

# COMBINED NAVIGATIONAL AND ENVIRONMENTAL DREDGING

## HOWARDS BAY, SUPERIOR, WISCONSIN

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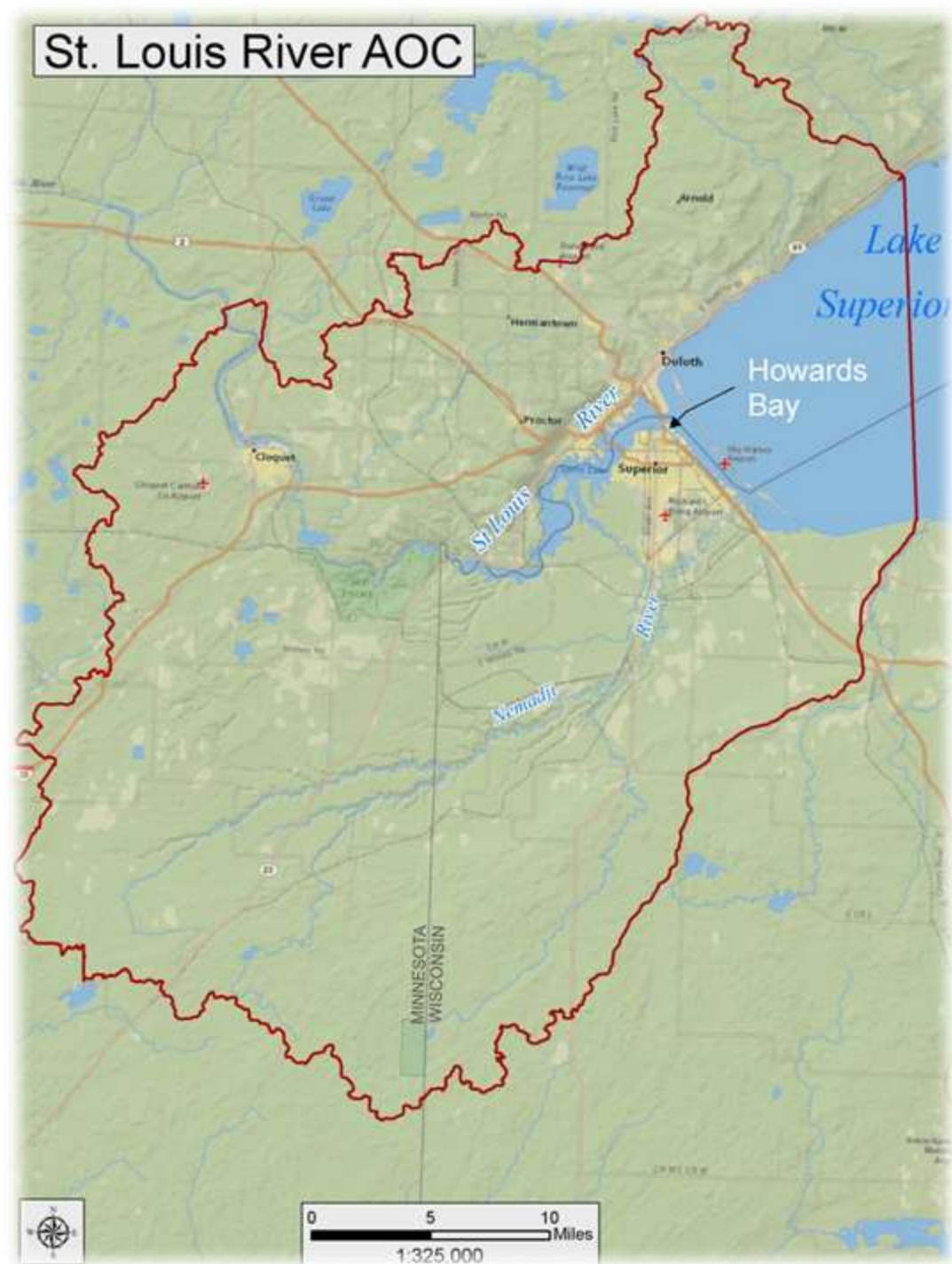
# Overview

- Site Location and History
- Project Partners and History
- Integrated Design Approach
- Funding and Cost Sharing
- Project Status and Schedule



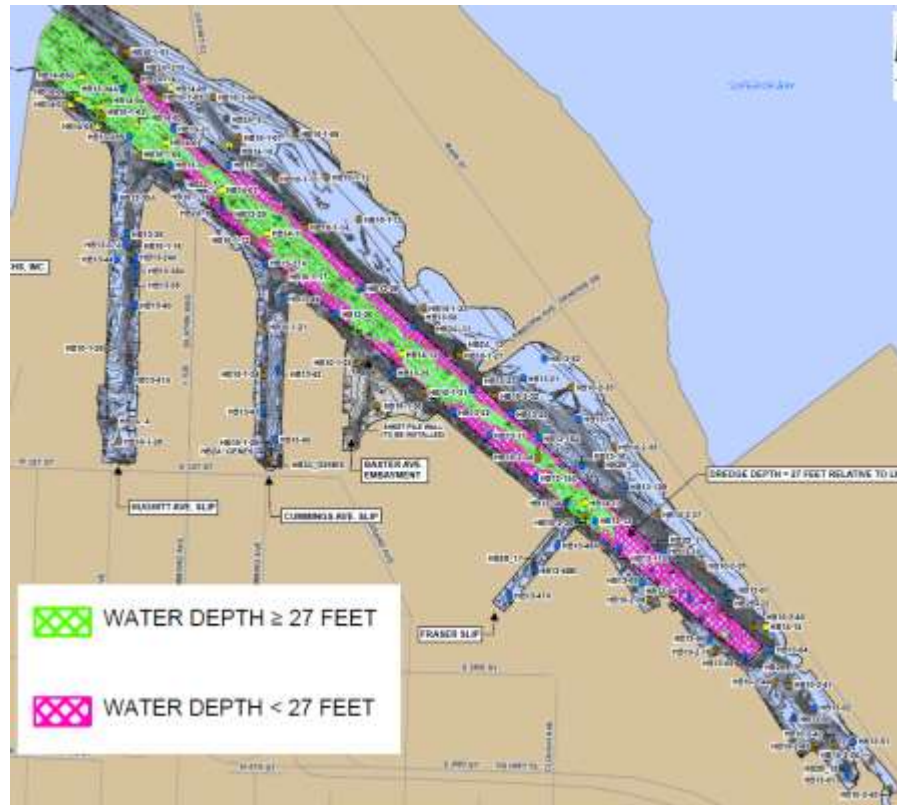
# Site Location and History

- Superior, WI
- Part of Twin Ports (Duluth/Superior)
- Part of St. Louis River Area of Concern
- Shipping in federal channel and private slips
- Ship repair and utility boat manufacturing
- Largest capacity grain terminal in N. Amer.



# Navigation Requirements

- Water depth > 27 ft in navigational channel
- Periodic maintenance dredging by USACE, Detroit



# Project Partners

- USEPA Great Lakes National Program Office (GLNPO)
  - USACE, Detroit District has interagency agreement with USEPA
  - Arcadis contracted to USACE
- WDNR
- Fraser Shipyards
- City of Superior

# Project Initiation

- USEPA and WDNR assessed sediment under Great Lakes Legacy Act (GLLA)
- USACE developed initial maintenance dredging program
- Fraser and City invited to collaborate in cleanup planning
- Joint supplemental investigation completed
- GLLA funding for Focused Feasibility Study (FFS) and Remedial Design (RD)

# Project History

- Data collection (2007, 2010, 2013, 2014)
- Data Summary Report (DSR; 2014)
- Focused Feasibility Study (FFS; 2015)
- Additional data collection (2015, 2016, 2017)
- Remedial Design (RD; 2016-2017)





# FFS Overview

- Considered options with various combinations of
  - No action
  - Enhanced natural recovery (ENR)
  - Capping
  - Dredging
- Final alternative
  - Select dredging
  - Select ENR
  - No action for remaining areas
  - Refined dredge limit



# Project Requirements

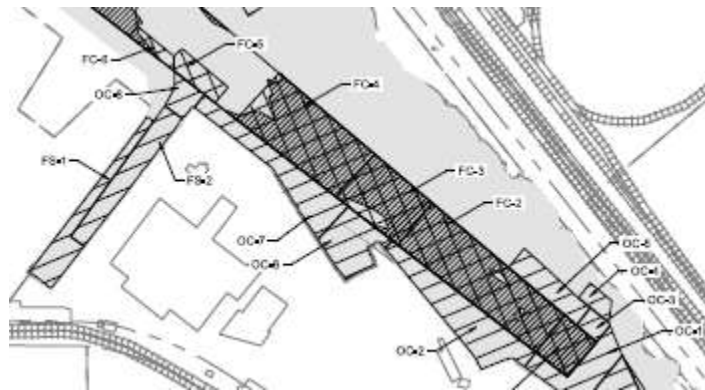
- Strategic navigation dredging (SND)
  - Designed by USACE, Detroit District
- Environmental dredging
  - Tied to post-SND conditions
  - Designed by Arcadis
- Costs restricted by available funds from GLNPO, Fraser, WDNR, and the City

# Extent of Remedy

- Interaction of SND/ENV
- 3D Model
- Geotechnical considerations
- Constructability considerations
- Residuals management
- Enhanced Natural Recovery (ENR)
- Material handling and disposal

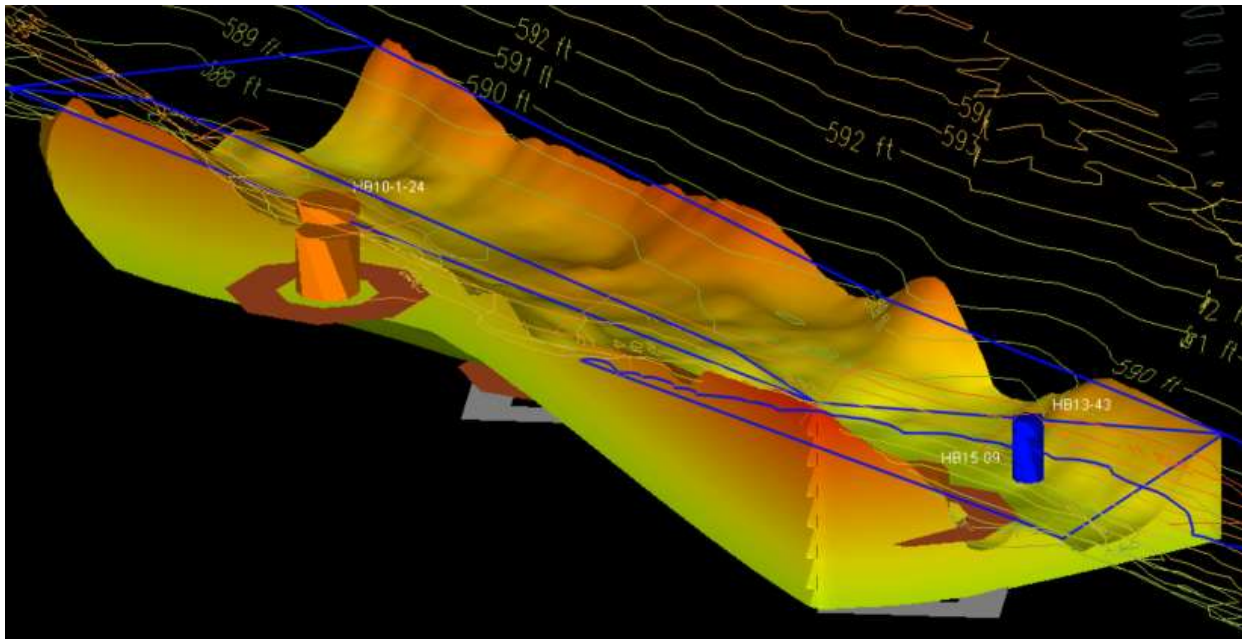
# Interaction of SND/ENV

- SND requires cut to El. 574.1 ft
  - Allow 1 ft overdepth to El. 573.1 ft
  - 2:1 slope outside of Federal Channel
- Allow concurrent SND/ENV work
- Adjust ENV design in the field for post-SND survey



# 3D Model

- Input data and constraints
- Kriging method to interpolate COC and clay data
- Refine dredge limits



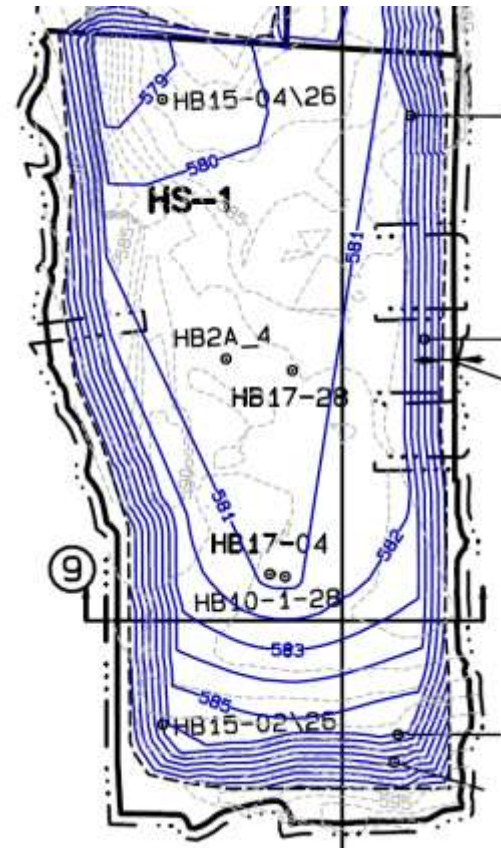
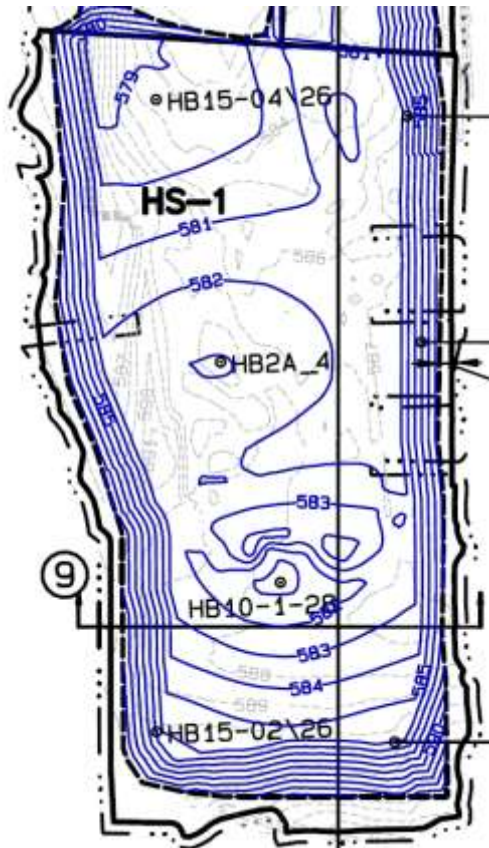
# Geotechnical Considerations

- Offset 10 ft min. from shorelines and structures
- Cut slope no steeper than 2:1
  - 3:1 slope at head of Hughitt Slip



# Constructability Considerations

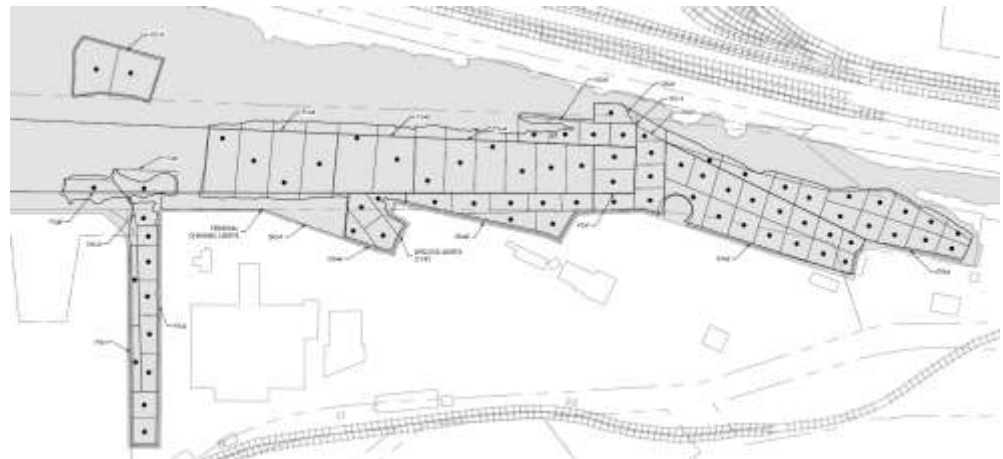
- Adjustment/smoothing of model grades
- Transitions between DMUs





# Residuals Management

- Uncertainty in design and construction
- Leaving material in offsets/slopes
- Collect confirmation samples
- Assess next steps with decision tree
  - No further action
  - Residual dredging
  - Residual cover





# Enhanced Natural Recovery (ENR)

- 6-inch sand cover
- Place in areas with shallow water and low COCs
  - No need for additional dredging
  - No need for specialized equipment
- Place after dredging is complete

# Material Handling

- Treatability study
- Barge-based mechanical removal and transfer to shore
- On-shore processing
- Commercial facility for debris and highest impacts
- Majority of material to Wisconsin Point Landfill

# Wisconsin Point Landfill

- Evaluated several options
- Closed municipal landfill, owned by City of Superior
- Necessary to afford project
  - Leverage federal fund matching
  - Lower cost than offsite
- WDNR placement criteria
  - Subgrade vs. cover fill
- Vegetative cover
- Redevelopment of landfill and haul route



# Design/Review Approach

- Weekly project calls
- Focused technical reviews
- Formal submittal/review process
  - Review conferences
- Close coordination on permits
  - Permitting agencies are part of the team

Cooperative approach to design and information sharing

# Funding and Cost Sharing

- Funding through GLNPO (35-50%)
- Monetary contributions from WDNR and Fraser
- In-kind contributions by Fraser and City

Team approach to designing cost savings

# Project Status and Schedule

- 100% Design complete: Q1/Q2 2018
- Bidding, award, mobilization: 2018/2019
- Construction complete: 2019

# Questions?

