowl and waders and is of national importance for many other bird species. It also supports communities of coastal plants that are rare or very local in Britain, including Hog's Fennel, *Peucedanum officinale*, which is found elsewhere only in Kent. In addition the cliffs at the Naze also have formations of Waltonian Red Crag unique to Suffolk and Essex. This section of the SSSI has the highest palaeontological diversity.

Within Hamford Water saltmarsh is being lost through erosion. Estimates suggest that approximately 25 per cent of the total area has been lost over the past 25 years.

The historic environment of the unit has numerous earthworks including current and former sea walls, enclosures, decoy ponds and the surviving historic structures of the explosives factory on Bramble Island. Other industrial works include the scheduled lime kiln and quay at the end of Beaumont Cut and the tidal mill pond of Walton mere. Jetties, quays and trackways highlight the importance of access to and from the sea and the relationship with adjacent dryland areas. The prominent tower of Trinity House is an important historic landmark at Walton on the Naze. Earlier exploitation of the area is marked by ancient buried land surfaces, particularly on the foreshore between the Naze and Stone Point and to the south of Dovercourt, which have produced much evidence for prehistoric occupation, and numerous Red Hills (salt making sites). Important areas of historic grazing marsh also survive, as on Horsey Island.

2.2.4 Management Unit C: Tendring Peninsula

There is less low-lying land along this frontage than most of the other frontages, with the exceptions being St Osyth Marsh, Seawick, Holland Haven Marshes and part of Walton-on-the-Naze. St Osyth Marsh comprises drained agricultural land with the settlements of Seawick and Jaywick to the east including a substantial caravan park and Jaywick golf club.



Figure 2-10 Holland-on-Sea towards Clacton Pier

The seafront at Clacton-on-Sea (Figure 2-10) has important recreational and tourism value with attractions including the beach and pier. Walton-on-the-Naze is another important tourist destination with its frontage and pier. Although these settlements are mostly outside the tidal flood risk zone, they are at risk from coastal erosion throughout the frontage, which is why there are coastal protection structures.

The foreshore and cliff exposures, and excavations in the Clacton district (Clacton Cliffs and Foreshore SSSI), have provided opportunities for the study of one of the most important Pleistocene interglacial deposits in Britain. The Holland-on-Sea Cliffs SSSI represents a stratigraphic site of considerable importance. These sites can be precisely attributed to the Anglian glaciation, providing a fixed dating point within the terrace sequence of the eastern London basin and a means of correlation with sequences where the Anglian is represented elsewhere in southern Britain and on the continent.

Holland Haven Marshes SSSI represents an outstanding example of a freshwater to brackish water transition and includes a number of nationally and locally scarce species. Holland Haven country park, situated on the flood plain of Holland Brook, is important both for conservation and recreational value. Part of Walton-on-the-Naze is also within the tidal flood zone, with several buildings and

a caravan site at risk. There are several Martello towers along this part of the coast. Martello towers are small defensive forts built in the 19th century that are of historic significance.

Structures associated with the coastal resorts at Walton and Clacton are a feature of the area's historic built environment, as are defences including distinctive Napoleonic Martello towers and WWII pill boxes. The reclaimed Holland Haven marshes are likely to contain well preserved palaeo-environmental deposits and internationally important Palaeolithic remains are known from the Clacton Cliffs and foreshore SSSI. Areas of well preserved prehistoric land surfaces may survive in places and a number of finds of Red Hills (salt making sites) have been recorded on the coast which date from the late Iron Age/Roman period. Post medieval oyster pits, industrial features, duck decoys and extant and relict sea defences reflect the strong coastal/maritime nature of the historic environment of the area and fragments of historic grazing marsh survive in places.

2.2.5 Management Unit D: Colne Estuary

Most of the land in the tidal flood zone lies within the river flood plain and agricultural areas. There are the communities of Point Clear, Brightlingsea, Thorrington, Wivenhoe and Rowhedge. There is an active sand and gravel quarry, at Ballast Quay to the south of Rowhedge village. The Wick Marsh/Langenhoe Marsh/Fingringhoe Marsh area has military importance as a Ministry of Defence firing range and is also within the tidal flood risk zone. At Point Clear, there is a large caravan site within the tidal flood zone as well as another Martello tower, an associated battery and a museum. The camping and caravan site at Brightlingsea also provides amenity and tourist value.

The Colne Estuary is designated as a Ramsar site, SAC, SPA, SSSI and NNR because of its international importance for wintering Brent geese and black-tailed godwit and of national importance for breeding little terns and five other species of wintering waders and wildfowl. The variety of habitats which include mudflat, saltmarsh, grazing marsh, sand and shingle spits, disused gravel pits and reed beds, support outstanding assemblages of invertebrates and plants. Recently saltmarsh erosion has speeded up reflecting the ebb tidal dominance within the estuary.

The historic landscape of this unit is characterised by areas of important historic reclaimed coastal grazing marsh, such as Howlands Marsh. Relict and extant sea walls are a dominant feature of the area, as is The Strood causeway which links Mersea Island to the mainland and is of Saxon origin. Other earthworks relate to the medieval and post-medieval exploitation of the marshes, including raised trackways and enclosures. The unit is also characterised by post-medieval oyster beds, industrial and transport structures such as timber jetties, hulks and

the dismantled railway from Wivenhoe to Arlesford Quarry. Earlier archaeological remains include finds of flint artefacts retrieved from possible habitation sites along the foreshore, indicating the possibility that well preserved land surfaces may be present in places. The potential for palaeo-environmental remains and deposits in the unit is high and there are significant possibilities of archaeological remains directly related to these deposits including timber structures. A large number of Red Hills (salt making sites) survive, with notable concentrations along the Strood Channel.

2.2.6 Management Unit E: Mersea Island

This frontage covers Mersea Island. Most of the properties are outside the tidal flood risk zone, including the properties in the West Mersea and East Mersea settlements as well as the Outdoors Education Centre and the Mersea Vineyard. However, there are several camping and caravan sites that are potentially at future risk where they lie within or adjacent to vulnerable frontages. The landward side of Mersea Island is comprised of drained agricultural land behind the flood defences with a small area of saltmarsh. The area around Mersea has an important oyster industry.

Two areas of foreshore at East Mersea are of geological importance. Cudmore Grove Country Park and Mersea Stone have local conservation and recreational value. The foreshore area surrounding Mersea Island is part of the Colne Estuary Ramsar site, Mid Essex SAC, SPA and SSSI.

The beach at Cudmore Grove, East Mersea overlies a peaty deposit containing the faunal remains of species dating to 300,000 years before present. Finds of flint artefacts retrieved from possible habitation sites along the foreshore suggest that prehistoric land surfaces may survive in places. A number of Red Hills (salt making sites) have been identified along the north side of the island. The Strood Causeway linking Mersea to the mainland has been dated to the 7th century and two massive timber fish-traps of Anglo-Saxon date have been recorded within the intertidal zone off West Mersea flats. Military defences include the Tudor blockhouse at East Mersea and WWII defensive structures such as pillboxes located along the sea walls.



Figure 2-11 Mersea Island (courtesy of ECC)

2.2.7 Management Unit F: Blackwater Estuary

This unit covers the low-lying land surrounding the Blackwater estuary extending inland to Maldon. The area within the tidal flood zone is mostly agricultural land with sporadic farm buildings. There are, however, several settlements within this zone: St Lawrence, Mayland, Maylandsea, parts of Maldon and Goldhanger. Sections of several B-roads, as well as numerous minor roads, are also within the tidal flood zone. The campsites at St Lawrence, Mayland Creek and Vaulty Manor provide amenity value. There are several marinas in the estuary that have recreational, amenity and economic value. The site of the Battle of Maldon and National Trust property is a valuable tourist attraction.



Figure 2-12 Maldon, inner Blackwater estuary (courtesy of ECC)

Bradwell nuclear power station is currently being decommissioned. There are, however, plans for development of a new nuclear plant on the site and flooding or undermining of this site would cause numerous issues. The site itself was built on higher ground to avoid flood risk.

Blackwater Estuary NNR and SSSI is the largest estuary in Essex north of the Thames and is one of the largest estuarine complexes in East Anglia. The mudflats are fringed by saltmarsh on the upper shores and support internationally and nationally important numbers of overwintering waterfowl. Shingle and shell banks and offshore islands are also a feature of the tidal flats. The surrounding terrestrial habitats – the sea wall, historic grazing marsh and its associated fleet and ditch systems, plus semi-improved grassland – are also of high conservation interest. This rich mosaic of habitats supports an outstanding collection of nationally scarce plants and a nationally important assemblage of rare invertebrates.

There have been four managed realignments in the recent past: Northey, Orplands, Tollesbury and Abbots Hall. Northey Island Nature Reserve (National Trust), Ray Island Nature Reserve (National Trust) and several other local nature reserves further highlight the conservation value of much of the tidal flood risk zone.

The area includes extensive settled Neolithic land surface preserved within the intertidal zone. There are also many large timber fish weirs of Saxon Date. There are numerous Red Hills (salt-making sites) and duck-decoy ponds on the present and former marshes, and the estuary is fringed by extensive cropmark landscapes dating to the prehistoric and Roman period. Extant areas grazing marsh as at Old Hall and Tollesbury Wick are complex historic landscapes. Overall the Blackwater estuary has one of the most significant coastal wetland historic environments in England and is included on the English Heritage list of nationally-significant wetland sites as part of the Heritage Management of England's Wetlands initiative.

2.2.8 Management Unit G: Dengie Peninsula

Within this frontage the tidal flood zone is nearly all drained agricultural land with scattered farm buildings and some minor roads. Othona Roman fort, a Saxon shore fort, and the chapel of St Peter on the Wall are of important value both historically and as tourist attractions. The remains of a very large Saxon fish-trap at nearby Sales Point is also a rare example of a Scheduled Ancient Monument within the intertidal zone.

The Dengie NNR, Ramsar site, SPA and SSSI saltmarsh is the largest continuous example of its type in Essex. The foreshore, saltmarsh and beaches

support an outstanding collection of rare coastal flora and internationally and nationally important wintering populations of wildfowl and waders, as well as supporting a range of breeding coastal birds in summer. Bradwell Cockle Spit Nature Reserve is made up of saltmarsh and shellbank habitats that support many species of breeding birds.

Bradwell Beach is also important to local people and visitors for its amenity value.

Earlier occupation of the marshes is marked by the survival of numerous Red Hills (salt-making sites), duck-decoy ponds, former sea-walls and World War II defensive sites. Former cheniers (beach ridges) are also buried within the marsh and these may well have served as central points for occupation and activity in the past.

2.2.9 Management Unit H: Crouch and Roach Estuaries

The settlements in the tidal flood zone include parts of Rochford, South Woodham Ferrers, Burnham-on-Crouch, Paglesham Churchend and Paglesham Eastend. Infrastructure found in the tidal flood zone includes several minor roads and the railway line between South Woodham Ferrers and Burnham-on-Crouch, along with the station at Althorne.

The marinas at Burnham-on-Crouch, Althorne and North Fambridge provide recreational and economic value, along with the campsites around Burnham-on-Crouch. Foulness and Potton islands have significant military importance as firing ranges for the Ministry of Defence.

The Crouch and Roach Estuaries Ramsar site, SPA and SSSI is of international importance for bird species, with other interest being provided by the water and land invertebrates and an outstanding collection of nationally scarce plants.

Wallasea Island is currently undergoing managed realignment. The north-east section of the Island has been realigned. The RSPB has planning approval up to 2019 for the creation of 668 hectares of new habitat, of which 457 hectares would be intertidal. The remainder is saline lagoon, engineered water vole habitat, grazing marsh, new sea walls and arable land. The north-west corner will remain protected. Completion of the project is dependent on the availability of funding and sufficient suitable material to raise the land height within the island.

A range of archaeological deposits and features, including prehistoric relict land surfaces, peats and 'submerged forests' survive well, within and beneath the alluvium, and in the intertidal zone. There are also numerous red hills, relict seawalls, oyster pits, timber structures and military remains. The extant grazing

marshes are complex and significant historic landscapes. There are important areas of surviving historic grazing marsh as at Blue House and Morris Farms. In view of its complex and important historic environment, the Upper Crouch Estuary has been included on the English Heritage list of nationally-significant wetland sites as part of the Heritage Management of England's Wetlands initiative.

2.2.10 Management Unit I: Foulness, Potton and Rushley Islands

The land in this unit is low-lying and the three islands are completely within the tidal flood zone. This includes the Ministry of Defence controlled firing ranges on Havengore and Foulness islands that extend offshore onto Maplin Sands. The associated buildings include the hamlets of Churchend and Courtsend. The Broomway public right of way across Maplin Sands has amenity value.

Foulness Ramsar site, SPA and SSSI is part of an open coast estuarine system made up of grazing marsh, saltmarsh, intertidal mudflats and sandflats which support nationally rare plants. It also supports nationally and internationally important populations of breeding, migratory and wintering waterfowl.

A range of archaeological deposits and features, including prehistoric relict land surfaces, peats and 'submerged forests' survive well, within and beneath the alluvium, and in the intertidal zone. There are also numerous red hills, relict seawalls, oyster pits, timber structures and military remains. The extant grazing marshes are complex and significant historic landscapes.

2.2.11 Management Unit J: Southend-on-Sea

Southend-on-sea is among the most populous and densely developed communities in the Essex and South Suffolk SMP area and functions as a regional coastal resort.

The whole frontage is at risk from erosion, which is why there are coastal defences along its whole length. The Southend-on-Sea seafront has important recreational and tourism value with attractions including the beach, pier, aquarium and museum.



Figure 2-13 Southend Seafront Pier

In addition to the erosion risk, approximately 9 km of the frontage is low-lying. The tidal flood zone extends up to 1.5 km inland and contains thousands of properties at Shoeburyness, Southchurch and other areas of the seafront. Sections of the B1016 and the railway line at Leigh-on-Sea are in the tidal flood zone, and so is the Thorpe Hall golf course at Southchurch. Shoeburyness is of military importance as a Ministry of Defence firing range. Some of the defences in this frontage are owned by Network rail, the Ministry of Defence and private developers.

Benfleet and Southend Marshes Ramsar site, SPA and SSSI is made up of an extensive series of saltmarshes, mudflats, scrub and grassland that support a range of flora and fauna. The south-facing slopes of the downs, made up of London Clay capped by sand, represent the line of former river cliffs with several river valleys known as re-entrant valleys because they were carved out by rivers and then filled by glaciers.

2.3 Role of Shoreline Management

2.3.1 Introduction

This section aims to illustrate how shoreline management can influence the position and nature of the Essex and South Suffolk shoreline and the activities and values around it. This is done by setting out two extreme scenarios for shoreline management and assessing the effects of these scenarios on the

shoreline in terms of the development of the land and level of flood risk. These two extreme management scenarios are:

- **No Active Intervention (NAI)** – this scenario assumes that the defences are no longer maintained and will therefore fail gradually over time. NAI does not, however, involve actively removing the existing defences, so for a time the defences will provide some residual protection while they are failing.
- **With Present Management (WPM)** – this scenario assumes that all current frontline defences are maintained to provide the same level of protection as they currently do. This includes keeping up with the effects of climate change. WPM is Hold the Line for the majority of the Essex and South Suffolk coastal flood and erosion defences and NAI for the remainder.

The role of shoreline management is discussed at a high level for the whole of the SMP area. More detail, including location-specific discussion for each of the management units, is provided in **Appendix F**.

We should make clear that there is an element of uncertainty in all aspects of the analysis. Specific gaps in knowledge are highlighted in the text (section 1.5), as they need to be dealt with in developing the plan and addressed in implementing it through the action plan.

2.3.2 Background developments

In looking at future effects of the policy scenarios, it is important to determine first how the conditions will change over the short, medium and long term. Section 2.1 describes historic and ongoing developments. It sets out the predicted rates of sea level rise and indicates that storminess is also likely to increase. Based on this information it is possible to indicate how the foreshore might develop, which is essential in describing the effects of the two extreme management scenarios.

For the estuaries, there is a general trend of erosion throughout the middle and lower estuaries, combined with sediment accretion in the upper estuaries and their creeks systems. There is an overall net loss of saltmarsh, which is estimated conservatively at approximately 48 hectares per year. There is some uncertainty to what extent these developments are happening only in response to sea level rise or whether there are other contributing factors. The SMP's Action Plan identifies the need for monitoring and study to improve understanding. For the short term, it is likely that the ongoing trend will continue. For the medium and long term, there is much more uncertainty: the current trend may continue or could accelerate as a result of accelerating sea level rise, but it could also slow down due to other processes. It has to be noted that the processes are not fully understood; there are other factors which may cause the frontage to develop differently, which is one reason why the SMP is reviewed on a regular basis.

For the coastal frontages, there are different trends in different sections of the SMP area. At the Tendring frontage, there is a nearshore sediment divide in the vicinity of Clacton. To the south of Clacton, sediment moves along the shoreline to the southwest and accretes at Colne Point. To the north of Clacton, the net sediment drift is northwards with a sediment convergence, roughly in the vicinity of Walton, where it meets the southerly drift from the north leading to a sediment deposition at the Naze (Essex SMP1, 1996). For Mersea Island, the foreshore consists of mudflats and sandflats; these are generally eroding. For Dengie and Foulness there are indications of a general trend of saltmarsh and mudflat accretion. This is the response of the shoreline to sea level rise if there is sufficient sediment available. Finally, the Southend frontage is similar to Mersea, with a foreshore of sandflats and mudflat which are generally eroding. Generally, these overall trends are likely to continue in the short term. On the medium and long term the response to sea level rise is more difficult to predict. Where the trends are related to sea level rise (such as the accretion at Dengie and Foulness), they are likely to continue or even accelerate as the rate of sea level rise increases. However, different trends are possible as a result of the other factors that influence the processes, such as sediment availability and channel morphology. Again, the SMP's Action Plan has identified the need for monitoring and study to improve understanding to inform future shoreline management.

2.3.3 With Present Management

For most of the Essex and South Suffolk SMP shoreline, continuing present management would mean holding the flood defences in place that are present along most of the estuaries and coastline, and holding the coastal defences in the seaside towns. There are a number of frontages without current defences (mostly in Stour and Orwell plus the Naze), and these would remain undefended.

Continuing to hold the **flood defences** in their current place and to the current standard of protection would of course help sustain the existing land use behind the defences, including the communities, dwellings, businesses, infrastructure, historic and environmental features. However, climate change is likely to increase the pressure on the defences. This could become particularly problematic in locations where there is no or limited foreshore in front of the defences, where the foreshore is eroding or where the defences are of poor quality. Holding the line where the foreshore is eroding can also lead to accelerated loss of beaches and marshes. These natural features are being 'squeezed' between sea level rise and hard defences leading to the loss of valuable habitats, natural resources and heritage assets. This in turn can make the coast more vulnerable to coastal processes, lead to the loss of valuable

habitats and have a negative impact on local economic activities seaward of defences such as fisheries, recreation and eco-tourism.

For the **coastal towns**, holding the defences in place would sustain the seafront which is vital for the towns' character and economy. However, for some of the towns the coastal processes are already making this difficult, and this is likely to become more difficult into the future. In addition, holding the line may reduce the availability of sediment: this could threaten the beach locally, but could also have a longshore impact on neighbouring frontages and all their features and values, which could threaten the tourist economy.

For **currently undefended areas**, continuation of this approach would sustain the natural processes and the landscape. Climate change may lead to an accelerated rate of erosion, but there is no reason to consider active intervention until erosion starts to threaten significant features. Conversely: the alternative option to start holding the line would typically have negative impacts on coastal processes, but this could be justified if it protects important features at risk.

2.3.4 No Active Intervention

For the areas that are currently defended, both against erosion and flooding, this scenario would set in motion a process of gradual and unmanaged deterioration of the defences until they no longer function. As discussed in section 2.1.6, the residual life depends on the current condition, the asset type and its exposure, and varies between very short (0-10 years) and very long (more than 100 years). In time, the probability of flooding and erosion would increase and on the medium to long term, all low-lying areas along the shoreline would revert to an intertidal state while the cliffs would progressively erode. There are significant areas in the Essex and South Suffolk SMP area where the defences protect dwellings and settlements, and these would be lost in time in this extreme and unrealistic scenario. For most areas it would also come at the expense of agricultural land and it could cause pollution from existing contaminated land, landfill sites or industrial areas. The gradual return of natural processes, although unmanaged, might in time lead to significant gains for the local economies through fisheries, recreation and eco-tourism.

For currently undefended areas, this scenario is a continuation of the current approach as described above.

2.3.5 Summary

At the broad-scale level of the SMP, the key differences between the scenarios are obvious: With Present Management would continue to sustain land use in the defended areas with all the associated benefits, but it can cause squeeze of the

intertidal area and it could become more and more difficult in the future. No Active Intervention would require significant adaptation of society, at a local and regional scale and would cause an unmanaged increase of flood and erosion risk and loss of land and assets.

The assessment shows that continuing to hold the existing alignment meets the short-term aspirations for managing existing land use and infrastructure and protecting the most people and property for as long as possible. For many areas, this may be the right solution. However as time passes there will be an increasing negative impact on the seaward assets of this coast which are very important for the local economy and society as well as for the environment both locally, regionally and nationally. Therefore, for some frontages a change of approach may be needed. This change of approach will have to happen in a managed way: the assessment also shows that wherever the defences protect important features, No Active Intervention is not realistic because it will lead to an unmanaged increase in flood and erosion risk and loss of land and assets.

2.4 Sustainable Shoreline Management: Finding the Right Balance

2.4.1 The 'big decisions' for the Essex and South Suffolk SMP

This section builds on the conclusion of the preceding one to identify the 'big decisions' that this plan needs to make.

The preceding sections show that the Essex and South Suffolk shoreline poses some very particular challenges to shoreline management, which are essential for the future of the area itself and could also be significant on a regional or even national scale. Particular ways of managing the shoreline will benefit some of these values and land uses, but damage others. The aim of this shoreline management plan is to develop a plan that achieves the right balance between all these values. This is reflected in the set of principles and corresponding criteria that was agreed among all partner organisations involved in the development of this SMP (see section 1.4). Based on the principles, the SMP has worked toward three key aims:

- Protect the most people and property we can for as long as we can;
- Allow people and places time to adapt;
- Balance environmental, social and economic needs.

Section 2.2 identifies for each Management Unit the values and land uses that can be influenced by shoreline management. These findings illustrate the 'big decisions' that the Shoreline Management Plan has to make. The two scenarios from section 2.3 are extremes, so in reality there may be opportunities to develop a plan that benefits all values and land uses. However, there are also cases

where hard decisions have to be made because the interests are conflicting. For such cases, it is essential that the plan aims to provide sufficient time for adaptation, for people, businesses and other organisations, including the mitigation of impacts on significant features.

For the Essex and South Suffolk SMP area, the ‘big decisions’ for shoreline management can be summed up as follows:

- For the coastal defences that protect the seaside towns against erosion, the question is how to sustain the vital role of the seafront for the towns’ character and economy. Holding the existing alignment protects existing features, but it can be difficult and it can have a negative impact on the beach and elsewhere along the shoreline.
- 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.
- For all other flood defences, the SMP does have to ask the question whether continued defence is the best solution in the face of increasing pressures and the negative impacts 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. Pressure can also come from waves where the foreshore is eroding. These pressures can lead to undermining of the defences and are likely to increase as a result of climate change. In such cases, holding the existing defence alignment will be difficult.
- 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, some of which are protected by international designations, in addition to their value for the local economy. It has been recognized that the natural environment is a valuable asset, although quantifying the value of the natural environment is extremely difficult. Moving the defence landward could mitigate for this threat of losing the natural environment as a valuable asset.
- The defended areas have important values, even if they don’t include settlements or key infrastructure. This includes agriculture, access to the shoreline and heritage assets. They also contain important freshwater habitats, some of which also have international designations and value to

the economy. Similar to above, the natural environment is recognised as a valuable asset, in some cases, the functioning of the freshwater and intertidal habitats is mutually dependent.

Finally, the SMP looks at the long term, but we only have limited knowledge about future developments. This is the case for the coastal processes, but 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 and flexible in the face of these uncertainties.

2.4.2 Moving forward to solutions

These considerations have steered the development of the Shoreline Management Plan.

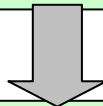
We have started by using these considerations to identify which of the four policies could be realistic for each of the SMP's frontages. For some of the frontages this led to the conclusion that there is only one realistic option; for other frontages this identified which options needed appraisal. These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

The process included a number of steps to refine and streamline the policy appraisal.

The full process of option development and appraisal is described in **Appendix E**, with references to more details in the other appendices. This main SMP report focuses on the Plan: chapter 3 describes the plan and its implications, while chapter 4 describes the specifics of the plan per Policy Development Zone.

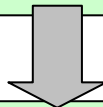
STEP 1

For frontages that are currently defended against flooding, we identified which are under pressure, now and in the future, either because of the state of the existing defences or because of intertidal evolution. The maps in Appendix F4 show the results of this analysis. For these frontages, Managed Realignment was identified as a realistic option, to be appraised against Hold the Line.



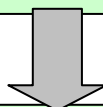
STEP 2

For the currently defended frontages that are not under pressure, the economic viability was assessed to check that Hold the Line would be realistic. Where this is the case, Hold the Line was identified as the only realistic option, based on the principles and aims of the SMP. For frontages where Hold the Line is not viable, there is a need to appraise Managed Realignment against No Active Intervention.



STEP 3

For currently undefended frontages, continuation of No Active Intervention is a realistic option. However, for frontages where ongoing erosion could affect features, it could be a realistic option to start defending against erosion. We identified those frontages for which this is the case, and for these a policy of limited intervention (labelled as Managed Realignment) was appraised against continuation of No Active Intervention.



STEP 4

This process led to a list of Policy Development Zones for which there was **more than one realistic** option. We have then appraised these options against the **criteria** that are based on the **principles**, as listed in **section 1.4**. This has led to the selection of the policies suggested in this draft SMP.

3 General description of the plan

3.1 Overview of the plan

The overall intent of management for the Essex and South Suffolk shoreline is

- to keep protecting all dwellings and key infrastructure against flooding and erosion for the coming 100 years;
- 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 provide sufficient time to adapt;
- to realign vulnerable flood defences that are currently under pressure from natural coastal processes to a more landward alignment to 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 intent is to continue to hold the existing line of flood and coastal defences throughout the short, medium and long term.

For a number of frontages however, the SMP process has identified that the defences are under pressure from eroding channels or from wave attack, typically in the middle and outer reaches of the estuaries. This pressure is likely to increase with climate change and sea level rise. For these frontages a change of policy is desirable, by realigning the defences to a more landward, more sustainable location (while continuing to protect all dwellings and key infrastructure). However, there are defences under pressure where realignment is not seen as a realistic option because of overriding constraints. This can be because existing land use is too important and needs the existing alignments. There are also cases where the defence itself, or the area behind it, contains contaminated land, which is likely to make realignment unviable. The SMP's Action Plan includes a study to assess the economic feasibility of realigning flood defences and dealing with the contamination, for input into the next SMP review.

There are also a few frontages in the Essex and South Suffolk SMP area where Managed Realignment is the proposed option even if the defences are not necessarily under pressure. These are frontages where the defences don't protect any dwellings or significant infrastructure which means that continued maintenance would be challenging. Realignment is often a more positive approach than a policy of no active intervention as it will create intertidal habitats and the associated socio-economic benefits. EU-funded research has concluded

that managed realignment sites have wider benefits than simply habitat creation or serving flood risk management. The economic value of these wider benefits is recognised but remains difficult to quantify.

This approach has identified a list of 29 policy development zones where the SMP proposes managed realignment for flood defence frontages: 3 in epoch 1 (of which 2 were already in progress during the development of the SMP), 16 in epoch 2 and 10 in epoch 3, of which 2 are dual policies that could also be confirmed to have a Hold the line policy. 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.

The proposed timing of the realignments in the plan (short, medium or long term) aims to ensure that there is sufficient time for people, businesses and organisation 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 so we can maximise the opportunities for reducing flood risk, enhancing 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 events. This could mean that timing of realignment may be re-considered and changed.

As stated before, where these 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.

Managed realignment works with natural processes to absorb large surge tide events and also create new intertidal habitat. 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 with them. 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.

There are a number of frontages, typically where flood defences protect larger settlements, where the SMP's intent 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 and in some instances more detailed analysis

beyond the SMP will be required. The SMP's Action Plan which can be found in Section 5 identifies the timing, roles and responsibilities for this.

For most of the frontages that are currently undefended (parts of the Stour and Orwell estuary, the Naze, Paglesham Creek and isolated frontages on the Blackwater, Crouch and on Mersea Island), the intent is continue this approach throughout the short, medium and long term.

However, where erosion threatens important features, the intent is to allow local intervention (reliant on the granting of appropriate permissions, such as planning consent, by appropriate authorities) 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 The Strand at 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 on the medium and long term are difficult to predict. The SMP's Action Plan identifies the monitoring and research that will be needed to inform the planned review of the SMP in 5 to 10 years time.

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. **Landowners will still have to seek appropriate permissions prior to commencement of works. A streamlined consenting approach is currently being trialled between the Environment Agency, landowners, the CLA and the NFU.** 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.

Therefore, 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 of **Appendix M**).

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 the loss of intertidal habitats due to coastal squeeze. For this purpose, the relevant partner authorities have worked and will continue to work with landowners to achieve the targets set by the 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 policy statements for each management unit in chapter 4 describe in more detail what the plan proposes for each section of shoreline.

3.2 Implications of the plan

The plan primarily describes how we intend to manage the shoreline, but this has been driven by, and will have implications for, a range of functions, features and

values. The overview of the plan in section 3.1 and the policy statements touch on the most relevant implications; this section describes the implications in more detail for a range of aspects.

The Strategic Environmental Assessment (SEA) process is a legislative requirement that accompanies the SMP and intends to make sure that environmental and socio-economic issues relating to the coast are central to developing and evaluating policy. Further details on the SEA can be found in **Appendix L**. The SEA supports a structured evaluation of the key environmental and socio-economic implications by evaluating the effects on an established suite of categories in a targeted and specific manner. The evaluation in this section is consistent with the SEA, but uses the categories identified in the SMP guidance.

Property and infrastructure

The plan intends to provide continued defence for all dwellings that are currently at risk of flooding and erosion. This concerns the low-lying areas of major settlements such as Felixstowe, Ipswich, Manningtree, Harwich, Colchester, Maldon, South Woodham Ferrers, Rochford and Southend, and all other settlements and isolated dwellings around the shoreline. The flood defences in the Essex and South Suffolk SMP area currently protect over 22,000 properties, and with sea level rise this would increase to over 31,000 in 2105 (assuming no further development in the tidal flood zone). In addition, the properties that continue to be protected from erosion are mainly along the seafronts of Harwich, Walton, Frinton, Clacton, West Mersea and Southend.

The plan also intends to provide continued defence to key infrastructure such as Felixstowe and Harwich ports, all A-roads and railways and Ministry of Defence property in and around Foulness, Great Wakering, Fingringhoe and Langenhoe. For all critical infrastructure, including key evacuation routes, the plan either intends continued protection, or it aims to start a process to enable adaptation (such as for The Strand at Wherstead).

One role of the SMP is to provide information to the Local Planning Authorities about the areas which are vulnerable to flood or erosion risk. The SMP should form part of the evidence base when Local Planning Authorities are preparing their LDFs both when setting policy and allocating land as part of the Site Allocations process. It is expected that the land use planning system will ensure that a rigorous assessment of flood and erosion risk accompanies any applications for residential or key infrastructure development in the areas identified as being at risk of tidal flooding or erosion, either now or in the future, in accordance with the draft national planning guidance on Development, Flood Risk and Coastal Erosion. This is an important starting point of the plan.

Along the frontages with potential managed realignments, where defences are still needed to protect dwellings or key infrastructure, these would usually be built in a more sustainable place further inland, typically on higher ground. This would allow for a much wider foreshore to reduce wave attack and to prevent undermining by estuary channels. Most of the realigned defences are also likely to be shorter than the existing alignments. These factors reduce the likelihood of flooding compared to holding the existing alignment. Moving the defences closer to the features behind them could increase the impact if a flood does occur. This will have to be addressed in developing the realignment beyond the SMP

Communities and local economy

The plan intends to provide continued flood and erosion defence for all settlements.

For most low-lying frontages, continued protection of the settlements and the surrounding area supports the communities and the socio-economic role of agriculture. For those frontages where defences are realigned, there will be a negative effect on agriculture; see under 'land use'. Continued protection of the seaside towns (Harwich, Walton, Frinton, Clacton, West Mersea and Southend) is essential for those particular communities and their local economy.

The impact of managed realignments on fisheries (including the oyster industry), navigation, tourism and coastal land use such as wildfowling is very specific to each location and situation. There can be a negative effect if poorly designed, but realignments can also create opportunities for improvement. These effects and opportunities will be taken into account during project appraisal and scheme development, which will be carried out with full stakeholder involvement before any works start.

Where significant features are at risk of erosion along frontages with no current defences (particularly in the Stour and Orwell estuaries), the SMP keeps open the possibility of limited intervention, as long as the effect on natural estuary processes is minimised.

Land use

For those frontages where defences are proposed to be realigned, there will be a negative effect on agriculture. The area affected is shown in Figure 3-1. This is based on the Agricultural land classification of England and Wales (Ministry of Agriculture, Fisheries and Food 1988).

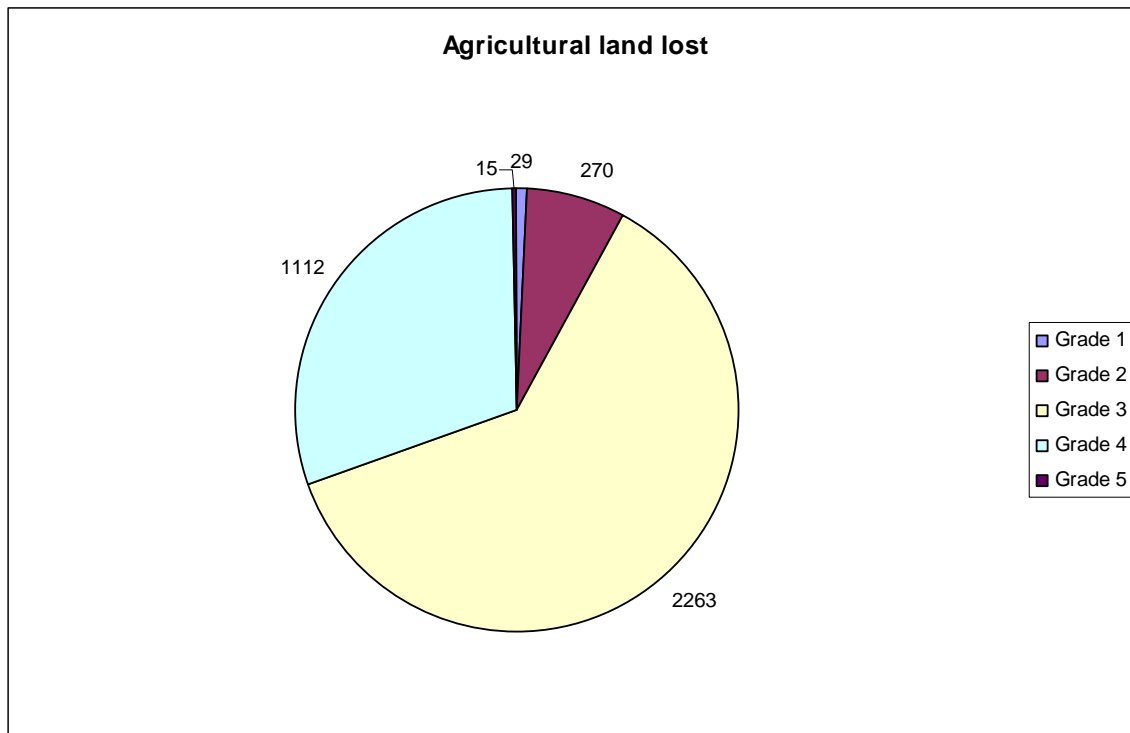


Figure 3-1 Area of agricultural land affected by potential managed realignments

Most of the affected land is Grade 3 and 4, which is abundantly present both locally and nationally. The potential realignments would affect approximately 4.5 per cent of the agricultural land in the SMP area's floodzone, with an emphasis on Grade 3 and 4 land. The impact for each of the grades is less than 0.1 per cent on the total agricultural land in England. Table 3-1 shows the approximate areas of agricultural land loss per grade and epoch.

Table 3-1 Agricultural land affected by potential realignment throughout the SMP epochs

Agricultural land grade	Hectares lost			Total
	Epoch 1	Epoch 2	Epoch 3	
Grade 1		29		29
Grade 2	10	260		270
Grade 3	785	951	527	2263
Grade 4	9	280	824	1112
Grade 5		12	3	15
Non agricultural		136	40	177
Urban*			1	1
Total	803	1668	1395	3866

*in fact these areas are undeveloped areas on the fringe of urban land

**the area of agricultural land lost excludes the conditional realignments at Holland-on-Sea (PDZ C2) and Jaywick (PDZ C4).

***loss of agricultural land in epoch 1 includes the loss of a substantial area of Wallasea Island

The impact can be significant locally. However, because the affected area is relatively small and mostly of relatively low quality, there is only a limited impact on the economy and on food supply at a regional and national scale. Note that intertidal areas can have some residual agricultural value for sheep grazing on salt marsh. Future reviews of the SMP in the coming years will have to take account of emerging insights and policy on food security.

The issue of potential future loss of agricultural land to address the UK's legal conservation responsibilities is recognised nationally both within the Environment Agency and Defra. This will be considered nationally once all 22 Shoreline Management Plans have been completed across England and Wales. Many of the potential managed realignments highlighted in the Essex and South Suffolk Shoreline Management Plan are proposing realignments on land which is not currently used for food production.

Wildlife and geology

Much of the Essex and South Suffolk SMP shoreline, both behind and in front of the defences, is currently protected by national and international designations. These designations concern intertidal habitats and species, freshwater and brackish habitats and species and geological features.

As far as intertidal habitats are concerned, in the majority of cases shoreline management will not significantly affect the ongoing large-scale processes on the estuaries and the coast. Where very large managed realignments are proposed, such as at Wallasea, they will have to be designed so that their wider impact is

manageable. Shoreline management can however have significant local effects. In the estuaries, the potential realignments in the middle and lower reaches of the estuaries will reduce constraints on the natural processes. The potential realignments will also create new intertidal habitats to compensate for the ongoing and predicted net losses of saltmarsh. The plan (excluding dual policies in Tendring (MU C) would create on average approximately 37 hectares a year of intertidal habitat, which could be both mudflat and saltmarsh.

Some of the potential landward realignments will create new intertidal habitats at the expense of currently-designated freshwater or brackish habitat. Most of these realignments are proposed for the medium or long term. The lost habitats will have to be replaced elsewhere and be fully functional before they are lost, which can take a long time for long-established habitats. Still, over the long term, with increasing pressure on the defences, this is likely to be more sustainable than continuing to defend the freshwater and brackish habitats against tidal flooding. The relevant partner authorities intend to work with local landowners and other relevant organisations to identify the best sites for mitigation and compensation of lost freshwater habitats, for example through the Regional Habitat Creation Programme. Whenever possible, replacement of freshwater habitat should take place as near to the area of loss as possible to enable retention of the habitats' function and population. This is particularly important for the freshwater habitats of Suffolk where the implementation of this SMP and the Lowestoft Ness to Felixstowe Landguard Point SMP may result in significant loss of freshwater habitats. Replacement fresh water sites will be sought ahead of realignment projects.

The geology of the area is of national importance and the following sites are designated as Sites of Special Scientific Interest for their geological interest: The Stutton Cliff (part of the Stour Estuary SSSI), The Naze, Holland-on-Sea cliff, Clacton cliffs and foreshore, The cliff at Burnham-On-Crouch, as well as The Blackwater Estuary SSI, which is designated for both its biological and geological interest. Of particular interest are the exposed and currently undefended cliffs at The Naze and The cliff at Burnham-on-Crouch. These will largely remain undefended; only at the southern end of the Naze, the policy is to manage and slow down the erosion in order to limit erosion risk to the Naze Tower.

The Appropriate Assessment, the Strategic Environmental Assessment and the Water Framework Directive assessment (Appendices K, L and M) contain a comprehensive assessment of the effects of the plan on environmental features. Section 1.5 explains how these stand-alone documents relate to the SMP.

Landscape

The landscape of the Essex and South Suffolk coast has characteristics resulting from the action and interaction of natural and human factors. For the Stour and Orwell estuaries, the importance of the landscape is also reflected in their designation as part of the Suffolk Coast and Heaths Area of Outstanding Natural Beauty (see section 2.2.2). The remainder of the SMP area is characterised by the extensively rural Essex coastline, interspersed with major seaside resorts and ports, is filled with creeks and estuaries that over millennia have been exploited for trade, transport, fishing, shellfish, salt manufacture and grazing pasture; resulting in a historic landscape of great significance for nature conservation and local communities (Heppell and Brown 2008).

The plan intends to help sustain the quality of the landscape as it is perceived by the people living and taking part in recreation activities in and around the Essex and South Suffolk coast. Potential realignments in the Orwell Estuary could have a significant impact on the AONB by changing freshwater habitats to intertidal habitats; this will be mitigated by aiming to recreate freshwater habitats within the AONB area. In the most heavily defended parts of the estuaries, the plan aims to enhance the natural and historic character of the landscape and make it more sustainable. The impacts on the historic landscape are discussed separately in the section below about historic environment.

Historic environment

It is important to note that heritage assets are not just individual features, but often collections of inter-related features or landscapes. Heritage assets are also irreplaceable and, where significant, can be extremely expensive to record or (in the case of key buildings) move. There are also important links to be made between historic freshwater grazing marshes, for example, and the rare plants and animals they support. Finally, the historic environment makes an important economic contribution to the area, through tourism associated with heritage assets and historic landscapes.

The effect on the historic environment has been assessed through the following six indicators:

- Presence of designated heritage assets;
- Presence of significant undesignated heritage assets;
- Expected quality of preservation;
- Archaeological potential;
- Historic landscape quality;
- Expected scale of mitigation.

The effects on these indicators have been examined separately for each Policy Development Zone in consultation with the partner organisations. This

assessment has informed the appraisal and has played a role in determining whether realignments are proposed for the short, medium or long term.

For all frontages where the existing line is held, there is no significant effect on heritage assets. The natural evolution of the estuary and coast may have a gradual effect on features, such as Saxon fish-traps, in the intertidal area but rapid change is unlikely, which means there should be sufficient time for preservation by recording of any features under threat. By intending to continue flood defence to all settlements, the SMP supports the character of the historic environment by protecting numerous clusters of Listed Buildings and a range of Conservation Areas.

For a number of the potential managed realignment frontages, there could be significant effects, especially in the archaeologically-rich Blackwater and Crouch estuaries. There could be a large negative impact on the historic landscapes, in particular the collective importance of long-term settlement patterns and land uses, and their relationship to natural environment designations such as biological SSSIs. Areas with significant heritage assets, high landscape value or high archaeological potential should, where possible, be accommodated by design of the realignment projects. Mitigation of the impacts on heritage assets can require significant time and resources; these will need to be provided in the further development of the potential realignments beyond the SMP. It needs to be noted that there is no effective mitigation for the loss of historic landscapes. Where the SMP proposes Managed realignment for such areas, the epoch of realignment has been chosen to allow time for recording and mitigation of individual heritage assets, such as archaeological sites; it is even possible that future reviews of the SMP will revert the policy to Hold the line based on improved knowledge.

Erosion on undefended frontages would have moderate to high adverse impact on most aspects related to the historic environment. The Butt and Oyster Public House, a Grade II Listed Building on the Orwell southern bank, is the only Listed Building that might be at risk from erosion of undefended frontages due to its proximity to the expected erosion risk area. The proposals to prevent erosion of the southern end of the Naze cliffs will, if implemented, prevent the loss of the Grade II* Listed Naze Tower.

Amenity and recreation

Most amenity and recreation features are covered by the other aspects such as navigation, specific tourist spots such as the seaside towns and monuments, historic environment and landscape.

The potential realignments will affect a number of caravan parks and campsites throughout the SMP area. They will also affect golf courses in Holland Haven and

at Point Clear. The plan intends to provide enough time for these businesses to adapt, and their interests will be taken into account when implementing the SMP through the Action Plan. The impact of shoreline management on caravan parks is a national issue which needs a nationally consistent approach. The Action Plan identifies the need to develop this.

A particular element of amenity and recreation concerns the access to the shoreline. The intended realignments will have an effect on the footpaths. They will involve breaching the existing defences in one or more places, which will cut the public footpaths that run on top of many of the embankments. The footpaths are an important feature of the area and will need to be sustained, for example through re-routing. The best solution needs to be determined as part of the plan's implementation, in cooperation with the Highway Authority. This will also need to link up with the Marine and Coastal Access Act which will develop a footpath around the whole of the English and Welsh coast. Managed Realignment can also create opportunities to improve access to the coast and other amenity and recreation features.

The maintenance and provision of flood defences is undertaken by the Environment Agency under permissive powers laid out in the Water Resources Act. The EA does not have a duty to maintain or provide defences under Flood defence law. The defences are rarely owned by the Environment Agency and ownership usually resides with the landowner. Where defences would no longer be maintained by EA, landowners may undertake maintenance through consent. If a landowner or EA officially no longer wishes to maintain a defence and the wall and footpath deteriorate, a footpath diversion would be recommended. If EA withdraw from the defence they would advise the highways department. Where active management of a defence under managed realignment is concerned any footpath diversion and provision of land for a new footpath would be secured through the MR scheme and where possible opportunities to enhance access would be sought.

3.3 Economic viability

The SMP guidance states that "*policy decisions are initially taken upon the appraisal of achievement of objectives, not on an economic appraisal. Economic assessments are only undertaken to provide a check on the viability of the selected preferred policies,*" (p.13, section 2.5). This reflects the overall aim of SMPs to develop shoreline management plans for balanced sustainability. The SMP only needs to do a check on the economic viability of the policies to assess whether a policy is clearly viable, challenging or of marginal viability. Even so, there could be cases where a marginally viable or even economically challenging policy is selected as the policy. It is important to clarify that a defence that is economic to maintain (i.e. benefits:cost ratio greater than 1) may not also be

affordable from finite public finances. This is because funding availability in the future cannot be predicted. There is a need to explore all sources of funding for all epochs.

For the Essex and South Suffolk SMP, the assessment of economic viability is largely based on available information from strategies. For some of the frontages this has been complemented by a broad scale analysis of costs and benefits. **Appendix H** gives further background and details. It is important to note that at the broad-scale level of the SMP it is only possible to calculate the benefits from the protection of properties and the costs from building and maintaining defences. All other sources of costs and benefits have been taken into account qualitatively in the assessment. Further economic assessments will take place beyond the SMP, as part of the implementation of the plan.

The overall outcomes of the economic viability analysis are as follows:

- The Plan is clearly viable for frontages where settlements are defended against flooding, either through Advance the Line, Hold the Line or Managed Realignment policies. For a number of these frontages, the available information or the SMP's broad scale analysis shows that the benefits of defence are at least four times as high as the costs. For these frontages, it is realistic to expect that the standard of protection will at least be sustained, including taking account of climate change. Note that this is based on current insights in nationally available flood and coastal erosion budgets and in climate change predictions. Also note that for the other frontages, it may also be possible to maintain or even upgrade the standard of protection, but this will require more detailed study beyond the SMP.
- There are a number of PDZs where the plan is marginally viable or even looks challenging. This concerns both Hold the Line and Managed Realignment PDZs. It is important to note the following comments:
 - The assessment of costs and benefits is typically conservative, because it can't take account of all benefits to society. How conservative the benefit-cost ratio is, depends on the source of information. We have made a judgement to take this into account in our conclusion on the economic viability per PDZ (see Appendix H).
 - If an SMP policy is assessed to be challenging from a flood and coastal risk management point of view, then it needs to be clear what the drivers for the policy are, including related sources of funding.
 - For Hold the Line policies that are assessed to be unviable, these sources of funding typically relate to use of the defended land (for example by land owners). The alternative for these cases would be a No Active Intervention policy. Note that for some of the PDZs a Managed Realignment policy has been proposed because continuation of the current hold the line policy

- was assessed to be unviable, but the potential benefits of Managed Realignment are judged to exceed the costs (compared to No Active Intervention). There are also cases where there is no alternative that is more viable, for example where contamination issues mean that costs of realignment are likely to be excessive.
- For Managed Realignment policies assessed to be challenging, the sources of funding would be from partner organisations with an interest in intertidal habitats.
 - The economic viability has not been assessed for PDZs where the policy is No Active Intervention, because this policy does not lead to flood and coastal erosion risk management interventions, and therefore there are no benefits and costs to compare. In reality, a No Active Intervention policy does of course have an economic impact, but this has been included through the appraisal of principles and criteria.
 - The situation is similar for PDZs where the policy is limited local intervention where erosion is threatening features. There may be interventions, but these would be carried out by individuals or organisations who will make their own decisions about benefits and costs.

4 Policy statements

4.1 Introduction

The policy statements in this section outline the policies for each policy development zone (PDZ). They are illustrated by the policy maps and accompanied by additional information that was used to appraise, select and confirm these policies. There is one policy statement for each management unit, consisting of the following elements:

Overall summary of the plan and description of the plan in the three epochs

This is a description in text of the plan and policies. The text starts with the overall intent for the Management Unit. It then describes the different policies throughout the Unit, and summarises their impacts (both positive and negative).

Summary table of the policies per PDZ

This is a table that summarises the policy per PDZ for all three epochs. It lists the policy label (HtL, MR, AtL or NAI) and explains what this means locally. The text box on the next page explains how the four policy labels have been applied to the various intents of management that the SMP proposes.

Description of changes compared to present shoreline management

This highlights where this SMP is proposing changes from the current management. For the open coast frontages, the first SMP produced in 1996 is used as the reference. For the estuaries, which were not included in the first SMP, the reference is the existing management. Although Flood Risk Management Strategies have been undertaken for the Essex estuaries only the Roach and Crouch Estuary Strategy contained fully appraised management policies. Information from all the estuary studies has been included in the development of the SMP.

The main aim of the Shoreline Management Plan is to develop an ‘intent of management’ for the shoreline that achieves the best possible and achievable balance of all the values and features around the shoreline for the coming 100 years. This intent of management constitutes the actual plan. For all SMPs nationally, the plan for each section of shoreline is then translated into one of four policy labels (see also section 1.1):

- **Hold the line (HtL)** – means holding the defence line where it is now. The SMP does not determine an intended standard of protection for defences: this needs more detailed study beyond the SMP, in strategy studies or asset management plans. However, for some frontages the SMP can indicate an intent to maintain or upgrade the standard of protection. This is explained further in the next paragraph.
- **Advance the line (AtL)** – means building new defences seaward of the existing defence line.
- **Managed realignment (MR)** – means 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, see below.
- **No active intervention (NAI)** – no further investment in coastal defences or operations.

Even though the SMP does not determine an intended standard of protection, there are frontages where the broad scale analysis of the SMP gives sufficient confidence about the benefits and costs to state an intent to maintain or upgrade the standard of protection, including taking into account impacts of climate change. For clarity, we have added a + sign to the policy labels for these frontages. Note that for the other frontages, it may also be possible to maintain or even upgrade the standard of protection, but this will require more detailed study beyond the SMP.

This can be the case for any policy that contains defences, i.e. HtL, AtL or MR, as follows:

Policy label	Intent of management
HtL+	Maintain or upgrade the standard of protection, including
AtL+	taking into account impacts of climate change
MR+	

There can be various types of managed realignment, and this is also the case for the Essex and South Suffolk SMP. This is explained for each PDZ in the intent of management but, to prevent any confusion, this SMP uses policy labels that identify various sub-types of the managed realignment policy, as follows:

Policy label	Intent of management
MR1	Allow local and limited intervention to limit the risks of erosion, as long as negative impacts are minimised. This may involve small scale works.
MR2	Breach of the frontline defence after building any necessary new landward defence line and counterwalls to limit flooding to adjacent areas.

Overview of effects related to the principles

The results of the policy appraisal process are illustrated in the policy statements by tables. A symbol was assigned to each of the principles as shown in Table 4-1.

Below that are the criteria that were used for the appraisal. The cells of the tables were then shaded in green, amber or red to visualise how the plan performs against the criteria and principles. The colours have the following meaning:

- green: the plan has a positive effect on the principle
- amber: the plan has a neutral effect on the principle
- red: the plan has a negative effect on the principle
- grey: the principle does not apply to the PDZ (for example, the infrastructure symbol is grey for PDZs where there are no roads or utilities that can be affected by policies of the SMP).

Appendix E describes the full process of appraisal, and provides the baseline data used to derive the scoring.

Policy maps

Each policy statement contains a set of four policy maps to illustrate the plan: the present day situation and a map for each epoch.