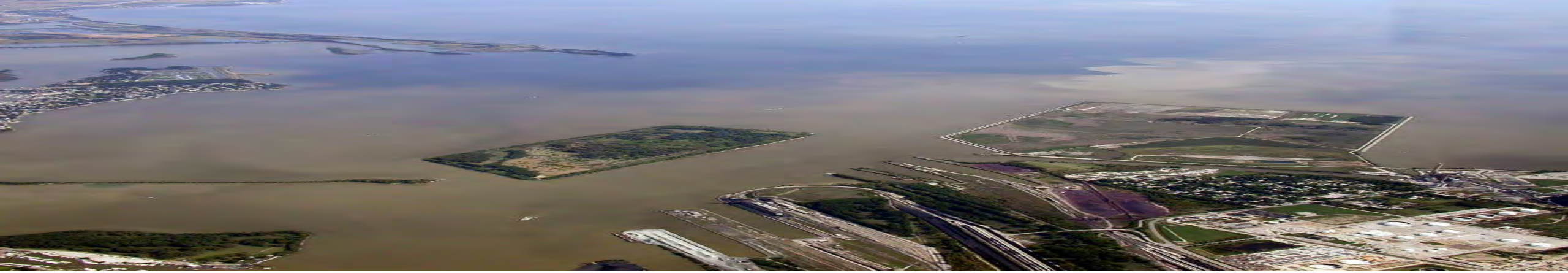

REMEDY DESIGN FOR COST-EFFECTIVE DREDGING AND DISPOSAL OF CONTAMINATED SEDIMENTS

Kristin Searcy Bell, Jim Hutchens, Yamini Sadasivam, Victor Magar

WEDA Dredging Summit and Expo – Chicago, IL

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PRESENTATION OUTLINE

Site Location and Description

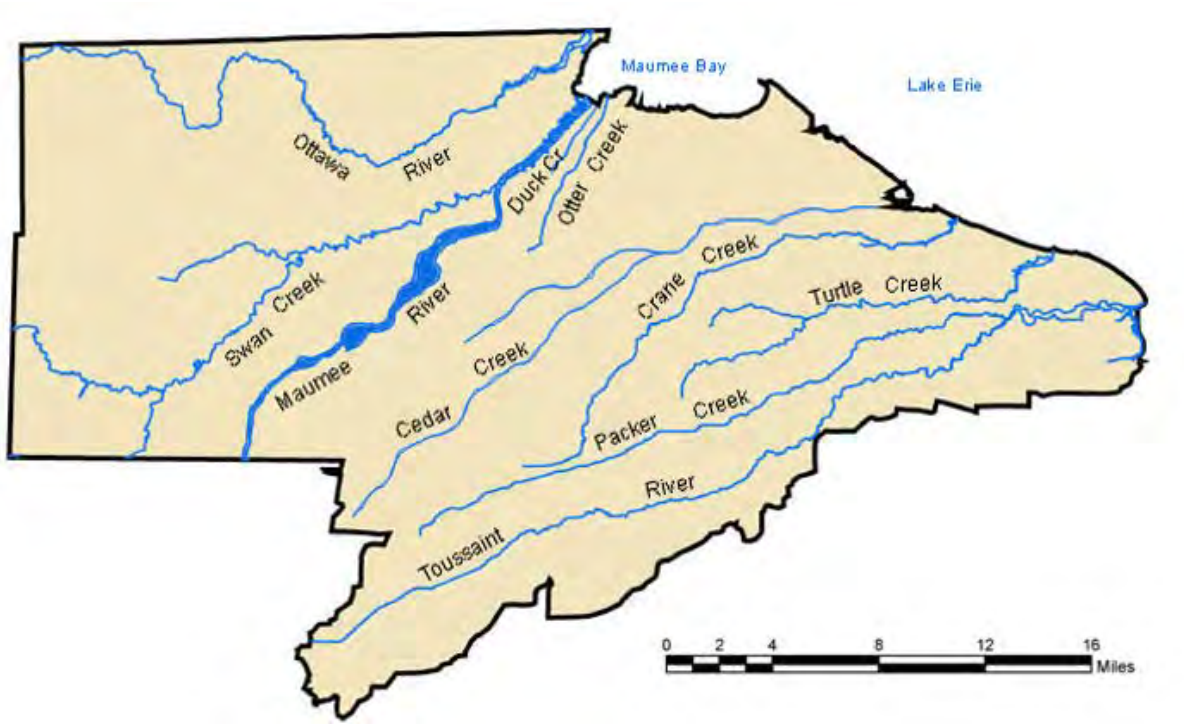
Site Investigations and Preferred Remedy

Remedy Design Approach

Challenges and Lessons Learned

OTTER CREEK LOCATION

- Located in northwest Ohio, part of the Maumee Watershed
- Discharges into Maumee Bay, western basin of Lake Erie
- Located with Maumee Area of Concern (775-acre area)



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SITE DESCRIPTION

- Industrial area
  - East – railroad yards / West – phragmites wetland
  - Pipelines located adjacent to creek
  - Commercial and industrial properties
  - Municipal and industrial outfalls discharge into creek

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PAST INVESTIGATIONS

1990s:
State Agency sampling

2007-2010:
Sediment investigation

2010-2011:
Data gap and confluence investigations

2012-2013:
Focused feasibility study

2016-2018:
Predesign Investigation

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PRE-DESIGN REMEDIAL INVESTIGATION (2016 – 2018)

1. Sediment and porewater sampling and analysis
2. Sediment geotechnical evaluations
3. Upland and sediment elevation surveys
4. Hydraulic monitoring at two locations (near confluence & 0.9 miles upstream)
5. Drone video and photography

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REMEDIAL OBJECTIVE

Remedial Action Objective (Creek and Confluence Area)

Reducing benthic invertebrate exposure to chemicals of concern and associated toxicity below levels of concern

Chemicals of Concern

- Polycyclic aromatic hydrocarbons (PAHs)
- Diesel range organics (DROs)

SEDIMENT MANAGEMENT AREA (SMA)

- Creek
  - Lower 1.7 miles
  - Width of creek: 25 to 85 ft
- Confluence
  - 5.5 Acres

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PREFERRED REMEDY ALTERNATIVE

Sediment removal and cover placement

Creek

- Remove sediments up to a depth of 4 feet below the sediment surface or to native clay (whichever is less)
- Place 1 foot of cover material over dredged areas

Confluence

- Remove sediments at depths ranging from 1 to 5.5 feet

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DREDGE DESIGN

- Sediment remedy is currently in design phase
- Approximately 50,000 CY of sediment identified for removal
- Sediments are proposed to be hydraulically dredged
- Advantages of hydraulic dredging over mechanical dredging
  - Cost and time efficient
  - Can be implemented with minimal footprint and lesser impacts to adjacent wetland areas
  - Lesser potential for sediment resuspension

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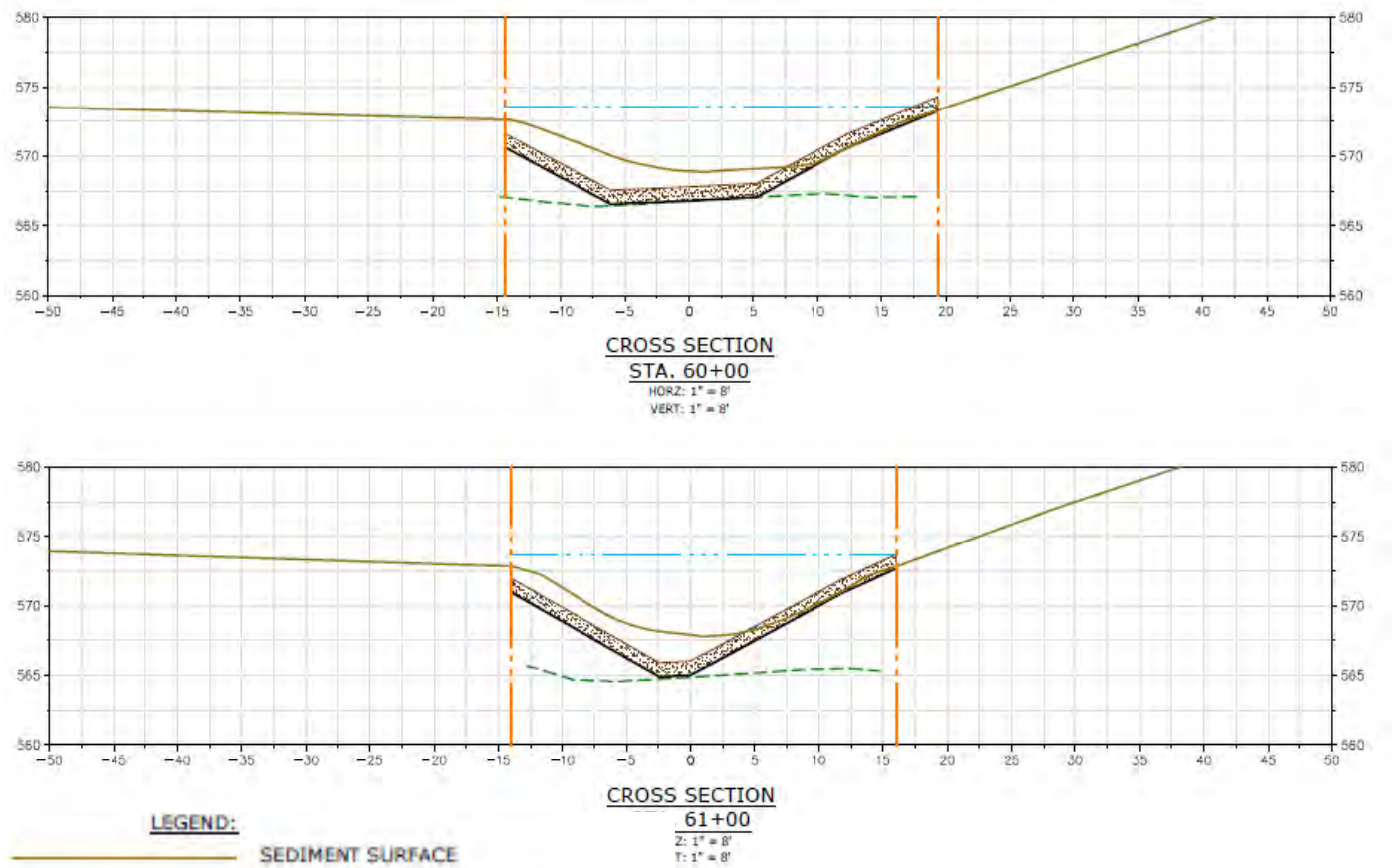
TYPICAL DESIGN CROSS-SECTIONS OF CREEK

Upstream

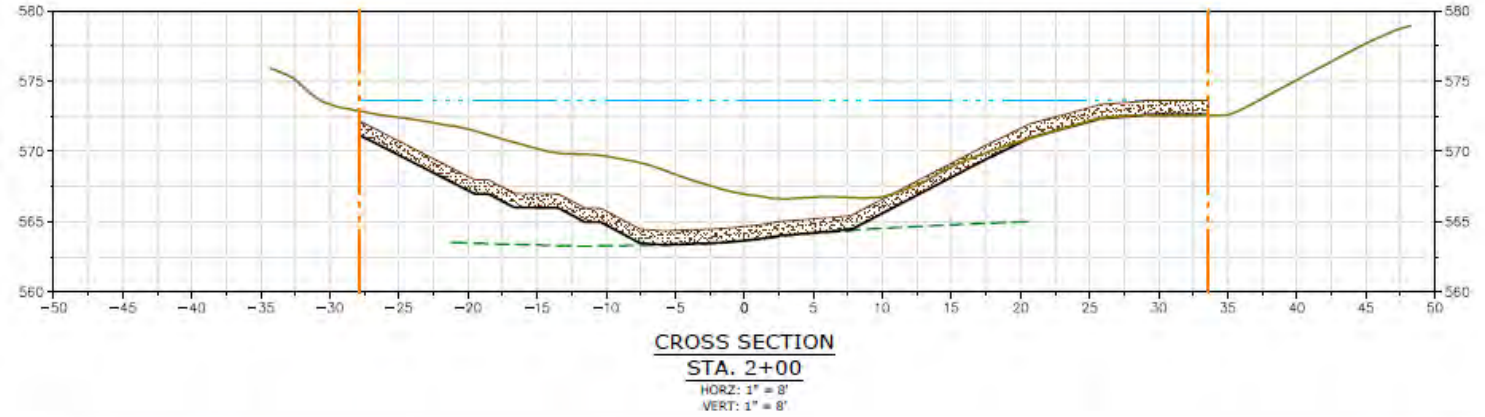


Delineation of creek boundary

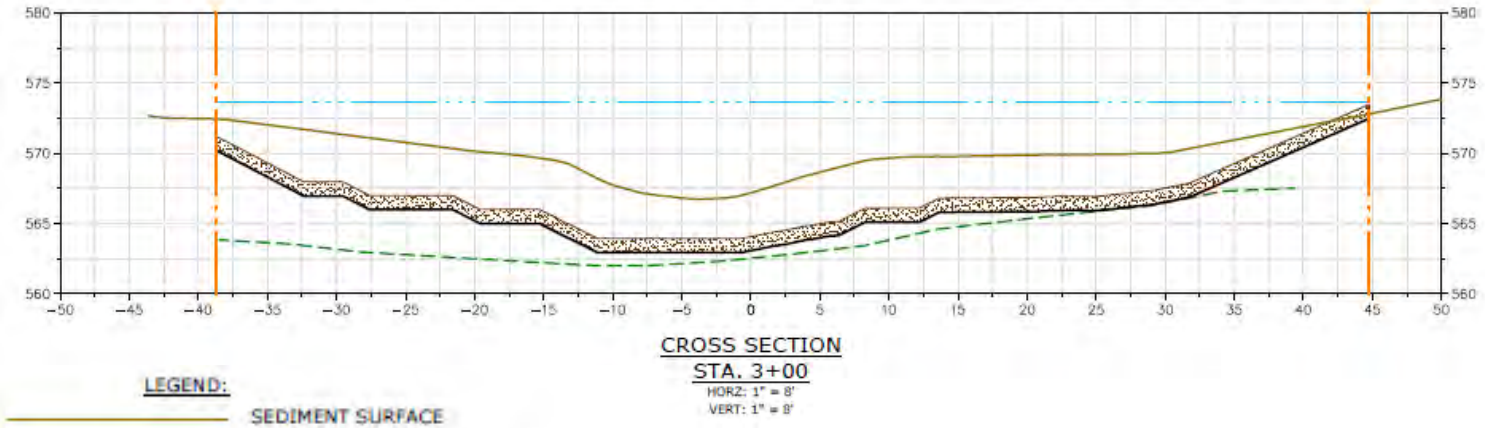
- Site walkthrough/ visual survey
- Upland and sediment surface elevation data
- Aerial imagery
- Water elevation
- Sediment surface morphology

TYPICAL DESIGN CROSS-SECTIONS OF CREEK (CONTD.)

Downstream



CROSS SECTION
STA. 2+00
HORZ: 1" = 8'
VERT: 1" = 8'



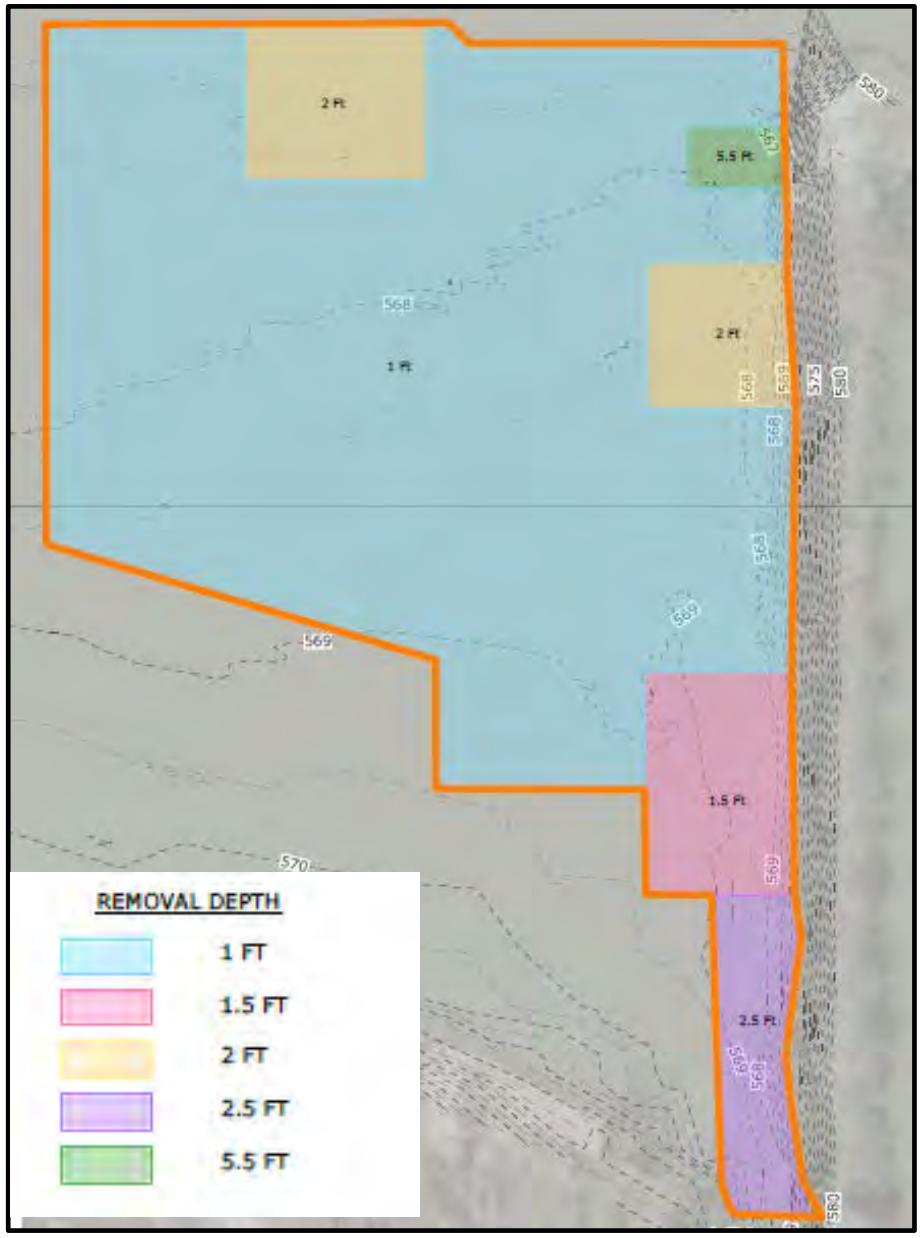
CROSS SECTION
STA. 3+00
HORZ: 1" = 8'
VERT: 1" = 8'

LEGEND:

- SEDIMENT SURFACE
- INTERPOLATED TILL SURFACE
- PROPOSED DREDGE LINE
- MEAN LOW WATER LEVEL (573.61' AMSL)
- CREEK SMA BOUNDARY
- COVER MATERIAL

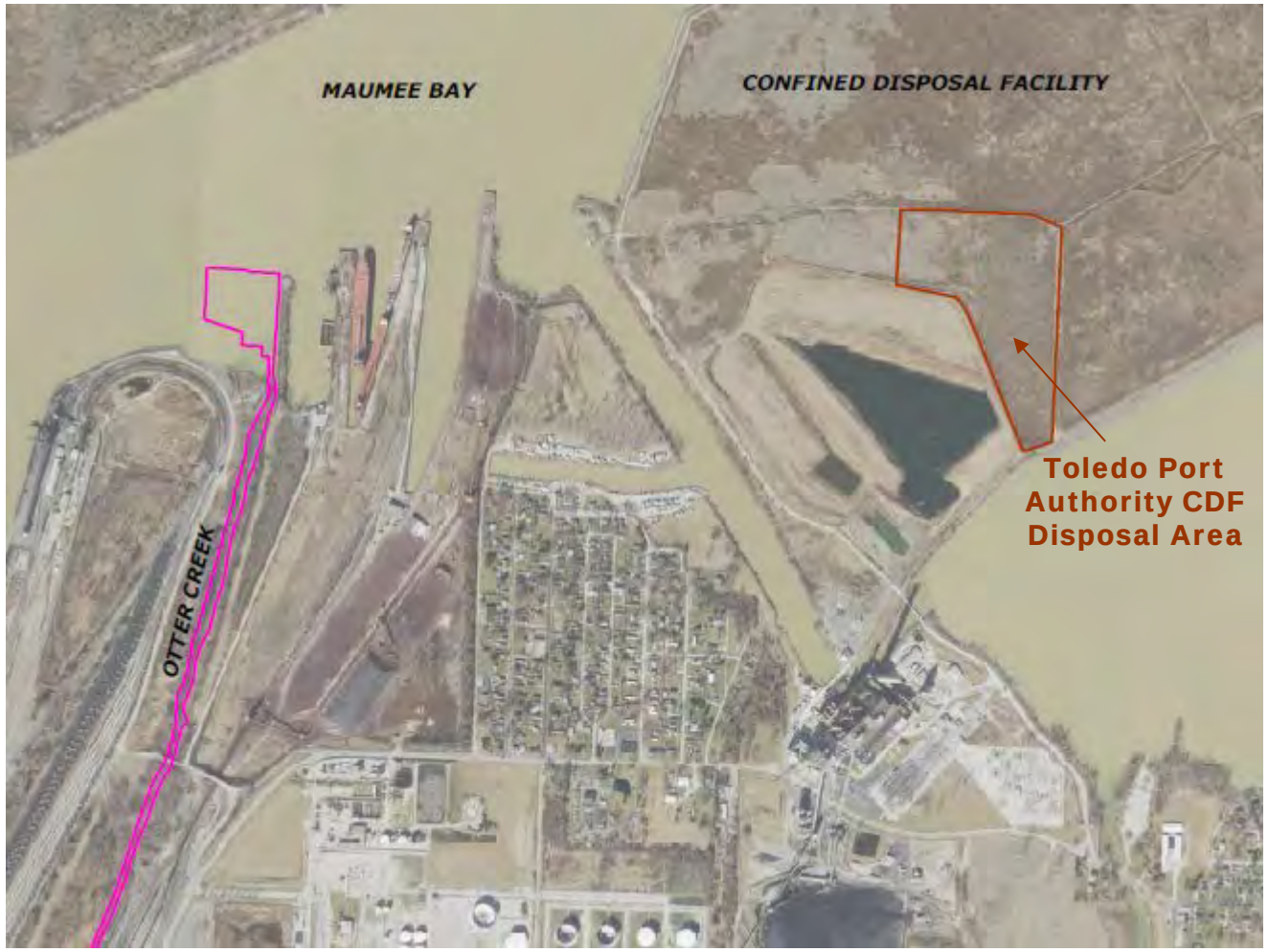
SEDIMENT REMOVAL IN THE CONFLUENCE

Confluence sediment removal depths range from 1 to 5.5 feet



SEDIMENT DISPOSAL

- Hydraulically dredged sediments will be pumped to the nearby Confined Disposal Facility (CDF)
- Potential pipeline routes are being considered:
  - Via water – Pipeline would be submerged and anchored to the bottom floor to prevent interference with boat traffic
  - Over land – Pipeline would be protected at road crossings
- CDF disposal area is designated for contaminated sediment – these sediments are not authorized for reuse



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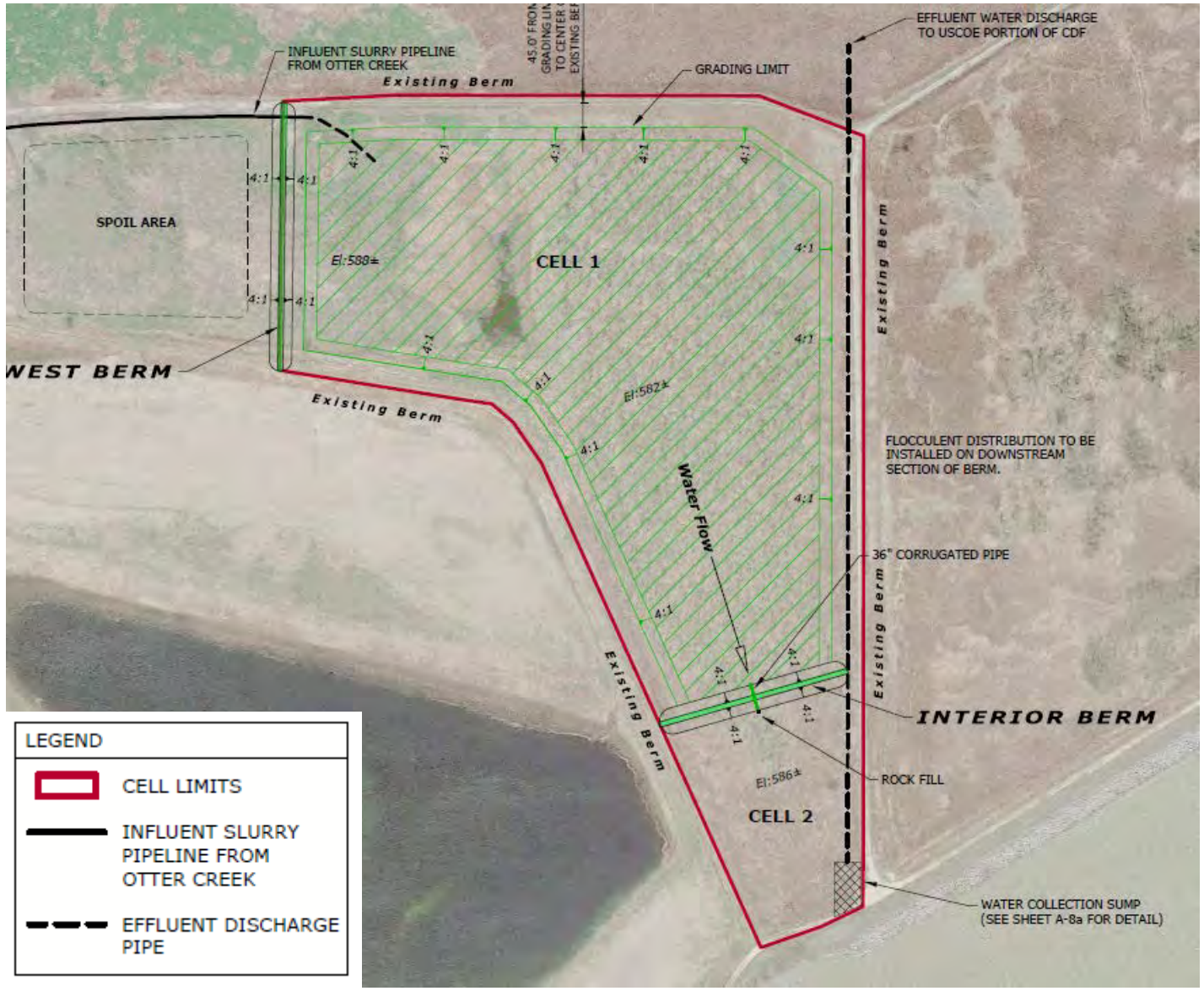
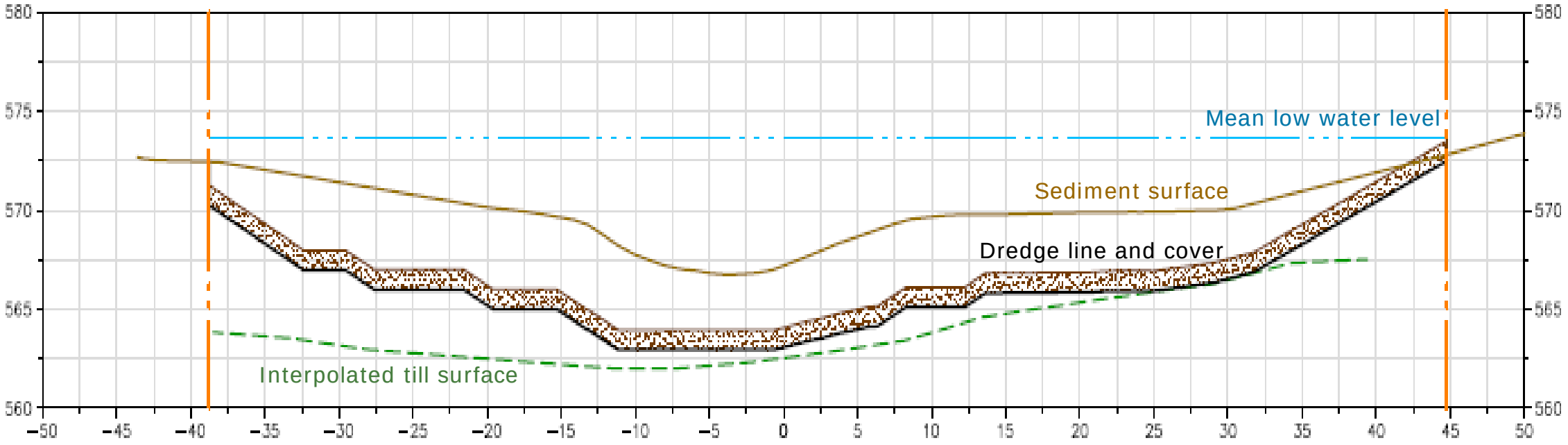
PROPOSED CDF CELL LAYOUT

- Two-stage settling system
- Overflow from Cell 1 within culvert will allow flocculent addition and assist in mixing
- Effluent from Cell 2 will be pumped to USACE CDF



COVER MATERIAL PLACEMENT

- Following removal a 1-ft clean sand layer will be placed on the new sediment surface
- Backfill will be placed in shallow lifts to reduce mixing with underlying sediment
- Dredging and cover placement will start upstream and move downstream to the confluence



CHALLENGES AND LESSONS LEARNED

- Sediment removal in narrow creek:
  - Identified site-specific benefits of hydraulic dredging versus mechanical dredging
  - Due to low bridge clearance, determined dredging equipment will need to be removed from creek and replaced on other side of bridges
  - Established dredge slopes to maintain integrity of existing creek banks while aiming to maximize volume of contaminated sediment removal
- Use of local CDF
  - Collaboration with USACE and local Port Authority allowed for use of local CDF for disposal of hydraulically dredged material
  - Modifications to Port Authority CDF designed to facilitate settling of sediments and meet the USACE effluent criteria from Cell 2.

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QUESTIONS?

Kristin Searcy Bell

ksbell@ramboll.com

312-288-3864