

CASE STUDY: Shell Brook, Kisswood Farm

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Kisswood Farm is a sympathetically managed landholding of livestock grazing, hay meadows and woodland units in the parish of Wincle, Cheshire. The landholding extends to include a section of Shell Brook and its tributaries which flow through Priority Habitat of Deciduous Semi-Natural Ancient Woodland.

Location: Shell Brook, Kisswood Farm, Wincle

Water course: Shell Brook

Sub-catchment: Dane, Upper Weaver-Gow



Ownership:

The farm is owned and managed privately.

Access:

Shell Brook flows through woodland on Kisswood Farm which can be accessed by permissive footpaths. Some of the interventions can be seen from the footpaths.

About the project:

4ha of native broadleaved woodland have been created converting tightly grazed slopes into ungrazed young woodland. The area planted previously provided little resistance to overland flow following heavy rain. By fencing this area and excluding grazing, the surface roughness has been enhanced along with the added benefit of evapotranspiration. Additionally, 19 Large Woody Debris (LWD) log jams have been installed along 550m of Shell Brook. The aim of this work was to restore natural stream processes within the watercourse and reduce the rate at which peak flows travel through the catchment. In low flows, water passes unimpeded through the woody material in the stream. In times of high rainfall, the woody material provides physical resistance to flow so that peak flood flows downstream are 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 Forestry Commission Woodland Creation Grant was used and fencing was installed by local contractors. Planting costs were covered by the grant. This new woodland links existing woodland habitats and provides vital natural flood management (NFM) benefits. The felling work within Shell Brook mimics natural processes. Approximately 60 trees were felled creating 19 log jams comprised of c.3-4 trees per jam. Selective felling provided the timber and most jams were created perpendicular to the direction of flow. The stream flows through a steep sided valley with a closed canopy, in some instances only 1-2 trees were used in the jams to create linear LWD features parallel with flow. Trees were selected based on needs of both the aquatic and terrestrial habitats. Tree species used in the jams were predominately non-native conifers, as well as beech, alder and sycamore. Each tree was felled on top of the previous tree to create a lattice of interlocking branches and woody material. This interlocking mass creates a heavy, dense structure and exceeded the size movable by high flows in this tributary which prevents mobilisation. In the unlikely event of trees breaking loose from the jams, the most downstream jam was strategically felled into a pinch point within the natural topography of the stream to trap any incoming debris. This work was carried out by trained arborists. The technique used here has been described as the 'Chop n Drop' approach which 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 habitats.



Karl Van Roy, Landowner

Why have you allowed this work in your woodland?

"I took advice from Ashley as to how installing Large Woody Debris in Shell Brook could improve it for wildlife and also obviously flood risk. I want the woodland and river corridor to be a wildlife haven and have done a lot of work over the years to improve the habitats so this allowed us to make further improvements to the stream itself."

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

"In a short space of time you can see already how the habitat in the stream has changed for the better. There are more clean gravels for fish and you can see how silt is dropping out behind the wood in the stream. Following heavy rain you can see the effects of the jams from the time lapse photography data Ashley has recorded".

Consents:

This work 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 Cheshire East 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, the felling licence was part of an existing woodland management plan agreed with the Forestry Commission.

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 along with consulting other statutory organisations such as Natural England.

Why was the work needed:

Shell Brook had few natural LWD jams within the stream. The installation of LWD log jams improved the habitat for wildlife by introducing the pool and riffle effect. This provides shelter for fish and invertebrates and also suitable spawning and foraging places for aquatic species. This work was needed to provide a physical barrier in the stream in order to slow down peaks flows. Additionally the woodland creation provided habitat connectivity as well as reduced over-land flow rates following heavy rain and increased transpiration rates to mitigate against flood risk.

Benefits:

LWD log jams have multiple benefits. Firstly, and crucially, log jams reduce flow rates meaning peak flow conveyance is much slower. Secondly, 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:

- 19 LWD log jams
- 550 m of watercourse restored with LWD
- 3.8ha of native woodland creation

Costs:

- 2 days FTE labour, 2 days volunteer labour, 4 days of arboricultural contractor labour at a total costs of £1600 (ex VAT)
- Number of structures: 19
- Cost per structure: £84.21 (ex VAT)
- Forestry Commission Woodland Creation Grant Scheme