

## Rejected Scenarios

### 1. Introduction

A range of scenarios were considered at the start of the appraisal process. As the understanding of the physical environment improved, a number of the scenarios were deemed unacceptable on technical grounds. It was also clear that some approaches were not justifiable on economic grounds. The table below summarises the scenarios that have been removed from the assessment process on either technical or economic grounds. A further description of these scenarios and the issues associated can be found below.

Policy option	Rejected Scenario	Status
Hold the existing defence line	Improve the existing defences	Rejected on economic grounds
Advance the existing line of defence	Advance the existing line of defence	Rejected on technical grounds
Managed Realignment	Breach realignment – western defences only (Cell B)	Rejected on technical grounds
	Tidal exchange system	Rejected on technical grounds
	Artificial raising of the floodplain	Rejected on economic grounds
	Bank realignment (cells A, B & C)	Rejected on economic & environmental grounds

Table 1 - Summary of the scenarios rejected on technical/economic grounds

### 2. Policy Option - Hold the Existing Defence Line

#### **2.1 Rejected Scenario - Improve the existing Defences**

Given the limited number and nature of assets currently protected and the low benefit cost ratio that has been identified through the sustain scenario, there is no economic justification for considering an improved standard of protection.

### 3. Policy Option – Advance the Existing Defence Line

There is a clear long-term tendency for this coast to erode. In the estuary the defences are being eroded by the natural estuarine processes. A policy of ‘Advance the existing line of defence’ would be unrealistic in the face of such a natural recessionary tendency. It was identified early within the appraisal process that there is a limited practical application for this approach within the Cuckmere Estuary between the mouth and Exceat Bridge. Consequently this policy is discounted as an approach for this frontage and is not carried forward further in the appraisal process. This approach is in accordance with the findings of the SMP.

#### **4. Policy Option - Managed Realignment**

##### **4.1 Rejected Scenario - Breach Realignment – Western Defences only (Cell B)**

Breach realignment of the western defences (only) had been investigated prior to the current work. This scenario would involve maintaining the existing defences on the eastern side. The existing earth flood banks on the eastern side would need to be protected from erosion caused by the normal channel flow and the additional erosive forces created by the flows discharging from the western floodplain. Maintenance would involve providing a revetment protection system to the front of the bank.

In the long term the banks are likely to need a greater level of protection. This will take the form of harder engineering solutions. The existing level of protection would also need to be maintained to the crest of the defences. This will involve raising the banks as previously mentioned to allow for the effects of climate change. In addition, the mouth would need to be monitored and occasionally unblocked because the system is unlikely to be completely self-cleaning. The training walls would be maintained and in the long term replaced to cater for the adjustments at the mouth. Both the western and eastern beach would also need to be maintained through re-nourishment because of progressive wave attack. In the medium-term the western beach would need to be substantially reinforced using hard engineering techniques such as rock armouring.

The technical assessments from the earlier investigations on this approach raised the following concerns with this approach

- Concern over the impacts on the eastern defences and the training structures at the mouth. This impact would significantly intensify the maintenance requirements along this bank.
- The increase in the volume of water being exchanged during each tidal cycle would lead to increased erosion at the mouth. To manage this, the training structures would need to be closely monitored and in the immediate term (0-20 years) replaced.
- High level of other maintenance requirements, including monitoring and removal of material from the mouth to prevent a blockage.

The high level of intervention associated with this scenario and the residual risk associated with a blockage of the mouth has resulted in a decision not to progress further the detailed assessment of this scenario.

##### **4.2 Rejected Scenario - Tidal Exchange System**

A tidal exchange system raises the level of the existing flood plain by managing the deposition of sediment from tidal water. Controlled inundation of the floodplain (south of Exceat Bridge) would occur through a number of temporary control structures (sluices/gates) built into the existing earth banks. The water within the inundated area is then held in place to allow it to deposit its sediment load, prior to water being released

back in to the estuarine system. The sediment is then allowed to dewater and consolidate prior to subsequent inundation and the process repeated. This will increase the floodplain elevation to above MHWS level, and potentially close to HAT level. This approach would remove the risk of increased tidal flooding by raising land levels and would mean that the tidal prism would remain largely unchanged if the defences were to breach in a storm event or as a result of no maintenance.

During the appraisal process several issues were identified with this approach:

- This approach does not resolve the issue of the potential for the river mouth to block at the entrance leading to a potential flood risk upstream.
- The tidal exchange approach would rely on a sediment source to raise the ground levels. At Cuckmere the sediment source would largely come from fluvial input. There is a high level of uncertainty over the time frame for this process and the coincidence of high water levels with high sediment loads.
- Preliminary considerations estimate that bring land levels up to (about) annual inundation levels could take up to 10 to 15 years. During this period it is unlikely new vegetation would develop significantly due to the system continually adjusting between inundation, sedimentation, and consolidation processes (during which rainfall etc would accumulate).
- This approach could have adverse landscape implications as it would tend to mask the historic drainage patterns and would remove some of the potential for ditch/lagoon habitats.
- The tidal exchange approach requires significant investment to maintain and replace the defences. There is also a need to construct, maintain and remove the new flow control structures. The construction and subsequent removal of these structures would have adverse environmental impact on the local environment.

The high level of intervention required, coupled with the uncertainty mentioned above, has resulted in a decision not to progress the detailed assessment of this scenario.

#### **4.3 Rejected Scenario - Artificial raising of the floodplain**

Consideration was also given to the possibility to raise the land levels by the importation of imported material used dredge spoil from Newhaven harbour rather than by tidal exchange. Spoil from dredging would have coarser sediment characteristics (leading to potential changes in the habitats). Estimates based on the volume of material required and current dredging rates indicated that it would take about seven years to raise the land to the required level. This was also discounted due to significant impacts on landscape values and potentially high costs.

#### **4.4 Rejected Scenario - Complete Bank Realignment (Cells A, B and C)**

Bank realignment considers removing entire sections of bank rather than just creating individual breaches in the flood bank. In the case of the Cuckmere valley there is no need to build a defences line behind the existing as the topography of the land will act as the new line of protection. While considering the bank realignment scenario, a number of different channel alignments were looked at. This was necessary because the proposed

realignment would lead to an increase in the tidal prism (the volume of water exchanged during each tide cycle). This in turn means the estuary would need to dissipate more energy to achieve dynamic equilibrium. One way of reaching this state is to extend the length of the channel. Some of the different alignments considered are illustrated below.

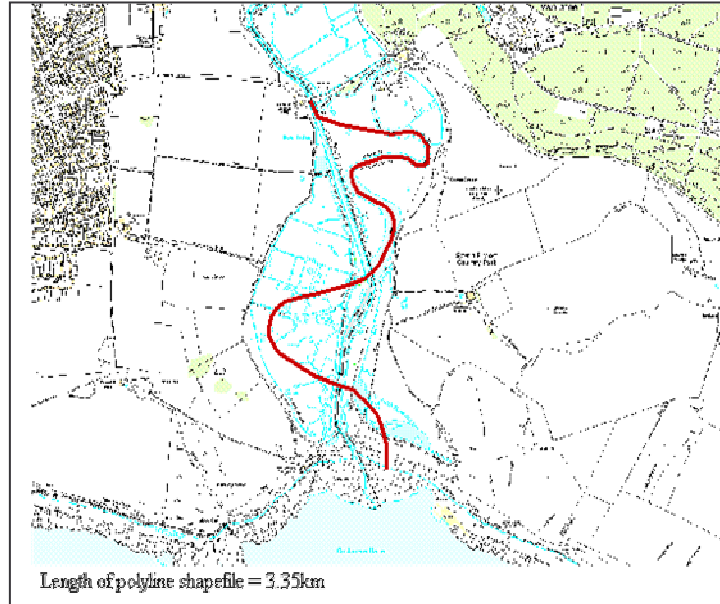


Figure 1 - Potential channel alignment incorporating meanders and a mouth at the centre of the estuary

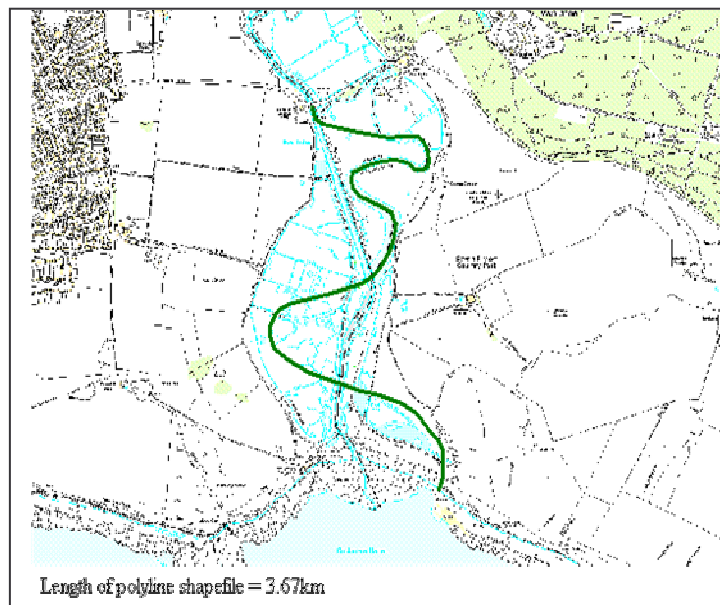


Figure 2 - Maximising potential channel length incorporating meanders and a mouth at the eastern side of the estuary

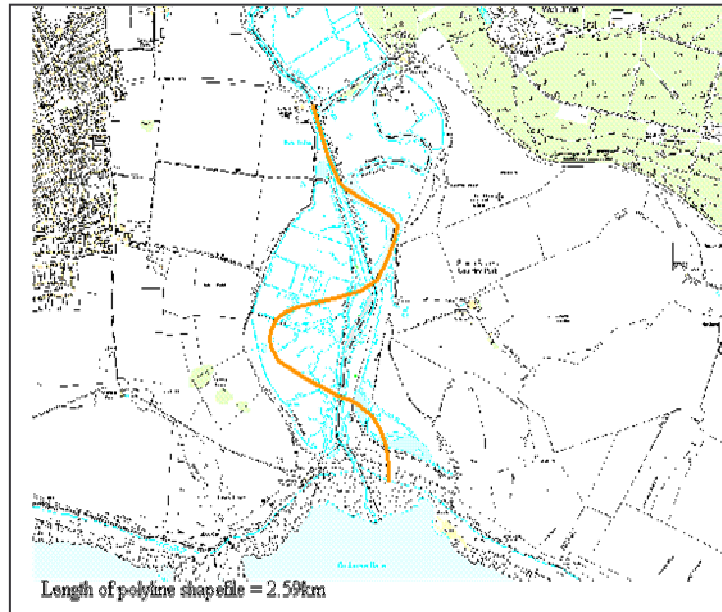


Figure 3 - Potential channel alignment incorporating lower section of the meanders and hence reducing need for channel excavation

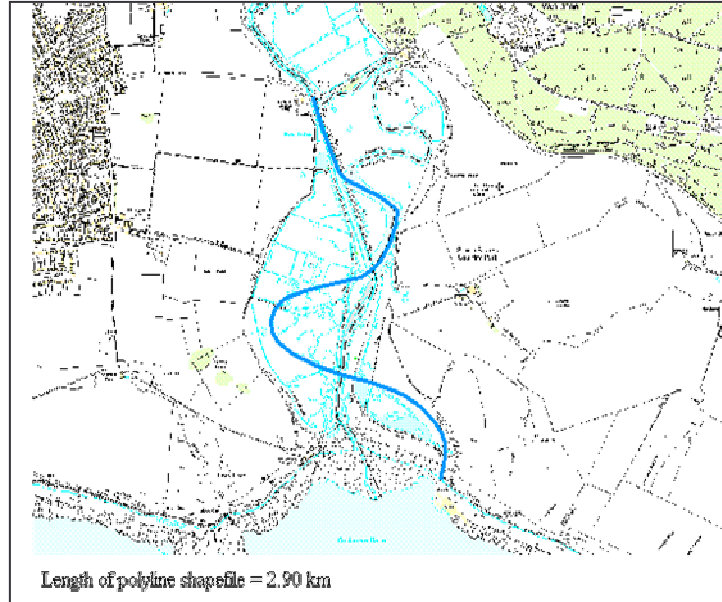


Figure 4 - Potential channel alignment incorporating lower section of the meanders and a mouth at the eastern side of the estuary

The technical analysis to date have identified that there is little benefit in excavating new channels through the floodplain. The assessments have shown that by solely breaching sections of the existing flood bank and ensuring that the remnant meanders are connected back into the system (as a tidal limb) will provide sufficient channel length to dissipate the energy. In addition, excavating significant quantities of material is expensive and will have adverse environmental impacts.

The assessments have identified that there is no benefit in removing entire sections of bank compared to creating individual breaches. In the short term, both approaches will lead to similar results for the whole estuary (south of Exceat Bridge). Under the breach realignment approach, it is unlikely the existing banks will remain prominent for long, once the initial breaches have been created. The existing banks are constructed from chalk, which will quickly erode in the aggressive environment; there are only short sections where timber piling has been used to support the back face of the banks. It is likely these sections will be the first sections to be breached. Bank realignment is also more expensive to undertake than breach realignment due to the larger quantities of material that have to be handled and potentially removed from site. In addition, the feasibility of safely removing extensive lengths of bank needs careful consideration. Once tidal inundation occurs, site working can pose unacceptably high levels of risk. Therefore, based on technical, health and safety and economic grounds there is no benefit is considering bank realignment over breach realignment.