Wamphray Fish Pass
Wamphray Water, Wamphray, Dumfries and Galloway
Amalgamated Construction Ltd

BIG Biodiversity Challenge Award category: Medium Scale Permanent Award

Project overview

Network Rail engaged AMCO to undertake upgrade works to the Wamphray Culvert, which was unable to deal with water volumes during high water conditions. The culvert was also inhibiting the movement of migrating fish due to its weir and high velocity flows. AMCO, working in collaboration with Network Rail, the River Annan Trust and Scottish Environmental Protection Agency (SEPA), devised an alternative scheme which utilised the existing Wamphray Culvert as the overflow channel and then constructed a new river channel which included a box culvert detail under the railway, a pre-cast downstream channel using U shaped channel units and an insitu concrete river channel upstream of the works.

The project has significantly increased the capacity of water that can now flow under the railway and has also opened up a significant amount of upstream spawning habitat for migratory fish, whilst reducing the chance of flood water impacting on local residents.

Aerial photograph of the new fish pass

What were the biodiversity conditions on site, prior to the enhancement?

The Wamphray Weir was assessed by the River Annan Trust to be the most significant complete barrier to migrating fish within the entire Annan catchment. Prior to construction the fish surveys below the old weir consistently produced some of the highest densities of Atlantic Salmon while no salmon were found above.

Were there any specific conditions that led to you carrying out this work?

There were no specific conditions associated with the design. However there was extensive consultation with SEPA and Annan District Salmon and Fisheries Board at design stage to find a suitable robust fish pass solution that could withstand the flow velocities of the River Annan during flood events.

What were the biodiversity measures taken?

Dumfries and Galloway Local Biodiversity Action Plan biodiversity prioritises

- A halt in the loss of biodiversity and reverse previous losses through targeted action
- Increase in the area of connected natural habitats and ecological features
- In addition, the LBAP aims to conserve selected Scottish species e.g. Freshwater Pearl Mussels. These mussels used to be relatively common in the Annan Catchment, however are now extremely rare. There is a significant correlation between the health of pearl mussels and the health of young salmon, as the mussel uses young salmon as a host in part of its lifecycle.

With these priorities in mind, AMCO Rail, working in collaboration with Network Rail, the River Annan Trust and the Scottish Environmental Agency (SEPA), re-evaluated the initial remit to increase the capacity of the watercourse during periods of high flow. The biodiversity priorities were considered and resulted in the construction of a longer and lower gradient new river channel which enhanced the suitability for fish passage, increasing the habitat available for spawning fish by approximately 12km. The base levels of the new channel gradually step up to tie in with the natural river bed level. Weir walls were constructed at each step in the base which hold shingle washed down by the river, providing a natural habitat for fish to spawn. V notch fish passages are also incorporated into each weir wall allowing fish to travel upstream and downstream during times of low water flow. Fish habitat has also been created at the lower end by boulders embedded in the concrete base.

New channel base levels

What were the biodiversity measures taken?

Network Rail have funded five years of post-work monitoring upstream of the fish pass, to demonstrate the net biodiversity gain of this project. Encouragingly, adult salmon and sea trout were seen ascending the partly constructed fish pass during the large flood in mid-November 2015!

How would you best describe the project?

An enhancement

Further information

First Phase: Removing the track, excavating down to level, before installing six pre cast box sections across the railway

Second Phase: Installation of 19 U-shaped pre-cast sections, each section weighed in at 19t and was lifted by a 200t crane.

Third Phase: Construction of a reinforced 350mm deep concrete base connecting the Box culvert sections to the U-shaped sections.

Fourth Phase: Installation of 'dam and divert' temporary works. Positive engagement with River Annan Trust during this period, who carried out a succession of fish rescues.

Fifth Phase: Construction of a new permanent upstream river channel; the new channel beginning at the box culvert and extending for 60 metres upstream. The channel increases in width from 5m at the box culvert, to 15m at the upstream tie in, where it connects back into the natural river. The work involved constructing the 4 bases in a 'hit & miss' sequence. The base levels would gradually step up to eventually tie in with the natural river bed level.

The newly constructed Wamphray culvert was completed on January 15th 2016. Since then electrofishing by the River Annan Trust has proven the success of the scheme with migratory fish being found upstream of the original weir. This success will benefit the status of the catchment which was previously failing Water Framework Directive criteria due to it being a barrier to fish.

West Coast Main Line

passage. Early engagement with key stakeholders is essential on these schemes to ensure an optimum design is chosen that satisfies all parties.

What was your personal motivation for carrying out the enhancement?

Partly due to the bottleneck affect of the Wamphray Weir, this stretch of watercourse was historically plagued by flooding events for many years, which was impacting upon local residents and the operational railway – the main artery between London and Glasgow.