

RE-BUILDING THE ANGLIAN COASTLINE

Every minute of every day the sea is attacking the Anglian coastline



NRA

*National Rivers Authority
Anglian Region*

Beaches, sand-dunes and cliffs are under the constant threat of erosion from the harsh and aggressive environment of the North Sea which has pounded the coastline for centuries. Although it is not possible to ever stop this erosion, the NRA works hard to manage it, in a cost effective and environmentally sensitive way.

Exposed to heavy seas, strong tides and the danger of a surge of water caused by extreme weather conditions, the coast relies on the protection of its sea defences. Without them lives would be at risk and coastal towns, villages and thousands of hectares of low lying land would be flooded, damaged or destroyed.



Soft defences are becoming a more natural method of protection



Providing and maintaining defences is an endless task in which engineers look to find new ways of improving the level of safety, while at the same time trying to preserve the character and open beauty of the Anglian seascape.

Re-building beaches is already an important method of protecting our vulnerable Anglian coastline. It will become of increasing importance in the future, particularly if we experience climatic change and sea level rise.



Rock armour is a frequently used method to protect the Anglian coastline

A VULNERABLE LEGACY

Until recently most east coast sea defences were built of concrete and steel. Slabbed steps topped by wave walls, metal flood gates, steel and timber groynes still serve as constant reminders of the power of the sea off the Anglian coastline and the potential danger which it poses to local communities, industry, agriculture and road and rail communications.

But many of the defences which were built immediately after the disastrous 1953 floods are becoming more and more vulnerable as the erosion of the beaches in front of the defences threatens to undermine them, causing them to crack or collapse.

Running repairs, strengthening and in some cases heightening of walls are part of a regular maintenance and improvement programme. More sophisticated engineering and building techniques and materials have proved useful in softening the visual impact of sea defence structures but in recent years there have been increasing public demands for more natural and environmentally acceptable solutions to protection.

Mablethorpe

Ingoldnesley
Skegness

THE WASH



1953

THE WHOLE PICTURE

The search for the solution caused engineers to take a long hard look at what was happening on the Anglian coastline. They discovered that beaches were growing steeper and disappearing at a much greater rate than had been realised. Their investigations also showed it was a common problem and as such posed a substantial risk to many of the existing older defences.

Tackling the issue demanded a new approach. Previously the tendency had been to look at isolated problems in specific locations and to design solutions to solve them. Now for the first time it was necessary to look at the whole of the coastline. In this way the full extent of the loss of beaches, the offshore movement of beach materials and other factors could be identified to produce a comprehensive assessment of the effect of defence schemes on adjoining areas and the remainder of the coast.

Following the most extensive and intensive coastal investigation ever carried out in Britain, the long term environmental and economic value to the Anglian region of beach rebuilding was reinforced.





Work on hard defences at Skegness

Currently underway is:

Skegness to Mablethorpe in Lincolnshire - the Lincshire project involves the largest beach recharge scheme ever undertaken in the Anglian region. Covering nearly 20 kilometres along some of the most vulnerable coastline in Britain, the defences protect more than 35,000 people, over 15,000 homes and 18,000 residential caravans as well as extensive agricultural, commercial, industrial and service related activities on 20,000 hectares of low lying land.

The first phase of the project, the length of beach from north of Skegness to Ingoldmells Point, will be completed in 1995 using nearly a million cubic metres of sand. The major section - the 18 kilometres south to Mablethorpe - is planned to be completed in 1997 with the beaches requiring up to 12 million cubic metres of sand to provide improved protection.

Planned for future 'soft' engineering solutions is:

Happisburgh to Winterton in Norfolk - every year thousands of cubic metres of sand and shingle are washed from these Norfolk beaches by the southerly drift of the tides. Falling beach levels and the erosion of the underlying clay are endangering the existing sea defences and sand dunes. Beach rebuilding will help to reverse the accelerating rate at which material is being lost and provide an environmentally sensitive solution for an area which is noted for its open natural appearance.

For centuries the coastline of eastern England has fought a long and bitter battle against the ravages of the sea.

Today our sea defences provide us with a thin grey and green line of protection - the grey of concrete walls mixed with the green of embankments and sand dunes. But it is a line which is under increasing threat from old age and the savagery of the sea.

More than 750,000 people and many billions of pounds worth of property are kept safe by the existing defences which have to be improved, strengthened and maintained. New defences also have to be built to replace those that have fallen victim to erosion and damage and in areas where new risks have arisen.

Increasingly engineers and scientists are looking to new methods of protection by going back to nature.

Useful Information

The following leaflets are available from the Public Relations Department, telephone 01733 371811.

Building a Beach

Offshore Dredging - applying for a licence

Lincshire - the project

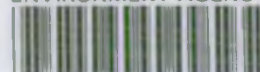
Beach Nourishment - Phase I

Offshore dredging - Safeguarding the Environment

The 1953 East Coast Floods

Battling the Tide - Flood Defences in the Anglian Region

ENVIRONMENT AGENCY



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To rebuild the beaches along the long and vulnerable coastline of the East Coast is a massive programme which will never be completed.

Every year stretches of beach which have been rebuilt, but subsequently attacked by winter storms or eroded by the constant scouring of the sea, will have to be repaired by replacing the lost sand.



Mechanical plant is used to shape the new beach

Finding supplies of sand will be major challenge but one which will have to be met successfully if life and property are to be protected into the next century.

The Lincshore project is the beginning of programme which will eventually involve sections of many of the beaches which are at risk in Lincolnshire and Norfolk. Work has already begun on lengths of the Lincolnshire coast north of the Wash and beach nourishment will be used on the section of the Norfolk coast between Happisburgh and Winterton.

THE LINCASHORE APPLICATION

To help to begin to rebuild some of these beaches the Anglian region of the National Rivers Authority wants to obtain a supply of sand from the North Sea. It has applied for permission to dredge the Race Bank and Docking Shoal, about 20km off shore.

The NRA needs over 12 million cubic metres of sand for the initial rebuilding of the beaches and about 500,000 cubic metres a year to replace sand which will be 'lost' as part of the natural erosion process. Under law the sand belongs to the Crown Estates, the Government department which licenses offshore dredging.

THE LINCASHORE SCHEME

Work on the first section of the Lincshore beach nourishment scheme started in August 1994. It involves 19 kilometres of beaches from north of Skegness to Mablethorpe beginning with a one kilometre length from Whitehouse Corner to Ingoldmells Point. The £5 million project will be completed in 1995 using 0.8 million cubic metres of sand from an existing extraction licence (Area 107) held by a commercial company.

For the second phase of the scheme - the 18 kilometres from Ingoldmells Point to Mablethorpe - commercial sources of supply, which are strictly controlled, are not available in sufficient quantities. Because of the special nature of its requirements - sand only of a particular size - and the need for a guaranteed continuity of supply the NRA has made the specific application for its own licence. Commercial operators have applied for licences to dredge alternative sites which can supply the specified sand after screening. If the application is successful it is expected the second part of the programme will be finished in 1997.



THE DREDGING

The dredging, which would be carried out on behalf of the NRA by approved contractors who are fully experienced in offshore operations and beach recharging techniques, would involve reclaiming only sand from the seabed. The sand would have to be of a suitable size and all other materials such as shingle and gravel would be screened out as part of the dredging process and returned to the seabed.



Material is screened before being pumped ashore

All commercial dredging involves taking material from offshore and using it in the construction industry for building roads, homes, schools and similar structures which need sand and aggregates. This means it is lost to the environment. The NRA application is purely recycling of the sand. After being put on the beach it will be washed back into the sea and ultimately re-dredged to be used again.



Offshore material is dredged for many uses

FOR MORE INFORMATION

- For information about the Lincshore Project please contact: **Harry Lunt on 01522 513100 or Nigel Pask on 01733 371811.**
- For information on environmental issues concerning the project, please contact: **Peter Barham on 01733 371811.**

THE LINCASHORE PROJECT



“To rebuild the beaches along the long and vulnerable coastline of the East Coast is a massive programme which will never be completed.”



Flood defences must be built and maintained in balance with the environment

SAFEGUARDING THE ENVIRONMENT

As the leading environmental agency in Europe the NRA insists on the highest standards in safeguarding the water environment and this includes its own handling of the dredging application. Not only does it have to meet the stringent conditions which are laid down in the licence but in submitting its application it has to investigate and form a professional view on the environmental impact which the operation will have both in the sea at the site of the dredging and on the beach itself.

There are three key areas :

- 1** *The dredge site* - here the NRA has to carry out scientific and engineering assessments of the extent of any disturbance which will be caused to the seabed and fisheries in the area. The intensive nature of these investigations is illustrated by the Race Bank and Docking Shoal applications where £500,000 was spent on an environmental baseline survey, with particular emphasis on the crab population.
- 2** *The sea route* - throughout the duration of the scheme the repeated transport of sand from the dredge site to the beach means any disturbance to normal navigation and fishing activities has to be kept to a minimum. This is achieved by liaison with the shipping authorities and local fishing interests over the most appropriate routes.
- 3** *The discharge point* - this is the busiest part of the operation with the arrival and turn round of the dredger at the mooring barge and the pumping ashore of the sand through a large pipeline. Every effort has to be made to minimise disruption both to offshore and onshore activities, to curb any environmental impact and to ensure fishing and navigation interests are safeguarded. This can involve anything from detailed liaison with fishermen to minimise any potential loss of their normal fishing areas to re-arranging visitor access points and car parking facilities.



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BUILDING A BEACH

A beach is a natural breakwater. The energy of the waves is absorbed as the water flows across and up the beach towards the high water mark. If the beach is damaged by erosion the force of the water is undiminished and its scouring action further reduces the level and amount of sand.

In helping to deaden the effect of the waves and reduce their impact on man-made and natural sea defences, beaches act as a vital first line of protection.

As the key element in the coastal defence system the reinstatement of beaches has distinct advantages over the traditional methods of constructing hard defences. It is :

- efficient - it works directly with nature not against it;
- economic - it is often cheaper and less disruptive than building rigid structures of concrete and steel;
- sustainable - it is the recycling of a natural product (sand);
- attractive - it is more pleasing visually and completely in harmony with the coastal environment.



Exposed clay on a badly eroded beach



Sand is screened before being pumped into the hopper

BUILDING A BEACH

A beach needs sand. This can only be supplied by reclaiming it from the seabed where it has been deposited by tides and wind.

The operation takes place many kilometres offshore in areas of the North Sea specially licensed for dredging by the Government. A dredger sails across the bank of sand and the material is sucked up a large suction pipe into the vessel. Because the material is often a mixture of sand, shingle and gravel, the mixture has to be screened so that only sand of the required size is put into the dredger's hopper. The remainder of the mixture is returned to the seabed.

THE LIFE OF THE BEACH

A beach is a living thing. Waves and wind action change its profile and the sand on it moves in response to the various pressures of the sea.



Slurry being pumped ashore

Once the hopper is full the dredger transports its cargo close to the beach site. It moors offshore well below the low water mark alongside a floating barge which acts as a dock for the dredger. Seawater is mixed with the sand in the hopper to form a slurry which is then pumped ashore through a floating pipeline which runs from the barge to the top of the beach. The sea water drains rapidly from the slurry leaving behind the sand which can then be finely shaped on the beach by bulldozers.

Most beach building has to be restricted to suitable weather 'windows' in the year. This is when conditions are right for dredging the sand, shipping it to the discharge point and spreading it on the beach and means operations usually take place between May and October.



Beaches have important conservation value



A beach is important for recreation

Once it has been rebuilt a beach does not remain unchanged. This means that engineers have to work out what is likely to happen to the beach and monitor it closely to establish the amount of sand being displaced, where it is moving to and how much will have to be brought back to replace any loss. The 'recharging' of the beach is an integral part of the on-going process of what is known as beach nourishment and takes place every year or every few years depending on the severity of the impact of the wave action.

Soft engineering of this kind can also involve the use of imported rocks. Placed to provide additional protection against wave action they allow sand to build up near and around them rather than being washed away.



Beaches attract tourism



OFFSHORE DREDGING

Applying for a licence



There is only one source for the sand which is used to rebuild East Anglia's beaches - the sea.

It has to be reclaimed from the banks and shoals of the North Sea where it has been washed by tides and wind.

No one can take any material from the seabed unless they have been given special permission to do so by the Government and this complex process to obtain a licence is designed to ensure that the interests of the

water environment are fully protected at every stage of the operation.

Meeting the demanding requirements of an offshore dredging licence is the major reason why so few exist and why it is extremely difficult for applications to succeed. As a result the amount of material which can be made available to organisations like the National Rivers Authority from commercial operators is strictly limited.



THE APPLICATION

Any organisation that wants to take sand, shingle or gravel from the sea has to apply for permission to do so from Crown Estates. The application has to identify the purpose for which the material will be used, the precise area from where it will be taken, the nature of the material, the amount, the recovery method, the likely environmental impacts and the rate of extraction. Every aspect has to be covered in great detail in the application which will be rejected by the Crown Estates if its criteria are not met.



Public information boards illustrate plans for flood defence works

CONSULTATION

Because of the sensitive nature of such applications there is an extensive procedure for consultation with those whose interests might be affected by the proposals. Once the application has been submitted the details have to be advertised publicly so that

formal consultations can take place with statutory bodies, organisations and groups.

Views on the application are put forward to the applicant who has the opportunity to respond directly on any issues or explain matters in greater detail. The Crown Estates are then responsible for bringing together all the information and views from the consultation. The Department of the Environment then proceeds with the formal consultation on the application. This is a further opportunity for public comment before the Department determines the Government view and specifies the detailed conditions of the licence.

THE REGULATOR

Throughout the life of the licence Crown Estates monitor the activities of the licensee to make sure they meet all the conditions and requirements which have been imposed in the licence.



Public consultation is an important part of any large NRA scheme



OFFSHORE DREDGING

Safeguarding The Environment

Making sure that the interests and uses of the water environment are fully protected throughout the whole of the beach rebuilding process is of paramount importance to the National Rivers Authority.

As the leading environmental protection agency in Europe, the NRA insists on observing the highest standards possible, both in the planning and operation of any scheme and of consulting widely on its proposals and plans, particularly where potentially sensitive issues or locations may be involved.

PLANNING

The planning process of any large NRA scheme involves a detailed investigation of every aspect, by engineers, scientists and conservation experts and all the impacts it will have on the environment, both short and long term are considered. In most instances this means a detailed assessment carried out by independent environmental consultants, who will help to identify specific issues and provide advice on the best methods of tackling them.

From the very onset and at various stages of the project, the NRA will also consult with a range of external bodies who can provide additional expertise in areas such as bird, animal and marine life, botany, conservation, fisheries and ecology. The aim of the vast amount of preparatory work is to ensure plans are soundly based and can be achieved with the minimum of disruption to existing activities.

DREDGING

Conditions required in the licence are rigorously enforced throughout the whole of the operation, with regular monitoring of activities both out at sea

and at the inshore mooring point. The dredging of the sand, and the return of unwanted materials to the seabed, creates some disturbance in the water and a 'plume' of small suspended solids. Both have to be monitored carefully to make sure they are not having an adverse effect on any fisheries or fishing areas in the vicinity.

The results of monitoring both during and after the operation are compared with the evidence obtained from special surveys carried out in advance of the work. This enables any impact to be measured precisely - an important point in deciding whether any corrective action is necessary as a result of the dredging.



Careful monitoring of the environment at sea - both during and after dredging

Although it takes place many kilometres offshore, dredging can interfere with other activities such as shipping or fishing. The dredger has to observe any detailed navigation requirements which are imposed as part of the licence as well as normal maritime regulations. Full account also has to be taken of the effect on fishing in the area including restrictions on access by boats for which compensation might have to be paid.



BEACH BUILDING

Local fishing and sailing areas can also be affected by the operation of the pumping ashore of the sand. The inshore location of the mooring barge from which the sand is discharged and the pipeline, either floating or submerged, down which it is pumped to the beach have to be sited to cause the minimum inconvenience to other users of the area. Although there can be restrictions on movement and on some normal seashore activities such as swimming, sailing or watersports the NRA works in conjunction with local interests to try to maintain them, together with beach access, for the duration of the work. In resorts and on popular beaches this can involve extensive consultation with local authorities and user groups before a scheme begins.



The mooring barge is located inshore for much of the process

Full environmental assessments are undertaken in highly sensitive locations so that the right balance is struck between improving the level of protection against flooding and preserving the existing habitat. Wherever appropriate and possible the NRA will carry out environmental improvements to provide added 'value' to the overall scheme.

As beach building operations are totally dependent on the weather the timescale has to be restricted to suitable weather 'windows'. This means most of the work has to take place during the late spring, summer and early autumn. Working against the clock demands a 24 hour, seven day a week dredging and pumping schedule but on the beach the use of any mechanical plant such as bulldozers and earthmovers



Earthmovers are in use throughout daylight hours

is restricted to daylight hours and resident engineers are responsible for ensuring contractors comply fully with noise and health and safety requirements and special arrangements which have been agreed as a result of local consultation.

CONSULTATION

Consultation is vital to the development of a successful scheme. In addition to detailed discussions with a wide range of statutory bodies, the NRA always seeks to involve representative bodies and voluntary interest groups in the planning process. It believes full and frank disclosure and debate not only provides a sound basis for a considered evaluation of all the relevant issues but that improved access to information reduces substantially the possibility of misunderstanding and misrepresentation of views.



Sensitive issues are often discussed at public meetings

The consultative process tends to involve a mixture of direct discussions with organisations representing specific interests, public meetings, exhibitions and displays, the publication and distribution of literature and information together with publicity in the media. During the process the NRA provides opportunities for people to put forward their views on any aspect of the proposals.

