Harnessing the Harbourne

A flood defence scheme for Harbertonford

ENVIRONMENT AGENCY

Harnessing the Harbourne

Harness: *to control so as to employ the energy or power of*

Harnessing the power of the River Harbourne; it caused misery and disruption whenever it flooded. But the floodwaters can be put to good use, creating opportunities for people and nature, with help from the right design to restore the river's natural form and function.

The South Devon village of Harbertonford has been flooded 21 times in the past 60 years - including six times since 1998.

The high frequency of flooding and serious damage caused to properties resulted in a fllod defence sheme for the village being made a priority by the Environment Agency and the Department for Environment, Food and Rural Affairs. This leaflet describes the £2.6 million flood defence scheme, substantially completed in 2002, to reduce the risk of flooding in the village.

▲ *Harbertonford, 26 December 1998*

▲ *The village green, with new seats and beach, at the confluence of the River Harbourne and Harberton Stream*

Background

Harbertonford - four kilometres south of Totnes - is located at the confluence of three watercourses, the River Harbourne and the smaller Harberton and Yeolands Streams.

The River Harbourne rises on South Dartmoor and flows initially through steep valleys eventually reaching the productive pasturelands of the narrow river valley downstream. There is a history of milling on the River Harbourne. in the 19th century the channel downstream of the road bridge in Harbertonford was widened to create a mill tail race above the leat.

The Harbourne flows into the tidal waters of the River Dart at Bow Creek, some three kilometres downstream of the centre of Harbertonford.

The Harberton Stream joins the River Harbourne immediately downstream of the A381 road bridge at Harbertonford. It rises just north of Harberton village and flows through a narrow valley of farmland, to Harbertonford. In its lower reaches the stream flows alongside the main road and through the churchyard of St Peter's Church in Harbertonford.

The Yeolands Stream joins the Harbourne from the south and has a very steep catchment of less than one square kilometre, water levels rise rapidly when it rains.

A history of flooding

Harbertonford has suffered relatively frequent flooding from the three watercourses that pass through the village.

Records as far back as 1938 list properties affected by flooding - in August that year 36 are believed to have been inundated. The records document frequent flooding - e.g. in January 1960 15 properties flooded; March 1981 13 properties; and there were three flood events in 1993. Since 1998 there has been flooding six times.

▲ *High flows in the River Harbourne contained by the new wall alongside Bow Road*

▲ *A stone wall now replaces the earth bank alongside Bow Road*

◀ *The flood storage dam nearing completion in 2002*

Options for a flood defence scheme

A scheme was needed to reduce the frequency of property flooding from once in three years to a minimum of once in 25 years, and if possible to a higher standard of protection.

The aim was to provide a combination of flood defence measures that are inherently capable of providing environmental enhancement. Environmental in this context includes people, the historic environment, as well as nature. The scheme had to be sustainable, both in terms of use of natural resources, but also to have minimal maintenance, such as dredging, requirements. The scheme was also planned so that people could enjoy their river once again, rather than be fearful of flooding.

A large number of options were investigated, including various combinations of channel improvements, together with flood storage areas at different sites upstream of the village.

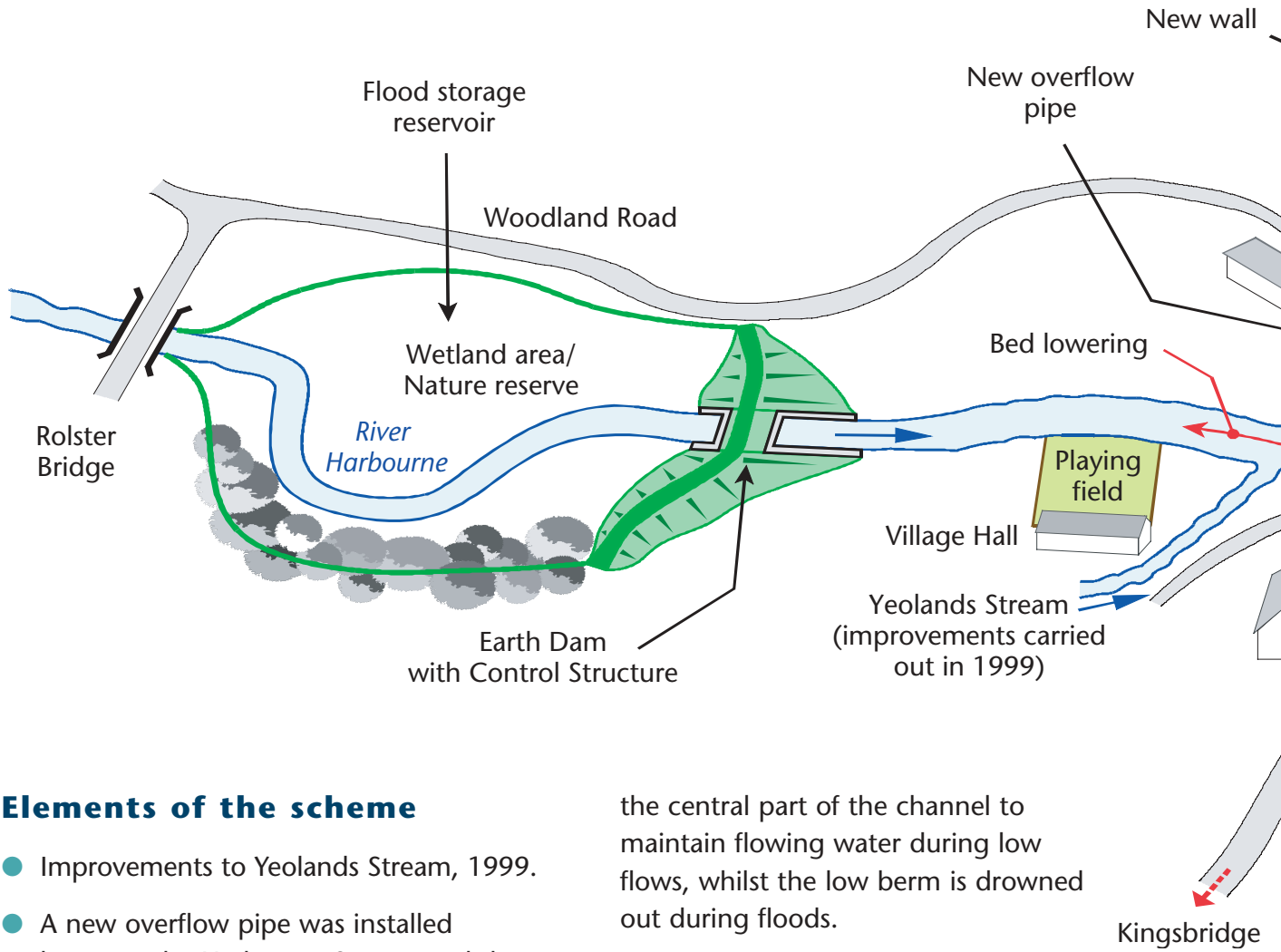
▲ *Enhancing river flows - stone riffles near the village green, laid to mimic natural rock strata*

The design of the chosen scheme was displayed to members of the public at exhibitions in August 2001 and April 2002.

The scheme has two main features - an upstream flood storage reservoir, and flood defence works through the village. This option has reduced the risk of flooding to a minimum of once in 40 years.

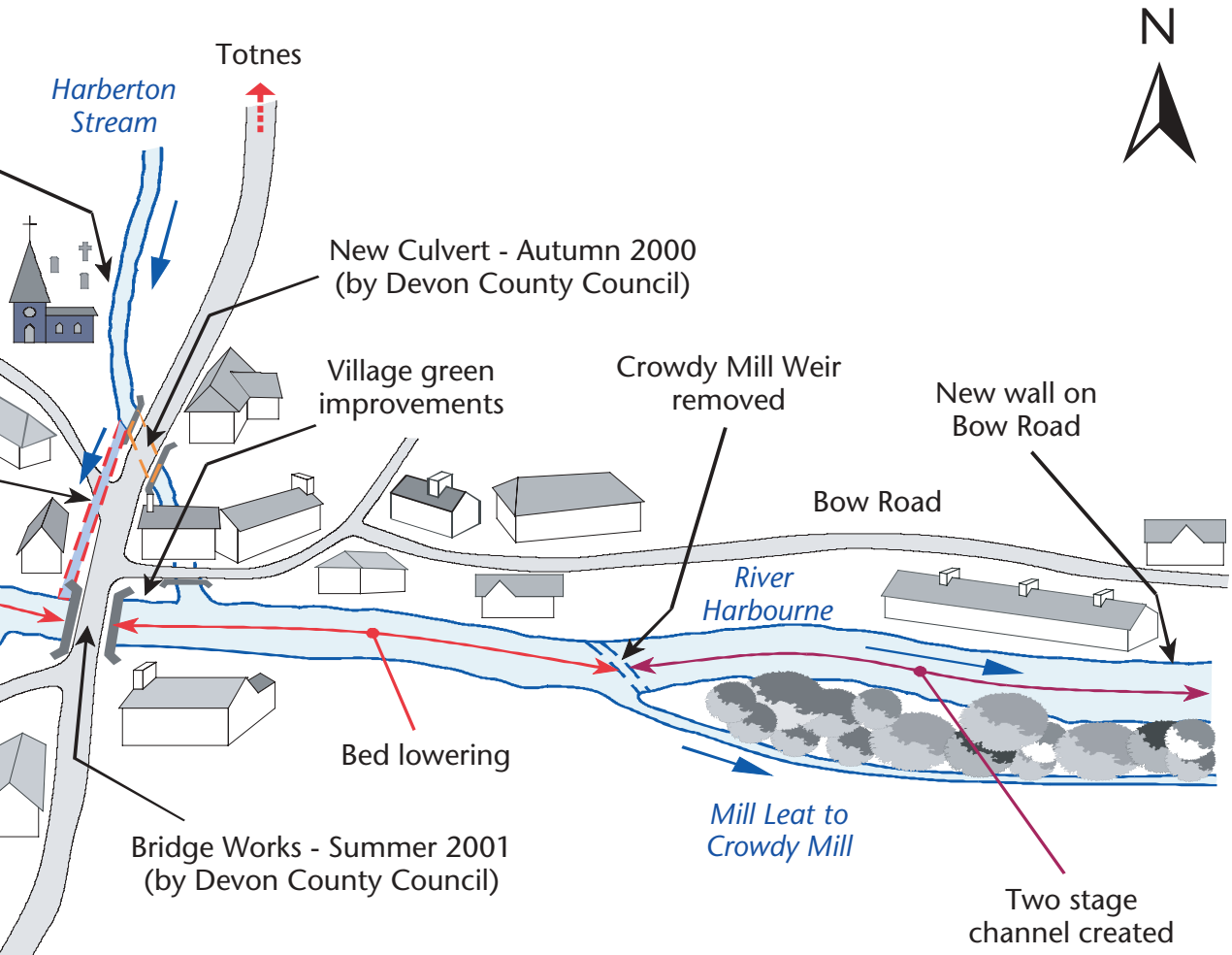
A key objective was to ensure the scheme was completed before the 2002 winter floods.

▲ *The crest of the dam - nearing completion in 2002*



Elements of the scheme

- Improvements to Yeolands Stream, 1999.
- A new overflow pipe was installed between the Harberton Stream and the River Harbourne between February and June 2002.
- A wall was built at the same time along the edge of St Peter's churchyard to prevent the Harberton Stream overspilling into the churchyard, nearby car park, road and houses.
- The earth bank alongside Bow Road was replaced with a stone wall, doubling the width of the river channel and providing vastly improved highway drainage. A wet berm (lower part of the bank), colonised with wetland plants, was created as part of a two stage channel; the central part of the channel to maintain flowing water during low flows, whilst the low berm is drowned out during floods.
- Some localised sealing of garden walls belonging to Bow Road properties next to the river.
- The bed of the channel was lowered by 600mm from just upstream of the A381 bridge down to Crowdy Mill weir to increase flow capacity. The river channel was un-natural, having been widened for milling in the past. This caused the river to silt up, requiring frequent maintenance. The Crowdy Mill weir and Mill Leat were also lowered and three large stone riffles were installed to maintain a self-cleansing flow of water and help return the river to its natural



pre mill state. The creation of 'riffle/pool' sequences through the village followed advice from the River Restoration Centre, Silsoe, Bedford.

- A flood storage area, measuring 4.1 hectares, was created one kilometre upstream of the village, using a clay-core earth dam to retain the water in times of flood. This area will become a wildlife area, replacing the plain grass field that was there. The hollows where the clay was removed are suitable for a variety of wetland species of plants and animals. Children from Harbertonford primary school will monitor the colonisation of wildlife in this area as part of their nature studies.

- Landscaping works and planting were carried out on the village green. Large stone blocks, which prevented pedestrian access to the river from the village green, have been replaced with a gently shelving beach. An all weather flat area, opposite the village store, has been created with access for disabled people, or those with prams. The seating arrangement was specially commissioned; its shape reflecting Harbertonford's cultural heritage as a centre for wool production. It is built out of local natural materials. The primary school children planted wildflowers within the green, which will help to give them a sense of ownership of the project. A screen of trees was planted to shield the village green from the main road.

▲ *Palmer's Dam*

▲ *The mill leat has been restored to preserve its function*

▲ *The stone wall replaces the earth bank which follows Bow Road. The new fence allows open views of the river, now doubled in width.*

▲ *A plaque on the dam recognises the support of the Palmer family. Mrs Virginia Palmer is pictured at the unveiling*

◀ *The flood storage area prior to colonisation by wetland plants and animals*

▲ *Children from Harbertonford primary school plant wildflowers in the village green area*

Palmer's Dam

Local farmer Ken Palmer provided the land for the flood storage reservoir and dam on the outskirts of Harbertonford. The dam has been named after his family in recognition of his support for the scheme and concern for the people of Harbertonford.

Palmer's dam is an important part of the Harbertonford flood defence scheme, providing a vital upstream storage area during times of heavy rain. The dam enables the Agency to monitor and control the amount of water flowing down the River Harbourne into the village.

5000 tonnes of clay were excavated from the storage area and used to construct the earth dam across the valley. The downstream face of the dam is unusual because it slopes gently, and the whole structure has been carefully orientated and contoured to fit in with the surrounding landscape. The dam is located at the narrowest point in the steep river valley and designed to link existing woodlands.

The dam has been designed to allow a once in 10 year flood event to flow through the opening in the dam whilst retaining larger floods up to a once in 40 year event. The opening through the dam has been engineered to allow the movement of migrating salmon and trout.

The dam can hold 150,000 cubic metres of water in a four hectare storage area and is designed to overtop in a safe and controlled manner above the once in 40 year flood event. The downstream slope is grassed in order that overtopping floodwater is not impeded.

The trees both help to screen the dam, but also form extra habitat and corridor for the dormice and other wildlife which inhabit the area.

▲ *Marsh marigolds alongside the river*

The fields purchased to create the flood storage area were used for the temporary site compound and subsequently restored to form part of the nature reserve. Material for the construction of the dam was dug from the area. This helped to reduce costs and keep transport movement to a minimum.

Support and funding

The £2.6 million scheme was funded by the Environment Agency, the Department for Environment, Food and Rural Affairs (DEFRA), South Hams District Council and Harbertonford parish council. The Agency's south west regional flood defence committee approved the scheme. Considerable help in kind was provided by Devon County Council.

Design of the scheme was by Halcrow Group Ltd of Exeter and construction by E Thomas Civil Engineering of Truro, part of Mowlem Civil Engineering. Mowlem also participated in safety awareness raising at the school, and posters prepared by the pupils were used to reinforce the safety message whilst works were in progress in the village.

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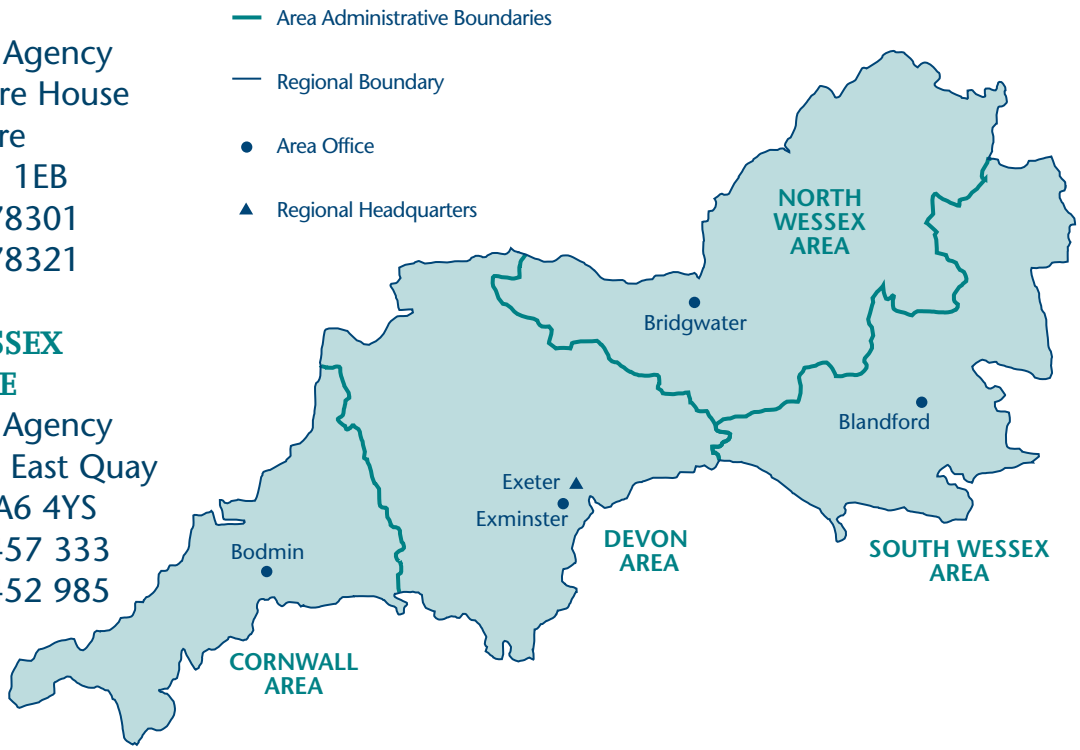

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