Broads Forum
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Agenda Item No 6

Eccles to Winterton on Sea Coastal Defences

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Summary: The paper provides the history to the current flood management strategy for the area of coast between Eccles and Winterton on Sea. It outlines how the approach seeks to retain a sufficiently large beach to cope with the energy of major storms and so support the main sea wall which gives protection against a breach. It then explores what might happen in an extreme event which would cause extensive flooding in the whole area if it were sufficient to breach the defences. Reference is made to the agreed emergency planning and recovery process that would be undertaken by the relevant agencies. The paper also considers that the likely sea level rise and the, as yet poorly detailed, climate change impacts on the East coast may require a different approach to establish the resilience needed.

1 Introduction

1.1 As part of the discussions around adapting the Broads to the impacts of climate change, Forum members raised their concerns over what might happen if the area of the Upper Thurne was flooded by sea-water. They questioned how would decisions be made about the response to such a situation. This paper seeks to give the background to the current flood risk management and how such scenarios are approached.

2 Eccles to Winterton Sea Defences

2.1 The 14km long length of coastline between Eccles and Winterton has a long history of flooding often resulting in the loss of lives and property. The most recent catastrophic event was the 1953 storm surge, following which a concrete sea wall was constructed along the frontage in stages up to 1987. There are now three main elements making up the sea defence system: the beach, the sea wall and the sand dunes.

2.2 The beach provides natural protection by absorbing wave energy. Sediment transport studies show that there is an average annual net loss of sand from the frontage of approx 150,000 cubic metres. The input of sand to the system from the adjacent coast is not sufficient to maintain healthy beaches. The beach becomes highly volatile during storms, and it can be drawn down to such an extent that the sea wall becomes unstable.

2.3. In the early and mid 1990s, beaches in the Eccles/Sea Palling area reached critical levels where the sea wall foundations started to fail. Three emergency works contracts were implemented for placing rock protection along the toe of

the sea wall. A further contract, and the last such operation, was carried out at Waxham in December 1999.

2.4 If the sea wall was allowed to collapse, the sand dunes would offer the last line of defence. From Eccles down to Waxham, in the absence of the sea wall, it would be expected that the dunes would be breached rapidly by wave action. To the south of Horsey, however, the volume of sand in the dunes is more than adequate to prevent an immediate breach in the defences.

2.5 In 1992, the Environment Agency's predecessors adopted a beach management strategy to address the increasing flood risk. This involves the periodic recharge of depleted beaches so as to maintain a beach which is of sufficient height and width to protect the sea wall in storm conditions. Implementation of this strategy can be challenging in such a dynamic environment, but it has been shown to be effective over the past 15 years. During this time, 3.3 million cubic metres of sand have been placed on the beaches.

2.6 The likelihood of a defence failure at different locations along the frontage can be calculated using the results of beach surveys combined with an analysis of sea wall stability. The sand recharge needed to restore an adequate beach profile for maintaining the integrity of the sea defences can then be quantified. The investment required for the work to proceed has to be justified using flood propagation modelling to determine the extent of potential flooding for a range of breach scenarios.

3 Response to a Flood Event

3.1 The 1953 storm surge was caused by an intense low pressure weather system which tracked south-eastwards across the North Sea raising the height of the sea. Because of the funnelling effect produced by the shape of the North Sea, the height of the surge reached almost three metres at King's Lynn.

3.2 During a North Sea storm surge mean sea level rises and higher waves approach the shoreline. The highest risk of flooding occurs when a storm surge coincides with the peak of a spring tide. These are random events, and the EA uses the latest technology to forecast floods and provide advance warnings to the public.

3.3 Under the Civil Contingencies Act 2004, Local Resilience Forums were created based upon police authority areas. The Norfolk Resilience Forum ensures that all relevant organisations work together to respond effectively and plan for recovery from emergencies, such as flooding.

3.4 Any surge tide event which threatens the integrity of the sea defences on the Eccles to Winterton frontage will be of such severity that flooding will inevitably be widespread elsewhere on the coast and on the tidal rivers. The emergency response during and in the immediate aftermath of this type of

event will be co-ordinated by Norfolk Police through the inter-agency 'gold' and 'silver' command and control structure.

3.5 When the situation has stabilised sufficiently, 'Gold Control' will hand over to a Recovery Co-ordinating Group (or Recovery Working Group). This Group is led by the local authorities, and will include representatives from other organisations with a role to play in all aspects of recovery after a major flood. The EA will support this Group in the recovery process, but the main focus for its resources is likely to be on the repair and restoration of defences to cut off the source of further flooding as quickly as possible.

3.6 Forward planning for emergency recovery and the clean-up stage includes making arrangements for regional collaboration and co-operation between professional partners, contacts for external contractors and suppliers of specialist equipment, such as large capacity pumps. Inter-agency exercises are used to test the response to some 'what-if' scenarios, but the range of potential scenarios is so wide that it is not realistic to prepare detailed contingency plans for all eventualities.

4 What Does the Future Hold?

4.1 Climate change will have an impact across the full range of socio-economic and environmental challenges facing us in flood and coastal risk management. Although the performance of the Eccles to Winterton Sea Defence strategy to date is encouraging, there is no room for complacency. Our assessments of defence vulnerability and hazard mitigation measures need to be reviewed on a regular basis.

4.2 The potential for future increases in the rate of sea level rise is relatively well understood, but there is still considerable uncertainty about the effect climate change will have on the frequency and severity of storm surges on the East Coast. However, flood events considered extreme today are very likely to be far less extreme in the future.

4.3 Future rises in mean sea level will inevitably result in an increased requirement for beach recharge along the Eccles to Winterton frontage. North Norfolk District Council and the EA will shortly be commissioning a study to investigate the longer term implications of the coastal management policies proposed in the latest Shoreline Management Plan covering the length of coast between Cromer and Winterton.

4.4 The updating of our coastal flood risk assessments and associated emergency planning framework provides us with an opportunity to engage with coastal communities, to raise awareness of flood risk issues, and to listen to people's concerns and aspirations. This dialogue can include more detailed consideration of the planning and resourcing needs for the post-flood recovery stage.

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