

CASE STUDY

Gabions & Reno Mattresses

Project: Jimblebar Crossing of Fortescue River
Date: November 2008
Client: BHP Billiton Iron Ore
Engineer: MPD JV (Fluor and SKM)
Contractor: Macmahon (Specialist Gabion Installer: Nviroscope)
Location: Newman, Western Australia

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Smarter Infrastructure

Gabion Low Level Causeway

BHP Billiton Iron Ore was investigating the blending of ore from all mine sites at Newman. A southern rail turnout across the Fortescue River adjacent to the North Jimblebar Causeway was required so that ore from Ore Body 18 and Jimblebar could be taken directly to the Newman Mine site. Initially a high level causeway and a high level bridge were considered as being possible solutions to effectively get the rail turnout across the river. The costs for these two options were high and a less expensive lower level crossing option was investigated.

It was later proposed that a low level causeway be constructed with a Gabion weir on the downstream edge of the formation. The crest of the weir would generally be 0.6m to 0.75m above the top of the formation level. It would protect the ballast from the high velocity flow (approx. 4.4m/s) across the top of the crossing during flooding by causing the floodwaters to back up. It was also proposed that the 1:3 downstream batters be protected against scour using Gabion mattresses.

The design of the causeway was carried out to ensure that the storage between the proposed and existing causeways is filled with water prior to overtopping occurring. The head drop across the proposed causeway was also kept as low as possible to assist in reducing the instance of flood damage. In March 2009, before the rail formation had been constructed, a major flood event occurred. The entire 1m height of the Gabion took the full force of the floodwater. If the formation was in place, only 0.6m of the Gabion would have been exposed. The Gabion weir was able to cope with the inundation and dissipate the energy sufficiently to resist any flood damage.

The project tender technical documentation stated that the Gabion work shall only be undertaken by specialist installers, approved and certified by Geofabrics Australasia and highly experienced in this work. A sample group of Gabions were also required to be constructed on site to be used for quality control purposes throughout the duration of the Gabion works. Only once these units had been inspected by relevant parties (including the Gabion manufacturer's representative), and deemed to have been constructed to the acceptable standard, could the main gabion works be undertaken.



Mechanical means used to assist in the rock packing process



Terramesh panels to anchor the Gabions into the embankment



Assembly and filling of the Gabions

Quality - Support - Expertise

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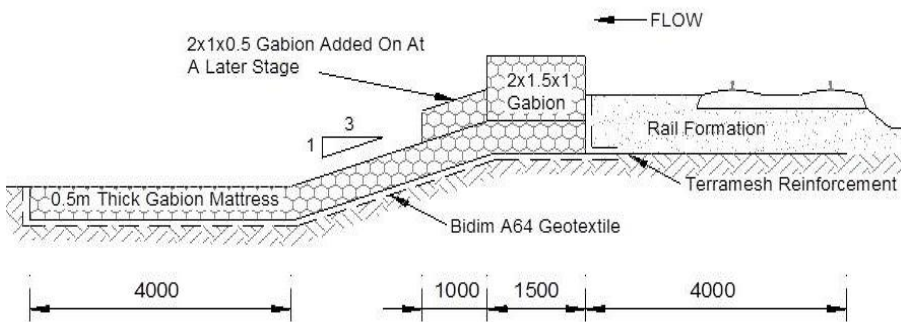


The 980m long Gabion low level causeway being tested during a flood event – March 2009
There was no maintenance required to the structure once the flood waters had receded.

Approximately 1,800m³ of Gabions, 10,500m² of 500mm deep Gabion Mattresses and 12,000m² of woven Terramesh soil reinforcement was installed. All woven mesh products specified in the project documents were Galmac (95%Zinc 5%Aluminium Alloy) + PVC coated to the most stringent national and international standards. A valid British Board of Agrément (BBA) certificate was provided as part of the QA documentation.



The Gabion causeway protection – March 2013



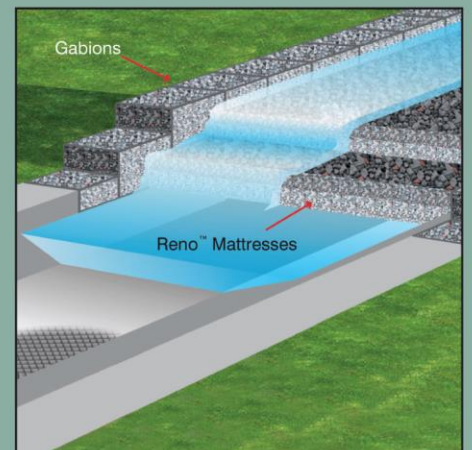
Typical section of the Gabion weir rail formation protection

How Gabions and Reno™ Mattresses work

Gabions and Reno™ Mattresses are a trusted and technically sound way to retain earth and combat soil erosion. They have been used in Australia for the past 50 years, in locations ranging from remote mine sites to urban parklands. They both have a steel wire structure designed for maximum long-term durability, and are supported by a range of design software and installation tools.

Gabions are rectangular woven wire mesh baskets filled with rock to create flexible, permeable structures such as retaining walls for mining, industrial and road projects. They are also used for erosion control, bank stabilisation, architectural and urban design features, and weirs.

Reno™ Mattresses are thinner flexible cages made from double twisted woven wire mesh, filled with rock and divided into cells to limit movement of the rock fill during high-flow conditions. Because of their flexibility **Reno™ Mattresses** are used mainly for hydraulic applications such as weirs, scour protection along riverbanks, and embankment stability in channel linings. **Reno™ Mattresses** can handle water flows in excess of 6 m/sec for long durations.



Gabions and Reno™ Mattresses Installation