

Environment Agency in
partnership with



planning for the future

Coastal flood risk management strategy
Pegwell Bay to Kingsdown

guide for local communities



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Environment Agency in partnership with
Dover District Council

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introduction

The Environment Agency and Dover District Council are working together to develop a strategy to manage coastal flooding and erosion between Pegwell Bay and the MoD Rifle Range at Oldstairs Bay. The strategy will also look at tidal flooding in the River Stour downstream of Fordwich. The result will be the Pegwell Bay to Kingsdown coastal strategy.

This new strategy will develop the flood management policies set out in the *Isle of Grain to South Foreland shoreline management plan* and the *River Stour catchment flood management plan*.

With the climate changing, sea levels rising and increased

frequency and intensity of storms, our existing coastal defences are under increasing threat from the elements. This consultation document sets out the options for the strategy to manage the area's coastal and tidal river defences over the next 100 years.

The Environment Agency and Dover District Council have powers to construct flood defences for the protection of people and property where these are economically justified and government funds are available. The amount of funding available from central government is limited and there is strong competition for these funds from around the country.

The Environment Agency also has a legal obligation to protect endangered habitats such as inter-tidal salt marsh and mudflats that form part of a network of internationally designated sites. These are considered to be at risk from rising sea levels and where sections are lost compensatory areas will have to be provided.

This document introduces the key issues we need to address in the strategy and outlines the leading options. It has been prepared as part of the public consultation on the strategy and you are invited to comment. Details on how to contact us are provided on the inside back cover.

ENVIRONMENT AGENCY





the Pegwell Bay to Kingsdown coastline

The frontage of the Pegwell Bay to Kingsdown coastline has two distinct characters. To the north of Sandwich Bay Estate the coast is characterised by an extensive dune system behind a sand and shingle beach. The dunes narrow towards Deal with low-lying agricultural land behind. Most of the dunes are incorporated into three golf courses, which attract a large number of visitors to the area. The residential area of north Deal is also low-lying.

To the south of Deal the land begins to rise to meet the cliffs at the southern end of the

strategy frontage. This stretch is characterised by residential areas, with agricultural land further back. The shingle beach is reinforced with formal defences towards the south.

The area's close proximity to the Continent has led to a rich history in trade. Its historic buildings and the Cinque Port of Sandwich has resulted in the area becoming a popular destination for visitors, with numerous facilities and recreational activities both land and water based.

The River Stour is tidal up to

Fordwich, approximately 17 miles upstream. With its tributaries it drains a considerable part of the Kent countryside, flowing through the urban areas of Canterbury and Sandwich.

The area supports large areas of coastal habitats designated within the Natura 2000 network. These include sites designated as Special Protection Areas (SPA), Special Areas of Conservation (SAC), Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR).

strategic options for managing the strategy area

The coastal and river frontages within the strategy area have been divided into nine reaches reflecting the varying nature of the frontage and the specific issues affecting each reach.

Reach 1: Cliffs End to Stonar Cut

Generally low lying coast and river frontage sheltered from wave energy by the extensive inter-tidal mudflat area in Sandwich Bay.

Reach 2: Shell Ness to Sandwich Bay Estate

Sand dunes fronted by a wide sandy foreshore, which narrows towards the southern end of this section. Shingle deposits overlay the sand beach along the northern half of this unit.

Reach 3: Sandwich Bay Estate

This residential area is located immediately behind a concrete based revetment (bank) and the natural shingle beach.

Reach 4: Sandwich Bay Estate to Deal Castle

Between Sandwich Bay Estate and Deal flood protection is provided by a colliery shale embankment. Along the Deal frontage this is replaced by a seawall and timber groynes. A

shingle beach provides additional protection along the whole of this frontage.

Reach 5: Deal Castle to Walmer Castle

This frontage is characterised by its wide and open shingle beach.

Reach 6: Walmer Castle, Kingsdown and Oldstairs Bay

The wide shingle beach at Walmer gradually reduces in size towards the south. A concrete seawall, timber groynes and the shingle beach protect Kingsdown. A groyned shingle beach and rock revetment provide erosion protection to the exposed area of Oldstairs Bay.

Reach 7: MoD Rifle Range

The former Rifle Range at the foot of cliffs is protected by a concrete seawall.

Reach 8: Sandwich and Stonar Loop

River frontage mainly protected by earth embankments, with flood walls through Sandwich.

Reach 9: Stour Valley

River frontage predominantly protected by earth embankments with floodplains on both banks.

Strategic options

The strategy will set out how we need to manage coastal and tidal flood and erosion risk for the next 100 years. To do this we will consider for each of the nine reaches a range of options described in the table below.

Coastal strategy
Do nothing – no further maintenance or repair work is undertaken
Do minimum – emergency repairs undertaken as required
Maintain – maintaining the existing defences in their current form
Sustain – defences are raised and strengthened to sustain the current standard of protection
Improve – defences are improved to increase the standard of protection
Managed realignment – moving defences inland in a controlled way to a more sustainable position



Nature can affect the coast and riverbanks in different ways. The level of impact depends on the current and future flooding and erosion risks in the different reaches of the strategy. The condition of the existing flood defences is also a factor in the impacts that can be expected as some are in better condition than others.

The following identifies the impact on those reaches at risk of flooding if no action is taken. Reaches 2, 5, 7 and 9 require **do nothing** or **do minimum** as described later.

Reach 1: Cliffs End to Stonar Cut

If nothing is done, 14 properties would be flooded annually and therefore lost by 2107. A further 24 residential and commercial properties would also be affected by flooding, although the damage to individual properties would vary.

It is also likely to lead to flooding of large stretches of the low-lying land of the Wantsum Channel, while flood damage to the A256 is also increasingly likely.

Reach 3: Sandwich Bay Estate

Although the current defences provide sufficient protection to the properties in Sandwich Bay Estate now, if nothing is done during the next 100 years 38 properties will be lost due to annual flooding by 2107. A further 54 properties would be affected by flooding.

Reach 4: Sandwich Bay Estate to Deal Castle

Almost 1,300 residential and commercial properties are currently at risk of flooding during an extreme tidal event (1 in 100 chance of occurring each year). This would rise to more than 4,000 by 2107 if no action was taken, with many of those lost permanently.

Along this reach the Cinque Ports golf course is also likely to suffer significant damage, while the promenade and Pier at Deal would also become increasingly vulnerable to flood damage.

Reach 6: Walmer, Kingsdown and Oldstairs Bay

In this reach the main problem is erosion of the coastline, which will move landward if no measures are taken to stop this process. There would be a steady loss of property in this

reach and it is expected that approximately 177 properties would be lost by 2107.

Reach 8: Sandwich and Stonar Loop

In the current situation some flooding already occurs occasionally, most markedly at Sandwich Quay. To date, this has not resulted in the loss of properties but there has been some flood damage to property in Sandwich in the past – most notably in 1953 and 1983.

Almost 500 properties are currently at risk of flooding during a tidal event with a 1 in 20 chance of occurring each year. If no action was taken, by 2107 some 1,400 properties would be affected by flooding to varying degrees during significant tidal events, with nearly 600 properties affected so badly that they would be lost.

shortlisted options

For each of the nine reaches a number of appropriate options were short-listed for further analysis. To determine the leading option each of the reaches has been considered in terms of:

- flood and erosion risk to people and property;
- climate change and predicted sea level rise;
- cost of the option and value of protected assets;
- impact on the natural environment.

The following paragraphs outline the characteristics of all nine reaches together with the short-listed options for the relevant reach. The leading option for each reach has been highlighted in blue.



Pegwell Bay, Reach 1

Reach 1: Cliffs End to Stonar Cut

The only reach combining coastal and river frontages, the reach between Cliffs End and the Stonar Cut comprises the left bank of the River Stour downstream of the Stonar Cut and the coastal frontage of Pegwell Bay. Pegwell Bay Country Park has a small embankment at its

perimeter boundary while the A256 provides further protection to the land behind.

There are no formal flood defence structures along the river frontage as the ground level north of Richborough Port provides the protection against flooding, while at Richborough Port itself, flood

protection is provided by the land behind the quayside.

The inter-tidal mudflats on the coast and the river corridor itself are of international environmental value.

The Stonelees Golf Club is located behind the A256.

Strategic option	Actions
Do nothing	No further work will be undertaken on the existing defences
Do minimum	Repair A256 road and rock revetment as and when damage occurs
Sustain	The existing defences currently offer sufficient protection. To sustain this protection into the future the defences will need to be improved in about 50 years, with a combination of walls and embankments adjacent to the A256
Improve	Works are undertaken now to increase protection, with a combination of walls and embankments adjacent to the A256

Sustain has been selected because the existing level of protection is sufficient, although works will be required in the future to allow for sea level rise. This option provides the best economic option and will not have significant impact on the natural environment.

Reach 2: Shell Ness to Sandwich Bay Estate

This reach comprises the coastline between Shell Ness and Sandwich Bay Estate. It is characterised by a sandy beach backed by an extensive dune system. The ground levels of the dune system provide protection from flooding for the land behind

the dunes. The frontage has a large area of inter-tidal mudflats on the seaward side, which narrows towards the southern end of the reach.

The entire frontage forms part of an important international nature conservation area and there is an RSPB nature

reserve approximately halfway along the reach. The area contains no residential settlements, but there are two major golf courses. Two long-distance footpaths run along the length of the reach providing access to the frontage from the centre of Sandwich.

Strategic option	Actions
Do nothing	No further work will be undertaken on the existing defences
Do minimum	Reactive maintenance only

Do nothing has been selected because of the existing high level of protection provided by the beach and works to the dunes would have a negative impact on the designated sites. In the event of a major breach in the dune system during an extreme storm there is a possibility of emergency repairs, including re-profiling of dunes and breach repairs. Under the 'do nothing' option the risk of flooding is acceptably low.

Reach 3: Sandwich Bay Estate

The reach comprises a shingle beach backed by a concrete revetment.

The beach and defences in this reach protect Sandwich

Bay Estate, a residential settlement. To the southern end of the reach there is a sailing club, which launches its vessels directly from the beach.

The land immediately to the north and south of Sandwich Bay Estate is subject to international environmental designations, as are the beach and foreshore.

Strategic option	Actions
Do nothing	No further work will be undertaken on the existing defences
Do minimum	Existing revetment is patch repaired when damage occurs
Maintain	No work on defences other than local maintenance in first 50 years. Replacement of the existing revetment in 2057
Sustain	No work on defences in first 50 years. Replacement of the existing revetment in 2057 and beach nourishment undertaken to sustain the level of protection

Maintain has been selected because the existing level of protection is sufficient, but works will be required in the future to ensure the integrity of the existing revetment. This option provides the best economic option and will not have significant impacts on the natural environment.

Reach 4 ...continued

Improve 1 has been selected because the existing level of protection just north of Sandown Castle is too low, and north Deal would be exposed to flooding if the embankment was damaged. In addition, a wave wall in Deal would mitigate against future sea level rise, which would otherwise lead to increasing flood damage in Deal by waves overtopping the seawall. The beach management option would provide a wider more extensive shingle beach to protect Deal, and is the leading economic solution.



Deal seafront, Reach 4



Reach 4: Sandwich Bay Estate to Deal Castle

North of Sandown Castle the frontage consists of beaches backed by a colliery shale embankment and a narrow dune system. The beach and dunes are of important international environmental value. Further inland parts of the Lydden Valley are also subject to international environmental designations.



Coastal frontage north of Deal, Reach 4

A golf course is situated among the dunes and a long-distance footpath follows the coastline. The Lydden Valley contains a dense network of streams and ditches and is crossed by a mainline railway.

From Sandown Castle to Deal Castle the coast is protected by a shingle beach with timber groynes and a concrete sea wall. The flood defences protect a large area of Deal from flooding.

Both Deal and Sandown Castles are scheduled monuments, while the town contains several listed buildings and conservation areas.

Reach 5: Deal Castle to Walmer Castle

The frontage between Deal Castle and Walmer Castle consists of a shingle beach with no formal flood defences. The beach widens from 50m in the north to 100m towards the

southern end of the reach, providing sufficient flood defence for Walmer and the south of Deal. There are two scheduled monuments located immediately behind the beach,

with Walmer Castle set into a historic park and garden.

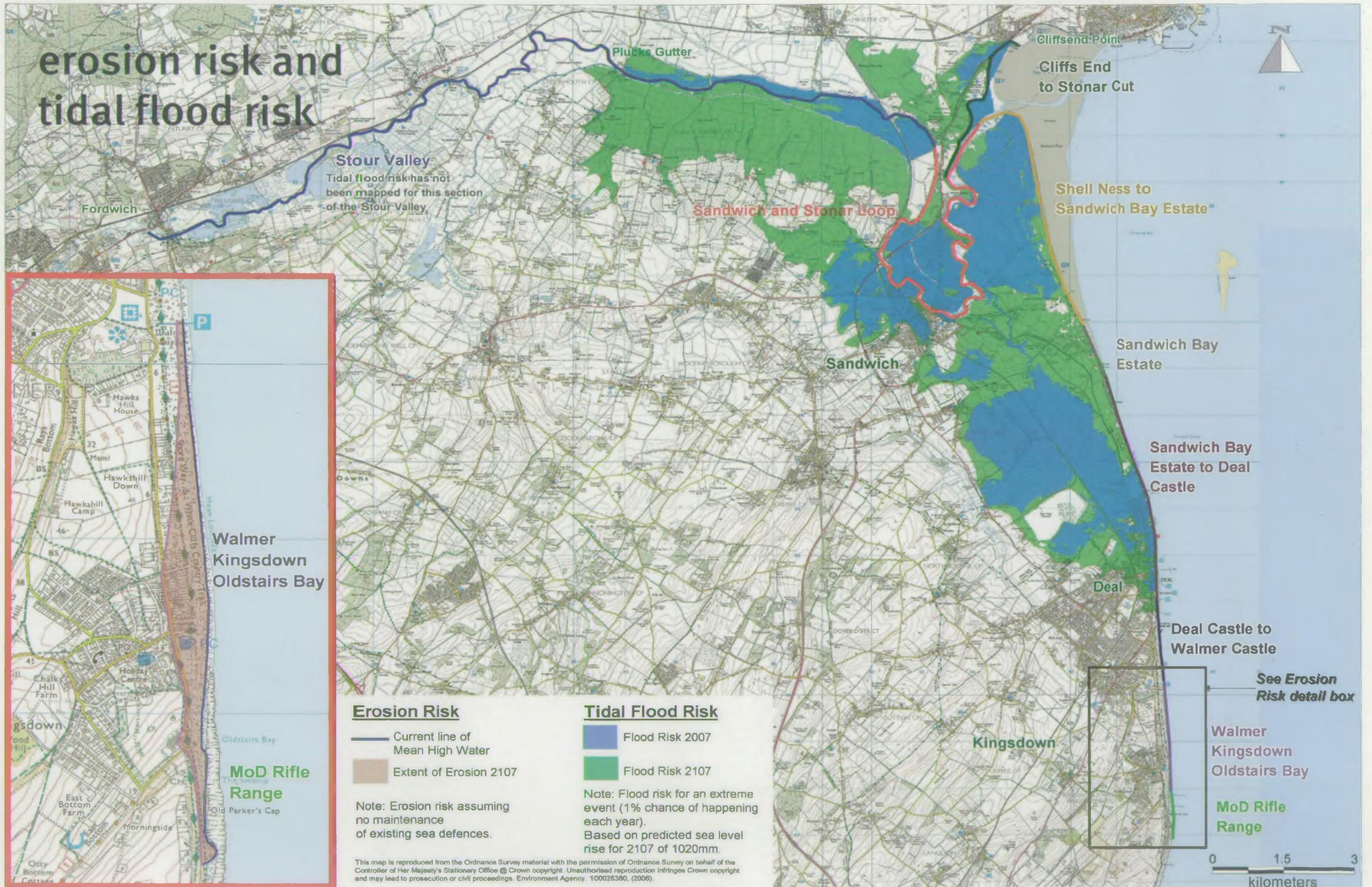
A long-distance footpath runs along the entire length of the frontage.

Strategic option	Actions
Do nothing	No further work will be undertaken on the existing defences
Do minimum	No active maintenance will be undertaken. However, some minor beach management work could be undertaken if these are beneficial to coastal processes for neighbouring frontages

Do minimum has been selected because the existing level of protection provided by the beach is high, and is expected to remain so with future sea level rise. No properties would be at risk if the 'do minimum' option is adopted.

Strategic option	Actions
Do nothing	No further work will be undertaken on the existing defences
Do minimum	No pro-active maintenance, but breaches or failures in the existing defences will be repaired if they occur
Maintain	The existing defences will be actively maintained to reduce the risk of breaching or failure and keep them in a similar condition as they are today
Improve 1	Beach management to increase the shingle volume of the beach throughout the reach. The existing timber groynes will remain in place until the end of their remaining life. A rock revetment will be provided just north of Sandown Castle to protect the shale embankment. A low wave wall will be constructed in Deal to reduce the risk of waves overtopping onto the road
Improve 2	Timber groyne replacement and beach nourishment to increase the shingle volume of the beach. Rock revetment will be provided just north of Sandown Castle to protect the shale embankment. A wave wall will be constructed in Deal
Improve 3	Rock groynes would replace the existing timber groynes with beach nourishment to increase the shingle volume of the beach. Rock revetment will be provided just north of Sandown Castle to protect the shale embankment. A wave wall will be constructed in Deal
Improve 4	Three large rock headlands would replace the existing timber groynes with beach nourishment to increase the shingle volume of the beach. Rock revetment will be provided just north of Sandown Castle to protect the shale embankment. A wave wall will be constructed in Deal

erosion risk and tidal flood risk



Reach 6: Walmer Castle, Kingsdown and Oldstairs Bay

This reach comprises the coastal frontage between Walmer Castle and the MoD Rifle Range. The frontage consists of beaches with a sea wall at Kingsdown,

interspersed by timber groynes.

Behind the coastal defences the land rises relatively steeply and consists predominantly of low to medium density

residential development, with agricultural land further inland.

A long-distance footpath runs along the northern frontage within the reach.

Strategic option	Actions
Do nothing	No further work will be undertaken on the existing defences
Do minimum	No pro-active maintenance, but breaches or failures in the existing defences will be repaired if they occur
Maintain	Beach recycling combined with replacement of existing timber groynes at the end of their remaining life (about 10 years). Supplemented by shingle when required
Sustain	Similar to maintain option, but repairs to timber groynes will start early in the strategy and additional shingle will be brought onto the beach
Improve	A range of improvement options have been considered, including construction of rock headlands, replacement of existing groynes and beach with rock revetment, construction of rock groynes and the refurbishment and upgrade of the existing seawall at Kingsdown

Maintain has been selected since this option would prevent erosion and loss of property, and is the most cost-effective and environmentally acceptable solution.

Reach 7: MoD Rifle Range

The MoD Rifle Range consists of an elevated plateau of fill material in front of chalk cliffs, protected by a concrete seawall.

to national environmental designations and a footpath runs along the base of the cliffs.

There is some uncertainty about the nature of the fill material for release into the

coastal system. The sea wall has collapsed at one section allowing some fill material to seep out.

The site is owned by the MoD.

The site and cliffs are subject

Strategic option	Actions
Do nothing	No further work will be undertaken on the existing defences
Do minimum	Repair of failed sections of the seawall and reactive repairs to further failures. These repairs are likely to consist of steel sheet piled retaining walls or rock armour infill
Managed realignment	Following a detailed investigation of fill material for contamination and appropriate remediation work, the existing seawall would be removed or left to collapse allowing the site to return to natural processes

Managed realignment has been selected. This would provide the maximum environmental benefit, restoring the coastline towards a more natural process, which would benefit the beaches to the north. This option is dependent on further analysis of the site and the availability of funding and intentions of the land owner, who will be responsible for implementation of this option.

Reach 8: Sandwich and Stonar Loop

The Sandwich and Stonar reach comprises the downstream section of the tidal River Stour as it loops through the historic town of Sandwich.

Industrial activity dominates land inside the loop, with Pfizer owning the majority. The area east of the river loop is predominantly high grade agricultural land, with large

sections subject to environmental designations such as SSSI, SAC, Ramsar site and SPA.

Sandwich is rich in cultural heritage, including scheduled monuments, listed buildings and conservation areas. Further upstream on the right bank Richborough Castle is also a scheduled monument.

Long-distance footpaths are located along the banks of the river.

The A256 crosses the River Stour west of Sandwich and runs through the centre of the Stonar Loop to Thanet and the Deal to Canterbury railway line runs through Sandwich and follows the western section of the river.

Strategic option	Actions
Do nothing	No further work will be undertaken on the existing defences
Do minimum	No pro-active maintenance, but breaches or failures in the existing defences will be repaired if they occur
Sustain	To continue the present standard of protection, the existing 'on-line' defences (such as the banks of the River Stour) will be raised to allow for projected sea level rises. They will need raising again in 50 years to keep pace with the continued sea level rises
Improve 1	'On-line' defences – raising defences along the River Stour to increase the standard of protection. As under the 'sustain' option these defences will have to be raised again in 50 years to keep pace with sea level rises
Improve 2	Tidal storage and 'on-line' defences – Construction of a tidal storage facility in the Broad Salts area. This includes the construction of a spillway, embankments and a drainage facility. The 'on-line' defences will also need to be raised, but not as much as if 'on-line' defences were the only protection
Improve 3	Tidal barrier and 'on-line' defences – A tidal barrier would be constructed on the River Stour near Richborough Port. The existing embankments on the eastern bank of the River Stour would be raised and strengthened and extended to the coast north of Sandwich Bay Estate. The 'on-line' defences will also need to be raised, but not as much as for 'on-line' defences only

All **improve** options have been evaluated against economic and environmental criteria. **Improve 2** has been selected because the existing level of protection is too low, and significant areas of Sandwich and all of Stonar Loop are at risk of flooding. The tidal storage option keeps the raising of the 'on-line' defences through Sandwich to a minimum. It also provides potential for a 230 hectares wetland/nature reserve to be developed, enhancing the existing network of designated sites and providing additional recreation opportunities. It is the leading economic and environmental solution.



Sandwich, Reach 8



Broad Salts, Reach 8





Flooding 2001

Reach 9: Stour Valley

Along the River Stour flood protection is predominantly provided by earth embankments, apart from the frontage immediately north of Richborough Castle where ground levels provide adequate protection against tidal flooding.

The land on both banks is

considered to be good to very good grade agricultural land.

Flooding in this reach is dominated by fluvial processes. Therefore the long-term strategic management of this area will be determined in the forthcoming *Lower Stour River strategy*. The option identified in this *Pegwell Bay to*

Kingsdown coastal strategy is a 'holding' option until completion and adoption of the *Lower Stour River strategy*.

The preferred policy from the Catchment Flood Management Plan (CFMP) for this reach is to 'Take action to increase frequency of flooding to bring benefits elsewhere'.

Strategic option	Actions
Do nothing	No further work will be undertaken on the existing defences
Do minimum	The condition of the existing defences would be monitored and any damage repaired on a reactive basis

Do minimum has been selected as a holding option until completion of the *Lower Stour River strategy*. It is anticipated that managed realignment will be the preferred option in this reach to reduce flood risk to Canterbury. The viability and extent of this managed realignment will be determined by the *Lower Stour River Strategy*.

Have your say

This document is a summary of the options developed in partnership with Dover District Council and in line with government guidelines.

We want to know what you think. Your opinions on the leading options are important:

- Do you support the leading options?
- Do you have ideas for improvements?
- Do you have any other comments?

Please send us your comments before 12th October 2007 to either of the following addresses. Please mark your envelope Pegwell Bay to Kingsdown Coastal Strategy.

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For additional copies please call 08708 506 506 (Mon - Fri 8-6). Or visit our website www.environment-agency.gov.uk/yourenv/consultation/current_consultations/

What happens next?

We will be holding public exhibitions in Sandwich and Deal.

Dates and times will be advertised in advance in the local press.

We will address any comments that we receive and these will be taken into consideration for the final strategy report. This will define the construction, improvement or maintenance works that are required in the next five years between Pegwell Bay and Kingsdown, including up the River Stour through Sandwich. The strategy report will also define an overall flood risk management plan for the next 100 years.

The strategy will then be issued to the Department for Environment Food and Rural Affairs (Defra) for review and approval.

**Would you like to find out more about us,
or about your environment?**

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