

The estate is managed in a traditional manner with a strong emphasis on the environment and wider community. The Upper River Frome flows through the length of the estate with numerous springs, dry valleys and historical impoundments.

Location: Miserden Estate, Miserden

Water course: The River Frome

Sub-catchment: Upper River Frome, Stroud Frome

Ownership

The Miserden Estate has been owned by the Wills family since 1913.

Access

There is good public and permissive footpath and bridleway access on the estate and the structures can be seen in various locations.

About the project

Fifty large woody debris (LWD) leaky dams and in-stream timber deflectors were installed in the Upper River Frome and one of its main tributaries. The aim of the work was to provide a physical barrier for high flows. The leaky dams were constructed from tree trunks and branches to provide a partial blockage of the stream. This creates a series of small pools to reduce flood flows and to slow down the rate at which flood water progresses down the valley to residential areas. The timber deflectors were designed to concentrate flows into a small section of channel. Some of the structures were also designed to improve and extend suitable habitat for the native white-clawed crayfish which populate a small stretch of the River Frome on the estate.



How it was achieved

The structures were built primarily using ash, hazel coppice and a small amount of alder sourced from the estate woodlands. Fifteen of these structures are small and designed to deflect flows within the channel and improve in-stream habitat. Thirty-five were designed primarily to reduce high flows and deflect flows onto the floodplain. All of the structures are pinned in place using 1.2m reinforcing steel bars to attach the tree trunks together and into the ground. The LWD leaky dams have been constructed to a design specification agreed with the estate. This includes using a few large pieces of timber to create neat, formal structures that don't extend too far across the floodplain.

Construction was carried out by Gloucestershire Wildlife Trust (GWT) staff using a small number of skilled volunteers. A group of 13 students from the Royal Agricultural University also volunteered for a day and helped with construction. GWT staff applied for, and are entitled to hold, a licence to work with white-clawed crayfish. The estate's woodland manager was sub-contracted to move timber to the work locations and provide machine support for heavy lifting. Timber costs were donated by the estate.

Consents

The works described above required two main types of consent:

Land drainage consent - a consent under Section 23 of the Land Drainage Act 1991 permitting works that may impede the flow of a water course. Issued by Stroud District Council under powers devolved from Gloucestershire County Council.

White-clawed crayfish licence (WML-A29) – Issued by Natural England, this is a licence to kill, take, disturb or possess wild animals for science, education or conservation.

Why have you allowed this work on the estate?

"The objectives of this project aligned very closely with the estate's objectives of enhancing natural habitats and providing a benefit to the wider community. In addition, working with the project has heightened awareness of the benefits of water management, particularly in response to higher intensity weather events, which have enormous detrimental impacts on the estate's infrastructure. The funding structure of this project meant it was of no financial cost to the estate but, to ensure more wide-scale uptake, these sorts of projects need to be incorporated into agri-environment funding structures."

Oliver Cooper

Strutt & Parker



Why this work was needed

The large woody debris structures on the Miserden Estate were designed to do two things:

- To help reduce flood risk by slowing high flows and deflecting these high flows onto the floodplain.
- To make the stream and its banks more attractive to wildlife, particularly the native white-clawed crayfish and the wild brown trout.

Benefits

Large woody debris has several benefits. Firstly, and crucially, the structures reduce high flows, slowing the rate at which flood peaks travel downstream. Secondly, LWD will, over time, speed up the flows that are immediately downstream of each structure, cleaning gravels and stones of silts. Silt and sediment will eventually accumulate behind the structures, creating a small head of water and resulting in long-term changes to stream structure. Large woody debris can divert water during higher flows and allow it to collect on the floodplain. This allows silt and sediment to drop out of the water column onto the floodplain, decreasing the total sediment load in the stream.

Woody debris also provides a natural habitat for many invertebrates, lower plants and fungi. It engineers habitat diversity, creating a system of pools and riffles which will attract a range of invertebrates and fish.



In this case, the LWD will provide valuable shelter and deeper water for white-clawed crayfish, giving them a better chance of surviving low flows and allowing them to expand their range upstream.

Construction data

- **50** LWD leaky dams
(**35** large woody debris structures and **15** timber deflectors in the main River Frome)

Capital costs

- **18** days FTE, **20** days volunteer labour plus Miserden Estate's staff time and materials at a total cost of **£7,200**
- Total number of interventions = **50** (**35** large woody debris structures and **15** timber deflectors in the main River Frome) @**£144 per structure**



**STROUD VALLEYS
NATURAL FLOOD
MANAGEMENT**

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