

Environment Agency in  
partnership with



Environment  
Agency



*Worthing*  
BOROUGH COUNCIL

# planning for the future

Rivers Arun to Adur  
draft flood and erosion management strategy

Summary document



# strategic overview of the coast

In April 2008, the Environment Agency became responsible for overseeing the management of all flood and coastal erosion risk in England

Under the new arrangements the Environment Agency now:

- Takes the lead for managing coastal flooding risk in England
- Ensures that proper and sustainable long-term Shoreline Management Plans are in place for our coastline and approves them on behalf of Defra
- Allocates flood and coastal erosion risk management capital funding

Local authorities will still do much of the operational work on coastal erosion, but under the Environment Agency's coastal overview.

Management strategies along the coast including this *Rivers Arun to Adur draft flood and erosion management strategy* will continue to be developed in partnership by local authorities and the Environment Agency.

The Environment Agency, coastal groups and local authorities are working hard to ensure that we deliver this new way of working in a true partnership approach.

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## introduction

This document summarises our *draft Rivers Arun to Adur flood and erosion management strategy* and provides details on how you can comment.

In 2000 the Environment Agency in partnership with Arun District Council, Worthing Borough Council and Adur District Council completed the *Rivers Arun to Adur coastal defence strategy*. The strategy made recommendations on how to manage the coastline until the year 2050. It initiated several flood defence improvements. £18 million was spent on the Shoreham to Lancing Sea Defences, a new timber seawall was constructed at Littlehampton beach and groynes were renewed at Worthing.

This *2008 draft flood and erosion management strategy*, undertaken by the same group of Operating Authorities, is a review of the *2000 coastal defence strategy* and takes account of:

- an increase in the predictions for future sea level rise;
- the need to plan for 100 years into the future;
- impacts on the natural environment;
- a tidal barrier option on the River Adur at Shoreham-by-Sea;
- the previous *Beachy Head to Selsey Bill Shoreline Management Plan*, which was consulted on extensively with the public, local authorities and other bodies.

This document summarises the findings and recommendations of our draft strategy and sets out the preferred flood and erosion management options along the coastline.

This is a draft strategy and no final decisions have been made yet.

We welcome your views and will consider these before we conclude this strategy in early 2009. You can find out how to send us your comments on page 22.

ENVIRONMENT AGENCY



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# the Arun and Adur estuaries and the coastline between



River Adur

The draft strategy covers the coastline between the Rivers Arun and Adur, which is characterised by shingle beaches, with a relatively low-lying coastal plain behind.

This area includes large residential and commercial developments as well as important local infrastructure, such as roads and railway lines. At present the number of properties at risk of a 1:200 year flooding event is about 1,500. This is predicted to increase to about 7,600 over the next 100 years due to sea level rise with an additional 2,200 properties at risk from coastal erosion.

This draft strategy covers a number of areas that are environmentally important. The Adur Estuary Site of Special Scientific Interest (SSSI), which also includes a

reserve managed by the Royal Society for the Protection of Birds (RSPB), is a nationally important site. Sites of regional importance include Shoreham Beach Site of Nature Conservation Interest (SNCI) and Local Nature Reserve (LNR), Widewater Lagoon SNCI and LNR and Ferring Rife SNCI.

Rising sea levels could result in loss of saltmarsh habitat over the 100 year lifetime of the strategy. We are looking at alternative sites locally that may be used to create replacement habitat.



# who is involved in flood and erosion risk management?



Beach at Ferring

The Environment Agency, Arun District Council, Worthing Borough Council and Adur District Council are the Operating Authorities for this coastline.

There is generally no legal duty on us to build and maintain coastal defences. We have permissive powers that allow us to protect both people and property where economically, technically and environmentally viable and where affordable within national budgets.

We are working with Natural England, which is responsible for recreational issues, landscapes and protection of wildlife, to identify how our strategy impacts on the natural environment. We are also involving English Heritage, which has responsibility for protection of the historic environment, to identify any

archaeological interest in the area. Views from both of these organisations have been taken into account within the draft strategy.

In addition we recognise the need for local community understanding of flood and erosion issues and their involvement in addressing them.



# options appraisal

For each frontage we have assessed flood and erosion risk management options, using government technical, economic, social and environmental criteria. For each option we have considered:

- how it would address flood and erosion risk to people and properties;
- whether it is going to work for the short, medium and long term given the effect of sea level rise;
- the cost of the option and the value of damage avoided by providing defences;
- how it would be built or maintained (if it is a structure);
- how it could impact on people who live in, work in and visit the area;
- the effect it could have on the natural environment.

We have considered four main types of option within the draft strategy as shown in the table below.



Coastguard Lookout, Shoreham Harbour

Management option	Description
No active intervention	Let nature take its course – <b>no</b> work will be carried out to maintain or repair defences, allowing them to <b>deteriorate</b> over time.
Active intervention to hold the line – by maintain, sustain or improve sub-options	<b>Maintain</b> – defences are <b>maintained</b> as they are, but as sea levels rise flood and erosion risk increases <b>over</b> time. <b>Sustain</b> – defences are <b>raised</b> and strengthened keeping the levels of flood and erosion risk the same <b>as</b> now. <b>Improve</b> – defences are <b>improved</b> to increase the standard of protection over time, beyond the requirements of rising sea levels.
Managed realignment	Improve coastal stability by <b>moving</b> coastal defences to a more sustainable location further inland, <b>allowing</b> controlled flooding to occur.
Adaptive management	Managing complex areas by <b>monitoring</b> changes and acting on them in a planned but flexible way, <b>increasing</b> our understanding over time.



# frontage proposals



Within this strategy area the preferred option is generally to hold the line by improving or sustaining the current standard of defence against flood and erosion.

Overall this is in line with previous recommendations given in the *Beachy Head to Selsey Bill Shoreline Management Plan (1997)* and the *Rivers Arun to Adur Coastal Defence Strategy (2000)*.

While central government funding is likely to be forthcoming for frontages which are assessed as having a high benefit cost ratio, funding of proposals for other areas is less certain. In these cases, alternative sources of funding will need to be investigated in future, before schemes are subject to detailed design.

# summary of proposals

Frontage	Previous recommended options of Coastal Defence Strategy 2000	Our recommended options in the draft strategy 2008	Benefit cost ratio	Approximate number of properties at risk from flood and erosion if defences are not maintained	
				Now	In 100 years**
River Arun East Bank	Phased Improve	Hold the line – improve	12	1120	2150
Littlehampton to Rustington	Improve - defer*	Hold the line – improve			
Rustington to Goring	Maintain	Hold the line – sustain	4	0	350
Ferring Rife	Improve	Hold the line – sustain	11	1	220
Marine Crescent Goring	Improve – defer*	Hold the line – sustain	10	0	490
Worthing	Improve - defer*	Hold the line – sustain	10	0	1540
Brooklands to Shoreham	Improve	Hold the line – sustain	30	270	4310
River Adur West Bank	Phased improve	Hold the line – improve			
River Adur East Bank (north)	Phased improve	Hold the line – improve	6	100	790
River Adur East Bank (central)	Phased improve	Hold the line – sustain	2		
River Adur East Bank (east)	Phased improve	No active intervention	1		

\* Improve – defer denotes that improvement works will be deferred until the existing groynes reach the end of their useful life.

\*\* including sea level rise. Some properties may also be affected by flood and erosion events occurring in neighbouring frontages.



# River Arun east bank

Littlehampton is a coastal town situated at the mouth of the River Arun, the majority of the town being on the east bank. It is a busy seaside resort and a local commercial centre. The town features the Look & Sea! Visitor Centre and the East Bank Riverside Development with the Railway Station and the Littlehampton Harbour Park situated close by.

There are a number of flood defences along the east bank of the River Arun including earth embankments, sheet piled walls and a concrete apron with brick wall. Some of the defences are maintained by the Environment Agency but the majority are privately owned. Littlehampton Harbour Board is also responsible for a significant frontage. The defences currently afford a low standard of protection to the town. As sea level rises they can expect to be overtopped with increasing frequency which may eventually lead to failure and flooding.

## Our recommendation: Improve

We propose to **Improve** the current standard of protection by raising the level of the walls and embankments. This would provide an increased standard of protection for the town of Littlehampton. We are confident that central government funding will be available for undertaking these works.



Location of defences



Mouth of the River Arun

## Options considered but rejected include:

**No active intervention** would lead to failure of the defences and flooding and erosion of the local area.

**Maintaining** the defences in their current form would not deal with sea level rise and would result in a gradual increase in flood risk into the future.



# Littlehampton to Rustington

East of the mouth of the River Arun the coastal frontage includes the traditional sand and shingle East Beach with Littlehampton Harbour Park and other public open spaces. There are significant residential and commercial properties situated immediately behind the beach. A broad promenade runs behind the majority of the beach.



Location of defences

The coastline between Littlehampton and Rustington is protected by both hard and soft flood and coastal defences including a low concrete seawall protected by a shingle bank with timber groynes. The defences are maintained by Arun District Council and they currently afford a reasonable standard of protection to the town.

However, the groynes immediately adjacent to the river have reached the end of their life and we are looking at options to replace them.

## Our recommendation: Improve

We propose to **Improve** the current defences through beach management, replacement of groynes at the end of their residual life and reconstruction of the concrete wall. This would provide an increased standard of protection for the town of Littlehampton. We are confident that central government funding will be available for undertaking these works.

## Options considered but rejected include:

**No active intervention** would lead to failure of the defences and flooding and erosion of the local area. **Maintaining** the defences in their current form would not deal with sea level rise and would result in a gradual increase in flood risk into the future.



East Beach, Littlehampton



strategy area



# Ferring Rife

Ferring Rife is located in the low-lying area in South Ferring. It is a wide channel between two grassy embankments which flows beneath a beachfront car park to a gravity outfall allowing drainage to the sea. Immediately adjacent to the channel are the residential properties of Ferring.

The primary defence at the Ferring Rife is a timber wall protected by a wide shingle beach. The defences are maintained by the Environment Agency and they currently afford a high standard of protection to this area.

## Our recommendation: Sustain

We propose to **Sustain** the current standard of protection by raising defences over time as sea level rises. This would require beach management and maintenance of existing groynes. We are confident that central government funding will be available for undertaking these works. However, long term viability of this option will depend on funding being available for holding the line on adjacent frontages.



Location of defences

## Options considered but rejected include:

**No active intervention** would lead to failure of the defences and erosion and flooding of the local area. **Maintaining** the defences in their current form would not deal with sea level rise and would result in a gradual increase in flood risk into the future.



Beach at Ferring



# Rustington to Goring (excluding Ferring Rife)



Location of defences

This frontage includes the built up areas of East Preston, Kingston and Ferring and the large area of open space and agricultural land around Kingston Gorse. The urban areas are mostly residential properties and are situated immediately behind a low vegetated bank behind the beach.

The primary defence between Rustington and Sea Lane, Goring is a shingle beach with a number of timber and rock groynes. The defences are maintained by Arun District and Worthing Borough Councils. They currently afford a high standard of protection to this area and will not require major investment in the immediate future.

## Our recommendation: Sustain

We propose to **Sustain** the current standard of protection by raising defences over time as sea level rises. This would require beach management and replacement of groynes. It is currently considered unlikely that central government funding will be available for undertaking these works in the short term and other sources of funding may need to be investigated if government funding were unavailable in the longer term.

## Options considered but rejected include:

**No active intervention** would lead to failure of the defences and erosion of the coastline. **Maintaining** the defences in their current form would not deal with sea level rise and would result in a gradual increase in erosion risk into the future.



Beach at Rustington



# Marine Crescent, Goring

This frontage runs from the west end of Marine Crescent in Goring to the western suburbs of Worthing and consists of mainly residential properties. The beach here forms a major local attraction for fishing, sailing, jet skiing and kite surfing. There is a large open space between the beach and Marine Crescent, beachfront parking and a yacht club at Sea Place. There is also a public path and promenade running the full length of this frontage.

The primary defence along Marine Crescent is the shingle beach which is held in place by timber and rock groynes. Particularly vulnerable areas are protected against erosion and flooding by rock armouring and splash walls. The defences are maintained by Worthing Borough Council and they currently afford a high standard of protection to this area.



Location of defences

## Our recommendation: Sustain

We propose to **Sustain** the current standard of protection by raising the defences over time as sea level rises. This would require beach management and replacement of groynes. We are confident that central government funding will be available for undertaking these works.

## Options considered but rejected include:

No active intervention would lead to failure of the defences and flooding and erosion of the local area. **Maintaining** the defences in their current form would not deal with sea level rise and would result in a gradual increase in flood risk into the future.



Beach opposite Marine Crescent



# Worthing

Worthing is a major town with a large population and busy commercial centre. A wide promenade stretches along the coast with a pier near the town centre and theatres and restaurants situated nearby. The promenade and coastal amenities attract many visitors during the summer months and the shopping centre is busy all year round.

The primary defence between West Parade and Brooklands Pleasure Park is a shingle beach which is held in place by timber and rock groynes. Particularly vulnerable areas are protected against erosion and flooding by rock armouring and splash walls. The defences are maintained by Worthing Borough Council and they currently afford a reasonable standard of protection to the town.



Location of defences

## Our recommendation: Sustain

We propose to **Sustain** the current standard of protection by raising these defences over time as sea level rises. This would require ongoing and future works to replace and improve groynes, increase the height of the beach by adding shingle to it and protect vulnerable sections of the defences from erosion. We are confident that central government funding will be available for undertaking these works.

## Options considered but rejected include:

**No active intervention** would lead to failure of the defences and erosion and flooding of the local area. **Maintaining** the beach and defences in their current form would not deal with sea level rise and would result in a gradual increase in flood risk into the future.



Splash Point, Worthing



# Brooklands to Shoreham-by-Sea

This frontage is mainly residential with some commercial and industrial premises. It includes the Brooklands Pleasure Park, Widewater Lagoon and Shoreham Beach. There is a public path immediately behind the beach that runs the full length of the frontage.

The primary defence between Brooklands Pleasure Park and the mouth of the River Adur is a concrete sea wall with some timber sections protected by a shingle beach held in place by timber and rock groynes. The beach and groynes have recently been improved in this area. The defences are maintained by the Environment Agency and they currently afford a high standard of protection along the coast.

Parts of this area remain vulnerable to flooding from the west bank of the River Adur as discussed on the next page.

## Our recommendation: Sustain

We propose to **Sustain** the current standard of protection by improving the defences as sea level rises. This would require beach management and maintenance of the existing groynes. We are confident that central government funding will be available for undertaking these works.



Location of defences

## Options considered but rejected include:

No active intervention would lead to failure of the defences and erosion and flooding of the local area. Maintaining the beach and defences in their current form would not deal with sea level rise and would result in a gradual increase in flood risk into the future.



Beach at Lancing



# River Adur

The River Adur flows south along the western edge of Shoreham before turning east and flowing out to sea by the Old Fort, a scheduled monument at the Harbour entrance.

This frontage includes the west bank from the A27 south to the river mouth, while the east bank has been further divided into three sections:

- north section, A27 flyover to footbridge;
- central section, footbridge to Kingston Beach lighthouse;
- east section, Kingston Beach lighthouse to the lock gates at the port.

Along the River Adur there are significant areas of residential and commercial property, many historic and modern buildings, as well as public open space and agricultural land. Shoreham airport and the houseboat communities are on the west bank. The north section of the east bank includes the urban area of the town, while the central and eastern sections feature mainly light commercial and leisure use and Port facilities.

The River Adur west of the footbridge is designated as a Site of Special Scientific Interest (SSSI) and includes a significant area of saltmarsh and a nature reserve managed by the Royal Society for the Protection of Birds



Location of defences

(RSPB). It is also located near the South Downs Area of Outstanding Natural Beauty (AONB).

The banks of the River Adur include a variety of defence types including steel sheet piling, concrete walls, rock revetments and timber groynes. The defences on the west bank are maintained by the Environment Agency and provide only a very low standard of protection with the possibility of regular overtopping and defence failure. The defences on the east bank are mainly maintained by Adur District Council and provide a reasonable standard of protection.



Footbridge over the River Adur, Shoreham



## Our recommendations:

We propose to **Improve the west bank and east bank (north section only)** by raising the existing defences to provide a higher standard of protection.

We propose to **Sustain the east bank, central section**, by raising the existing defences to take account of sea level rise while providing the same standard of protection.

We propose **No active intervention** for the east bank, east section, due to the currently low flood risk in this area. This position may be reviewed subject to any future development proposals within this section.

We are confident that central government funding will be available for undertaking works on the west bank and east bank (north section only). It is currently considered unlikely that funding will be available in the short term for the east bank central section for which other sources for funding will need to be investigated.

To address predicted sea level rise solely through defence raising over the entire 100 year strategy period would involve raising existing defences by up to 1.5m in places. It is therefore proposed to carry out defence raising over the first 50 years of the strategy period. Sea level rise beyond that time would be addressed by either further defence raising or by construction of a tidal barrier in 2058.

This is an adaptive approach that can be kept under review as sea level rise predictions are confirmed and can provide an improved standard of protection when required.

## Options considered but rejected include:

**No active intervention** would lead to failure of the defences and erosion and flooding of the local area. **Maintaining** the defences in their current form would not deal with sea level rise and would result in a gradual increase in flood risk into the future.



River Adur, Shoreham



# how will our proposals be paid for?



Widewater Lagoon, Lancing

Our draft strategy recommendations depend on the availability of funding to implement them.

Our strategy does not propose detailed schemes or guarantee funding. In this document, we set out our strategic recommendations and highlight the likelihood of frontages attracting government funding.

Central government spending on flood and erosion risk management has more than doubled over the last ten years, rising from £312 million in 1999 to a forecast £800 million by 2011. Despite these large increases, funds still have to be prioritised to get the maximum benefit for the money spent.

Last summer's flooding in Kingston upon Hull and Gloucestershire highlights that many areas of the

country are at risk of flooding and need investment in flood risk management. Funding is allocated nationally, and priority is given to schemes protecting large numbers of houses and where flooding will cause significant damage.

There could be a long wait for national funding for schemes protecting fewer houses and where benefit cost ratios are small. We have identified such schemes as 'unlikely to receive central government funding' in this document. At these locations, exposure to flood or erosion risk could increase over time in the absence of investment. Other sources of funding would then need to be investigated.



# where can I find out more?

This document sets out the options we have considered and our recommendations for how to manage flood and erosion risk. This document is available on our website [www.environment-agency.gov.uk/yourenv/consultations/](http://www.environment-agency.gov.uk/yourenv/consultations/) or additional hard copies can be provided on request. You can email or write to us at the addresses on the next page, or call us on 08708 506506.

We have produced a strategic environmental assessment (SEA) of the draft strategy which is recorded in an environmental report. The SEA includes early consultation with other environmental organisations and looks at the potential environmental consequences of the strategy. These assessments are carried out at a high-level and will be developed more comprehensively during the detailed planning and design of any individual schemes.

Copies of the environmental report are available at the main local libraries and at the offices of Arun District, Worthing Borough and Adur District Councils.

A display of the draft strategy will be set up at three locations within the area where you can come and talk to the project team about this strategy.

These exhibitions will be held on:

- Thursday 10 July at the Richmond Room, adjoining the Assembly Hall, in Worthing;
- Monday 14 July at the Ropetackle, Shoreham-by-Sea;
- Tuesday 15 July at Littlehampton Town Hall.



Worthing Pier



# have your say

We welcome your comments on these proposals. In particular, we are keen to understand any concerns or questions you may have so that we can respond to them where possible within the final strategy.

Please send your comments or questions to us:

By email:

[arun.adur@environment-agency.gov.uk](mailto:arun.adur@environment-agency.gov.uk)

or by writing to:

Rivers Arun to Adur 2008  
Environment Agency  
Guildbourne House  
Chatsworth Road  
Worthing  
West Sussex  
BN11 1LD

Please provide your comments to us as soon as possible and no later than 18 September 2008. We will consider all of these before making our final decisions in early 2009. We will keep you informed of our progress and share the outcomes of this consultation with you.



Worthing Pier



# feedback form

Please read the *Rivers Arun to Adur draft flood and erosion management strategy summary document* and share with us your views by answering the following questions

1.	In which of the following areas do you live?	
	a) Littlehampton b) Rustington c) East Preston d) Kingston e) Ferring f) Goring-by-Sea	g) Worthing h) Lancing i) Shoreham Beach j) Shoreham-by Sea k) other (please specify) _____
2.	Which section, or sections, do you wish to comment on?	
	1) River Arun East Bank 2) Littlehampton to Rustington 3) Rustington to Goring 4) Ferring Rife 5) Marine Crescent, Goring 6) Worthing	7) Brooklands to Shoreham 8) River Adur West Bank 9) River Adur East Bank (north) 10) River Adur East Bank (central) 11) River Adur East Bank (east)
3.	From your point of view is the strategy information within the document presented clearly?	
yes / no – please tell us why.		
4.	Have we missed any issues that are important to you?	
yes / no – please give details.		



5.	Do you support the proposed options for the sections you wish to comment on? yes / no – please tell us why.
6.	If you have any additional information or ideas that you feel may be useful for the strategy, please let us know in the box below.

If you would like to receive future updates on our work with this strategy, please complete the following details:

Name	
Address	
Postcode	
Email	
Area(s) of interest	

The comments that you provide may be referred to and published in the final strategy or made available to other parties. Personal data will not be made available to others.

Where you have asked to be kept updated about the strategy the personal information you have provided will only be used for this purpose. We may pass the information on to our agents/representatives to do this on our behalf.

**Thank you**

Please send the completed questionnaire to: Rivers Arun to Adur 2008, Environment Agency, Guildbourne House, Chatsworth Road, Worthing, West Sussex BN11 1LD. Alternatively you can email: [arun.adur@environment-agency.gov.uk](mailto:arun.adur@environment-agency.gov.uk)



notes



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