

Preserve and improve water's edge and bank side habitats

Project Summary

Title: Afon Brennig Flood Alleviation Scheme

Location: Afon Brennig, Tregaron, Wales.

Technique: Installation of rock revetments

Cost of technique: £££

Overall cost of scheme: £££££

Benefits: £££

Dates: 2008

Mitigation Measure(s)

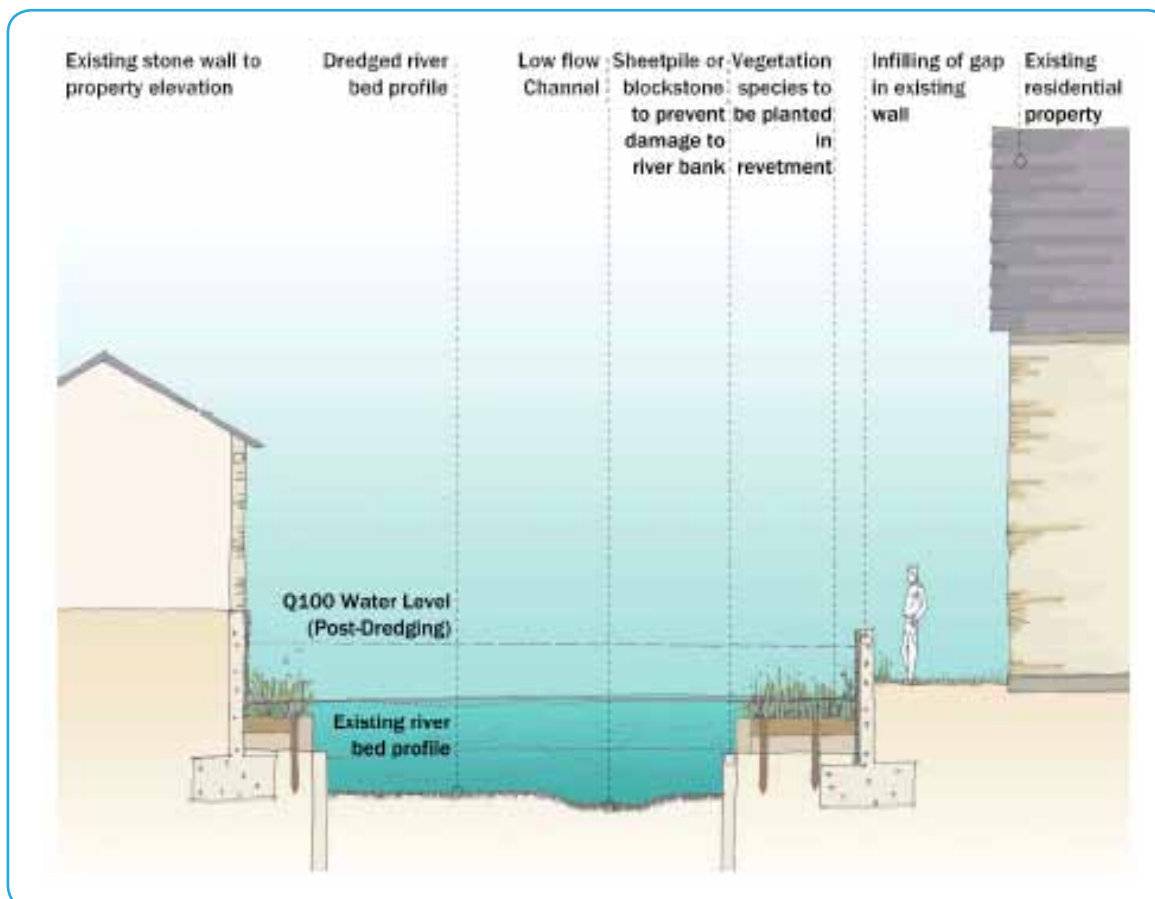
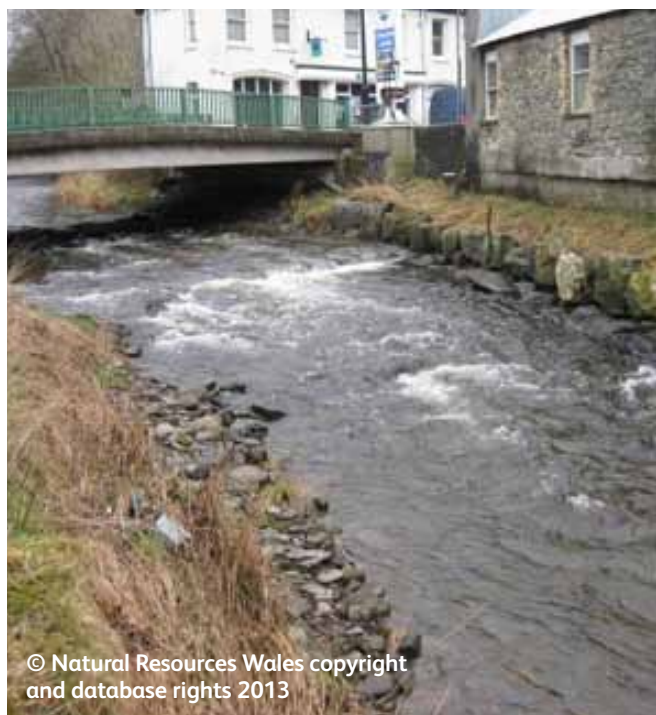
Preserve and improve water's edge and bank side habitats

Improve channel geomorphology to create habitat

How it was delivered

Delivered by: Environment Agency Wales
(now Natural Resources Wales)

Partners: Arup



Channel cross section: schematic design © ARUP copyright and database rights 2013

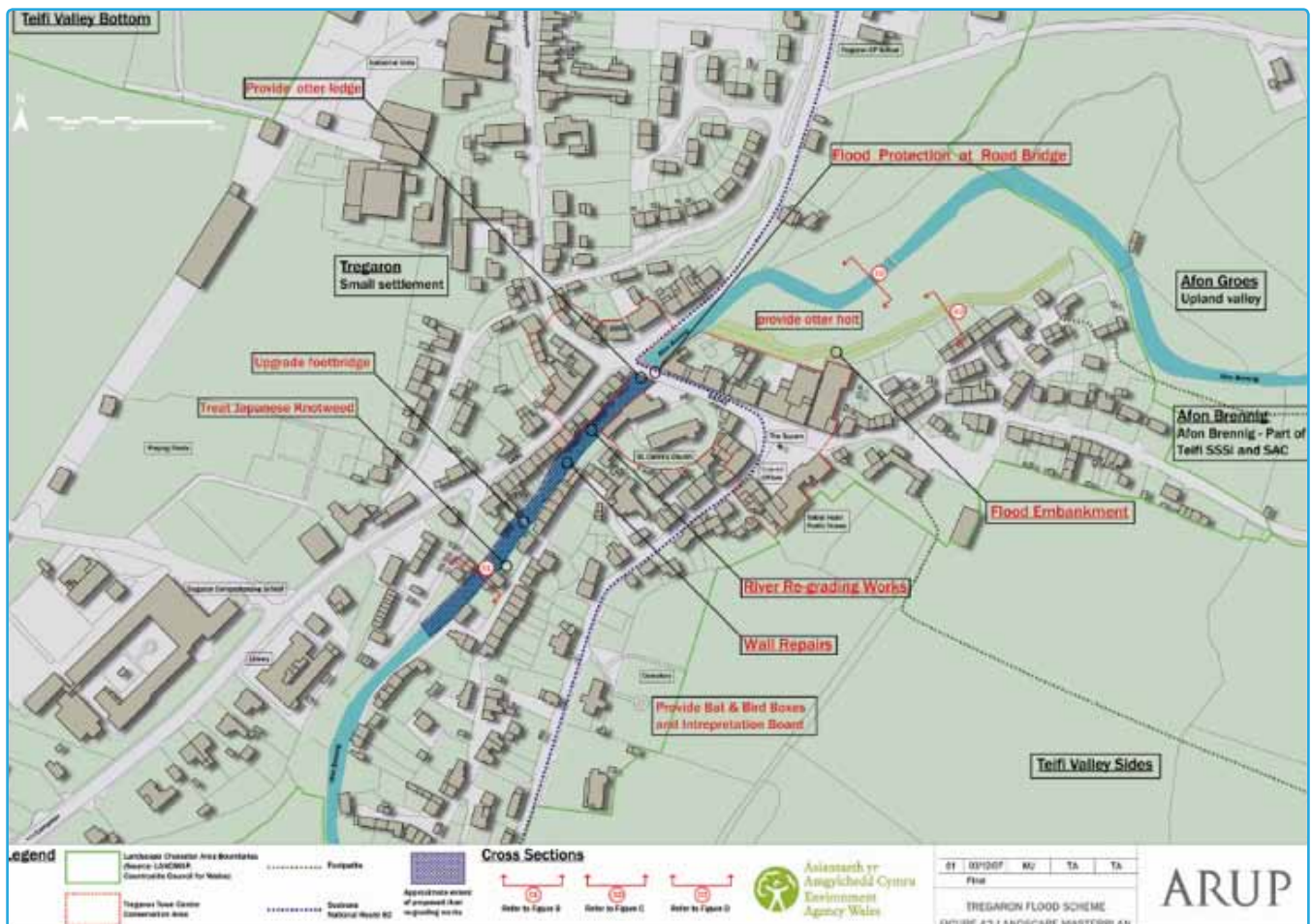
Background and issues

The Afon Brenning is situated in Tregaron in Ceredigion, mid Wales. The river is an upland tributary of the Afon Teifi, which flows into Cardigan Bay at Cardigan. The Afon Brenning and its tributaries, the Groes and the Berwyn, rise on the edge of the Cambrian Mountains (specifically Bylchau'r Llyn, Garn Gron and Esgair Fawr). The Afon Brenning is located within the Afon Teifi SAC and SSSI, which is designated due to the vegetation, fish and mammal communities that it supports.

The river has a moderately sinuous, meandering planform, which appears to be predominantly natural. However, the channel has been heavily engineered for a length of approximately 200m as it flows through Tregaron, where it is encroached on by residential development. This urban development pre-dates the first edition Ordnance Survey mapping of the area, which was published in 1889. The channel has not changed significantly since this time, although two small offtakes associated with historical

milling are no longer present. A weir at the downstream of St. Caron's church that was associated with one of these offtakes was removed at some point between 1905 and 1964.

Tregaron previously had a long history of flooding, with up to 133 residential and commercial properties at risk. Those flood defences that were in place prior to 2008 generally formed part of buildings or property boundaries, and were not specifically intended to be flood defence assets. A flood alleviation scheme was constructed on the Afon Brenning in 2008 in order to alleviate flooding in Tregaron. As part of the flood alleviation scheme, the defences through the town were formalised, with new concrete walls, additional protection to the main road bridge, and the installation of new revetments to narrow the channel. In addition, a redundant sewer which previously impounded flows was removed and the bed regraded accordingly.



Flood alleviation scheme design overview © ARUP copyright and database rights 2013.

Step-by-step

Several mitigation measures were implemented as part of the flood alleviation scheme, alongside the installation of concrete flood walls and structural modifications to the road bridge to prevent overtopping. These measures consist of the following:

- A redundant surface water sewer that was located in the middle of the reach influenced by the flood alleviation scheme was removed. This structure formerly acted as a weir.
- A 215 m-long reach of the Afon Breninig as it flows through Tregaron was regraded, with the depth of the channel increased to an average of 600 mm below the original bed level. The regraded bed incorporated a series of pools and riffles at a spacing of approximately 35 m. A blockstone check structure was installed at bed level at the upstream end of the regraded section to prevent erosion propagating upstream. The regraded bed replaced the drop in bed levels originally formed by the sewer.
- A blockstone and planted earth revetment was constructed along both banks of the regraded reach to prevent increased scour of the existing channel boundary walls.



(1) Blockstone check structure preventing upstream erosion, (2) Bar forming on right-hand bank.



(3) Rock and geotextile revetments and a blockstone check structure at the upstream end of the regraded reach; (4) Rock and geotextile revetments on both sides of the channel.

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Benefits

- Improved flood protection for 133 residential and commercial properties in Tregaron.
- The regrading of the bed and deepening of the bed level in the reach through the centre of Tregaron has created a series of riffles and pools, with lateral gravel bars at the channel margins. This has created a range of physical conditions that can support a variety of ecological niches.
- The installation of rock revetments on either side of the river has successfully narrowed the channel and created riparian habitats in a reach that previously had entirely artificial banks.



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Lessons Learnt

- Whilst good morphological diversity has been achieved through the scheme, it may be possible to improve the range of habitats supported by creating higher gravel deposits in places (potentially graded onto the permanent banks) to ensure that a greater quantity of sediment is exposed during flows that are above base levels.
- Where possible, the use of “softer” alternatives to large boulders should be explored when revetments are used to narrow a river channel. The rocks used here produce a very abrupt and immobile transition between the banks and river channel, and as such limit the potential for the development of riparian habitats.
- The range of plants found on revetments could potentially be increased with planting of suitable native species rather than grasses.

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