



[www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)

# Suffolk Estuarine Strategies Alde and Ore Estuary Strategy

Options Shortlisting Consultation Document  
December 2004



**ENVIRONMENT  
AGENCY**

The Environment Agency is the leading public body protecting and improving the environment in England and Wales.

It's our job to make sure that air, land and water are looked after by everyone in today's society, so that tomorrow's generations inherit a cleaner, healthier world.

Our work includes tackling flooding and pollution incidents, reducing industry's impacts on the environment, cleaning up rivers, coastal waters and contaminated land, and improving wildlife habitats.

**Published by:**

Environment Agency  
Kingfisher House  
Goldhay Way  
Orton Goldhay  
Peterborough PE2 5ZR  
Tel: 08708 506 506 Fax: 01733 231 840

© Environment Agency December 2004

All rights reserved. This document may be reproduced with prior permission of the Environment Agency.

This report is printed on Cyclus Print, a 100% recycled stock, which is 100% post consumer waste and is totally chlorine free. Water used is treated and in most cases returned to source in better condition than removed.

## Introduction

The Environment Agency is responsible for managing the flood risk arising from rivers and the sea, in many areas.

There are several areas in Suffolk that are becoming increasingly susceptible to flooding. The Agency has commissioned the development of long-term strategies to manage the flood defences for three of the Suffolk Estuaries: the Blyth, the Alde and Ore and the Deben. This project is known as the "Suffolk Estuarine Strategies". These flood management strategies are being developed on a river-by-river basis starting with the Blyth, followed by the Alde and Ore, then the Deben estuary. The study area is shown in Map 1.

With sea levels expected to rise over the next 100

years, and with areas of land behind the current defences several metres lower than the normal high water in the estuary, steps must be taken to ensure that the response to changes in the risk of flooding is appropriate. The production of a flood management strategy will enable us to manage the potential impacts that natural change will bring and also allow opportunities associated with such change to be identified at a strategic level.

This consultation document sets out the shortlisting of options for the Alde and Ore Estuary.

## The Aims of the Options Shortlisting Consultation Document

This consultation document marks the next stage of the option assessment process and follows on from 'The Alde and Ore Estuary Strategy: Options Consultation Leaflet – May 2004'.

After further studies and following on from comments received from consultation to date, this present consultation document sets out the process of moving from a long list of options to a short list of options for the Alde and Ore Estuary.

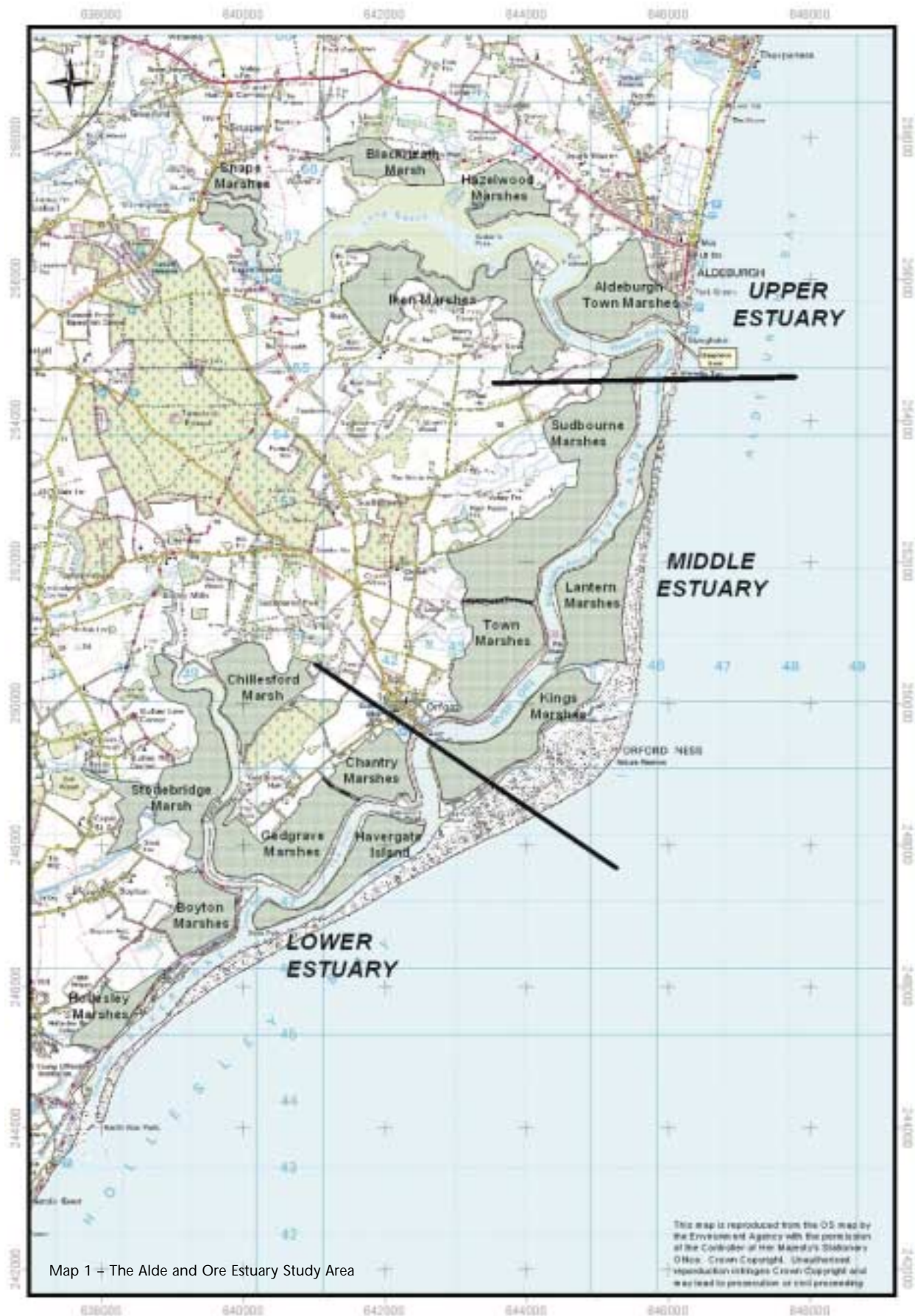
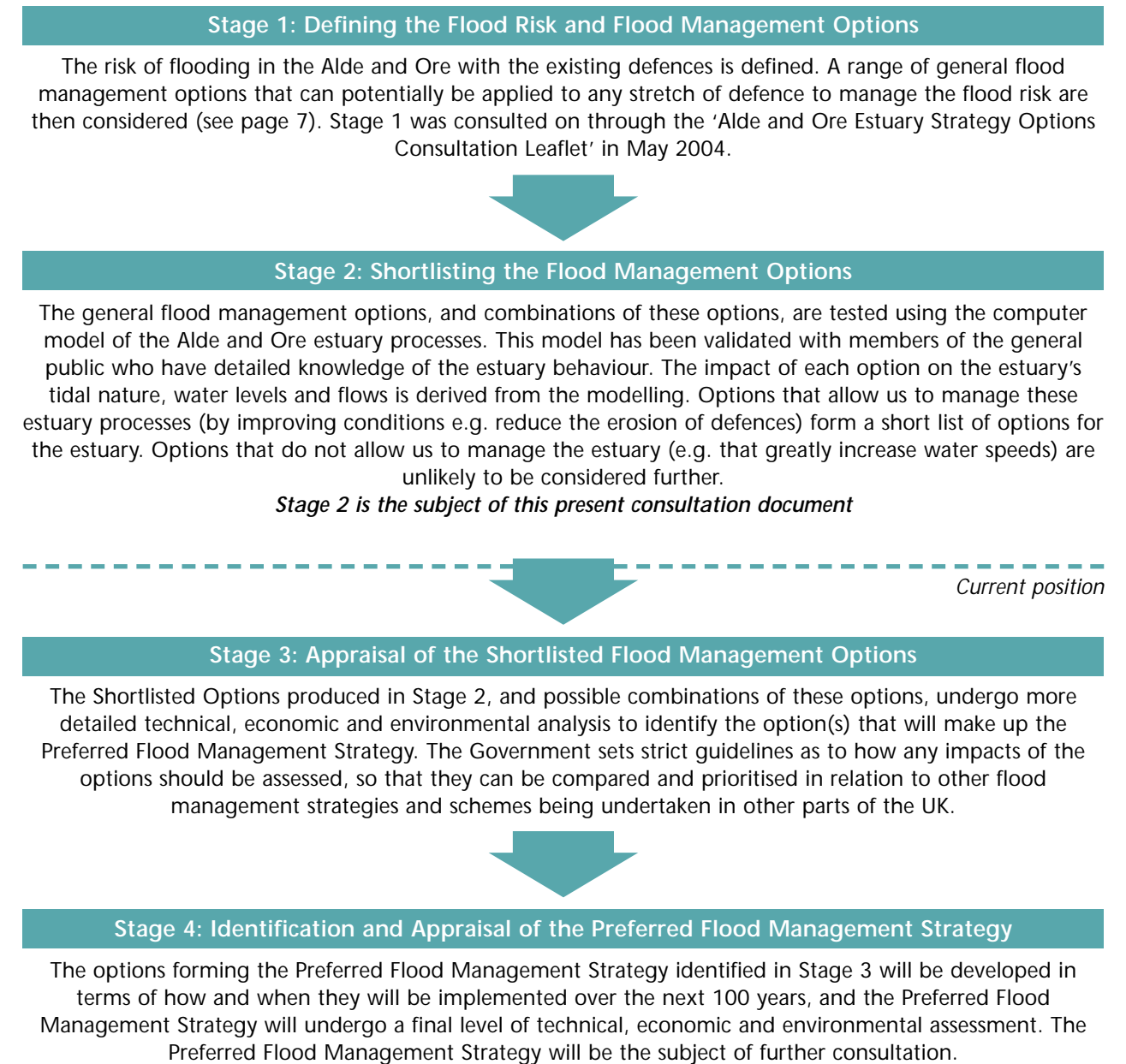
The objectives of this consultation document are to:

- Illustrate the process of option selection.
- Present the long list of options that have been considered.
- Describe the proposed shortlisted options.
- Seek the views of interested and affected parties and identify the key concerns of individuals and organisations.

# What is the Approach to Option Selection?

The process of choosing the Preferred Flood Management Strategy for the Alde and Ore Estuary is made up of several stages.

This allows the Agency to check at each stage of strategy development that the appropriate level of detailed study has been given to each option before it is taken forward or ruled out. The process also allows the views of stakeholders to be included at each key stage. This process is set out below:



# The Current State of the Alde and Ore Estuary

The Alde and Ore Estuary is a dynamic entity, constantly straining to shift its course in response to changing environmental factors. The existing floodplain for a flood event with a 0.5% probability (chance) of occurring in any given year is shown in Map 2.

The estuary is currently slightly flood dominated, that is the incoming tide is stronger than the outgoing tide. As a result, the estuary acts as a slight sediment trap. The opposite of a flood dominated estuary is an ebb dominated estuary where sediments tend to be moved out of the estuary.

Maintenance of the existing flood defences around the Alde and Ore Estuary is becoming less sustainable due to changes in sea level rise, water speeds and the forces of erosion. These flood defences currently provide a relatively low level of protection for the majority of agricultural land and grazing marsh that they protect. Statistically, studies have shown that there is a 10% chance of this land being flooded in any one year.

One of the key issues in the Alde and Ore Estuary is in relation to Slaughden sea defences. From an estuary point of view the estuary side of the Slaughden Bend is suffering from increased erosion pressure, which will be exacerbated by sea level rise and changes in water levels and water speeds. The coastal frontage is also under stress and without

heavy engineering and the current management regime it would almost certainly breach. Slaughden Bend is therefore a key area to consider within the strategy, with the long term sustainability of this feature dependent on both estuary and coastal processes.

To address the coastal processes, the Environment Agency has recently started the Thorpeness to Hollesley Coastal Strategy to assess whether the existing coastal defences and shingle recycling is sustainable in the long term. A decision is due in approximately 15 months time but in the meanwhile the Alde and Ore Estuary Strategy will need to decide if a breach at Slaughden is acceptable from the point of view of managing the estuary processes only. By working closely with the coastal strategy team, we will be able to advise them on the implications of a breach from the estuary point of view. Given the importance of ensuring that any strategic investment over the next 100 years is based on robust decision-making, a very thorough analysis of a potential breach at Slaughden is required.

# Maintenance works on the Alde and Ore Estuary

The Flood Management Strategy Study will set the framework for the future management of the Alde and Ore Estuary.

It will provide us with a greater understanding of how the Estuary works today and how the Estuary will be affected by sea level rise and other changes in the future. This will allow a strategic approach to flood management encompassing social, economic and environmental issues. This strategic approach is also required to secure future investment in flood defences.

Many of the existing defences in the Estuary are, and have always been relatively low. This, coupled with erosion of the flood banks and loss of saltmarsh due to natural change, rather than any lack of maintenance, has increased the risk of flooding. These risks need to be managed strategically, by managing the estuary processes. However, we also

recognise that we need to maintain the existing system whilst the strategy is being developed.

The defences are inspected regularly, from which we develop our maintenance programme. In the last seven years we have completed works on twenty sections of river walls within the Suffolk Estuaries. Due to the extensive environmental designations in the Alde and Ore Estuary, all maintenance works need to be evaluated for their potential impact before approvals can be obtained and works progressed. On the Alde and Ore Estuary, we are planning to undertake works on the river banks at several locations this year and next as part of our ongoing maintenance programme.

# What are the Options for the Alde and Ore Estuary?

The previous consultation document set out a number of general flood management options for the Alde and Ore Estuary. These were: No Active Intervention; Do Minimum; Hold the Line; Advance the Line; and Managed Realignment (Notes 1 and 2 see page 28).



THIS MAP IS REPRODUCED FROM ORDNANCE SURVEY MATERIAL WITH THE PERMISSION OF ORDNANCE SURVEY ON BEHALF OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE © CROWN COPYRIGHT. UNAUTHORISED REPRODUCTION INFRINGES CROWN COPYRIGHT AND MAY LEAD TO PROSECUTION OR CIVIL PROCEEDINGS. ENVIRONMENT AGENCY, 100026380, 2004.

These options form the basic building blocks for developing a strategy for the Estuary. We have therefore used these building blocks to develop a long list of options for the Estuary, by considering the following:

- The options of Hold the Line and No Active Intervention each applied across the whole of the Estuary;
- The general flood management options applied to specific locations (flood management units) along the Estuary;
- The general flood management options in combination with a breach at Slaughden. A breach at Slaughden Bend has been considered so that possible scenarios for Slaughden Bend can be accounted for in both the Alde and Ore Estuary Strategy and the Thorpeness to Hollesley Coastal Strategy.

Given that there are five general flood management options and 15 flood management units within the study area, there are a staggering 30,517,578,125 possible different combinations of options that could be considered for the Alde and Ore Estuary! To develop a more manageable 'long list' of options for the Estuary, we therefore used a number of tools including:

- professional judgement;
- comments received during the previous round of consultation (Stage 1);
- preliminary analysis of 'top down' modelling results – 'Top down' analysis involves using historical patterns of estuary changes to predict what might happen in the long term (50-100 years); and
- preliminary analysis of 'bottom up' modelling results – 'Bottom up' analysis involves using a computer model built on the existing conditions in the estuary which is used to predict what might happen in the short term (0-20 years) to medium term (20-50 years).

We have also divided the estuary into upper, middle and lower 'sections' (see Map 1). Rather than model every possible managed realignment site throughout the estuary, we have modelled representative marshes from each of these sections of the estuary. This allows us to understand how managed realignment at other sites within these sections of the estuary might affect estuary processes.

The long list of options for the Alde and Ore Estuary is shown in Table 1.

Table 1 Long list of possible options for the Alde and Ore Estuary

Management Options	Long list of options
No Active Intervention Options	No Active Intervention throughout the whole Estuary (Maintain Slaughden sea defences)
	No Active Intervention throughout the whole Estuary (No maintenance of Slaughden sea defences)
	<i>This option assumes that both the defences along the estuary have failed and that a breach has occurred at Slaughden Bend. In reality, the timing of a breach at Slaughden is dependent on coastal processes; this will be considered further in the next stage of this study and as part of the Thorpeness to Hollesley Coastal Strategy.</i>
Hold the Line Options	Hold the Line throughout the whole Estuary
	Hold the Line + Bypass channel across the top corner of Sudbourne Marshes (Ferry Point Corner) by dredging a channel. The purpose of the bypass channel is to force the water to follow the route of the new channel (which would not happen naturally), reducing pressure on the outside bend at Slaughden.
Advance the Line Options	Barrier* at Estuary mouth, or upstream at Orford, or at Slaughden
	Barrage† at Estuary mouth, or upstream at Orford, or at Slaughden
No Active Intervention/ Managed Realignment + Hold the Line Options	Hold the Line + No Active Intervention/ Managed Realignment at one or more sites in the Upper Estuary:
	<ul style="list-style-type: none"> <li style="width: 25%;">● Snape Marshes</li> <li style="width: 25%;">● Blackheath Marsh</li> <li style="width: 25%;">● Iken Marshes</li> <li style="width: 25%;">● Hazelwood Marshes</li> </ul>
	Hold the Line + No Active Intervention/ Managed Realignment at one or more sites in the Middle Estuary:
No Active Intervention/ Managed Realignment + Bypass Channel + Hold the Line options	<ul style="list-style-type: none"> <li style="width: 25%;">● Sudbourne Marshes</li> <li style="width: 25%;">● Orford Town Marshes</li> <li style="width: 25%;">● Kings Marshes</li> <li style="width: 25%;">● Lantern Marshes</li> </ul>
	Hold the Line + No Active Intervention/ Managed Realignment at one or more sites in the Lower Estuary:
	<ul style="list-style-type: none"> <li style="width: 16.6%;">● Chillesford Marsh</li> <li style="width: 16.6%;">● Stonebridge Marsh</li> <li style="width: 16.6%;">● Chantry Marshes</li> <li style="width: 16.6%;">● Gedgrave Marshes</li> <li style="width: 16.6%;">● Boyton Marshes</li> <li style="width: 16.6%;">● Hollesley Marshes</li> </ul>
Breach at Slaughden Management Options	Breach at Slaughden + Hold the Line + Open Estuary Mouth (this option assumes that the existing estuary mouth remains open)
	Breach at Slaughden + Hold the Line + Closed Estuary Mouth (this option assumes that as the breach at Slaughden becomes the dominant mouth for the estuary, the existing estuary mouth closes as a result of natural build up of silt from the coast).
	Breach at Slaughden + Managed Realignment at sites in Upper and/or Middle and/or Lower Estuary + Hold the Line elsewhere

\* A barrier is a defence which can be raised and lowered to reduce the flood risk upstream of the defence. A barrier does not affect the day to day estuary use or tidal conditions it only reduces the effects of surge events.

† A barrage is a permanent defence structure within the estuary. The barrage stops the tide moving upstream of the structure. A barrage provides flood protection to all land upstream of the structure from tidal surges but not fluvial flows. The barrage does not provide any protection to land areas downstream of the barrage.

# Shortlisting the Alde and Ore Estuary Options

## The process of shortlisting the options

In order to identify a short list of options from the long list of options shown in Table 1, we have used the two modelling techniques outlined on page 7.

These techniques have been used to identify how each option will affect the whole estuary under present conditions and scenarios of Sea Level Rise and Tidal Surges (like the 1953 flood event). This is done by considering how an option affects the following:

- water speeds (velocity) and, where applicable, the extra amount of water that would enter and leave the estuary each tide (tidal prism);
- erosion pressure; and
- water levels.

Water speeds and erosion are linked in that an increase in water speeds in the estuary will generally result in an increase in erosion pressure on flood defences and intertidal habitats in front of the defences.

Using the results of these model exercises, we can see which options allow us to manage estuary processes and which options do not. Only options that allow us to manage the estuary processes will be taken forward as 'Shortlisted Options' for the estuary. This comprises options that allow us to minimise the effect of some or all of the existing conditions, such as reducing water speeds, in the Estuary. Options that do not allow us to manage the estuary processes, for example by increasing erosion pressures, are unlikely to be considered further.

Whilst we will not consider 'do nothing' options that have an adverse impact on the estuary processes, we will continue to look at options that include limited or no intervention.

## Results of the shortlisting exercise for the Alde and Ore Estuary

The results of the model exercises for the Alde and Ore Estuary long list of options shows that there are some options that do not allow us to manage estuary processes at all. The results also show that there is no single option that allows us to manage all the estuary processes. That is, in the majority of cases, a single option may result in both a benefit e.g. reduces water levels, and a disbenefit e.g. increases water speeds. It is therefore not possible to rule out the majority of the options on the basis of estuary process impacts alone.

Based on the modeling results, the options proposed for shortlisting and the reasons for this are set out in Pages 10 to 13 of this document. The options that are not proposed for shortlisting, and the reasons for this, are set out in Pages 14 to 15. For each option, a description of its effect on estuary processes is provided. The description includes details on the magnitude of change so that organisations and individuals can see how changes may affect their particular interests. These details can also be found on the SES website: [www.suffolkestuaries.co.uk](http://www.suffolkestuaries.co.uk) and will be available at the forthcoming public exhibitions.

# Options proposed for shortlisting

The options proposed for shortlisting fall into two categories: (1) Options that must be taken forward for more detailed technical, economic and environmental study, and (2) Options that are proposed to be taken forward on the basis of the model results.

## (1) Options that must be taken forward

The following options must be taken forward for more detailed study. The reasons for this are set out below. The effect of these options on estuary processes is shown in Table 2.

- **No Active Intervention** – Defra requires us to consider this option as a baseline against which other options must be compared.
- **Hold the Line** – This option presents the existing situation and therefore provides a baseline against which other options can be compared. It was also stated as a preference during the previous rounds

of consultation.

- **Breach at Slaughden management options** – Slaughden Bend is influenced by both estuarine and coastal processes therefore any decisions relating to this site need to take into account both the results of the Estuarine and the Coastal strategies. As the long term sustainability of the existing sea defences and shingle recycling at Slaughden is currently being investigated in the Thorpeness to Hollesley Coastal Strategy, it is necessary to consider the impacts of the possible Slaughden Breach management options on the Estuary in further detail.

Table 2 Impacts on Estuary processes of shortlisted estuary options

Management Options	Impacts on Estuary Processes
No Active Intervention throughout the whole Estuary (Maintain Slaughden sea defences)	<ul style="list-style-type: none"> <li>● <b>Water speeds:</b> Increase in the volume of water entering &amp; leaving the estuary each tide, with an increase in water speeds in the lower estuary and in particular the estuary mouth (up to 30%) and a decrease in the upper estuary (up to 50%).</li> <li>● <b>Erosion:</b> increase in the lower estuary &amp; at the estuary mouth (up to 55%), which may lead to a widening of the mouth. Reduction in the middle &amp; upper estuary (up to 70%). Would encourage a more flood dominant estuary, encouraging sediments to stay in the estuary.</li> <li>● <b>Water levels:</b> Noticeable reduction throughout the whole estuary.</li> </ul>
No Active Intervention throughout the whole Estuary (No maintenance of Slaughden sea defences)	<ul style="list-style-type: none"> <li>● <b>Water speeds:</b> Decrease in lower estuary (up to 35%). Increase at mouth (10%) &amp; in middle and upper estuary (up to 280% around the area of the new breach as this effectively becomes another mouth to the estuary). Increase at the downstream end of Butley Creek (100%).</li> <li>● <b>Erosion:</b> Reduction at the existing mouth &amp; lower estuary (up to 60%). Increase in middle &amp; upper estuary (up to 250% around the area of the new breach), &amp; in Butley Creek (200%).</li> <li>● <b>Water levels:</b> Marginal decrease in lower &amp; middle estuary, with a noticeable decrease in the upper estuary.</li> </ul>
Hold the Line throughout the whole Estuary	<ul style="list-style-type: none"> <li>● <b>Water speeds:</b> No effect in the short term. As sea levels rise, noticeable increase in the lower parts of the estuary as it is forced to cope with an increase in water flowing into and out of the estuary each tide.</li> <li>● <b>Erosion:</b> Noticeable increase, resulting in a reduction in the lifespan of existing defences.</li> <li>● <b>Water levels:</b> No effect in the short term. In the long term, noticeable increase throughout the estuary.</li> </ul>

Table 2 Impacts on Estuary processes of shortlisted estuary options continued

Management Options	Impacts on Estuary Processes
Breach at Slaughden + Hold the Line + Open Estuary Mouth	<p><b>Breach at Slaughden Management Options</b></p> <ul style="list-style-type: none"> <li>● <b>Water speeds:</b> The model shows that the flow through Slaughden breach would dominate flows in the upper estuary &amp; down to Orford, with the existing estuary mouth still dominating flows downstream of Orford. Increase in the upper estuary at Slaughden (by 130%) &amp; at Butley Creek (35%). Decrease in the middle &amp; lower estuary (by approx. 20-30%).</li> <li>● <b>Erosion:</b> Increase in the upper estuary &amp; upper section of the middle estuary (from approx. 250% to 160% respectively). Reduction in lower estuary &amp; existing estuary mouth (by approx. 70%). It is likely that the reduction in water speeds &amp; erosion pressure in the lower estuary will result in a build up of silt, especially around Havergate Island &amp; up to Orford.</li> <li>● <b>Water levels:</b> Noticeable decrease in the upper estuary. Marginal increase in lower estuary.</li> </ul>
Breach at Slaughden + Hold the Line + Closed Estuary Mouth	<ul style="list-style-type: none"> <li>● <b>Water speeds:</b> Increase in upper estuary, in particular at Slaughden Bend (by 95%), although the increase is less than for the above option. Increase in the lower Butley Creek (12%). Decrease in lower estuary (of 60% - greater reduction than if the existing mouth remains open, see option above).</li> <li>● <b>Erosion:</b> Increase in middle &amp; upper estuary (up to 220%). Increase in lower Butley Creek (approx 100%). Reduction in lower estuary (up to 90%).</li> <li>● <b>Water levels:</b> By closing the existing mouth maximum water levels are reduced in the majority of the estuary (noticeable decrease at the existing estuary mouth and in the upper estuary). Marginal increase in the lower Butley Creek. No change in the lower estuary between Havergate Island &amp; Orford.</li> </ul>
Breach at Slaughden + Managed Realignment at sites in Upper and/or Middle and/or Lower Estuary + Hold the Line elsewhere	<ul style="list-style-type: none"> <li>● These scenarios have not been specifically tested by the model &amp; will be considered once a better understanding of the implications of a breach at Slaughden has been investigated in detail, and in liaison with the Coastal Strategy study team.</li> </ul>

## Note to Tables 2 to 4

Marginal increase/ decrease in water levels = less than + or – 5cm (2 inches)

Noticeable increase/ decrease in water levels = equal to or more than + or – 5cm (2 inches)

The values shown for water speeds relate to single points of measurement throughout the estuary.

The values shown for erosion relate to the average maximum values along sections of the estuary.

## (2) Options proposed for shortlisting

The results of the model exercises shows that the following options result in some benefits to estuary processes e.g. reduction in water levels, whilst also having some disbenefits e.g. by increasing water speeds.

The issues associated with each of these options are set out below. The impact of each option on estuary processes is shown in Table 3.

- **Hold the Line + Bypass channel across the top corner of Sudbourne Marshes** – this option has been shown to reduce water speeds and erosion around Slaughden Bend (a key pressure point in the estuary) and the Upper Estuary, however it also results in an increase in water speeds and erosion in the Middle Estuary. It is proposed that this option is taken forward, and should be considered in combination with options that address the increases in water speeds and erosion in the Middle Estuary.
- **Barrier** – this option would provide protection to areas upstream of the barrier location during storm or surge events. This option is therefore proposed as a shortlisted option.
- **Managed realignment options in the Middle Estuary:**
  - Managed realignment at one or more sites in the Middle Estuary generally results in an increase in water speeds and erosion in the Middle and Lower Estuary however it does result in reduced water speeds and erosion in the Upper Estuary. Middle Estuary realignment also results in a noticeable reduction in water levels in the whole of the estuary. For this reason, it is proposed that managed realignment at one or more sites in the Middle Estuary is taken forward as a possible option, with the following taken into account.
  - Due to the large area of Sudbourne Marshes, managed realignment of the whole of this area would result in a noticeable increase in the amount of water entering and leaving the estuary, with associated increase in erosion pressure. Managed realignment of only part of Sudbourne Marshes is therefore proposed as a possible option.
  - Due to there being no natural boundary between Sudbourne Marshes, Town Marshes, Chantry Marshes and Gedgrave Marshes, it would be necessary to construct an artificial boundary around any proposed realignment site on any one of these marshes.

### ● **Managed realignment options in the Upper and Lower Estuary:**

- Managed realignment at any one or more sites in the Upper Estuary in isolation would generally result in a decrease in water speeds and erosion in the Upper Estuary and at the Estuary Mouth with an increase in erosion pressure in the Middle Estuary (between Orford and Slaughden). Conversely, managed realignment at one or more sites in the Lower Estuary in isolation reduces erosion pressure on the defences in the Middle Estuary whilst increasing erosion at the Estuary mouth. Therefore, it is conceivable that by undertaking a managed realignment at a site(s) in the Upper Estuary in combination with a site(s) in the Lower Estuary, the effects on estuary processes associated with each option in isolation can be balanced out.
- The analysis of the impact of individual managed realignment sites in the Upper and Lower Estuary also indicated the following:
  - Gedgrave Marshes are very large: managed realignment at this site would result in a noticeable increase in the amount of water entering and leaving the estuary each tide, with an associated increase in erosion. Managed realignment of only part of Gedgrave Marshes is therefore proposed as a possible option.
  - The low level of the land at Aldeburgh Town Marshes means that flooding this area would result in a significant increase in the amount of water entering and leaving the estuary. This would result in increased water speeds and erosion on Slaughden Bend. These effects cannot be reduced by realigning only part of this site. It is therefore proposed that managed realignment at Aldeburgh Town Marshes is not considered further.
  - Managed realignment at sites in the Butley River (i.e. Chillesford Marsh and Stonebridge Marsh) results in a significant increase in water speeds and erosion within this river. Furthermore, these sites do not allow us to manage estuary processes elsewhere in the estuary. It is therefore proposed that managed realignment sites in the Butley River are not considered further.

For all other sites proposed in the Upper and Lower Estuary, the analysis did not show any effects on estuary processes that would prevent these sites from being shortlisted.

Table 3 Possible options for shortlisting and their impact on estuary processes

Management Options	Impacts on Estuary Processes
<b>Hold the Line + Bypass channel across the top corner of Sudbourne Marshes</b>	<ul style="list-style-type: none"> <li>● <b>Water speeds:</b> Decrease around Slaughden Bend &amp; in the upper estuary (by up to 14%). Increase in the middle estuary &amp; lower estuary (under 10%).</li> <li>● <b>Erosion:</b> Increase in the lower &amp; middle estuary (by approx. 20%). Reduction in the upper estuary &amp; on outside bend at Slaughden (up to 5%).</li> <li>● <b>Water levels:</b> Marginal decrease throughout the estuary.</li> </ul>
<b>Barrier at Estuary mouth, or upstream at Orford, or at Slaughden</b>	<ul style="list-style-type: none"> <li>● <b>Water speeds:</b> No effect on water speeds in the estuary under normal tidal conditions. No protection to areas downstream of the structure during surge or storm events.</li> <li>● <b>Erosion:</b> No effect on erosion.</li> <li>● <b>Water levels:</b> No effect on water levels under normal tidal conditions.</li> </ul>
<b>No Active Intervention/ Managed Realignment at one or more sites in the Upper Estuary:</b> <ul style="list-style-type: none"> <li>● Snape Marshes</li> <li>● Blackheath Marsh</li> <li>● Iken Marshes</li> <li>● Hazelwood Marshes</li> <li>● Aldeburgh Town Marshes</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Water speeds:</b> Increase downstream of managed realignment site (by up to 20%). Decrease upstream of site (by up to 20%).</li> <li>● <b>Erosion:</b> Increase in middle estuary (up to 35%), with the greatest increase at Slaughden. The exception to this is realignment at Iken Marshes which results in a decrease in the middle estuary and Slaughden (up to 50%). Decrease in erosion upstream of the site (up to 80%).</li> <li>● <b>Water levels:</b> Noticeable decrease throughout the estuary.</li> </ul>
<b>No Active Intervention/ Managed Realignment at one or more sites in the Middle Estuary:</b> <ul style="list-style-type: none"> <li>● Sudbourne Marshes</li> <li>● Orford Town Marshes</li> <li>● Kings Marshes</li> <li>● Lantern Marshes</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Water speeds:</b> Decrease in upper estuary (up to 25%) &amp; Butley River (14%). Increase downstream of managed realignment site (by up to 35%).</li> <li>● <b>Erosion:</b> Increase in the lower &amp; middle estuary (up to 75%). Reduction in the upper estuary (up to 60%).</li> <li>● <b>Water levels:</b> Noticeable decrease throughout the estuary.</li> </ul>
<b>No Active Intervention/ Managed Realignment at one or more sites in the Lower Estuary:</b> <ul style="list-style-type: none"> <li>● Chillesford Marsh</li> <li>● Stonebridge Marsh</li> <li>● Chantry Marshes</li> <li>● Gedgrave Marshes</li> <li>● Boyton Marshes</li> <li>● Hollesley Marshes</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Water speeds:</b> Decrease in the upper estuary (by up to 10%). Increase in lower estuary/estuary mouth (approx. 10%).</li> <li>● <b>Erosion:</b> Reduction in parts of the lower &amp; middle estuary between Havergate Island &amp; Slaughden (up to 10%). Increase at the estuary mouth (10%).</li> <li>● <b>Water levels:</b> Marginal decrease throughout the estuary.</li> </ul>
<b>Managed Realignment at Sudbourne Marshes + Bypass Channel across top corner of Sudbourne Marshes (Ferry Point Corner) + Hold the Line elsewhere</b>	<ul style="list-style-type: none"> <li>● <b>Water speeds:</b> Increase in the lower &amp; middle estuary (by up to 35%). Decrease in the upper estuary (by up to 25%) &amp; Butley River (15%).</li> <li>● <b>Erosion:</b> Increase in the lower &amp; middle estuary (up to 80%). Reduction in the upper estuary including Slaughden Bend (up to 60%) &amp; Butley River (25%).</li> <li>● <b>Water levels:</b> Noticeable decrease in water levels throughout the estuary.</li> </ul>

NOTE: Impacts reported for the managed realignment sites relate to average potential impacts that would occur if one or more of these sites were realigned.

# Options not proposed for shortlisting

The following options are not proposed to be taken forward for more detailed technical, economic and environmental study.

The reasons for this are set out below. The effect of these options on estuary processes is shown in Table 4.

- **Barrage** – a barrage stops the tide moving upstream and is therefore only effective against tidal flooding (and not fluvial flooding). A barrage located at either Orford or Slaughden would provide no protection from tidal surges to people and property downstream of these locations. The optimum location for a barrage to provide maximum protection from tidal surges is at the mouth of the estuary. However, due to the dynamic processes at the mouth of the estuary (the mouth location is constantly changing) it is not feasible to locate a barrage there. Even if it were feasible, the structure itself would encourage a sediment bar to develop in front of the barrage, which could result in a significant change in coastal processes. Upstream of the structure, a freshwater ‘pond’ would be created. For these reasons a barrage is not proposed as a shortlisted option.

- **No Active Intervention/ Managed Realignment at Aldeburgh Town Marshes** – this option is not proposed for shortlisting. For reasons why, please refer to Page 12.
- **No Active Intervention/ Managed Realignment at sites in the Butley River** – this option is not proposed for shortlisting. For reasons why, please refer to Page 12.
- **Managed Realignment at Aldeburgh Town Marshes + Bypass Channel across top corner of Sudbourne Marsh (Ferry Point Corner) + Hold the Line elsewhere** – the low level of the marshes at Aldeburgh Town Marshes means that flooding this area would result in a large increase in the amount of water entering and leaving the estuary. This would result in a noticeable increase in water speeds and erosion on Slaughden Bend, a key pressure point in the estuary. The noticeable effect on Slaughden Bend means that this option on its own is not proposed as a shortlisted option.

Table 4 | Impacts on Estuary processes of non-shortlisted options

Management Options	Impacts on Estuary Processes
<b>Barrage at Estuary mouth, or upstream at Orford, or at Slaughden</b>	<ul style="list-style-type: none"> <li>● <b>Water speeds:</b> Marginal reduction in water speeds above the structure under normal tidal conditions. No protection to areas downstream of the structure during surge or storm events.</li> <li>● <b>Erosion:</b> The estuary would silt up behind &amp; erode in front of the barrage. Silting up in front of a barrage located at the estuary mouth could have a significant effect on coastal processes. The location of a barrage at the estuary mouth is also not feasible due to constantly changing location of bars.</li> <li>● <b>Water levels:</b> Marginal reduction in water levels under normal tidal conditions. Area upstream of the structure will effectively become a freshwater pond.</li> </ul>
<b>Managed Realignment at Aldeburgh Town Marshes + Bypass Channel across top corner of Sudbourne Marshes (Ferry Point Corner) by dredging a channel + Hold the Line elsewhere</b>	<ul style="list-style-type: none"> <li>● <b>Water speeds:</b> Decrease in Butley Creek (by approx. 10%) &amp; upstream of Slaughden Bend (by approx. 67%). Increase in lower &amp; middle estuary (by up to 22%). This option increases water speeds around Slaughden Bend.</li> <li>● <b>Erosion:</b> Reduction in lower estuary (by up to 65%) &amp; in upper estuary (approx. 30%). Increase in middle estuary between Orford and Slaughden (up to 100%) and Butley Creek (up to 25%).</li> <li>● <b>Water levels:</b> Noticeable decrease throughout the estuary.</li> </ul>

# Summary of Proposed Shortlisted Estuary Options

Table 5 summarises the options proposed for shortlisting.

Table 5   Proposed shortlisted options	
<b>Management Options Shortlisted Options</b>	
<i>Options that must be taken forward</i>	
<b>No Active Intervention Options</b>	<p><i>Option 1:</i> No Active Intervention throughout the whole Estuary (Maintain Slaughden sea defences i.e. prevent a breach at Slaughden)</p> <p><i>Option 2:</i> No Active Intervention throughout the whole Estuary (No maintenance of Slaughden sea defences)</p>
<b>Hold the Line options</b>	<p><i>Option 3:</i> Hold the Line throughout the whole Estuary</p> <p><i>Option 4:</i> Hold the Line + Bypass channel across top corner of Sudbourne Marshes</p>
<b>Breach at Slaughden Management options</b>	<p><i>Option 5:</i> Breach at Slaughden + Hold the Line + Open Estuary Mouth</p> <p><i>Option 6:</i> Breach at Slaughden + Hold the Line + Closed Estuary Mouth</p> <p><i>Option 7:</i> Breach at Slaughden + No Active Intervention/Managed Realignment at site(s) in Upper Estuary + Hold the Line elsewhere</p> <p><i>Option 8:</i> Breach at Slaughden + No Active Intervention/Managed Realignment at site(s) in Middle Estuary + Hold the Line elsewhere</p> <p><i>Option 9:</i> Breach at Slaughden + No Active Intervention/Managed Realignment at site(s) in Lower Estuary + Hold the Line elsewhere</p>
<i>Options proposed for shortlisting</i>	
<b>No Active Intervention/ Managed Realignment + Hold the Line Options</b>	<p><i>Option 10:</i> Hold the Line + No Active Intervention / Managed Realignment at one or more sites in the Upper Estuary with one or more sites in the Lower Estuary:</p> <p>Upper Estuary Sites:</p> <ul style="list-style-type: none"> <li>● Blackheath Marshes</li> <li>● Iken Marshes</li> <li>● Hazelwood Marshes</li> <li>● Snape Marshes</li> </ul> <p>Lower Estuary Sites:</p> <ul style="list-style-type: none"> <li>● Chantry Marshes</li> <li>● Boyton &amp; Hollesley Marshes</li> <li>● Gedgrave Marshes (partial only)</li> </ul> <p><i>Option 11:</i> Hold the Line + No Active Intervention/ Managed Realignment at one or more sites in the Middle Estuary:</p> <ul style="list-style-type: none"> <li>● Sudbourne Marshes (northern tip only)</li> <li>● Lantern Marshes</li> <li>● Town Marshes</li> <li>● Kings Marshes</li> </ul>
<b>No Active Intervention/ Managed Realignment + Bypass Channel + Hold the Line options</b>	<p><i>Option 12:</i> Managed Realignment at Sudbourne Marshes + Bypass Channel across top corner of Sudbourne Marshes + Hold the Line elsewhere.</p>
<b>Advance the Line options</b>	<p><i>Option 13:</i> Barrier upstream of Orford or at Slaughden</p>

# Request for Feedback

We welcome your comments and thoughts on the proposed shortlisted options. In particular, we would like your feedback on the following:

- Are there any shortlisted options in Table 5 opposite, that you would consider unacceptable? If so, please state why.
- Of the proposed shortlisted sites for managed realignment, are there any sites that you would find unacceptable? If so, please state why.
- Are there any further options that you believe should be shortlisted? If so, please state why.

Any further comments on the shortlisting process and the proposed shortlisted options are also welcome.

A full list of consultees for the Alde and Ore Strategy can be seen on Page 25.

# Potential implications of selected options

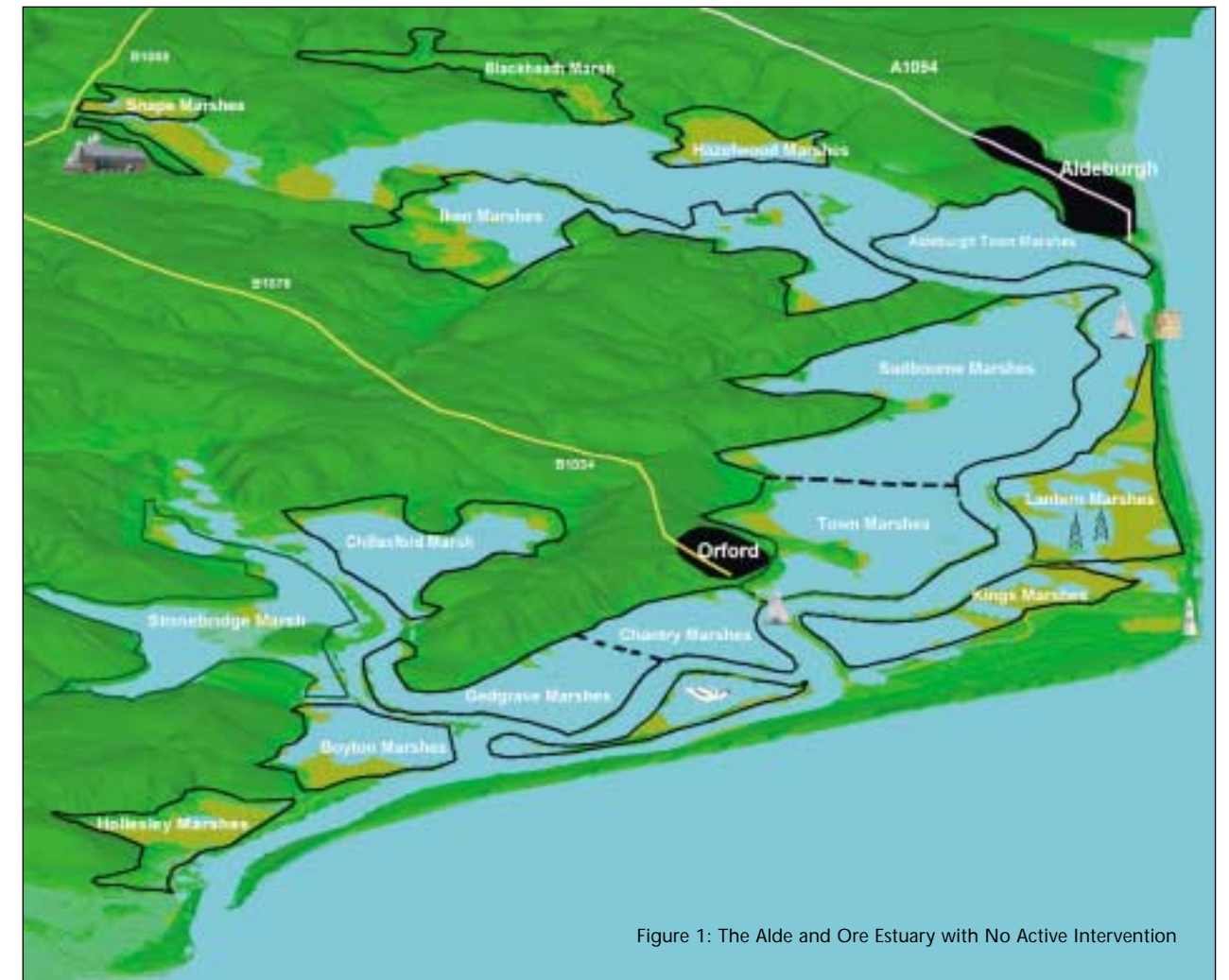
To give you an idea of the implications associated with the shortlisted options, pages 19 to 22 of this consultation document set out images generated from the computer model.

These images are provided to help you in formulating feedback for all the shortlisted options shown in Table 5. The images of No Active Intervention throughout the whole Estuary (Option 1) and Hold the Line throughout the whole Estuary (Option 3) represent the two ends of the range of options being considered. In addition, images have been provided of an example of the implications of a breach at Slaughden (Option 5) and managed realignment (Options 10 and 11). These images present a 'birds eye' view of the Alde and Ore Estuary, showing where the high tide and low tide will extend under these options on a day-to-day basis, based on tide levels today.

The area covered by the low tide (the blue areas) shows the land that will be underwater at all times. The area covered by high tide (the brown areas) shows the land that will be periodically under water i.e. the intertidal area. These images do not show the extent of flooding that would occur under an extreme event; we will investigate this during the next stage of the study, once we have confirmed which options should be taken forward for detailed assessment.

## Option 1: No Active Intervention throughout the whole Estuary (Maintain Slaughden sea defences)

This option would involve ceasing all maintenance, repair and renewal work on the defences throughout the Alde and Ore Estuary. The defences would continue to be monitored and assessed until they eventually failed. Areas of land currently protected from tidal flooding would no longer be protected. It has been assumed that the sea defences along the coastal frontage at Slaughden are maintained and therefore this option does not consider the implications of a breach at Slaughden. Figure 1 shows the area over which high spring tide water levels would extend under this option.



Under this option, all land below the the Mean Low Water Spring line would be permanently flooded. This will include all the marshes currently located behind the existing flood defences, with the exception of Snape Marshes, Blackheath Marsh, Hazelwood Marshes, Lantern Marshes and Hollesley Marshes which would be flooded intermittently. Water speeds and erosion in the Lower and Middle Estuary would increase whilst water speeds and erosion in the Upper Estuary would decrease. Water levels throughout the Estuary would be reduced and the amount of intertidal habitat in the estuary may increase.

### Option 3: Hold the Line throughout the whole Estuary

This option would involve maintaining the existing flood defences on their current alignment throughout the estuary. This option also assumes that the sea defences along the coastal frontage at Slaughden are maintained. The change that this option would have on the low and high tides is shown in Figure 2. The low and high tide levels under this option are similar to the current low and high tide levels in the Estuary.

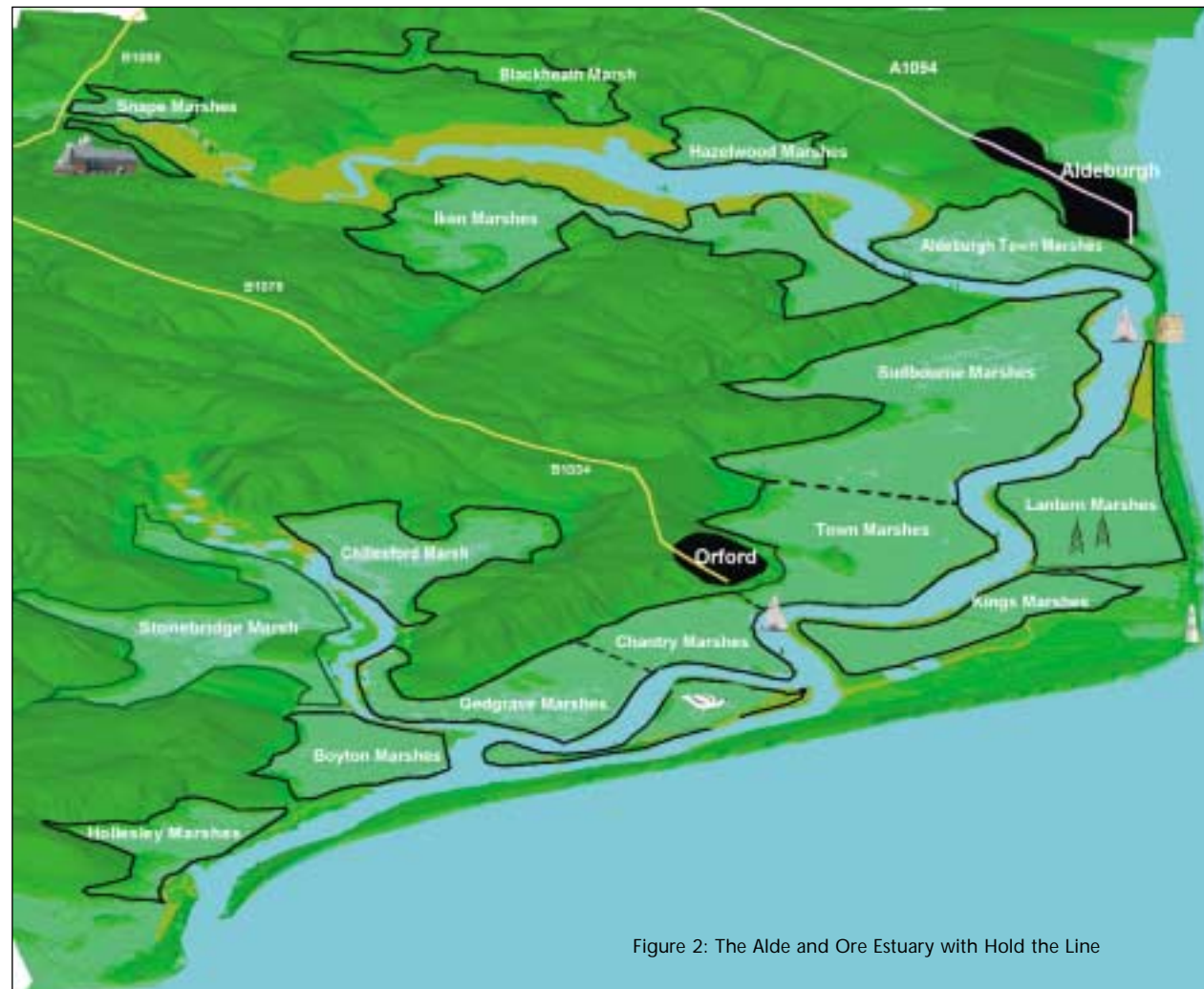


Figure 2: The Alde and Ore Estuary with Hold the Line

Under this option, the assets behind the defences would continue to be protected. As sea levels rise, this option would result in an increase in water levels, water speeds and erosion pressure on the defences. The intertidal habitats in front of the defences would also experience increased erosion. To account for the increased pressure on the defences and rise in water levels, the existing defences would need to be raised and strengthened to provide the same standard of protection as today.

### Option 5: Breach at Slaughden + Hold the Line + Open Estuary Mouth

This option would involve deliberately breaching (putting in a channel across) Slaughden at a position to be determined in the future to give the estuary a second mouth. The remaining defences within the estuary would be maintained on their current alignment throughout the estuary. Figure 3 shows the area over which high spring tide water levels would extend under this option.



Figure 3: The Alde and Ore Estuary with Hold the Line and a Breach at Slaughden

A breach at Slaughden with the existing Estuary Mouth remaining open could result in a decrease in water speeds and erosion in the Middle and Lower Estuary. This would reduce pressure on these defences, increasing their lifespan. In the Upper Estuary, flows would be dominated by the new breach and this area would experience an increase in water speeds and erosion pressure.

## Options 10 & 11: No Active Intervention/ Managed Realignment at one or more sites in the Upper, Middle and / or Lower Estuary

This option would involve either naturally allowing the defences to deteriorate or deliberately breaching the defences in a controlled manner. This would result in a loss of the land use at the managed realignment site, with a gain in intertidal habitats at this site. Figure 4 provides an example of managed realignment at a site in the Upper Estuary, showing the area over which high spring tide water levels would extend under this option.

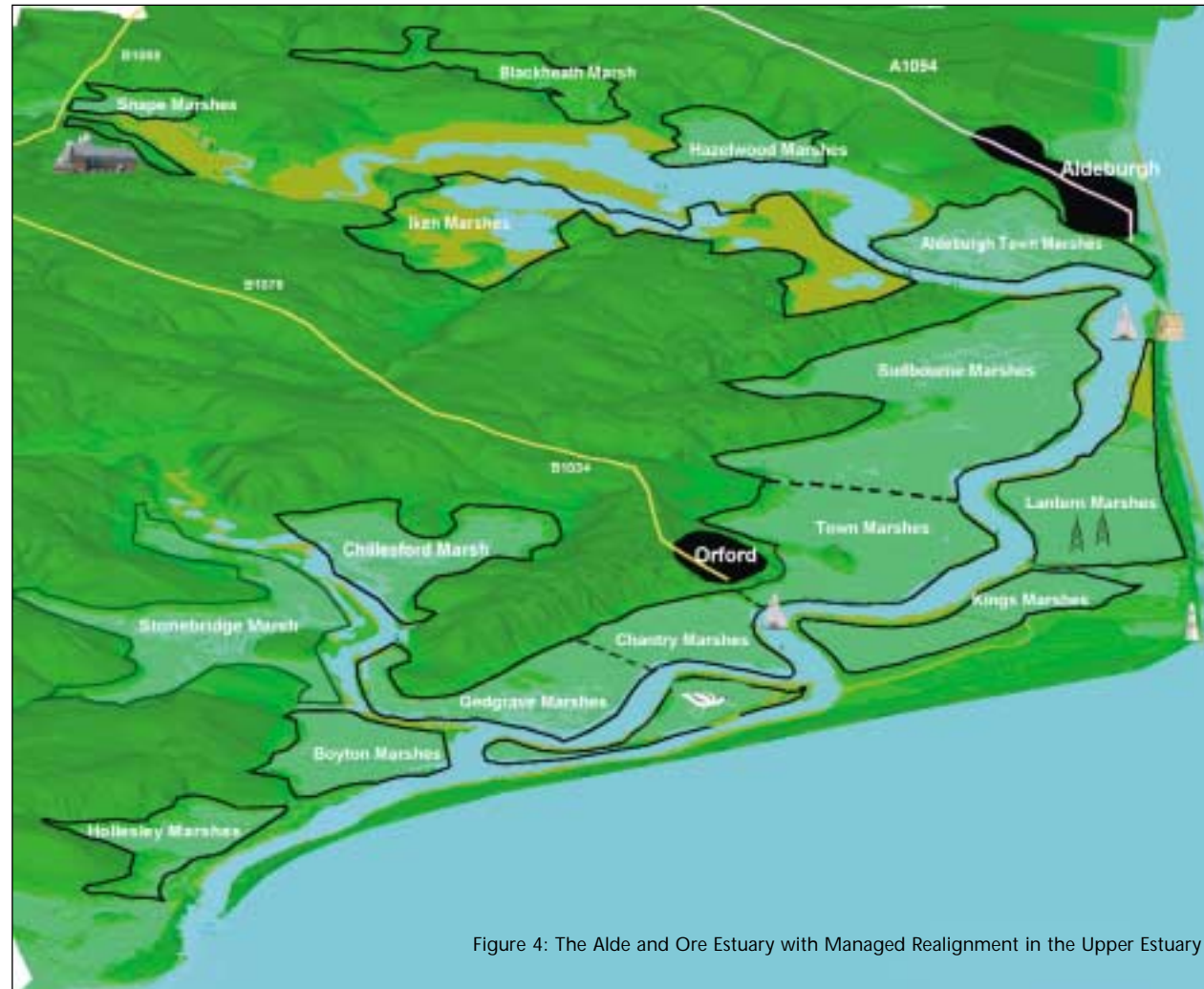


Figure 4: The Alde and Ore Estuary with Managed Realignment in the Upper Estuary

Managed realignment at selected sites in the estuary could have a combination of effects, such as reducing water speeds, erosion and water levels. This will reduce pressure on key areas such as Slaughden Bend and the remaining defences within the Estuary, increasing their lifespan. The overall impact in Estuary processes will depend on the location and number of managed realignment sites.

## What happens now?

During the next stages of the strategy study (Stages 3 and 4) the refined shortlisted options, and any combination of these options, will be subject to detailed technical, environmental and economic assessment to identify a preferred overall strategy for the Estuary.

The assessment will be undertaken in line with Government guidelines for flood management strategies. It will also take into account the Agency's permissive powers to undertake flood defence works. The outcome of the model will be used to assist us in making these decisions, as will any comments received during this round of consultation.

Each shortlisted option, and any combination of these options, will be assessed against the following as part of the technical, environmental and economic assessment:

### Technical Assessment

- How the option will be built
- How effective the options will be in the short, medium and long term
- Sustainability of the option – whether the materials required to construct and maintain it will always be readily available at an acceptable economic and environmental cost, and how much maintenance the option will need
- How easy it would be to alter the structure in the future, if necessary
- More detailed assessment of the impacts of options on estuary processes and the impact of estuary processes on the option

### Environmental Assessment

- A Strategic Environmental Assessment (SEA) will be carried out to find out how each option will affect:
- Existing and future commercial, residential and leisure use
  - Land use, including abstraction points
  - Navigation
  - Existing flora and fauna and areas designated for nature conservation
  - Water quality
  - Archaeology and heritage features
  - Recreation

### Economic Assessment

- Cost of damage caused by flooding if nothing is done
  - The cost-effectiveness in relation to the benefits provided, as long as it meets technical and environmental criteria
  - Identification of potential partnership opportunities with other organisation
- Once the options making up the Preferred Strategy for the Estuary have been identified, the timing of their implementation will be optimised to produce the most sustainable flood management plan for the Estuary over the next 100 years.

# Consultation Stages

Consultation with organisations and individuals who are interested in and /or affected by the Alde and Ore Estuary Flood Management Strategy will continue to be undertaken at key stages throughout the programme as shown in Table 6.

**Table 6** | Key consultation stages of the programme

Consultation stage in Programme	Consultation Opportunity	Timescale
Introduction to the Alde and Ore Estuary study	Initial consultation with the local community, landowners, statutory authorities and other parties	<b>COMPLETED</b>
Initial appraisal of options for the Alde and Ore Estuary	Presentation of the various General Flood Management Options in the form of a public consultation document. Consultation with organisations and individuals who expressed an interest in response to the previous consultation period.	<b>COMPLETED</b>
Shortlisting of options for the Alde and Ore Estuary	Presentation of the short listing of Estuary Options in the form of a public consultation document and public exhibition. Consultation with organisations and individuals who expressed an interest in response to the previous consultation document.	Winter 2004/5 - current round of consultation
Appraisal of preferred strategy for the Alde and Ore Estuary	Presentation of the preferred strategy in the form of a public consultation document and public exhibition. Consultation with organisations and individuals who expressed an interest in response to the previous consultation document.	Summer 2005
Publication of Alde and Ore Estuary strategy	Advertisement in local newspapers. Report available for public comment.	Summer 2005
Approval of Alde and Ore Estuary strategy	Period for review of strategy by statutory consultees and approval sought from Defra.	From Summer 2005
Alde and Ore Estuary strategy implementation	Implementation of the Alde and Ore Estuary Strategy review findings and recommendations.	Following approvals

# Consultees

The following groups will be contacted during the present and future consultations, as well as the general public:

Alde & Ore Estuary Planning Partnership	Countryside Agency	Ramblers Associations
Alde & Ore Wildfowlers Association	Crown Estate	RDS, Rural Development Service
Alderton Hollesley and Bawdsey IDB	Defra, Department of the Environment, Food and Rural Affairs	RNLI, Royal National Lifeboat Institution
Aldeburgh Golf Club	Department for Transport	RYA, Royal Yachting Association
Aldeburgh Productions	East Anglia Fisherman's Association	RSPB, Royal Society for the Protection of Birds
Aldeburgh Town Council	Eastern Sea Fisheries	Shingle Street Association
Aldeburgh Yacht Club	East Suffolk Water Ski Club	Snapes Parish Council
Anglian Water plc.	English Heritage	Strutt and Parker
Anglian Wildfowlers Association	English Nature	Sudbourne Parish Council
Barker Gotlee	Environment Agency	Suffolk Coastal District Council
Bawdsey Parish Council	Essex and Suffolk Water Company	Suffolk Coast and Heaths Project
Boyton Hall Farms	Friston Parish Council	Suffolk County Anglers Association
Boyton Parish Council	Hollesley Parish Council	Suffolk County Council
British Association for Shooting and Conservation	Iken Parish Council	Suffolk Preservation Society
British Canoe Union	Marine Estates	Suffolk Underwater Studies Group
British Telecom	Maritime and Coastguard Agency	Suffolk Wildlife Trust
British Trust for Ornithology	NFU, National Farmers Union	The Alde and Ore Association
Butley Parish Council	National Grid	Transco
CEFAS, Centre for Environment, Fisheries, and Aqua-culture Science	National Monuments Record Centre	Wildfowl and Wetlands Trust
East Suffolk Water Abstractors Group	National Trust	As well as,
Friends of the rivers Alde & Ore	Norfolk and Suffolk Anglers Norfolk & Suffolk Local Flood Defence Committee (LFDC)	Internal Drainage Boards
Chillesford Parish Council	New Orford and Gedgrave Parish Council	Local conservancy bodies
Country Land and Business Association	Orford Sailing Club	Local landowners and businesses
	New Orford Town Trust	Local clubs
		Voluntary and special interest groups

# The SES and Alde and Ore Strategy Consultation Groups

## The Suffolk Estuarine Strategies Overarching Consultation Group

An overarching consultation group for the Blyth, Alde and Ore and Deben estuaries has been set up to provide guidance on the requirements of UK law, local government policy, planning issues and initiatives in the region and provide comment on project objectives for the strategy. The group is made up of representatives of the District and County Councils, English Heritage, English Nature, the National Farmers Union, Royal Yachting Association and the Suffolk Coast and Heaths Management Unit.

## The Alde and Ore Estuary Strategy Consultation Group

A consultation group made of representatives of the local community has also been set up in conjunction with the Alde & Ore Estuary Planning Partnership (EPP). The Consultation Group will provide guidance and information on and about local issues and provide comment on local objectives to be considered in the development of the strategy. The Alde and Ore Consultation Group consists of key stakeholders from the EPP which include: Suffolk Coast and Heaths Unit, the Environment Agency, The National Trust, English Nature, Aldeburgh Town Council, New Orford Town Trust, the Alde and Ore Association, sailing, business and farming interests and many other groups such as wildfowlers, fishermen, the RSPB, Suffolk Preservation Society etc. and individual residents.

## The Suffolk Estuarine Strategies Website

All the information presented in this and previous documents for the Alde and Ore Estuary, and information on the Blyth and Deben strategies can be found on the SES website –

[www.suffolkestuaries.co.uk](http://www.suffolkestuaries.co.uk)

The website includes a Glossary of all the terms used in the consultation documents.

Alternatively, if you would like a copy of the Glossary to be posted to you, please let us know.

The website also provides you with the opportunity to comment online, so if you will find it easier to do this or you want to save the cost of a postage stamp please log on and let us have your comments and queries online.

# Consultation Contacts

If you have any queries or issues you wish to discuss, please contact:

## Suffolk Estuarine Strategies

Nigel Pask, Project Manager  
Environment Agency (Anglian Region)  
Kingfisher House  
Goldhay Way  
Orton Goldhay  
Peterborough PE2 5ZR

Telephone 01733 464 168

E-mail: [nigel.pask@environment-agency.gov.uk](mailto:nigel.pask@environment-agency.gov.uk)

Mike Steen, SES Local Liaison  
Environment Agency  
Cobham Road  
Ipswich  
Suffolk IP3 9JE

Telephone: 01473 706748

E-mail: [mike.steen@environment-agency.gov.uk](mailto:mike.steen@environment-agency.gov.uk)

Matthew Clegg, Environmental Scientist  
Black & Veatch Consulting Ltd.  
Grosvenor House  
69 London Road  
Redhill  
Surrey RH1 1LQ

Telephone 01737 774 155

E-mail: [suffolk-enquiries@bv.com](mailto:suffolk-enquiries@bv.com)

## Thorpeness to Hollesley Coastal Strategy

Stuart Barbrook, Project Manager  
Environment Agency (Anglian Region)  
Kingfisher House  
Goldhay Way  
Orton Goldhay  
Peterborough PE2 5ZR

Telephone 01733 464 168

E-mail: [stuart.barbrook@environment-agency.gov.uk](mailto:stuart.barbrook@environment-agency.gov.uk)

Paul Turney, Consultant Project Manager  
Halcrow Group  
Burderop Park  
Swindon  
Wiltshire SN4 0QD

Telephone 01793 812479

E-mail: [turney@halcrow.com](mailto:turney@halcrow.com)

## Notes:

**Note 1:** Do Minimum involves a limited amount of maintenance, which will lead to a reduced standard of defence over time due to the effects of sea level rise. In the short term, this option will be the same as the Hold the Line option as it will involve keeping the defences on their current alignment. In the long term, the eventual deterioration of the defences will result in an impact similar to the No Active Intervention option. Do Minimum has not therefore been considered as a separate option for the purposes of the model.

**Note 2:** Managed Realignment and No Active Intervention are similar options in that they both involve allowing the existing defences to deteriorate (naturally or in a controlled way), with the consequent flooding of the land behind the defences. When looking at whether No Active Intervention or Managed Realignment is more suitable for a site, we need to consider factors such as the topography of the land (e.g. is there naturally rising ground behind the defences) and whether any properties would be flooded further away from the site without any intervention (e.g. a secondary defence). We will investigate the most appropriate solution at sites where these options are considered during the next stage of the strategy study.

## CONTACTS:

### ENVIRONMENT AGENCY HEAD OFFICE

Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol BS32 4UD  
Tel: 01454 624 400 Fax: 01454 624 409

[www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)  
[www.environment-agency.wales.gov.uk](http://www.environment-agency.wales.gov.uk)

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

### ENVIRONMENT AGENCY REGIONAL OFFICES

#### ANGLIAN

Kingfisher House  
Goldhay Way  
Orton Goldhay  
Peterborough PE2 5ZR

#### MIDLANDS

Sapphire East  
550 Streetsbrook Road  
Solihull B91 1QT

#### NORTH EAST

Rivers House  
21 Park Square South  
Leeds LS1 2QG

#### NORTH WEST

PO Box 12  
Richard Fairclough House  
Knutsford Road  
Warrington WA4 1HG

#### SOUTHERN

Guildbourne House  
Chatsworth Road  
Worthing  
West Sussex BN11 1LD

#### SOUTH WEST

Manley House  
Kestrel Way  
Exeter EX2 7LQ

#### THAMES

Kings Meadow House  
Kings Meadow Road  
Reading RG1 8DQ

#### WALES

29 Newport Road/  
29 Heol Casnewydd  
Cardiff/Caerdydd  
CF24 0TP



ENVIRONMENT AGENCY  
CUSTOMER SERVICES LINE

**08708 506 506**

ENVIRONMENT AGENCY  
FLOODLINE

**0845 988 1188**

ENVIRONMENT AGENCY  
EMERGENCY HOTLINE

**0800 80 70 60**





[www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)

We welcome feedback including comments about the content and presentation of this report.

If you are happy with our service please tell us. It helps us to identify good practice and rewards our staff. If you are unhappy with our service, please let us know how we can improve it.

For further copies of this report or other reports published by the Environment Agency, contact general enquiries on 08708 506 506 or email us on [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk)



**ENVIRONMENT  
AGENCY**