

BROADLAND

FLOOD ALLEVIATION STRATEGY



**BANK STRENGTHENING AND EROSION
PROTECTION**

The Programme for Flood Defence Works



ENVIRONMENT AGENCY

INTRODUCTION

The River Yare and its two major tributaries, the Waveney and the Bure, drain to the sea through Great Yarmouth in East Anglia. The low lying land surrounding the tidal reaches of these rivers is known as Broadland, an area unlike any other in the country. Flat and low lying, it contains a variety of landscapes and wet-land habitats and supports a wide range of activities. Much of the area is devoted to agriculture but this co-exists with an extensive tourist industry, visitors being attracted by the opportunities offered for boating, walking, fishing and general sightseeing. The major town is Great Yarmouth, an active port and an important supply base for the offshore gas industry.

The area forms one of the most important wetland marsh areas in the United Kingdom and in addition to the numerous Sites of Special Scientific Interest was designated an Environmentally Sensitive Area in 1986.

Much of Broadland and Great Yarmouth is susceptible to flooding, either from high freshwater river flows or, more frequently, high sea levels. Flood protection is the responsibility of the Agency and at present is provided by flood walls through Great Yarmouth and earth embankments along the rivers in Broadland. The Great Yarmouth defences have recently been upgraded and improved but, apart from routine maintenance and emergency repairs, little work on the Broadland defences has been undertaken since the major flood of 1976, following breaches in the defences at North Breydon. During this period the embankments have settled and their condition has deteriorated so that the risk of overtopping and breaching is now very serious.

THE BROADLAND AREA


Low lying Areas



This book is due for return on or before the last date shown below.

20 Jan 2003 .		
---------------	--	--



THE BROADLAND STRATEGY

The Agency is committed to:

- protect people and property from flooding
- protect and enhance the environment
- achieve the above without disadvantaging others

Up to 75 % of the cost of The Agency's flood defence works comes from the Ministry of Agriculture, Fisheries and Food (MAFF) and a number of alternative strategies for Broadland were considered in line with their requirements.

The scheme that meets the rules for funding is bank strengthening and erosion protection.

This scheme will reduce the risk of banks breaching which would otherwise eventually result in the permanent loss of 1700 properties, 21,300 hectares of land and the intrinsic value of the area.



Above left: Works at Breydon Outfall Pumping Station

Left: Erosion protection works, North Breydon

BANK STRENGTHENING AND EROSION PROTECTION

There are 240 kilometres of banks in Broadland. The major cause of flooding in Broadland at the moment is breaching of these banks. The last comprehensive bank improvement project was carried out almost 20 years ago so most of the banks now require extensive strengthening and renewal of their toe protection. In addition, some banks may be raised by up to 375 mm to take account of settlement and sea level rise.

The aims of bank strengthening are:

- to reduce the risk of breaching
- to sustain the existing flood defences
- to protect and enhance the environment

The ten year bank strengthening programme will cost £63 million and has three main parts:

- to strengthen the banks - cost £22m
- to protect the toe of the bank from erosion - cost £35m
- to improve the protection of undefended properties - cost £6m

Right: Works to Soke Dyke at Ashtree Farm, River Yare



PHOTOGRAPH COURTESY OF
THE BROADS AUTHORITY

STRATEGIC ENVIRONMENTAL ASSESSMENT

Carrying out bank strengthening in an area of such high environmental value will require careful management. Every opportunity will be taken to ensure that environmental enhancements are included wherever possible. A Strategic Environmental Assessment has been prepared after lengthy consultations with three specialist panels: Environment, Recreation/Navigation and Agriculture.

This is an important document which sets out the way the Agency will manage the Flood Alleviation Scheme in an environmentally sensitive way. It effectively provides a Code of Practice for the Scheme.

STANDARD OF PROTECTION

Various levels of bank strengthening have been considered. However, major bank raising throughout Broadland is not feasible on engineering and technical grounds and would disadvantage others within Broadland. The Agency will maintain the banks at approximately their existing standard over the next 15 years by building in an allowance for settlement and sea level rise.

Overtopping will continue to occur but with the substantial strengthening envisaged, comprehensive and permanent flooding will not feature.



MAINTAINING THE STANDARD

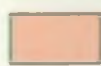
Every fifteen years, there will be a ten year programme of bank renewal in order to maintain these standards (allowance for this is included in the 50 year design life). At no one point in time will all areas be protected to one precise standard. The reasons for this are:

- settlement of new bank material
- settlement of the bank structure as a result of the underlying ground conditions
- the effect of sea level rise

PROTECTION FOR CURRENTLY UNDEFENDED PROPERTIES

There are at least twelve undefended communities which include land, business premises and holiday dwellings (475 approximately). Many of these properties already suffer regular flooding. The Agency is looking at those properties that are at risk to see how works can be carried out to provide first time defences within the scope of the project.

FLOOD PROTECTION ZONES and Provisional Construction Programme



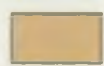
1 - 4 years



5 - 6 years



7 - 8 years



9 - 10 years

BANK STRENGTHENING AND EROSION PROTECTION - THE WAY FORWARD

The works will involve:

- Strengthening flood banks to prevent breaching
- Countering erosion of the river bank
- Obtaining fill material to build up banks
- Setting back and realigning banks in some cases
- Ensuring that work is carried out in compliance with all legal requirements
- Balancing the needs and wishes of all those with an interest in the area.

PROPOSED WORKS

The Agency is working on proposals for the next five years which include:

- Halvergate Marshes between Berney Arms and Reedham
- South Breydon
- Burgh/Norton/Haddiscoe Marshes
- Works to undefended properties starting with Reedham.

This forms the first phase of the ten year programme. Works have been progressing over recent years at North Breydon and Haddiscoe Cut but these major projects will commence in 1998.

The timing of subsequent phases are indicated on the map left.

SOME LONGER TERM VIEWS

In the long term, particularly if sea level rise from global warming is a reality, the only effective method of flood protection would be by a barrier or barriers. However, sea level rise is not determined for the long term and therefore a barrier or barriers cannot be justified at this stage. If ultimately a barrier is needed for sea level rise reasons, then the works on the banks will still be an integral part of the flood defences and will ensure the area is maintained for the future.

Further information on the Broadland Strategy will be available from your Environment Agency Customer Services Department.

Environment Agency
Eastern Area
Cobham Road
Ipswich
Suffolk
IP3 9JE
Telephone: (01473) 727712



Berney Arms Windmill



ANGLIAN ADDRESSES

REGIONAL OFFICE

Environment Agency
Kingfisher House
Goldhay Way
Orton Goldhay
Peterborough PE2 5ZR
Tel: 01733 371 811
Fax: 01733 231 840

NORTHERN AREA

Environment Agency
Waterside House
Waterside North
Lincoln LN2 5HA
Tel: (01522) 513 100
Fax: (01522) 512 927

CENTRAL AREA

Environment Agency
Bromholme Lane
Brampton
Huntingdon PE18 8NE
Tel: (01480) 414 581
Fax: (01480) 413 381

EASTERN AREA

Environment Agency
Cobham Road
Ipswich IP3 9JE
Tel: (01473) 727 712
Fax: (01473) 724 205



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.

**ENVIRONMENT AGENCY
GENERAL ENQUIRY LINE**

0645 333 111

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

**ENVIRONMENT AGENCY
EMERGENCY HOTLINE**

0800 80 70 60

ENVIRONMENT AGENCY



006946



**ENVIRONMENT
AGENCY**