Hunstanton and Heacham Sea Defence Strategy

HARD DEFENCES

BEACH NOURISHMENT

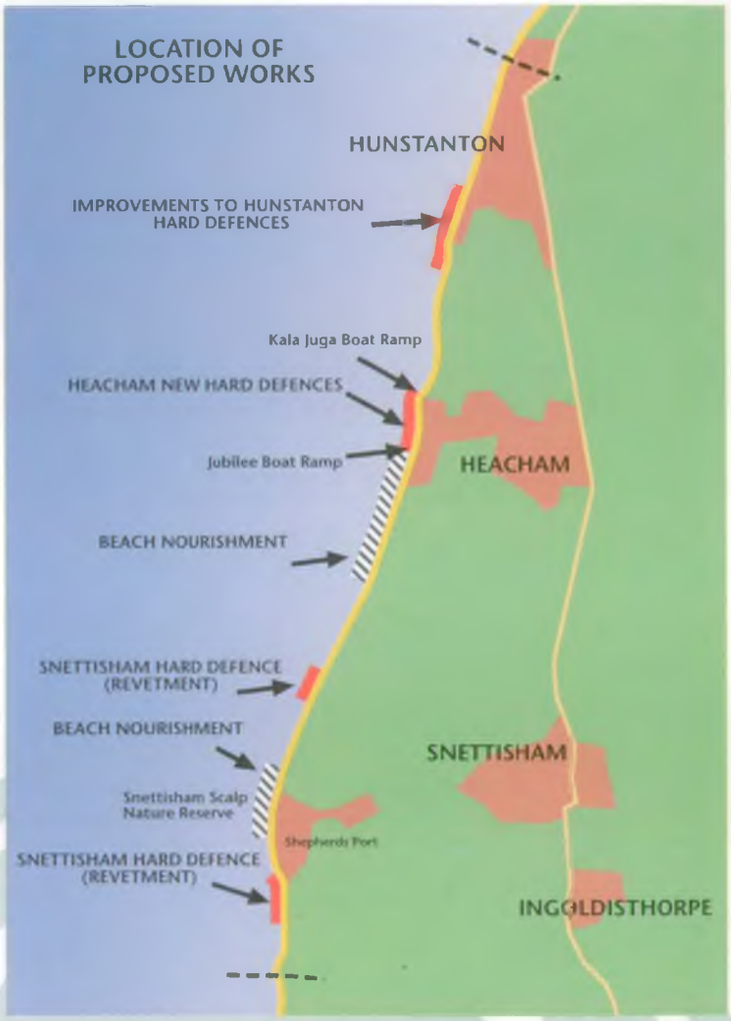
BEACH MANAGEMENT

ENVIRONMENT AGENCY

HUNSTANTON AND HEACHAM

Introduction and Background

The Environment Agency is responsible for sea defences between Hunstanton South Beach and Snettisham. These defences include concrete walls and shingle embankments. The beach itself is also an important feature of the defence. The area protected by the defences is a mixture of holiday parks and permanent properties as well as expanses of open land. It is estimated that the assets at risk from flooding amount to some £26 million. The need for effective sea defences has been poignantly demonstrated both in 1953 when 65 people died as a result of sea flooding and again in 1978 when flooding caused considerable destruction. The area is not only important in residential and tourism terms but is also internationally significant in environmental terms, falling within the Wash Site of Special Scientific Interest (SSSI) and designated Special Protection Area (SPA) as well as being a candidate for Special Area of Conservation under the Habitats Directive.



Damage caused by breach of sea defences at Heacham in 1978

Snettisham – Poor state of the shingle ridge

Hard Defence Improvements

Hard defences are those using conventional construction materials (eg concrete and steel). The existing sea wall at Hunstanton is a typical example. Rock is an alternative hard defence material.

Hard defence improvements are proposed at three areas along the frontage:

- Snettisham – at two locations strengthening of the shingle ridge is required probably using concrete flexible revetment systems. These are south of Snettisham Scalp and within the Snettisham Country Park (where the beach narrows near the RSPB Bird Hide).
- Heacham – between Kala Juga and Jubilee Boat Ramps the shingle ridge currently protected with flexible revetment is likely to be replaced with a concrete sea wall similar to that to the north.
- Hunstanton – the existing concrete defence for 500 mtres south of the Power Boat Ramp requires improvement. This may include extending the step work and raising of the level. Some 300 metres of wall to the north of the ramp also requires improvement. This section currently falls within the responsibility of the Kings Lynn and West Norfolk Borough Council and will be subject to discussions between the Agency and the Council.

Heacham North Beach – Strengthened only with concrete revetment

Hunstanton – as the beach levels reduce the toe piles are exposed

Soft Defence Improvements

Keeping beach levels as high as practicable is a very effective way of providing flood defence. Where this does not happen naturally then the technique of 'beach nourishment' or 'recharge' is often used. This involves removing suitable material from a licenced source on the sea bed and pumping it ashore to raise beach levels. This was carried out at Hunstanton and Heacham in 1990/91 and the Strategy now recognises the need to carry out further nourishment, but this time targetting those areas which would benefit most.

It is proposed to renourish two areas:–

- Heacham South Beach and Snettisham Beach (in the vicinity of the car park).

We would like to achieve a healthy beach profile with 'Soft Defences'

Sand and Shingle pumped ashore during beach nourishment

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Surveying beach levels is a continuous process

Beach Recycling – Recovery of material from the Spit at Snettisham Scalp

Monitoring

Extensive monitoring of beach management performance has been carried out to date and this has proved invaluable in providing data for the revised strategy. It is proposed to continue with a full programme of monitoring which will include:–

- Regular beach level and bathymetric surveys carried out in order to quantify changes.
- Aerial stereoscopic photography carried out annually to provide interpretation of coastal change to complement level survey information.
- Ecological monitoring carried out to determine changes in flora and fauna which may occur as a result of nourishment and other works.
- Regular physical inspections of the beach and sea defence structures undertaken to ensure that the standard of defences are maintained.

Maintenance

Maintenance of the sea defences is an essential feature of the proposed Strategy and the most visible maintenance activity proposed is a continuation of beach recycling.

Annual recycling works are carried out to maintain the required beach levels. As a result of the natural southerly drift, shingle is naturally removed from the beach at Hunstanton and Heacham and tends to be deposited at Snettisham Scalp Spit. Beach levels are also altered by tidal action causing formation of storm bars and areas of erosion and accretion.

Survey data can be used in conjunction with computer techniques to indicate changes in surface levels and assist in the planning of recycling work.

Shingle is recovered from the Spit by excavation plant, transported by dumper truck and the beach reprofiled as required by bulldozer.

Storm tides can cause sudden changes in beach levels, therefore requiring urgent remedial action. Emergency works would be required should any areas of beach erosion encroach into the crest of the defence leaving it in an endangered state. Erosion may also cause cliffing in the beach slopes and urgent attention would be required to maintain safe access and public safety.

Other maintenance activities include repairs to concrete defences and groynes.

Cost and Programme

The Strategy will require a capital investment of some £10 million over the next five years. This considerable investment poses significant funding problems and necessitates full detailed appraisal and economic justification of each scheme element. Assuming a safe passage through the various stages of approval, the Agency's programme for implementation of the five year Strategy is as follows:-

Snettisham Hard Defence Works	Year 1
Heacham Hard Defence Works	Year 2
Heacham and Snettisham Beach Renourishment Works	Year 3
Hunstanton Hard Defence Works	Year 4/5
Beach Recycling	Annually
Beach Monitoring	Continuous

The Sea Defence Strategy

The findings of both the North Norfolk SMP (July 1996) and The Wash SMP (Dec 1996) have significantly influenced the strategy

During the last decade the importance of maintaining high beach levels to absorb the energy of the sea has been recognised and incorporated in the strategy for providing sea defence. During 1990, 400,000 m³ of sand and shingle was pumped ashore to raise beach levels and subsequent annual operations have been carried out to recover material which naturally drifts along the beach in a southerly direction. This recycling activity normally takes place each winter.

Beach nourishment and recycling, together with maintenance of existing concrete and shingle defences, in conjunction with a comprehensive monitoring programme, has been the flood defence beach management strategy for the last five years or so.

In 1995 a Review was undertaken to determine how effective this strategy was. The findings suggested that although for much of the beach the defences were adequate to provide an appropriate level of protection, certain vital areas were deficient and required improvement.

The conclusions of the review and subsequent follow up work were that:-

- The recommendation of the North Norfolk and Wash Shoreline Management Plan to "hold the line" was acknowledged.
- The standard of defence for this area falls below the appropriate standard for the type of assets being protected.
- The residual life of some of the defences would be very low (only 3 to 5 years) in the absence of ongoing recycling and maintenance work.
- The existing practice of recycling is an important feature of beach management but is insufficient in itself to sustain the standard of defence.

Accordingly, a revised strategy has been prepared taking into account the results of wide consultation, technical and economic considerations as well as an environmental assessment.

The new strategy proposes that:-

- Recycling of beach material and maintenance of existing defences be continued.
- A scheme of new works should be undertaken over the next five years to include improvement to hard concrete defences, provision of concrete revetment to strengthen some shingle ridges and further beach nourishment. This is a recognition of the fact that for this coastline the best overall approach is to use both 'hard' and 'soft' defence techniques.
- Monitoring should be continued to provide an ongoing assessment of the performance of the system. This should include both physical surveys and ecological monitoring.

Damage caused by storm tide in 1978

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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For general enquiries please call your local Environment Agency office. If you are unsure who to contact, or which is your local office, please call our general enquiry line.

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The 24-hour emergency hotline number for reporting all environmental incidents relating to air, land and water.

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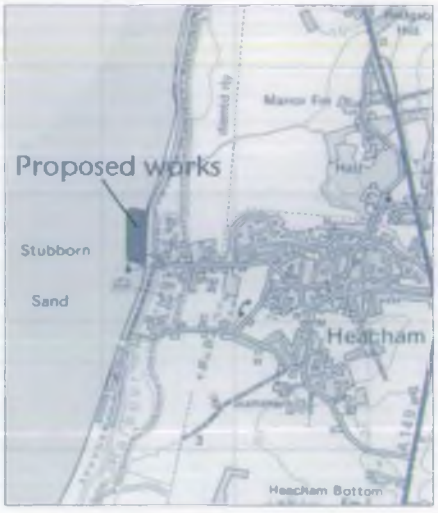
HUNSTANTON/HEACHAM SEA DEFENCES IMPLEMENTATION OF STRATEGY

Heacham Hard Defences



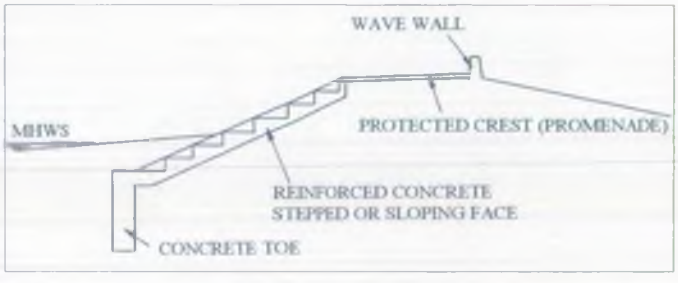
Location

The sea defence at Heacham North Beach requires strengthening. It is located between the two boat ramps known as Kala Juga and Jubilee Bridge.

Necessity for Strengthening Works

This length of defence is on a slight promontory and this makes it prone to beach loss as a result of storms. When the beach is lowered, larger waves can reach the defence which consists of a relatively light concrete block revetment to the front face of a shingle bank. In these circumstances large waves could either damage the revetment or overtopping water could wash out the crest or back of the defence, thereby causing a breach. Urgent works were carried out in 1997 to give protection to the toe of the defence, but the integrity of the upper defence relies on maintaining a high beach. This can only be a short term measure as beach material will naturally erode from promontory locations such as this. A long term improvement is required to ensure the integrity of this length of defence.

Existing concrete revetment at the site of the proposed works



Cross-section of typical hard defence

The works that are proposed

It is proposed that the existing defence be strengthened by building a hard defence over it whilst making use of the recent improvements to give protection to the toe of the defence.

The works will comprise a reinforced concrete seaward face in the form of stepwork with a concrete promenade to give protection to the crest. A wave wall will be incorporated to reduce overtopping and the risk of wash out of the rear face of the defence.

Example of a typical hard defence at North Beach, Heacham

The Construction of the proposed works

The method of construction will involve conventional reinforced concrete work i.e. setting up timber or steel forms, inserting steel reinforcing bars and pouring concrete between the formwork. It is possible that some items, such as the concrete toe, could be pre-cast off site in sections and delivered by lorry ready to be built into the defence.

The construction will require the use of cranes, excavators and sundry small plant. The concrete is likely to be mixed off site and delivered by truck mixer to the works.

The construction work is expected to take 8 months and commencement is subject to the availability of MAFF funding.

Stepped sea wall during construction

Issues to Consider

As part of the development of the sea defence scheme for these defences an Environmental Assessment has been undertaken in parallel with engineering studies to assess the environmental impacts of the scheme on the natural, human and physical environment.

Examples of typical issues assessed in the area of these defences include:-

- Transportation of construction materials and equipment to the site
- Provision of secure site offices and storage areas for the Contractor and Supervising Engineer close to the works
- The need to restrict public access to the construction area for safety reasons
- Disturbance to people during the construction period (e.g. noise, visual amenity) and the need to specify suitable working hours
- Disturbance to plants and invertebrates within the construction area and to birdlife nearby
- Ensuring the proposed defences are visually appropriate to the environment and in accord with similar defences in the area.

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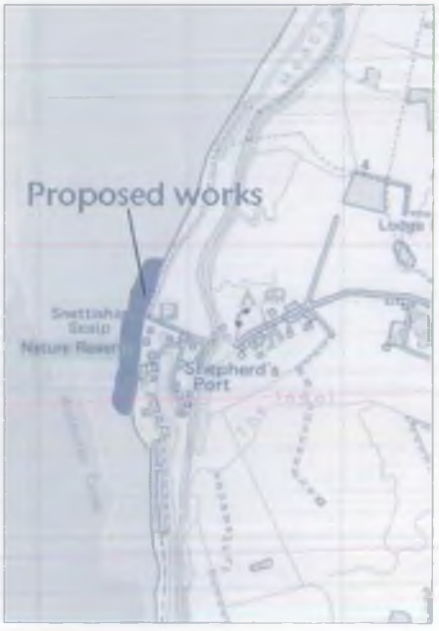
HUNSTANTON/HEACHAM SEA DEFENCES IMPLEMENTATION OF STRATEGY

Beach Nourishment at Heacham & Snettisham

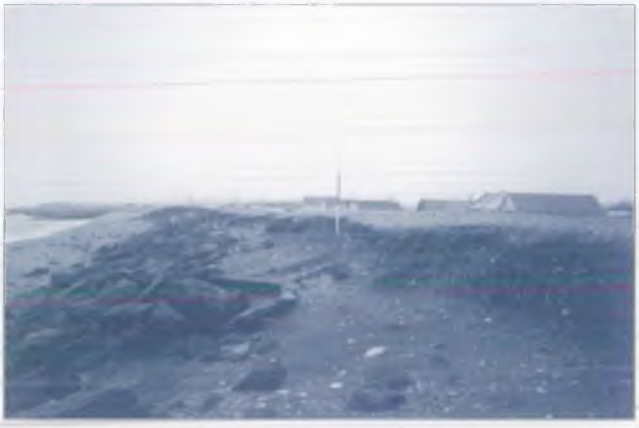


Location

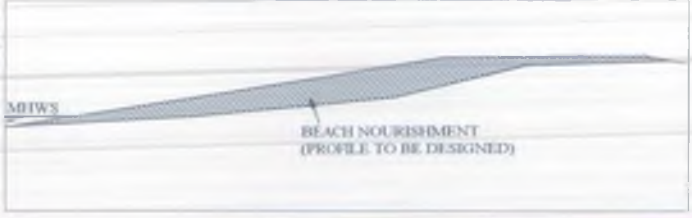
There are two locations where the beaches require nourishment. They are at Heacham South Beach and to the north of Snettisham Scalp seaward of Snettisham car park.

Necessity for Nourishment works

The defences at Heacham South Beach and Snettisham consist of shingle banks with no additional protection. An adequate standard of defence in these locations relies upon having sufficient width of beach in front of the bank to absorb wave energy, reduce overtopping and tolerate erosion during storms without threatening the defence bank itself. Currently beach levels are maintained by recycling beach material that migrates south to Snettisham Scalp. However, there has been a gradual loss from this coastline and there is now a need to import material to build up the beaches at Heacham South Beach and Snettisham. Recycling of material will still be necessary from time to time, but the reservoir of beach material will have been topped up.



Eroded beach



Cross-section of typical beach nourishment defence

The works that are proposed

It is proposed to import similar beach material to that which is on the beaches at present. The extra material will be profiled such that the existing crest is widened (but not significantly raised) and the seaward face subject to wave action remains at a stable slope.

At each end of the nourishment the extra width of beach will be blended into the adjacent lengths of coastline by placing additional material to form transitions.

Example of beach nourishment at Heacham

The Construction of the proposed works

The beach material is likely to be imported by sea thereby avoiding the disruption caused by road transport. Material will be dredged from a licenced source and discharged on the beach. It is likely that a trailing suction dredger (same principle as a vacuum cleaner) will be used to pick up the material at the source and deposit it in its hold. It will then come ashore ready to discharge its load. The shallow waters at these locations impose restrictions on the draft and therefore the maximum size of dredger that can be used and also the tidal window (over high water) in which it can get close enough inshore to discharge. It is likely that the material will be pumped from the dredger along a pipeline and discharged onto the beach where a bulldozer will shape it into the required beach profile. Since the sea shallows to the south (severely limiting dredger access) it is probable that the pipeline will come ashore at Heacham South Beach and then be extended along the top of the beach to the Snettisham car park site. Alternatively, the material could be deposited ashore at Heacham South Beach and moved to Snettisham by dump trucks.

Nourishment works showing pipeline discharge

The nourishment is expected to take 6 months and commencment is subject to the the availability of MAFF funding. It is necessary to carry out the works during the summer months because the dredger can only carry out this type of operation during calm weather conditions.

Issues to Consider

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