ERDC Coastal and Hydraulics Laboratory and Villanova University Perform Geotechnical and Geophysical Investigation of a Confined Disposal Facility in Support of Beneficial Reuse of Dredged Material

Impact Statement: Many of USACE's coastal confined disposal facilities (CDF) are at or nearing full capacity and contain clean sediment, while surrounding environments are deteriorating due to sea-level rise and storm forcings. In support of a beneficial reuse of dredged material effort championed by the USACE Philadelphia District (NAP), ERDC Coastal and Hydraulics Laboratory (CHL) in collaboration with Villanova University performed a subsurface investigation of the Campground cell of the Cape May Ferry CDF in Cape May, New Jersey, to quantify sediment types and volumes to support future restoration efforts.

Many of the nation's federal, state, and local confined disposal facilities (CDFs) are at or nearing full capacity and in some cases contain clean (i.e., uncontaminated) sediments. CDFs remove sediment from natural coastal systems, permanently locking them away, while many coastal environments are deteriorating due to combined effects of sediment starvation, sea-level rise, storm forcings, salinity fluctuations, and other factors. To remediate this, the USACE Philadelphia District (NAP) will be extracting sediment from a CDF in Cape May, NJ, to try to optimize the operational process and support restoration of multiple shoreline and wetland areas.

To support this beneficial reuse of dredged material, Drs. Brian Harris and Justin Shawler (both of ERDC-CHL) led a field investigation to determine geotechnical and geophysical properties of sediment within the Campground CDF in Cape May, New Jersey. The team was a collaboration among engineers, geologists, and surveyors from ERDC's CHL, USACE NAP, and Villanova University. The team utilized dynamic cone penetrometers (DCP), ground penetrating radar (GPR), and real time kinematics (RTK) surveys. Subsurface survey methods were validated using soil classifications and grain size analysis from test pit samples. Three transects were performed across the CDF cell, resulting in over 650 meters of GPR profiles, 12 DCPs, and four test pits over the course of one 8-hour field day, emphasizing the efficiency of the methodology for subsurface analysis (Figures 1 through 3). The team is currently processing the data to quantify volumes of clean sands and mixed sediments to inform future restoration efforts.

The full project field team includes Drs. Brian Harris, Justin Shawler, and Kaitlyn McPherran (all from CHL); Daniel Gallegos (LSU/CHL); Dr. Jonathan Hubler (Assistant Professor, Villanova University); and Garret Albert and Nicole Ertle of NAP's Survey Section.

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POCs: Dr. Brian Harris (CHL) Brian.D.Harris@usace.army.mil, Dr. Justin Shawler (CHL) Justin.L.Shawler@usace.army.mil, and Monica Chasten (NAP) Monica.A.Chasten@usace.army.mil

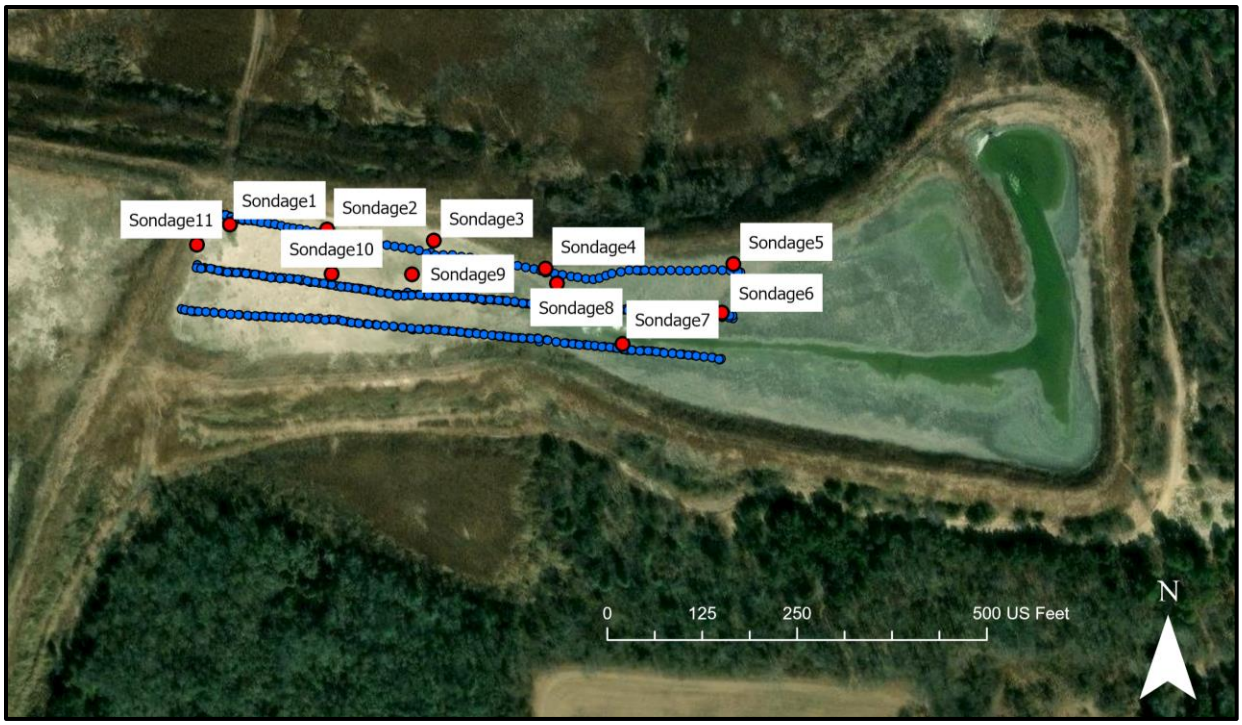

Figure 1. Map of the Campground confined disposal facility (CDF). Blue global positioning system (GPS) points mark the locations of the three ground penetrating radar (GPR) lines, and red points mark the dynamic cone penetrometer (DCP) sondage sampling locations. Figure created by Dr. Kaitlyn McPherran (ERDC CHL).

Figure 2. (Left) Ground penetrating radar (GPR) profile being performed by Dr. Kaitlyn McPherran (CHL), while real time kinematic (RTK) measurements were being simultaneously taken by Garret Albert and Nicole Ertle (NAP). (Right) Dynamic cone penetrometer (DCP) being performed by Dr. Jonathan Hubler (Villanova University) and Daniel Gallegos (LSU/CHL). Photos taken by Drs. Justin Shawler and Brian Harris (both fromCHL).

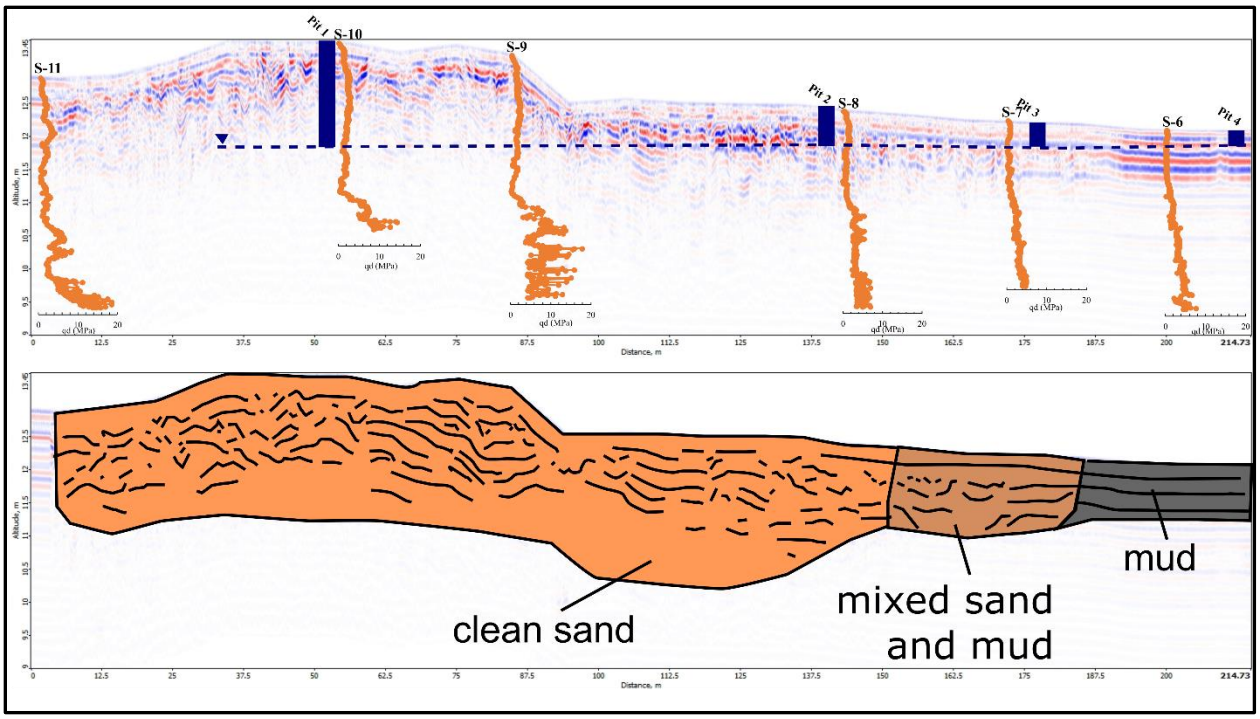

Figure 3. (Top) Uninterpreted middle ground penetrating radar (GPR) profiles from Figure 1 overlain with dynamic cone penetrometer (DCP) sondages (orange graphs) and test pit locations (blue rectangles). Local water table shown as dashed blue line. (Bottom) Subsurface sediment interpretation based on synthesis of GPR, DCP, and test pit data.