



## River Raisin Area of Concern – NAPL Area – Sediment Remediation

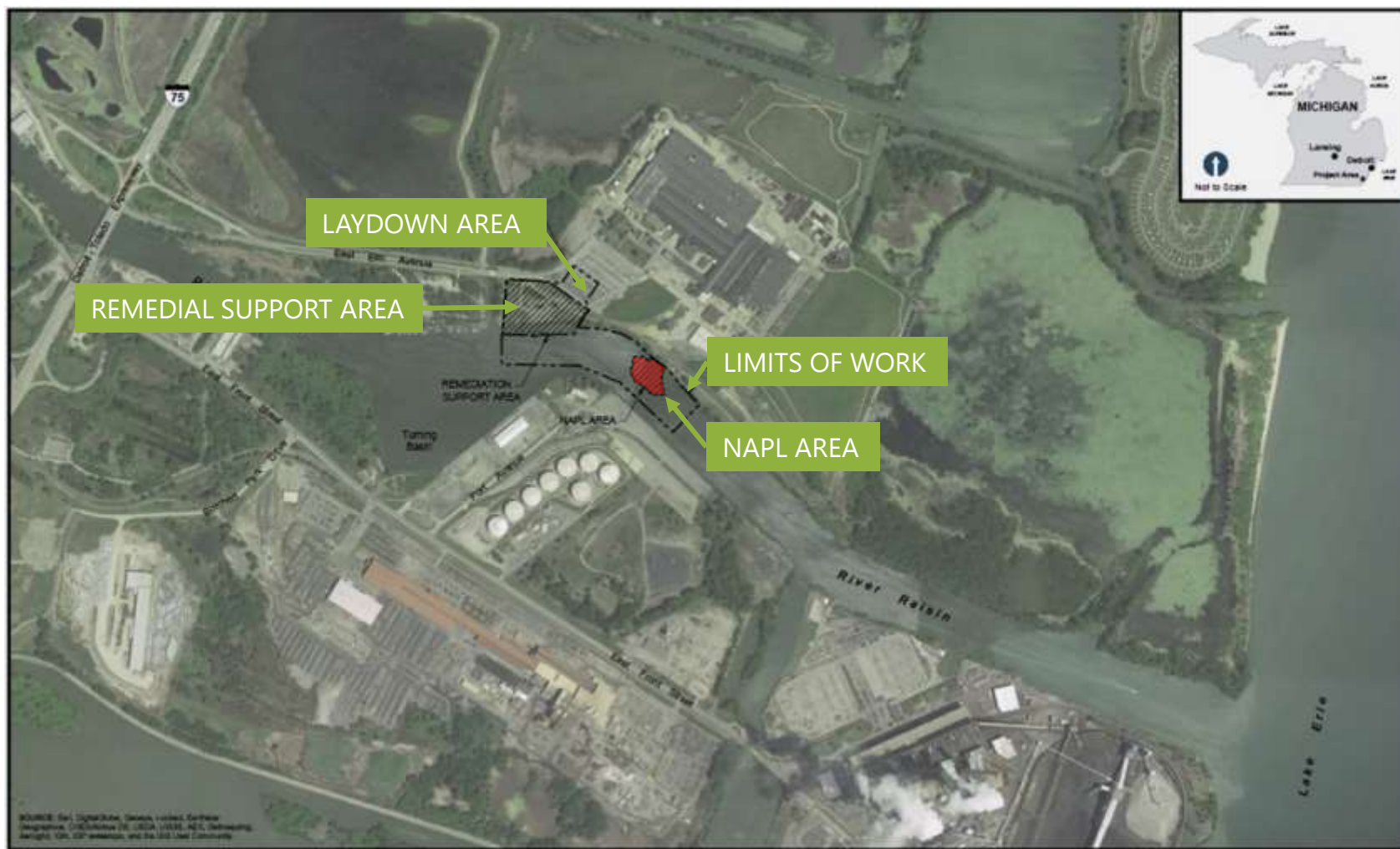


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# Site Description and History



# Site Description and History

- **1997 to 2012:** 120,000 cubic yards (cy) of sediments with PCBs were removed from the area of concern
- **2012:** Nonaqueous phase liquid (NAPL) observed during 2012 dredging and verification sampling
- **2013 to 2014:** Define the extent and mobility of the identified NAPL
  - NAPL and Toxic Substances Control Act (TSCA) PCBs (>50mg/kg) found as deep as 28 feet below the existing sediment surface
  - Additional sampling successfully delineated lateral extents of NAPL area
  - Presented remedial alternatives to regulators
- **2015:** Regulators approve final remedy

# Project Participants

- Ford Motor Company
  - Mannik & Smith
  - Anchor QEA
  - Severson Environmental Services
    - Geo. Gradel Company
- EPA
  - GLNPO
  - Environmental Restoration, LLC and J.F. Brennan Co.
  - U.S. Army Corps of Engineers
- MDEQ
  - Surface Water Quality Division

The remedy was a joint effort between Ford Motor Company and EPA (GLNPO).

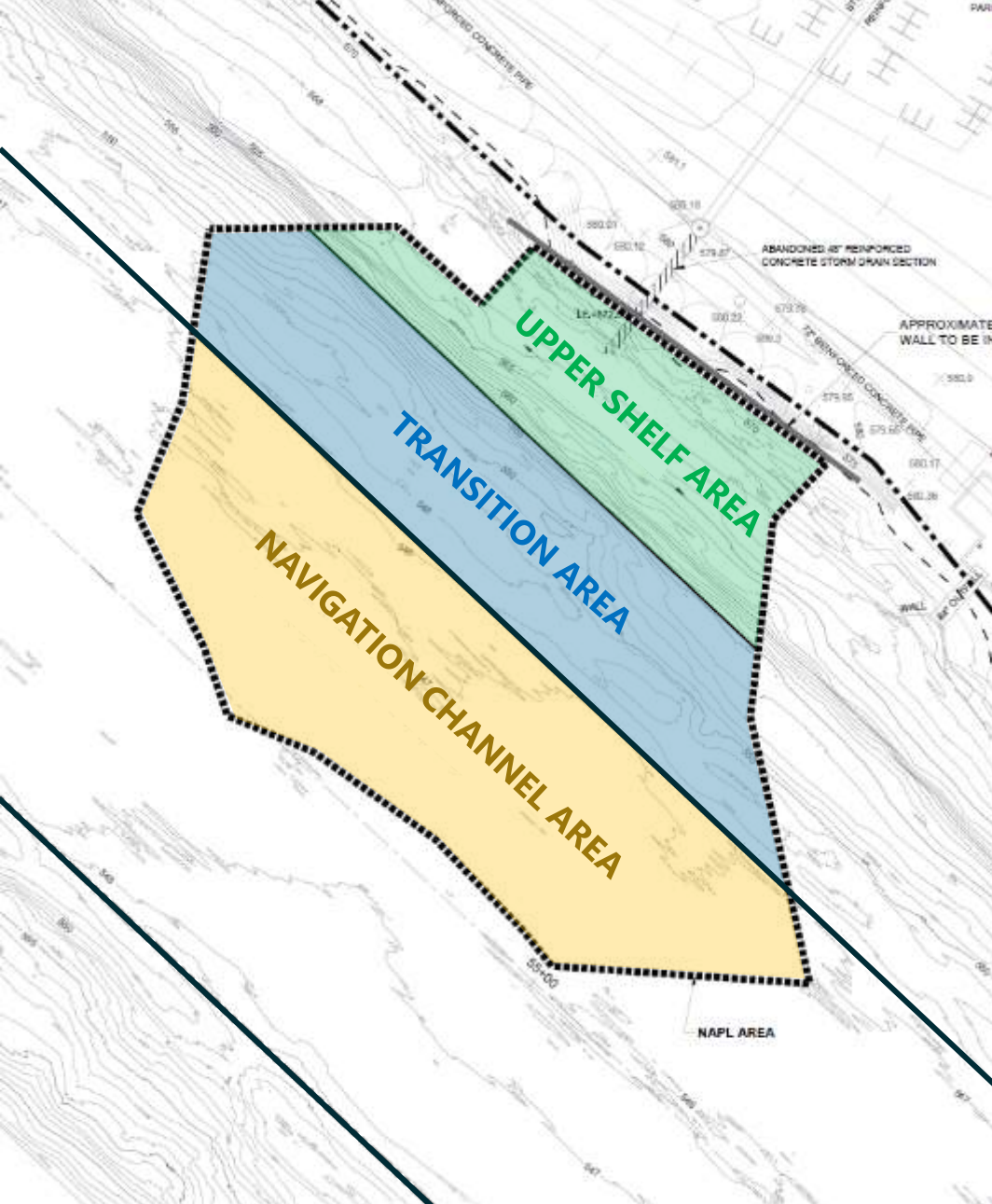
# Remedial Design Elements

- Permanent sheet pile wall along shoreline to facilitate nearshore sediment removal
- Planned dredging of 28,100 cy of sediment
- Upper shelf area includes:
  - Target removal depth of 8.2 feet of material
  - 6-inch residual cover (graded gravel)
- Transition area and navigation channel includes:
  - Target removal depth of 10.0 feet
  - 5-foot cap in transition area
  - 3.75-foot cap in navigation channel

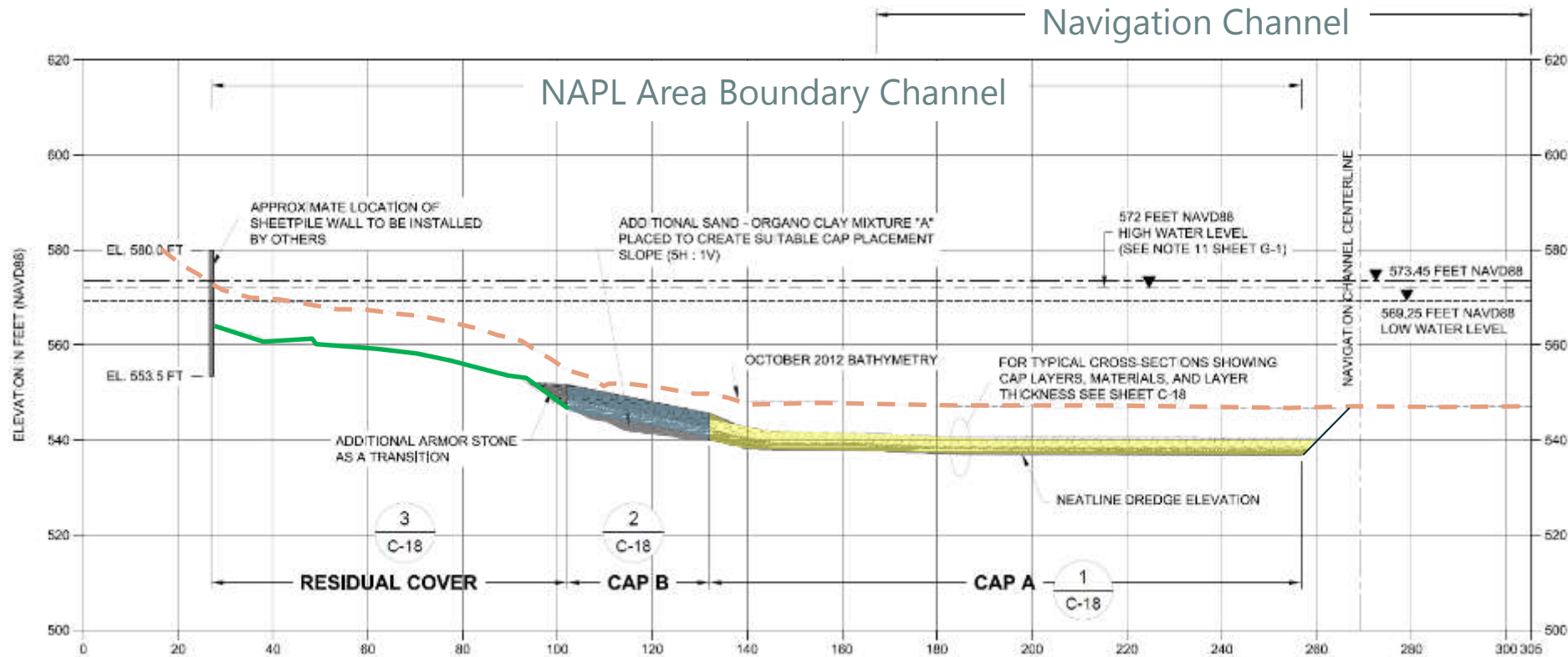


# Remedial Design

1. PCBs above 50 parts per million (ppm) and NAPL observed up to 25+ feet below mudline
2. Dredging 8 feet in upper shelf area to remove PCBs above 1 ppm
3. Dredging 10 feet in transition and navigation channel for practicability
4. Engineered cap installed in transition and navigation channel after dredging



# Remedial Design



# Construction – Sheet Pile Installation



2016 Sheet Pile Installation



# Construction – Sheet Pile Extensions



# Construction – Dredging



2016 Sediment Remediation at River Raisin<sup>1</sup>

<sup>1</sup> Source: <https://www.youtube.com/watch?v=N28Arvufgxl#action=share>



# Construction – Environmental Controls

- Dual-curtain system
  - Moon pool
  - Permeable outer curtain
  - Impermeable inner curtain
- Real-time turbidity monitoring
  - Upstream and downstream sensors take readings every 10 minutes, averaged every hour
  - 1 hour average not to exceed 50 Nephelometric Turbidity Units above upstream, or 1.5 times greater than upstream, whichever is greater
  - No project exceedances attributable to dredging or capping



# Construction – Dredging

- Actual removal was 29,465 cy
- On average, 330 cy dredged per day
- Water depths greater than 35 feet in navigation channel (post dredging)





# Construction – Sediment Processing



# Construction – Stabilization and Disposal

- 62,293 tons of stabilized sediment hauled off site as TSCA waste (1,353 truckloads)
- Calciment® and Type II Portland cement used for stabilization
- Average dosage rate of 6%
- Processed an average 776 tons of sediment each day on a 28,900-square-foot pad

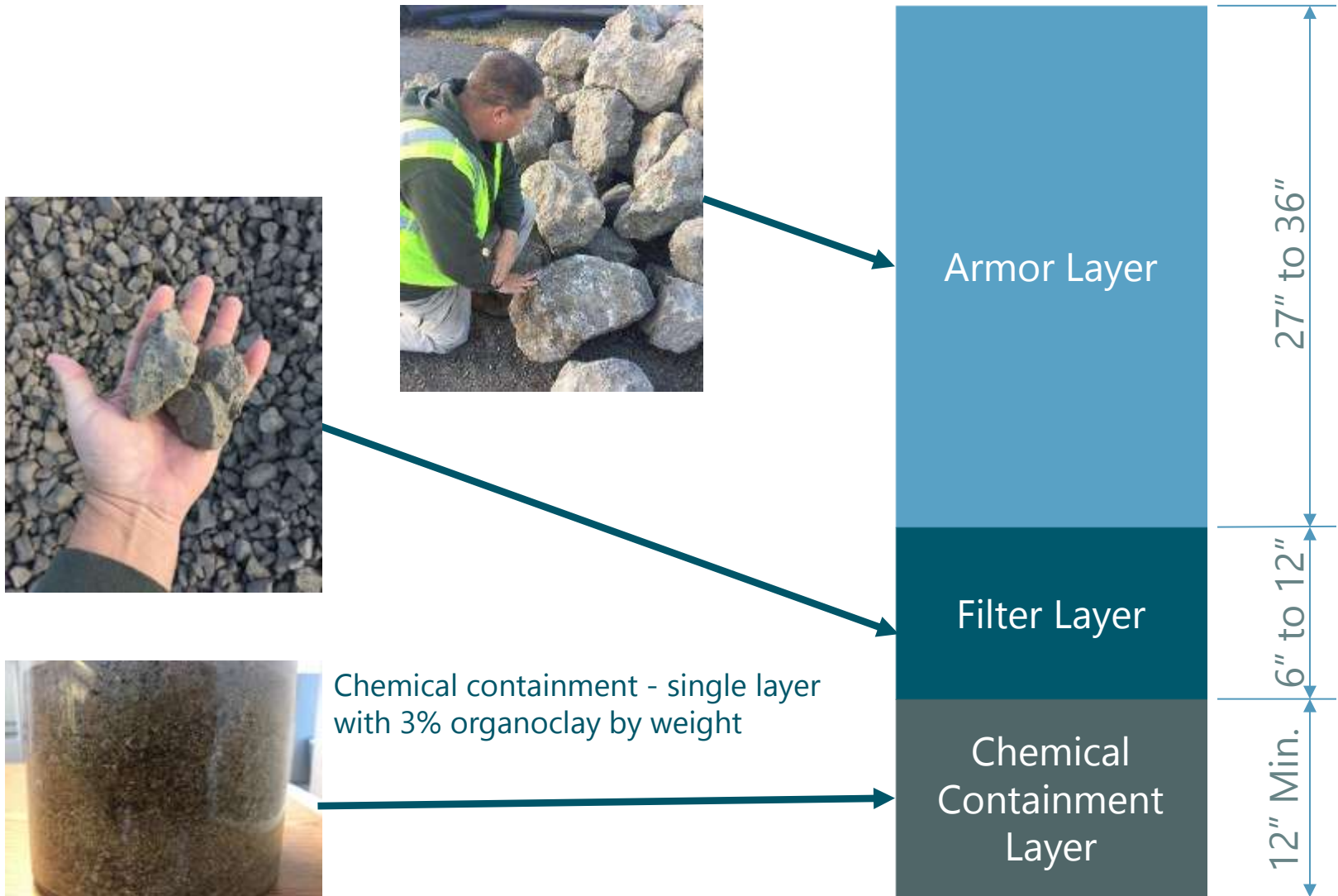




# Construction – Capping



# Construction – Engineered Cap





# Construction – Capping

- Sand and organoclay blended onshore using series of hoppers, conveyors, and mixing augers
- Sand and organoclay placed using moonpool
- No turbidity controls utilized during placement of filter and armor stone



# Quality Assurance

- Daily coordination
- Full-time oversight
- GPS control
  - Dredgepack®
  - ClamVision®
- Capping
  - Sand leveling
  - Depth of placement
  - Organoclay content
- Bathymetric survey



# Quality Assurance

- Separated organoclay from sand in the chemical containment layer to determine organoclay percentage by weight





# Quality Assurance





# Project Challenges

- Water depth/Geology
- Extent of impacts
- Embedment depth of sheet pile wall
- Vessel traffic scheduling and coordination
- Procurement and contracting
- Variable work schedule – up to 24 hours per day



# Key Takeaways

- Communication and flexibility needed to manage schedule challenges
- Developing and maintaining good working relationships with regulators and project partners was key to success

# Questions?

