

Project Info

Avoca Mines - CC Alternative to
Pre-cast Concrete Channel Lining



01 / 06 / 17



CC13™ Bulk Rolls



1520m²



Transverse layers



Avoca Mines, Tigroney
West, Co. Wicklow,
Ireland



Priority Construction
Ltd.



CC13™ was used to
provide scour protection
to drainage channels
at the Avoca Mines in
Wicklow



Overview of completed drainage channel

In June 2017, Concrete Canvas® GCCM* (CC) was used to line a series of drainage channels to divert surface water around a remediated contaminated spoil site at the Avoca Mines in Wicklow, Ireland.

Copper mining is reported to have begun in the Avoca River valley in around 1720 and continued, with interruptions, until 1982. Among the minerals produced in the last two centuries, copper has been primarily mined along with silver and gold, although the latter was mined to a lesser extent. The Avoca river, which flows southwards through the Avoca mine site, is overlooked by upland areas known as the East and West Avoca mine areas.

Mineral extraction has left an environmental legacy that comprises open pits, over 70 shafts and adits, numerous spoil piles and former mine buildings and structures. Water discharges from the abandoned copper and sulphur mines are acidic and metal laden which impacts water quality in the Avoca River.

Civil and Environmental Engineering Contractor, Priority Construction Ltd. was appointed to carry out health and safety and remediation works at a part of the site known as Tigroney West in 2016.

The site is located to the west of a railway line and at the base of the East Avoca mining area. This area was overlain by waste material contaminated with heavy metals from earlier mining activities (spoil). The close proximity of the spoils to the Avoca River has had a direct effect on water quality in the river.

*Geosynthetic Cementitious Composite Mat





Site before installation of CC13™



Channels prior to installation



Measuring the CC prior to cutting to match channel width



Marking the 100mm overlaps in chalk & measuring 250mm anchor trench



Sealing overlaps with Clearfix sealant & securing with screws at 200mm intervals



CC13™ was delivered in Bulk Rolls and deployed from a spreader beam



CC laid out prior to hydration



Hydrating the CCTM



Spillway steps produced, prior to installation



Completed installation in use

As part of the remedial works, the spoil areas were regraded and capped with clay soil, and drainage channels were installed at the boundaries around the site to redirect upstream drainage around the capped area on site instead of through it.

The original design used a combination of precast concrete channels and a HDPE liner/rip rap channel. In order to reduce long lead in times for the precast concrete and construction risk associated with steep slopes, Priority Construction Ltd. proposed CC as an alternative.

The bulk rolls of CC can be cut to the exact section of any given channel, eliminating wastage and it can easily accommodate variations in profile. The main advantages of CC over conventional concrete are speed and ease of install, cost savings, durability and environmental friendliness.

Unlike most concretes, CC uses a specialist high early strength concrete with a limited alkaline reserve. It has a very low wash out rate and when combined with the volume of water required for hydration these characteristics mean that CC run-off can be directly discharged into the local water course without the need for prior treatment, making it ideal for this project.



Headwall detail on upstream side



Poured concrete spillway leading into CC™ channel



Completed CC Channel



Wideshot overview of completed CC channel

19 bulk rolls of 13mm thick CC (CC13™) was delivered to Avoca mines and stored on site in heavy duty plastic sheeting. Prior to installation, the channel was excavated and compacted to profile using a 20T excavator and V bucket. A 250mm x 250mm anchor trench was created on either side of the channel to allow the leading edge of the CC to be buried so as to prevent any undermining. The CC was mounted onto a spreader beam and hung from an excavator, and was then unrolled before being cut to specific profile length with a utility knife and dragged into place, minimising material wastage.

Priority Construction Ltd. laid the CC transversely to accommodate changes in profile, overlapping layers by 100mm in the direction of water flow. The overlaps were sealed using a bead of Everbuild Clearfix adhesive sealant and screwed together at 200mm intervals with 30mm stainless steel screws. 250mm steel ground pegs were inserted through each overlap in the anchor trenches on either side of the channel and the anchor trench was then backfilled with material as an extra precaution against undermining.

For certain areas of the channel, due to the steep slopes concrete steps were installed and the CC material was laid over the steps to dissipate the water energy. The CC was flexible enough to accommodate these step details and was pinned into the vertical interface of the steps using Hilti anchors. The CC material was hydrated after each day's work using a hose with spray nozzle attached and a 6000ltr water carrier.



Completed installation

In total, 1,520m² of CC13™ was installed within 2 weeks and will provide long-term scour protection and erosion control for the network of drainage channels on the site.

Despite the steep and varying slopes and difficult to access areas on site, the contractor achieved installation rates of over 200m² per day. Following the success of this installation, Concrete Canvas (CC) is now being considered for multiple projects in the same region in both the public and private sectors.

After carrying out some research into alternatives for in-situ or pre cast concrete drainage channel we encountered Concrete Canvas. As we learned more about this solution we realized it would be ideal for the Avoca Mines Remediation Project which we had been awarded. We succeeded in gaining approval from the client for the use of Concrete Canvas. As the project progressed it became clear that this solution provided a number of benefits when compared with traditional methods. These benefits included speed of installation and flexibility in terms of levels e.g. where there were changes in design levels. I intend to use this product on future projects where possible.

*Ken Madden
Senior Contracts Manager, Priority Construction Ltd.*



Lined channel immediately after installation



Lined channel, 1 year after installation