

# WEST CUMBRIA RIVERS TRUST NATURAL FLOOD MANAGEMENT (NFM) CASE STUDY: THRELKELD HALL FARM FLOODPLAIN BUND

## ABOUT THE PROJECT

This project was carried out by West Cumbria Rivers Trust as part of their DEFRA funded Glenderamackin Natural Flood Management (NFM) Project and Water Environment Grant in partnership with the Environment Agency and landowner. The farm is affected by flooding from the River Glenderamackin during significant storm events, most recently, February 2021. The project involved the installation of a number of 'assisted natural' and 'soft engineered' features which aim to slow the flow, temporarily store water and capture debris on the floodplain with the use of hedges. Big flood events can cause significant disruption to the Farm infrastructure and prevent access to Keswick Golf Club, this is due to water spilling over the Glenderamackin embankment at two places which flows across the floodplain at speed.

The overall cost of the project was £21,500. Funding came from the Water Environment Grant and the DEFRA NFM programme. The cost can be broken down to the following:

- Topographical survey: £720
- Construction cost for kested hedge, bund and ponds: £8,319
- Cost for cross floodplain hedge and cross slope hedges (one kested): £12,186
- Cost of consent: £275

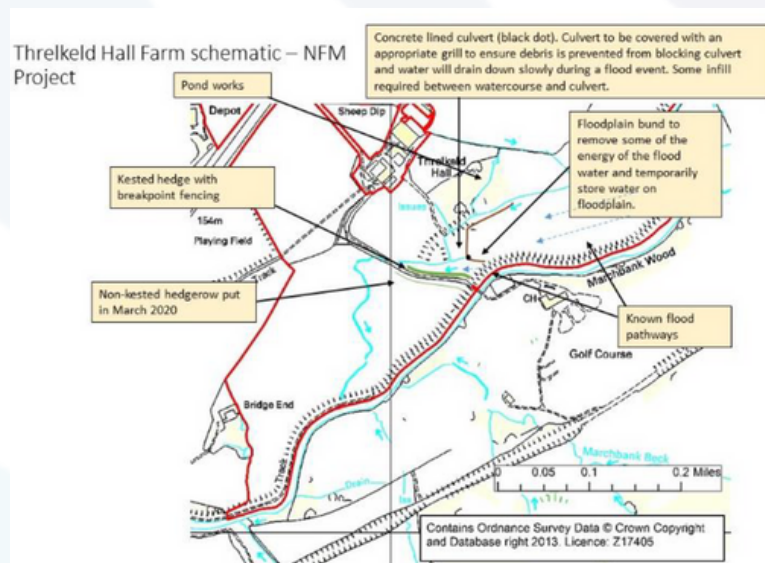


Image: West Cumbria Rivers Trust  
Map showing the project area

## DESIGN AND CONSTRUCTION METHODS

The following permissions were required for the project:

- Ordinary watercourse consent (for pond and stone leaky dam works)
- Habitat Regulations Assessment
- Agricultural Permitted Development
- Environment Agency Main River Consent
- Archaeological approval from LDNPA Archaeologist.

The project was delivered in two phases; the first phase was restoration of 2 cross slope hedges (1 kested) and the creation of 1 cross floodplain hedge along Golf Course Road. The second phase included the installation of a second cross floodplain kested hedge, the creation of a floodplain bund to temporarily store water and work on two ponds with the addition of two stone leaky dams to increase storage capacity whilst maintaining fish passage.

Floodplain bund: A topographical survey was carried out by an external company and the floodplain bund was designed by a contractor and project officer using a laser level to determine the optimum height of the bund on the floodplain (and therefore estimating water storage behind bund before it drains through an existing concrete culvert). The final height of the bund was determined by how much material could be generated through creating and restoring two ponds in the woodland nearby. The stone for the leaky dams was from a nearby quarry (see photos below).

Images: West Cumbria Rivers Trust



Flooding on golf course access road, February 2020 (Photo below taken by farmer at Threlkeld Hall Farm).



Photo of bund during construction.



Photo of culvert before and after restriction placed on it (the outlet, as circled in red on the second image, can be amended following monitoring).

Images: West Cumbria Rivers Trust



Photo of finished floodplain bund (white arrow shows direction of flow of floodwater).



Photo of kested hedge.

## EFFECTIVENESS

The volume of water stored behind the floodplain bund is 4300m<sup>3</sup> and the effectiveness of the project is monitored through anecdotal evidence for the landowner, water level loggers and time lapse cameras for the small-scale pond and floodplain bund.

## MULTIPLE BENEFITS

The project has multiple benefits:

- Reduced impact on the farm by reducing the chance of the fences washing out in a big storm event.
- Creation of aquation habitats and hedges to improve habitat connectivity.
- Temporary water storage enables the field to remain grazable and can be used an example to show other landowners how this can be done on their land.