We Energies – Third Ward Milwaukee River Sediment Remedial Action

A Component of the Milwaukee Estuary AOC

3/14/2024

Acknowledgements:
We Energies (Patrick Kenny), GEI authors from abstract, JF Brennan

GEI Consultants

AGENDA

1 Health and Safety Summary
2 History of the Milwaukee River Estuary
3 Design
4 Construction Implementation
5 Questions

Safety Highlights

- GEI, J.F. Brennan, EDI, Pieper Electric, DOC Mapping, KL Engineering, Wiss, Janney, Elstner and Frattalone
- ~45-50 Workers/day
- ~60,000+ safe worker hours
- **0** Incidents
- Highlights
  - Air Quality
  - Underwater Utilities
  - Team Collaboration

Milwaukee:
A Place of Council

Brief History of the Milwaukee River Estuary

Place of Council and Gathering dating back to approximately 13,000 BCE.

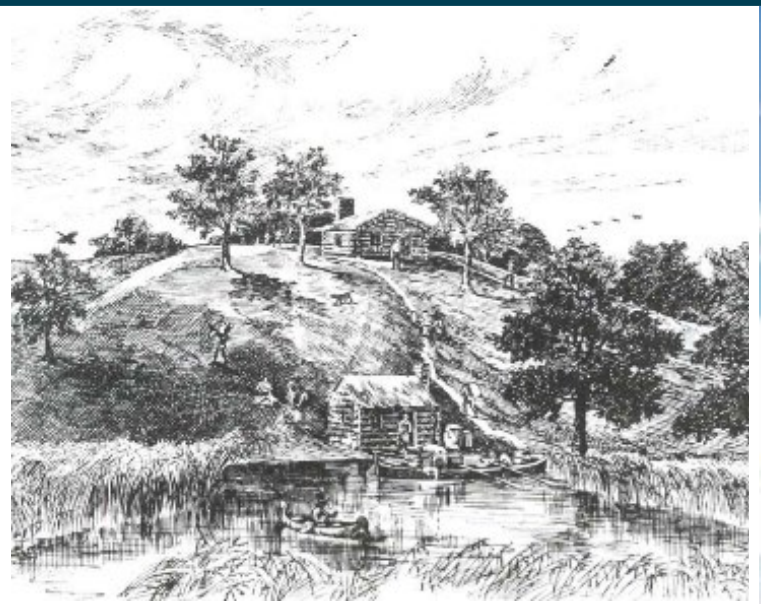
First Nation's Peoples from the Potawatomi, Ottawa, Ojibwa and Menominee bands shared the neutral ground.

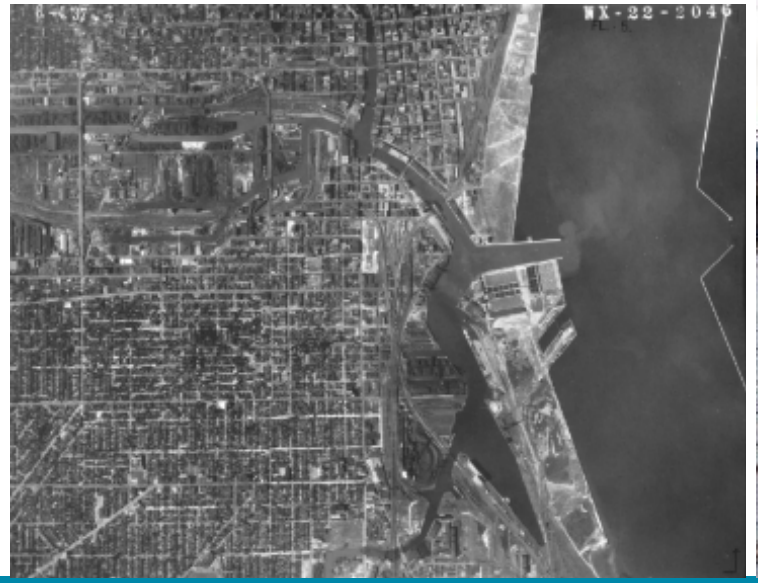
Economic Center of Wisconsin for Manufacturing and Shipping 1750s – 1950s.

2017 Study Estimate **$106M** in revenue from Port Milwaukee alone but the location has changed.

Currently the Milwaukee River serves as the focal point for the City It's now the center of Arts and Entertainment

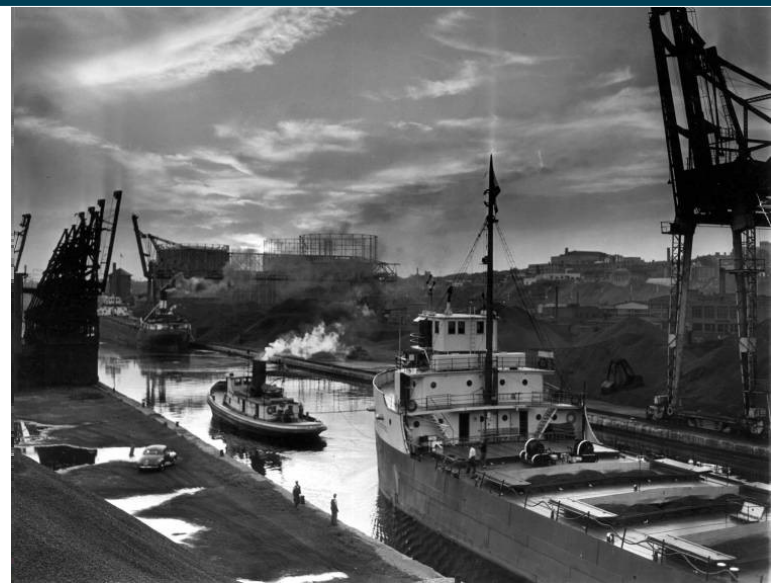
Milwaukee's Riverwalk won the 2017-2018 Global Award of Excellence from the Urban Land Institute





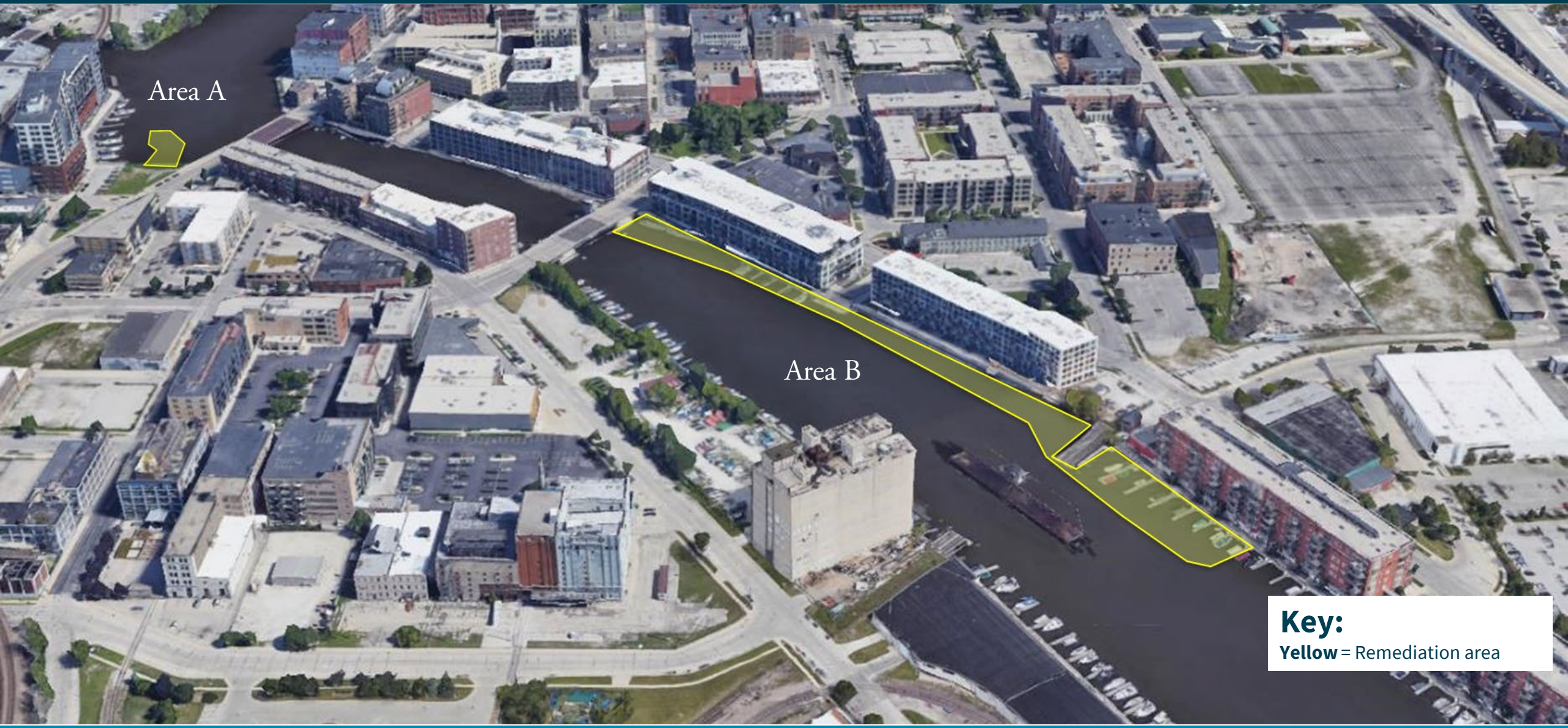
Project Need

- Historic Impacts
  - Milwaukee-Menomonee-Kinnickinnic Rivers served as the main location for all of Milwaukee's industries.
- Milwaukee River AOC Targets and Goals
  - ~1.4M cubic yards of sediments planned for remediation
  - ~$65.5M already spent on remediation projects.
- Desire to be good stewards of the communities we live and work in.
  - Sediment remediation projects as a part of urban waterway revitalization.
  - Removing NAPL (and other contaminants) impacts from the sediments.



Design

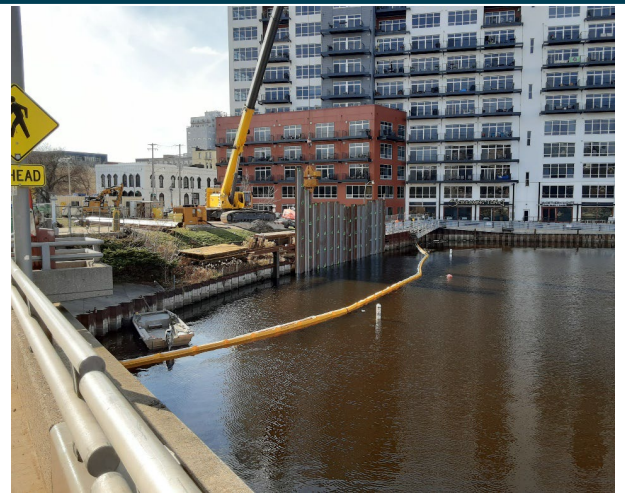
Challenges of an Urban Waterway

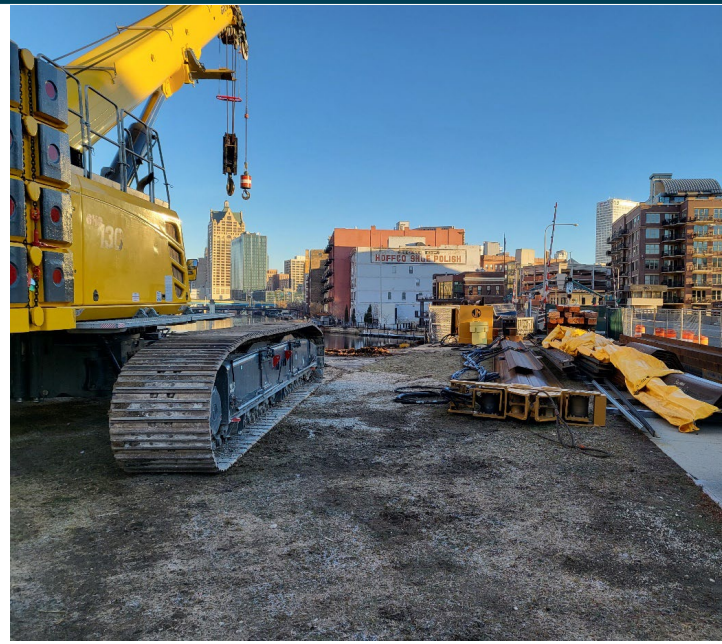


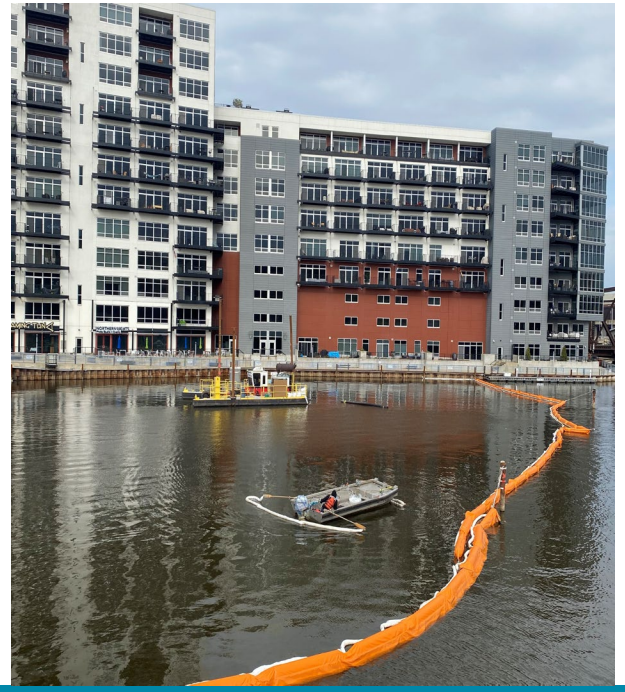
Challenges of an Urban Waterway

Design

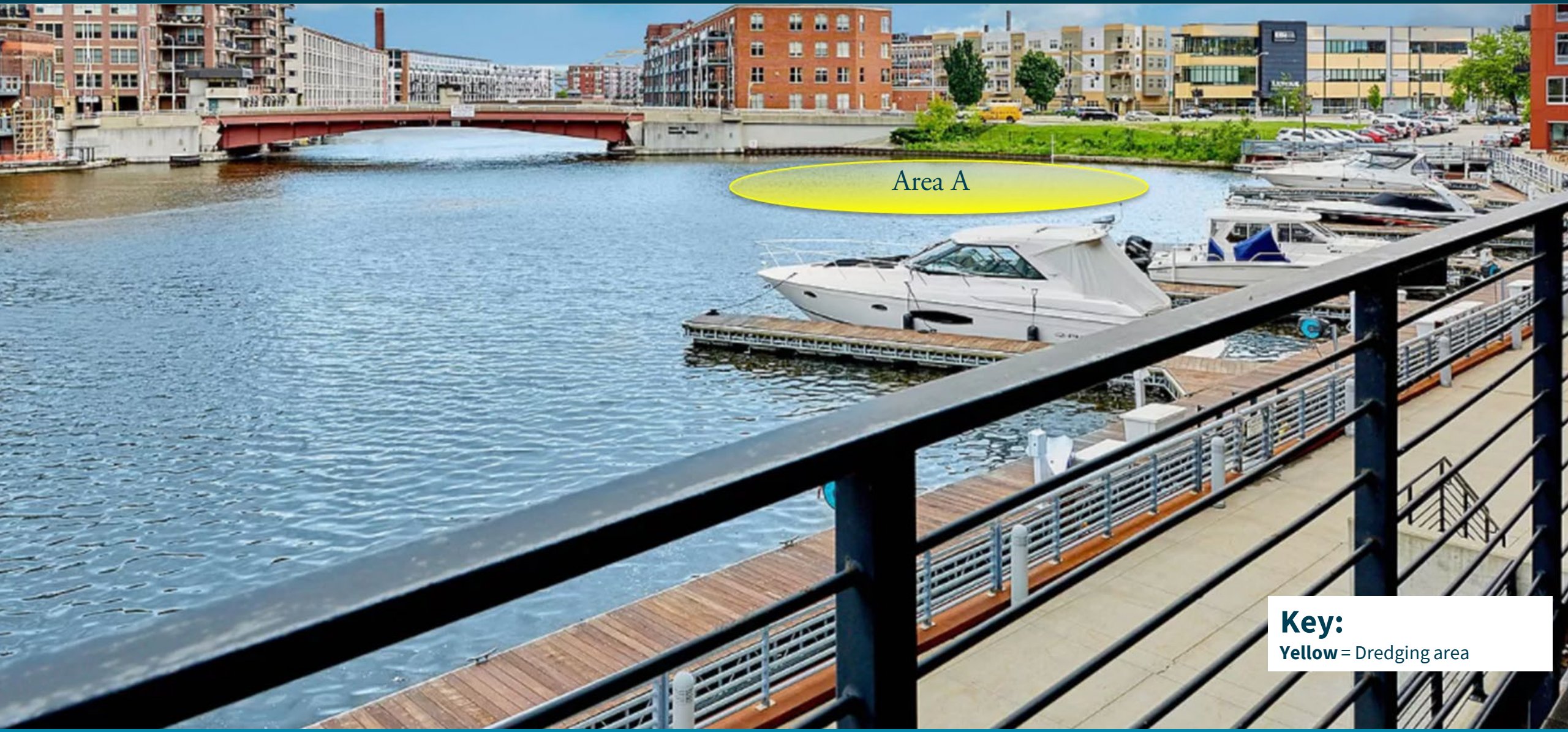
- Lacking as-Built data
- Deep water environment (15-35 feet deep)
- Potential for subsurface debris
- Protection of structures
- Seasonal limitations
- Removing NAPL containing sediments
- Treatment of the sediments post dredging
- Development of a monitoring program
- Cultural resources (shipwrecks)



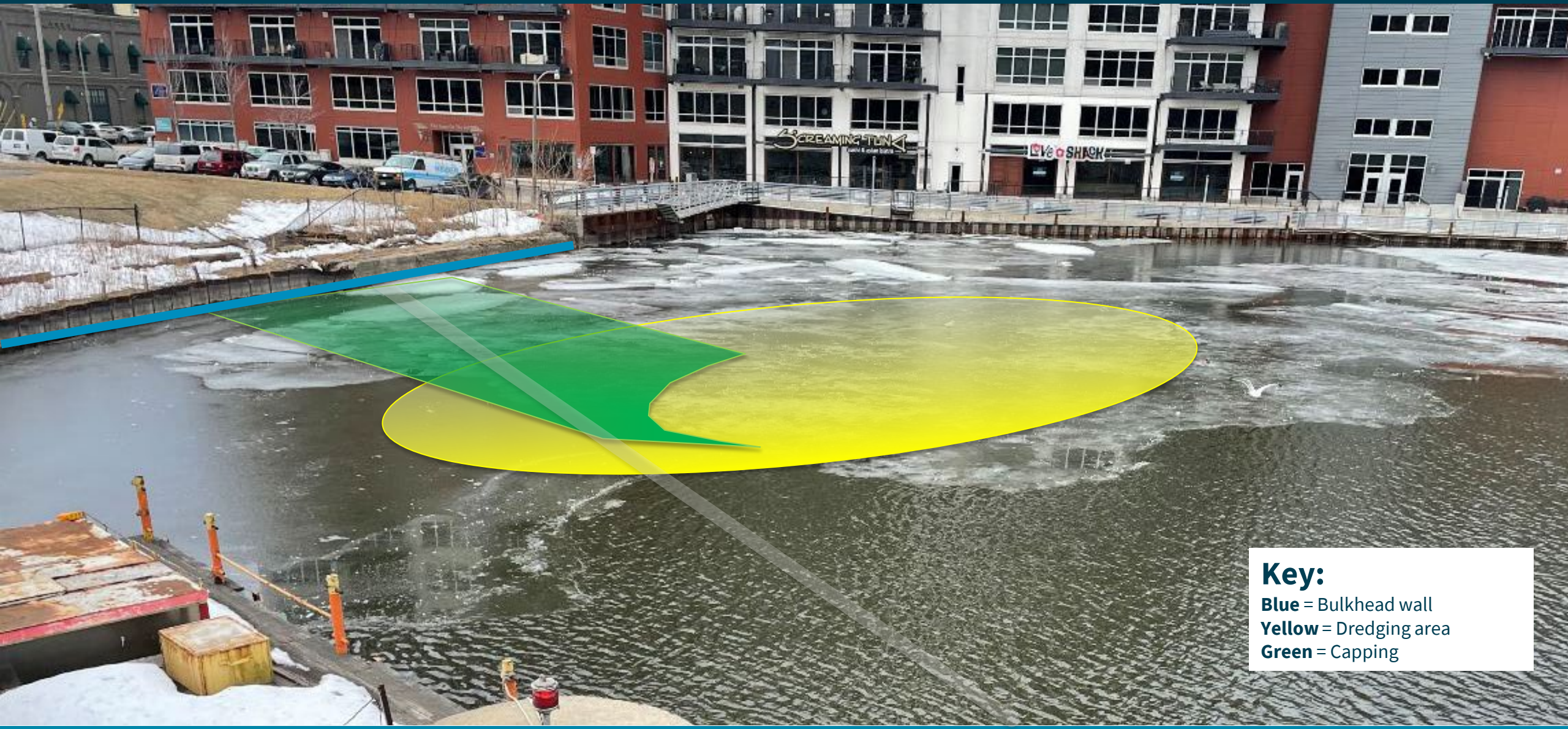




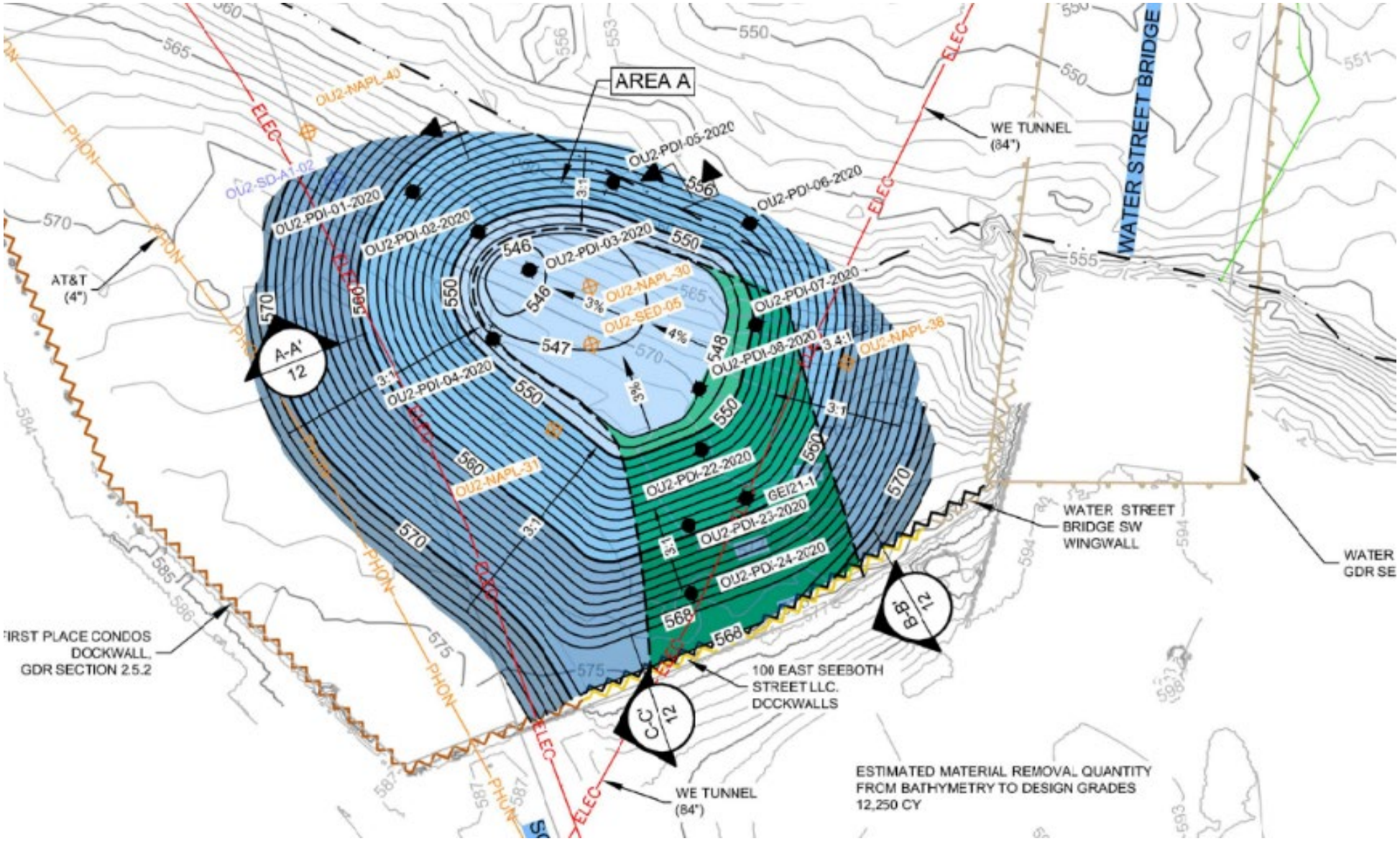
Challenges of an Urban Waterway



Area A

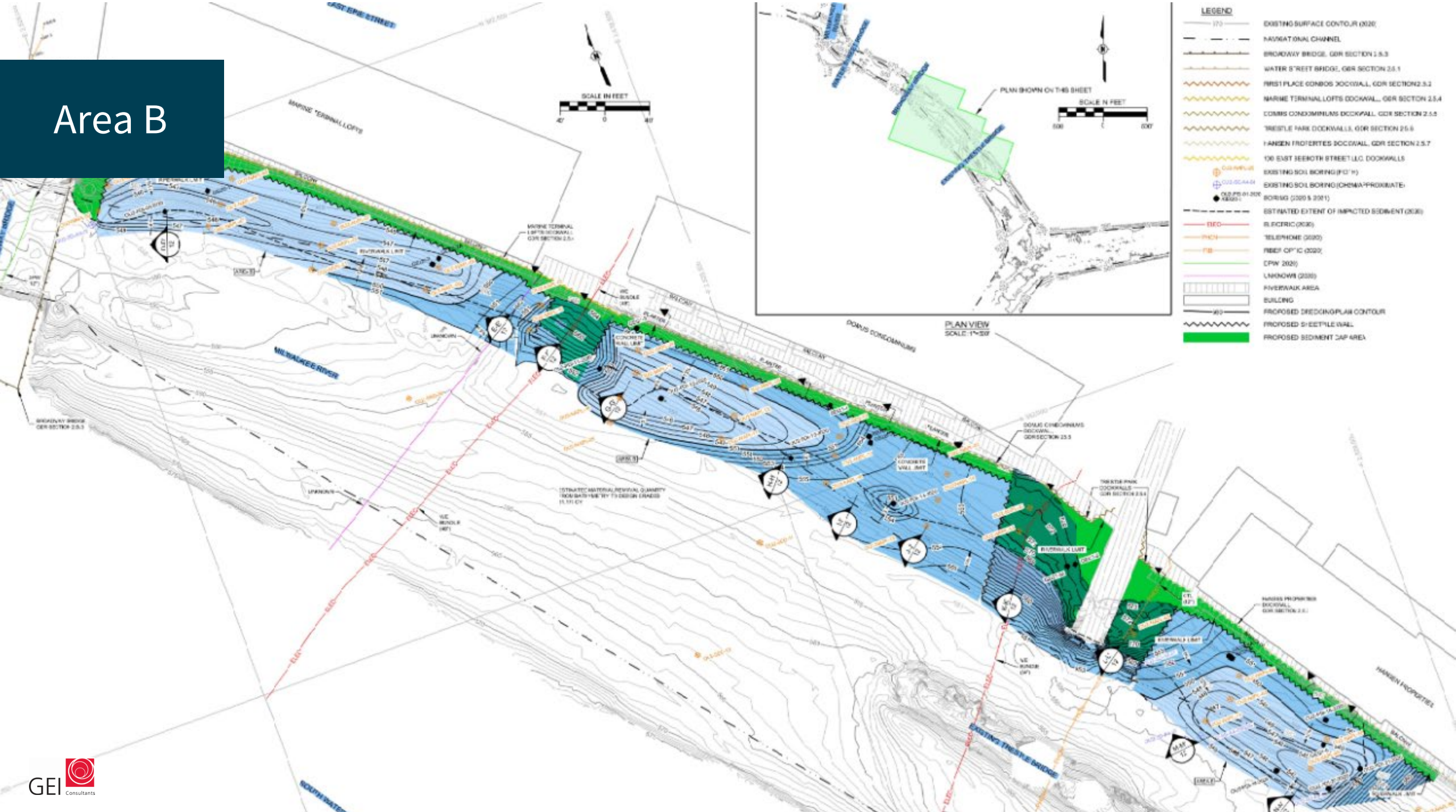

SCREAMING TUNA
SHACK
Key:
Blue = Bulkhead wall
Yellow = Dredging area
Green = Capping

Area A


AREA A
OU2-PDI-01-2020
OU2-PDI-02-2020
OU2-PDI-03-2020
OU2-PDI-04-2020
OU2-PDI-05-2020
OU2-PDI-06-2020
OU2-PDI-07-2020
OU2-PDI-08-2020
OU2-PDI-22-2020
OU2-PDI-23-2020
OU2-PDI-24-2020
GEI21-1
OU2-NAPL-30
OU2-NAPL-31
OU2-NAPL-38
OU2-NAPL-40
OU2-SED-05
OU2-SD-A1-02
A-A'
12
B-B'
12
C-C'
12
WE TUNNEL
(84")
WATER STREET BRIDGE
AT&T
(4")
WATER STREET
BRIDGE SW
WINGWALL
WATER
GDR SE
100 EAST SEEBOTH
STREET LLC.
DOCKWALLS
WE TUNNEL
(84")
ESTIMATED MATERIAL REMOVAL QUANTITY
FROM BATHYMETRY TO DESIGN GRADES
12,250 CY
ELEC
PHON

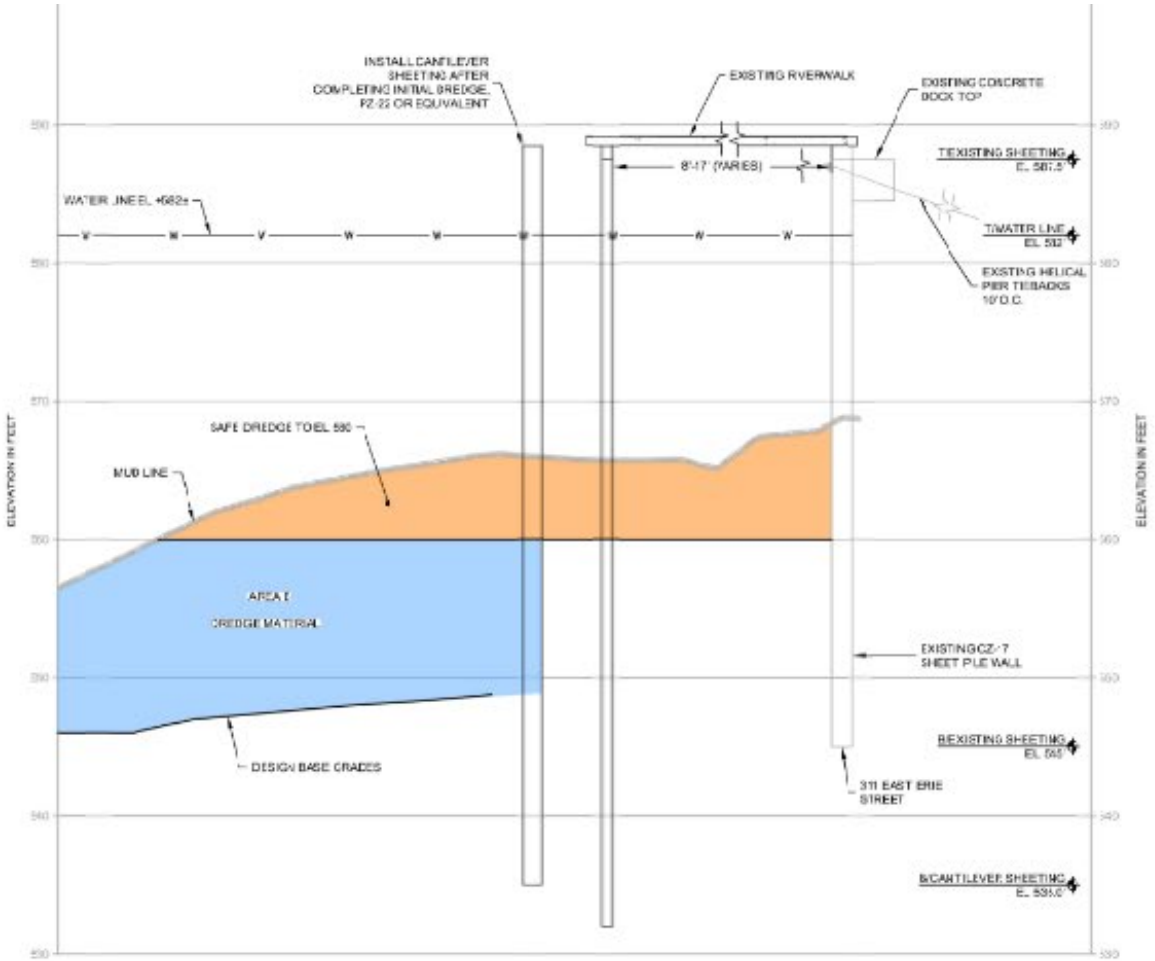
Area B

Area B

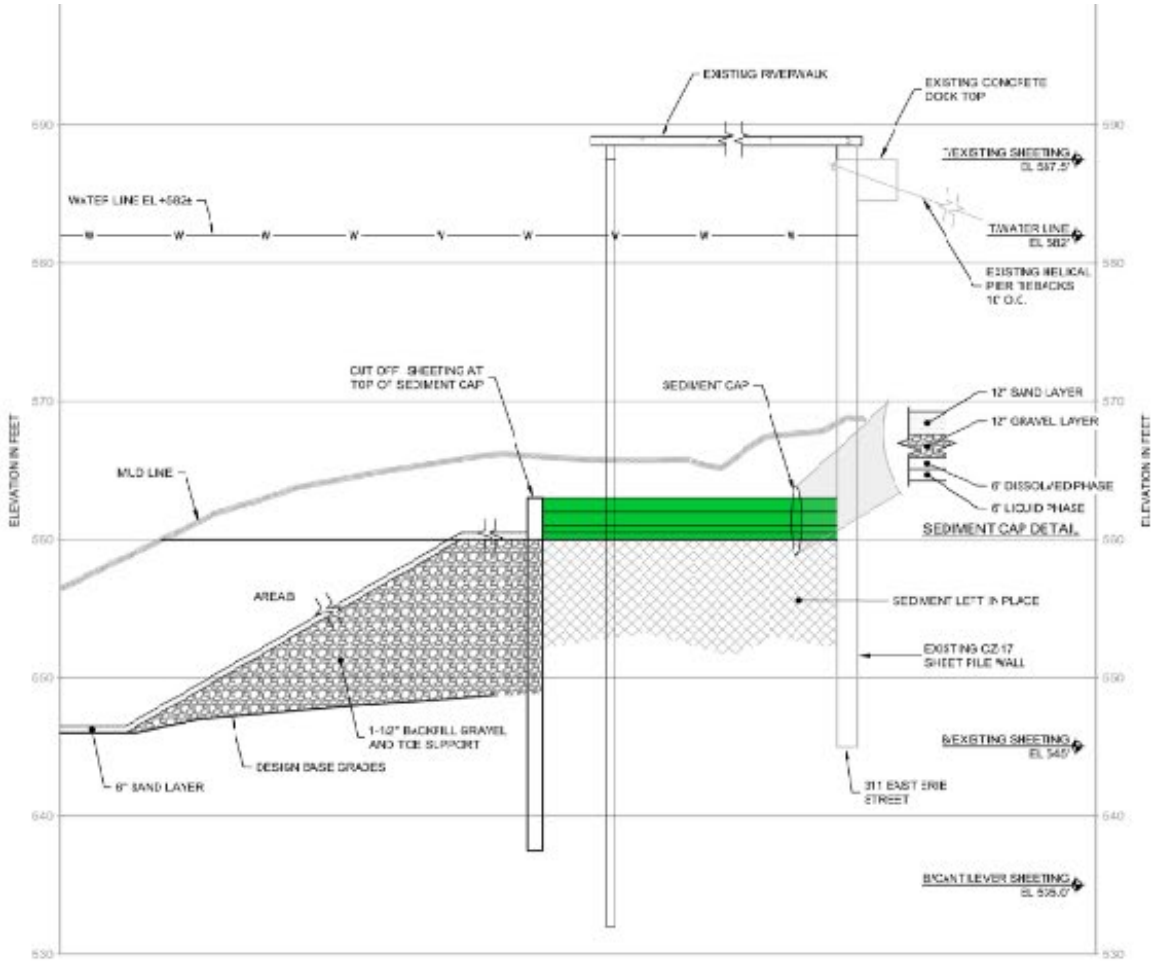


GEI Consultants

Typical Cross-Section



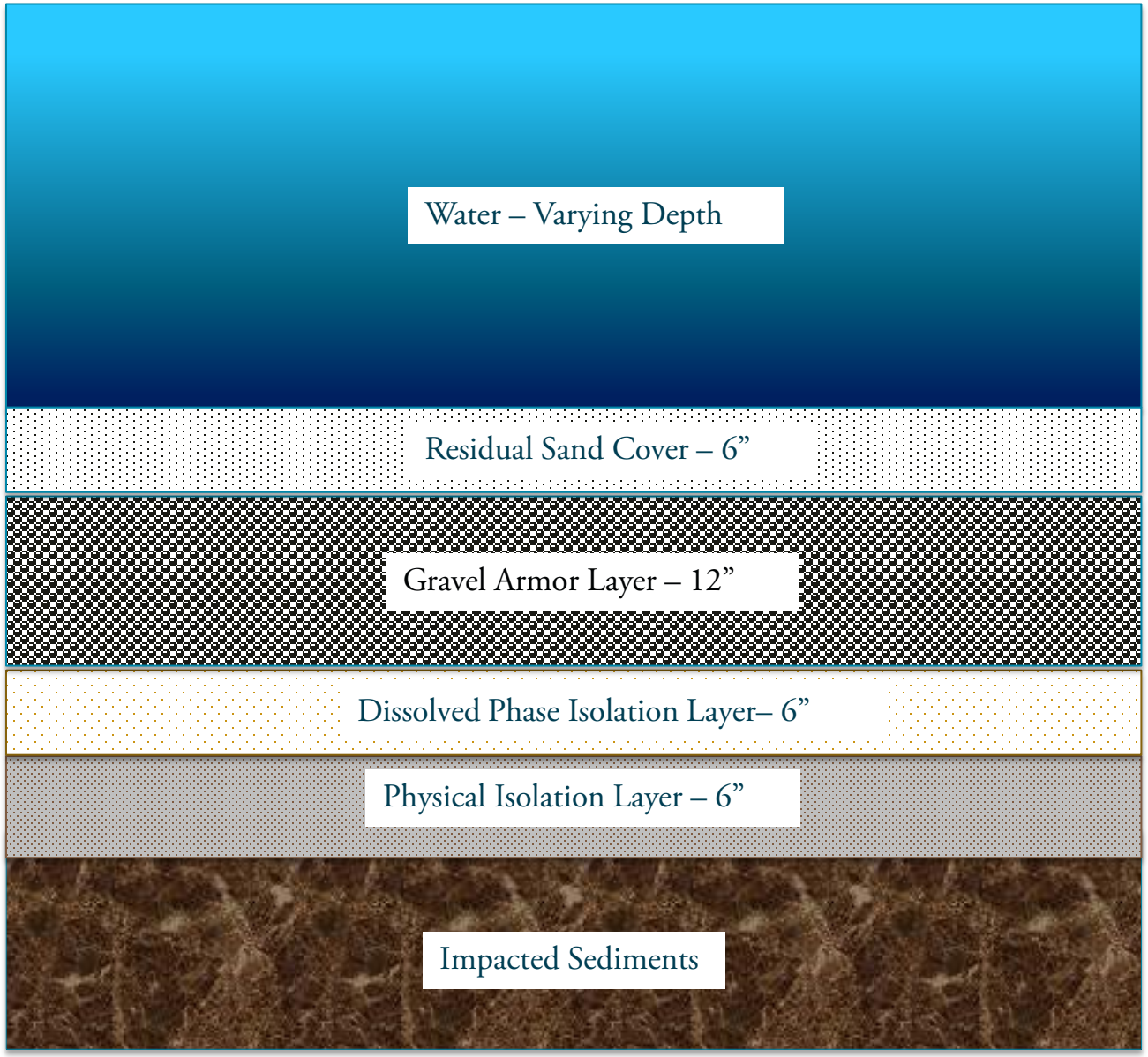
STABILIZATION PRIOR TO DREDGING
CROSS-SECTION D-D (WEST TO EAST)
Scale: Hor'l 1"=5'
Vert. Exaggeration: 1



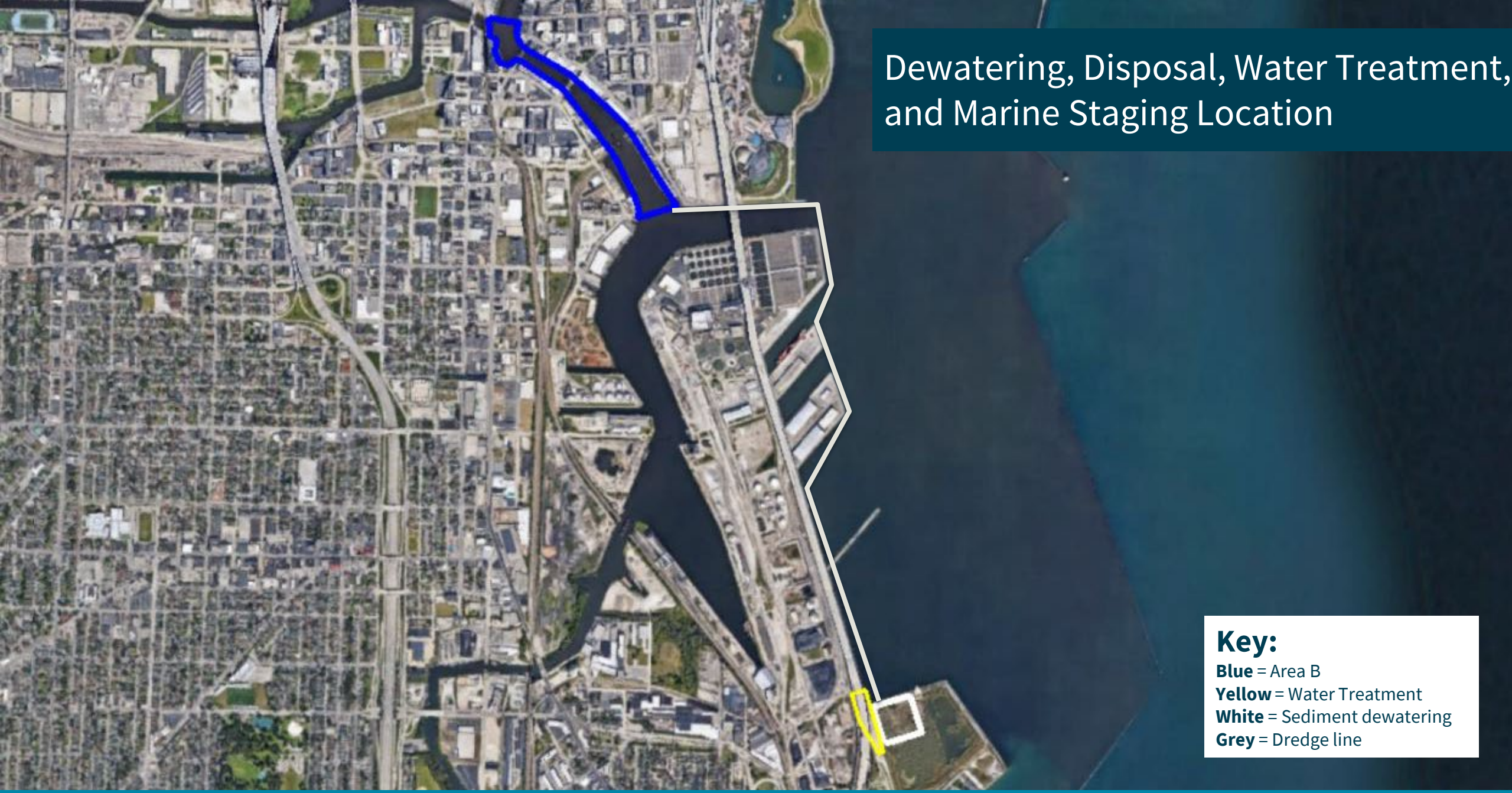
FINAL RESTORATION CROSS-SECTION D-D' (WEST TO EAST)
Scale: Hor'l 1"=5'
Vert. Exaggeration: 1

Engineered Cap

- Residual Sand Cover
- Gravel Armor Layer
- Dissolved Phase Isolation Layer
  - Sand and Granular Activated Carbon (0.4 kg/sf)
- Physical Isolation Layer
  - Sand and Organoclay Layer (1.5 kg/sf)



Dewatering, Disposal, Water Treatment, and Marine Staging Location



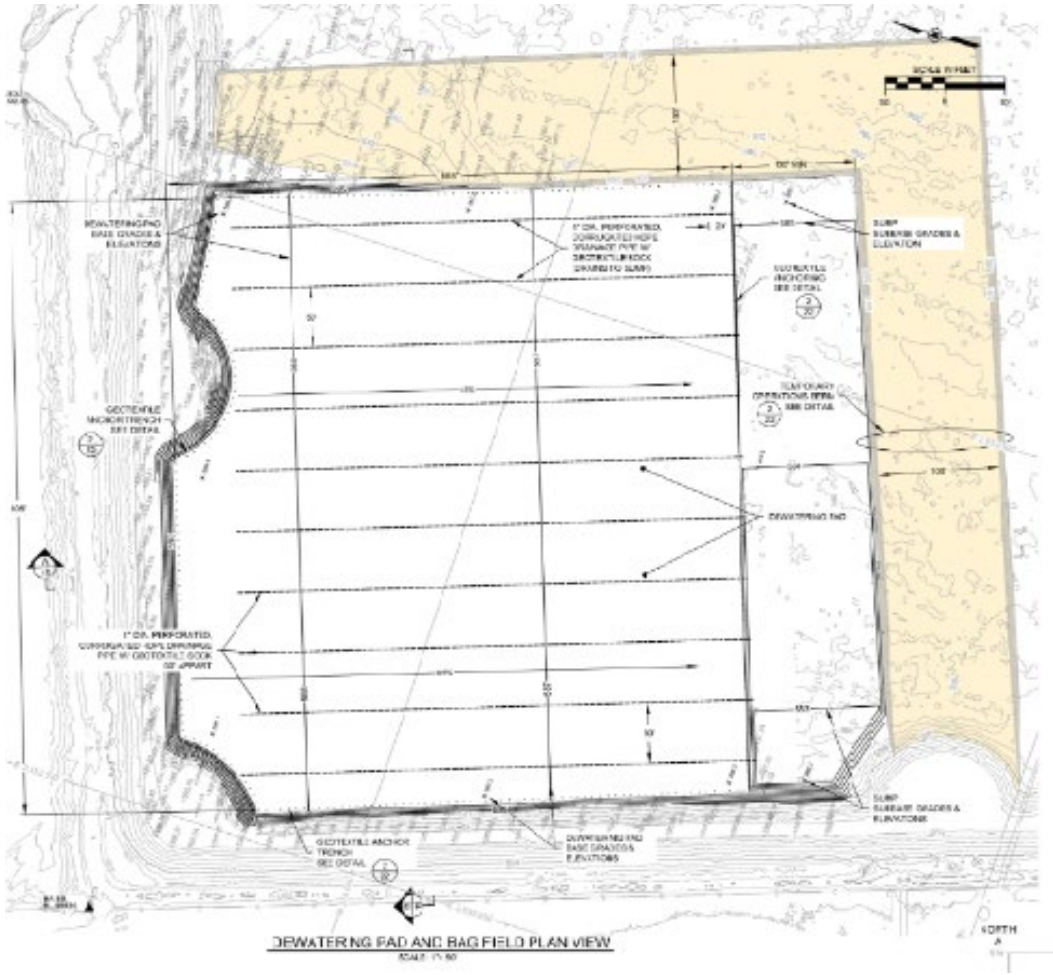
Key:

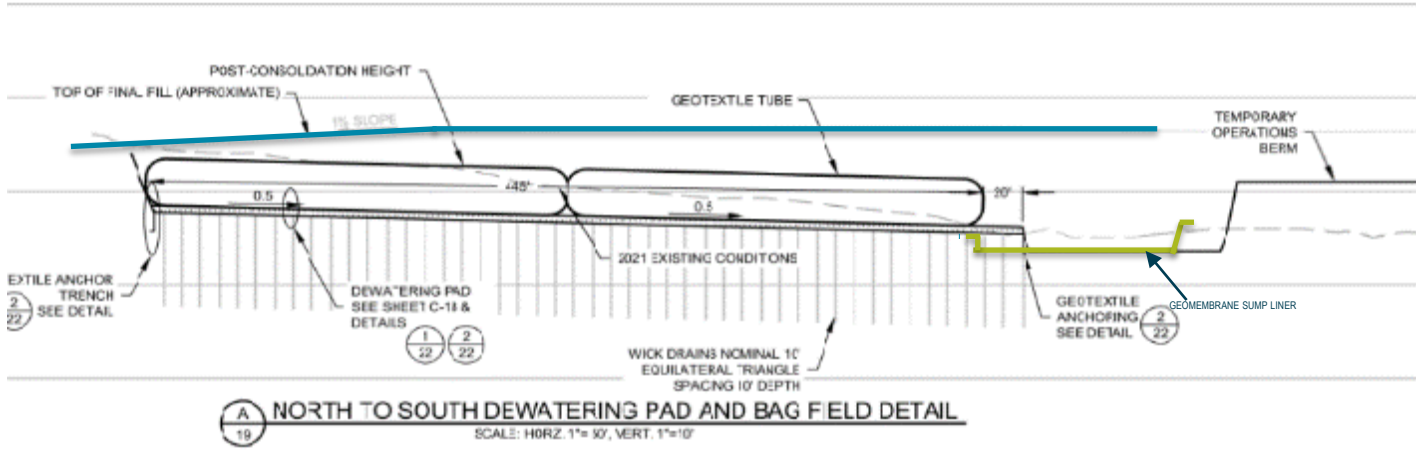
Blue = Area B
Yellow = Water Treatment
White = Sediment dewatering
Grey = Dredge line

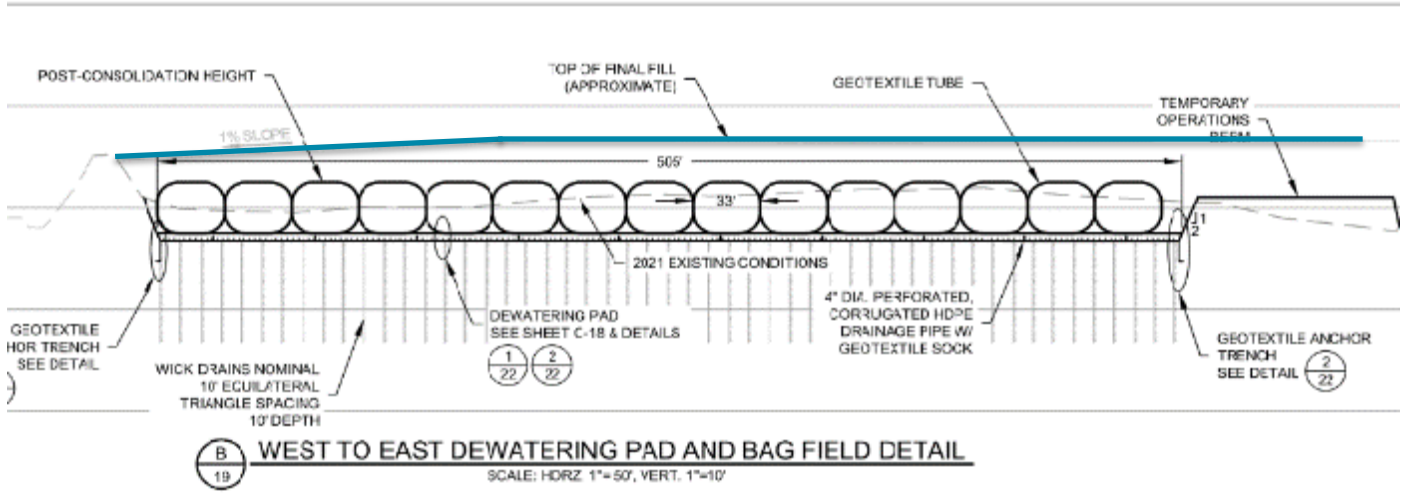
Sediment Dewatering, Water Treatment and Disposal Location

Key:
Yellow = Water Treatment
White = Sediment dewatering

Dewatering/Disposal Pad







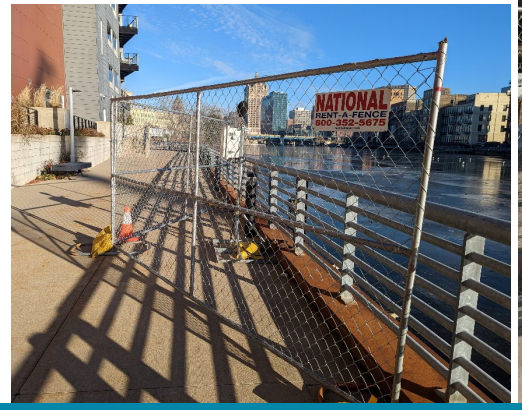
Challenges of an Urban Waterway

Stakeholders

- Utility Companies
- Residents & Property Owners
- Riparian Owners
- City Officials
- State and Federal Regulators
- Event Planning Commissions
- Conservation & Recreation Clubs
- Adjacent Businesses
- Commercial & Pedestrian Traffic
- Public Safety
- Boat Slip Owners
- Railroads

Design Lessons Learned

- Development of monitoring programs
  - Air – Real-Time and Grab Samples
  - Structural – Assessment/Surveys/Tiltmeters
  - Vibration
  - Noise
  - Turbidity and Water Quality
- Extensive project team
- Proactive stakeholder engagement
- Permitting – USEPA, WDNR, USACE, WisDOT, USCG, Port MKE, MMSD, City of MKE
- Cost/risk management
- Logistics of materials in an urban setting.



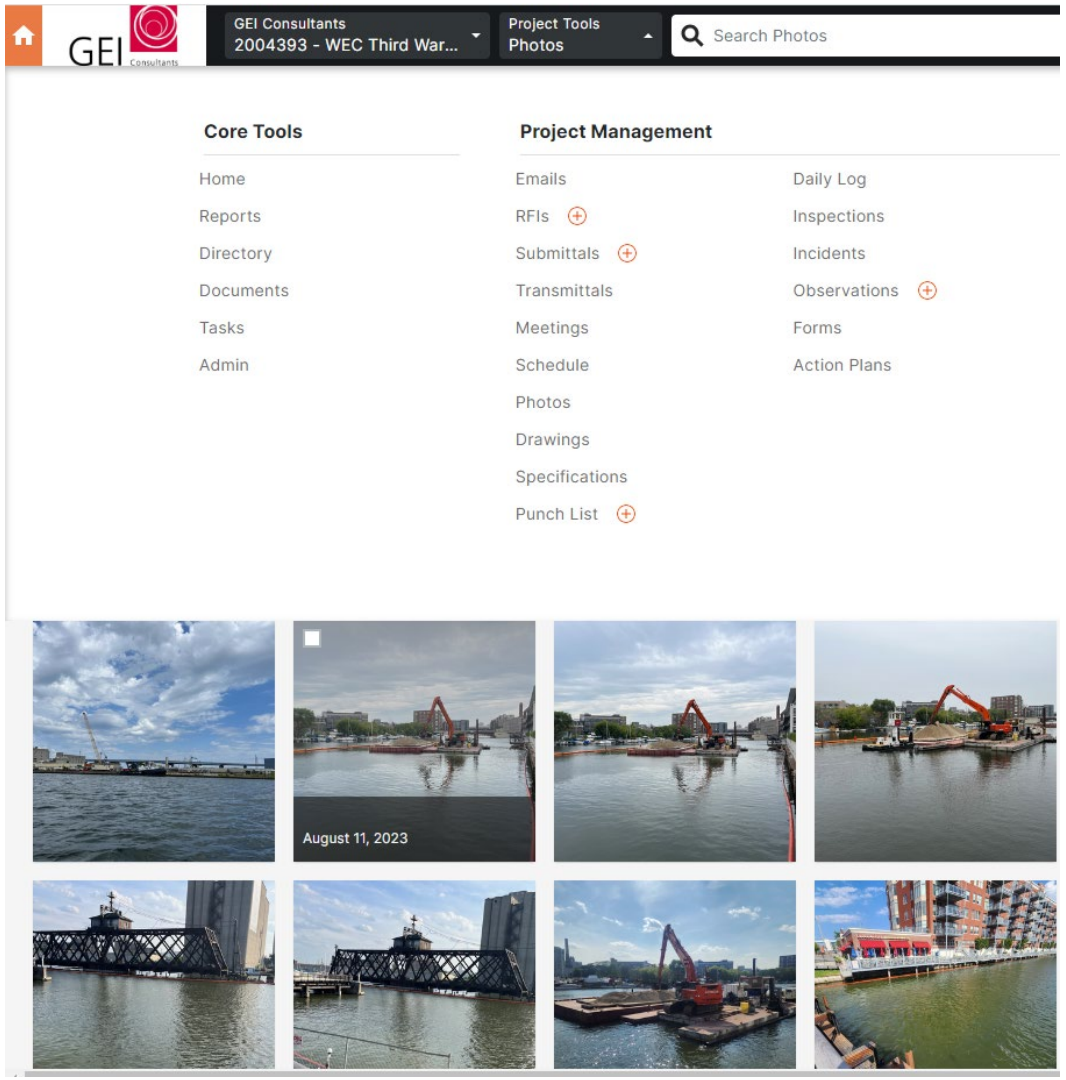
Construction Implementation

Project Details

- ~45,000 CY impacted sediment
- 2 miles 10” submerged HDPE pipeline to DMDF
- 7-acre sediment dewatering pad
  - 35 geotubes
- 3,500 GPM water treatment system
  - >100M gallons treated (zero discharge exceedances)
- 1,500 LF steel sheet pile (55’)
- 35,000 SF engineered sediment cap
- >160 instruments monitoring structural movement, vibration, air quality, noise and turbidity

CM/Management

- 4-5 GEI Onsite fulltime
- 2-3 GEI office engineering
- Working hours
  - Six 12hr days (April-August)
- Four safety meetings at different locations
- Project Management Information Software - Procore
- Project Controls
- Significant effort
  - Stakeholder management
  - Communication (external/internal)
  - Documentation



Urban Site Logistics

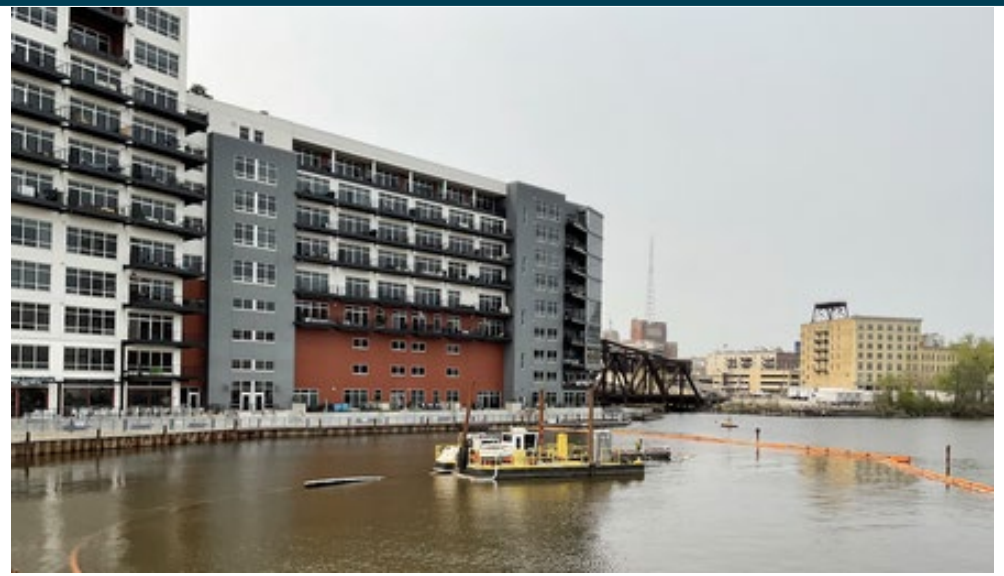
- Marine traffic
  - Commercial
  - Recreational
  - Tour Boats
- Riverwalk management
- Multiple bridges

Public Announcement Video

https://youtu.be/iJ6oeMTOHaA?si=kL-n7YvIbDbvA2xr

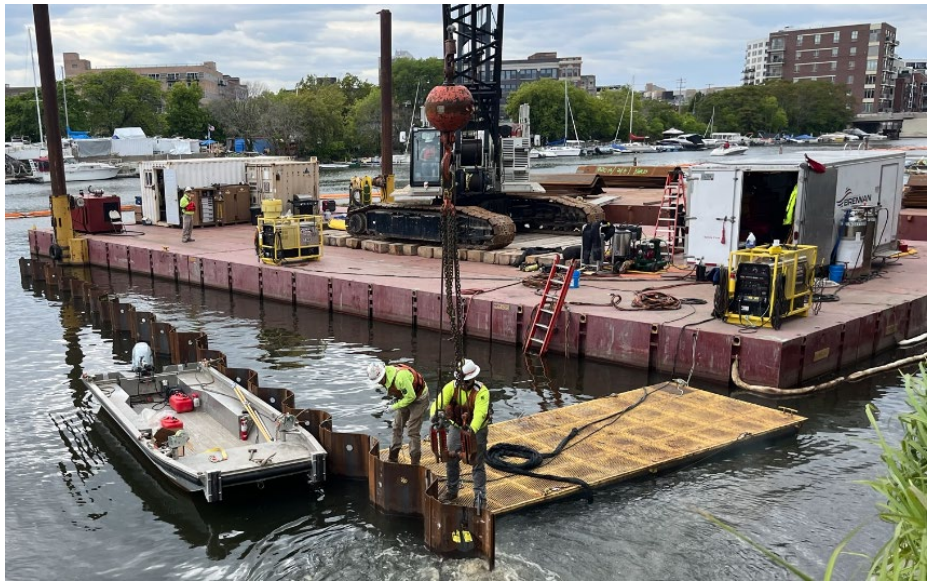
Implementation - Dredging

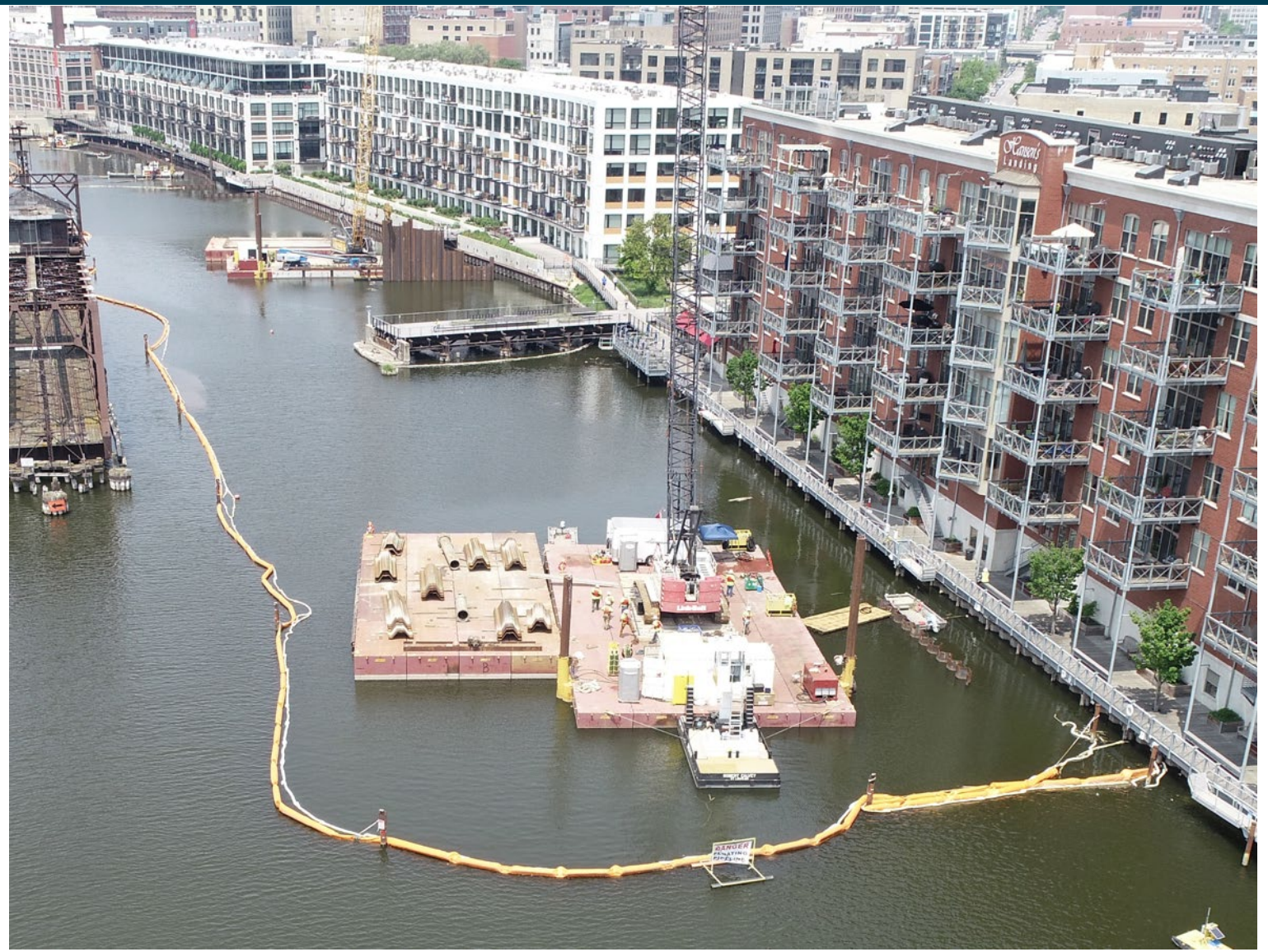
- Safe Dredging
- Sheen Management
- Odors
- Final Dredge Pass



Implementation – Sheet pile Installation

- 1,500 LF (55’ sheets)
- Interlock Sealant
- 10’ offset from existing bulkhead wall
- 2 drive crews
- Diver removal of 15’
- Only three sheets had obstructions



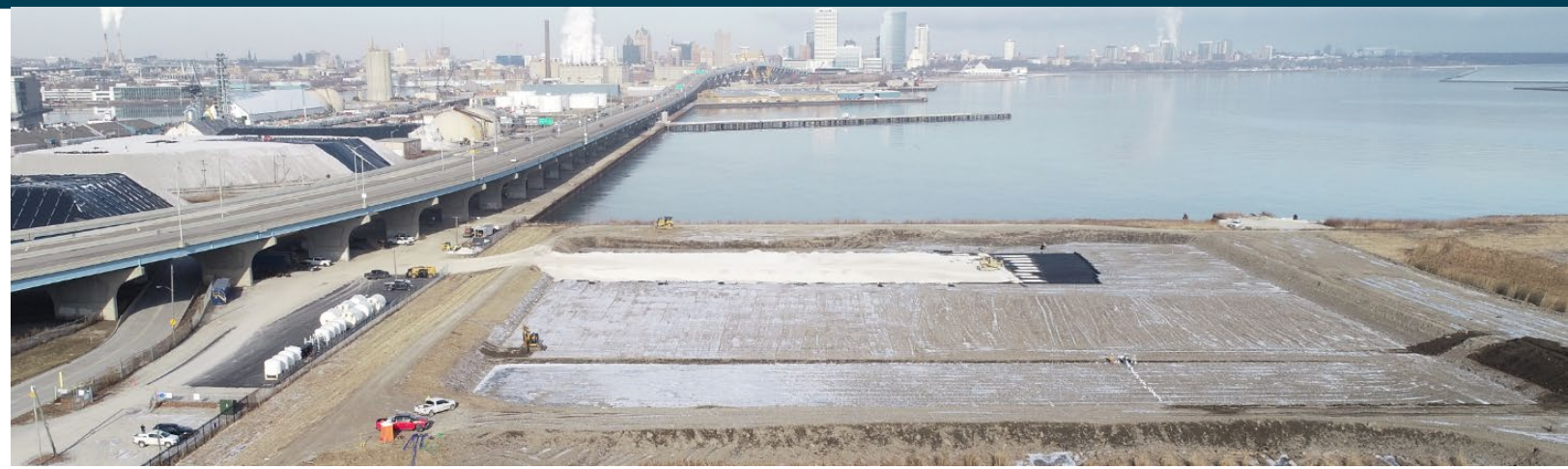


Implementation - Capping

- Capping
  - Gravel buttress
  - Engineered Cap
  - Residual Sand Cover
- Placement Methods
  - Mechanical/Bucket
  - Broadcast Spreader
  - Slurry

Implementation – Sediment Dewatering

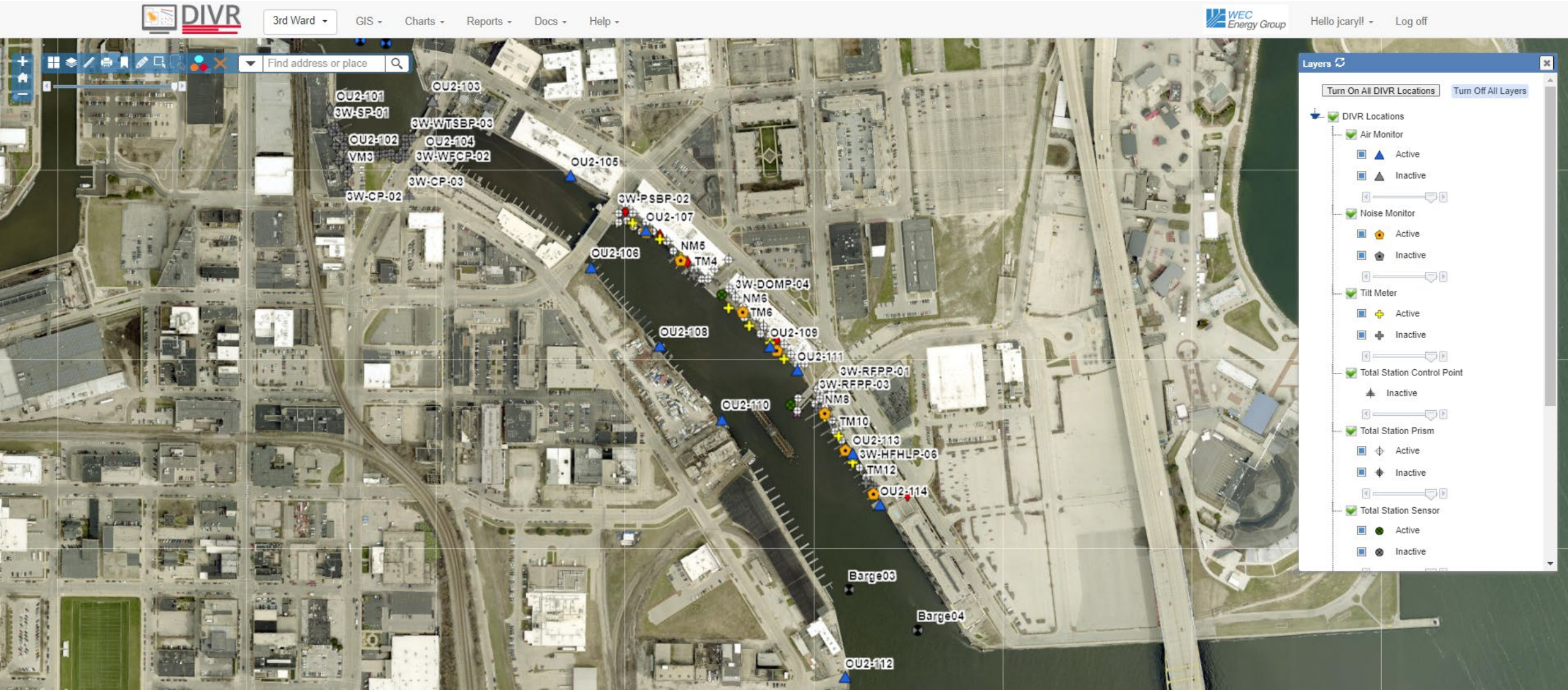
- 12” gravel drainage layer
- Lined sump
- Wick drains (promote consolidation)
- 36 Geotubes
  - 75’ diameter x 245’ long
  - Constantly working to break surface tension
  - Polymer
  - Coagulant
  - Ferric Chloride
  - Sodium Hydroxide
- Constant balancing flow
- Sometimes they rupture



Implementation – Water Treatment

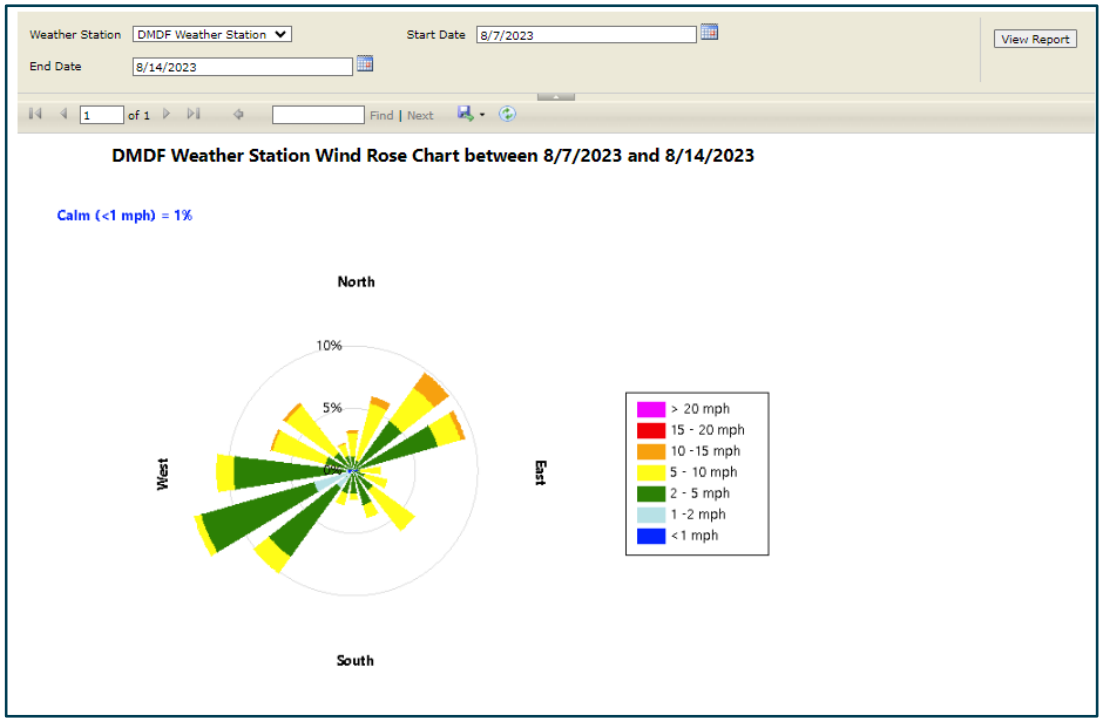
- 3,500 GPM
- Treated over 105M gallons
- Thickener/shaker
- Multimedia filters (12)
  - Gravel
  - Garnet
  - Filter sand
  - Anthracite
- Bag Filters
- Organoclay (6)
- GAC (10)
  - 200,000lbs
- 1,000 AMP service

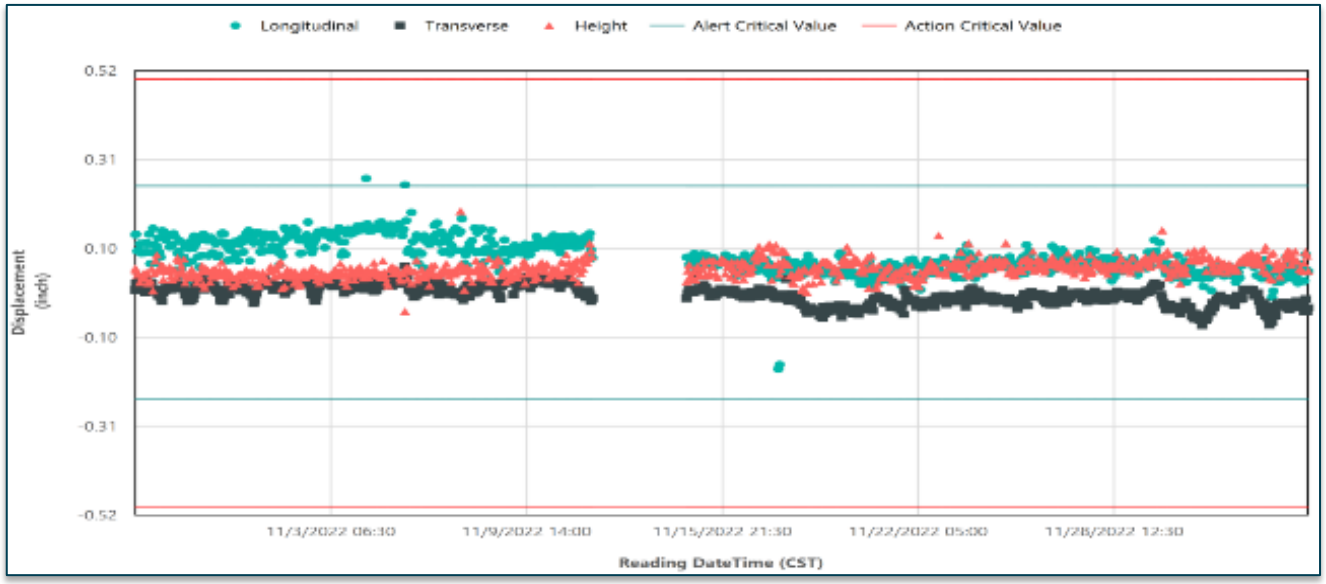
DIVR

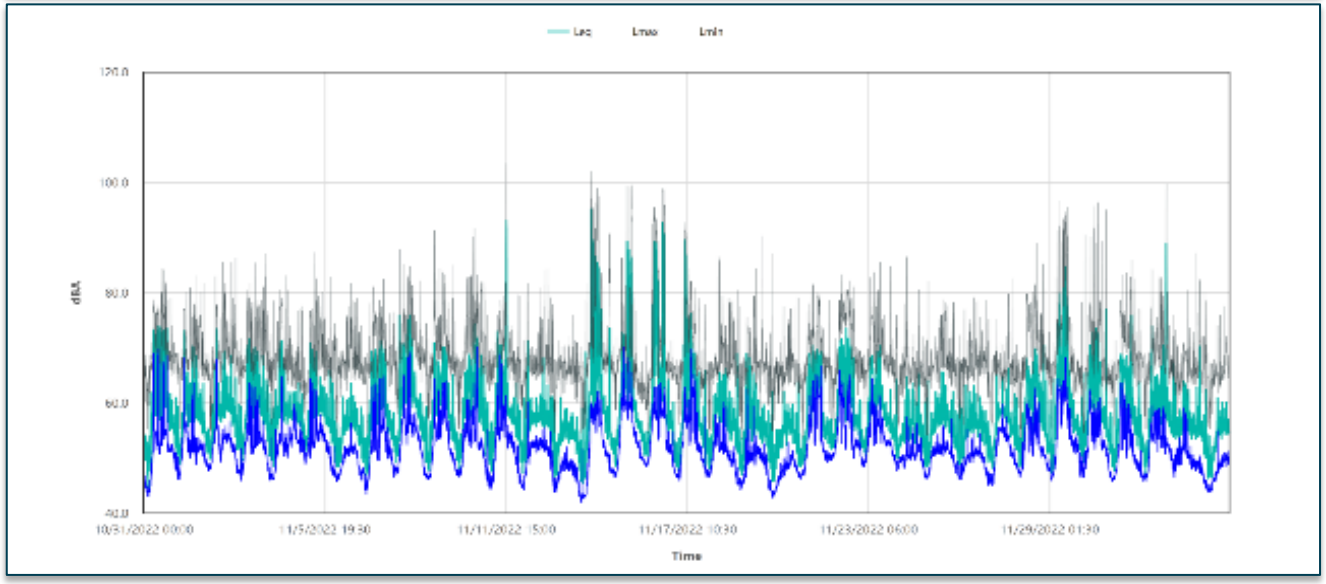

DIVR
3rd Ward
GIS
Charts
Reports
Docs
Help
WEC Energy Group
Hello jcaryl!
Log off
Find address or place
OU2-101
3W-SP-01
OU2-103
3W-WTSBP-03
OU2-102
VM3
OU2-104
3W-WFCP-02
OU2-105
3W-CP-03
3W-CP-02
3W-PSBP-02
OU2-107
NM5
TM4
OU2-106
3W-DOMP-04
NM6
TM6
OU2-108
OU2-109
OU2-111
3W-RFPP-01
3W-RFPP-03
NM8
OU2-110
TM10
OU2-113
3W-HFHLP-06
TM12
OU2-114
Barge03
Barge04
OU2-112
Layers
Turn On All DIVR Locations
Turn Off All Layers
DIVR Locations
Air Monitor
Active
Inactive
Noise Monitor
Active
Inactive
Tilt Meter
Active
Inactive
Total Station Control Point
Inactive
Total Station Prism
Active
Inactive
Total Station Sensor
Active
Inactive

DIVR

- Significant amount of data
- Real-time alarms
- Data trends
- User friendly
- Not perfect but getting better

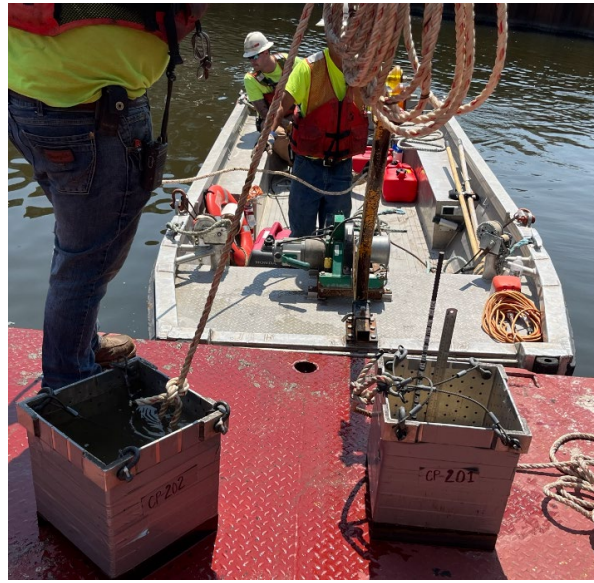






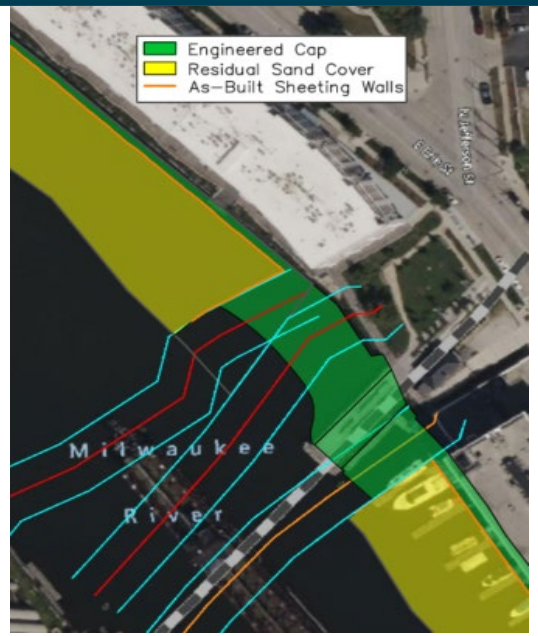
QA/QC

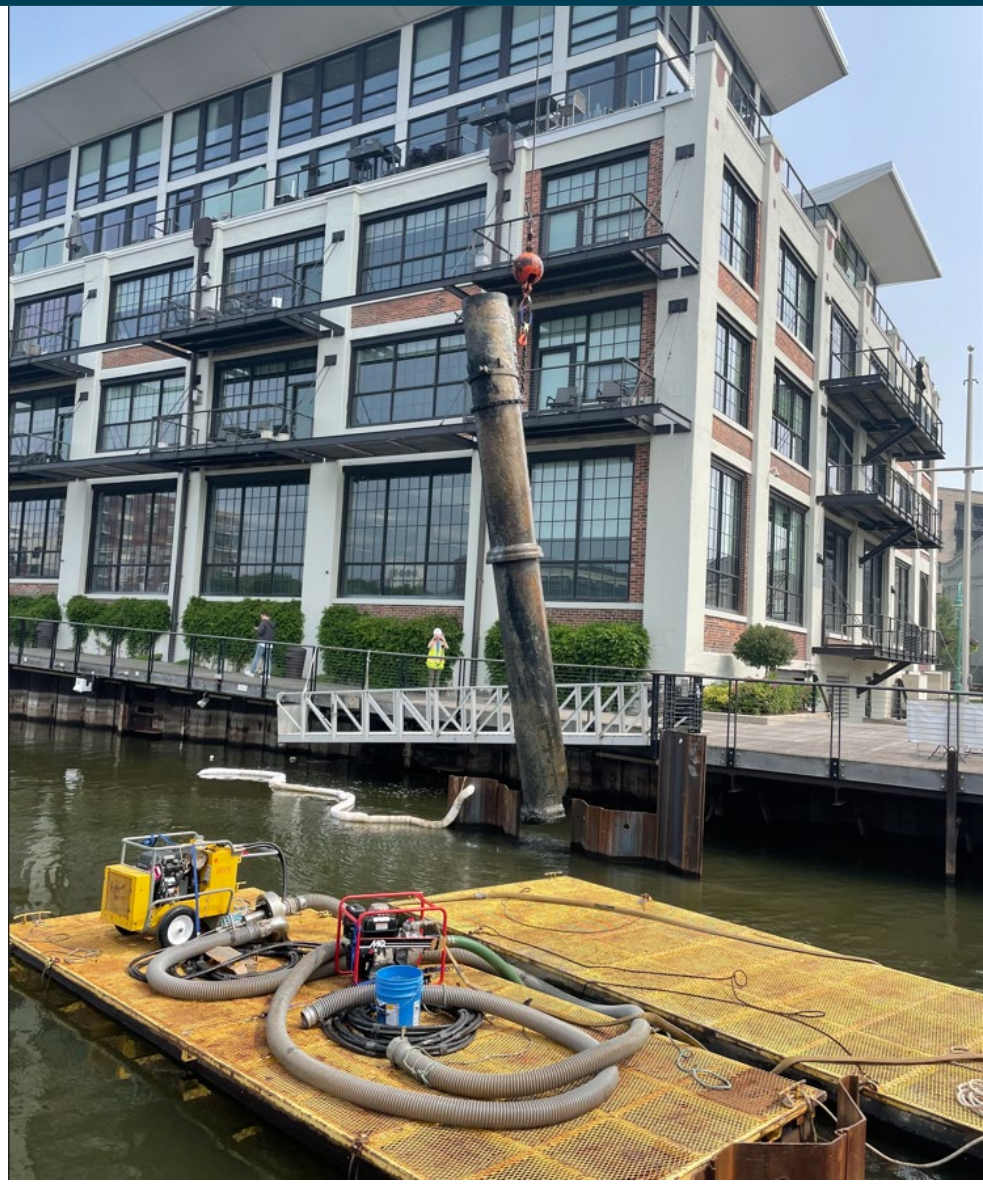
- Confirmation sampling
- Cap Material testing
  - Pre- and post-placement testing
  - Light aggregate testing
- Survey
  - Significant CAD support to review
- Catch cans

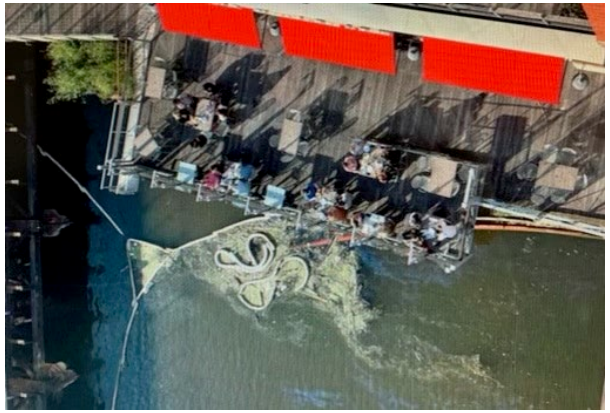


Managing Change

- Sequencing
  - Plan Upriver to Downriver
  - Lake Express Ferry
  - Restaurant/Condo Owner Complaints
- Temporary power supply
- Booster pump barge relocation
- Unknown utilities
- Previously cleared utilities
- Large abandoned utilities
- Significant debris (cable/wire)
- Bricks







Key Takeaways

Implementation

- Engage stakeholders, public, waterway users and authorities early
- Identification of and acquiring agreements for access and staging is critical
- Develop a Risk Register (expect the unexpected)
- Conduct pre and post construction structural inspections and have a sound monitoring plan
- Importance of project closeout (reporting, access agreements and permits)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