Shoeburyness Coastal Management Scheme

Non- Technical Study

Southend-on-Sea Borough Council

southend onsea
BOROUGH COUNCIL

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Contents

Shoeburyness Coastal Management Scheme

Introduction

This non-technical summary document outlines the work undertaken to date for the Shoeburyness Flood and Erosion Risk Management Scheme (herein known as the scheme). The aim of the scheme is to improve protection to properties and critical infrastructure from the risk of coastal flooding and erosion at Shoeburyness, Southend-on-Sea.

To implement a scheme, the Environment Agency require the submission of an Outline Business Case for approval. The Outline Business Case will present the work undertaken to determine the Council's preferred scheme, and includes technical, environmental, and economic justifications.
The Council are currently working to develop the preferred scheme, which must fulfil the following objectives:

The Council are currently working to develop the preferred scheme, which must fulfil the following objectives:
- Reduce the risk of coastal flooding and erosion in at Shoeburyness over the next 30 years.
- Contribute to a healthy environment.
- Support regeneration and tourism in Southend-on-Sea.
- Align with our emerging Shoreline Strategy, as well as regional, national, and international legislative requirements.
- Deliver value for money to Tax Payers and the UK economy.

The preferred scheme is being developed with input from other organisations that share an interest in our coastline. These include Natural England and the Environment Agency. But we also want interested residents, businesses, and community groups to help select and develop the preferred option so that the approach we adopt is widely understood and jointly supported.

Aim of Document

We are keen to ensure that the community is well informed, and we would like to hear your feedback. In this document we:
- Explain the current situation and the need for action.
- Explain the key risks of doing nothing, including coastal flooding and erosion.
- Make recommendations for managing these risks.
- Look at the next steps for producing the Outline Business Case.
- Explain the process to obtain funds for a coastal protection scheme.
- Provide links to further information and ways to comment.

To assist your understanding a glossary has been included at the end of this document to explain technical terms you may be unfamiliar with.

Shoeburyness Coastal Management Scheme Area

The Council are working to develop a coastal defence scheme for Shoeburyness. The Shoeburyness Coastal Management Scheme stretches over 2km of coast between Thorpe Bay Yacht Club and the World War Two Quick Fire Battery at Shoebury Garrison (refer to Figure 1). The scheme would improve protection to residential properties, beach-front businesses, and critical infrastructure including roads, railway, and utilities services within the area.

The area is an important tourist site, with Shoebury Common Beach awarded the Blue Flag beach award and the Quality Coast Award. A National Cycle Route and Public Rights of Way are situated along the coast.

The study area has internationally designated habitats, which support important populations of birds. The site also covers Shoebury Common South and North Local Wildlife Sites and Shoeburyness Old Ranges Local Nature Reserve.

The site is close to Shoebury Garison Conservation Area which includes the Danish Camp Scheduled Monuments and several listed buildings.


Shoebury Common Blue Flag Beach


Foulness Internationally designated habitat


Shoebury Old Ranges

The Need for Action

The majority of the coastal defences along the frontage are ageing, having been initially constructed and developed between the 1920s and 1960s. Furthermore, in considering actions now, the impacts of potential future sea level rise require consideration.

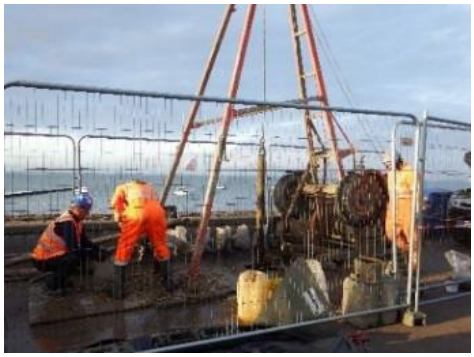
A structural assessment of the existing defences was carried out in 2017 to improve our overall understanding of their current condition. This included drilling investigation holes into the defences to better understand their condition and the underlying ground conditions.

Key Issues for the Frontage

The frontage has been divided into three sections based on the nature of the coastal defences and the conditions unique to each section.

Section 1: Thorpe Bay Yacht Club to the groyne between the beach huts on the beach and those on the promenade. A vertical concrete seawall exists between the beach and the promenade. Timber groynes are used to control the movement of beach material.

- Beach material is restricted from naturally entering this section of frontage by an old cart track at Thorpe Bay Yacht Club.
- The timber groynes are in poor condition as they are near the end of their useful structural life.
- The structural assessment of these defences suggests there is the potential for raising the height of the existing seawall on its existing foundations to address sea level rise concerns.



Section 2: From the beach huts on the beach to the H.M. Coastguard Station. The existing defence consists of beach with the promenade protected by a sloped blockwork revetment topped by concrete seawall.

- Maintaining healthy beach levels is critical to the stability of the defences, the beach absorbs wave energy, and supports the coastal defence preventing the structure being undermined or sliding towards the sea.
- The height of the defences in this section is lower than those in adjacent sections. This can allow more wave overtopping during storms.
- Raising the existing defences is not possible as structural investigations have proved that the foundations are too shallow.
- There is an existing requirement for maintenance to the structure and improvement to access points.

Section 3: H.M. Coastguard Station to World War Two Quick Fire Battery. Concrete revetment with seawall and timber groynes on foreshore. There is an embankment setback from the shoreline to provide flood water storage

The developer of the Garrison site currently has a project underway to improve the condition of the existing coastal defences. The Shoeburyness Coastal Management Scheme will review the setback embankment, which surrounds the local wildlife site to ensure it provides adequate protection.

Flood and Erosion Risk

Flood Risk

Flood risk considers the probability of a flood event occurring with the impact it would have. In assessing flood risk, it is important to consider the impact it may have on homes, infrastructure, businesses and the environment. Figure 2 illustrates the areas at flooding risk at Shoeburyness.

Erosion Risk

Erosion risk occurs from the ongoing erosion of the land by wave action, combined with the impact of the loss of land. Currently, in most areas along the frontage, defences are in place to stop erosion occurring. However, to justify maintenance funding it is important to consider what may happen if these defences were no longer in place.

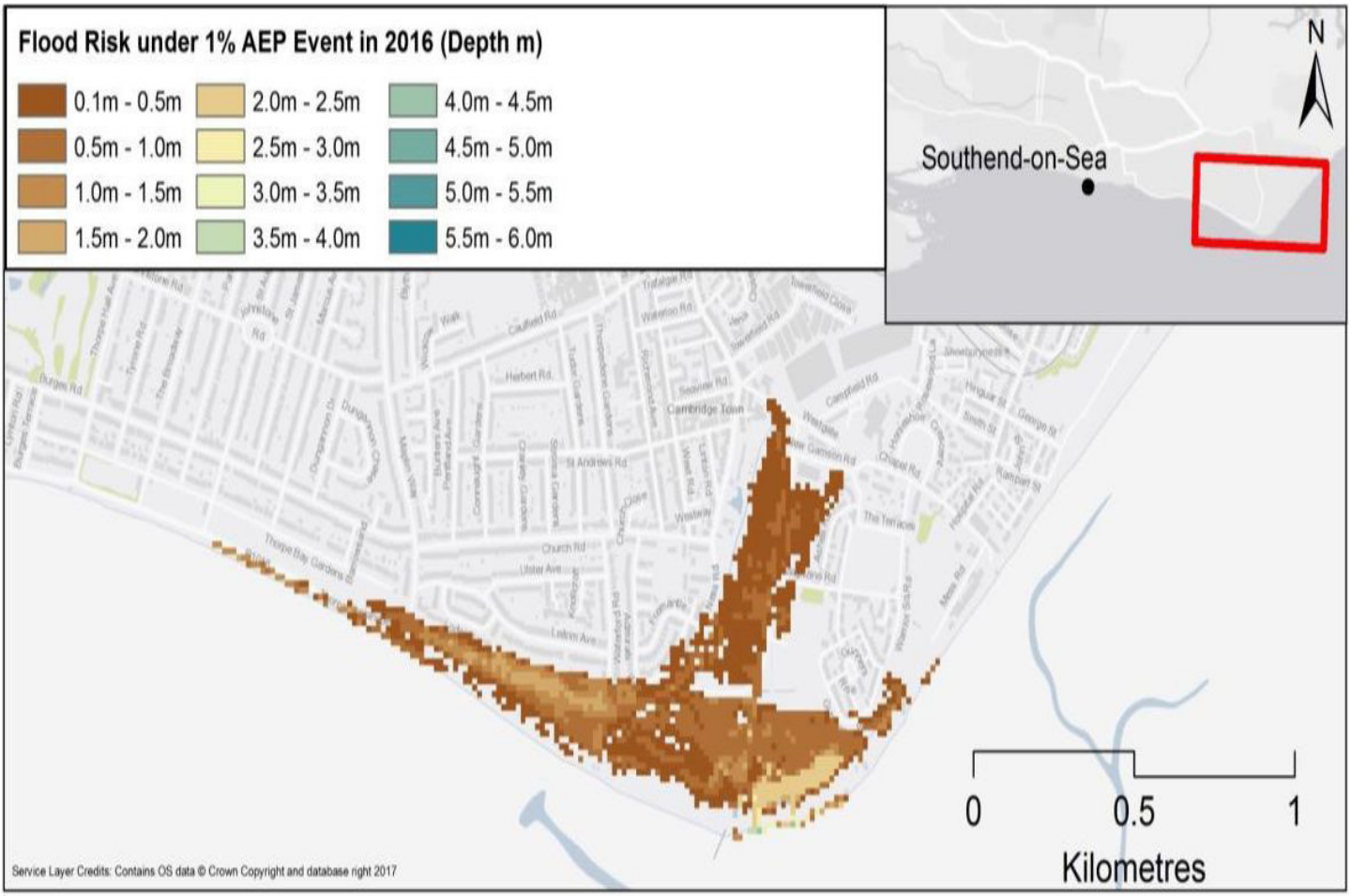
Current Risks

Low-lying areas are currently at risk of flooding from the sea during storm events as high-water levels and large waves can combine to cause overtopping. The risk increases significantly if maintenance of the beach were to stop.

The coastal defences along Section 2 could fail if sufficient beach levels are not maintained. This would increase the number of properties at risk of flooding. Additionally, the land behind the failed defences would become vulnerable to erosion.

The existing defences have been assessed as providing protection for events between a 10% Annual Exceedance Probability (AEP) (10 Year event) and 2% AEP (50 Year event). Any proposed scheme will aim to protect against a 1% AEP event (100 year event). As with any coastal defence scheme, protection is not absolute and some risk of flooding from more extreme events will always remain.

Figure 2 Flood risk under a 1% AEP event in 2016 at Shoeburyness, modelling by Mott MacDonald



[1] see Glossary

Managing Impacts on the Environment

Designated Areas

The Southend-on-Sea frontage is of international and national importance for nature conservation and has areas designated as: Special Protection Area, Ramsar Site, Special Area of Conservation, Site of Special Scientific Interest, Marine Protected Area, National Nature Reserve, Local Nature Reserve and Local Wildlife Site[2].

Coastal Squeeze

Areas such as saltmarsh and mudflats, which can be seen at low tide, will be under water for longer in the future because of rising sea levels.

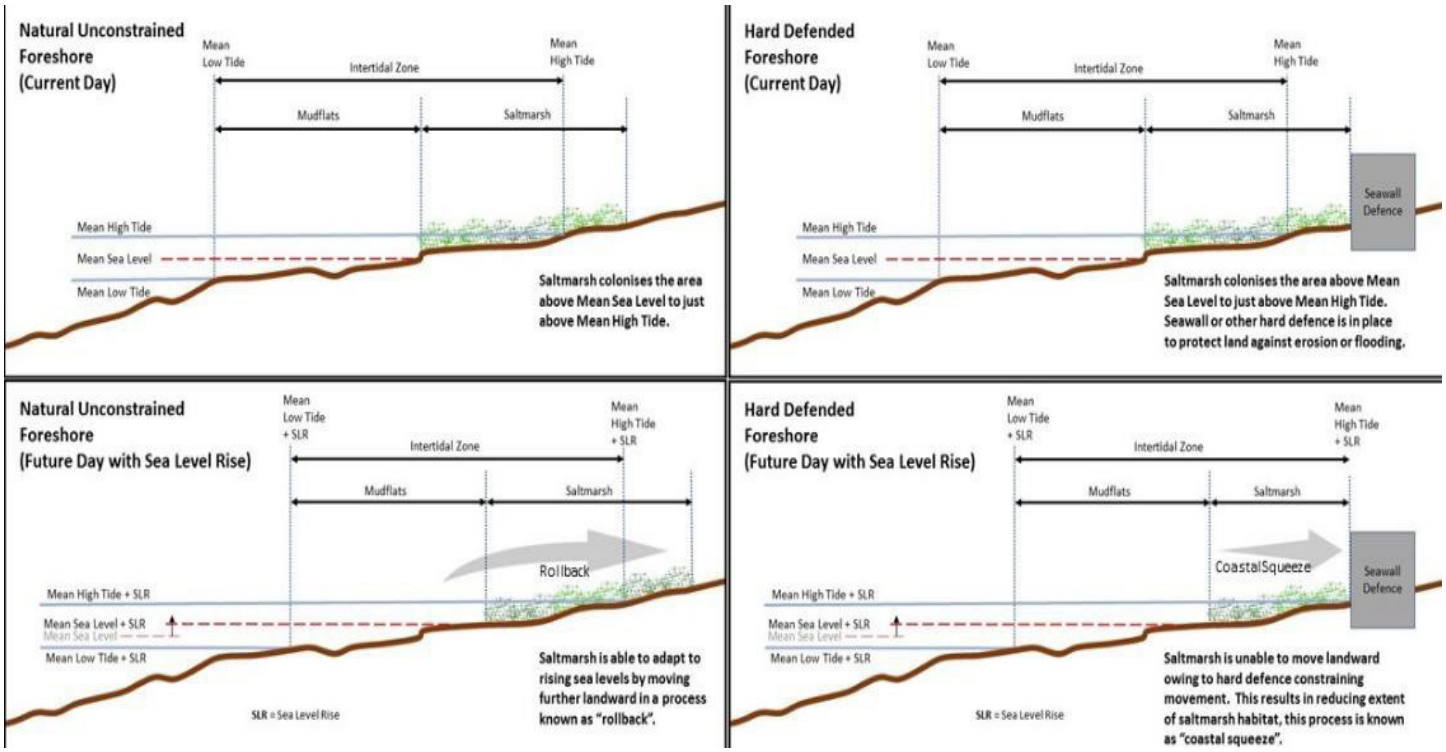
Hard defences, such as seawalls, can reduce the area of mudflats and saltmarsh as the sea level rises. This is because the natural process of habitats moving further landward is prevented by the presence of the hard defence. This phenomenon is called coastal squeeze. Refer to Figure 3.

Loss of habitat will affect the wildlife that depends on these areas, including birds of international importance. We cannot stop sea level rise but we can compensate for the loss of habitat caused by defences, by creating new areas of suitable habitat. Future management of the coastline will need to protect the natural environment and be cost-effective.

Environmental Report

The Shoeburyness Coastal Management Scheme will be supported by an environmental study which will look at the potential impacts of the short listed options on the environment. It will identify ways to reduce these impacts and provide a Habitat Regulations Assessment to ensure compliance with international legislation.

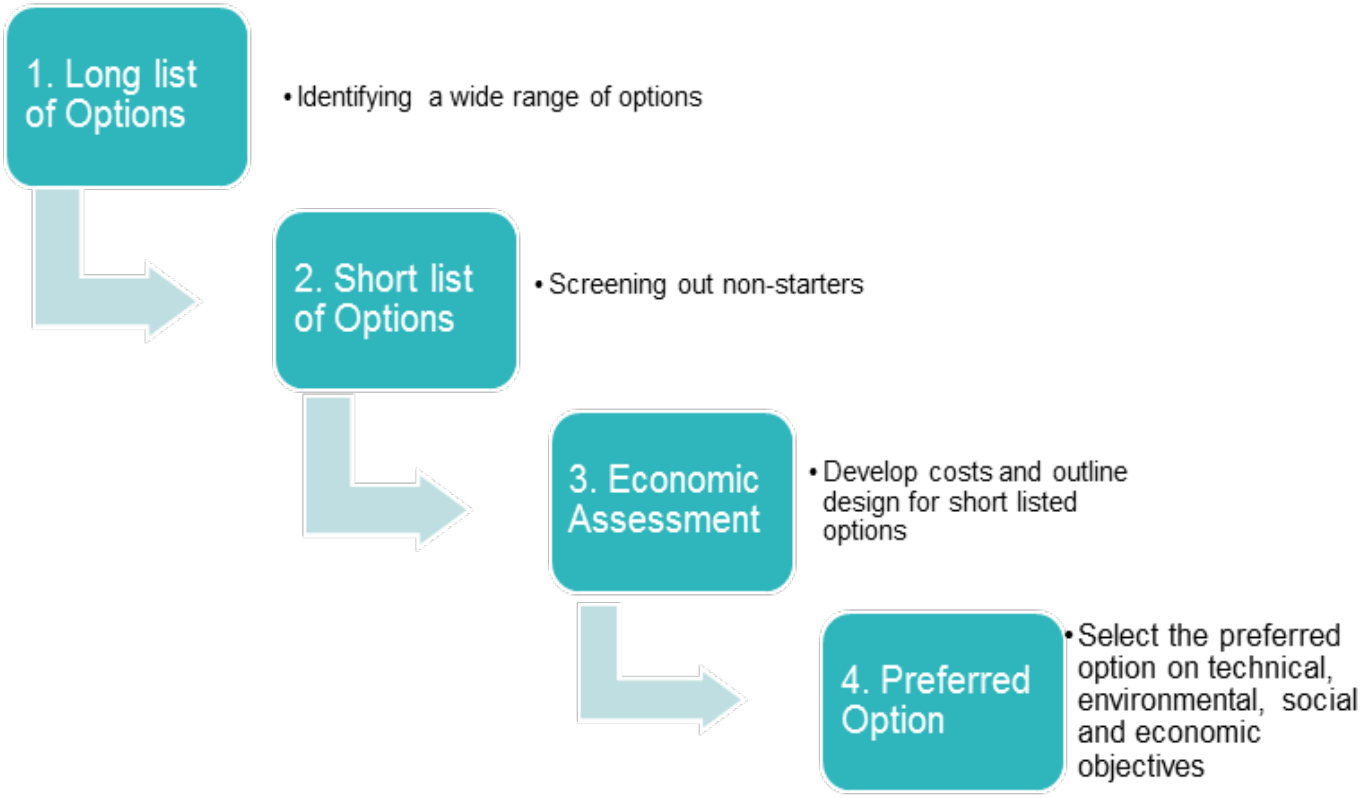
Figure 3 Schematic example of Coastal Squeeze



[2] see Glossary

Appraisal Process

The Shoeburyness Coastal Management Scheme is seeking funding from Central Government. To be granted funding we must demonstrate that during the appraisal process we have followed, government guidance. The appraisal guidance requires that we undertake a staged option process, the tasks outlined below.



Task 1: Long List of Options

Working with the Environment Agency and Natural England, we have developed a long list of options of possible methods to improve protection against coastal risks (flooding and erosion). The long list is very high level and is developed to ensure that a wide variety of options are considered. The long list of options is then assessed against technical, environmental, social, and cost criteria to identify those options that are feasible and meet the aims of the project. The long list appraisal is outlined in the table below.

No	Option	Technical	Environmental	Social	Economic	
1	Do Nothing	✔	x	x	x	**No***
2	Maintain Existing Defences	x	✔	✔	✔	**Yes**
3	Tidal Barrier	x	x	x	x	**No**
4	Offshore Breakwater /Multi-Purpose Reef	x	x	x	x	**No**
5	Construction of New Seawall	x	✔	x	x	**No**
6	Geotextile Bags and Timber Groynes	✔	✔	✔	✔	**Yes**
7	Beach Recharge and Timber Groynes	✔	✔	✔	✔	**Yes**
8	Rock Groynes and Beach Recharge	x	x	✔	x	**No**
9	Terminal Groyne	x	x	x	x	**No**
10	New Seawall	✔	✔	x	x	**No**
11	Raising Existing Seawall	✔	✔	✔	✔	**Yes**
12	Setback Secondary Defence	✔	✔	x	x	**No**
13	Armour at the Toe of the Seawall	✔	✔	x	✔	**Yes**
14	Install Demountable Defences	x	x	x	✔	**No**

Task 2: Develop the Short List of Options

1. Maintaining existing defences

This option would maintain the defences on the frontage in their current form with no substantial changes. Works would include patch repairs of the current defences and groynes and ongoing management of the defences and the beach over the 30-year lifetime of this scheme. Repairs would also be undertaken to the access stairs, which would include options to improve inclusive access to the beach.

The existing setback embankment in Section 3 is already sufficient to provide flood protection against a 1% AEP event , which this scheme is looking to achieve. Therefore, no works are proposed within Section 3.

Advantages

- Repair activities would be relatively low cost, however may need to be repeated on a more regular basis over the next 30 years.
- There would be no change to the existing structures and foreshore, meaning limited impact on the environment.
- Repairs to access stairs would provide improved access to the foreshore.

Disadvantages

- Protection against flooding would not improve.
- A risk remains that beach levels may be eroded during a storm, which could lead to a failure of the coastal defences
- There would be an ongoing requirement (and associated costs) to regularly manage the beach.
- Designated habitats may be damaged through coastal squeeze and flooding at Shoebury Garrison.

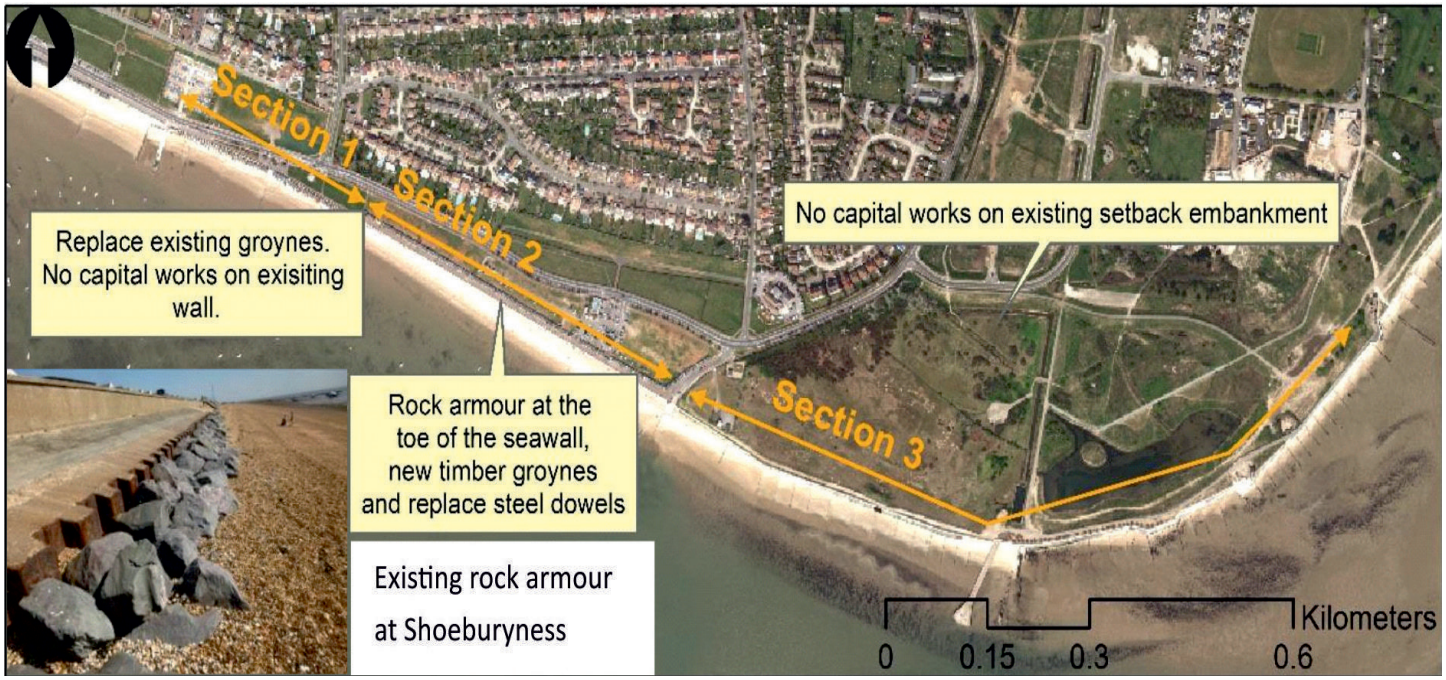
2. Armour at the base of the seawall

The wall in Section 1 would remain at its current height. The timber groynes that exist in this section are in a poor condition and would be replaced to help retain beach levels.

Rock armour would be placed at the base of the coastal defences in Section 2. The rock armour would be on average 0.9m in height (Refer to Figure 10). This approach would not increase protection against coastal flooding but would provide resistance loss of beach material at the toe of the wall and prevent the wall sliding or rotating seawards.

The existing setback embankment in Section 3 is already sufficient to provide flood protection against a 1% AEP event, which this scheme is looking to achieve. Therefore, no works are proposed within Section 3. This scheme would include patch repairs of the existing defences and access stairs where they are in poor condition. Options to improve the inclusive access to the beach will be considered. Ongoing management of the defences and the beach would occur over the 30-year lifetime of this scheme.

Figure 5 Option 2 Works



Advantages

- Would provide stability to the defences reducing the risk of failure.
- Would reduce the requirements for beach recycling.
- Would reduce erosion of beach sediment and scour.

Disadvantages

- Protection against flooding would not improve.
- Designated habitats may be damaged through coastal squeeze and flooding at Shoebury Garrison.
- Rock armouring may be seen as unattractive and there is a potential health and safety risk if people climb on the rocks.

3. Buried geotextile bags and timber groynes

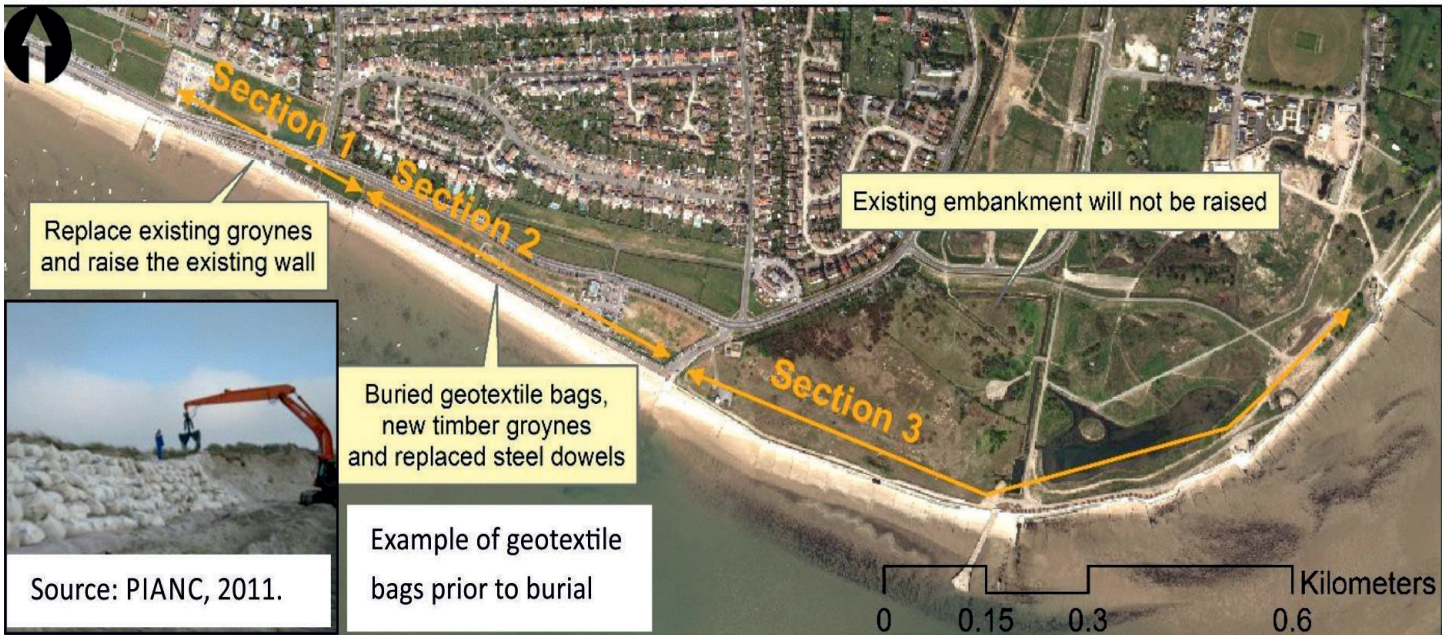
The wall in Section 1 would be raised to 6.00mODN to ensure protection against flooding will be consistent along the entire frontage (Refer to Figure 11). Wall raising is required due to constraints with raising the beach levels caused by the presence of beach huts. The timber groynes in this section are in a poor condition and would be replaced. A flood gate would be required at the Thorpe Bay Yacht Club launch ramp to provide flood protection and maintain access.

Along Section 2 this option would propose burying filled geotextile bags (large sandbags) beneath the beach, to raise the beach levels to 4.16mODN (Ordinance Datum Newlyn). The raised beach would provide better protection against flooding by forcing waves to break further away from the defences and would stabilise the seawall structures behind. Timber groynes would be built in Section 2 to reduce the movement of beach sediment and keep the geotextile bags buried.

The existing setback embankment in Section 3 is already sufficient to provide flood protection against a 1% AEP event , which this scheme is looking to achieve. Therefore, no works are proposed within Section 3.

Patch repairs would be undertaken to existing defences and access stairs. Options to improve the inclusive access to the beach will be considered. Ongoing management of the defences and the beach would occur over the 30-year lifetime of this scheme.

Figure 6 Option 3 Works



Advantages

- Improves protection against coastal flooding and stabilise the existing defences
- An opportunity may exist to use available clay as a fill material for the geotextile bags, reducing costs.
- Timber groynes would stabilise the beach and reduce the amount of beach recycling required.
- An improved beach may bring potential tourism and leisure benefits.
- Improved access to the foreshore can be incorporated.

Disadvantages

- There would be a risk of the geotextile bags becoming exposed or splitting requiring maintenance.
- Wall raising in Section One may have some impacts on views of the estuary for footpath users.
- There may be an impact on designated habitats and high water feeding areas for birds through construction activity and coastal squeeze.

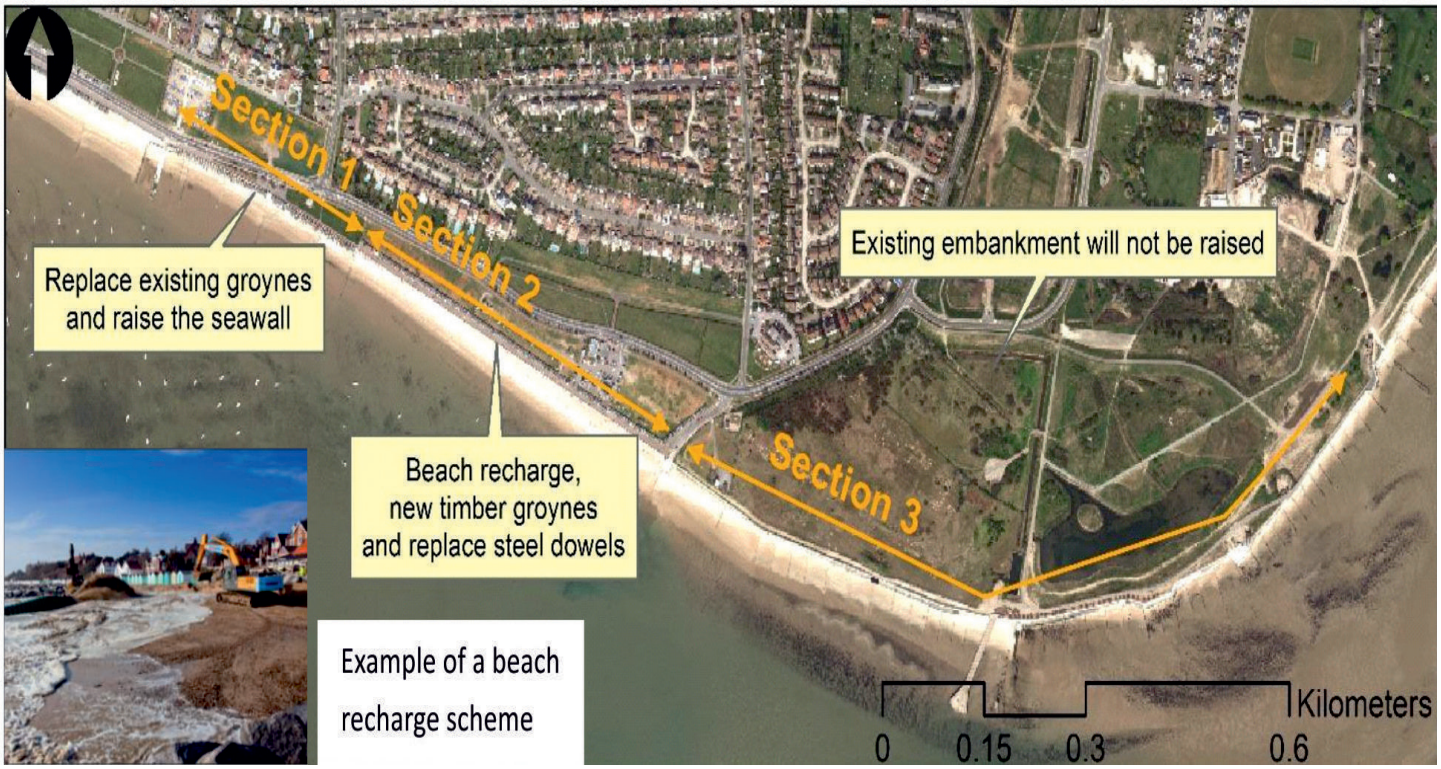
4. Construct timber groynes and beach recharge

The wall in Section 1 would be raised to 6.00mODN to ensure that protection against flooding is consistent along the entire frontage (Refer to Figure 11). Wall raising is required due to constraints with raising the beach levels caused by the presence of beach huts. The timber groynes in this section are in a poor condition and would be replaced. A flood gate would be required at the Thorpe Bay Yacht Club launch ramp to provide flood protection and maintain access.

The beach within Section 2 would be raised to 4.16mODN (Ordnance Datum Newlyn) by importing additional beach material. The raised beach levels would increase protection against flooding by forcing waves to break further offshore, and reduce the risk of failure of the seawall structure at the rear of the beach. Timber groynes would be built in Section 2 to reduce the movement of beach sediment and lessen long-term maintenance requirements.

The existing setback embankment in Section 3 is already sufficient to provide flood protection against a 1% AEP event , which this scheme is looking to achieve. Therefore, no works are proposed within Section 3. Part of this scheme would be an immediate patch repair of the existing defences and access stairs. This would include looking at options to improve disabled access to the beach. Ongoing management of the defences and the beach would occur over the 30-year lifetime of this scheme.

Figure 7 Option 4 Works



Advantages

- Would offer better protection against coastal flooding and stabilise the existing defences.
- Timber groynes would stabilise the beach and reduce the amount of beach recycling required.
- An improved beach may bring potential tourism and leisure benefits.
- Likely to be cheapest long-term solution.
- Improved access to the foreshore can be incorporated.

Disadvantages

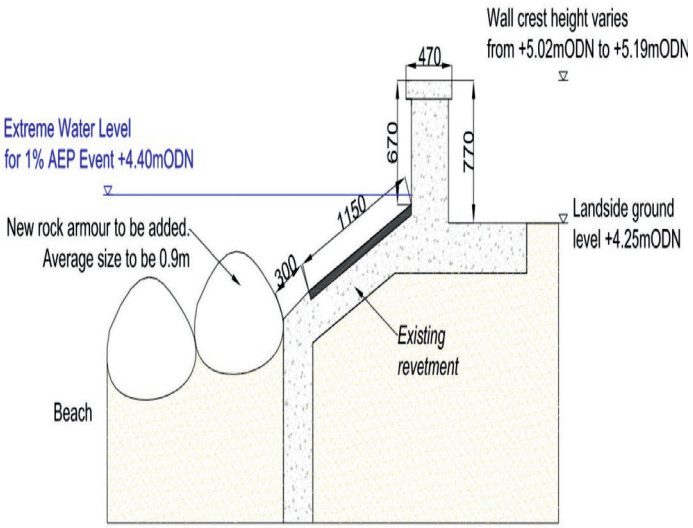
- Wall raising in Section One may have some impacts on views of the estuary.
- There may be an impact on designated habitats and high water feeding areas for birds through construction activity and coastal squeeze.

Initial Designs

Rock Toe Armour - Used in Option 2

The concept design for rock armouring in Section 2 is shown below. All measurements are approximate and given in millimeters. The rock armour units would be between one and three tonnes in weight with an average height of 0.9m.

Figure 8 Rock Toe Armour Concept Design and Visualisation

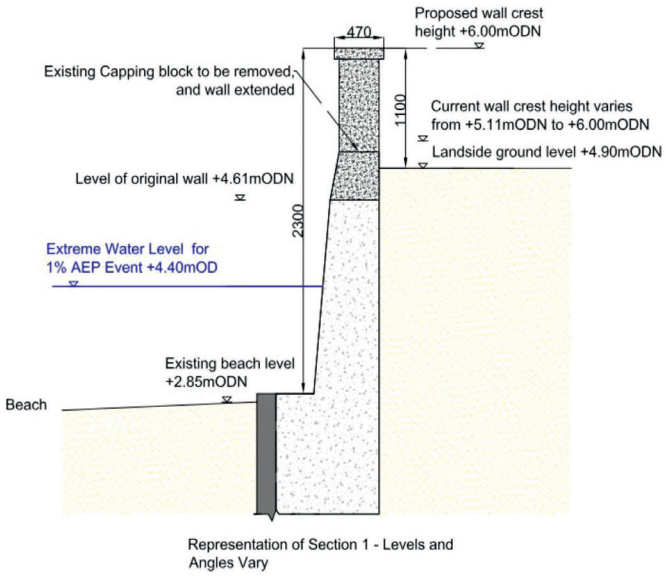


Representation of Section 2 - Levels and Angles Vary

Wall Raising – Used in Section 1 of Options 3 and 4

Initial designs for the wall raising in Section 1 are shown below. All measurements are given in millimeters. We are currently investigating the best options for achieving this design requirement, including the types of material to use in construction.

Figure 9 Raised Seawall Concept Design and Visualisation

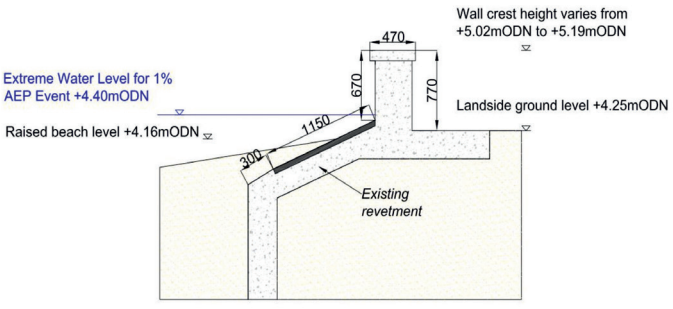


Representation of Section 1 - Levels and Angles Vary

Beach Raising - Used in Options 3 and 4

The initial design for beach raising is shown in Figure 11 below. All measurements are given in millimeters. The existing beach level varies from +2.40mODN and +3.72mODN and therefore the amount of material required to raise the beach will vary along the length. The raised beach level will be achieved either through placing geotextile bags and covering with beach material, or undertaking beach recharge bring in in additional sand and shingle material.

Figure 10 Beach Raising Concept Design and Visualisation



Representation of Section 2 - Levels and Angles Vary

Task 3: Select the Preferred Option

Task 3 is where the project is currently.

Any scheme could provide better protection against the risk of flooding and erosion. However, we must also consider the impacts this may have to the environment, landscape and local communities.

The short list options have been developed and each option assessed as to its technical feasibility. These designs are also being assessed to determine how much each option would cost, their impact on the environment and whether they would be acceptable to the local community (stakeholder engagement). This consultation document forms part of this process.

The outcome of this task will be to select a preferred option.

Task 4: Prepare the Business Case

Following Task 3, the results of all the assessments will be presented in the Outline Business Case to the Environment Agency.

The Business Case will focus on presenting the benefits of the preferred option and will outline the justification for the scheme. This will include a robust economic analysis of the scheme as the Environment Agency will use the Business Case to determine the level of funding that will be received.

How Will Coastal Works be Paid for?

The majority of funding for flood and coastal erosion schemes is provided by Central Government (via Defra). A coastal protection scheme must satisfy the Government's Flood and Coastal Erosion Risk Management Strategy. This is the process which is currently being undertaken.

The case for funding will be made within the Outline Business Case and submitted to the Environment Agency for approval. Successful schemes are given a portion of the funding required called Flood Defence Grant in Aid (FDGiA).

Partnership Funding

Additional funding may be required from third parties, where a scheme does not qualify for 100% grant funding. This is called partnership funding and is generally sought from beneficiaries of the proposed scheme.

From our initial assessments, it is unlikely that the proposed scheme will be fully funded by Central Government. Therefore, the Shoeburyness scheme will need to either reduce costs or obtain local partnership funding contributions.

Once the preferred option is confirmed the project team will have a clearer understanding of the funding shortfall and will begin to approach third parties to commit to providing contributions. These can come through Local Authorities, developers, infrastructure providers or from the Regional Flood and Coastal Committee (RFCC) local levy. SBC has made some provision in its capital programme to support the grant application.

We Want to Know Your Views

In this document, we have presented the work undertaken so far for the Shoeburyness Coastal Management Scheme, including potential risk from flooding and erosion. The Outline Business Case is looking to recommend that works are undertaken to manage the risk of flooding and erosion at Shoeburyness.

Further to this document, specific engagement is taking place via a series of public exhibitions.

How You Can Find Out More

- See the webpages at www.bettersouthend.co.uk
- Contact us using PlaceConsultations@southend.gov.uk
- If you have a specific information request please contact 01702 215408 quoting Shoebury Coastal Management Scheme

If you provide your email address, we will keep you informed of the outcome of the consultation and future developments in the project.

How You Can Comment

Once you have read through this document you can send us YOUR views in several different ways:

- Complete the online questionnaire at www.bettersouthend.co.uk
- Request a paper copy from PlaceConsultations@southend.gov.uk or 01702 215408 quoting Shoebury Coastal Management Scheme
- Post completed questionnaire back to
  Business Intelligence Officer
  Department for Place, Southend-on-Sea Borough Council
  PO Box 6
  Civic Centre, Victoria Avenue
  Southend-on-Sea
  Essex, SS2 6ER

Next Steps and What We Will Use the Responses For

We will use the responses from this consultation to help shape the Outline Business Case. Our colleagues involved with this consultation will see all responses in full.

We will use the information from the consultation to feed into the next steps of the study, which will be to finalise the assessment on the short- listed options and identify the preferred options.

Once the preferred options have been identified, the Outline Business Case will be prepared.

Under the Freedom of Information Act 2000, we may be required to publish your response to this consultation, but will not include any personal information. If you have requested your response be kept confidential, we may still be required to provide a summary.

Glossary of Terms

Annual Exceedance Probability (AEP): Refers to the probability of a flood event occurring in any particular year. The probability is expressed as a percentage. Larger flood events occur less often and therefore have a lesser AEP. A 100% AEP means the event is likely to occur on an annual basis. A 1% AEP event has a 1% chance of occurring in a particular year, so on average, once every 100 years.

Beach Recharge: The addition of new sand and shingle onto a beach to boost beach levels. A raised beach will force waves to break further offshore, providing better protection against overtopping.

Coastal Squeeze: The loss of coastal habitats resulting from the effect of being trapped between a fixed land boundary (e.g. seawall) and rising sea levels as a result of climate change.

Demountable Defence: A flood defence which can be installed into fixings in the likely event of a flood occurring.

Erosion: This is the action of natural processes (such as wind or water) removing material from one location and transport it to another location.

FDGiA: Flood Defence Grant in Aid. Central Government funding scheme for flood and coastal defence projects

Groyne: A barrier built across the shoreline to stop the movement of sand along the beach. Commonly built from timber but can also be built using rock.

Habitats Regulation Assessment (HRA): A European Directive to ensure protection of Natura 2000 sites, translated into British law through the Conservation (Natural Habitats, &c.) Regulations, 1994.

Intertidal area: The foreshore area exposed to the air at low tide and submerged in water at high tide.

Marine Management Organisation (MMO): Government organisation which oversees the licensing, regulation and planning of marine activities in the seas around England.

Marine Protected Area: Parts of the sea where wildlife and habitats are protected. A catch-all term for designated marine and coastal protected sites.

Mudflat: Coastal wetlands found in the lower intertidal area of sheltered areas, regularly flooded by seawater. An important ecosystem to support a variety of wildlife.

Multi-Purpose Reef: A structure designed to induce wave breaking offshore. Can be used for recreational benefits of creating surf areas as well as coastal protection.

Natura 2000: Network of key resting and breeding sites for protected species. Made up of SACs and SPAs.

Offshore Breakwater: A structure built offshore designed to intercept incoming waves and protect the coastline from flooding.

Ordnance Datum Newlyn: Vertical reference used for determining the height of a surface above sea level. Newlyn in Cornwall is taken as a single reference point in the UK.

Overtopping: The process of waves breaking on a structure and the flood water being carried onto the land. This can lead to flooding in storm events.

Ramsar: A protected wetland site of international importance. Named after the city of Ramsar in Iran where the legislation was signed.

Revetment: A sloping structure used on the coastline to protect against coastal erosion from waves and the force of water.

Saltmarsh: Coastal wetlands found in the upper intertidal area of sheltered areas, regularly flooded by seawater. An important ecosystem to support a variety of wildlife.

Scour: Localised removal of beach material. If occurring around the foundations of a structure this can lead to instabilities in the structure itself.

Sea Level Rise: The rise in global sea levels as a result of climate change.

Setback Secondary Defence: A defence built behind the existing coastal defences to provide additional protection against flooding, for instance a setback flood wall.

Shoreline Management Plan (SMP): Regional policy documents for the future management of the coastline. For Southend-on-Sea this is the Essex and South Suffolk Shoreline Management Plan 2 (2010).

Site of Special Scientific Interest (SSSI): One of the country's best wildlife and/or geological sites which has been given legal protection to support conservation. There are more than 4000 SSSIs om England.

Special Area of Conservation (SAC). Sites designated under the European Union's Habitats Directive (92/43/EEC) to maintain and conserve biodiversity.

Special Protection Area (SPA): A site designated under the EC Birds Directive (1979) to safeguard the habitats of rare and vulnerable birds.

Strategic Environmental Assessment (SEA): Systematic decision support process to ensure environmental and other sustainable aspects are accounted for in a scheme.

TE2100: Thames Estuary 2100 project.

Temporary Defences: A defence which can be used as a short term, localised measure against flooding, for instance property-level protection.

Tidal Barrier: A floodgate designed to prevent flooding through preventing flood water entering an area, an example being the Thames Barrier.

Water Framework Directive (WFD): EU Directive (2000/60/EC) which commits EU member states to achieve good status of water bodies, including marine waters.