Project Profile

Black River Dredged Material Reuse Facility

GeoPool Pilot Study

Client
City of Lorain, Ohio

Period
2019—ongoing

Value
$2+ million
Healthy Lake Erie Grant

Role
Prime

Innovating Dredged Material Dewatering

Harbor cites, lake managers, facility managers, & contractors are annually confronted with managing fine-grained dredged sediments, hydraulically-slurried dredged material, financial and seasonal restrictions, and anti-degradation water quality provisions. For Lorain that means processing 75,000 cubic yards or the equivalent of 42 feet of silts & clays stacked up on a football field every year. Solutions that focus on function and finances drew the stakeholders to implement the GeoPool Pilot Study.

What is a GeoPool?

Simply...envision an above-ground swimming pool where the "pool liner" resembles window screen and intermittingly spaced louvered "doors" flush clarified water facilitating solids settlement and compaction.

It's comprised of rigid 8 ft x 8 ft steel triangular frames linked together forming a circle with frame-mounted geotextile fabric. The pilot pool contained 5,000 cy, had 59 frames and a 1/2 acre footprint.

Top Take-Aways

While the study focused on Black River dredged sediments, the results indicate that the textile dewatering technology is superior to basins / CDFs and geotextile tubes based on footprint needed, throughput, effluent clarity, settling rate, sustainability, and processing often difficult to manage fine-grained sediments.

The study continues assessing low-cost, low-contact scenarios such as the seasonal freeze-thaw cycle and cost-effective residual solids reuse as agricultural soil, residential garden soil, brownfield cover soil, and engineered fill.

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Highlights

- First time used **globally** to dewater sediments
- Hydraulically dredged highly fine-grained organic laden sediments from Federal turning basin—93% silts & clays with leaf strata.
- 8 to 15 percent solids slurry pumped over 1 mile and ~90 feet of head (upgradient elevation)
- Low dosed polymers (polyamine and polyacrylamide) in-line to optimize mixing and particle exposure
- Slurry substantially settles to clear water ~2 hours in pool
- 3 orders of magnitude clarification—incoming slurry 40,000 mg/L TSS, outgoing clear water 40 mg/L TSS
- Solids compaction—facilitates volume reduction
- Modular, reusable, portable design facilitates long life span with minimal wasted costs

Partners

- Ohio Department of Natural Resources, Coastal Management (funding)
- Ohio Environmental Protection Agency (funding)
- City of Lorain, Ohio (owner)
- Coldwater Consulting, LLC (prime)
- Ohio Department of Natural Resources, Parks & Watercraft, Dredging Team
- IMS / Ellicott Dredging Technologies (manufacturer)
- Bluff City Materials (installer)
- Erie Blacktop (earthwork)
- AquaMark (polymer)
- Ronan / Gilson Engineering (meters)
- Wood Environment & Infrastructure Solutions (civil, geotechnical, ecological, and materials analyses)
- ALS Laboratories (chemical analyses)

Permits

- USACE Letter of Permission
- OEPA General NPDES
- City Storm Water

Learn More

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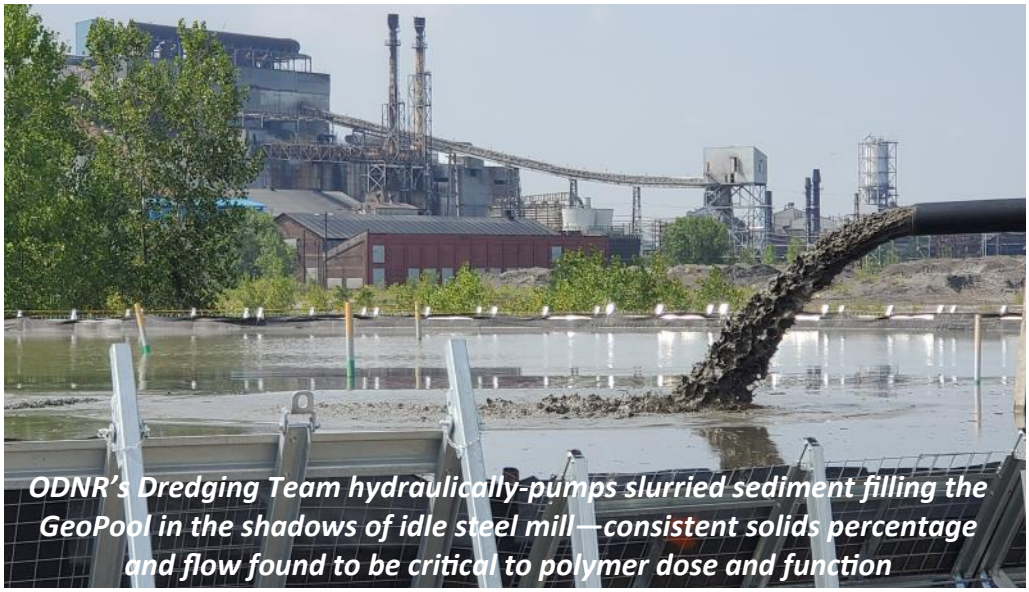
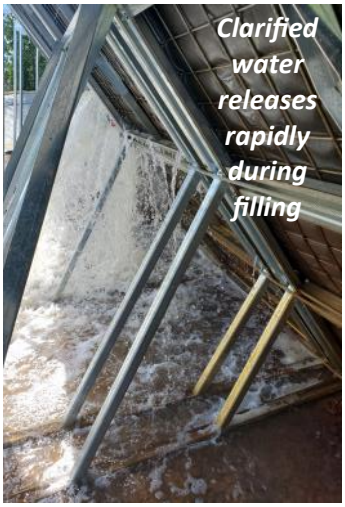


ODNR's Dredging Team hydraulically-pumps slurried sediment filling the GeoPool in the shadows of idle steel mill—consistent solids percentage and flow found to be critical to polymer dose and function



Clarified water releases rapidly during filling

Solids settled, effluent clarified, and overlying water shed on a daily basis

Steel frames

Frame-mounted geotextile retains solids—compacted clay as base

Data Collected

- Assembly duration by feature
- Insitu dredged volume (BD/AD)
- Incoming slurry percent solids, flow rate & polymer dosages
- Structural deformation
- Differential settlement during filling and dewatering
- Moisture content change over time
- Ponding on surface and rainfall response
- Effluent water quality at frames, sump, and outfall
- Dewatered solids handling & Beneficial Use Test Plots
- Solids characteristics: physical, agronomic, & pollutant concentrations