

Workmans Wood near the village of Sheepscombe is part of the Ebworth Estate. The woods are part of the Cotswold Commons and Beechwoods National Nature Reserve and they form the source of the Sheepscombe Brook, a tributary of the Painswick Stream.

Location: Workmans Wood, Sheepscombe

Water course: Sheepscombe Brook

Sub-catchment: Painswick Valley, Stroud Frome

Ownership

The woods are owned and managed by the National Trust.

Access

Some of the interventions are visible from public footpaths and bridleways in the woodland.

About the project

The aim of the work was to provide a physical barrier to high flows and divert water onto small floodplains, slowing down the flow of flood peaks down the valley. The type of interventions used in Workmans Wood were determined by the geology and the presence or absence of continuous flow within the stream channel. In sections with permanent baseflow, 11 large woody debris (LWD) leaky dams were constructed from tree trunks and branches to create a partial blockage of the stream. In low flows, water can pass freely under the structure but, at high flows after very heavy rain, some water will be attenuated behind the leaky dam, slowing it down. The dams are designed to allow base flow at all times but to reduce and slow high flows.



How it was achieved

The structures have been built using alder, ash, conifer and beech and are pinned with 1.2m reinforcing steel bars. No significant coppicing or clearing was needed prior to felling.

In sections with ephemeral or seasonal flows, large beech and poplar tree trunks have been positioned within the channel bed and, in some cases, across the full width of the floodplain. This



is to create temporary attenuation pools and to encourage the water to make full use of the floodplain. Machine access was available for these works.

A large number of minor structures have also been positioned in order to divert water onto the woodland floor to increase infiltration. These structures are only active during periods of significant rainfall but take advantage of the high infiltration rates on the woodland floor and within the numerous hollows and depressions that can be found in the woodland.

To divert seasonal flows under access tracks and to reduce track erosion, eight new culverts have been added. These culverts include a large catchment chamber to allow silts to accumulate and, at the discharge end, a large soakaway has been constructed to increase infiltration. Each of these took a day to construct. Where the camber allows, large numbers of trackside grips have been added to remove water from tracks and increase infiltration.

The National Trust indicated that they would like to use their preferred contractor for the works as they had already established a good working relationship and the contractor understood the constraints of working within a sensitive site such as a National Nature Reserve. Timber costs were donated and not costed but are likely to be significant.

Consents

The works described above required the following consents:

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.

Felling licence – a consent 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.



Why have you allowed this work in your woodland?

“The National Trust is really supportive of the scheme and, as a responsible landowner, we want to do our part for the community beyond our boundaries. We also want to put our money where our mouth is, so to speak, and as we are suggesting works like this should be better supported, we want to show that we can do natural flood management on our own land.”

What impact has it had on the environment or your woodland?

“We are hoping obviously it will have a positive impact. As for impact on our estate management, that has been minimal. Chris worked with contractors that we know well and trust, so it caused minimal disturbance to both our woodland operations and to our tenant. The works will also be of direct financial benefit, and we should see a return with reduced track maintenance costs.”

Matt Stanway
National Trust

Section 28 of the Wildlife and Countryside Act – a consent issued by Natural England to allow an activity that may damage or disturb a Site of Special Scientific Interest. The work also had to be assessed against the requirements of the Conservation of Habitats and Species Regulations 2010. Natural England concluded that, since the work would make a positive contribution to the conservation objectives for the woodland, it did not require a full assessment.

Why this work was needed

Traditional management of water in the woodland had been focussed on draining the woodland as quickly and efficiently as possible. A wide variety of structures, positioned in multiple places throughout the woodland, have been created to encourage many small areas of attenuation and infiltration. This will reduce the overall flows discharging from the woodland after significant rainfall. In addition to slowing the flow and reducing flood risk, the measures also reduce the amount of silt entering the stream.

Benefits

The works have contributed to achieving the conservation objectives for the woodland by allowing greater amounts of deadwood on the woodland floor. This encourages fungi, lower plants and invertebrates and helps maintain moisture levels on the valley floor for the benefit of a snail population. This is important because the woodland is part of a Site of Special Scientific Interest and also part of a larger area designated as being of international importance. Keeping water off trackways by diverting it onto the woodland floor will reduce flows significantly, resulting in less erosion and therefore reducing the cost of track maintenance for the landowner.

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 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.

Construction data

- 11 LWD leaky dams
- 8 large ephemeral stream LWD structures
- 8 culverts and soakaways
- 40 minor woody debris dams, numerous track drainage grips throughout woodland and 1 earth bund.

Capital costs

- 11 smaller structures downstream of ponds - 14 FTE days plus tractor and winch at a total cost of **£3,200 = £350 per structure**
- 8 larger structures upstream of ponds - 7 FTE days plus 13 tonne excavator at a total cost of **£2,000 = £400 per structure**
- 8 culverts and soakaways - 8 FTE and materials plus 13 tonne excavator at a total cost of **£4,000 = £500 per culvert**
- 40 minor woody debris structures - 7 days FTE at total cost of **£1,000 = £25 per structure**



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