

EA- ANGLIAN BOX 7

# FLOOD defences



## HAPPISBURGH TO WINTERTON



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# FLOOD

Over the centuries the north facing coast of East Anglia has been the scene of many battles with the sea. The area of low lying coastal plain with its scattered villages and farmsteads is now protected by sea walls backed up by sand dunes.



Although the walls provide adequate defences against the ultimate storm, the exposed profiles of the walls associated with low beach levels do not encourage the retention of the immediate foreshore.

The foreshore consists of a sand and shingle 'vener' overlying firm organic clay. There is a north to south drift of beach material from Cromer to Winterton from where it disperses into the North Sea shingle banks. Every year an estimated 75,000m<sup>3</sup> are lost and as there is no substantial inflow of material the overall effect is a gradual lowering of beach levels. Lagoons periodically form at the base of the sea walls, exposing the steel pile foundations to the direct hammering of the sea. Under severe sea conditions the overlying sand and shingle is removed and the exposed underlying clay is eroded. Under calmer conditions some of the sand and shingle is returned, but not the clay material. Thus there is a continuing lowering of foreshore levels.

The existing steel and timber groynes are proving incapable of preventing this loss of material along the more exposed areas of the Happisburgh to Winterton frontage, which if allowed to continue, will result in the present

beach being reduced to mud flats. In turn this will lead to the lower sections of the sea walls being more exposed. This would have serious consequences for the effective structural life of the walls.

The Eccles and Sea Palling beaches have suffered eroding beach levels on a severe scale, and after a storm event in October 1990 were reduced to a level where the stability of the sea walls was endangered. The NRA (predecessors of the Environment Agency) took immediate action and by April 1991 approximately 18,000 tonnes of rock armour had been



Exposed toe piling to sea wall.

placed against the steel toe of the Eccles Sea Wall. During the period between Winter 1991 and Spring 1996 a further 140,000 tonnes of rock was placed against the toe of Sea Palling Sea Wall. However, this type of protection alone is only a stop gap measure until an effective Beach Management Strategy can be implemented.

If the sea wall failed, 6,000 hectares of low lying hinterland would be regularly inundated by the sea and reduced to salt marshes. Residential, agricultural and commercial properties would become untenable. This would destroy the existing natural environment and adversely affect the recreation and tourist attraction of the beaches.

In order that the coastline and the hinterland can be retained in its present form, it is essential that the structural stability of the existing sea wall is safeguarded. This can only be



natural continuation of eroding beach levels along the unprotected frontage. However, at this stage it is envisaged that a further five reefs will be required to the south of Horsey, along with periodic beach recharge, groyne replacement and rock armour to the toe of the sea wall where it is not protected by reefs.

## Environmental Considerations

The sand dunes are a Site of Special Scientific Interest and home to many species of sea birds. They are wholly dependant on being replenished by sand, wind-blown from the foreshore. If the beach is allowed to erode to mud flats then the sand dunes will be literally blown away by the wind. An Environmental Statement has been produced which assesses the effects of

the proposed reef system. The statement highlights the environmental losses that will occur if the coast is not managed.

### In particular:

**The Broads area, including a RAMSAR site at Hickling Broad and five SSSI's behind the defences will eventually become inundated and destroyed by salt water.**

**The dunes will be starved of fresh sand from the beach and will gradually erode away.**

**The beach will be lost. As the top layers of sand and shingle are stripped off all that will remain will be an unpleasant clay mudflat.**



Beach recharge pipeline being positioned before sinking to the sea bed.



Beach recharge work in progress

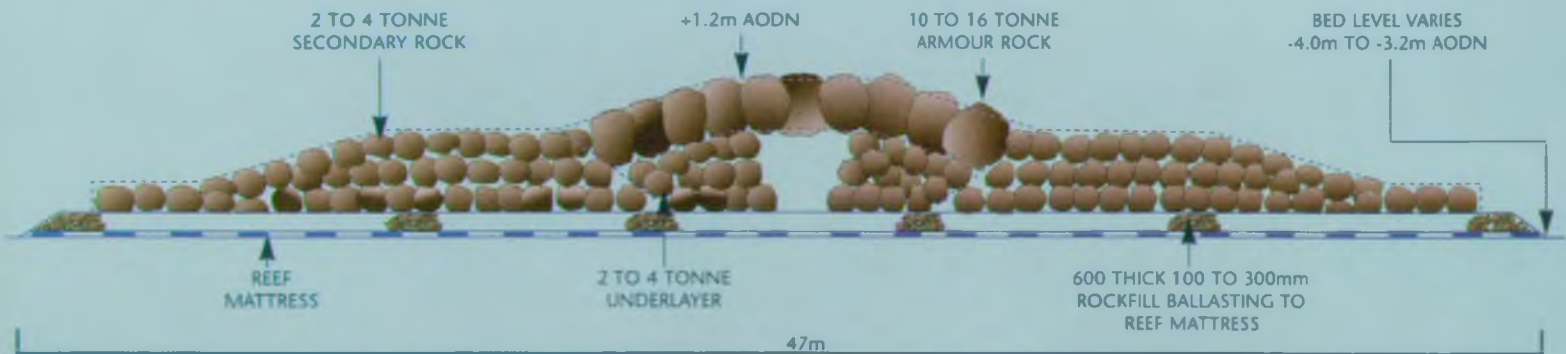


Completed section of beach recharge. South of sea Piling.

# EAST NORFOLK FLOOD DEFENCES



## OFFSHORE REEF CROSS SECTION



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done by taking steps to retain the sand and shingle foreshore. The Environment Agency has produced a long term strategy for sea defences between Happisburgh and Winterton. It is based on long term beach management to ensure foreshore levels are always sufficient to protect, as much as possible, the steel and concrete sea walls which are the final barrier against the sea. To assist in retaining desirable



foreshore levels, it is proposed, over the next 15 years, to complete the construction of a series of 'shore parallel' offshore

reefs to reduce beach volatility and to periodically replenish the beach to acceptable profiles.

To date, four reefs have been completed between Eccles and Sea



*View of reefs completed in the first stage of defence works.*

Palling, and a further five to the south of Sea Palling are currently under construction. Subsequent to a review of the performance of the first four reefs, the latest reefs have a lower crest level, are shorter in length, and closer together. These refinements will produce a more acceptable beach plan shape and be less restrictive to the north/south drift of beach material.

To supplement the natural inflow of material onto the frontage an initial 1,000,000m<sup>3</sup> of sand is also being placed behind the existing and new reefs to assist the process of re-establishing acceptable beach levels.

## Future Works

Future reef construction will be subject to a review of the performance of the nine reefs, the associated beach recharge and the



*Construction and placing of reef materials*

# DEFENCES

## MANAGEMENT AND CONTACTS:

The Environment Agency delivers a service to its customers, with the emphasis on authority and accountability at the most local level possible. It aims to be cost-effective and efficient and to offer the best service and value for money.

Head Office is responsible for overall policy and relationships with national bodies including Government.

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