

Tillegra Spillway Study

Williams River at Tillegra, Hunter Region, NSW

Background

NSW Public Works' Dams and Civil group was commissioned by Hunter Water Corporation to undertake detailed design for the new Tillegra Dam. As part of this investigation Manly Hydraulics Laboratory was commissioned by Dams and Civil to conduct a 3D physical model study to evaluate the hydraulic performance of the proposed spillway chute design. A computational fluid dynamics (CFD) analysis was also undertaken.

Project Scope

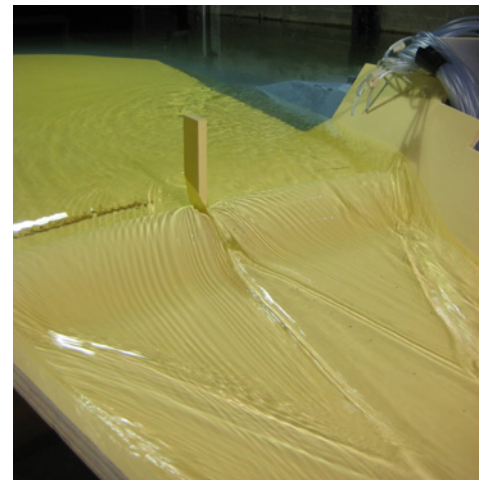
The aim of the study was to carry out physical model testing of the proposed Tillegra Dam spillway to evaluate and verify the adequacy of the proposed designs to safely accommodate spillway discharges up to $1495 \text{ m}^3/\text{s}$ (PMF); as well as a preliminary 3D numerical analysis on the spillway to identify complex issues related to the hydraulic design.

Our Role

MHL constructed a 1:60 scale physical model of the proposed Tillegra Dam spillway, approach channel, flip-bucket dissipater, plunge pool and downstream channel. The testing program included discharge rating, water surface profile, velocity measurement and static pressure on the chute. A 3D numerical model was also generated with appropriate boundary conditions to resemble physical model conditions.

Outcomes

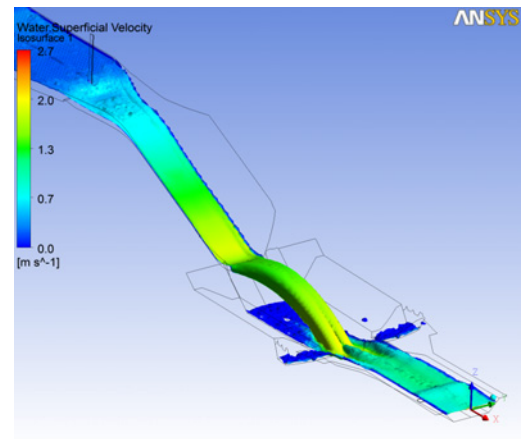
Modifications focused on the optimisation of the flip bucket exit angle to improve conditions in the plunge pool and downstream channel. As for the 3D spillway analysis, the results provided an insight of the general hydraulic behaviour of the flip-bucket, jet angle and location of the jet impact.



Crest and upper chute flow pattern



Spillway chute and plunge pool



CFD simulation of the spillway