

**MAGOEBAKLOOF ROCKFALL PROTECTION**  
MAGOEBAKLOOF, LIMPOPO PROVINCE

**ROCKFALL PROTECTION SYSTEMS / DRAPERY SYSTEM & WALL BARRIERS**

**Product:** Gabions and Double Twist Wire Mesh

**Problem**

The Magoebaskloof Pass is a scenic tourist route which runs from the top of the northern reach of the Drakensberg Mountains to the lowlands bordering private game reserves and the Kruger National Park.

In late January and early February 2000, the region was devastated by cyclone Elina which resulted in continuous heavy downpours with some areas receiving up to 4000mm of rain.

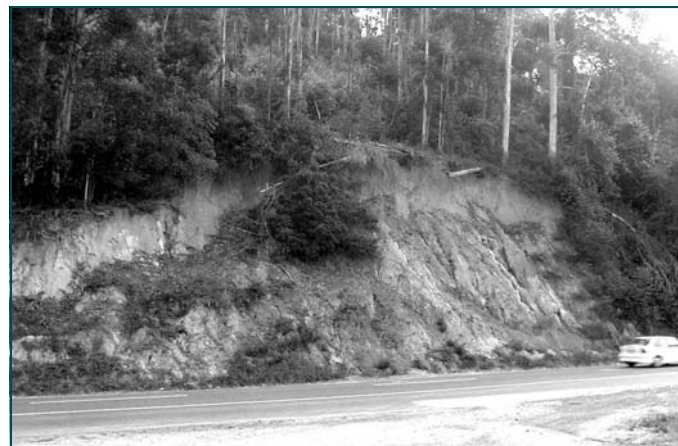
The intensity of the rainfall and the subsequent runoff resulted in the creation of some 30 individual landslides along the 5,5km Pass. This prompted the authorities to declare it a disaster area and because of the strategic importance of the Pass and the danger imposed to motorists, fast tracked remedial measures were sought.

**Solution**

The cut landslides were characterised by very steep slopes, poor vegetal cover, thickness of sandy mantle and lack of cut-off drains at the crest of the slope. The situation would deteriorate and unravel in time if left unattended.

Design considerations for the rehabilitation works included the need to implement rapid remedial measures, accommodation of traffic during the construction phase of the project, difficult access, environmental concerns, need to employ unskilled labourers from the local community and the adoption of a rehabilitation system that was both flexible and durable.

After careful evaluation of the design criteria, the specialist geotechnical consultants proposed the use of gabions, double twist wire mesh rockfall netting and lateral support in the form of soil nails as it fulfilled the economic, geotechnical, social and environmental demands inherent in the project.



Before construction

Date: Feb 2000



During construction



View behind gabion wall barrier

Date: June 2001

Client name:

LIMPOPO ROADS AGENCY

Main contractor name:

HILLARY MASINGITA & DURA PILING

Consultant:

MOORE SPENCE JONES

Product used:

12 500m<sup>3</sup> OF GABIONS & 12 000m<sup>2</sup> OF WIRE MESH

Construction info:

Construction date:	FEBRUARY 2001
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Completion date:	2001
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Over the steep exposed rock slopes, where there was a chance that loose rock could fall off the slope and endanger passing motorists, double twist mesh was fixed to the slope using short rock dowels.

At the toe of these slopes, PVC coated gabions were placed in rows with a maximum height of 3m and fixed to the existing bedrock with dowels. These structures served as gabion wall barriers due to their high energy absorbing properties when impacted upon by falling rocks.

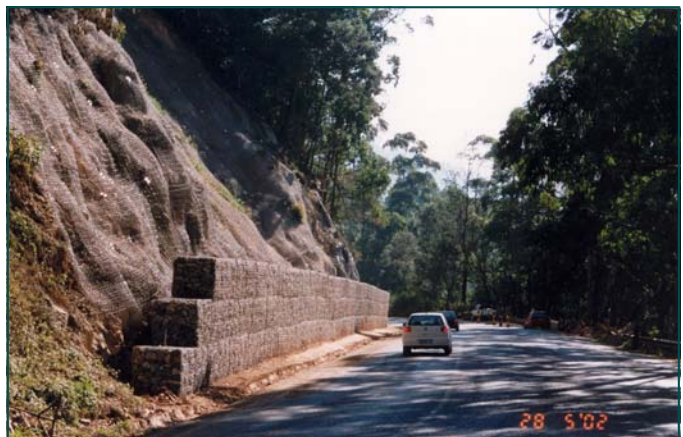
A passive tie back system combining the use of soil nails and gabion baskets were also introduced along various sections of the cut landslides. This somewhat unique system involved attaching the pre-driven soil nails to steel channel sections located on the outer face of the gabion, thus avoiding the need to excavate and compact selected fill as required by the more traditional reinforced soil systems.

**Benefits**

- The use of gabions and woven wire rockfall netting contributed to the labour-intensive remedial measures required in Magoebaskloof and consequently aided in absorbing all of the unskilled labour within the area.
- Maccaferri's dedicated training programme adopted at Magoebaskloof resulted in the transfer of skills to the local community, enabling them to continue working on a further three projects in the Magoebaskloof / Tzaneen area.
- The woven wire used for the rockfall netting is extremely flexible in all directions and will not unravel in the event that some of its wires are accidentally damaged, thus providing a higher level of safety when compared to chain link mesh.
- The construction of the passive tie back systems did not require extensive excavation, allowing traffic to flow freely at all times. The rockfill used in the composite system resulted in a free draining structure.
- The stone beam effect created by the rockfill inside the gabion was exploited to assist in distributing forces associated with ground movement back into the soil nails. The overall efficiency of this system was significantly greater when compared to conventional tie back systems, mass gravity or reinforced earth structures.
- From an environmental standpoint the gabion / soil nail retaining structures along with the rockfall netting and re-vegetation of the remediated slopes resulted in an overall aesthetically pleasing solution which blended into the natural beauty of the surrounding area.



**Rockfall netting/rock dowel connection detail** Date: June 2001



**After construction** Date: May 2002



**After construction** Date: May 2002

**Maccaferri SA (Pty) Ltd**

**HEAD OFFICE - DURBAN, SOUTH AFRICA**  
P O Box 15777, Westmead, 3608 Tel: +27-31-700 8456 Fax: +27-31-700 8469 e-mail: dbnsales@maccaferri.co.za

**JOHANNESBURG, SOUTH AFRICA**  
P O Box 2285, North Riding, 2162 Tel: +27-11-704 0160 Fax: +27-11-704 0159 e-mail: jhbsales@maccaferri.co.za

**CAPE TOWN, SOUTH AFRICA**  
P O Box 22150, Fish Hoek, 7974 Tel: +27-21-702 1416 Fax: +27-21-702 2977 e-mail: cptsales@maccaferri.co.za

**MADAGASCAR**  
BP 168 Antananarivo 101, Madagascar Tel: +261-20-22-231 02 Fax: +261-20-22-553 90 e-mail: maccaferri@moov.mg

[www.maccaferri.co.za](http://www.maccaferri.co.za)

