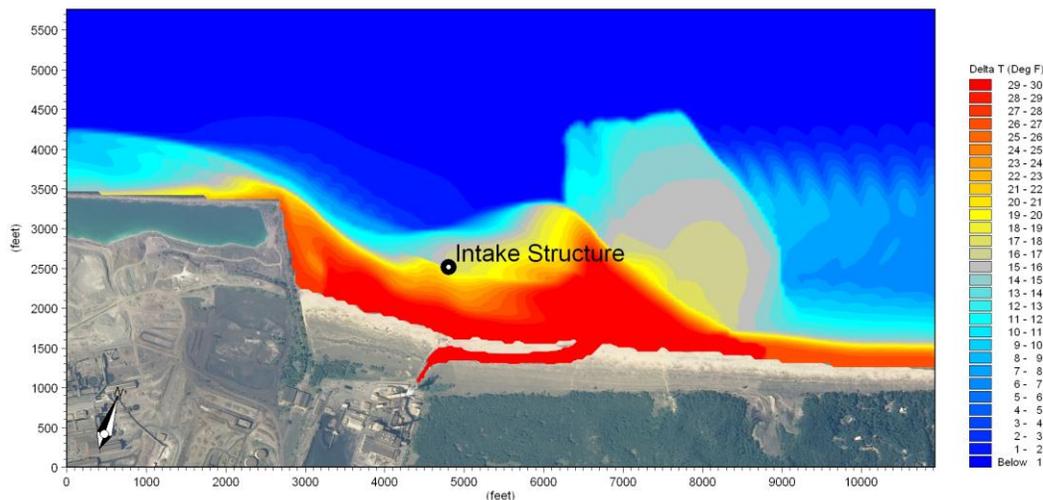


3D Modeling Used to Evaluate Environmental Impacts from a Cooling Water System on Lake Michigan

[Baird & Associates](#) were retained to conduct an assessment of the thermal impacts from a cooling water system on ambient conditions in Lake Michigan. Specifically, the objectives of the study, included: an evaluation of near shore water temperature distribution created by the existing cooling water outlet channel, quantification of the thermal impacts at the existing water intake location, evaluation of various alternative discharge channel configurations, and recommendations on the most feasible option. A morphological analysis was also conducted in order to examine shoreline evolution and quantify sand accretion rates in front of the constructed discharge channel.

A combination of near-field and far-field modelling techniques were utilized to assess near shore thermal impacts. The mixing model CORMIX was used to simulate near-field mixing and initial dilutions, while the three-dimensional hydrodynamic model [MIKE 3](#) was used to simulate far-field transport and mixing. Developed by [DHI](#), MIKE 3 is a comprehensive software system designed for the simulation of three-dimensional flows and environmental processes where stratification due to density variations, such as thermal discharges, is an important phenomena to simulate. The strength of MIKE 3 is in evaluating the movement of the heated effluent plume throughout the model domain where spatially varying current conditions may exist due to shoreline features, coastal structures, irregular bathymetry and forcing mechanisms such as wind. The MIKE 3 model is also capable of simulating the cumulative impacts due to recirculation, which can cause short-circuiting in the cooling water process. For this study, the MIKE 3 model was run for a range of ambient current and wind conditions, the results were then analysed and presented as maximum spatial temperature plots.



Conceptual design options and probable estimates of construction costs were prepared for each alternative. A preliminary feasibility analysis was also conducted for a 2,000 ft water intake relocation option.

For more information on how MIKE 3 can help you to meet your 3D coastal and marine water modeling needs, please visit www.dhigroup.com, send an email to dhi-us@dhigroup.com, or call our Toll Free North American number at 1-888-344-9233.

For more information about this project or about Baird and Associates please visit their website at www.baird.com or contact Mike Fullarton at mfullarton@baird.com.