Focus Area

Dredged Material Management

Problem

A significant knowledge gap exists regarding sedimentation and movement of sediments placed, especially hydraulically, in shallow water environments. As a result, it has been presumed that complete confinement is necessary to retain sediments and meet water quality requirements. Traditional approaches to diking are expensive and may detract from the project purpose. Further, the cost to construct substantial structures in challenging, soft-sediment environments can, in some cases, be cost prohibitive. This project will investigate the potential for shallow water placement using minimal confinement. The project will also evaluate the effectiveness of a variety of lower cost, less intrusive confinement approaches. The project is expected to result in new confinement designs for thin layer placement that are cost effective, functional, and compatible with ecological restoration efforts.

Study Description

This research will link results from column settling tests and self-weight consolidation tests to predict sediment surface profiles and water column TSS concentrations that will result when dredged sediments are discharged into shallow water environments with limited or no confinement. A finite difference approach is envisioned for application during dredging, i.e. the period when sediment is being actively discharged to the placement site. The spatial and temporal domains of the dredged material placement model will be rather different than those for long-term consolidation because the rate and duration of processes are different. Laboratory testing will play a significant role in this research. A relatively large, shallow flume will be used to mimic unconfined placement in this flume by pumping different sediment slurries into the flume and monitoring sediment build-up and supernatant water quality conditions. Those will be compared to CST results and model predictions.

Products

This research project will produce at least 4 products:

- DOER Tech Note and/or Journal Article on design procedures for partial confinement methods.

- Journal article summarizing sedimentation and transport during TLP.

- Computational tool implementing the modeling approach.

- Conference paper/DOER Tech Note on strategic placement for TLP projects.

Summary

This research project will provide guidance to optimize confinement requirements for TLP projects. A range of innovative retention structures will be tested and guidance provided on their application in lieu of traditional dikes.

Balancing operational and environmental initiatives and meeting complex challenges of dredging and dredged material placement in support of the navigation mission.

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