



PROJECT DESCRIPTION

Coldwater was contracted by Leap Engineering LLC to assist in the design of shore protection that also created wetland habitat along the Pleasure Island shoreline downstream of the Martin Luther King Bridge in Port Arthur, Texas. The focus of the work was to assess ship-generated flows and to optimize the project design.

PROJECT APPROACH

Coldwater's proprietary Ship-Generated Hydrodynamics (SGH) numerical model was used to estimate flow conditions generated along the shore for existing conditions and in the presence of a new proposed revetment scheme. The SGH model allows the input of detailed channel geometry, specific vessel hull shapes, and variable sailing paths in the channel. In addition to drawdown and wakes, SGH can also model flows from multiple propellers and/or bow-thrusters using a coupled jet-flow module. An important capability of the SGH model for this project was its ability to model the wetting and drying processes that can occur in shallow regions.

Ship traffic in the waterway is dominated by push-barges and liquid bulk cargo carriers. Since wake conditions along the shoreline are highly dependent upon vessel speed and vessel size, a Suez-max size bulk liquid cargo carrier was selected as the design vessel for this study. This vessel had an overall length of 247 m and a beam of 41 m. A draft of 8.8 m was used for outbound vessels, whereas drafts of 10.0 m and 11.4 m were used for the fully-laden inbound vessels.

The wetland habitat design was composed of four gaps in the shore protection leading to a series of interconnected channels. The design takes advantage of the flows generated by passing vessels to provide sufficient flushing action to ensure adequate water quality in the wetland area. SGH modelling was employed for several purposes: wakes and currents on the exposed revetment were used to estimate design conditions for the shore protection schemes, currents in the channels were analysed to determine scour protection requirements and flushing rates. The cross-sectional geometry and gap configurations were optimized to provide adequate flushing while keeping velocities behind the revetment sufficiently low to prevent scour.

CLIENT

Leap Engineering LLC

LOCATION

Port Arthur, TX

DATE

2008