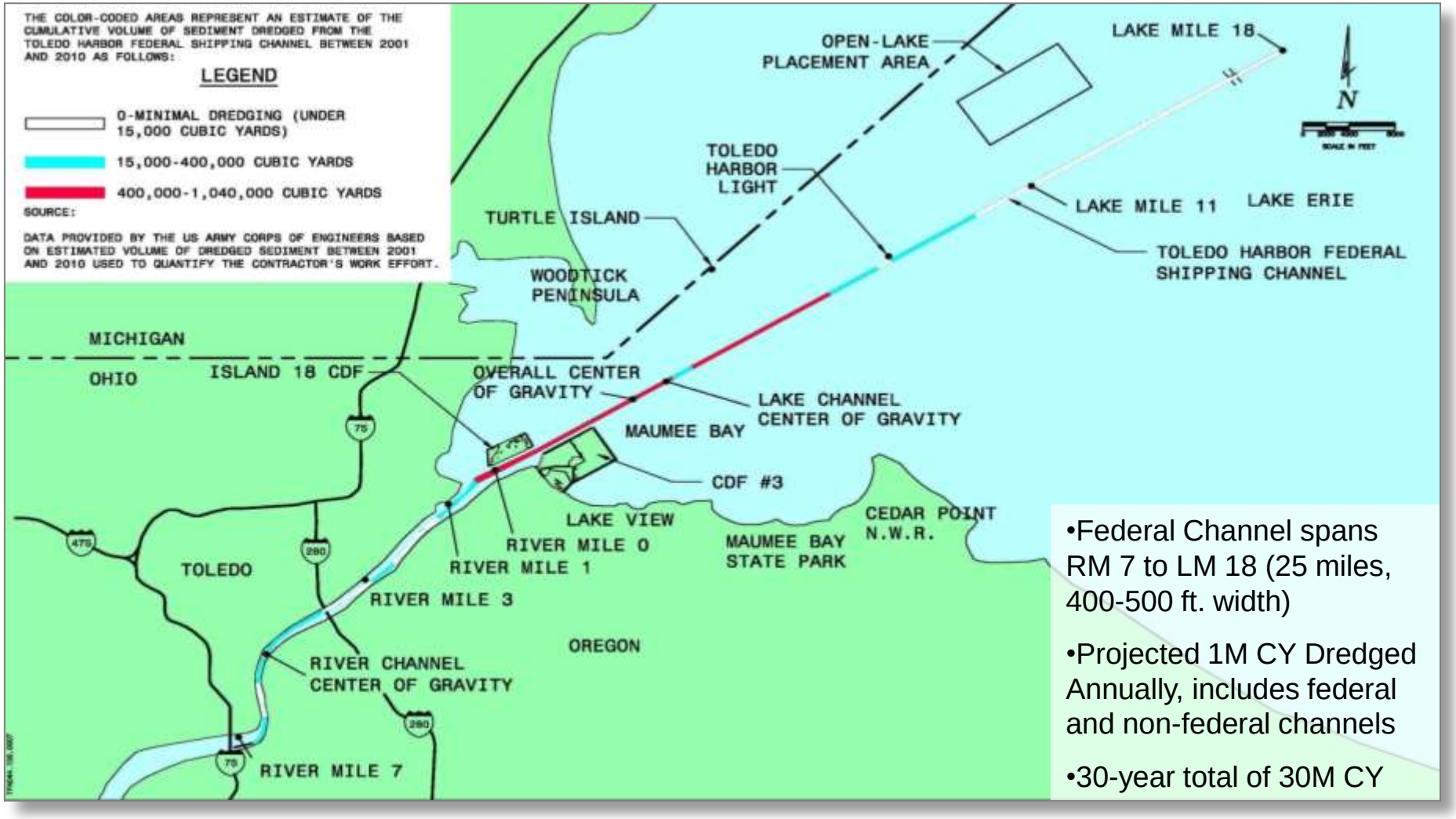
Western Dredging Association
2018 Midwest Chapter Meeting

Great Lakes Dredged Material Center for Innovation

Joe Cappel – Toledo-Lucas County Port Authority

Wednesday, March 14, 2018

Toledo Harbor Dredging



- Federal Channel spans RM 7 to LM 18 (25 miles, 400-500 ft. width)
- Projected 1M CY Dredged Annually, includes federal and non-federal channels
- 30-year total of 30M CY

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Current Regulatory Scenario

- State of Ohio passed legislation that banned the practice of open-lake placement of dredged material in Lake Erie by July 1, 2020.
- After July 1, 2020, the Ohio EPA director, in consultation with the director of ODNR, may authorize placement of dredged material in portions of Lake Erie (within Ohio's jurisdiction), for the following purposes:
  - Confined disposal facilities;
  - Beneficial use projects;
  - Beach nourishment projects if at least 80% of the dredged material is sand;
  - Placement in the littoral drift if at least 60% of the dredged material is sand;
  - Habitat restoration projects;
  - Projects involving amounts of dredged material that do not exceed 10,000 cubic yards, including material associated with dewatering operations related to dredging operations.
- 131st General Assembly, Sub. S. B. No. 1, Sec. 6111.32(E):
  - The director of environmental protection, in consultation with the director of natural resources, may determine that financial, environmental, regulatory, or other factors exist that result in the inability to comply with this section. After making that determination, the director of environmental protection, through the issuance of a section 401 water quality certification, may Sub. S. B. No. 1 131st G.A. 14 allow for open lake placement of dredged material from the Maumee river, Maumee bay federal navigation channel, and Toledo harbor.

Toledo Harbor Sustainable Sediment Management and Use Planning

- The Ohio Lake Erie Commission received a $250,000 GLRI grant in 2010 to create a sediment management strategy for the Toledo Harbor

- Plan identified and addressed:
  - Short-term (1-5 years) options
  - Long-term (30 years) options
  - Funding needs/sources/mechanisms
  - Timelines for implementation

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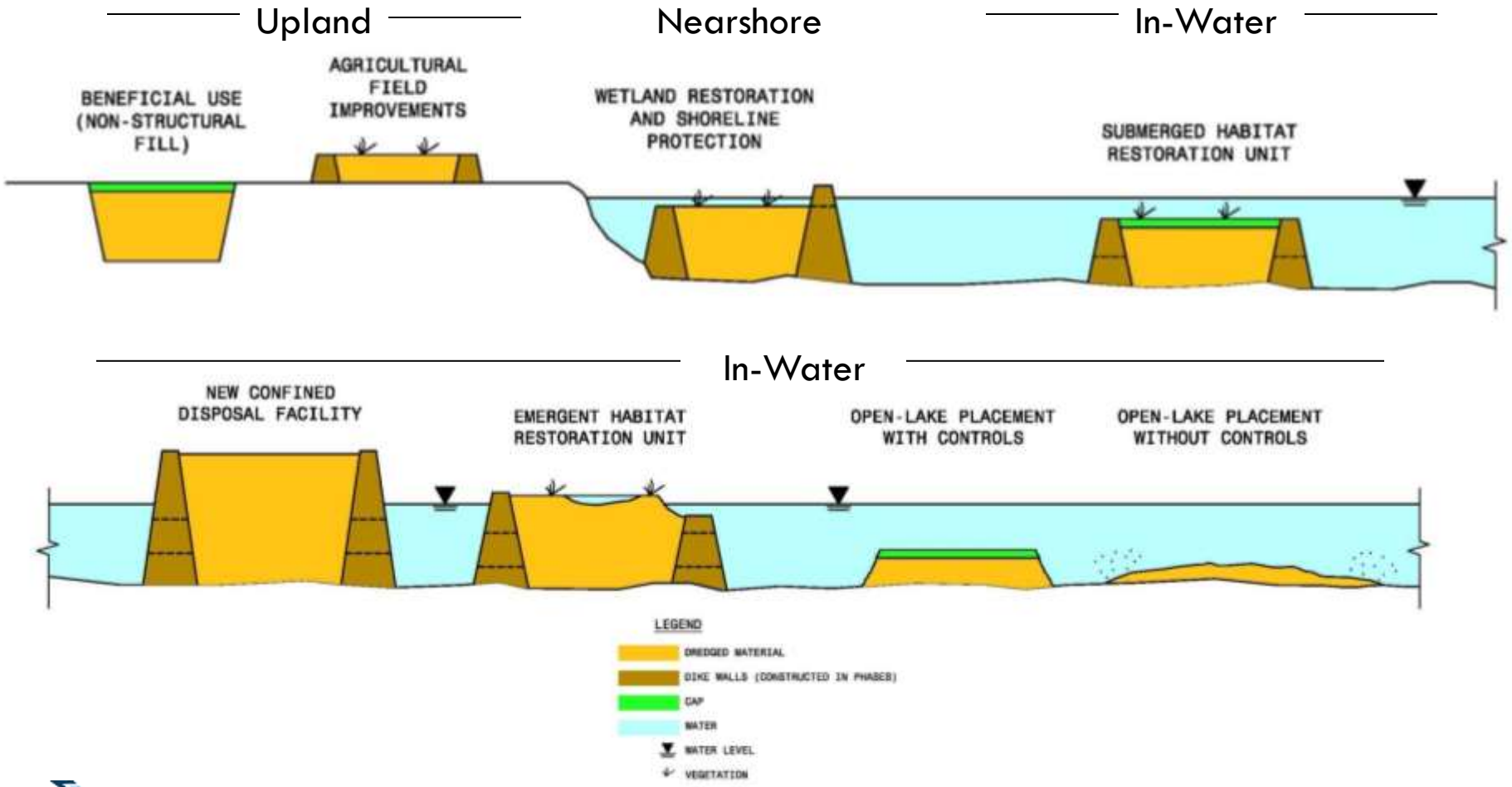
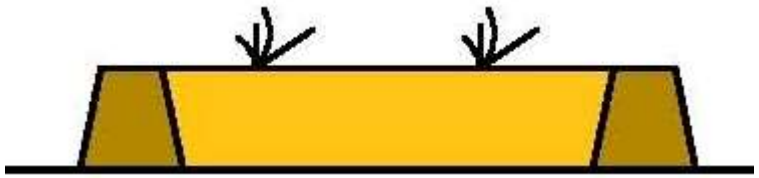
Potential Sediment Management and Use Options



Agricultural Field Improvements

Use dredged material to raise the elevation of agricultural fields, thus, improving drainage and future productivity – Need to determine

- Feasible Pumping Rates
- Dewatering Rate – 401 Compliance
- Consolidation Rate
- Agricultural Productivity
- Potential for Edge of Field Treatment System



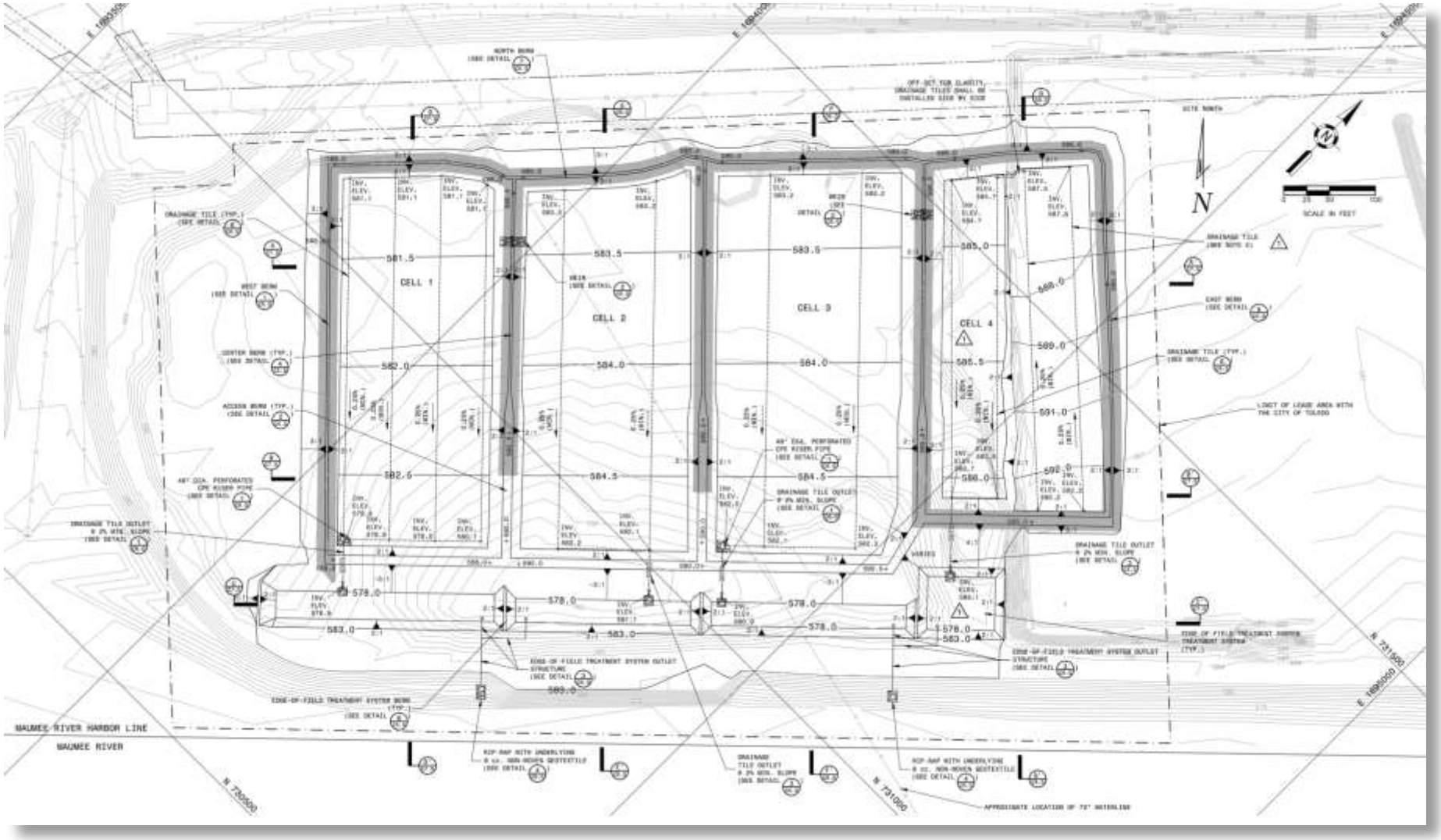
Great Lakes Dredged Material Center for Innovation Project Partners

- State of Ohio is funding this project
- FY2015-2016 State of Ohio capital budget bill provided $10 million for the Ohio Healthy Lake Erie Fund
  - The Toledo-Lucas County Port Authority was allocated approximately $2.5 million through the Ohio Healthy Lake Erie Fund to design & construct the facility
- Ohio Department of Natural Resources and Ohio EPA are co-administrators
- Toledo-Lucas County Port Authority is the grant recipient
- City of Toledo owns property that Port Authority is leasing
- U.S. Army Corps of Engineers provided dredge material to the site during their annual federal channel dredging activities

Project Location/Design Considerations

- Establish a model demonstration site that will further the cause of beneficial use of sediments locally and beyond;
- Offer operational flexibility for short and long-term purposes;
- Provide for innovative Edge of Field research opportunities that will lead to future agricultural runoff impact reductions; and
- Provide soil blending/conditioning opportunities for other long-term beneficial use of dredge material as non-structural fill.

Facility Design



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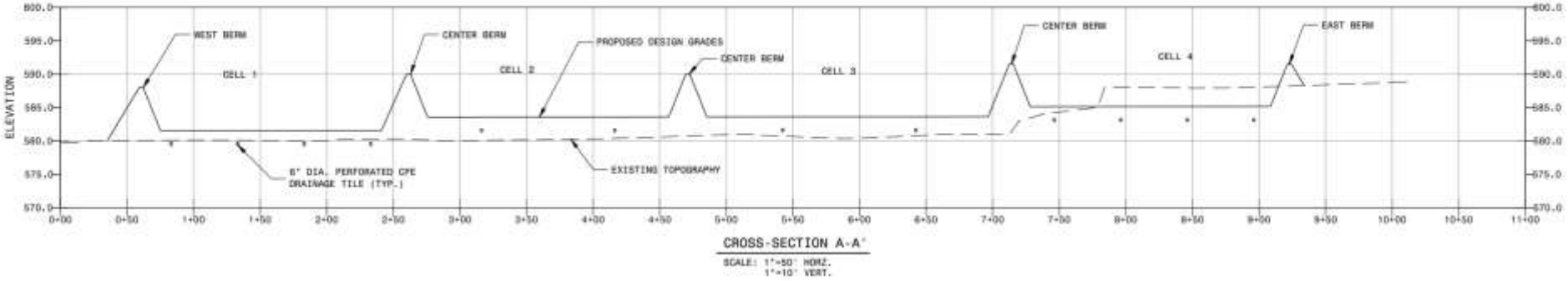

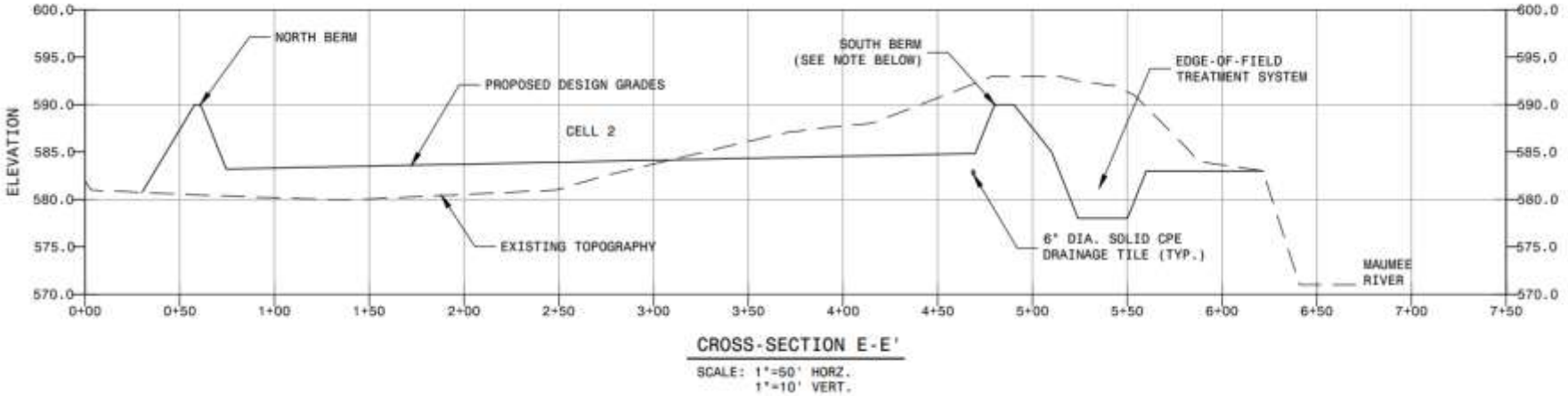

Facility Construction

- Installed berms, underdrain, inter-cell weirs, and Edge of Field System between November 2015 and May 2016
- Contractor: Geo. Gradel Co., from Toledo, Ohio
- All earthen materials were obtained on-site
- In summer 2017, AgriDrain weirs with stop-logs were installed in each cell to facilitate direct decanting to Edge-of-Field System based on lessons learned from the 2016 dredging/pumping experience

Facility Construction

Dredging/Pumping Experience

2016

- Offloading over 21 days in August 2016
- Number of scows: 27
- Total material volume (per USACE's scow measurements): 40,286 CY
- Average volume per scow: 1,492 CY
- Pumping rate of approximately 9,000 gpm

2017

- Offloading over 20 days in September 2017
- Number of Scows: 21
- Total material volume (per USACE's scow measurements): 35,215 CY
- Average volume per scow: 1,677 CY
- Pumping rate of approximately 9,000 gpm

2016 Dredging/Pumping Experience

2017 Dredging/Pumping Experience (Site Conditions – Pre-Dredging)

Findings/Lessons Learned – Dewatering

- Underdrain system: once a layer of sediment is over the pipes, dewatering rate significantly reduces, although it is steady and clear.
- Weir system: very efficient in the decanting process, after primary sediment settlement. Also helpful to remove water from direct precipitation.
- Riser pipes/overflows: helpful but not necessary; weirs work better.
- During the post-dredging/pumping period, removal of decant water significantly increases the secondary consolidation process; the underdrain system continues to dewater the cell in a slow but steady rate.

Findings/Lessons Learned – Water Quality

- Relatively higher concentration of metals and nutrients detected in samples with higher TSS

- Decanting of system during pumping significantly reduces the nutrient and COCs loads in return water

Parameter (ug/L)	Offload	AgriDrain at Cell 1	Underdrain at Cell 2	West Outlet at River
Total Suspended Solids	**194,000**	**169**	<5	**26**
Arsenic	**1,080**	**12.7**	<10	<10
Nickel	**4,230**	**15.4**	**14**	<10
Potassium	**339,000**	**17,200**	**15,000**	**14,800**
Phosphorus	**225,000**	**510**	**80**	**190**

Findings/Lessons Learned – Vegetative Growth

- Volunteer vegetative growth in the spring accelerates the dewatering/consolidation process and introduces organics to the sediment composition.
- Volunteer plant composition from field observations:
  - Pale smartweed (*Persicaria lapathifolia*) - dominant plant species within the cells; covered over 90% of the non-flooded area
  - Duckweed (*Lemna minor*) and cattails (*Typha* sp.) - dominant plants in the edge-of-field cells
  - Isolated patches of *Phragmites* and reed canary grass (*Phalaris arundinacea*) - observed on the berms and damp slopes
- Preliminary sediment analytical testing indicates that the material would be advantageous for agricultural use (from a nutrient standpoint).

  P_{Total} ~ 1,100-1,200 mg/kg (dry weight)
  P available 75-90 mg/kg
  Ammonia as Nitrogen 300 mg/kg (dry weight)
  N available 70 mg/kg (dry weight)
- Consolidation: farming equipment is expected to be able to work and prepare the soil for planting the following year (or two) after fall placement – depending on depth of fill.

Next Steps – Material Characterization

- Completed post-dredging sampling and analytical testing of sediments to determine a baseline of the chemical characteristics of the dredged material pumped into the cells – Winter 2018 (currently under review).
- Preliminary results:
  - PolyAromatic Hydrocarbons – low levels (in range of residential standards).
  - Metals – similar to background/native soil levels (in range for residential standards).
- Prepared a Material Certification Plan for Ohio EPA's approval to establish a protocol for sampling and testing blended material for beneficial (currently under review).

Next Steps – Facility Use

- Harvest sediment (likely from Cell 4) for beneficial use – spring 2018
- Prepare cells 1-3 for agricultural experiments – spring 2018
  - Grade material to provide positive runoff towards the edge-of-field cells
  - Till the surface to prepare it for farming
- Begin agricultural experiments in cells 1-3 – summer/fall 2018
  - Evaluate effects of herbicides and fertilizer on tile discharges
  - Evaluate phyto and/or amendment treatments to be incorporated in Edge of Field Systems
- Solicit research opportunities for future research

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