

## ROCKFALL MITIGATION WORKS- DHAULIGANGA HEP STATION, UTTARAKHAND TAPOVAN, DHARCHULA, UTTARAKHAND, INDIA

### Dynamic Barriers

#### Problem

Dhauliganga dam which is part of the hydroelectric project is constructed over Dhauliganga River in Uttarakhand, India, close to the borders with Tibet and Nepal. Rockfall is a major problem at the dam site especially at the entry gate, and the control room and site offices adjacent to the entry gate. The surface morphology shows that the moderately fractured weathered rock with vegetation over the slope. The exposed slope is formed with weathered rock strata were subjected to rainfall during the monsoon seasons. These rainfall infiltration when accompanied along with the erosion factors and the steepness, triggers the rock detachment. In the previous rockfall event, the site offices and the control room were damaged by the shooting stones.

Even though shotcreting along with rigid fences were provided by the client for the bottom part of the slope near the road, these measures was not enough to cater the problem since the source of the rockfall is from the upper reaches of the slope. Hence, a suitable rockfall protection measures were required to address the problem above the shotcreted area.

#### Solution

As per the site observations and previous history of rockfall events, the stretch above the buildings have been identified as the critical location based on the trajectory analyses and proximity to the structures for maintenance. Rocfall software (of RocScience) is used for the simulation of probable trajectories and in the analysis and design of rockfall barrier and two lines of dynamic rockfall barriers of nominal capacity 3000kj and 5m height have been proposed for stretch lengths of 40m and 80m, at the height of 55 to 75 m(varies) above bottom road to mitigate the risk of rock detachments from upslope locations from affecting the structures at the toe.

The dynamic rockfall barriers installed are EAD certified and comprise of primary interception mesh of MacRing (Ring Net) and secondary interception mesh of DT Mesh.

**Client:** National Hydroelectric Power Corporation(NHPC) Limited

**Designer / Consultant:** Maccaferri Environmental Solutions Pvt. Ltd.

**Contractor:** Maccaferri Environmental Solutions Pvt. Ltd.

#### Products used (Qty.)

- Dynamic barrier RMC 300/A 120 RM (80 RM+40 RM)

**Date of construction:** 04/2022 - 06/2022



Figure-1 Activities related to installation of barrier posts



Figure-2 Rockfall barrier post erection completed





Figure-3 Installation of primary interception mesh (MacRing)



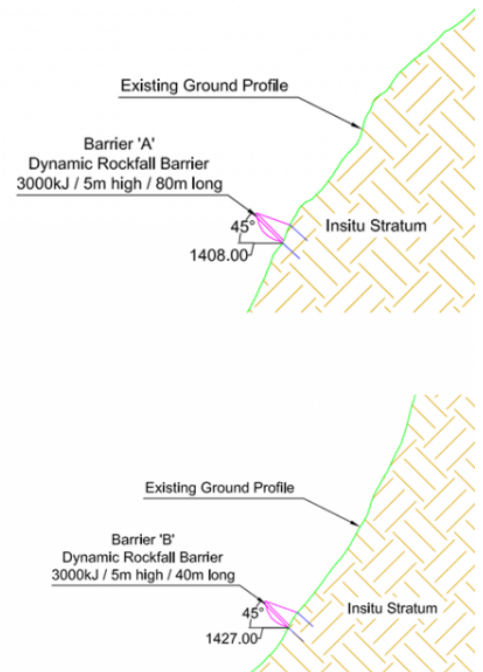
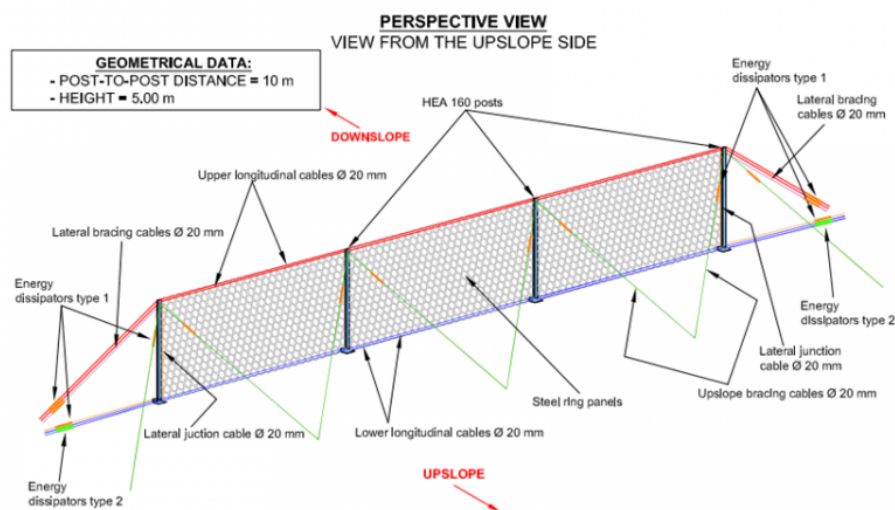
Figure-4 Installation of Secondary mesh (DT mesh) on upslope side of MacRing



Figure-5 Top view of installed Rockfall barrier



Figure-6 Front view of installed Rockfall barrier



## DETAILS OF ROCKFALL BARRIER

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