

BACKGROUND

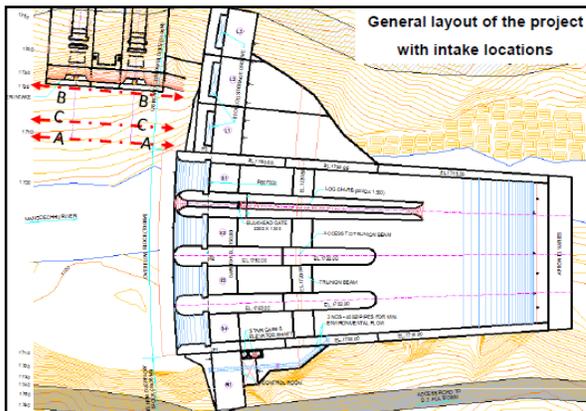
NHPC Ltd. has proposed to implement Mangdechhu H.E. project (720 MW) on Mangdechhu river, Bhutan. Since the project is based in the Himalayan region, live storage of the reservoir is likely to be filled with sediment in a short period. In order to restore the live storage, annual flushing of reservoir through low level sluice spillway is planned. Mangdechhu HE Project is envisaged as a run-of-the-river scheme for providing peaking power.

OBJECTIVES

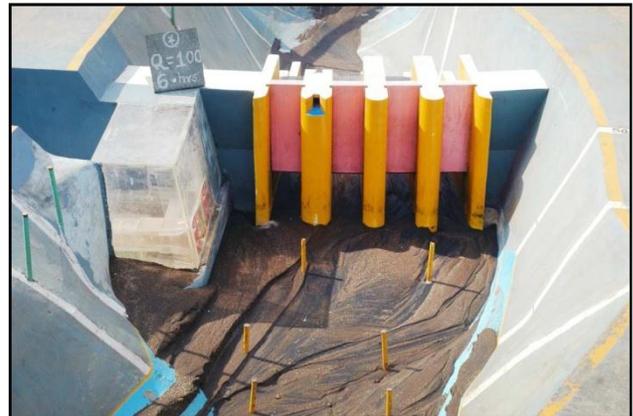
- To optimize the flushing operation vis-à-vis flushing discharge and duration and finalizing location of intake with regard to sediment deposition pattern.

STUDIES CONDUCTED

- Reservoir flushing was simulated in a 1:100 Geometrically Similar (GS) scale model of dam and reservoir of Mangdechhu H E Project.
- To optimize the flushing operation, simulations were carried out with flushing discharge varying from 100 to 300 m³/s for various durations (6 hrs, 12 hrs, 24 hrs etc.).
- Experiments were also conducted with three alternatives for intake alignment; viz., A-A (Intake aligned with left abutment of spillway), B-B (Intake shifted 25 m towards left bank) and C-C (Intake shifted 10 m towards left bank).



Alternatives alignment for Intake



Photograph of model showing final alignment

OBSERVATIONS

- The amount of sediment flushed varied between 0.18 to 0.24 Mm³ (55 to 72%) for discharge varying between 100 to 300 m³/s.
- It was observed that for higher discharges of 200 and 300 m³/s, there is not much increase in the quantity of sediment flushed beyond 6 hours. Therefore, it was suggested that, for optimum operation of the reservoir, flushing with higher discharges may be carried out for less than 6 hours duration only.
- For alignment of intake, the alternative A-A was best from sediment deposition criteria. However, the alternative C-C, which was marginally inferior was selected for implementation due to geological conditions.

SIGNIFICANCE OF THE STUDIES

- The studies helped in optimizing the flushing operation so that power plant can be shutdown for minimum duration, thereby increasing the power production.
- The alignment of Intake was finalized from the sedimentation perspective taking into account the existing geological conditions at the project site.