

## MORPETH FLOOD ALLEVIATION SCHEME (FAS)

MORPETH, NORTHUMBERLAND, NORTH EAST ENGLAND

Environment Agency, Northumberland County Council, Balfour Beatty, CH2M, Turner Townsend, JBA Consulting, Ryder Landscape Consultants

**BIG Biodiversity Challenge Award category:** Large Scale Permanent Award

### Project overview:

Morpeth has a long history of flooding. The most significant event was in September 2008 when over 1,000 properties and businesses flooded.

The Flood Alleviation Scheme is a challenging infrastructure project comprising the construction of a dam upstream of the **town and improvements to the town's defences**. The dam is capable of storing 1.3 million m<sup>3</sup> of water, enough to fill 560 Olympic sized swimming pools. The Team included the Environment Agent and Northumberland County Council (Client / Developer), Designer (CH2M) and contractor (Balfour Beatty) plus specialist consultants (Turner & Townsend, Ryder Landscape Consultants, JBA Consulting). Working closely with the community, across these various organisations and stakeholders over 200 people were involved (not including the people who attended public events).

324,000 staff-hours were completed during construction. Total Cost: £16.7 million. The scheme protects over 1000 properties in Morpeth from flooding.

### Were there any specific conditions that led to you carrying out this work?

Prior to agreement of the proposed upstream storage solution, we undertook innovative research to determine the impact of the culverting of the river on white-clawed crayfish (WCC). This was to make sure that our designs were environmentally led and minimise adverse impacts at the start. The on-line design was developed to support Water Framework Directive (WFD) targets. The FAS required full planning permission with an Environmental Statement. Conditions were included within the planning permission covering habitat replacement, maintaining fish passage and white-clawed crayfish mitigation.



*Dam inlet at the Mitford Flood Storage Area.*

Both WCC and otter are Protected Species and works affecting these species needed licences from Natural England.

### What were the biodiversity conditions on site, prior to the enhancement?

Northumberland is a rural county where agricultural is an important element of its economy. The River Wansbeck is nationally important for the native white-clawed crayfish (WCC) and has good populations of trout and salmon due to its natural condition. The river is used by otters, kingfishers and bats.

### What were the biodiversity measures taken?

The project team worked closely with the community to develop and deliver an innovative solution to reduce to flood risk to vulnerable communities. Our design solution was innovative, evidence based and sustainable. Our design has used new techniques and approaches that have been replicated in current projects across the country. Our WCC mitigation has been incorporated as best practice by the industry.

The on-line dam structure maintained the natural channel form / bed connectivity and reduced impact on the river ecosystem. The river passes through six large culverts each with a penstock to regulate flows. Culverts were sized to make sure that the regulated flows would maintain sediment movement critical for fish and WCC habitat. The 2 left bank culverts have lower inverts to make sure that a minimum depth is maintained for fish passage when water level is low. Favourable velocities are achieved using baffles through the culverts and a rough finish to the culvert. Eel matting was placed through the centre of the culverts.

A local field was used for the embankment material. This removed 19,000 dump truck movements, reducing impacts to local residents and made huge savings on the carbon footprint. The field was restored after construction. Staff and workers supported the scheme through public meetings, school visits and making themselves available for questions from residents.



*One example of new wetland being created and nearing completion.*

### What were the biodiversity measures taken?

As part of the scheme we have created 18ha of wet grassland, new ponds beneficial for great crested newts and wetland scrapes for uplands waders in the upper catchment and installed 3 artificial otter holts, 48 bat boxes and 30 bird boxes at the dam. These habitats were created with local farmers and will result in gains for the local biodiversity. Bats, otter, great crested newt, WCC and upland waders are all **listed on Northumberland's Biodiversity Action Plan.**

## How would you best describe the project?

Mitigation

### Further information

Baseline ecological surveys (2008 – 2012) were undertaken to support the design and planning. Planning permission was granted in 2013. Installation of three otter holts, bird and bat boxes was undertaken before construction. Construction of the dam required 100m of the river to be diverted through a 300m temporary channel, with a low flow channel created to maintain fish passage. Dewatering of the natural channel required the capture and relocation of over 3500 WCC (2013). Once the working area was dewatered, 147 culvert units were installed to form the six culvert lengths. 5400 WCC were relocated from the temporary channel (2014) after its closure. Trout, eels and lamprey were also relocated from the natural and diversion channels. The natural channel was fully restored reusing the material removed from the culverted section.

WCC have been recorded in the restored channel and culverts. A range of river birds (kingfisher, dippers) have been recorded. Otters are frequently seen. We already have records of 46 bird species, including Black-tailed Godwit visiting the 18ha of habitat created in the upstream catchment.

The scheme provides protection to over 1000 properties. Upstream storage means that upgrading of local defences is reduced and the need for in-channel works that could damage river ecosystems removed. Strong co-operation with statutory agencies, together with detailed forward planning meant we were aware of any environmental constraints and could programme our works around these. Establishing environmental design criteria at an early helped us to deliver a truly sustainable scheme.



*White-clawed Crayfish at Mitford Dam.*

### What was your personal motivation for carrying out the enhancement?

Providing a long-term sustainable option to flood risk management for the Morpeth Community that fully respected the nationally valuable biodiversity was fundamental. Ensuring support through community / stakeholder engagement including school and senior education visits and a number of open days was the key personal motivator.