

# Use of Adaptive Management at the Ashland Lakefront Superfund Site

*Ashland,  
Wisconsin*

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# Complex Site = Complex Remedy

- Land-based excavation (Ph. 1) & marine dredging (Ph. 2)
  - stringent clean-up targets
- Dredge footprint also impacted by historic fill activities
- 30 acre project site surrounded by public
  - minimize off-site impacts a priority
- Construction season limited
  - typically May - October



# Multi-Year Project

2013	2014	2015	2016	2017	2018	2019+
	<b>Phase I</b>			<b>Phase II</b>		
Upland Areas		Breakwater Construction	Sediment Pilot	Full Scale Sediment Removal		
		Long-term GW WTP Construction & Startup				
			LTWTP Operations			



Site,  
1940

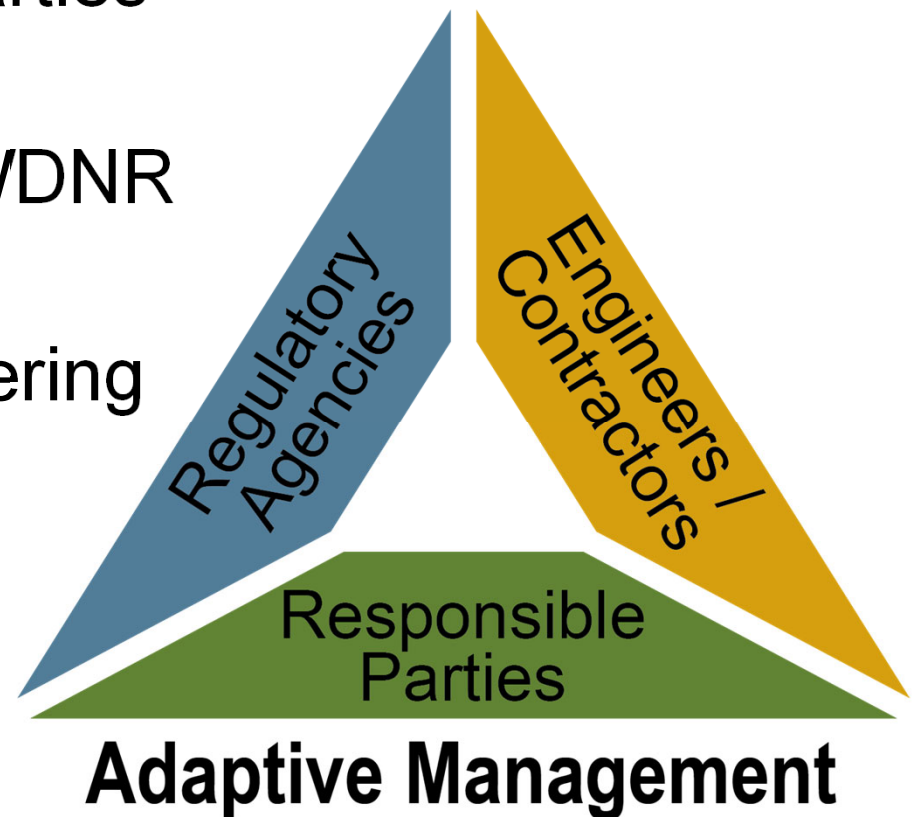
# Why Adaptive Management?

- Stakeholders recognized work was complex: typical change review & approval was too slow
- Required in context of short construction season
- Joint-decision making in the field to adapt to conditions
- Agencies retain final authority
- Trust established: all parties were committed to safe and effective project completion



# Design-Build Contracting Strategy Enhances Adaptive Management

- **Owner:** Responsible Parties
- **Regulatory Agencies:**  
USEPA Region V and WDNR
- **Engineer / Contractor:**  
Joint Venture of Engineering  
Design / Constructor  
(*Foth / Envirocon*)  
(*sub-JFB*)
- **City of Ashland**



# **Benefits of Design/Build Strategies for Adaptive Management**

- Schedule & Delivery
- Collaborative Design Process
- Engineer and Contractor have joint vested interests for timeliness and success
- Efficient Engineering Support and CQC / CQA during Construction

# Project Summary

## Phase 1 Upland Remediation – Excavation, Treatment, and Backfill



Upper Bluff, Filled Ravine, and Kreher Park  
containment & remedial footprint 2014



Gas holder removal and  
emission/odor control

# Project Challenges – Phase II Design

- ROD required “dry dredge,” but allowed for demonstration of viability of Wet Dredge
- Full-scale Wet Dredge Pilot required to implement Wet Dredge D/B
- ROD – stringent cleanup standards for soil, sediment, water, and air quality
- Contract provided milestones that drove the overall project schedule



# Adaptive Management - Breakwater

- First attempt did not work – Barges used to attenuate waves failed in a Sept 2014 storm
- Permanent stone breakwater wall was needed
- Design/Permit/Build all occurred concurrently with stakeholders working together
- BW Wall constructed in 5 months in 2015
- Allowed Phase 2 Full-scale Wet Dredge Pilot to proceed in 2016 on-schedule

# Project Summary

## Breakwater Construction - Make ready for Wet Dredge Pilot Project in 2016

Armor  
Stone  
Placement



Breakwater Construction  
2 Marine Plants



2014 attempted breakwater  
for Wet Dredge Pilot



Completed Breakwater Wall November 2015

# Project Summary

**Wet Dredge Pilot – Demonstrate ability to meet cleanup standards and maintain water and air quality**



Shoreline Removal



Typical Mechanical Dredge Sediments



Pilot Area Complete - Alum Applied



Mechanical Dredging within Barrier Curtain System

# **Project Challenges – Phase II Remedial Action**

- Surface Water Quality Compliance
- Sediment Dredging – Residual Clean-up and Management
- Sediment Processing and Dewatering
- Odor and Dust Controls
- Maintaining Schedule



# **Adaptive Management – Surface Water Quality**

- Added 3rd COC compliance monitoring location
- Added additional Buffer Curtain #1 allowing alum addition
- Alum application for reduction in turbidity/TSS
- Breakwater and Gap Closures to mitigate TSS migration
- Install Buffer Curtain #2 for additional TSS control

# **Adaptive Management – Sediment Processing and Dewatering**

- Increased DWTS capacity from 600 gpm (2017) to 1,100 gpm (2018)
- Installed 25,000-gal. surge tank for barge decant dewatering
- Introduced dewatering basket / recirc tank / shaker screen decks to aid sediment dewatering
- Modified mechanized stabilization process to enhance material handling
- Periodically removed solids from water storage tanks using slurry pump and geotextile tubes

# **Adaptive Management – Enhanced Odor Controls**

- Installed additional oil boom, curtains, dredge moon pool and oil booms downwind
- Reposition air misting stations and relocate dredge operations based on wind direction
- Odor suppressant rope misting systems placed on Peninsulas and Processing Tent Ceiling
- Use of RUSMAR foam and BioRem on dredge hopper barges
- No VOC/PAH action level exceedances

# **Adaptive Management – Enhanced Dust Controls**

- Real-time Adaptive Management collaboration
  - Multiple engineering controls to capture lime dust and steam during sediment stabilization
  - Partition placed in processing tent to separate stabilization area from load-out operations
  - Increased air changes in processing tent – added two Odor/Emission treatment Units to the five existing
  - Mobilized four Industrial Dust Collectors doubling air changes in processing tent
  - No dust action level exceedances



# **Adaptive Management – Optimize Schedule**

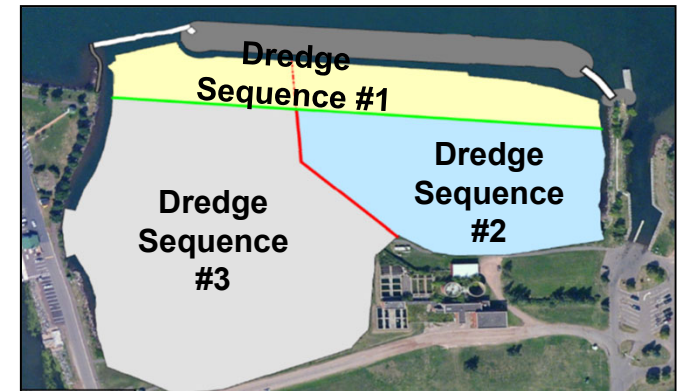
- Operated double shifts in 2017 – 2018
- Community outreach with agencies to address public concerns on dust or odor issues
- Changed dredge sequencing for schedule optimization
- Added hydraulic dredging tools to enhance the residual cleanup efforts in 2018
- Observed post-dredge cores with agency reps real-time to expedite decisions on approval or need for re-dredge
- Maintained high-end of DWTS operating capacity to allow maximum dredge up-time

# Project Summary

## Phase 2 Full Scale Wet Dredge – 2017 Mechanical inventory dredging of woody debris and sediments



Shoreline  
Removal within  
impermeable  
curtain



Dredging Strategy Change to meet  
water quality requirements



Two Dredge Plants  
working 12 hour  
shifts

Additional buffer  
curtain and Alum  
application system

Loadout highway  
Haul trucks for T&D  
8,800 loads  
or 184,000 tons



# Project Summary

## Dewatering & Stabilization - Debris and sediment handling

Dewatering / Offload Area



Sediment change to "oatmeal"



Apply Rusmar Foam - control odor



Dewatering  
Basket  
to separate  
"oatmeal"



Shaker Screen Deck dewatering



Dust Collectors – reduce lime  
dust in tent atmosphere



# Project Summary

## 2018 Hydraulic Residual Dredging – Multiple passes with different dredging methods to meet final cleanup requirements

Chemical  
dosing  
dredge  
feed



Swinging Ladder  
Hydraulic Dredge



Vic-Vac dredge head



Geotube field



Sediments ready for transport



Hydraulic Cutter Head Dredge



# **Lessons Learned for Design/Build Strategies to Adaptive Management**

- Flexibility – Owner and DB can make changes quickly with agency approvals
- Creativity – Adaptive Management works better under a DB contract
- Trust between the Owner, DB, and Agencies – easier to build trust with fewer parties involved
- Evaluate alternatives promptly with agencies
- Effective conflict resolution between parties – easier to manage
- Unity of purpose – single contract keeps Owner and DB interests aligned

# Before & After

**Upland and Bay Cleanup Criteria Successfully Accomplished**



Ashland Lakefront Site Fall 2011



Ashland Lakefront Site Fall 2018