

NRA South West 340

EXETER FLOOD DEFENCE SCHEME



NRA

*National Rivers Authority
South West Region*

EXETER AND THE EXE

The River Exe rises high up on Exmoor at a point known as Exhead near Exford, some 488 metres (1,600 feet) above sea level and near the Bristol Channel.

It is fed by many tributaries and drains a total area of around 1,300 square kilometres (800 square miles). It flows for just over 103-kilometres (sixty four miles) into the English Channel at Exmouth.

The city of Exeter has a long and close relationship with the Exe.

It was alongside the river that the Romans chose to build a fortress in AD55-60 and later, in AD80, a town.

The importance of the river is reflected in the Roman name for the settlement – Isca.

This is variously thought to have stemmed from the Celtic words meaning either 'a river abounding in fish' or 'water' (in the sense of a river).

Over the centuries the Exe has brought the city mixed blessings.

By providing a link with the sea it was the basis for a flourishing port that helped Exeter become one of the wealthiest medieval towns in the country.

But, in contrast, on many occasions the river arrived in flood causing widespread chaos and devastation.

The two great floods of 1960 were the final straw. A major project was carried out to defend the city.

This booklet describes the floods and the resulting scheme which today is owned and maintained by the National Rivers Authority.



Exeter Quay

The Exe in full flow.



A HISTORY OF FLOODS

It was 'Black Thursday'. The raging River Exe raced into low-lying Exeter at a rate of over 700 cubic metres per second (nine million gallons a minute).

The unstoppable tide of muddy, swirling water burst into homes, shops and factories at lunchtime, cutting the city in half. When the waters died down the owners of over 1,000 properties had to count the cost.

For Exeter it was a major emergency demanding a huge rescue and welfare operation. Convoys of amphibious vehicles evacuated stranded locals – many trapped at work. Hundreds were unable to return home for the night.

That was the drama of Thursday, 27 October, 1960. It was to be one of a series of floods to hit the Westcountry that year – the wettest this century and the third wettest since records began in 1727.

Other towns in Devon were also badly damaged, notably Exmouth and Tiverton. But in Exeter the turbulent River Exe struck not once but twice.

A three-inch downpour on 3 December drenched the countryside and turned the Exe into an angry torrent. The next day some 1,200 houses and businesses received a miserable soaking from the swollen river – many for the second time that year.

The 1960 events joined a long list of floods in the city. As long ago as 1286 it was recorded that "a great part of Exebridge through foul weather and high water, fell down".

In 1800 there had been "a prodigious flood, such as the oldest person then living had never before witnessed... All the streets in St Thomas were inundated, the water reaching up to the windows, and these poorer class inhabitants were in great distress..."

Serious flooding had followed, too, in 1917, 1920, 1929, 1950 and 1952.

Something had to be done and it was. The result is the Exeter Flood Defence Scheme – a 12 kilometre (seven mile) defence system stretching from the Cowley to Countess Wear areas. It cost £4 million (over £16 million at today's prices).

The Devon River Authority started construction in 1965. Their successor body, South West Water, took over in 1974 and completed the task in 1977. On its formation in 1989 the National Rivers Authority South West Region inherited responsibility for the scheme.



Above: Scenes from the 1960 floods. Top to bottom: Cowick Street under water. The River Exe diverts down Okehampton Street. Problems for a train driver at Cowley Bridge Alpbington awash.

THE SCHEME

The aim of the flood defence scheme is to safely divert water from the river in times of high flow.

The maximum capacity of the river in 1960 varied from about 280 to 450 cubic metres per second (4 million gallons to 6 million gallons per minute). This has now been raised to 700 cubic metres per second (9 million gallons per minute) by five main methods:



Construction of the new Exe Bridges in 1968.

1. Flood plain clearance

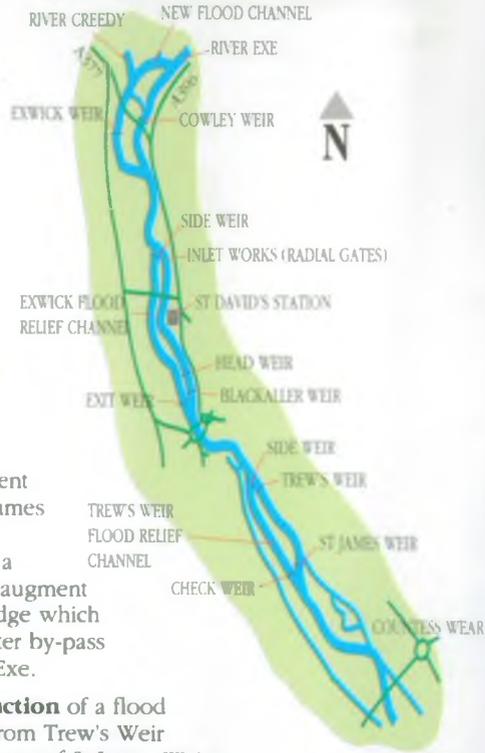
between the Countess Wear Sewage Treatment Works and St James Weir and the construction of a relief bridge to augment the existing bridge which carried the Exeter by-pass over the River Exe.

2. The construction of a flood relief channel from Trew's Weir to just downstream of St James Weir, together with control works to regulate the flow into the relief channel.

3. The widening and dredging of the river from Trew's Weir to Blackaller Weir and the replacement of the old arched Exe Bridge by two new road bridges.

4. The construction of a flood relief channel and control works from Blackaller Weir to Exwick.

5. The improvement of the waterways at Cowley to allow more water to pass under the large bridge spanning the River Creedy.



The River Exe (left) and the Exwick Flood Relief Channel.





RADIAL GATES

The radial gates at Exwick are a special feature: they close during high flows in the river, limiting the flow of the Exe downstream to a safe level. Excess flow is diverted over the side weir and down the 1,600 metre (one mile) long, 26 metre (28 yards) wide flood relief channel.

The gates are operated by changes in water level and so are not susceptible to power failures which often occur in storm and flood conditions.

They are designed so that the relief channel begins to be used when the river flow reaches 180 cubic metres per second (2.4 million gallons per minute). When the River Exe reaches this level water will begin to flood the two chambers containing the radial gate floats.

As each float rises, the radial gate lowers because the structure is pivoted. The gates lower only to within 830 millimetres (2 feet 9 inches) of the river bed to prevent a tranquil area of water developing behind the gates, which would cause sediment deposition immediately upstream of the structure. Floating objects and debris can pass through the centre flumed section at all times.

The two radial gates partially block the main channel which means some of the river flow will overtop the side weir and pass down the relief channel. The result is that the radial gates share out the river flow and prevent either channel from exceeding its capacity for flows up to the design discharge of 700 cubic metres per second (9 million gallons per minute).



The Exwick Flood Relief Channel.



The radial gates at Exwick.

CONSERVATION

The NRA places great importance on protecting and enhancing the conservation of the water environment.

The Exeter Flood Defence Scheme is managed and maintained by the NRA. Sections below the city are leased to Exeter City Council and form part of its 12 kilometre (seven mile) long Riverside Valley Park.

The network of waterways, ditches and wetland associated with the scheme and the flood plain offer a rich environment for wildlife. They ensure that a wildlife corridor remains free from development and links the estuary with the countryside to the north of the city.

Many creatures use this protected river valley both for feeding and as a migration route. Salmon and sea trout are well known examples, but others range from eels to otters and countless migrating birds which follow the river valleys on their annual migration.

RECREATION

The flood scheme and valley park offer tremendous opportunities for passive and active recreation.

Foot and cyclepaths are surfaced and provide level routes to enjoy the landscape.

The Exwick Flood Relief Channel has been especially developed for recreation with licences granted for boardsailing, model boating, water skiing and canoeing.

The whole area is also very popular with anglers. The Exe is an important salmon river.

ARTS PROJECT

The Exwick Flood Relief Channel is also being used for a major public arts project.

Leading British sculptor Edward Allington has designed a subtle monument for the city.

Seven large brackets cast in bronze and lead have been fixed to the water's edge.

The work echoes the classical traditions in architecture and concerns the nature of time and place.

It is a reflection on the thoughts of the ancient Greek philosopher Heraclitus who wrote that it was impossible to step into the same river twice.

The brackets were installed by the NRA's in-house workforce in 1992 under the direction of the sculptor.

The project was commissioned by Exeter's Spacex Gallery and is supported by the Henry Moore Sculpture Trust, Exeter City and Devon County Councils and Investment Southwest.

A complementary exhibition was held in the Spacex Gallery in October and early November 1992. The project forms part of the Gallery's continuing programme of city enhancement through art.

A proposed second part of the project – a floating classical temple – is now under consideration.

Further information on the Exwick Flood Relief Channel Arts Project is available from Spacex Gallery, 45 Preston Street, Exeter EX1 1DF. Tel Exeter (0392) 431786.



ALPHIN BROOK

The Alphin Brook drains a hilly catchment area of about 28.5 square kilometres (11 square miles), situated to the west of Exeter.

In its lower reaches it passes through the suburb of Alphington and the Marsh Barton Industrial Estate before discharging into the Exe below the canal swingbridge.

The Brook also caused severe flooding in 1960, particularly on the industrial estate where staff had to evacuate buildings and even needed to be rescued from roof tops.

It was decided to carry out the Alphin Brook Flood Defence Scheme at the same time as the River Exe project.

The scheme consists of 550 metres (600 yards) of concrete lined channel running through the industrial estate area.

The flow then enters an earth flood channel via a stilling basin. This carries the flood water under a railway bridge and the Exeter bypass to discharge onto Exminster Marshes.

The NRA, which owns the scheme, pays particular attention to the management of the marshes which are recognised as an international site of significance for wildfowl and waders. Visitors include the blacktail godwit, widgeon and brent geese.

Lapwing and redshank also use the area for breeding sites.

The ditch systems are carefully maintained to allow a rich and unique flora to develop and prosper.



Alphington near Alphin Brook Bridge, 1960.



A pastoral scene along the Alphin Brook Flood Defence Scheme.



The artist with one of the bronze and lead brackets.



Exminster Marshes.



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NATIONAL RIVERS AUTHORITY

The National Rivers Authority is an independent public body established in 1989 as 'Guardians of the Water Environment'. The main functions of the NRA are flood defence, water quality regulation, pollution control, environmental monitoring, water resources planning and control, fisheries, recreation and conservation.

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