

SHU KONGPING PHOSPHORITE MINE
XINGSHAN, YICHANG, HUBEI PROVINCE

GEOTECHNICAL - RETAINING WALLS, REINFORCED SOIL

Product: Gabion, Green Terramesh[®], MacMat[®] R, Reno Mattress[®]

Problem

Shu Kongping mine is located in Xingshan, a county of western Hubei. Due to the mountainous landscape, some areas were in need of protection against rockfall and landslides from the accumulation of mineral waste residue in this phosphorite mine.

An additional hazard was the risk of flooding as a result of heavy rainfall. The client, Xing Fa Group, required a solution which would protect the landscape and infrastructure against these potential hazards, while also encouraging the establishment of natural vegetation.

Solution

A combination of solutions was required:

- Slope stabilisation by the use of retaining structures, soil reinforcement and slope re-profiling
- Run-off water canalisation and control
- Erosion protection on slopes
- Re-establishment of vegetation on vulnerable slopes

Working with the project team, Maccaferri proposed solutions to meet the clients requirements. Gabion mass gravity retaining walls were proposed to both retain the unstable slopes and also to channel the watercourse and run-off water. At the toe of the gabion wall the hydraulic forces could cause erosion and possibly undermine it. Therefore, the gabion wall was built upon an scour protection apron of Reno mattresses, providing a robust and long-term channel lining.

Higher on the vulnerable slopes, the geomat MacMat[®] R was used to increase the soil's resistance to erosion by providing an environment that enhances the growth of vegetation through the mat.

Where required by the slope reprofiling, Green Terramesh[®] was installed to reinforce the soil and to encourage a lush, vegetative finish; an important feature of Green Terramesh[®] and requirement of the client. Green Terramesh is an environmentally friendly modular system which is more rapid to install than traditional soil reinforcement systems. All components of the unit are factory fitted including face reinforcement, erosion control blanket and bracing struts to support the face at the right face angle. These components minimise assembly and installation time for contractors.

The gabion retaining walls and Reno Mattress[®] were delivered to the site flat-packed, assembled and then filled with stones to form flexible and permeable channel linings for erosion control.

Client:

XING FA GROUP

Main contractor:

GEOLOGICAL SURVEY AND FOUNDATION

Products used:

9568M2 GABION, 630 SET GTM, 11753m2 MacMat R,

Date of construction

Spring/Summer 2012



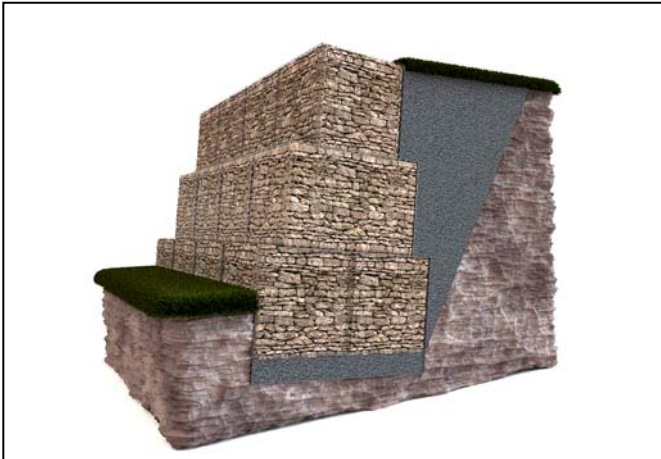
During construction of gabion walls, March 2012



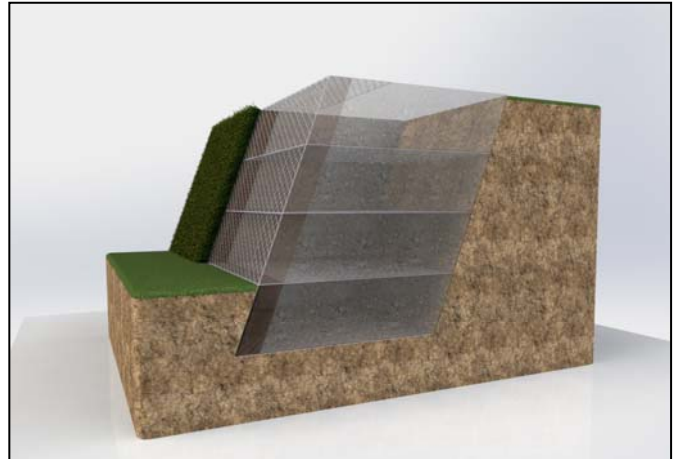
During construction, March 2012



During construction, May 2012



Schematic through typical gabion retaining wall



Schematic through typical Green Terramesh structure



After construction, May 2013



After construction, May 2013

An additional environmental benefit was that the gabions and Reno Mattress® were filled with site won rock fill, removing the need to import stone fill material and reducing truck movements in the surrounding area. This approach reduced the carbon footprint of the solution significantly.

Being free draining, gabion walls do not allow pore-water pressures to build up behind them. This is an ideal capability in when used in water courses, or where there is ground water movement.

Benefits:

The advantages of using steel wire double-twist mesh gabions, Reno Mattress® and Green Terramesh® are that they are flexible and allow differential settlements and movement without sustaining damage - essential in this challenging environment.

MacMat® R and Green Terramesh® provide a stable environment to re-establish vegetation and assist in the rehabilitation of the mine to the environment.

The Galmac/PVC coated mesh ensures the long term use is not compromised by chemical, biological or environmental degradation.



After construction, showing early plant growth, May 2013

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