

## ROCKFALL MITIGATION WORKS- MAT - TEESTA STAGE-III HEP, SIKKIM SINGHIK VILLAGE, MANGAN, SIKKIM, INDIA

### Dynamic Barriers

#### Problem

The Teesta Stage-III HEP(1200 MW) is located along Teesta river in the Mangan District of the state of Sikkim with a 60m high concrete faced rockfill dam at the Chungthang village and the power house site at Singhik village. The project utilizes the fall of the head in the river course, of about 800 meters between these two villages.

Rockfall is a major problem at the dam site, especially in the vicinity of spillway tunnels, chute spillways and main access tunnels of the powerhouse. The surface morphology shows that the moderately fractured weathered rock with vegetation over the slope. The exposed slope is formed with weathered rock strata that were subjected to rainfall during the monsoon seasons. The rainfall infiltrations when accompanied by erosion factors and steepness, trigger the rock detachment which threatens the dam's infrastructure and people. During past rockfall events, the dam infrastructures were damaged by the shooting stones. Hence, suitable rockfall protection measures shall be proposed to address the problem.

#### Solution

As per the site observations and previous history of rockfall events, the critical location above the main access tunnel(MAT) portals for power house has been identified based on the trajectory analyses and proximity for maintenance. Rocfall software (of RocScience) is used for the simulation of probable trajectories and in the analysis and design of rockfall of nominal capacity 5000kj and height 7m of 100m above the MAT portals to mitigate the risk of rock detachments from upslope. In addition, cable belting above the right portal location was done in order to hold the unstable large rocks onto the slope face.

The dynamic rockfall barriers installed are EAD certified and comprise of a primary interception mesh of MacRing (Ring Net) and a secondary interception mesh of DT Mesh. Skirting arrangement has been adopted wherever applicable. These rockfall barriers have a braking system, which maintains performance throughout the entire design life of the structure and are easy to visually inspect by maintenance engineers as it progressively deforms once the barriers are impacted.

**Client:** TEESTA URJA LIMITED

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

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

**Products used (Qty.)**

- Dynamic Barriers RMC 500/A 100 RM

**Date of construction:** 12/2021 - 04/2022



Figure-1 Initial site condition



Figure-2 Shifting and drilling activities





Figure-3 Installation of posts



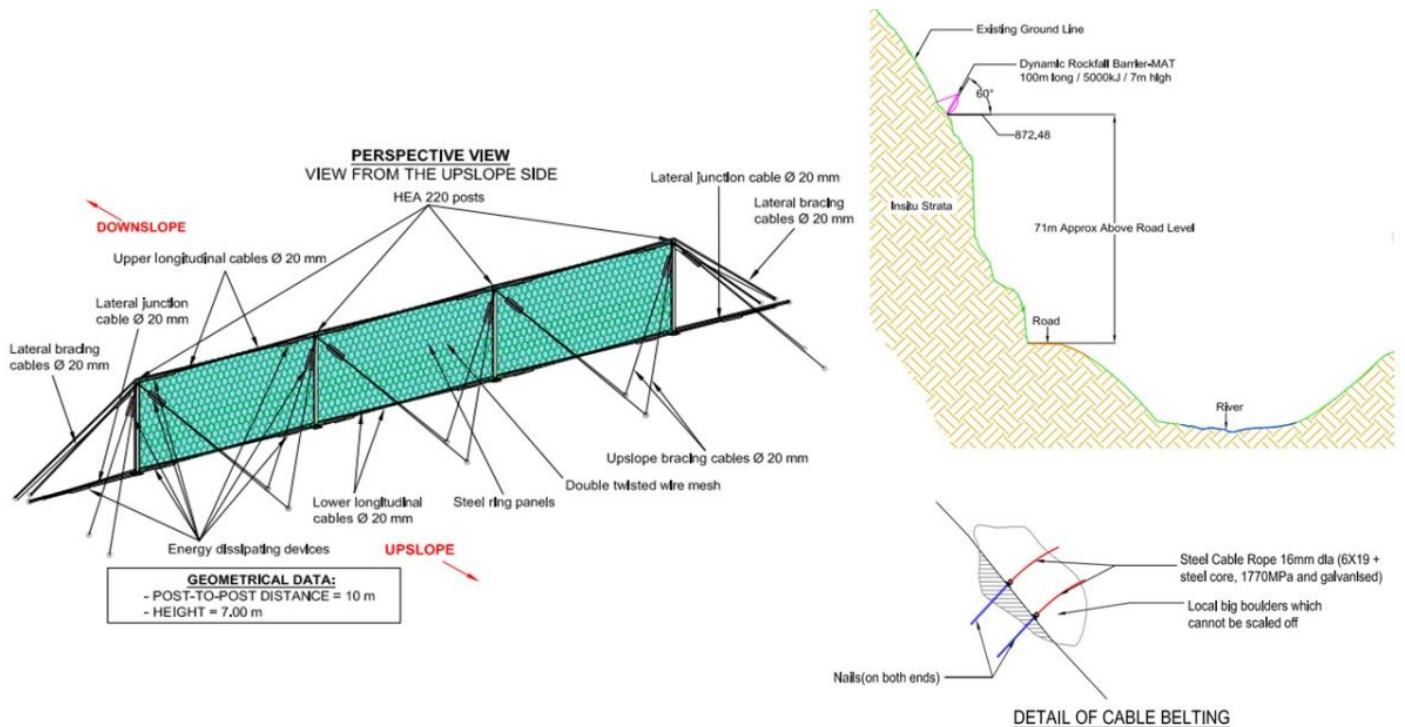
Figure-4 Installation of interception meshes and skirting arrangement



Figure-5 Installed Rockfall barrier



Figure-6 Overall view of slope after the installations of Rockfall barrier



## Scheme

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