

The river **Manifold at Manifold Leys**, south of Swainsley, is abutted by sympathetically grazed pastures to the west and Deciduous Semi-Natural Ancient Woodland Priority Habitat to the east. The river is single thread, fast flowing and deep with mature trees lining the river banks.

**Location:** Manifold Leys, Swainsley  
**Water course:** River Manifold  
**Sub-catchment:** Manifold, Upper Dove



## Ownership:

The land at Manifold Leys is owned by two separate landowners, with the brook forming the ownership boundary. The National Trust own one side of the river which is managed by a tenant farmer whilst the other side is privately owned.

## Access:

There are no public or permissive footpaths directly through the site however the interventions can be seen from a public highway which passes the site on one side of the river and by a public footpath on the other side.

## About the project:

The aim of the project was to restore natural stream processes within the brook. The River Manifold was a fast flowing and heavily modified river with artificially riveted banks and no naturally occurring woody material. This project delivered 12 Large Woody Debris (LWD) log jams along a 400m reach of the Manifold. This work slows down the rate at which peak flows travel through the system and vastly improves the habitat for wildlife. In times of high rainfall, the woody material provides physical resistance to flow so that peak flood flow further down the catchment is reduced. This woody material not only restores natural resistance to flood peaks, but it also enhances the aquatic habitat for native wildlife too such as invertebrates, fish, riparian birds and mammals.

## How it was achieved:

The log jams at Swainsley were installed using a military tractor-mounted winch to pull the trees into the river from the opposite bank. This allowed the log jams to be comprised of entire trees; canopy, main stem and importantly the root plate as well. This method mimicked the natural process of windblown trees and deadwood in rivers. Trees were selected based on a number of criteria with both the aquatic and terrestrial habitats in mind. There were 12 log jams created along this stretch of the river which were comprised of species such as sycamore, alder and willow. They were a mixture of either singular trees or 2-3 trees per jam to create a lattice of interlocking branches and woody material. This interlocking mass creates a heavy, dense structure. The woody material used in each jam was also tethered together using wire rope and cable clamps. This prevents them from mobilising in high flows but also acts as a debris trap to collect any material should it come loose from upstream. This work was carried out using training arborists to winch over the trees. The technique used here seeks to mimic windblown trees enabling the aquatic habitat to be restocked with woody material. The natural process of LWD in rivers is called the 'Riparian Wood Cycle'. LWD not only helps to reduce peak flows but it also has a crucial ecological role in freshwater rivers and streams by increasing biocomplexity.



## Pete Gibbs, Landowner

### Why have you allowed this work in your woodland?

“We’d spoken to landowners who’d told us about the benefits for fish and wildlife that this work has and so we wanted to do something similar. And because the trees have been winched rather than felled they will continue growing and have long lasting benefits.”

### What impacts has it had on the environment and habitat in your woodland?

“It’s had no negative impact on our land. The trees in the river doesn’t change how we use the land and the new fence is great as it allows better control of the grazing. We’ve seen loads of dippers using the log jams as perches, and king fisher’s feeding in our stretch of the river now too. We’ve also seen that there’s loads more fine gravel for fish spawning in the river now.”

### Consents:

The works at this site required the following consents:

#### Land Drainage Consent

Under Section 23 of the Land Drainage Act 1991 permitting works that may impede the flow of a water course. Issued by Staffordshire County Council.

#### Felling licence

Issued by the Forestry Commission under the Forestry Act 1967 permitting the felling of trees for any purpose that falls outside the exemptions listed by the act. In this case, no felling licence was required as the operations were within the permitted exemptions.

#### Section 28 of the Wildlife and Countryside Act

This act is in place to ensure wildlife, species and habitats are protected against disturbance and habitat degradation. As the work was also within the Peak District National Park consultation with the PDNPA was also required.

### Why was the work needed:

This section of the River Manifold has very few naturally occurring LWD jams within the stream and is fast flowing with banked margins and limited spawning gravels. The installation of LWD log jams improved the habitat for wildlife by introducing the pool and riffle effect, and improve the sediment regime. The log jams provide shelter and foraging grounds for fish and invertebrates and also trigger the deposition of suitable spawning gravels for fish. Additionally the work was needed to provide a physical barrier in the stream to slow down peaks flows.

### Benefits:

LWD log jams have multiple benefits. Firstly, and crucially, log jams play a fundamental role in the health of the river for aquatic wildlife. Secondly, they reduce flow rates meaning peak flow conveyance is much slower. And thirdly, LWD has a localised positive impact on immediate downstream gravels and stones as the flow rate in the immediate vicinity is altered enabling the flushing through of fine silts and cleaning of spawning substrate. Silt and sediment eventually accumulate behind the structures with a leaf-pack. This creates the ‘pool-riffle’ effect above and below log jams. LWD can also divert water during higher flows and allow it to reconnect with 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 provides important refuge and foraging ground for fish and affords shelter for juveniles from high flows and predation. It engineers habitat diversity and biocomplexity.

### Construction data:

- 12 LWD log jams
- 400 m of watercourse restored with LWD

### Costs:

- 2 days FTE labour, 4 days of arboricultural contractor labour, 1 day of tractor-mounted winch contractor labour at a total costs of £1920 (ex VAT)
- Number of structures: 12
- Cost per structure: £160 (ex VAT)

