

Project Info



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CC8™ Bulk Rolls



200m²



Transverse layers



York, UK



Balvac Limited on behalf of the EA



CC used to line an eel and lamprey pass on the River Ouse at Naburn Weir.



Environment Agency



Section of completed installation at the Naburn Weir eel and lamprey pass

In November 2014, Concrete Canvas® GCCM* (CC) was used to line a channel, which would serve as an eel and lamprey migration pass, on the River Ouse at Naburn Weir in York, UK.

Naburn is a small village in North Yorkshire, lying on the eastern side of the River Ouse about 4 miles south of York. A weir was made at Naburn, a mile downstream from the village originally in 1741 to accommodate tidal flows.

The Environment Agency (EA) are under obligation to secure species-specific needs as part of their species management programmes; one such example is this project, the aim of which was to create a naturalised channel flowing across the EA owned land adjacent to the weir and existing fish pass, to allow eels and lamprey to migrate upstream. The pass has created a series of pools and small step-weirs which these species can access on a rising tide.

The project required an innovative design approach to provide a channel that was capable of providing a constant trickle flow of water through complex and difficult ground conditions, on a site covered by invasive plant species and subject to tidal inundation and fluvial flood flows.

*Geosynthetic Cementitious Composite Mat



The site ground conditions presented a formidable challenge in terms of designing a channel which was impermeable and thus able to carry low-flows without leakage loss (for elver migration) and also to resist out of channel flows from the River Ouse, which is a regular occurrence at this site.

The ground through which the channel was formed consisted of tidal and fluvial silt deposits, overlaying the demolished remnants of an old mill building. The area to the left of the channel contained the partial buried remnants of the flooring of an old mill building. These take the form of a series of large rectangular stone blocks.

The channel had to be constructed to a gradient such that the drops between each successive pool were typically no greater than 100mm and such that it connected to the river Ouse, both upstream and downstream of Naburn Weir.

It was not possible to form a natural channel, due to the unstable nature of the tidal and fluvial silt deposits overlying the site and also as the low flows would probably have seeped straight through due to the porous nature of the soil and the rubble content. Mass concrete or reinforced concrete channel forms would have been expensive, have a high carbon impact and differential settlement would have been an issue.



Site during preparatory works



Local volunteers assisted with construction



Installation of transverse CC layers



Sealed joint corner detail



Completed project

The design solution was to use CC. CC has an inherent impermeable PVC membrane, requires very little preparation of the excavated profile, no expansion or contraction joints, can flex to allow movement as a result of settlement and could be lapped and terminated against the existing stone slabs on the left of the channel.

The low cement content of this product, in comparison to mass or reinforced concrete, provided a sustainable design solution and with a much lower carbon footprint than more traditional engineered channel construction solutions.

The high draping characteristics of CC created a natural looking channel profile and the fibrous top surface allowed it to quickly develop algae and weed growth whilst preventing root growing vegetation that would otherwise block the channel. It also provided a surface onto which river lamprey have been seen to attach themselves whilst resting in the flow in the channel.

The design of the channel was carried out in-house by the EA's Asset Performance Project Team, working closely with Balvac and Concrete Canvas Ltd. Concrete Canvas Ltd provided on-site training and advice to the contractor on the installation, jointing and fixing of their product.

Overall a high quality design was achieved and delivered which overcame the ground conditions and site constraints and provided an attractive, functional innovative solution. The design has already proven to be effective with over one hundred river lamprey captured in one survey and elvers seen in all of the pools.

The EA have effectively upheld their responsibilities under the Eel Regulations now that both species are now able to migrate upstream beyond the weir at the tidal limit of the River Ouse. The project was recently awarded the ICE (Institution of Civil Engineers) Sir John Fowler Award at the 2015 Yorkshire and Humber annual awards.



Completed Eel and Lamprey pass

“The use of Concrete Canvas to create the elver and lamprey pass at Naburn Weir allows us to carry very low flows across complex ground conditions, without the concerns of differential settlement and without the requirement for constructing a traditional (expensive) reinforced concrete structure. The Concrete Canvas also meets our requirements with regards to coping with high velocity out of channel flows from the River Ouse, coping remarkably well with the flows experienced in December 2015 on the River Ouse.

The material itself has surpassed our expectations with regards to its environmental benefit. The fibrous material can be latched-onto by the lamprey when they are resting on their ascent of the channel and its innate flexibility provides an organic and naturalistic visual appearance, enhanced by how quickly the material has allowed mosses and in-channel plants to become established.

The use of this material and this methodology at this site was a trial undertaken by our Fisheries and Project teams, but one which quickly realised positive results in terms of observed elver and lamprey migration and we are looking for opportunities to replicate this approach at other suitable sites.”

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