

WELLAND & GLEN RIVER SYSTEM



FLOOD DEFENCES ALONG THE WELLAND AND GLEN



NRA

*National Rivers Authority
Anglian Region*



Guardian of The Welland/Glen river system

Flood defences along the Welland and Glen rivers in south Lincolnshire are the responsibility of the National Rivers Authority's Anglian region.

These raised river embankments have to be able to protect local farmland, roads, homes and property from the unusually high river levels which follow heavy rainfall, or tidal surges which funnel down the Welland from the Wash.

The tidal reach of the River Welland extends 20 km inland to Spalding, but the rise and fall of the tide affects water levels in the river as far inland as Peakirk (see map).

As part of its continuous review of flood defences throughout the Anglian Region, the NRA has completed a comprehensive survey of the condition of flood defences along the Welland/Glen river system, and is employing the latest computer techniques to identify where they need to be raised, repaired or strengthened.

Existing flood defences

From Tallington to the Wash the Welland is an embanked channel conveying water through the Fens and out to sea.

Downstream of Spalding the river embankment has to be high enough to contain tidal surges, and at Spalding itself there are sluice gates to hold salt water back during Spring tides or tidal surges in the Wash.

The Glen drains the upland catchment areas of the East and West Glen and is embanked for 24 km from Kate's Bridge to Surfleet where it discharges into the Welland. The Welland/Glen river system includes several artificial channels which were added following the disastrous floods of 1947 in which the North Level and Postland Fens were flooded, the Welland broke its banks at Crowland, and the



1947 flood.

water level in Spalding rose to 15 cm higher than ever before.

The first new channel to be created was the Greatford Cut, which diverts a portion of the flow away from the West Glen and joins River Welland at Market Deeping.

The installation of the Maxey Cut, an 11 km artificial channel, enabled excess water to bypass the Deepings. At the same time the embankments of the Welland downstream of Tallington were raised so that this section of the river could convey a flow of 100 cubic metres per second.

The construction of Coronation Channel in 1956 finally removed the flood 'bottleneck' at Spalding. Earlier plans for a bypass channel had been shelved at the onset of the second world war.

The efficiency of the river system was further improved by the installation of a series of pumping stations and gravity drains, under the control of Internal Drainage boards, which allow water to drain from the Fens into the two rivers.

Maintaining a balance

The NRA's guardianship of the Welland and Glen rivers involves keeping this complex river system in good condition so that it can function properly as a transporter of fluvial and tidal water.



Building of the Coronation Channel.

The channels of the two rivers have to be large enough to perform their task of carrying run-off water away from their catchment areas. Channels which flow into the tidal reach of the Welland need additional capacity, so that outgoing water can be stored while locked into the river system by the tide.

The tidal channel of the Welland has to be large enough to accept extreme flood flows from inland, yet small enough to maintain a sufficiently rapid flow which will prevent silting and a build-up of debris brought in with the tide. Finally, the embankments of the tidal reach of the Welland have to be high enough to contain tidal surges flowing inland from the Wash.

Special features in the Welland/Glen river system



Coronation Cut Marsh Road Tidal Sluice.

The Welland/Glen river system has number of special features which make it better able to cope with flood conditions.

For example, the Welland flood plain upstream of Stamford can be used to store flood water.

There are also some looped and interlinking channels between Market Deeping and Tallington, where a series of weirs, sluice gates and old mill structures can be operated to divert some of the flow away from the Maxey Cut.

Flows from the Glen can be

diverted from the Pinchbeck/Surfleet area, through the Greatford Cut, into the non-tidal Welland.

When river flows are unusually high and trapped by the tide, surplus water can be temporarily stored in the Crowland and Cowbit Washes, which can be deliberately flooded to give 'last resort' protection to Spalding.

Calculating the flood risk

The Welland/Glen river system is so complex that NRA engineers are using a mathematical computer model to help them identify areas where flood defences are vulnerable and need to be improved.

The model, programmed on computer software was developed for the NRA by Hydraulics Research Ltd. It is able to simulate various combinations of the factors which affect water levels in the Welland and Glen: river flows, the effects of prolonged or heavy rainfall, high and spring tides, tidal surges, and the general rise in water levels resulting from global warming.

It is intended that the model can eventually be used to plan the NRA's response to flood events as they happen, because it should be able to forecast how changes such as the raising or lowering of sluice gates will affect the movement of water through the river system.

The results from the computer model will also enable the NRA's engineers to predict the highest water levels that might occur in the next 50 years or so.

The results from the detailed survey of the Welland/Glen embankments taken during the last three years are being compared with water levels predicted by the model, to ascertain whether existing flood defences are adequate. The computer model and survey together cost £200,000. Much of this has already been recouped because the exercise has revealed that major work the NRA had planned to carry out on the South Barrier bank on the River Welland is not now required.

Current flood defence projects

The survey of existing flood defences along the Welland and Glen, together with the computer-based predictions of future river levels, revealed areas where the embankments needed to be improved. The NRA has scheduled the following flood defence projects:

Market Deeping Defences

During 1994, flood walls will be repaired and earth embankments raised at a few specific locations along the River Welland at Market Deeping.



River Welland Maxey Cut Confluence

Deeping High Bank

The Crowland and Cowbit washlands last stored flood water from the Welland in 1947. Work starting in 1994 and scheduled for completion in 1996 will raise the lower level 'cradge' bank to a height sufficient to prevent floodwater in the Welland prematurely flooding the washlands.

Deeping High Bank itself, to the west of the Welland, is ultimately in danger of collapsing in places where the berm (which protects the front of the flood bank), has eroded. The berm will be repaired in order to stabilise the bank and provide a track for maintenance vehicles.

Coronation Channel Bank

Results from the computer model are helping NRA engineers to plan improvement work on this important element in Spalding's flood defences.

River Glen: Pinchbeck and Surfleet area

The computer model has confirmed that recent improvement work on stone flood walls and earth embankments in this area will provide the required level of flood protection.

Conservation and Fisheries

Both rivers have important fisheries and conservation interests which are well known. Where the computer study shows that work is required to re-establish defence standards full consideration will be given to those aspects.

A catchment management study which lasted four years was commissioned by the NRA and has recently been completed. The results of this provide wide ranging recommendations for improvements in the channel structure to maintain and improve conservation and fisheries objectives.

