

Project Info



01 / 03 / 19



CC8™ Bulk Rolls



2125m²



Transverse layers



Almond Feeder,
Newbridge, Edinburgh,
Scotland



Mackenzie Construction



CC8™ used to provide
a sustainable erosion
protection layer for an
open channel as part of
the improvement works
at the Scottish Canals
Almond Feeder



Completed CC installation at the Scottish Canals Almond Feeder

In March 2019, 2,125m² of Concrete Canvas® GCCM* (CC8™) was installed by Mackenzie Construction to provide a sustainable erosion protection layer for an open channel as part of the improvement works at the Scottish Canals Almond Feeder.

Opened in 1822 the Almond Feeder is the only formal water supply to the Union Canal. Just 3km in length, the Almond Feeder was constructed in a similar way to a canal as an open channel with four masonry tunnels on the route.

Canal feeders across the network are routinely checked and, in this instance, visual signs of ground movement were identified, raising concerns over the of stability of the structure. It was determined further remedial works were essential to protect the channel. If the Almond Feeder water supply isn't protected, the Union Canal will de-water and cease to be operable causing major environmental, public, navigational and economic issues.

The client originally considered lining the channel with HDPE, it was not possible to completely dry out the channel which made thermal welding very difficult. In addition to this, the client wanted a solution which could not only provide erosion control, but also significantly reduce maintenance and make clearing debris from the channel considerably easier and less time consuming in the future.

*Geosynthetic Cementitious Composite Mat



CC was identified as a long-term solution to prevent further erosion of the channel while significantly improving impermeability. The material consists of a cement filled geotextile that hardens on hydration to form a durable, fibre reinforced, impermeable concrete layer. It enables concrete construction without the need for plant or mixing equipment on site which allows for installations in restricted access sites. The main advantages of CC over HDPE for this project are durability and resistance to UV exposure.

CC uses a specialist high early strength concrete reaching performance strength at 24 hours after hydration and the material cannot be overhydrated and will still set underwater. This was critical on this project, as the Almond Feeder had to continue to feed the Union canal throughout the installation. Therefore, a section of the feeder could be lined with CC when the channel was dewatered, and following hydration, the contractor could allow the water to run through the feeder channel and over the CC material into the Union Canal without affecting the CC performance or disrupting the installation.

370 linear metres of the existing feeder channel was mostly unlined and was overgrown with vegetation and fallen trees. The works were carried out by MacKenzie Construction who operate across Scotland and provide civil engineering services for a number of Scottish Canals projects in the region.



Almond Feeder channel during initial inspection



Bulk rolls of CC8 delivered to site



Channel regraded and water diverted using pumps



Clay applied to the side slopes to provide a smooth substrate & minimise voids



CC8 cut to length and staggered along the channel



CC laid transversely and benched on either side



CC terminated into check slot & backfilled with clay to prevent water ingress



CC installation prior to backfilling anchor trenches

Prior to commencement of the project, a representative from Concrete Canvas Ltd provided a Toolbox Talk and basic training to the Mackenzie installation crew and regularly visited the site throughout the installation to provide guidance.

In preparation for the installation, the channel was excavated, using mini excavators or shovels in areas with restricted access. All vegetation and debris were then removed from the channel, and any void sections in the channels were filled with clay to provide a smooth, uniform surface.

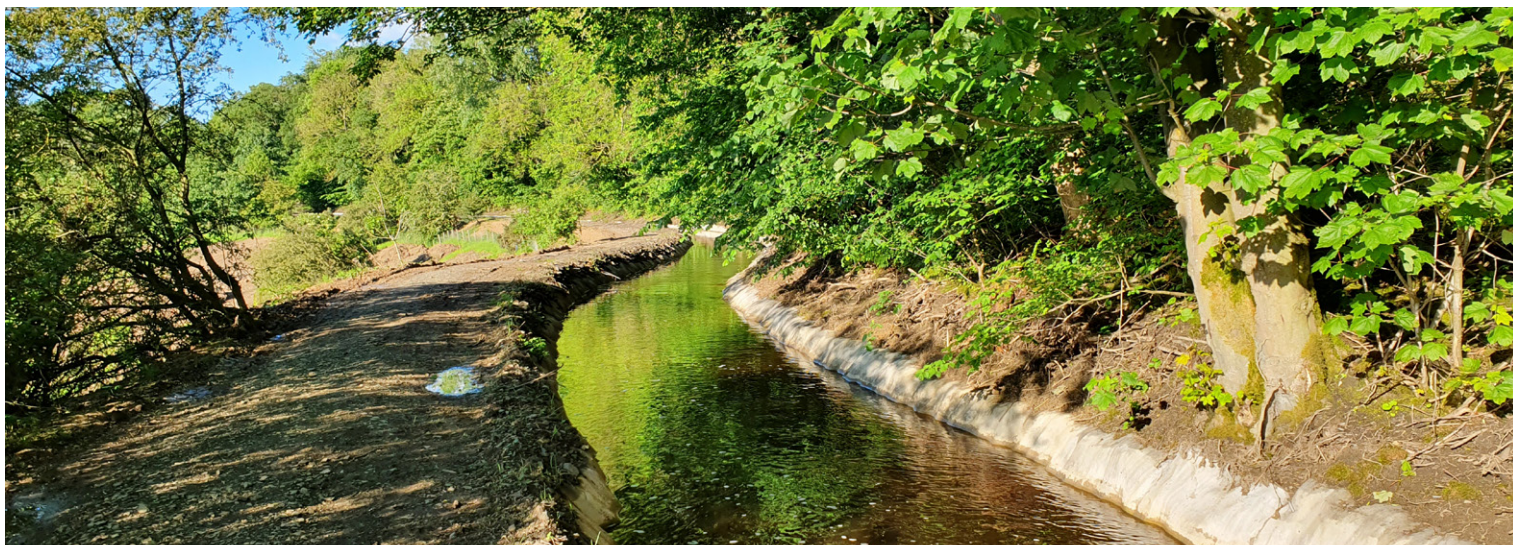
Bulk rolls of CC8™ were then delivered to site, mounted onto a spreader beam on a stand, and cut to profile length before being transported to the channel with a mini digger.

The CC was laid transversely across the channel, the ends laid in pre-dug anchor trenches and fixed using 250mm ground pegs. Additional layers were then laid with 100mm overlaps and sealed using a bead of Soudaseal adhesive sealant and screwed together at 200mm intervals with stainless steel screws.

The anchor trenches were either backfilled using clay or excavated soil, and all leading edges of CC at the masonry tunnels were captured in poured concrete as an extra precaution against undermining.



Backfilling anchor trenches



Tree line and various corners were easily accommodated



CC termination at masonry arch



Left: Before - overgrown channel leading to masonry bridge / Right: After - CC lined channel leading into masonry bridge

The CC was installed and hydrated during working hours, allowing water to run through the channel overnight to sustain the canal's water levels. In order to protect the CC leading edge, the last layer of CC was captured into a 200mm x 200mm check slot using 250mm ground pegs and backfilled with clay to prevent any undermining of the CC lined channel section. Once the channel was dewatered the following day, the contractor extended the upstream CC layer over the check slot and screwed and sealed it to the downstream CC layer before continuing the installation.

Once installation was complete, the CC was hydrated with a hose and adjustable nozzle using water from a nearby stream.

A total of 2,125m² of CC8™ were installed in 4 weeks by a 5-man crew and this included preparation works and stoppages to prioritise works elsewhere on site. Despite the difficult to access areas on site and having to continue to feed the Union Canal with water at regular intervals, the contractor achieved installation rates of over 40 linear metres per day and completed the works on schedule for the client.