



Introduction

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Remediation & Redevelopment

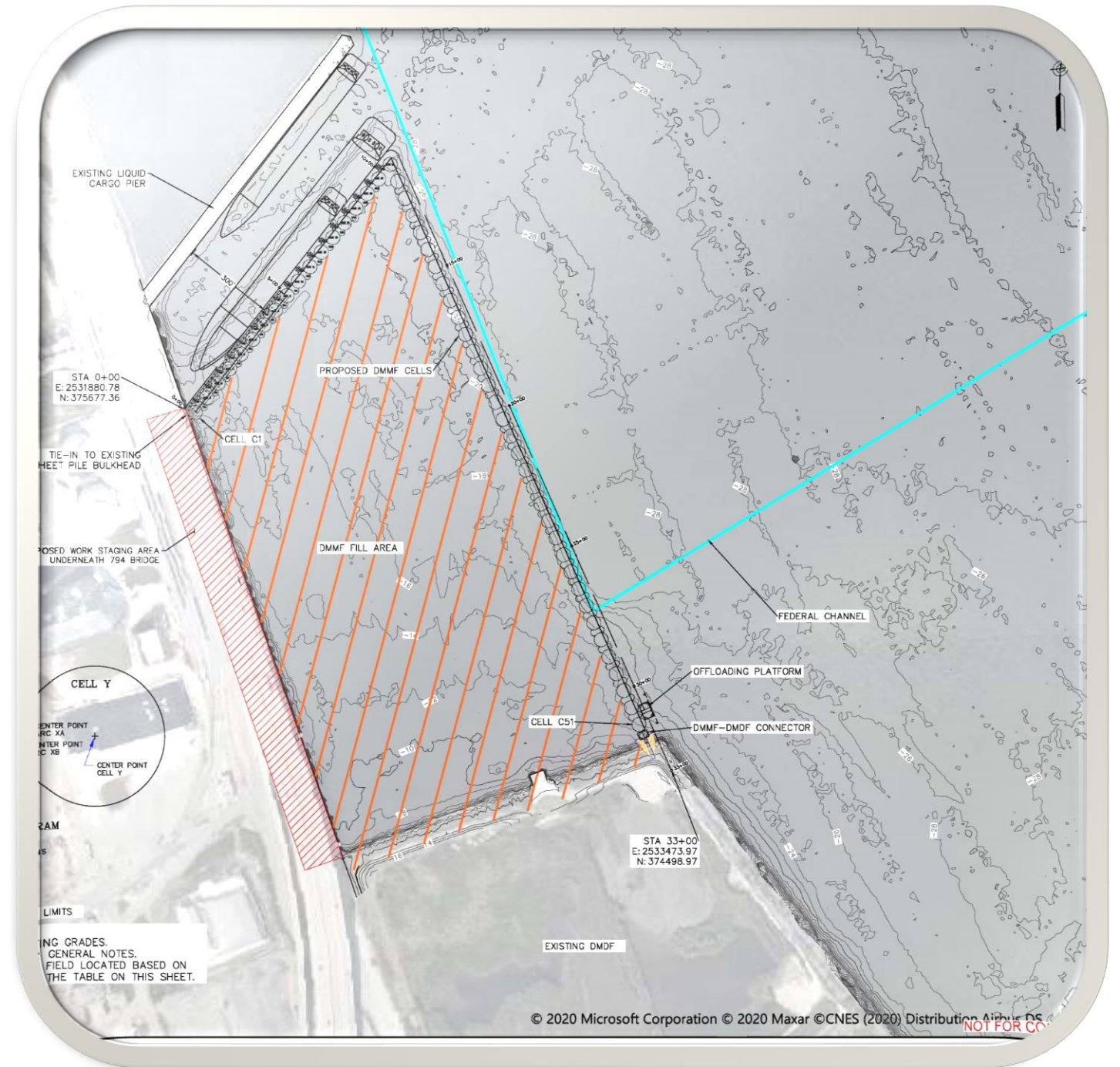
Wisconsin Department of Natural Resources

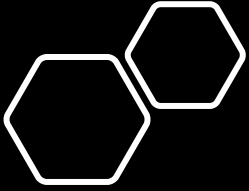


Topic

Milwaukee Estuary Dredged Material Management Facility

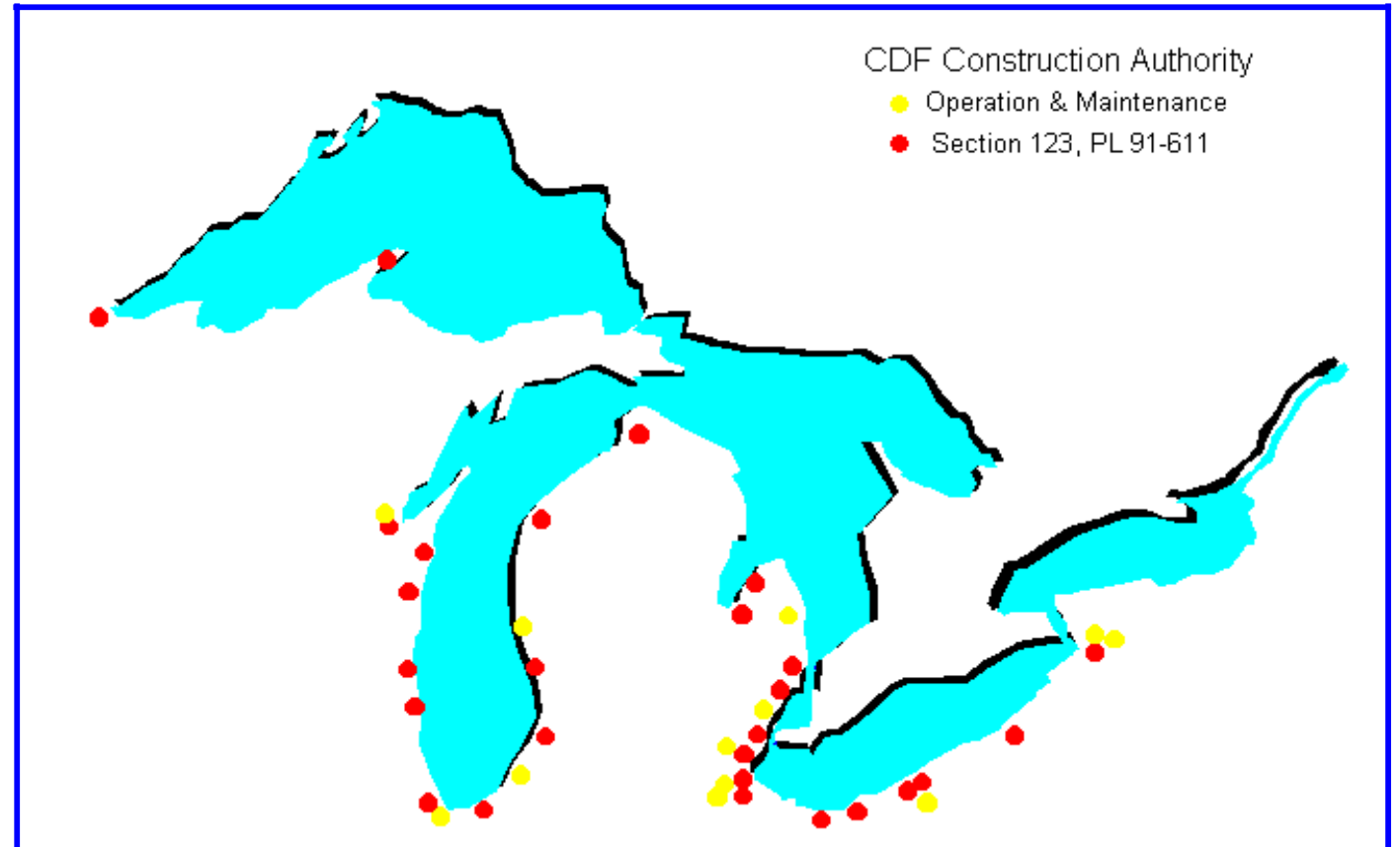
Presented to Great Lake Dredging Team February 26, 2021





CDFs on the Great Lakes

- 1970 River & Harbor & Flood Control Acts
- 43 CDFs built on Great Lakes
 - 16 on land, 27 in water
 - 6 built in Wisconsin waters
- Over 90 million cubic yards placed in CDFs



CDF use in Great Lake Legacy Act Projects

- Five Legacy Act projects have disposed of contaminated sediments in existing CDFs:

• Black Lagoon, MI	115,000 cy
• Buffalo River, NY	480,000 cy
• Kinnickinnic River, WI	167,000 cy
• River Raisin, MI	70,000 cy
• L. Rouge River O. C., MI	70,000 cy

Total: 902,000 cy

1,400,000 cy

Space for Legacy Act Projects in the DMMF

Historic sediment remediation by cubic yardage

Milwaukee Estuary Area of Concern

Year	River	Area	Total CY
1994	Cedar Creek	Ruck Pond	7,500
2000	Cedar Creek	Former Hamilton Pond	10,100
2008	Milwaukee River	Blatz Pavilion Lagoon	4,700
2009	Kinnickinnic River	Becher St to KK Ave	170,000
2012	Milwaukee River and Lincoln Creek	Lincoln Park Phase I	119,000
2015	Milwaukee River	Lincoln Park Phase II	52,500
2016	Cedar Creek	Ruck Pond Raceway & Culverts	5,500
2017	Cedar Creek	OU2A-Uplands	5,300
2017	Cedar Creek	Columbia Pond	56,900
2017	Cedar Creek	Wire and Nail Pond	10,300
		Total	442,000

Used the existing DMDF and has the lowest \$/CY

History Continued

- No new footprint for CDF's have been built upon Wisconsin Lakebed since Renard Island in 1987.
- The existing DMDF was vertically expanded for the KK River Project 2008.
- Proposed DMMF would be:
 - At 1.9 MCY and 42-acres
 - The largest facility on the Great Lakes to be built outside the USACE Federal Navigation Maintenance Mission.



Why DMMF?

- Two-part answer
 1. Name
 2. The Legacy Act Cleanup

Why Shipping?

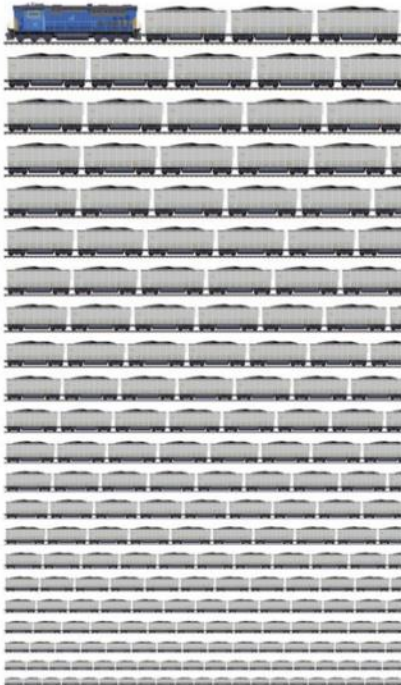
- Economical
- Sustainable
- Efficient
- Safe

THE EFFICIENCY OF GREAT LAKES SHIPPING

Units Needed to Carry 70,000 Tons of Cargo.



700 Train Cars: carrying capacity 100 tons each.



2800 Trucks: carrying capacity 25 tons each.





Schedule Driver



EPA issues Action Plan III –
prioritizes funding for AOCs
that can achieve management
actions necessary to delist by
2024



Ten AOCs on this initial list

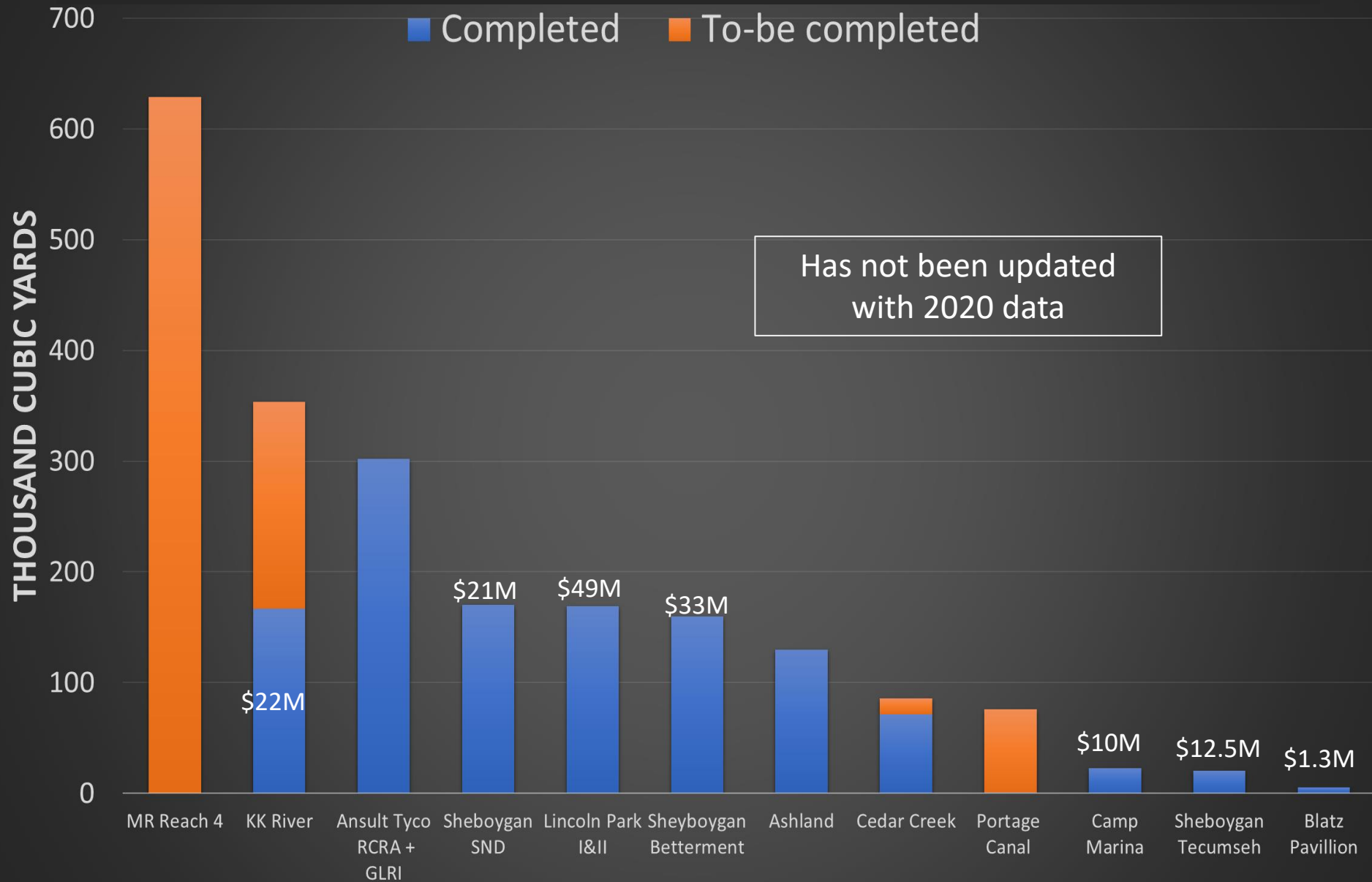
WI in competition with other
AOCs



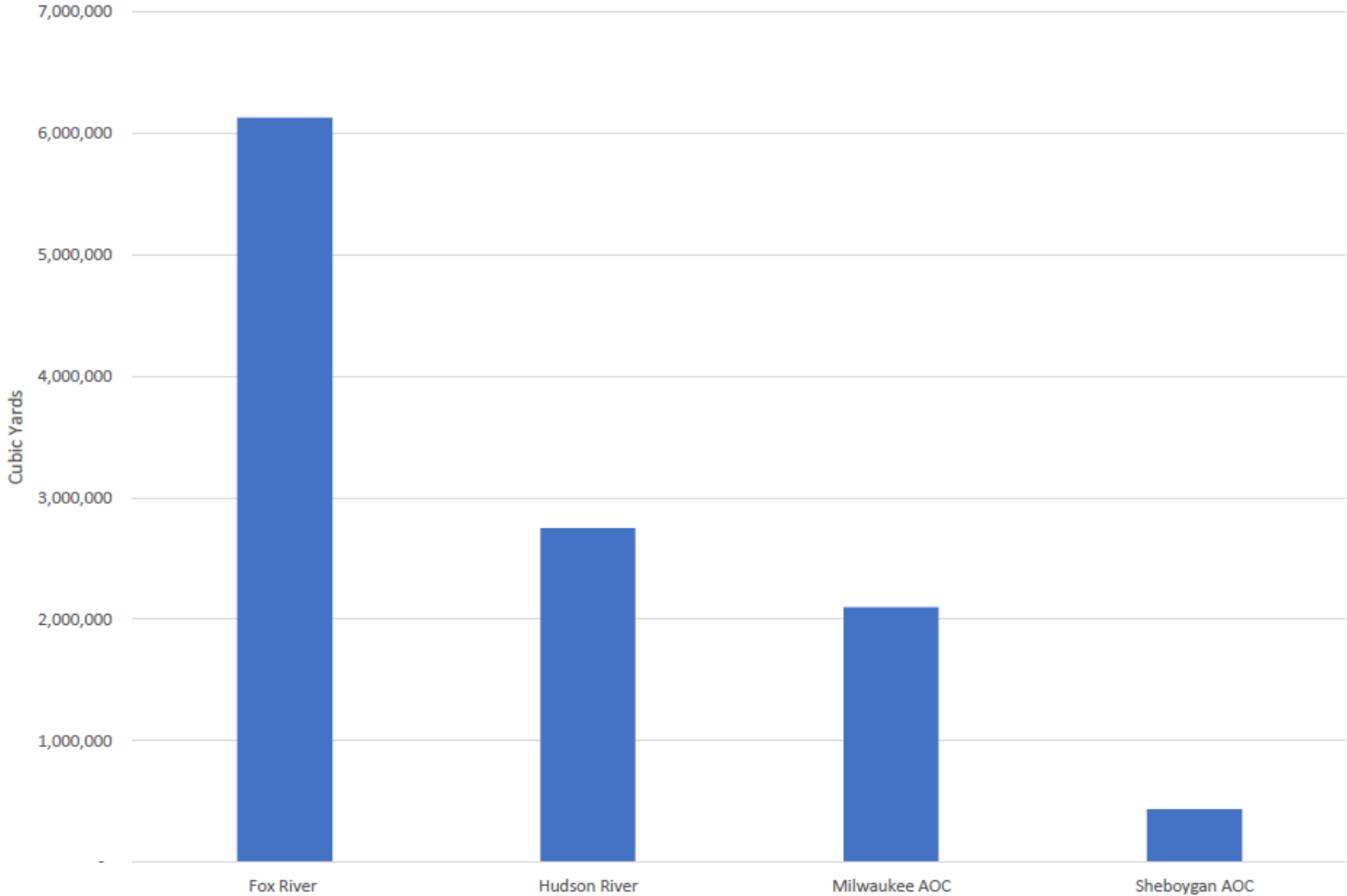
Milwaukee aims to be a priority
AOC

Sediment management facility
is key component

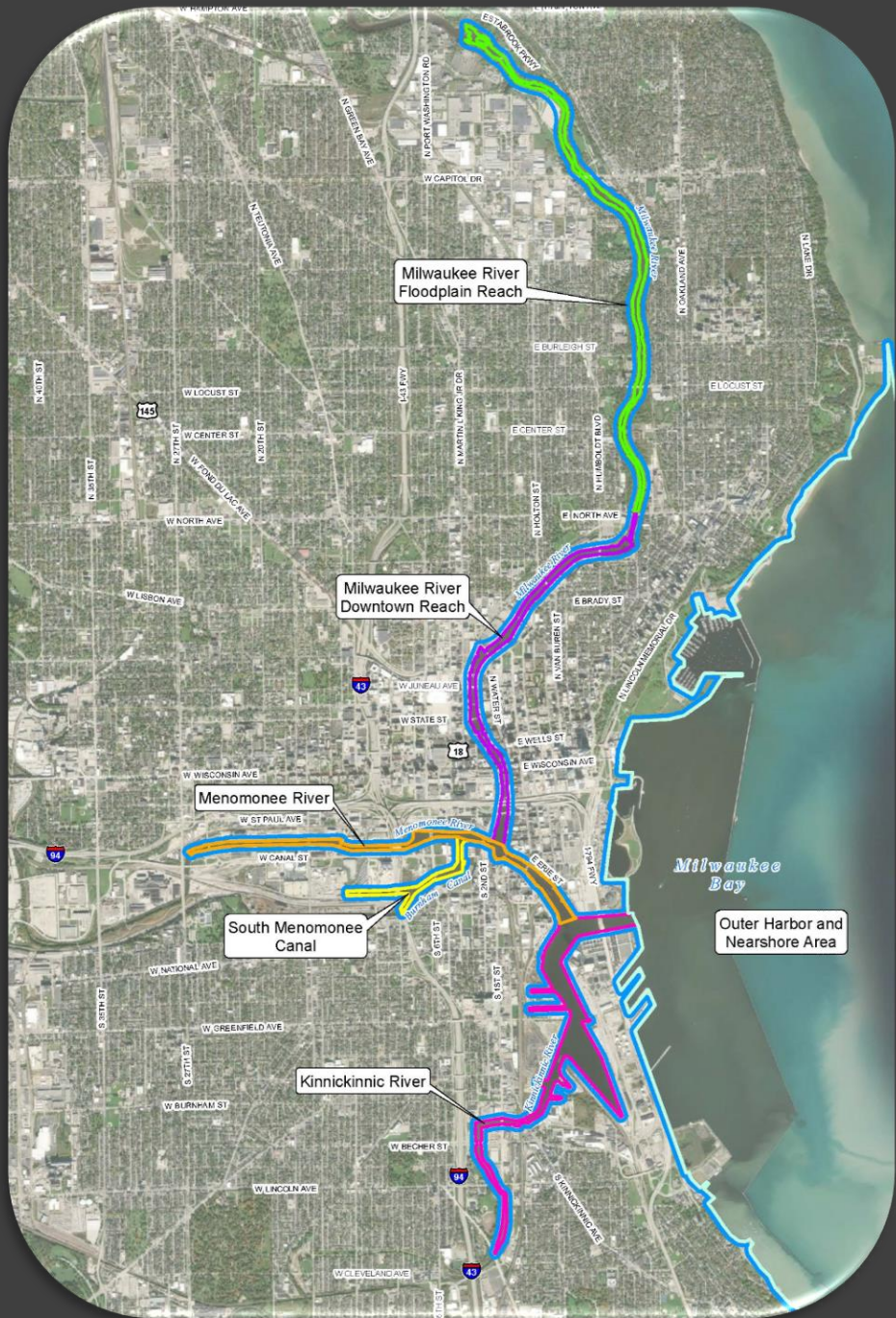
Wisconsin Sediment Volumes



Sediment Volumes Comparison



Has not been updated
with 2020 data



Expected extent of remedial areas

- Milwaukee River 6.5 miles
- Menomonee River 2.5 miles
- Kinnickinnic River 2.4 miles
- Total 10.9 miles**
- Milwaukee Bay – to-be-determined

Defining the problem

- Millions of cubic yards of contaminated sediment
- Very short timeframe
- Multiple Rivers / Project Areas
- Remediation in various stages
- Very few viability RPs
- 90 to 95% of sediment contamination is orphan

Solutions



Partnerships



Cost sharing



Wholistic and creative thinking

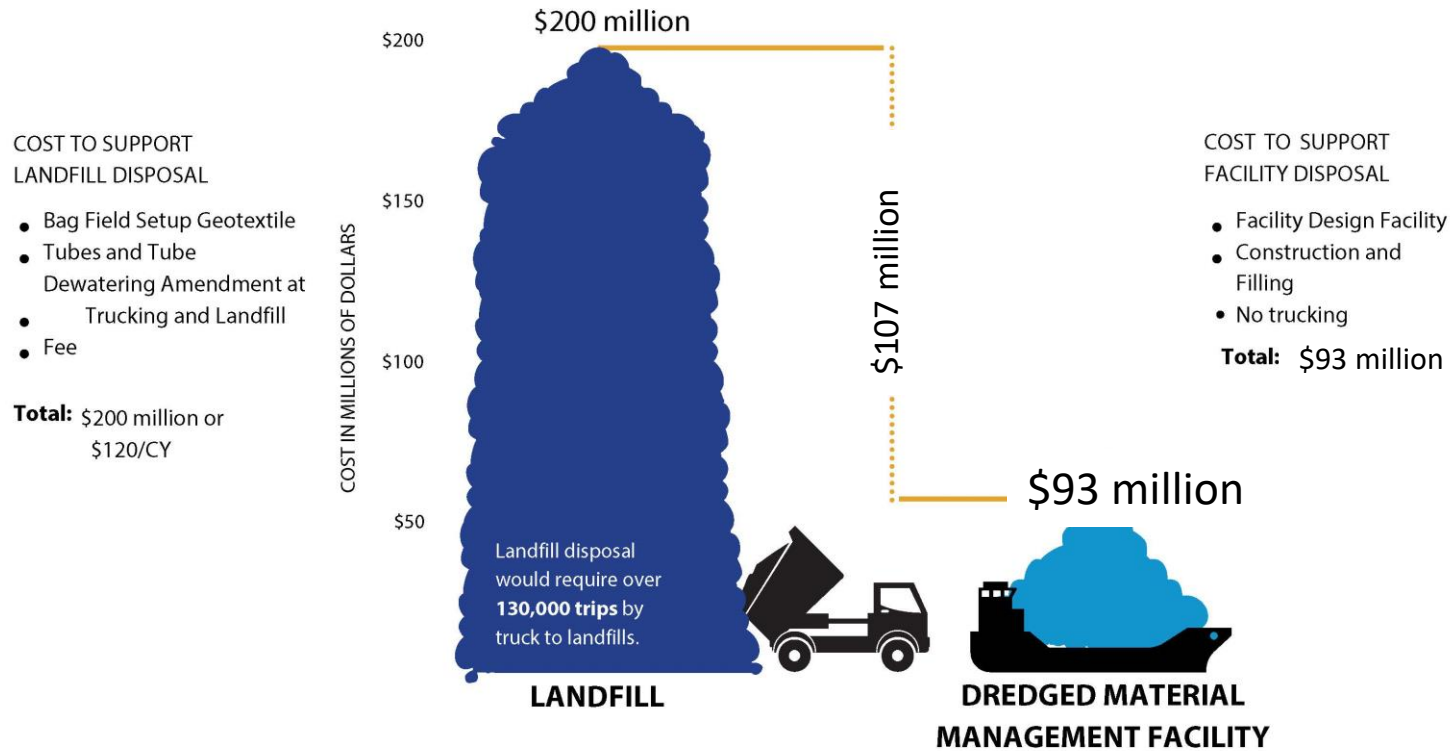


Scaling the remediation



Address disposal

Cost Comparison: Dredged Material Management Facility vs. Landfill Disposal



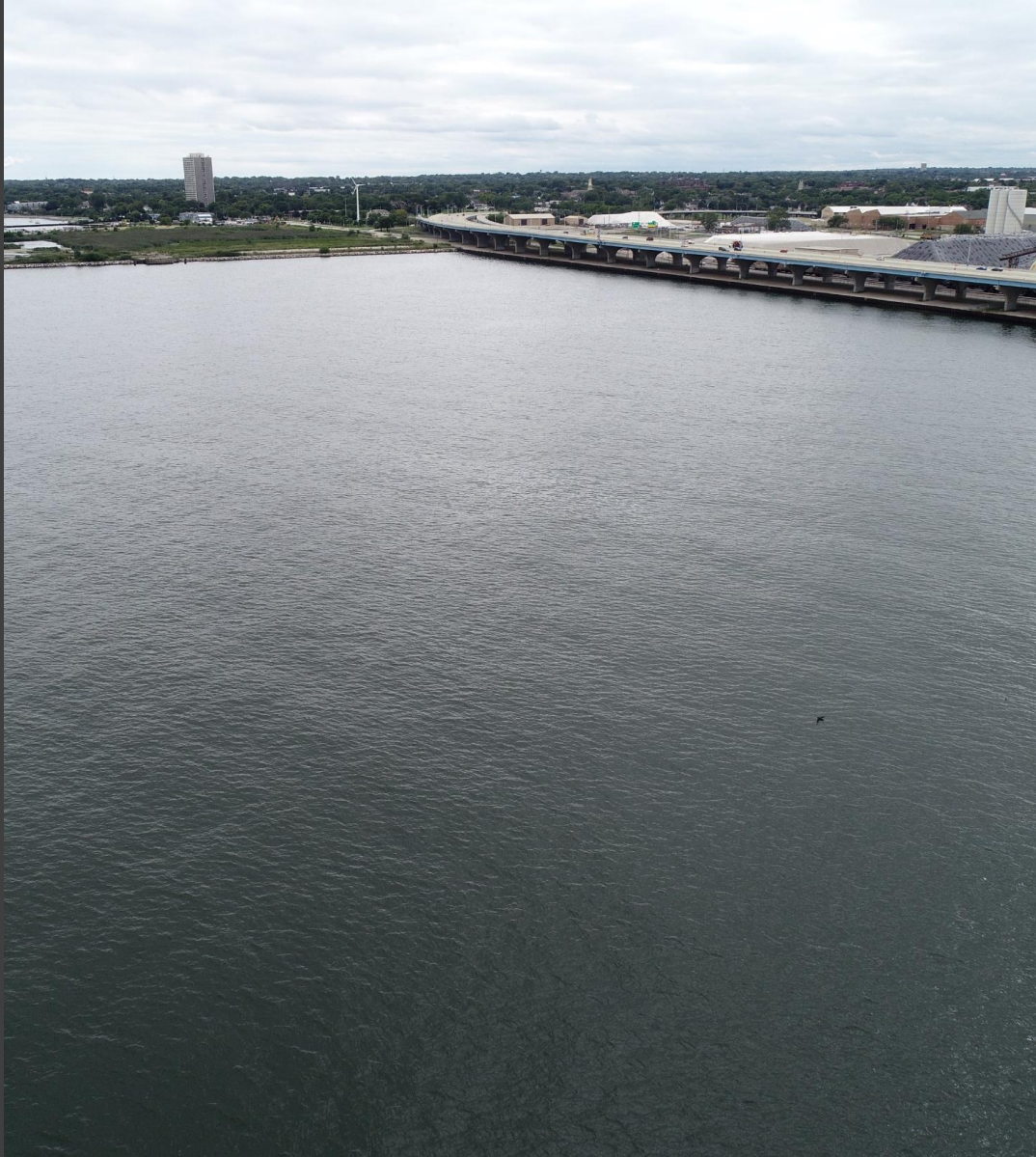
- \$1.5 million design and permitting
- \$93.5 million construction
- \$3.5 million outfall relocation
- \$3.5 million lakebed grand
- Addresses disposal, the most expensive part of contaminated sediment cleanup
- centrally located & can serve multiple water bodies and areas
- Reduces construction complexity
- Saves costs for, sediment processing infrastructure, material handling, amendments, testing, water treatment type, and trucking.
- Incorporates economic development beyond the project
- 495 direct jobs
- 432 supplier jobs
- 549 induced jobs
- Total 1,476
- Supports Port Operations

- Economical
- Sustainable
- Efficient
- Safe

DMMF

DMMF Timeline Highlights

	2016 to 2018	GLNPO Investigations find extensive contamination on the Milwaukee River
	June 2018	Existing DMMF Beneficial Use Evaluation Completed
➔	Early 2019	City & We Energies agreement. We Energies Acquires HAP grant Funds for DMMF Design
	June 2019	NFS submit application for project agreement to GLNPO
	July 2019	DMMF Design Technical Work Group Formed
	Oct. 2019	MKE AOC PFAS Special Study Started
	Nov. 2019	Discovery World Outreach
➔	Nov. 2019	DNR's Analysis of Dredged Material Disposal Alternatives Public Notice
➔	Dec. 2019	DMMF containment structure selected
	Jan. 2020	GLNPO Project Agreement Effective
➔	Jan. 2020	Winter Storm Slams Lake Michigan
	Feb. 2020	60% DMMF Design
➔	Mid 2020	Evaluated Additional DMMF Space
	June 2020	90% DMMF Design
	June 2020	DMMF Geotechnical Investigation Conducted
	October 2020	MMSD Submits WIFIA Loan Notice
	Nov. 2020	100% DMMF Design



Beneficial Use Evaluation Existing DMDF

- 2018 Evaluation by We Energies
- Investigation attempted to find clean sands.
- 8 cores advanced ~ 20 ft
- Chemistry Results
 - Most had PCBs > 1 ppm.
 - Widespread Benzo(a)pyrene > NR 538 Category II
- High organics and fine grained
- Not feasible or cost effective

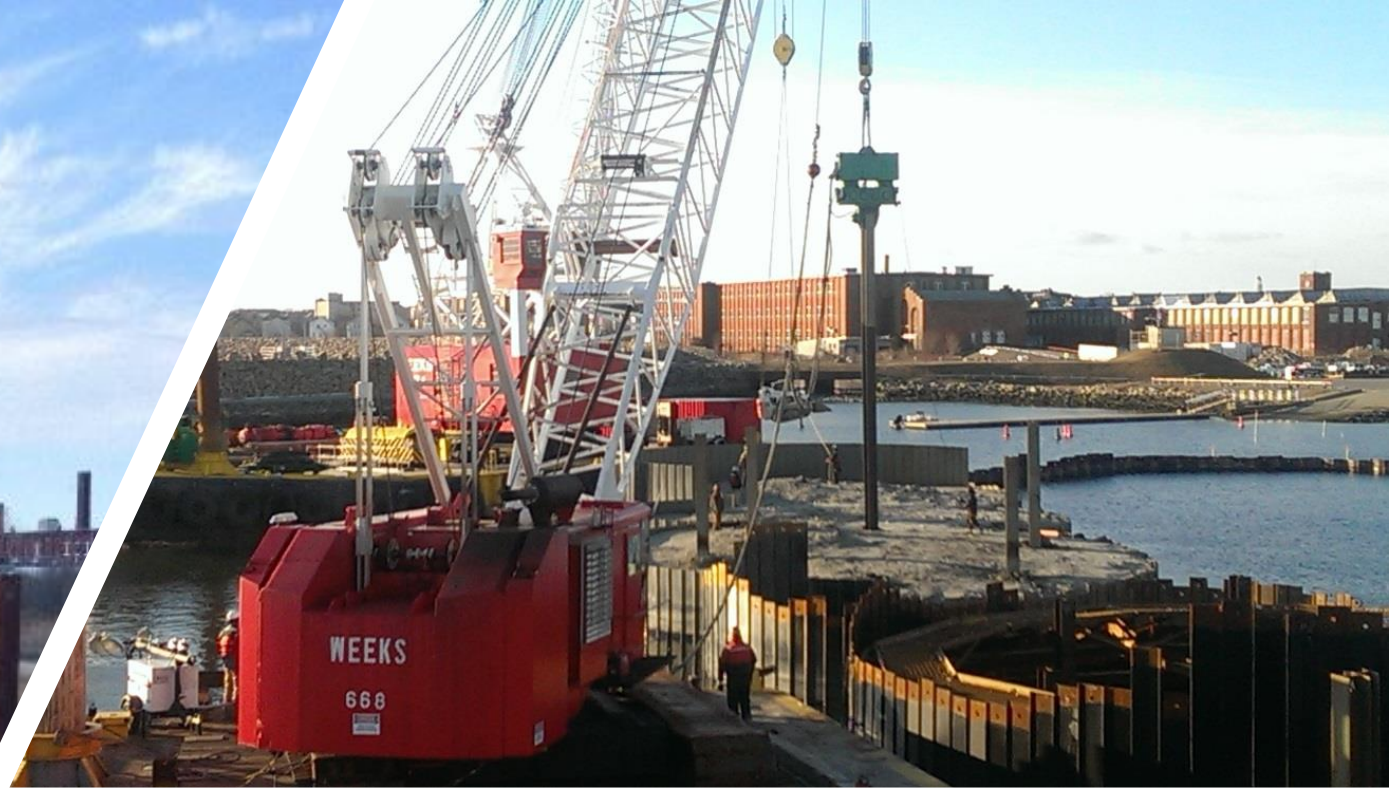
Types of DMMF Layouts Evaluated

Table 2
DMMF Alternatives Evaluation

		Water Quality	Provide Port Facility	Constructability/ Time Required	Storage Volume	Cost	Average Score
Alternative 1	Rubble Mound	1	1	1	1	3	1
Alternative 2	Cellular Cofferdam No LSP	3	2	3	3	2	3
Alternative 3	Cellular Cofferdam 500 ft LSP	3	3	3	3	2	3
Alternative 4	Cellular Cofferdam All LSP	3	3	2	3	1	2

LSP = Load support platform

Criteria are relative, from 1 (worst) to 3 (best)



Additional Volume Evaluated

- Evaluated more than 2.3 MCY
 - Horizontal expansion further into Lake Michigan
 - Encroaches much further into the Federal Navigation Channel
 - Deeper water needed larger diameter cells.
 - Requires 3rd Wall.
 - Higher \$/CY of space than proposed configuration.

Coastal Design

- Foth performed a Metocean Analysis
- Climate change and resiliency incorporated
 - Reduced ice coverage
 - Increased variability in water levels
 - Increased water temperature
 - More frequent extreme events

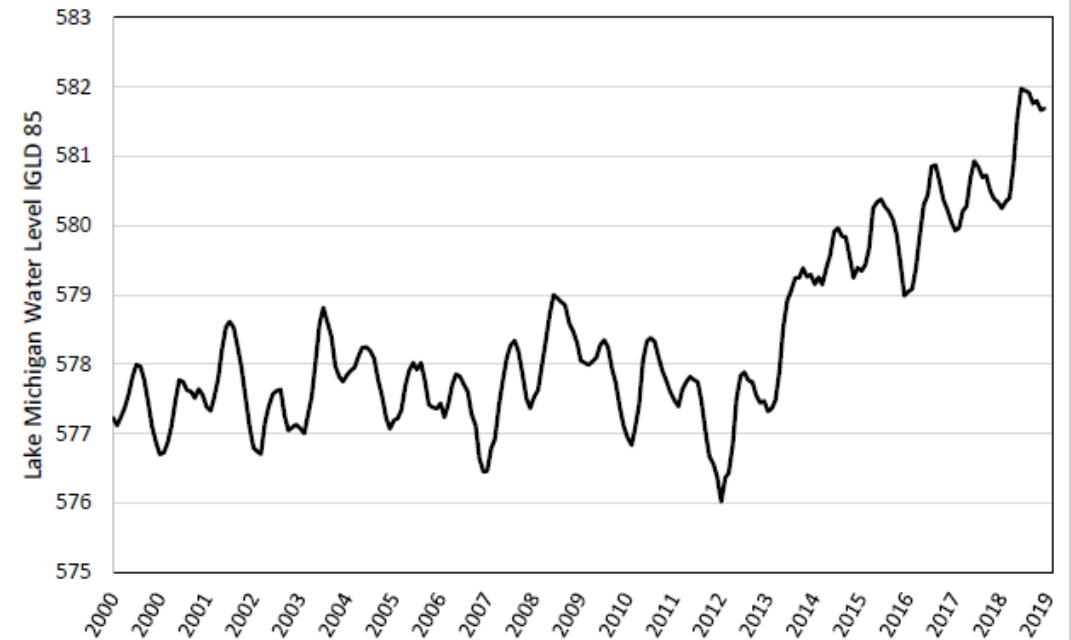


Figure 3: Monthly water levels at Milwaukee harbor for the last 20 years – last data point 12/19 (NOAA, 2019). (ILGD, 1985)

Storm Event During Design

- January 10-12, 2020 Storm Event
 - Several weather stations cut out and didn't record peak winds.
 - Foth modeled the storm event.
 - Water level (still water level + surge) = 60-year return period
 - Waves modeled to be 7 feet and exceeded 100-year return period of 6.2 ft.
 - Exterior walls are +12 LWD, which would have had significant freeboard



High winds, flooding cause major damage at Port Milwaukee

By Associated Press

Published: Jan. 12, 2020 at 3:25 PM UTC



High winds, towering waves and flooding have caused millions of dollars in damage to Port Milwaukee on Lake Michigan.

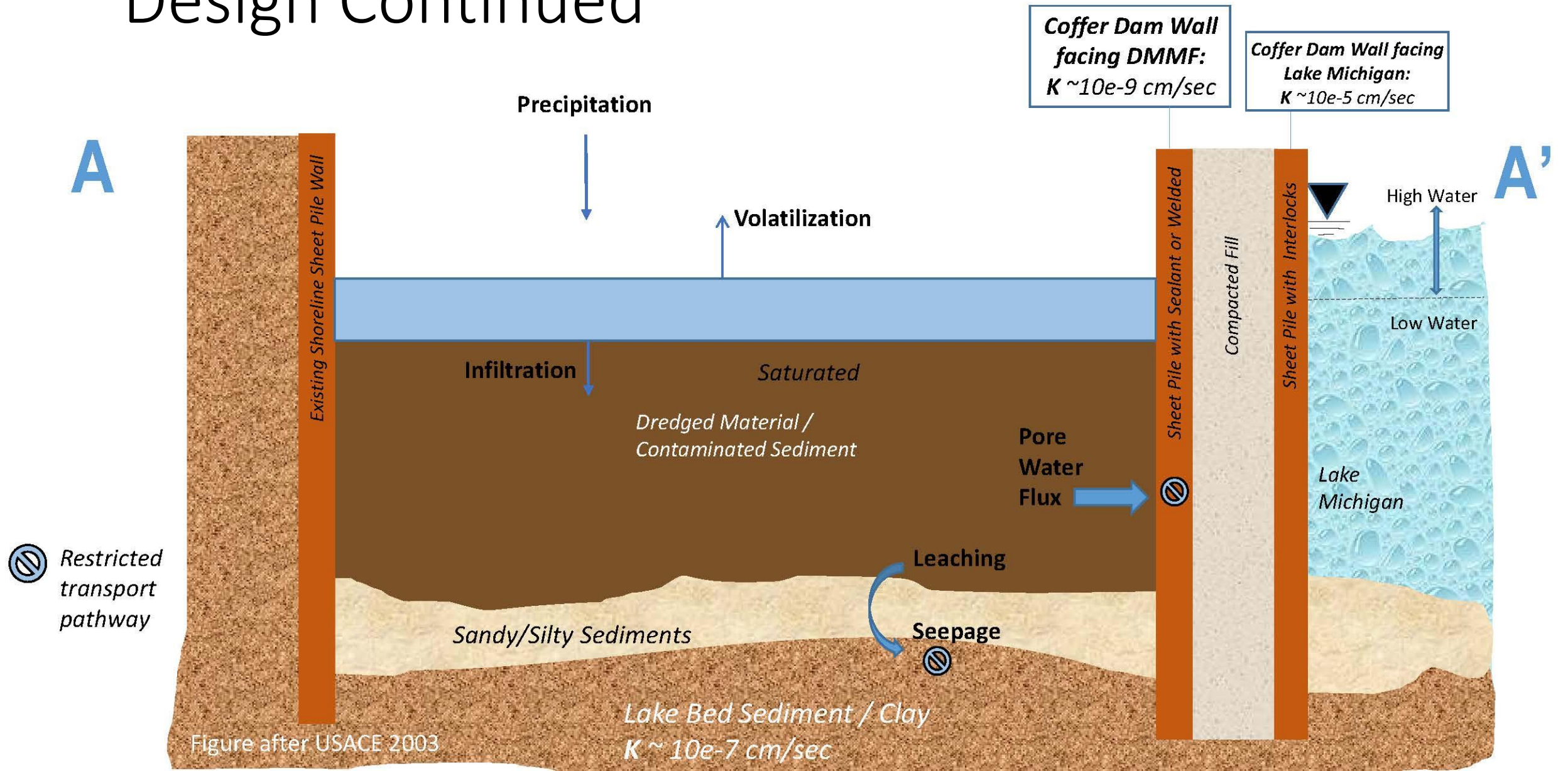
The wild weather Saturday forced the port to prohibit public access to Jones Island and caused flooding on all major roadways at the port.

Port Director Adam Schlicht called it "an unprecedented event at Port Milwaukee." Schlicht says the port's international docks, which are closed for the season, sustained "significant damage."

He said floodwaters were receding Sunday, The inner harbor is expected to reopen early Monday, and tenants on Jones Island will have access to roadways. No one was hurt.

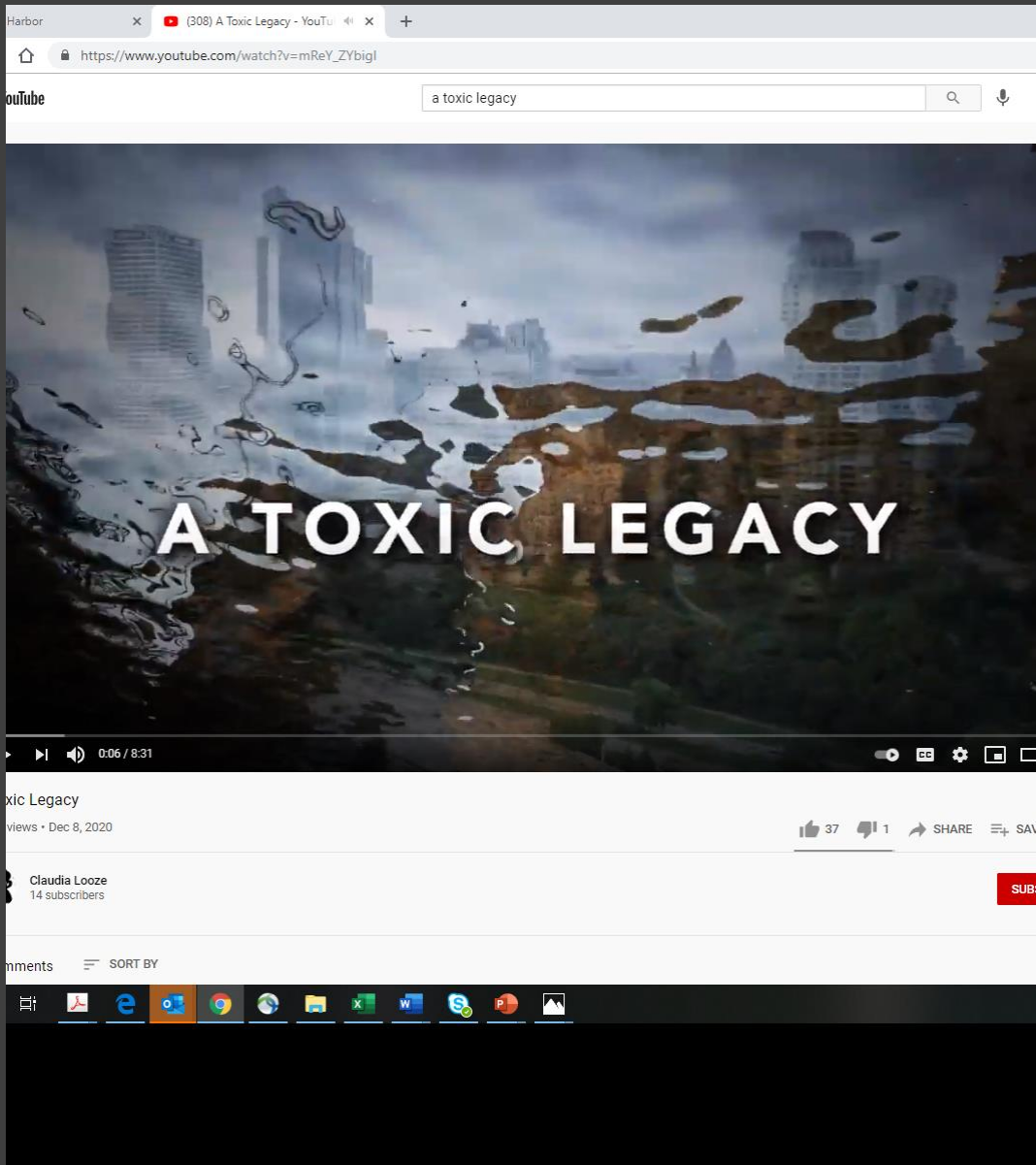
Figure 2: Contaminant Transport Conceptual Model for Cofferd Dam Wall during Operations

Design Continued



Outreach Event - Discovery World

- November 2019
- Held at Great Lakes Exhibit
- Organized by the Milwaukee Blue Crew
 - EPA, DNR, City, County, MMSD, Port Milwaukee, Riverkeeper, Harbor District, We Energies, the fund for Lake Michigan, and several consulting firms, and many others
 - Poster Session



Outreach – John Gurda Video

- Search YouTube for “A toxic legacy”

This event has passed.

Milwaukee: A City Built on Water (Zoom presentation)

JANUARY 28TH — 7:30 PM - 8:30 PM

Lake Michigan and the rivers that feed it have been Milwaukee's dominant natural resources since the days of the Potawatomi. Join me for a lively illustrated look at the lake and its adjacent watersheds. See how they served the community as transportation routes, recreational resources, and industrial corridors, and how they have weathered a cycle of heavy use and flagrant abuse to emerge as focal points of both celebration and concern in the twenty-first century. This talk is part of the programming around the Historical Society's new exhibit, "Where the Waters Meet." For details on the January 28 talk, go to <https://milwaukeehistory.net/visit/events/>

+ GOOGLE CALENDAR

+ I CAL EXPORT

Details

DATE: January 28th

TIME: 7:30 pm - 8:30 pm

COST: free will



The Making of Milwaukee


A richly illustrated history of the city known for beer, bratwurst, and bubblegum ... and also for Socialist mayors, world-class industry, and elaborate summer festivals.


[BUY NOW](#)


Coming up — January 28th, 2021, 7:30pm
Milwaukee: A City Built on Water (Zoom presentation)


[BUY NOW](#)


A Toxic Legacy YouTube Comments

 **Chad Rogers** 2 months ago
"Pumped directly to the east side of Jones Island" - then what?
👍 2 👎 REPLY

 **Tonia Kountz** 2 months ago
Thank you for the report and thank you to those responsible for the project getting done.
👍 👎 REPLY

 **hierbaum** 2 months ago
This is fantastic. Thank you all for your efforts.
👍 👎 REPLY

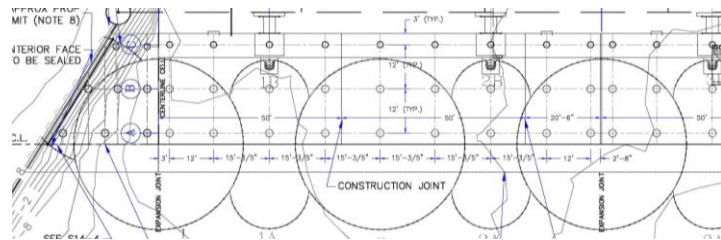
 **Denise Kallian** 2 months ago
We still need to do our part. Stop littering, and pick up litter in our neighborhoods. Cig butts are litter, and are full of chemicals and microplastics.
👍 👎 REPLY

 **Garrison H** 2 months ago
I hope this will happen..
👍 👎 REPLY

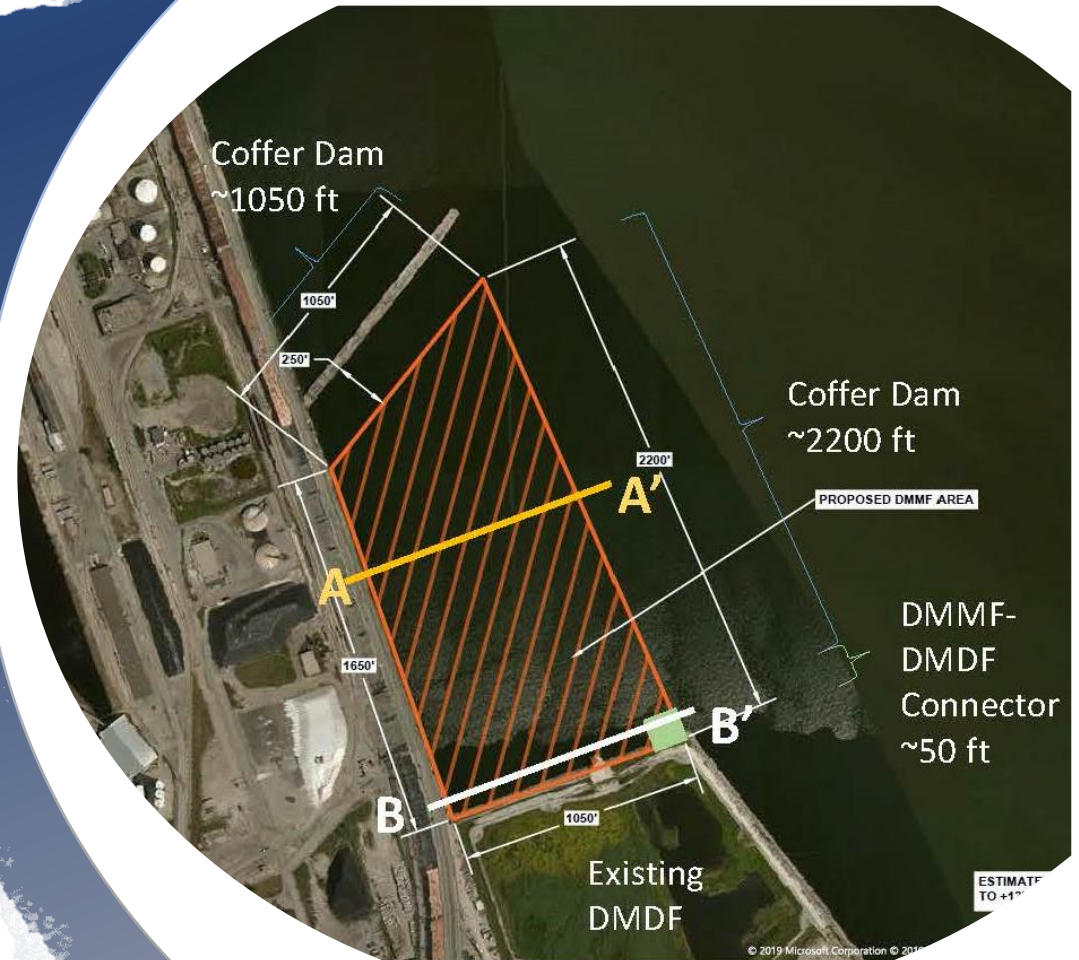
- 1,293 views
- 37 likes
- 1 dislike

DMMF Design

- Utilizes existing structures for two sides
- Capacity 1.9 million cubic yards
- Area: 42-acres
- Style: cellular cofferdam
- Cofferdam Length 3,250 feet
- Water Treatment possible 15,000 GPM
- Cells (51) 46-ft diameter cells
(50) cells with 11-ft radius
Embedded -52-ft LWD



- Replaces existing CDF offloading Platform
- Requires moving combined sewer overflow outfall 195



DMMF Agreement & Space Allocation

- Draft intergovernmental agreement - DNR, City, & MMSD.
 - MMSD funds and manages the construction
 - City owns long-term
 - Space Allocation
 - City 200 k cubic yards
 - MMSD 300 k cubic yards
 - Legacy Act projects 1,400 k cubic yards
- Total 1,900 k cubic yards
- If Legacy Act projects use <1,400,000 cubic yards, remaining space would be allocated to MMSD.

DMMF Collaboration & Leveraging Partnerships

City	\$ for permitting, long-term owner, lakebed grant
Corps of Engineers	technical review support & permitting
DNR	\$ for permitting & construction, permitting, outreach, PFAS sampling, Disposal Analysis
EPA	tasks Corps Tech Review, funding ideas & mechanisms, and match for DMMF space
MMSD	funds & manages construction, leads future outreach
We Energies	managed design & acquired HAP \$

DMMF & Port Operations

- Flat face exterior
- simultaneous vessel access to the liquid cargo pier and DMMF
- Accommodates 1,200-foot-long & 750-foot-long vessels
- Pile supported 500-foot-long load support platform with fenders and 60-ton bollards every 60-ft.
 - Allows offloading crane to operate anywhere on the platform



Port Milwaukee Economic Impact



1300+



\$88M



\$106M



\$34M



Cruising on the Great Lakes



Cruising the Great Lakes

- Two dedicated cruise docks
 - Pier Wisconsin
 - South Shore
- 2019 had 3200+ cruise passengers
 - 4 different cruise lines totaling 10 visits
- Start/stop port of call for new Viking itineraries beginning 2022



DMMF Timeline



Remedial Estimate

25,000 CY TSCA to TSCA landfill

1.4 MCY of sediment removed = space allocated in the DMMF

10,000 GPM water treatment plant

- 8, 10, and 16-inch dredge
- 6,300 CY per day
- 38,000 CY per week
- 150,000 CY per month

15,000 GPM water treatment plant

- (1) 10-inch & (2) 16-inch dredges
- 10,500 CY per day
- 63,000 CY per week
- 250,000 CY per month

- 50-acres of sediment capping
- 30-acres of cap armoring for habitat improvements & scour protection
- 120-acres of sand cover
- remediating > 2 million CY
- ~\$100 m remedial cost excluding DMMF
- ~\$49/CY for dredging associated items
- Potential to get to \$15/CY for dredging associated items





Things the Milwaukee AOC has going for it

- Wonderful partners
 - Every level of government
 - Industry
 - Skin the game
 - ~ \$130 m + of contributions to the AOC
- Compressive & cohesive plan for the sediment contamination
- Technically & economically feasible plan
- Aligned environmental goals with economic development
- Local buy-in
- Existing, broad, and unique Project Agreement
- Reduce time & cost
- Leverage partnerships

Questions

