

Case Study: Treig Dam

Physical Model Testing of Spillway for Halcrow Water

The Dam

Treig Dam is a rockfill embankment dam approximately 12m high. The spillway is located on the embankment with the spillway crest formed by the top of the core wall. The flow passes down the spillway over concrete slabs cast directly on the rockfill, which forms the sloping downstream face. The width of the spillway decreases from 100m at the crest to 45m at the roller bucket along the toe. Side training walls and baffle walls are used to guide the flow down the spillway.



The Concerns

- Original design flood peak outflow 215m³/s but recent estimates indicated PMF 624m³/s
- Flood Stability Assessment Report raised concerns that high flood flows could cause excessive erosion at the toe of the spillway resulting in:
 - failure of protective sheet pile wall beneath the toe of the dam
 - loss of embankment fill from beneath the concrete slabs
 - endangering the structural integrity of the dam.



The Work Programme

The model testing was required to assess the performance of the spillway under the revised potential flood flows to ensure that the spillway was capable of safely passing the PMF and to investigate the problem of erosion immediately downstream of the toe.

A 1:30 scale model of the Treig Dam was constructed to assess the performance of the spillway at a range of discharges up to the equivalent to the 1 in 10000 year peak flood and the Probable Maximum Flood (PMF). The installation of a mobile bed section enabled the extent and magnitude of the erosion of the downstream terrain to be investigated.

Stage 1: A series of tests on the existing arrangement of the dam and spillway. As a result, modifications were made.

Stage 2: The complete programme of tests was repeated. Further adjustments were then made.

Stage 3: Tests were carried out at the 1 in 10000 year flood flow and at the PMF on the final recommended arrangement.



A rockfill apron positioned immediately downstream of the roller bucket was found to prevent severe erosion of the bed material local to the spillway at discharges up to the PMF. This ensured that a sheet-piling wall previously installed along the toe of the spillway would be protected. Structural modifications were recommended to contain the flow within the confines of the spillway.

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