

Project Info

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CC CC8™ and CC13™ Bulk & Batched Rolls

837m² of CC8™ (Type II)
128m² of CC13™ (Type III)

V Transverse layers

G Glenridding, Ullswater, Cumbria

H 7-5 Engineer Regiment

i Re-lining of an existing channel on top of a tailings dam, using Type II & Type III GCCMs to prevent severe flooding & storm damage.

Lake District National Park



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Batch & Bulk Rolls of Type I & Type II Concrete Canvas® being delivered via a commercial helicopter

The use of Geosynthetic Cementitious Composite Mats (GCCMs) to provide durable surface erosion control solutions has increased globally in recent years, meaning the need to standardise the classification and define the intended uses has never been more vital. Users can now protect themselves by specifying GCCMs that conform to the only international specification standard for GCCMs, by using [ASTM D8364](#) 'Standard Specification for GCCM materials'. [ASTM D8364](#) is an essential tool for all GCCM users, making specifying the right product easier for the designer whilst ensuring they meet minimum performance requirements, helping to prevent project failures. [Concrete Canvas®](#) GCCM (CC) is the original GCCM and the first product to declare conformance to [ASTM D8364](#). GCCMs are flexible, concrete filled geotextiles that harden on hydration to form a thin, durable and waterproof concrete layer.

The CC lined channel at Greenside Mine at Glenridding, Cumbria, illustrates the importance of specifying the correct GCCM. Installed in August 2016, Both Type II (CC8™) and Type III (CC13™) GCCMs were used - Type II GCCMs are used for channel lining applications on medium dense subgrades, such as firm clays & compacted soils. Type III GCCMs offer increased durability in certain areas where scour or impact is more prevalent. As we see later on, the material has resisted significant erosion events over its operational life. The aim was to re-line an existing 200m long channel on top of a tailings dam to prevent damage from runoff during severe rain storms.

The project had multiple stakeholders; managed by the Lake District National Park Authority with significant support from the 7-5 Engineer Regiment under 4-2 Brigade, design input from the Coal Authority and the Environment Agency. The installation was completed over a ten day period. Various methods have previously been used to line the channel including dry stone walling and poured concrete. The Coal Authority, who provide geotechnical advice to the Lake District National Park Authority recommended the use of CC.



The channel prior to remediation



Large stones and debris were cleared to be re-used after CC installation



The 75 Engineer Regiment under 4 2 Brigade at work



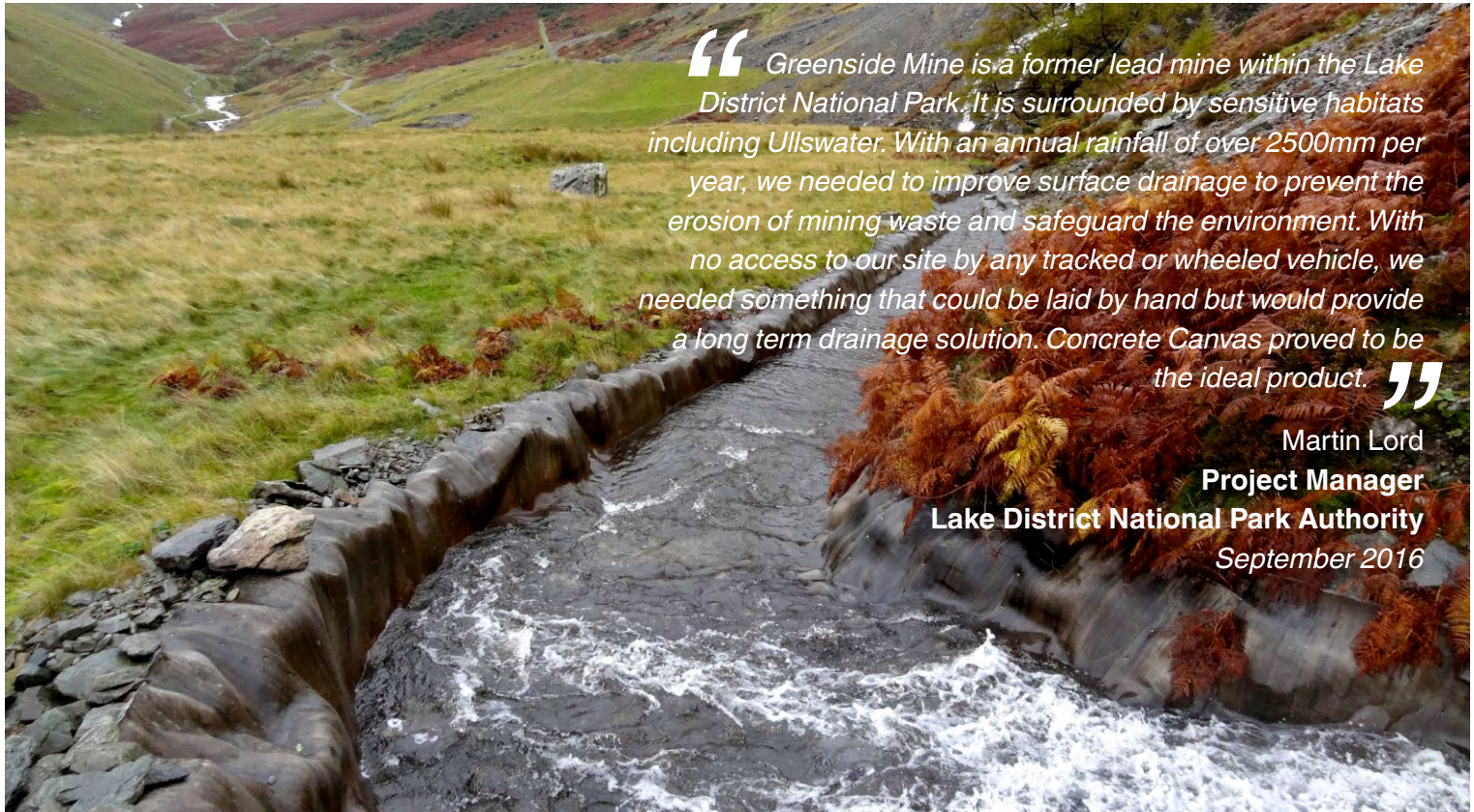
The site was extremely difficult to access, all work was carried out by hand



The completed lined channel at Glenridding, Ullswater



Two years later - May 2017 - the channel at Glenridding



“ Greenside Mine is a former lead mine within the Lake District National Park. It is surrounded by sensitive habitats including Ullswater. With an annual rainfall of over 2500mm per year, we needed to improve surface drainage to prevent the erosion of mining waste and safeguard the environment. With no access to our site by any tracked or wheeled vehicle, we needed something that could be laid by hand but would provide a long term drainage solution. Concrete Canvas proved to be the ideal product. ”

Martin Lord
Project Manager
Lake District National Park Authority
 September 2016

The installation five years later - October 2021 - CC is BBA certified with durability in excess of 120 years when used in erosion control applications.

Greenside Mine was, at one time, the UK's largest producer of lead ore and is now designated a Scheduled Monument as a result of over 150 years of continuous operation and evidence still being visible on the ground of the different mining techniques deployed over that time. Above the tailings dam, the natural scree habitat is designated as SSSI for species such as Juniper, rare mosses and ferns including the Parsley Fern.

Being such a sensitive location, arranging permitting was essential for planning permission, Environment Agency Licensing, LFRM, Scheduled Monument and SSSI Consent. This very complex permitting procedure, carried out by the Lake District National Park Authority was made much easier through the use of CC rather than poured concrete, and the fact that it could be installed by hand meant that (a) it was feasible, and (b) there was a very small on-the-ground footprint during deployment. Without the issue of re-bond that is present in more conventional construction methods such as shotcrete, CC proved to be a far more environmentally friendly option.

The mine site is on a steep hillside 2 miles up a remote track, presenting a number of logistical issues in regards to delivery. With no possibility of off-loading on site, the project manager organised delivery of palletised material by HIAB wagon to a point 500m away, with pallets then being flown into position by commercial helicopter. The rolls of CC8™ were batched to specific lengths to accommodate the different profile the channel takes along its 200 metre length. Concrete Canvas Ltd ensured that the hand-portable batch rolls were all labelled correctly and palletised to the customers' requirements into loads that each weighed less than 950kg, allowing them to be subsequently lifted and accurately positioned by helicopter. Getting the logistics correct was key to enabling a rapid delivery and the success of the project. With no wheeled or tracked machinery able to access the site, correctly positioning the pallets by helicopter meant the volunteer Army workforce was then able to focus on the installation of CC in the channel rather than waste time moving materials by hand.

Removal of some of the dry stone walls and overburden on one side of the channel took place prior to installation. The CC was trimmed using knives, and anchored to the ground using steel pegs and heavy rocks. The overlaps were jointed using stainless steel screws at 20cm centres. An army issue portable temporary 10,000 litre reservoir was used for hydration. In total, 837m² of CC8™ & 128m² of CC13™ was installed for this project.



The installation five years later - with an average rainfall of over 2500mm per year, 400mm fell in just six days at the end of October 2021.

CC8™ is designated as a Type II GCCM and CC13™ as a Type III GCCM, as defined in [ASTM D8364](#) - Standard Specification for GCCM Materials. [ASTM D8364](#) is the only internationally recognised GCCM specification standard and lists erosion control applications by three classifications, Type I, II & III, defining the minimum performance values required for each type based on the use of test methods that are specific to GCCM materials. ASTMs are an important resource for clients, consultants and contractors wishing to ensure the GCCM used on their project is fit for purpose. The performance properties of Concrete Canvas® GCCM materials have been independently tested with all products exceeding the performance requirements for Type I, II & III GCCMs respectively. Further information on [ASTM D8364](#) can be found [here](#).

The ASTM specification standard for GCCMs enables consultants and contractors to fulfil projects without being misled by manufacturers who provide performance data using inappropriate non-GCCM standards that may not represent the performance achievable in the field. Concrete Canvas Ltd is [ISO9001 certified](#); priding ourselves on the responsible sourcing and production of our products. CC is [BBA certified](#) with durability in excess of 120 years when used in erosion control applications.

“The concrete canvas is still working as effectively as when it was installed. We’ve had about half a dozen really heavy rainfall events since it went in and on every occasion the runoff from the hillside above the tailings dam has been intercepted and safely conveyed directly into the beck without causing any erosion of mine material. At the end of October 2021 the site received 400mm of rainfall in six days, the wettest week since Storm Desmond in December 2015. The Concrete Canvas performed exactly as it needed to and there was no erosion of any mine material.”

Martin Lord
Project Manager
Lake District National Park Authority