

Tillegra Intake Tower CFD Analysis

Williams River at Tillegra, Hunter Region, NSW

Background

Public Works' Dams and Civil group was commissioned by Hunter Water Corporation to design the new Tillegra Dam on the Williams River. This dam plays a key role in securing the water future of the lower Hunter and Central Coast regions for the next 60 years. As part of this investigation Manly Hydraulics Laboratory was commissioned by Dams and Civil to conduct 3D Computational Fluid Dynamics analysis of the intake tower.

Project Scope

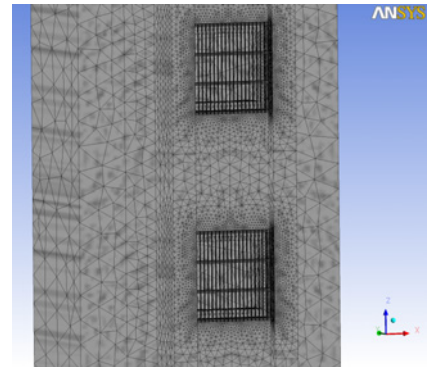
The aim of the Intake Tower Study was to investigate the flow behaviour around the tower, water temperature and water quality component through different configurations of aperture and closure of ports/gates in what is a complex stratified system.

Our Role

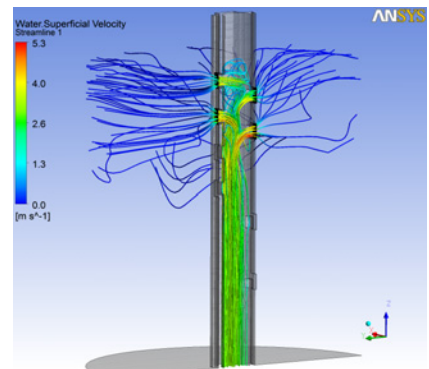
MHL extracted the 3D fluid region which contained the intake tower, reservoir and ports location. Appropriate boundary conditions including water quality and temperature profiles were specified. A free surface homogeneous multiphase option was implemented. A number of cases were run to examine representative scenarios of varying flow and port intake positions for selective withdrawal.

Outcomes

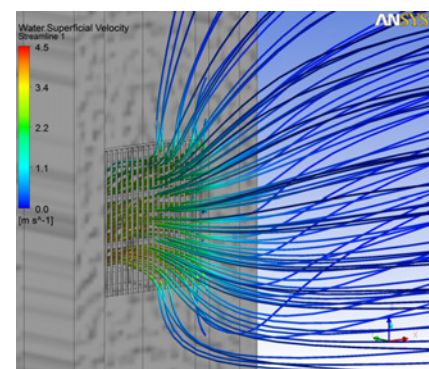
Results obtained from the CFD model showed that the hydraulic behaviour of the intake was consistent with the specified design requirements. It was also found that the position of the withdrawal port relative to the thermocline had an influence on flow behaviour and water quality as a result of buoyancy effect.



Mesh resolution of trashrack and around intake tower structure



Velocity streamlines during four ports aperture



Close-up of velocity streamline around port