CONCRETE CANVAS®
Concrete on a Roll

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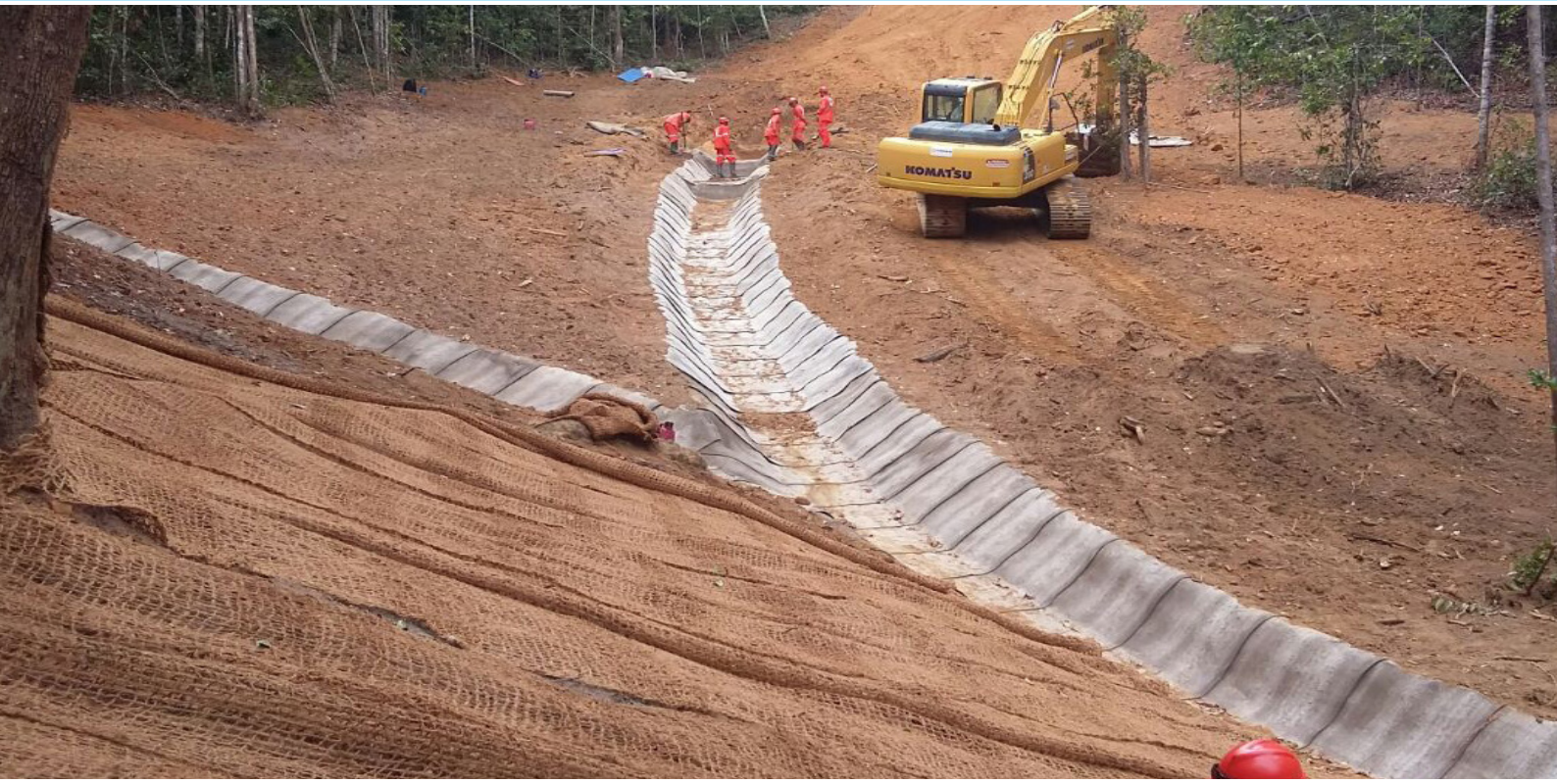
MADE IN UK



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Concrete on a Roll

AGRICULTURE CASE STUDIES

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Board of Trade Winner 2018

Winner Technical Innovation Award

Innovation Award ICE Wales Cymru Awards 2017

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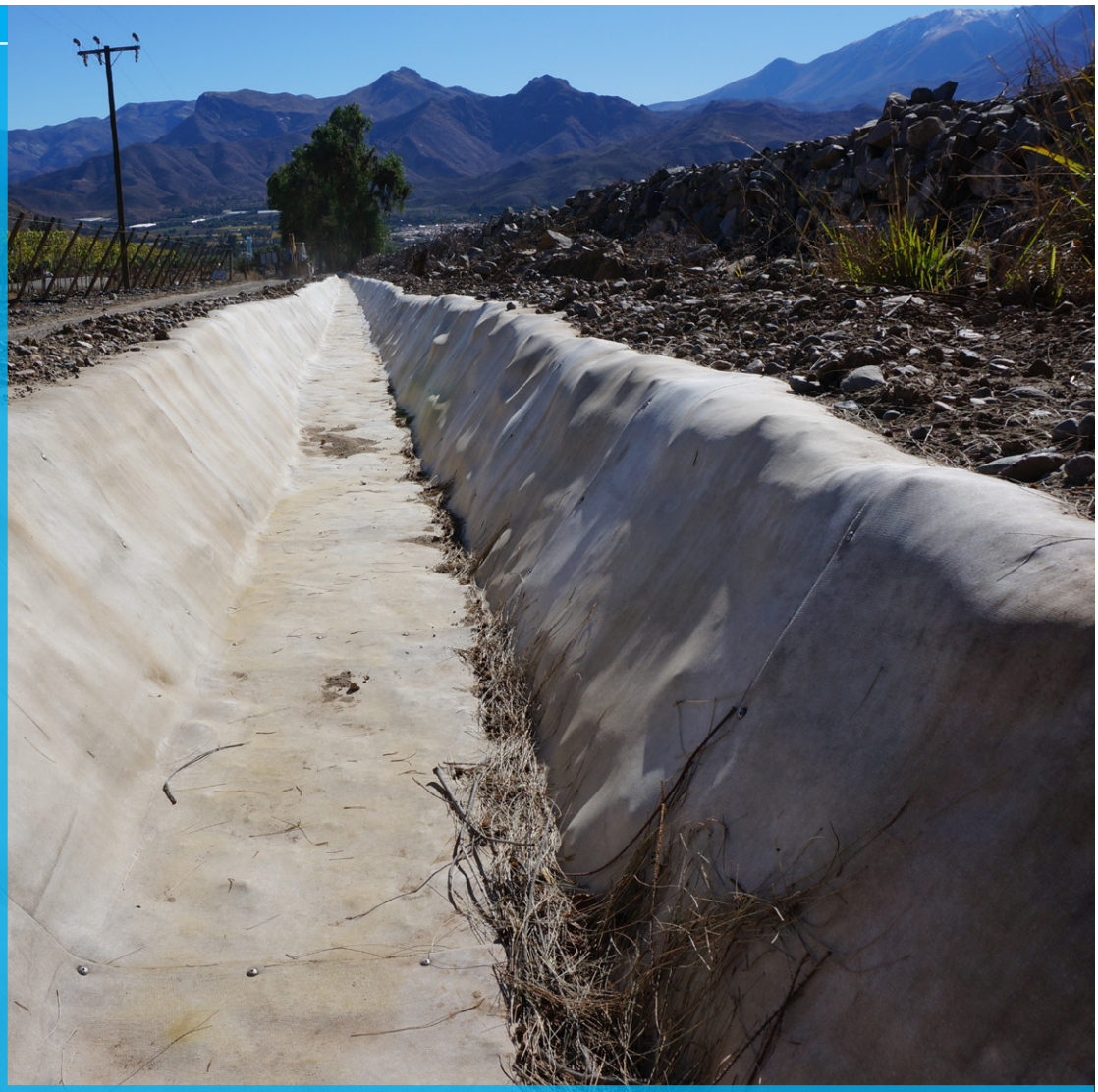
CHANNEL LINING

Project Info

- 01 / 05 / 16
- CC5™ Bulk Rolls
- 2,647m²
- Transverse layers
- Vicuña, IV region, Chile
- Agrotek Spa
- CC was installed to improve the local water management system.



Completed installation

In May 2016, Concrete Canvas® GCCM* (CC) was used to line a drainage channel in Vicuña, IV region, Chile. The objective was to stop water infiltration in an irrigation channel and to improve the local water management system. Reinforced concrete was also considered, but CC was chosen as it would be a cheaper alternative and faster to install. The works were carried out by Agrotek Spa for the Peralillo Agricultural community, with consultation from Comision Nacional de Riego.

Vegetation, and debris were removed, and the ground excavated, levelled and compacted in preparation for installation. The CC was delivered to site in bulk rolls and mounted onto a spreader beam frame, cut to profile length to eliminate wastage and laid transversely. Overlaps of 100mm were screwed together at 200mm intervals, and the outside edges of the CC were captured in backfilled anchor trenches after being pinned using 250mm steel ground pegs. Hydration was then completed using a roadside 1000L water tank and motorised pump.

In total, 2,647m² of CC5™ were installed over 10 days by a team of five people in temperatures in excess of 30°C. The client was very happy with the installation, as it allowed them to continue using the channel during construction, and has since used CC on a second section of the same channel. The overall project for improving the local water management system took a total of 1 month. A solution also had to be found which could allow the community to use the channel to irrigate their fields every Sunday to stop them drying out. The community now has 70% more water than they did previously, and the water now travels much faster down the channel.

*Geosynthetic Cementitious Composite Mat

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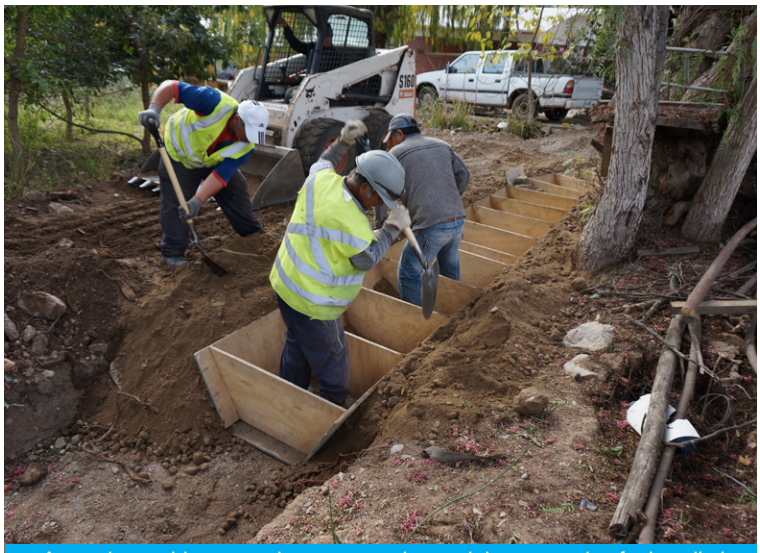
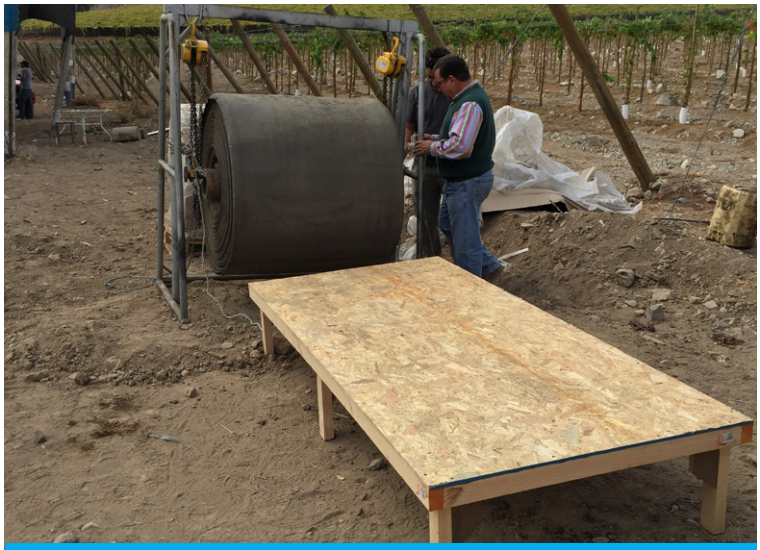
CHANNEL LINING



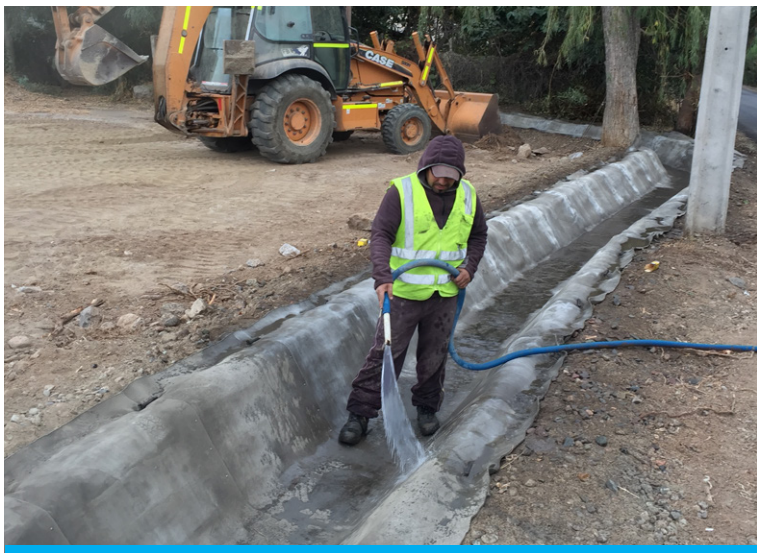
A wooden mold was used to compact the earth in preparation for installation

The channel before installation



The CC was delivered to site in bulk rolls and cut to profile length using knives

The CC was laid transversely across the channel



Hydration of the channel

Completed installation

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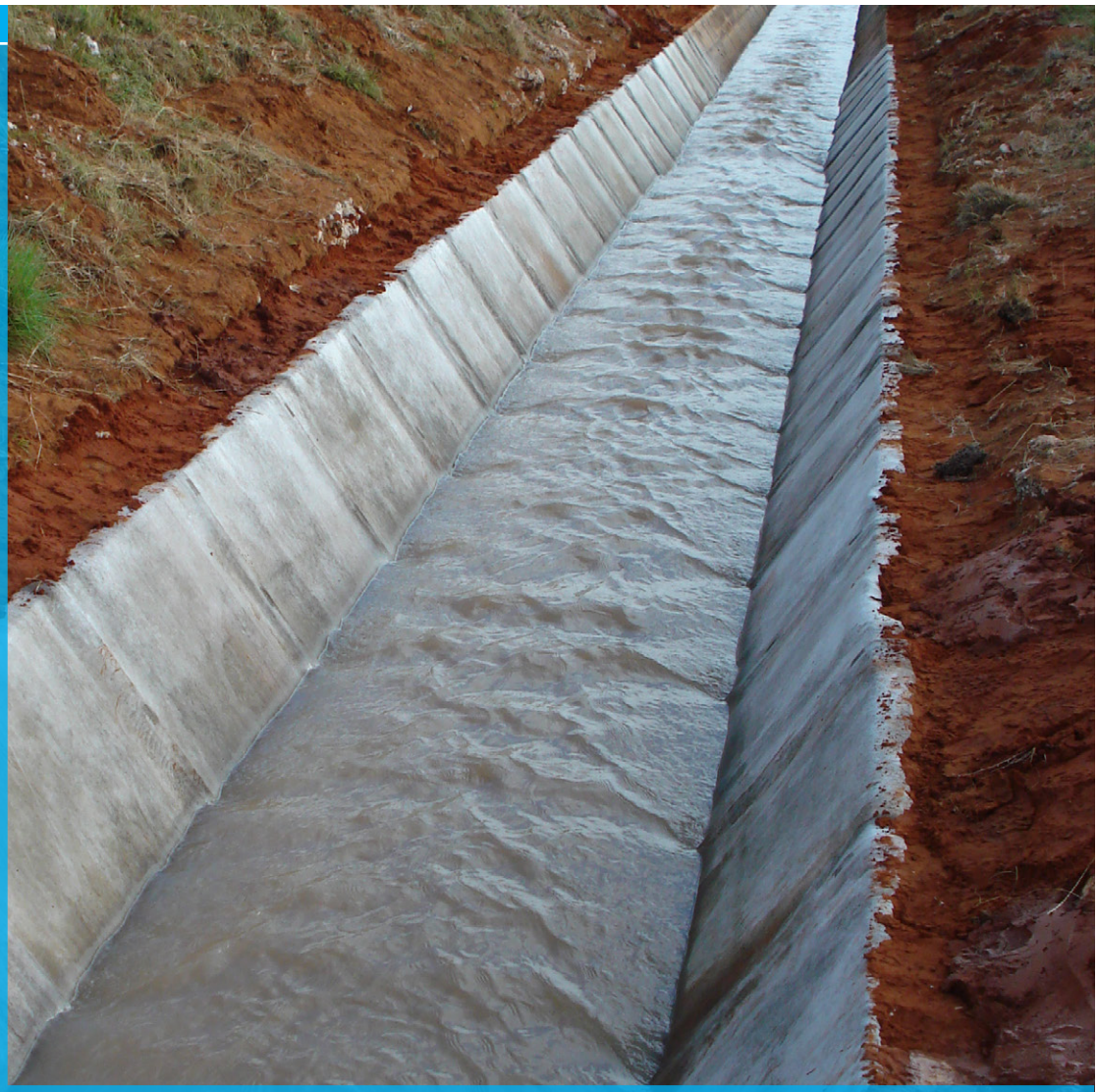
CHANNEL LINING

Project Info

- 30 / 03 / 11
- CC5™ Bulk Rolls
- 60m²
- Transverse layers
- Jacobsdal, Freestate, South Africa
- Oranje Riet Water Users Association
- A trial to establish whether CC could be used to reline existing canals that had deteriorated and needed either localised repair work or to be completely relined.



Completed installation

In March 2011, Concrete Canvas® GCCM* (CC) was used to line an existing canal in Jacobsdal, Freestate, South Africa. The lining was installed as a trial to establish whether CC could be used to reline existing canals that had deteriorated and needed either localised repair work or to be completely relined. The work was carried out by Oranje Riet Water Users Association.

Prior to installation, any debris was removed from the existing concrete channel and the CC delivered to site in bulk rolls. The CC was cut to profile length and laid transversely across the canal, which measured approximately 2.9m wide. A surface-to-surface bonding technique was then used, where the CC was folded back on itself by 50mm so that the Canvas to Canvas contact was used for securing the joints with the overlap in the direction of water flow.

In total, 60m² of CC5™ were laid in just 3 hours, with the result of a durable, efficient and neat section of canal relined with ease and at a good rate of implementation.

The client was very happy with the results, and the joints proved to be very strong and rigid, creating a section of the canal that was now completely waterproof. The client was keen to continue observing the installed section over time in order to determine whether or not the remainder of the canal should also be lined with CC.

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CHANNEL LINING

Canal before installation

Canal being cleared of water and debris before installation

The CC was laid transversely

The CC overlaps were folded under by 50mm to create a water tight seal

The CC was hydrated via hose

Completed installation

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CHANNEL LINING

Project Info

- 03 / 11 / 14
- CC8™ Bulk Rolls
- 200m²
- Transverse layers
- York, UK
- Balvac Limited on behalf of the EA
- CC used to line an eel and lamprey migration pass on the River Ouse at Naburn weir.

Environment Agency

Completed installation

In November 2014, Concrete Canvas® GCCM* (CC) was used to line an eel and lamprey migration pass on the River Ouse at Naburn Weir in North Yorkshire. As part of the Environment Agency's species management programmes, the objective was to create a naturalised channel adjacent to the weir to allow eels and lamprey to migrate upstream. The channel was designed by the EA's Asset Performance Project Team, and the works were carried out by Balvac, with input on-site from Concrete Canvas.

The project came with several challenges, including needing a constant trickle of water flow, an impermeable channel which could carry low-flows without leakage, a gradient that would allow pools with drops no greater than 100mm, and connections to the River Ouse both up- and downstream of the Weir. It was impossible to form a natural channel due to instability of the site, and so mass concrete and reinforced concrete channel forms were considered; however, the expense, high carbon impact and differential settlement made these options unsuitable. CC's lower carbon profile, natural looking properties and ability to promote algae and weed growth while still suppressing root growing vegetation meant it was chosen instead.

In total, 200m² of CC8™ were installed on a difficult site for an ambitious project, however, the ground conditions and site constraints were overcome and the CC provided an attractive, functional and innovative solution. The project was awarded the ICE (Institution of Civil Engineers) Sir John Fowler Award at the 2015 Yorkshire and Humber annual awards.

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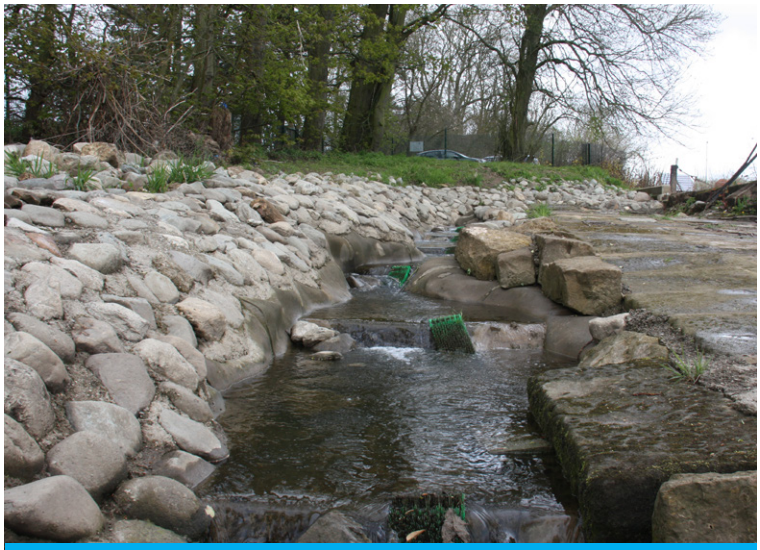
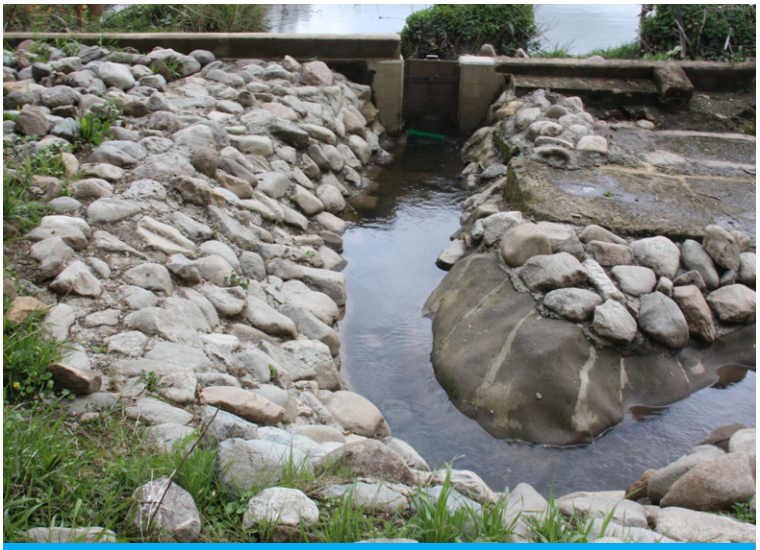
CHANNEL LINING

Site before installation

CC was laid transversely across the channel



Completed installation and artificial assits for species migrating upstream



Sealed joint corner detail

"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 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."

Paul Knight DIPWEM IEng MICE
FCRM Advisor | Yorkshire Asset Performance | Hull & Humber Environment Agency

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REMEDIATION

Project Info

- 14 / 04 / 14
- CC5™ Batched Rolls
- 70m²
- Longitudinal layers
- Iquique, Chile
- Pacifictek and INDAP joint venture
- CC5™ used to repair a ditch broken by a 8.2 magnitude earthquake

Completed installation

In April 2014, Concrete Canvas® GCCM* (CC) was used for emergency remediation of a concrete irrigation channel at a lemon farm located in the small oasis town of Pica, 90km east of Iquique, in Chile.

On the 1st of April 2014, an 8.2 magnitude earthquake struck off the coast of Chile. The force of the earthquake broke apart the farm's existing poured concrete irrigation ditch, cracking it in several places and making it unusable. This posed an immediate threat to the lemon trees and livelihood of the farmers. The works were carried out by INDAP (a government agency dedicated to help small farmers) and Pacifictek, who also funded the project as a joint venture.

Man portable batched rolls of CC5™ were carried to site, as the proximity of the trees would not allow any kind of plant access. Debris was cleared from the channel, before CC was unrolled down its length and folded over the existing structure. The CC was fixed to the poured concrete form using masonry screws at 200mm intervals. Each layer was overlapped by 100mm in the direction of waterflow, screwed and grouted with an epoxy grout. Epoxy grout was also used on the joints created by the steel doors located on the sides of the channel, which are opened to allow irrigation.

In total, 70m² of CC5™ was installed by a team of four in one afternoon. The speed of installation resulted in the lemon trees and the farmer's business being saved. Batched rolls allowed delivery to site with no damage to the lemon trees and the flexibility of CC meant no expensive or time-consuming formwork was needed. The installation has resulted in further project commissions.

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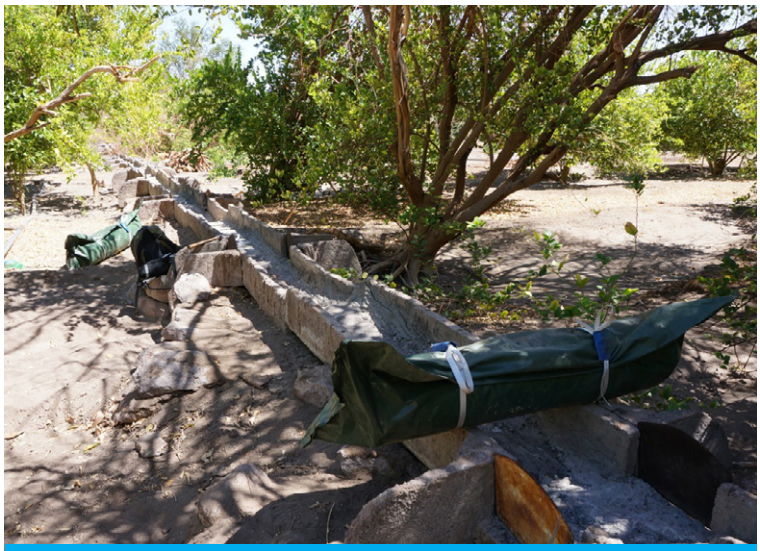
REMEDIATION



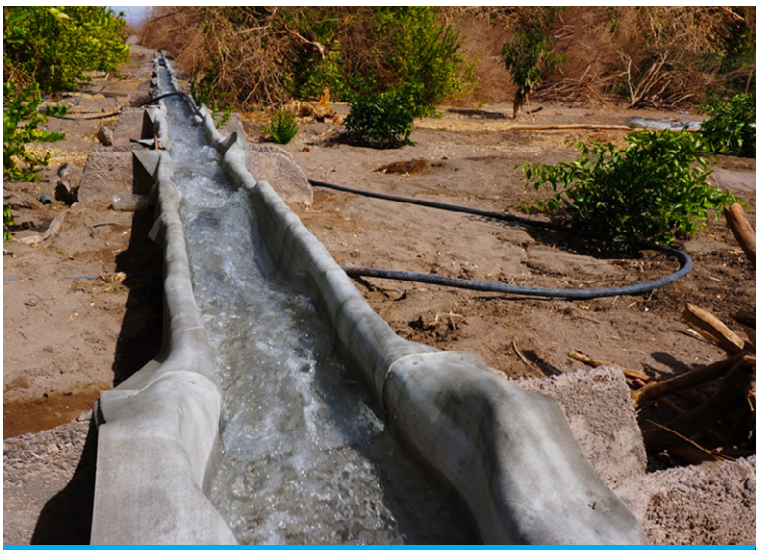
Damaged channel before repair

Installing the CC

The CC was laid longitudinally down the channel and fixed down the sides

Screws were used to fix the CC in place

Close up of the installation



Completed installation in use

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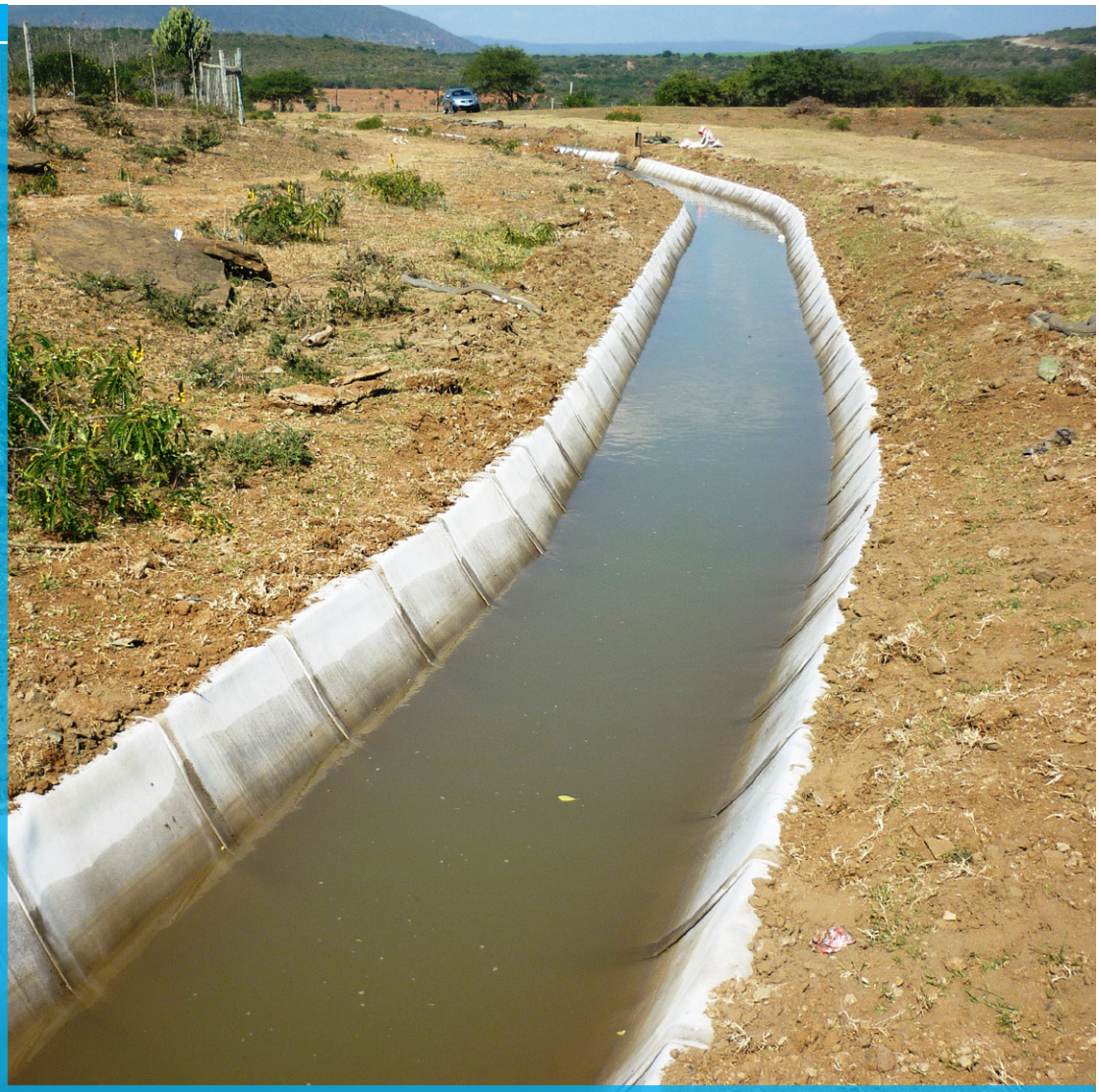
REMEDIATION

Project Info

- 01 / 05 / 15
- CC5™ Bulk Rolls
- 10,600m²
- Transverse layers
- Mooi River, Muden, KwaZulu Natal, South Africa
- Medina Engineers & Dwenga Trading JV
- CC5™ was used to remediate a failing irrigation canal.



Completed installation

In May 2015, Concrete Canvas® GCCM* (CC) was used to remediate the Mooi River irrigation canal, in Muden, KwaZulu Natal, South Africa. The canal was badly cracked resulting in large amounts of water loss. Poured concrete was considered for the project, however some areas of the canal were only accessible by foot, which would have made a poured concrete installation difficult. In addition, CC minimised interruption to the water supply for residents along the canal, who depend on it. The works were carried out in a joint venture between Medina Engineers and Dwenga Trading, with consultation from Element Consulting Engineers for the Department of Rural Development and Land Reform.

Due to the profile varying between 2m and 3m, a transverse layup was used to minimise wastage. The canal was cleared of any debris or vegetation and crumbling concrete was removed from cracks and voids before they were filled, and anchor trenches were excavated along the shoulders. The CC5™ was mounted onto a spreader beam hung from a JCB, and batched to specific profile length on site. The CC was unrolled across the channel, with layers overlapping by 100mm and the open edges placed into the anchor trenches. Hydration was given via 5000L water bowser and hose. 30 minutes later, knuckle joints were formed by folding the material back under itself, creating a 50mm wide knuckle. These joints were then hydrated again and compressed with sandbags. After setting, the anchor trenches were backfilled.

In total, 10,600m² of CC5™ was installed by 12 people, in temperatures of up to 36°C on a site with some access issues. The Department of Rural Development and Land Reform were very pleased with the installation and Element Consulting Engineers is considering it for use on similar projects.

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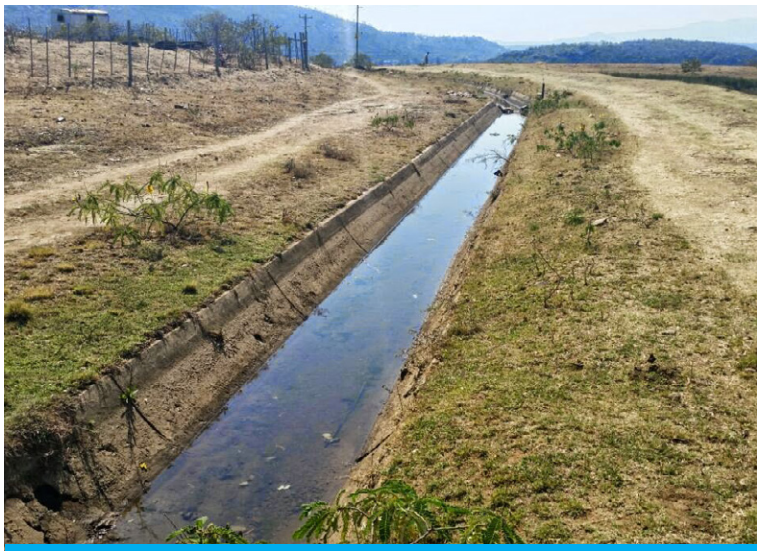
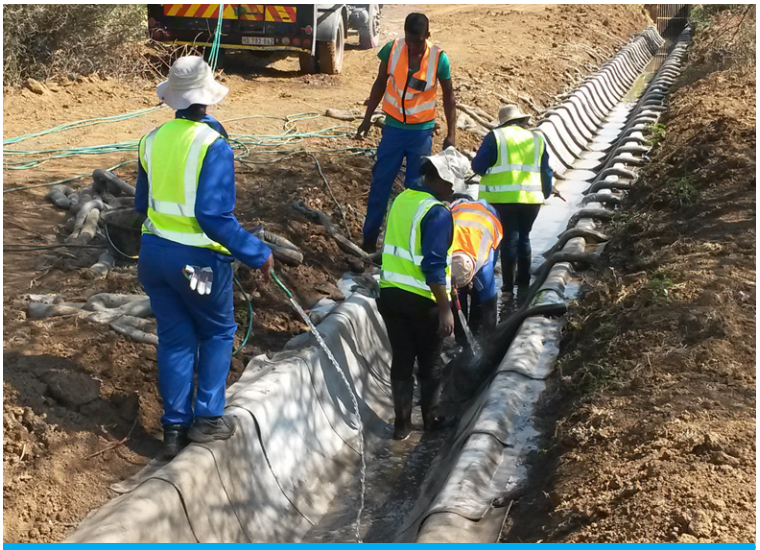
REMEDIATION



Site prior to installation

CC was delivered in bulk rolls and unrolled from a spreader beam

The CC was laid using a transverse layup



Joint overlaps and hydration via hose

Close up of completed installation

Completed installation at Mooi River

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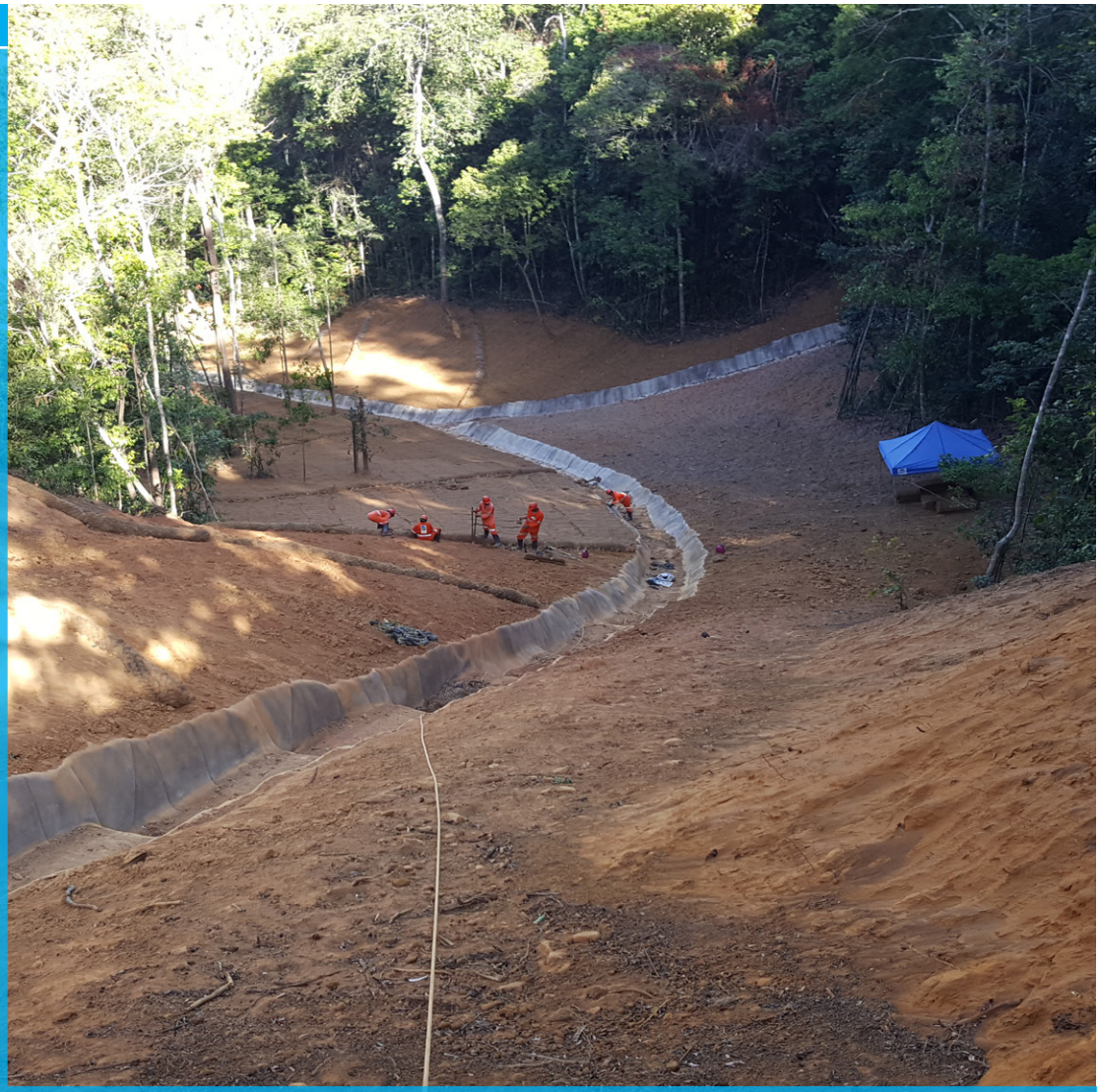
CHANNEL LINING

Project Info

- 10/01/2017
- CC8™ Bulk Rolls
- 1,125m²
- Transverse layers
- VIVIX S.A.
- Vertical Green
- Channel lining on an enviornmentally sensitive site in Recife, Pernambuco, Brazil.



Overview of the installation area

In January 2017, Concrete Canvas® GCCM* (CC) was used to line a channel in Recife, Pernambuco. Due to the site being adjacent to a glass factory, it was considered by the local authorities as an environmentally sensitive area. There were several other issues with the site with regards to drainage and erosion control, and an overall need for general site recovery was identified, which lead to the selection of CC as a channel lining solution instead of alternative methods.

The works were carried out by Vertical Green do Brasil Engenharia Naturalistica for Vivix SA, with the CC supplied from SPI Engenharia.

In preparation for the installation, all existing vegetation from the site was removed as far as the tree line, which, due to environmental restrictions, could not be touched by installation the team. The drainage of the site was then considered before the channels and anchor trenches were dug. The CC was delivered to site in bulk rolls, and laid transversely across the channel profiles, fixed and then hydrated.

1,125m² of CC8™ was installed over a period of ten days by a team of six people. A total of nine bulk rolls were installed for channel lining, and some CC was used for slope protection where required. The project spanned across three weeks as a geosynthetic material made of coconut fibre had to be laid down on top of the soil.

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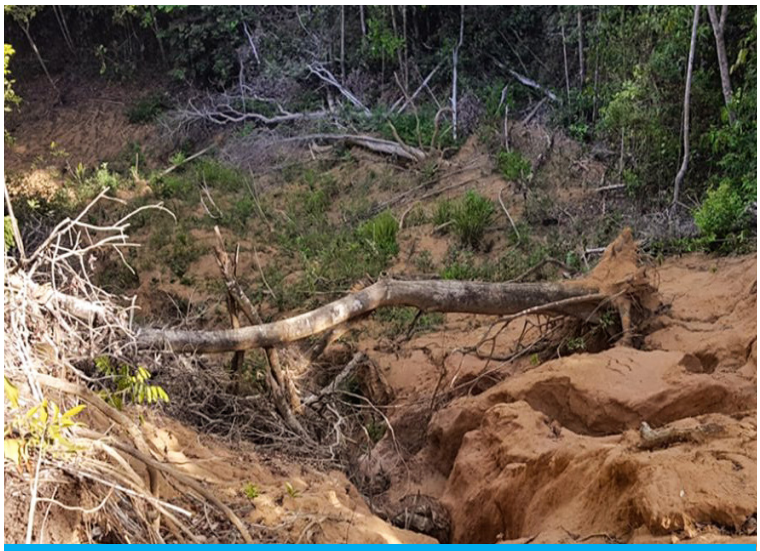
CHANNEL LINING



Site before ground work and installation

Ground preparation work was done by hand and with a digger

CC was laid transversely

An overview of the project's progression

Coconut fibre was fixed to slopes around the channels after installation

The completed installation, revisited

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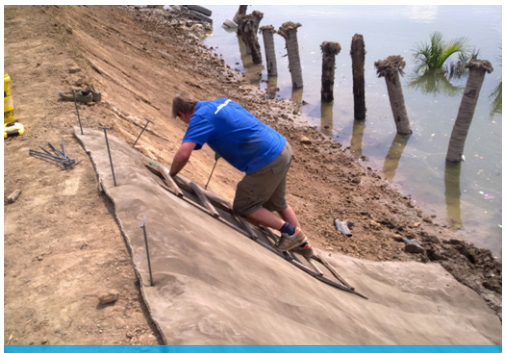
SLOPE PROTECTION

Project Info

- 26 / 02 / 11
- CC8™ Batched Rolls
- Unknown
- Vertical layers
- Palm Oil Plantation, Selangor, Malaysia
- Concrete Canvas Ltd.
- CC8™ was used in a trial to establish whether CC could be an effective erosion protection measure an earth-bund on a palm oil plantation.

Completed installation

Trial site located on bank of the Langet river



Pegging the pre-cut layers of CC to the substrate

Hydration of the CC using plant site equipment

In February 2011, Concrete Canvas® GCCM* (CC) was used to protect an earth-berm on a palm oil plantation in Selangor, Malaysia.

The palm oil plantation is situated 2ft below high water and protected by the earth-berm in question, running around the periphery of the plantation. Maintenance of the earth-berm is of paramount importance as it is the sole flood prevention measure protecting the island from flood water and the palms from seawater contamination. Monthly maintenance is conducted on the earth-berm using a combination of measures including regrading, piling, gabion walling and vegetation growth. However, there are still regular breaches and loss of land, and erosion is exacerbated by a number of factors including high tidal flows, strong water currents and wave damage. CC was chosen for a trial installation as an erosion control measure to protect the outside face of the earth-berm in order to reduce maintenance costs, time, and flood risk levels.

The CC was delivered to site in batched rolls of CC8™, unrolled and cut to specific profile length and fixed to the slope using steel pegs. The edges of the CC were then buried in anchor trenches at the crest and toe of the slope and backfilled with soil. Hydration was then given using water from the lake below.

The work was carried out by 6 people from the plantation, with help and guidance from one of Concrete Canvas Ltd's directors, Will Crawford.

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SLOPE PROTECTION

Project Info

- 01 / 04 / 16
- CC5™ Batched Rolls
- 40m²
- Vertical layers
- Sasebo City, Nagasaki Prefecture, Japan
- Murakami Kaihatsu Limited
- CC5™ was used to prevent shoreline erosion and weed suppression in Sasebo City, Japan

The slope prior to installation

In April 2016, Concrete Canvas® GCCM* (CC) was used to protect a slope along the shoreline in Sasebo City in the Prefecture of Nagasaki, Japan. The area was beginning to become overgrown with weeds and was eroding in places.

The area was approximately 5.5 metres wide by 7.3 metres in length, incredibly steep, and right on the shoreline, which presented some issues for the installation. A poured concrete retaining wall was considered, but this would need to be constructed under dry conditions, which could be difficult as the site was so close to, and leading into the water. However, as CC can even set under water, this was the best option, and was therefore chosen for the job.

The works were carried out by Murakami Kaihatsu Limited on behalf of the Sasebo City Government.

Ground preparation for the installation consisted of the removal of all existing vegetation in the area, before the CC was laid and fixed using galvanised steel pegs, anchor bolts and sealant. The CC was then hydrated from the water below with the aid of a hose.

Approximately 40m² of CC5™ was installed in just one day by three people, who had to work on ladders in order to install the CC safely due to the steep nature of the slope.

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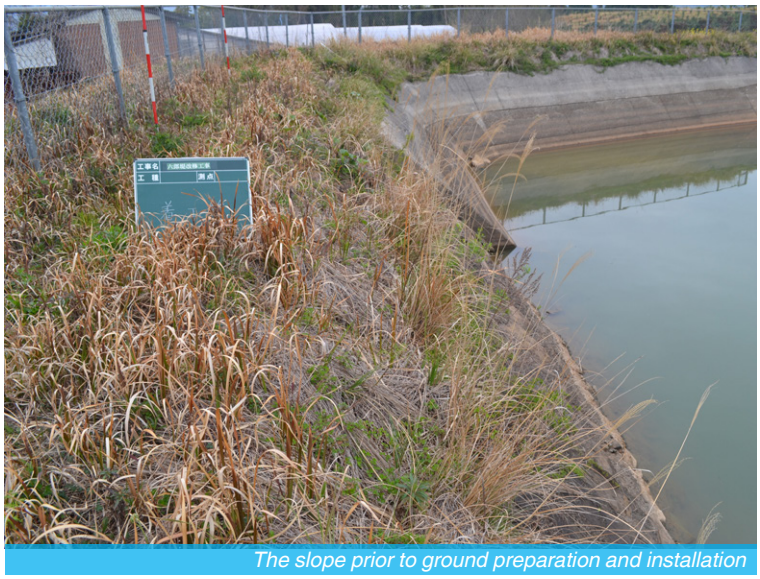
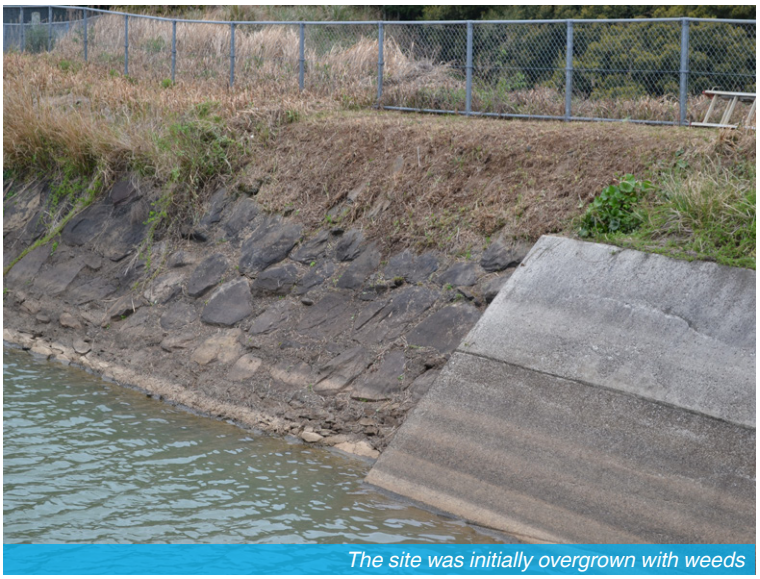
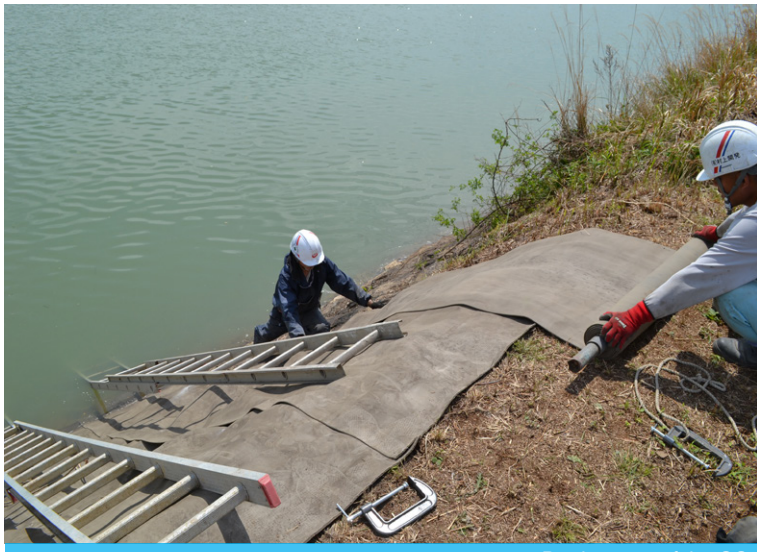
SLOPE PROTECTION



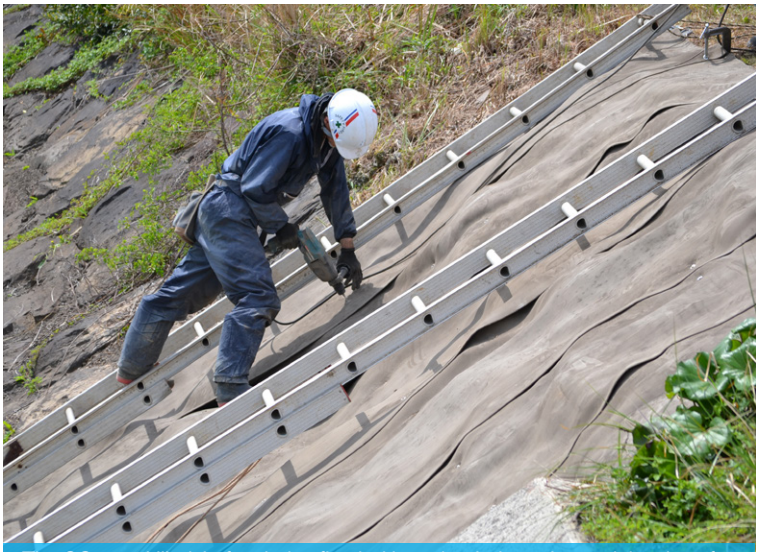
The slope prior to ground preparation and installation



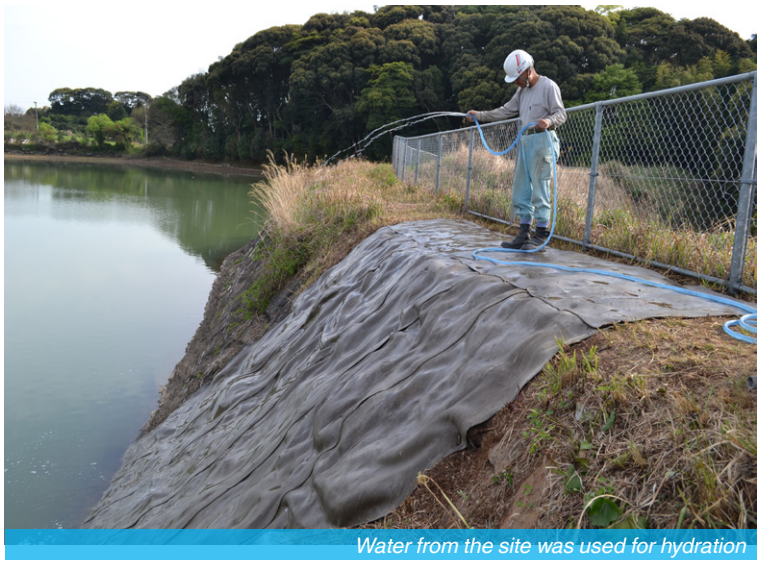
The site was initially overgrown with weeds



Deployment of the CC



The CC was drilled, before being fixed with anchor bolts to the partial rock surface



Water from the site was used for hydration

Completed installation

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