

EA - SOUTH WEST

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ENVIRONMENT  
AGENCY



# Protecting

the Kenwith Valley,  
Bideford

# Background

The town of Bideford is situated on the west bank of the Torridge Estuary, approximately 11 kilometres west of Barnstaple. This historic town has a maritime character which is maintained by the continued commercial use of Bideford Quay. However this close association of the town with the estuary is a mixed blessing. The tidal influence which led to Bideford's establishment as a port has also meant a vulnerability to flooding. Not only is Bideford regularly flooded from the Torridge Estuary, but parts of the town have in the past been flooded from the River Kenwith during tidelocked periods. This leaflet highlights the work carried out by the Environment Agency to enhance flood defences on the River Kenwith in the aftermath of serious flooding in June 1993.



## Scheme Acknowledgements

The Environment Agency, with the approval of its South West Regional Flood Defence Committee, promoted the Kenwith scheme. Grant aid was provided by the Ministry of Agriculture, Fisheries and Food.

## A History of Flooding

The catchment of the River Kenwith covers some 11 square kilometres to the west of Bideford. The lower reaches of the river are carried in a manmade channel through Bideford, before flowing into the Torridge Estuary via a 1.5 metre concrete culvert. These lower sections of the channel are affected by tide levels. In fact a large part of the catchment in Bideford lies below high tide level.

Between 1931 and 1963 there were 10 recorded occasions when flooding occurred to parts of Bideford in the Kenwith Valley. Further significant events have occurred in the last 30 years, and in 1979, 250 properties were flooded to a depth of 1.5 metres. Finally in June 1993, following two days of heavy rain, a combination of events led to existing flood defences being overwhelmed causing extensive flooding in the Kingsley Road, Newton Road, Alexandra Terrace and Northam Road areas of Bideford.



June 1993

## Dam Works

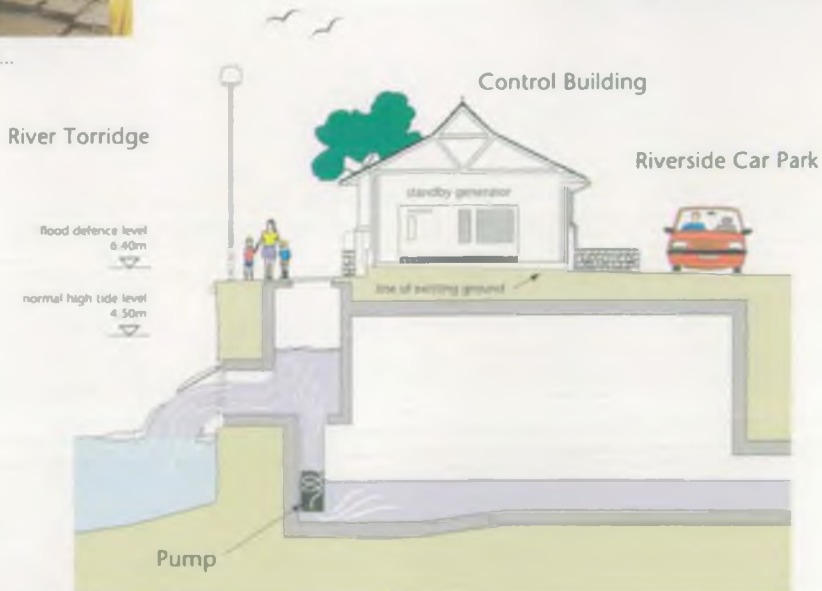


Work in progress...

As part of the scheme, the Kenwith Valley detention dam crest was raised by 350 millimetres and a new access track and spillway kerb provided. These works increased the storage capacity of the reservoir and provide a well defined crest over its 410 metre length. With the new level crest, if overspilling of the dam occurs in a extreme event this will be spread across the whole dam crest avoiding dangerous erosion of the downstream face of the dam which can occur in concentrated overspilling. The dam crest improvement works were carried out by the Agency's emergency workforce at a cost of £80,000.



The raised dam crest



Cross section of the pumping station in the Riverside car park, Bidford



## Conservation

The Taw-Torrige Estuary is of significant ecological value and the whole of the coastline, estuary and inter-tidal areas are designated as Sites of Special Scientific Interest (SSSI). Also Bideford is inside the 'transitional zone' of Braunton Burrows UNESCO Biosphere Reserve.

The site of the Kenwith Valley flood detention dam runs through the centre of the Kenwith Valley Nature Reserve which is managed by Devon Bird Watching and Preservation Society (DBWPS). A considerable amount of time and effort has been put in by local people to develop the reserve which was established after the construction of the dam. The Reserve has been well planned to encourage as wide a diversity of flora and fauna as possible in a relatively small area. As the dam improvement works were limited to the dam crest there was no intrusion into the areas actively managed as a nature reserve during the construction works.



local environment contributing to the diversity of flora and fauna in the Kenwith Valley Nature Reserve.

Of particular relevance to the pumping station site is the inter-tidal quay frontage which is within the Taw Torrige SSSI and lies within a Devon County Council Conservation Zone. The estuary is important for migrating wintering waders and wildfowl. However due to the narrow area of inter-tidal muds in front of the pumping station, and the existing high levels of disturbance due to boat moorings and open public access, it was considered that disturbance caused by the works was acceptable.

## Other Bideford Flood Schemes

Tidal flood defences for East-the-Water, upstream of Bideford Bridge, were completed in 1991. The Environment Agency also has plans in hand to develop further schemes to alleviate tidal flooding in Bideford. Planning applications are being submitted for the main quay, and for a section of the river bank from the Riverbank Car Park to Torrige District Council's Offices at Riverbank House. Defences for a section of the riverbank upstream of Bideford Bridge on the West Bank are being investigated.

Now that the works have been finished, the 'secondary' flood storage area just below the dam will no longer be required to hold flood

waters under normal circumstances. Therefore to enhance the environment of this area the Environment Agency has helped DBWPS to create a wetland reserve through the construction of several reed ponds. This wetland area has the potential to become an important feature of the



### Facts and Figures

Catchment:	11 square kilometres
Total Cost of Construction:	£700,000
Consultants:	Institute of Hydrology Sir William Halcrow and Partners
<b>Contractors</b>	
Dam works:	Environment Agency emergency work force
Pumping station:	Dean & Dyball Construction
Mechanical and Electrical:	ABS Pumps Ltd

## Existing Flood Defences

Various small scale flood defence measures were carried out along the River Kenwith between 1948 and 1962. However it was not until 1980 that the Kenwith Valley Flood Defence Scheme was implemented. The main element of this scheme was the construction of a flood detention dam designed to store up to 245,000 cubic metres of flood waters.

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## The Response to the June 1993 Event

A major inquiry was held following the flood event and many lessons learned. The Institute of Hydrology was appointed by the Environment Agency to investigate the

hydrology of the catchment to determine why the existing defences had been overwhelmed. They concluded that rainfall on the Kenwith catchment was likely to be greater than had been allowed for in the existing scheme design. Consultants Sir William Halcrow & Partners were then appointed to investigate the engineering options to resolve the problem of flooding.

The resulting engineering report on the problem was published in March 1995, enabling engineers to consider a number of options.

After careful study of these options it was concluded that a new pumping station in conjunction with limited raising of the dam crest provided the best solution. This option was selected mainly because it could remove flood flows generated from the urban catchment below the dam as well as removing flood waters released from the dam. In October 1994 a field test was carried out involving the controlled release of water stored in the detention reservoir. This test highlighted problems along the channel through the town and helped determine the size of the pumping station.

## Pumping Station

The site chosen for the new pumping station was the Riverside car park in Bideford. The pump sump, which connects into the existing River Kenwith culvert, was constructed inside a steel pile caisson - watertight chamber - with excavations up to 7.5 metres below the existing car park level. The works consisted of a reinforced concrete pump sump together with the construction of a control building. These works were carried out by Dean & Dyball Construction of Exeter at a cost of £410,000.

The consultant Halcrow also managed the mechanical and electrical aspects of the works associated with the provision of the pumps, power and control systems. The pumping station houses four axial flow



pumps, each of which pumps almost a tonne of water every second. In the event of a power cut in Bideford, the control building contains a standby generator. The installation of the pumps and the associated control and power equipment was carried out by ABS Pumps of Horely, Surrey at a cost of £200,000.

The pumping station has been designed to operate automatically, responding to rising water levels in the River Kenwith Channel and in the pump sump. The station can be monitored remotely through the Environment Agency's telemetry system either from the control building at the detention reservoir site or from the Regional Communications Centre at the Agency's regional headquarters in Exeter.

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