

Project Info



01 / 07 / 17



CC8™ Bulk Rolls



1,250m²



Transverse layers



Loch Goin Reservoir,
Eaglesham, Scotland, UK



George Leslie Ltd.



CC8™ was used to remediate a dilapidated concrete reservoir spillway channel at the Loch Goin Reservoir.



GEORGE LESLIE LTD
CIVIL ENGINEERING CONTRACTORS



Scottish Water
Always serving Scotland

AECOM



Completed installation

In July 2017, Concrete Canvas® GCCM* (CC) was used to remediate a dilapidated concrete spillway as part of remediation works at Loch Goin Reservoir in Eaglesham, Scotland. Extending to an area of 172 acres and retained by a 7m high earth embankment dam, the reservoir was built in 1910. It is operated by Scottish Water for the supply of drinking water.

The spillway structure principally comprises of an unreinforced concrete channel cast insitu. The condition of the spillway was poor in significant areas and some localised repairs had been carried out in the past. The deterioration to the structure is consistent with erosion and frost damage. Rather than using conventional concreting techniques, CC was chosen on a cost and time basis as well as a trial for future this new technique.

The 150mm thick concrete spillway is approximately 190m in length, the base is approximately 2.6m wide and the side slopes measure 1.0m.

Scottish Water commissioned the design and construction for the remedial works to the spillway and the works were carried out by George Leslie Ltd with design consultancy provided by AECOM.

*Geosynthetic Cementitious Composite Mat





Original concrete spillway channel



Algae & vegetation growth with existing concrete slabs damaged



Vegetation removed & voids filled with flexible cementitious mortar



80mm perforated pipe installed to divert underlying water back into channel

Prior to the installation of CC, the flume was pressure washed to remove vegetation and minor repairs were carried out using a flexible cementitious mortar to fill any voids in the concrete, ensuring intimate contact between the CC and the concrete substrate. Access to the site was restricted and the existing bridge over the spillway was deemed unsuitable for construction traffic.

CC8™ (8mm thick) material was specified as there would be significant water velocities in the spillway, particularly on the steeper channel sections. The contractor decided bulk rolls of CC8 would be the most appropriate choice for the installation. However, due to the restricted access, the contractor used an angle grinder to cut the material to profile width. The smaller, batched rolls were then mounted onto a trolley and hand wheeled into the spillway.

Each length of CC was laid transversely, with adjacent layers overlapped by 100mm in the direction of water flow and fixed in place using 37mm Hilti nails with 25mm diameter washers shot fired at centres not exceeding 600mm. In order to prevent any build-up of hydrostatic pressure between the original concrete slabs and the CC, the engineering consultant specified that the side slope and channel invert transition points should be broken out and an 80mm perforated pipe installed to divert underlying water back into the spillway channel at regular pipe discharge points.



CC8 roll dispensed with spreader beam & cut to length off site



CC batched lengths laid transversely across the channel



Hilti nails shot fired at 600mm centres



CC lined spillway channel with steel batten bar termination at siphon outlet

In addition to this, the CC joints were left unsealed and free draining to create natural weep paths to allow water ingress into the spillway. Once installation was completed, the edges of the CC on either side of the spillway were then completely buried within anchor trenches in order to prevent surface water undermining the material.

Although there was heavy rainfall on site throughout the installation, the CC material has a working time of 1-2 hours following hydration, giving the team sufficient time to anchor each layer in place before it began to set. Since the material cannot be overhydrated they ensured it was fully saturated at the end of each day by hydrating the material using water from a nearby stream.



Anchor trenches backfilled on either side of channel



CC terminated into anchor trench and backfilled with concrete



Localised damaged areas of the channel remediated with CC



CC easily cut & grouted around pipe discharge points



CC accomodating corners



Frozen sections of channel



CC lined channel during winter period showing no signs of degradation

Despite the difficult access to site and challenging weather conditions, a total of 1,250m² of CC8™ was installed in 5 days by a 5-man crew. The contractor used an efficient process, whereby the 2 men cutting the CC material matched the speed of the 3-man crew simultaneously installing the material in the spillway. This allowed them to install up to 250m² of CC per day.

The CC was able to easily accommodate significant variations in slope and profile, along with interior and exterior pipe protrusions and perforated pipe discharge points. CC also has a very low wash out rate and low alkali reserve meaning that it was not required to treat the run off from installation.

The client was impressed with the speed and ease of installation and are monitoring how the material handles future freeze-thaw conditions, abrasion resistance and environmental weathering. Scottish Water is satisfied that the CC material will provide a long-term solution that greatly increases the operational life of the structure and mitigates the need for costly periodic maintenance repairs in the near future.

“As leaders in providing infrastructure services to the water industry AECOM works with companies like Concrete Canvas to constantly innovate and considered this product as an ideal solution for the Loch Goin spillway remedials project. Large areas of the spillway were defective and historical patch repairs had proved ineffective. The reservoir was soon to become redundant and the concrete canvas product was considered as a medium to long term solution.

The spillway was not steep so velocities are not excessive but we look forward to reviewing the durability of the product and how it performs in this specific application. We were impressed by the speed of installation and the quality of the finished work and the supplier was incredibly helpful and easy to work with throughout the design and installation process”.

Stephen Lockett

Associate Director, Dams and Reservoirs, Edinburgh Water, **Aecom**