

Studying Engineering Alternatives

At a Glance

On April 10, 2012, after in-depth study and analysis, the U.S. Army Corps of Engineers, Savannah District released the Final General Re-evaluation Report (GRR) and Environmental Impact Statement (EIS) on a proposal to deepen the Savannah Harbor from its current depth of 42 feet down to 47 feet.

The congressionally-authorized study reflects an extensive analysis of the engineering alternatives, environmental issues, and economic costs and benefits of deepening the Savannah Harbor and shipping channel. Funded by the federal government and the state of Georgia, the study examined the characteristics of future international shipping fleets, current and future trade routes, and the capacity of the Garden City terminal on the Savannah River. The articles in this issue provide an in-depth explanation of the engineering, environmental, and economic aspects of the project.

The next step is for the Departments of the Army, the Interior, Commerce and the Environmental Protection Agency to sign the Record of Decision—expected in late 2012—before construction begins.

Since the last major navigation improvements were completed by the Savannah district in April 1994, the Savannah Harbor has experienced significant growth in containerized cargo volume, vessel traffic, and the size and frequency of container ships calling at the port.

A study concluded by the Corps recommends deepening the harbor from its current authorized depth of 42 feet down to 47 feet. It also identified improvements to increase the efficiency and safety of cargo vessel operations. The study identified and evaluated alternatives to:

- Reduce congestion and improve the efficiency of operations for container ships within the navigation channel;
- Accommodate recent and anticipated future growth in containerized cargo and container ship traffic from deeper draft vessels expected to call on the port in Savannah.

The Final GRR and EIS has selected the 47-foot depth of the “National Economic Development” Plan because it yields the highest annual net benefit of all alternatives studied.

Navigation Features

Piloting cargo vessels in and out of the port of Savannah requires carefully timed passage and skillful maneuvering. Using computer models of water and wave actions, computer-simulated ship movements, and engineering analysis—all specific to the Savannah River entrance channel and harbor—the Corps devised navigation features to accommodate the next generation

of deep-draft container ships expected to call on the port. Navigation features of the Savannah Harbor Expansion Project include:

- Extending the harbor entrance channel across the ocean bar an additional 7.3 miles
- Constructing meeting areas, which allow larger vessels to pass, at Long Island and Oglethorpe Ranges. Projections also consider the growth of future vessel designs
- Widening Kings Island Turning Basin to accommodate the larger ship dimensions
- Widening the channel at three bends in the river to allow the larger ships to navigate safely

River Banks

Geotechnical engineers investigated the effect of deepening on the Savannah River’s banks. The proposed design will not widen the navigation channel along River Street, but will instead extend the existing side slopes down further. This creates a deeper, more narrow channel with minimal effects to the river bank. The Corps also conducted a bank erosion analysis that focused on locations where vessel waves could cause shoreline erosion. The analysis determined that larger vessels will not cause more erosion than is presently occurring. Harbor pilots move vessels past River Street at a minimal speed and create very little wave action.

Drinking Water

Geologists and engineers also studied the effect of harbor deepening on drinking water from the Floridan aquifer. The extensive study, conducted in cooperation

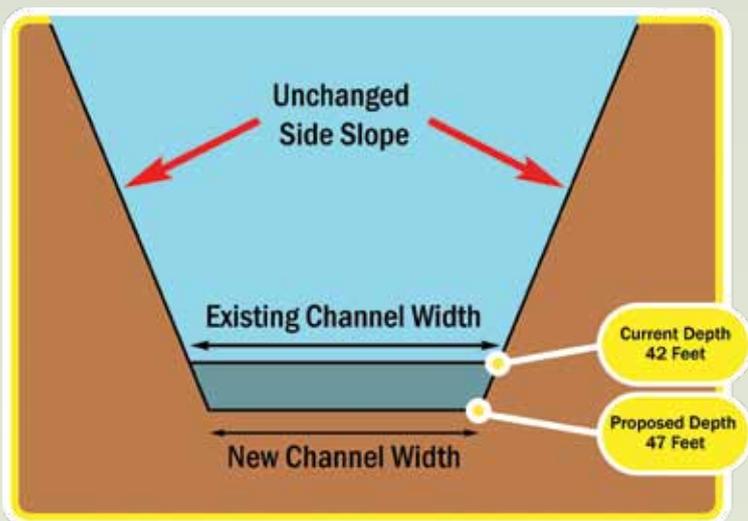


Diagram 1 shows how the proposed channel design would extend the existing side slopes down further, resulting in a deeper and narrower channel with minimal effects to the river banks. *Illustration by George Jumara*

with the Georgia Department of Natural Resources Environmental Protection Division, the South Carolina Department of Health and Environmental Control, and the U.S. Geological Survey showed that deepening to 47 feet will not significantly increase the rate of saltwater intrusion below the Savannah area, and therefore will pose little measurable change to the water quality in the aquifer. The analysis clearly shows the greatest impact to the aquifer is the current high withdrawal and use rate, not harbor deepening.

Other Studies

In total, the Corps undertook 64 engineering studies, some of which included:

- Ship simulations to aid in channel design, including vertical ship motion study
- Ship wake analysis to develop shoreline erosion estimates
- Soil borings for physical characterization of materials to be dredged
- Slope stability analysis to determine impacts to side slopes and banks
- Geologic field investigation/ modeling to determine groundwater impacts to the Floridan aquifer
- Coastal erosion analysis to determine impacts to Tybee Island
- Shoaling and sedimentation analysis
- Hydrodynamic and water quality modeling for impact determination and mitigation plan development, including oxygen injection
- Analysis of dredged material, including physical and chemical properties
- Impacts to Savannah Harbor's Operation and Maintenance practices, including a dredged material management plan
- Mitigation feature design, including oxygen injection system, boat ramp and marsh restoration
- Cost estimating and cost risk analysis for all depth alternatives, value engineering study 

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Additional Findings

After releasing the Draft GRR and EIS to the public in November 2010, information received during the comment period prompted the need for further analysis of the effects of the deepening on the Abercorn Creek Water Treatment Plant. Testing showed the infrequent combination of an extreme high tide coupled with

low flows from the upper Savannah River could produce increased chloride levels if salt water pushes too far upstream. To compensate, the Corps will construct a 97 million gallon impoundment, which spans approximately 30 acres.

When conditions require doing so, the existing raw water pumps which draw from Abercorn Creek will be shut down. Then, newly installed transfer pumps will pull stored water—with acceptable chloride levels—from the impoundment area for passage through the water treatment plant. The City of Savannah has approved this chloride mitigation feature and will assume all operation and maintenance costs, once the \$25.7 million project is complete.

