ERDC Researchers Characterize Confined Disposal Facility (CDF) with Ground Penetrating Radar (GPR) , Geotechnical, and Remote Sensing Methods

USACE-owned and managed Confined Disposal Facilities (CDF) are reaching full capacity with potentially clean sediment while surrounding coastal environments degrade due to sediment starvation. A team from ERDC, JALBTCX, and NAP performed an investigation at multiple CDFs and potential placement areas in New Jersey.

Many of our nation's confined disposal facilities are at or nearing full capacity and in some cases contain clean (i.e., uncontaminated) sediments. Sediment within CDFs is removed from the local ecosystem while coastal environments deteriorate due to combined effects of sediment reduction, increased inundation, and erosional storm events. While Districts are interested in sediment extraction from CDFs, USACE currently lacks guidance on optimal methods to identify the physical characteristics (i.e., grain size, geotechnical properties), extract, and transport material, especially for water-locked CDFs. Last FY, a team, led by Drs. Brian Harris and Justin Shawler, performed a proof-of-concept effort to use ground penetrating radar (GPR), dynamic cone penetrometers (DCPs), and UAS-based lidar to characterize and quantify sediment types and volumes within a CDF in coastal New Jersey. Recently, the team expanded efforts within the facility and investigated potential beneficial re-use placement areas in the adjacent coastal environment.

Erosion occurs on the USACE-owned shoreline abutting the Cape May CDF, so the Philadelphia District (NAP) is determining if extracting and placing sediment from the nearby CDF is a viable beneficial re-use opportunity. In preparation for this future coastal restoration, a team from ERDC's Coastal and Hydraulics Lab (CHL), the Joint Airborne Lidar Bathymetry Technical Center of Expertise (JALBTCX), and NAP surveyed multiple CDFs and potential sediment placement options in southern New Jersey. Specifically, the team collected GPR surveys (led by Kathryn Smith, CHL), DCP tests (led by Daniel Gallegos, CHL), uncrewed aerial system lidar and imagery surveys (led by David White and Heath Harwood of JALBTCX), and soil samples (led by Shane Nichols-O'Neill, CHL-ORISE). The gathered data enables an assessment of the CDF sediment suitability, volume quantification, and consolidation parameters at the proposed placement site. Similar shoreline erosion occurs along the New Jersey Intracoastal Waterway adjacent to the Ocean City CDF. To establish baseline site conditions in support of conceptual designs for a shoreline-stabilizing nourishment, JALBTCX, with support from ERDC, collected lidar and imagery of the CDF and adjacent shoreline.

Figure 1. Daniel Gallegos (left) collecting auger samples and Shane Nichols-O'Neill (CHL ORISE Fellow) (right) pulling the GPR across a sand to mud transition zone within the CDF.

Figure 2. Heath Harwood (left) and David White (right), of JALBTCX, collecting uncrewed aerial system lidar and imagery data.

Figure 3. Shane Nichols-O'Neill (front) and Kathryn Smith (back) collecting a cross-section of DCP and hand auger samples at the proposed shoreline placement site.

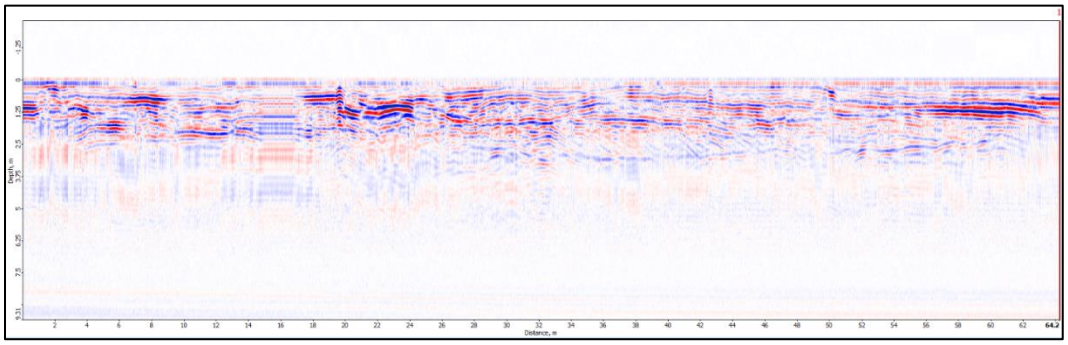

Figure 4. GPR transect at one of the CDF sites.

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