

A blue and white dredging vessel is positioned on a river. The vessel has a large window and a red logo on its side. In the foreground, there is a large, complex metal structure, likely part of a dredging or material reuse facility. The background shows lush green trees and foliage.

# GeoPool Pilot Study Black River Dredged Material Reuse Facility

Corry Platt, CEP

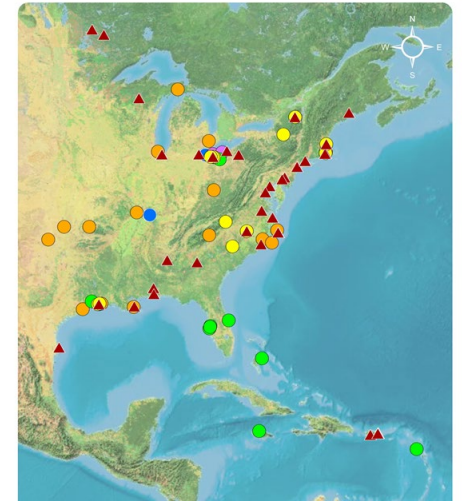
*Western Dredging Association, Midwest Chapter*

*March 2022*

*Distribution Restricted – Contact CT Platt for permission*



# About Corry



## Corry Platt, CEP – Geosyntec; Senior Principal – Sediments

- Certified Environmental Professional 2002; ABCEP Trustee since 2008; Marketing & Recognition 2008-2014; Treasurer 2014-2017; President-elect 2017-2019; President 2019-current
- 30 years, 29 States + Canada, Latin & South America, Germany
- EPA & USACE contractor, CEQ recognized EIS; dredging for LNG, Contractor's Advisor; Technical Advisor;
- Halliburton NUS, Brown & Root; Malcolm Pirnie; Black & Veatch; Environmental Services; Kimley-Horn; Hess LNG; self-employed Concept 2 Delivery & EnviroAdvisors; ERM; Amec Foster Wheeler; Wood; Coldwater Consultants





# Parties Involved

Presented on behalf of Coldwater Consulting & the City of Lorain, Ohio

*Not representing Ellicott Dredge Technologies or its GeoPool*

## Core Team

- Funding
  - Ohio Department of Natural Resources – Office of Coastal Management
  - Ohio Environmental Protection Agency
- Owner
  - City of Lorain
- Planning & Engineering
  - Coldwater Consulting
  - Wood
- Dredging
  - ODNR Parks & Watercraft – Dredging Team

## Contracted

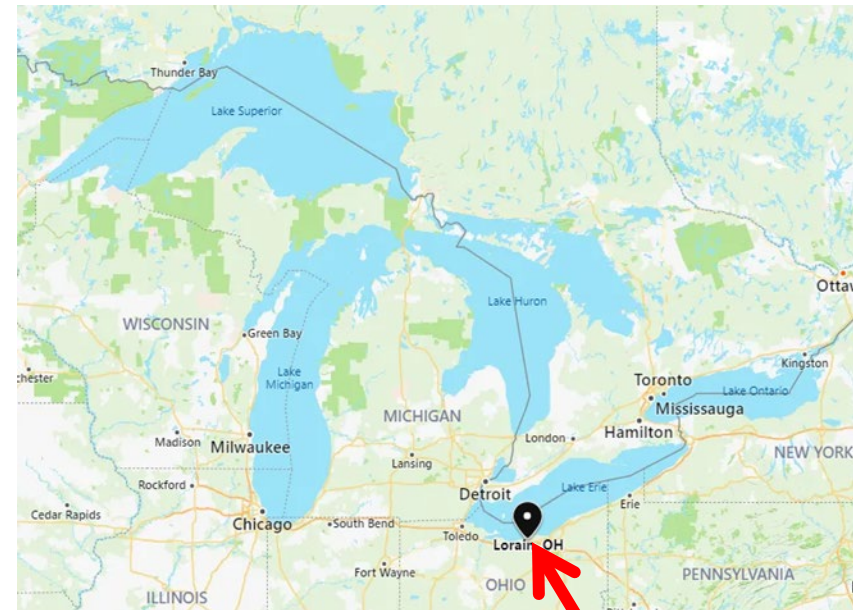
- Bluff City Materials
- Ellicott Dredge Technologies
  - Erie Blacktop
  - AquaMark
  - Xylem
- Bowling Green State University
  - Wright State University
  - ALS Global
- A&L Great Lakes



# Black River Dredged Material Reuse Facility

## Key Principles

- Capacities match
  - dredging = dewatering = reuse
- Capital investment presides over operational costs
- Cognizant of existing conditions
  - Tolerate 'not pristine' site(s), its material, & subsurface
- Integrate reasonable redundancy
  - Minimize shutdowns, allow reduced efficiency
- Functional end products



Great Lakes Area of Concern



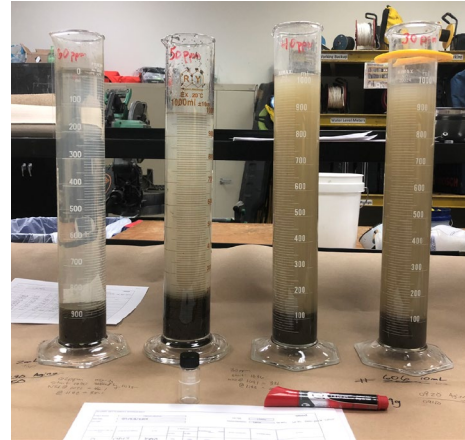




# GeoPool Pilot Study - stages

## First Global Use for sediments

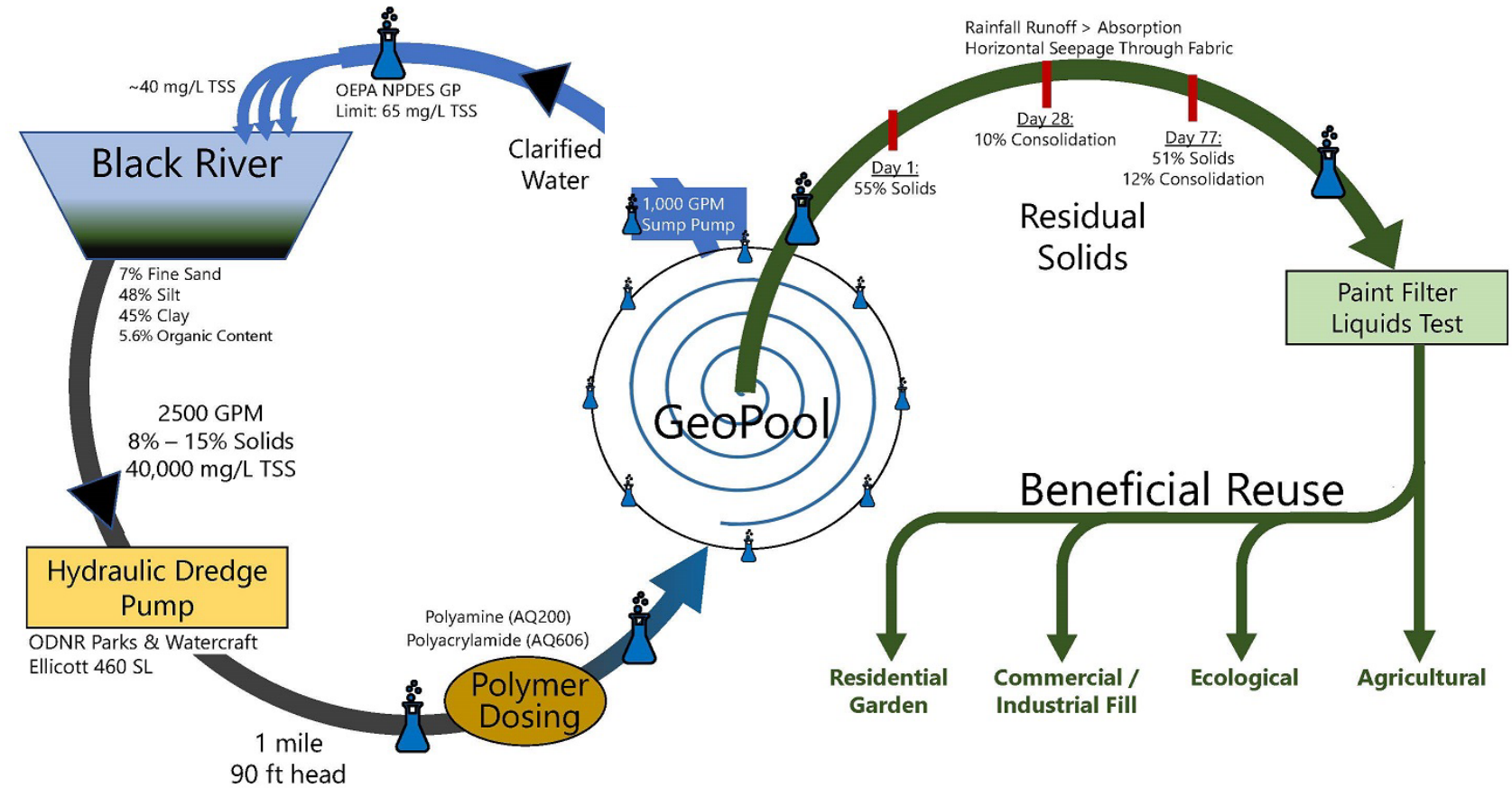
- Bench
  - Settling (w & w/o winds)
  - Polymers (suppliers & self)
  - Polymer dosing at variable slurry concentrations
- Dewatering Pilot
  - Contracting, civil design, USACE 408 & NPDES effluent permitting
  - State dredge, pipeline, meters
  - Assembly, Operation, Structural failure, Assembly, Operation, Consolidation, Disassembly
- Beneficial Reuse Pilot



# GeoPool Pilot Schematic

## GeoPool System

1. Site Civil pad
2. GeoPool structure and textile fabric
3. Sediment slurry & (as-pertinent) polymer dosing
4. Clarified Water sump and surface water return
5. Residual Solids reuse





# GeoPool - components

## GeoPool 101:

- Series of rigid steel frames linked together secured with four safety cables – *scalable, reusable, portable, up-n-ready timing*
- Textile filter fabric lined – *circumference seepage*
- Louvered dump doors provide rapid release of clarified surface waters – *incoming & outgoing GPM balancer*
- Equipment gates enable heavy equipment access for unloading – *single rehandling touch*



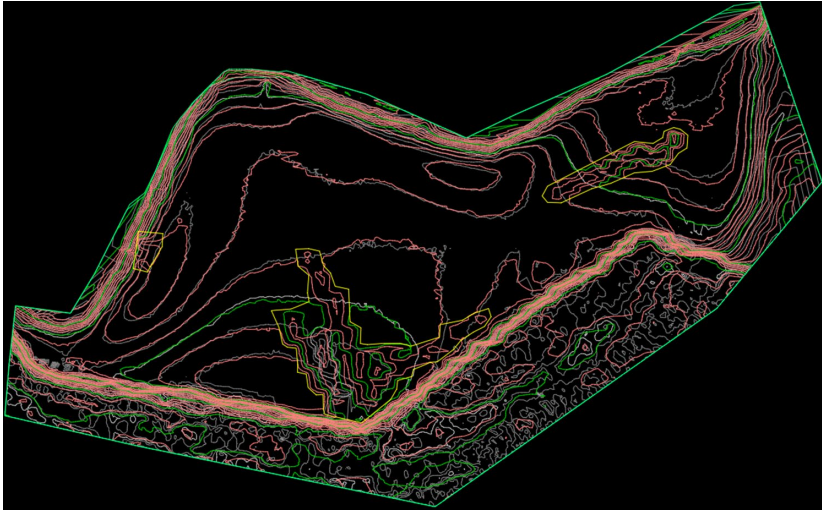


# GeoPool - components

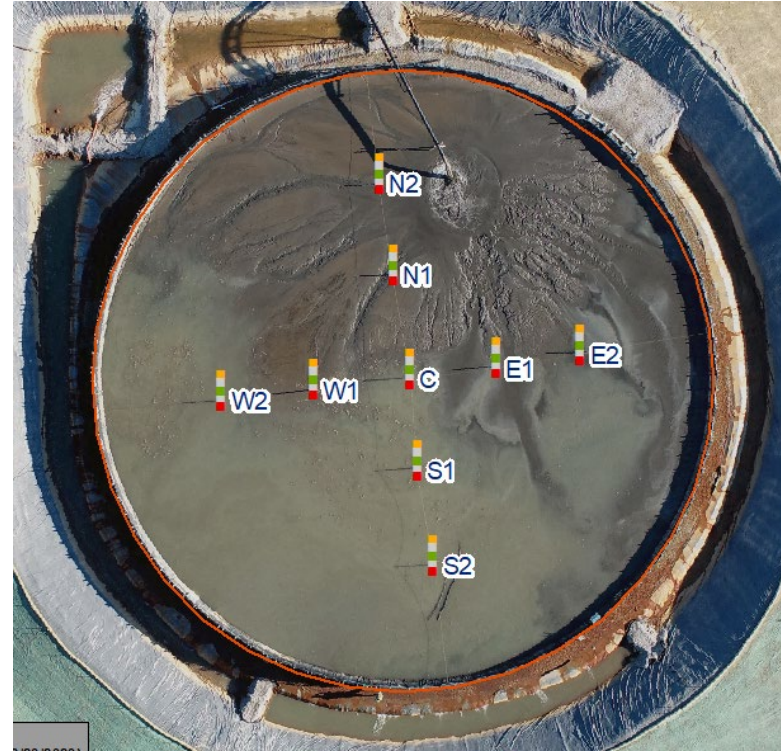




# GeoPool Pilot Study - calculations



- BD/AD Surveys
  - Single beam
  - 25 ft transects
- Meter calculations
  - Flow, % solids, uptime

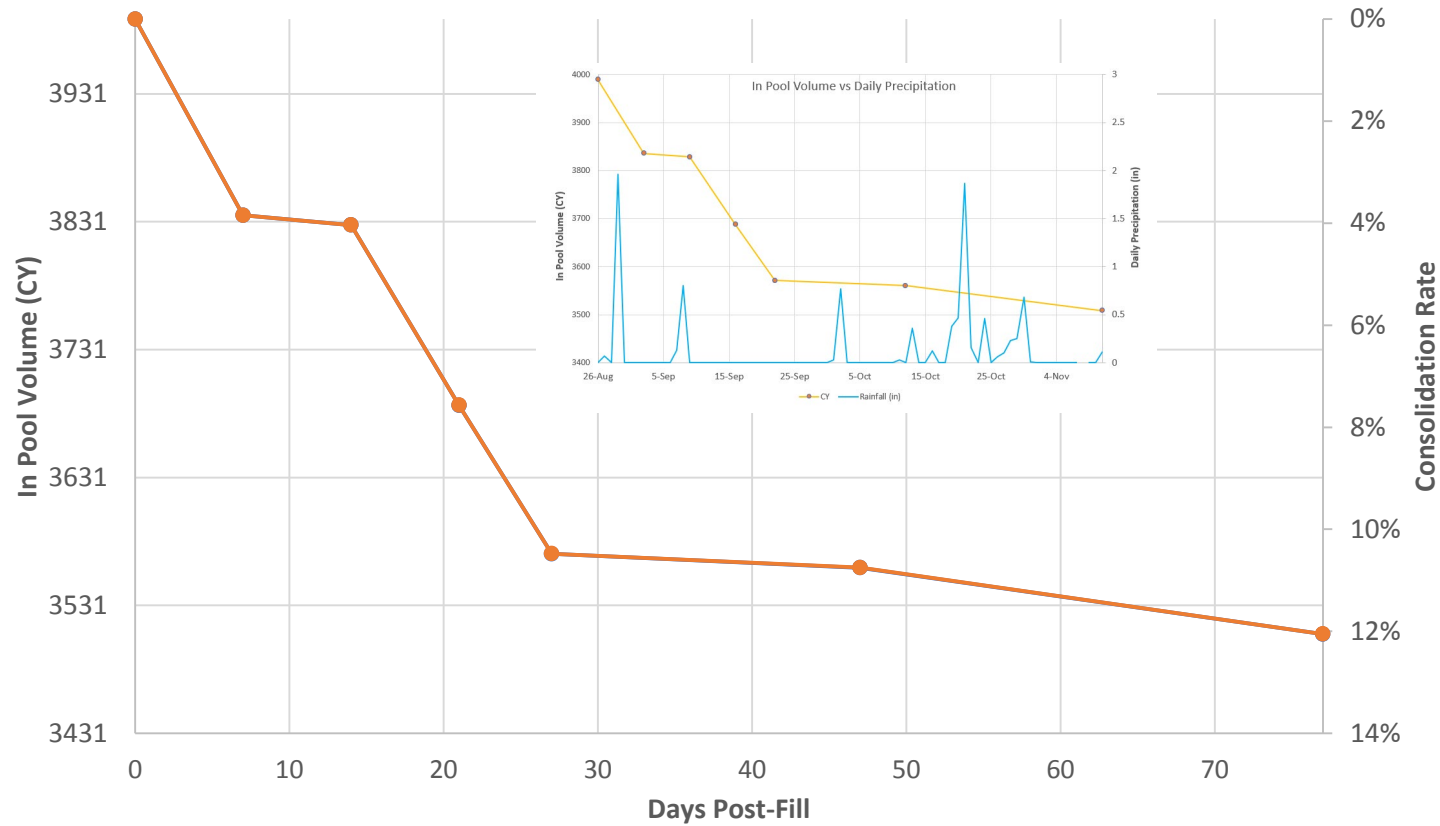


- Measuring posts
- AutoCAD Civil 3D





# In-Pool Solids Consolidation



Dewatering System	Bulking Factor Range
GeoPool, Post-Fill Day 0	<b>1.52 – 1.16</b>
GeoPool, Post-Fill Day 27	<b>1.36 – 1.04</b>
Solids Basins, with polymer (bench tests)	<b>2.6 – 2.3</b>
Solids Basins, without polymer	<b>&gt;2.6</b>





# Dewatering Lessons & Considerations

- ❑ Stable structure!
- ❑ Effluent quality!
- ❑ Slurry flow & % solids  
consistency is key
- ❑ Expect efference
  - ❑ Algae & bacteria
- ❑ “Rind” slowing “cake-like”  
residual solids



- Civil Pad
  - Integrate gravity-induced dewatering with connections to sump
  - Sump pump GPM
  - Infiltration barrier may be unnecessary
- Polymer-induced settling
  - Bench test dosing matched
  - Cost-optimizing bench testing for polymer selection
- Operation
  - Activating fabric is manual
- Consolidation
  - 75 days to load-out to on-road trucks with sludge locks
  - Bulking factor decrease in multi-pool pod from cycling
  - Natural freeze-thaw provided additional consolidation for **free**





# Residual Solids Evaluation (RSE)

## Objectives

- Focusing upon Reuse Applications
- Building upon studies-by-others yet customizing to Black River local market
- Plant survival & growth
  - Partnered with two Universities
  - Mirror and expand other port dredged material reuse in agricultural crop production
    - Corn, soybean, sod, fescue, restoration mix
  - Next...horticulture container media offset in greenhouse vegetable production
- Engineered Fill
  - Methods in general conformance with ASTM



*Blending effort to create suitable and marketable beneficial reuse products from typical Black River dredged material provides insight into workability and handling.*





# Plant Survival & Growth Studies Overview

## BGSU

- Investigators
  - Dr. Angelica Vazquez-Ortega
  - Margaret Rettig (undergrad research)
- DM & FS ratios
- Compost amendment
- pH adjustment / soil acidifier
- Corn, soybean, sod grass
- Germination & Growth
- Aboveground & below ground Biomass – three test species

## WSU

- Investigators
  - Dr. Megan Rua
  - Maureen Roddy (undergrad research)
- DM & FS ratios
- Plant-based soil prep (canola)
- Corn, fescue, restoration mix
- Germination & Growth
- Aboveground & below ground Biomass
- Corn lifecycle (ears)
- Restoration mix diversity



# BGSU Top Take-Aways

- DM improved growth in both corn and soybeans
- Treatments with compost tended to perform better...ones with acidifier tended to be less successful.
- DM did not hinder sod grass growth
- 10 DM : 85 FS : 5 Compost
  - best for corn...tallest and greatest above & below ground biomass
- 20 DM : 75 FS : 5 Compost
  - Best for soybeans...highest average height and greatest above & below ground biomass
- 70, 50, & 30 DM are similar for sod survival, growth, biomass





# WSU Top Take-Aways

- Corn grown on DM+FS produced additional ears suggesting higher yield (than commercial hybrids)
- Corn grown on Lorain DM+FS reached reproductive stages **faster than** Toledo fresh or weathered DM + FS.
- 100% DM was not suitable for corn (reduced germination, height, survival, & no ears)
- 50 DM : 50 FS yields greatest diversity for restoration purposes, yet 70 & 100% yielded high diversity suggesting these ratios are suitable for restoration applications with limited or no blending
- 30 DM : 70 FS ideal for canola
- 70, 50, & 30 DM are similar for fescue



# Engineered Fill: So what? What does it all mean?



Untreated dredged material  
(as-is)



3% cement additive

7% cement additive



10% cement additive

*Final acceptance of soil for use on any type of project is at the discretion of the project Engineer of Record*





# Discussion



**Corry Platt, CEP**

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