

Innovative Remedy Design for Cost-Effective Dredging and Disposal of Contaminated Sediment

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Bright ideas.
Sustainable change.



Lower Otter Creek and Confluence

- Located in Northwest Ohio, part of the Maumee Watershed
- Discharges into Maumee Bay, western basin of Lake Erie
- Sediment chemicals of concern
 - Polycyclic aromatic hydrocarbons (PAHs)
 - Diesel range organics (DROs)



Great Lakes Legacy Act Project

- Great Lakes Legacy Act sediment remediation project
 - A volunteer project in which funding from the federal government and non-federal sponsors is used to accelerate remediation in the Great Lakes Areas of Concerns
- Sponsors
 - Non-federal sponsors: BP-Husky, Chevron, Evergreen
 - Federal Sponsor: USEPA Great Lakes National Program Office
- Additional project team members
 - US Army Corps of Engineers
 - Ohio EPA
 - US Fish and Wildlife
 - Jacobs (on behalf of USEPA)
 - Toledo-Lucas County Port Authority
 - Ohio Department of Natural Resources



Sediment Remedy

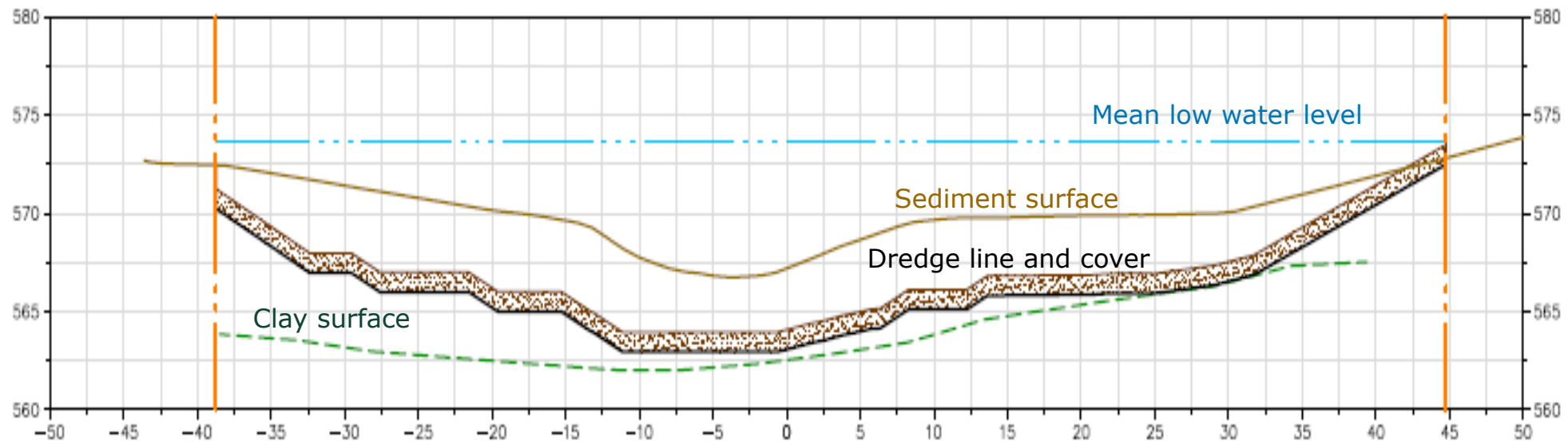
Sediment removal and cover placement

Otter Creek

- Remove sediments up to a depth of 4 feet below the sediment surface or to native clay (whichever is less)
- Place 1 foot of cover material over dredged areas

Otter Creek Confluence

- Remove sediments at depths ranging from 1 to 5.5 feet



Project Constraints

- Narrow and shallow creek with limited access points
- East – railroad yards;
West – *Phragmites* wetland
- Railroad bridge with <8 ft clearance central portion of site



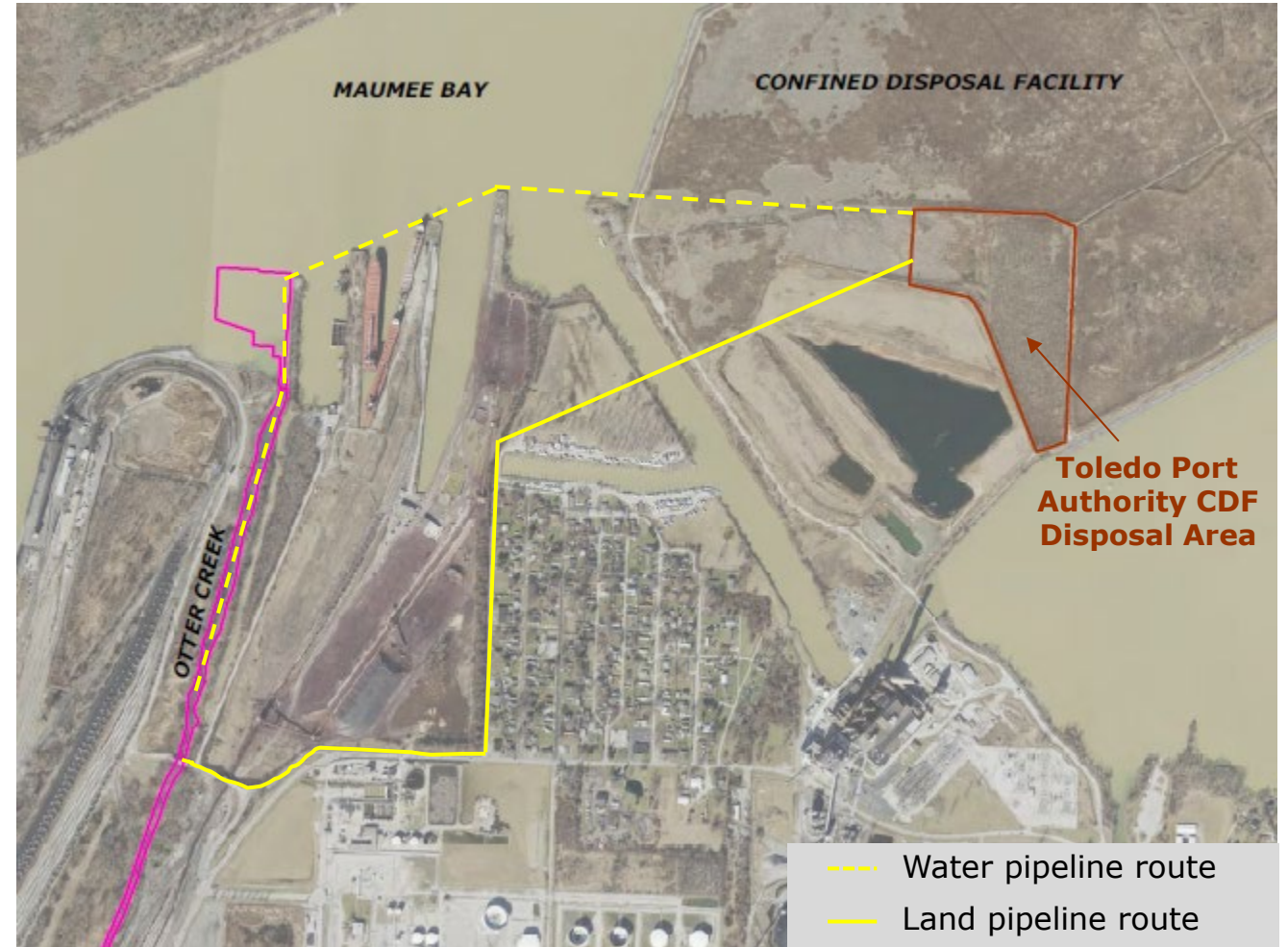
Sediment Removal and Disposal

- Removal of ~55,000 CY of contaminated sediment with off-site disposal
- The most cost-effective disposal option was an existing CDF within ¼ mile of the project
- A portion of the CDF is owned by the local port authority for contaminated sediment disposal
- Port authority historically received mechanically dredged material
- A value engineering study identified hydraulic dredging as a more cost-effective option for this site
- Several issues required resolution for use of hydraulic dredging as the removal process



Pipeline Route

- Hydraulically dredged sediments were pumped to the nearby CDF
- Potential pipeline routes were considered:
 - Via water – Pipeline would be submerged and anchored to the bottom floor to prevent interference with boat traffic
 - Over land – Pipeline would be protected at any road crossings and anchored to bridge



CDF Modifications

- CDF initially designed to have material placed by truck with minimal water
- Modifications required regrading to allow drainage of hydraulically placed material
- Added interior berm to two-stage settling system
- Overflow from Cell 1 within weir to allow flocculant addition as needed
- Volume not sufficient for sediment and projected water from hydraulic dredging
- Effluent from Cell 2 required special permit to discharge to adjacent USACE Cell



CDF Modifications (continued)

- CDF completely covered with Phragmites required controlled burn prior to grading activities
- Existing overflow within cell required isolation to prevent water flow into Lake Erie



CDF Modifications (continued)

- Interior berm separates CDF into two cells
- Overflow weir from Cell 1



Hydraulic Dredging

Upper Reach

- Able to use existing access road to minimize wetland/tree removal
- Dredged using amphibious excavator equipped with hydraulic cutterhead
- Used additional dredge barge as booster to transfer sediment to double booster barge



Hydraulic Dredging (continued)

Lower Reach/Confluence

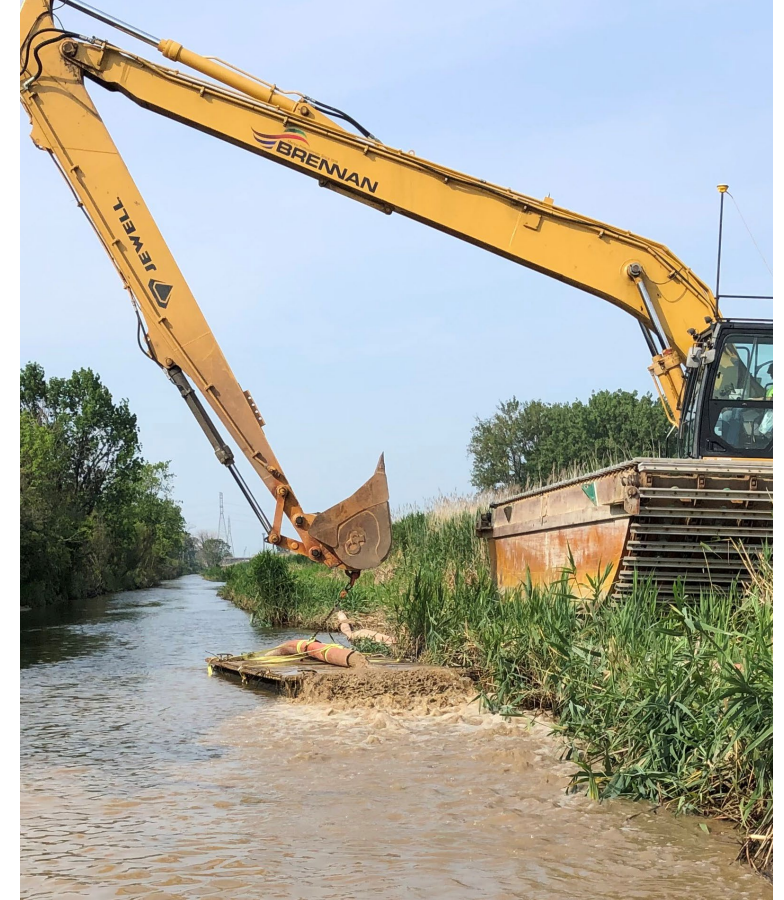
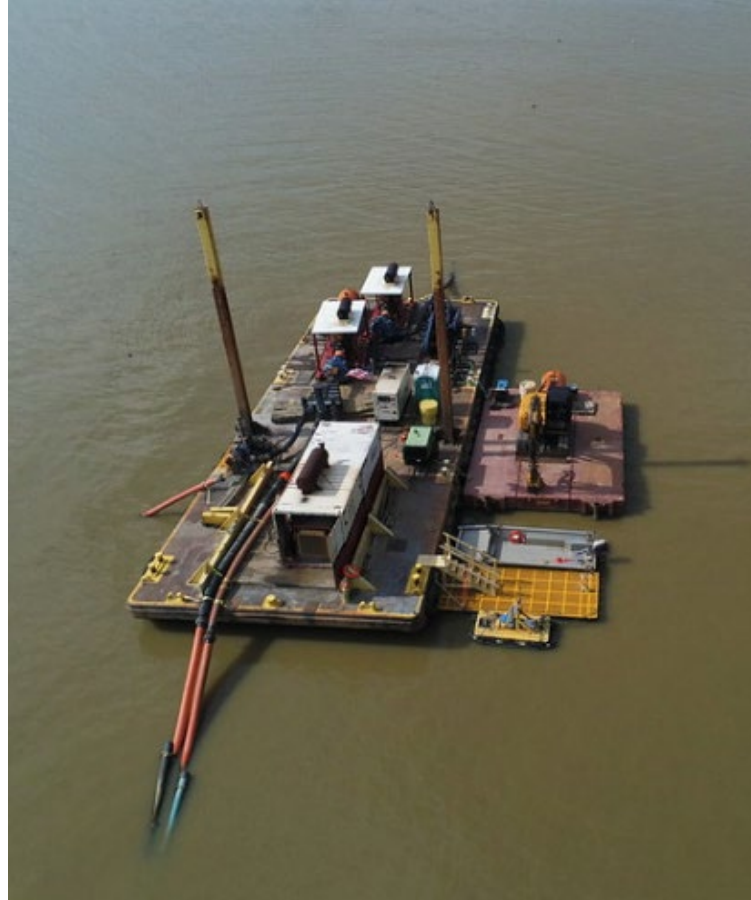
- Able to access from water to minimize traffic within railroad leased space
- Required minimal staging area within existing clearings



Cover Placement

Cover Material

- Barged to confluence and put in slurry
- Used existing dredge pipeline to transfer to placement location
- Able to use amphibious excavator or dredge barge for placement



Habitat Improvements

- Following remedy completion, additional habitat improvements were implemented
- Improvements support benthic invertebrate and fish populations:
 - Amended cover material with organic-rich material
 - Place submerged structures (bendway weirs and locked brush piles) in lower 0.6 miles of Otter Creek



Challenges and Lessons Learned

Sediment Removal and Cover Placement

- Coordination with port authority allowed for hydraulic dredging and reduced handling of the removed material
- Able to work with site owner and lessee to leave staging areas in place after construction
- Stakeholder review of designs can vary greatly; railroad companies can have long lead times
- Submerged pipeline crossing at heavily used marina with deep draft ships required daily communications
- Measuring cover thickness via coring rather than bathymetric surveys decreased potential for remobilization

CDF

- Collaboration with USACE and local port authority allowed for use of local CDF
- CDF modifications allowed to remain in place to allow future hydraulic dredging

Project Collaboration

- Great Lakes Legacy Act Project
 - Design performed by Non-Federal Sponsors (Ramboll as Engineer of Record)
 - Contracting by GLNPO
 - Contractor oversight by USACE
 - Submittals reviewed by all parties
- Habitat improvements included input from various state and federal agencies
- Project completed on schedule with no cost modifications



Questions?

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