



Cornsay Colliery Fish Easement

The River Deerness catchment has multiple Water Framework Directive failures, for water quality and within the middle reaches, for fish. There are multiple barriers to fish movement across the catchment, restricting access to a range of habitats ideal for fish development including spawning and juvenile habitat, such as riffles, pools and glides.

Four separate structures, using funds from the River Improvement Fund, administered nationally by The Rivers Trust, were assessed. The Wear Rivers Trust worked with Northumberland and Tyne Rivers Trusts who provided engineering expertise and geomorphological advice and solutions were developed to get fish past these obstructions in most conditions.

Further funding from the Catchment Restoration Fund (CRF) in partnership with Durham County Council and Durham University, was obtained to allow four fish easements to be built across the Deerness catchment and their impact on the distribution of fish populations measured. The study of fish populations and movements through a series of long culverts in the Old Durham Beck catchment is also part of the three year programme.

The first easement to be implemented under the CRF project was delivered on time in September 2012 addressed a road culvert at Cornsay Colliery, located on Hedleyhope Burn a tributary of the River Deerness (Figure 1).

The Hedleyhope Burn measures 9.2km in length and flows down from Tow Law and into the Deerness at Esh Winning. The road culvert at Cornsay Colliery had been cutting off access to over 5km of good quality habitat under most flow conditions as the culvert, a 30m corrugated steel pipe, had rapid and very shallow uniform flows when water levels were low and extremely fast concentrated high velocity flows at high water. The extensive erosion pool immediately downstream of the culvert evidenced the force of the water leaving the culvert (Figure 2).

A wide concrete step, normally rising 150 to 200mm above the surface of the water obstructed fish from gaining access to, and attempting to run, the culvert itself.

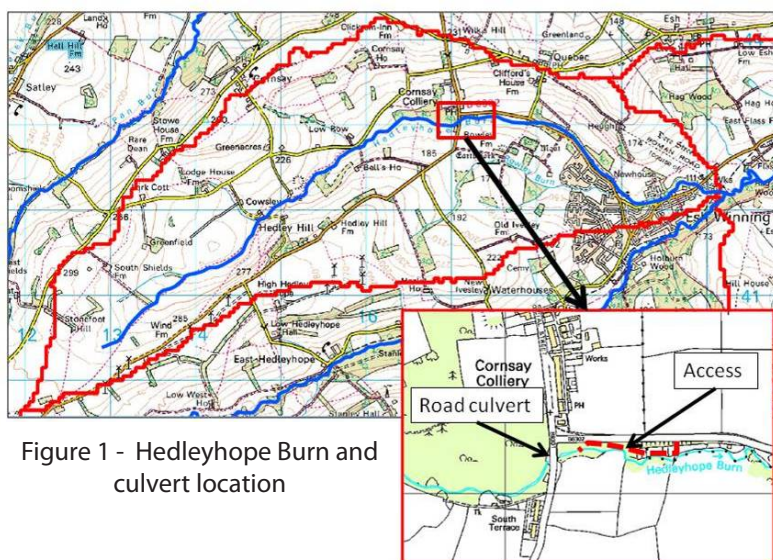


Figure 1 - Hedleyhope Burn and culvert location



Figure 2 - Original erosion pool and concrete step

Given the nature of corrugated iron cladding running through the culvert it was not possible to install baffles to create rest areas within the culvert without seriously effecting structural integrity.

The solution agreed was to replace the original scour pool with a series of rock pools which would provide a variety of flows for different fish species, and drown out the concrete step by increasing the water level to create a slower deeper flow through the culvert (Figure 3). Backing up water does not increase flood risk under any flow conditions, as the site lies within a deep depression with no vulnerable residential or industrial buildings upstream or downstream.

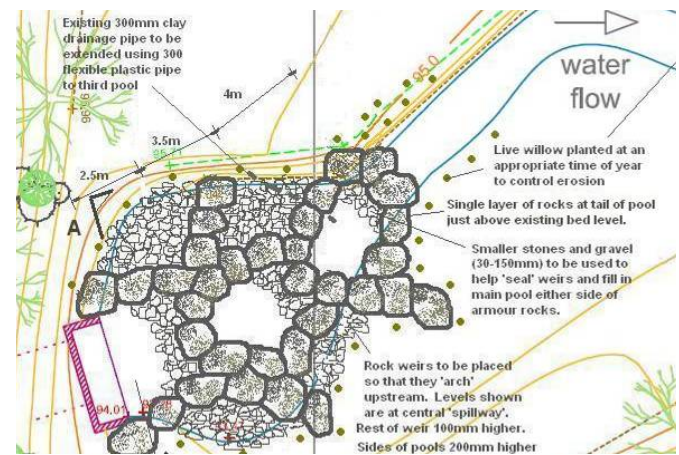


Figure 3 - Easement design drawing

The site is owned by Durham County, who contributed half of the cost of the easement as match funding. The county ecologist carried out a wildlife survey, identifying a diverse mix of wildflowers. The Highways Department cleared the site, and the Bridges Team worked with the Wear Rivers Trust to construct the fish pass.

Access to the site is good, and following the clearance of rank vegetation, materials were delivered to the site. An access road was constructed into the burn with straw bales downstream to trap any disturbed sediment.

Levels for each of the spillways were taken. The new surface level of the first pool needed to be 300mm higher than the original concrete platform, so a working level taken from bolts within the culvert was taken and used to place the initial spillway rock. The rest of the upper rock barrage was built around the spillway, "arched" upstream and keyed into rock protecting the banksides and narrowing the erosion pool, concentrating flows to the centre of the structure, especially important at lower flows and maximising stability at high volumes. Levels for the two subsequent weirs were confirmed against the first, upstream structure. Recognising the velocity of flows, generated in a high rainfall upland area with ground often at capacity and concentrated by the culvert, 2-3 tonne rocks were largely buried in the stream bed, with similar sized rocks keyed into the base, into each other and into the rocks forming a continuous line of bank protection (Figure 3 above and 4 below).



Figure 4 - Completed rock ramp easement

As ever with the construction of these structures there are concerns about the retention of water at low flows. Quick setting concrete in sandbags was used to plug of the larger holes created by the use of such large rocks. It is hoped that the sandbags will accelerate the accumulation of gravels and silts through the structure as it settles down, improving water retention. In addition larger gravels, puddled with clay were used to infill behind bankside revetments behind the first pool, filling in the edges of the original erosion pool.

Surplus rock armour was used along the northern bank to reduce erosion and willow spiling will be installed at a later stage to further protect the banks from high flows.

There has been some interest in the village in adopting and using the site for community benefit, now that the rank vegetation has been removed. The natural rock fish pass is an attractive feature, and community use will discourage poachers from exploiting the site.

Durham County have been sympathetic elsewhere to the adoption and management of county land for community benefit. There is attractive woodland, also County-owned, immediately upstream of the culvert and over the road from the fish pass site. It is an opportunity for the Trust to help the community to develop a management plan to look after their stretch of the Hedleyhope Burn.