



Combining Geophysical Tools With Coastal Hydrodynamic Modeling

Our company was contracted to evaluate the impacts of constructing a new commercial wharf in Cove Bay, Anguilla. The client was planning to construct a ~200 meter-long wharf at the project site, and requested an analysis regarding the proposed wharf's potential effects on local current flow and sediment transport. A combination of extensive in-situ current and sedimentary measurements and comprehensive computer hydrodynamic modeling was utilized to help predict the effect of building the structure. Electrical resistivity was incorporated along the shoreline and offshore in order to map the depth and distribution of sands and limestone for construction purposes. Extensive hydrodynamic modeling was implemented to simulate present conditions as well as how current patterns and sediment transport would potentially change as a result of the addition of the structure. Modeling included M2D simulations using tidal forcing as well as steering modules which incorporated M2D and STWAVE (a 2D wave simulation model), allowing for both low and high energy conditions to be simulated. The comprehensive modeling and in-situ measurements indicated that under normal, low energy conditions the new structure would have little to no effect on beach processes. The introduction of large waves into the system indicated that during potential storm conditions a significant amount of erosion would occur in specific zones along the shoreline. The new wharf was observed to create a zone of deposition in the area directly surrounding the structure. The levels of deposition and scour were quantified, and the results have helped to aid in re-designing the wharf to account for its potential effects on sediment transport.

