

**APPLICATION FOR 2013 WEDA ENVIRONMENTAL EXCELLENCE AWARD**  
**ENVIRONMENTAL DREDGING CATEGORY**  
**RIVER RAISIN AREA OF CONCERN PROJECT, MONROE, MICHIGAN**

**SUMMARY**

The construction team of Environmental Restoration, LLC (general contractor), J.F. Brennan Company, Inc. (marine operations), and Natural Resource Technology, Inc. (construction quality control) hereby nominate the River Raisin Area of Concern Project in Monroe, Michigan for the 2013 WEDA Environmental Excellence Award in the Environmental Dredging category. The following metrics summarize the project accomplishments:

- Field Construction Schedule: May – November 2012.
- Hydraulic Dredging Volume of Non-TSCA Sediment Using 8- and 10-inch Swinging Ladder Dredges: 71,457 cubic yard (cy).
- Non-TSCA Sediment Placement Site: USACE CDF at Sterling State Park.
- Volume Removed from CDF to Maintain Capacity for Navigation Dredging: 101,148 cy.
- Beneficial Use of CDF Sediment: Ford Motor Company.
- Mechanical Dredging Volume of TSCA Sediment: 2,500 cy.
- Quantity of Portland Cement Stabilization Additive for TSCA Sediment: 60 ton (2.1%).
- TSCA Disposal Facility: Wayne Reclamation Landfill.
- Quantity of Water Pre-Treated and Discharged to Monroe POTW: 41,700 gallons.
- Area of 6-inch Residual Sand Cover to Satisfy 1 mg/kg surface PCB goal: 7.7 acres.
- Area of Interim 4 to 6-inch Sand/Organoclay® Reactive Cap over Elevated PCBs: 1.4 acres.

**Project Background**

In September 2009, the U.S. Environmental Protection Agency (USEPA) Great Lakes National Program Office (GLNPO) and Michigan Department of Environmental Quality (MDEQ) entered into a Project Agreement under the Great Lakes Legacy Act (GLLA) to dredge and dispose approximately 100,000 cy of PCB-contaminated sediment from the lower 1.5 miles of the River Raisin Area of Concern (AOC) in the City of Monroe, Monroe County, Michigan. The scope also included placement of a layer of sand and stone to address residual dredge contamination of the affected area.

The Raisin River AOC is located in the southeastern portion of Michigan's Lower Peninsula in Monroe County. The AOC has been defined as the lower portion of the Raisin River (2.6 miles), downstream from the low head dam (Dam #6) at Winchester Bridge in the City of Monroe, extending one-half mile out into Lake Erie following the Federal Navigation Channel and along the nearshore zone of Lake Erie, both north and south, for one mile. Raisin River priorities include remediation of PCB contaminated sediments, nonpoint source pollution control, and elimination of combined sewer overflows (CSOs).

In 1997, approximately 20,000 cubic yards of sediments containing high levels for PCBs (up to 20,000 mg/kg) were removed from a “hotspot” located between the shoreline and authorized navigation channel maintained by the U.S. Army Corps of Engineers’ (USACE). This high concentration PCB sediment was disposed at an upland licensed landfill permitted to take Toxic Substances Control Act (TSCA) wastes. The USACE hydraulically dredges the turning basin and navigation channel extending into Lake Erie as needed and transports the sediment via pipeline to their nearby confined disposal facility (CDF) at Sterling State Park. Subsequent sediment and biological sampling by USEPA and MDEQ in 1998 through 2003 indicated that moderate to high levels of PCBs (up to 600 mg/kg) were still present in Raisin River sediments outside the navigation channel, the PCBs were bioavailable to aquatic organisms, and the PCBs presented unacceptable human health and ecological risks.

In 2004, the MDEQ submitted a sediment remedial proposal for GLLA funding that advocated dredging and disposal of approximately 100,000 cubic yards of the most contaminated sediments from the river. After review by the GLLA technical review committee, GLNPO notified MDEQ that additional design work would be necessary prior to a final decision regarding GLLA funding for the proposed sediment remediation project.

In July 2010, Environmental Restoration received a task order from USEPA Region 5 under its Emergency and Rapid Response Services contract to provide contractor and value engineering review of the preliminary design plans, with technical assistance from Natural Resource Technology. In late 2011, as part of the GLLA River Raisin remedial design effort, USEPA’s consultant completed the final engineering design and permitting documents for sediment dredging, as well as for excavation of an equivalent volume from the CDF to maintain USACE capacity for future navigational dredging needs. Then in April 2012, Environmental Restoration received a contract amendment from USEPA to implement the remedy, with team members J.F. Brennan and Natural Resource Technology.

### **TEAM MEMBERS**

- Natural Resource Technology, Inc.: Nominating Entity, WEDA Sustaining Member, Project Construction Quality Control and Environmental Monitoring.
- J.F. Brennan Company, Inc.: WEDA Sustaining Member, Project Marine Contractor for Dredging and Capping Operations.
- Environmental Restoration LLC: WEDA Member, Project General Contractor and Upland Operations.
- U.S. Environmental Protection Agency Great Lakes National Program Office: Project Partner, 65% Funding Source Under Great Lakes Legacy Act.
- Michigan Department of Environmental Quality: Project Partner, 35% Funding Source.
- U.S. Army Corps of Engineers, Detroit District: Project Partner, Provided Confined Disposal Facility for Placement of Non-TSCA Dredged Sediments and assisted GLNPO with Construction Quality Assurance.

### **ENVIRONMENTAL BENEFITS**

As noted above, approximately 101,000 cy of sediments were excavated from the existing USACE CDF to offset the placement volume from this project, and to maintain capacity for future navigational dredging of the river and turning basin. The excavated CDF materials, which

had previously been characterized and deemed to meet State of Michigan industrial standards for beneficial reuse, were trucked and stockpiled at the Ford Motor Company facility near the river. Ford will use these materials during future deconstruction and site restoration of their former manufacturing plant. Beneficial reuse instead of landfill disposal of the excavated CDF materials saved on the order of \$9.2 million, and substantially reduced the project's carbon footprint by eliminating 5,900 truck trips to a landfill, avoiding use of 21,600 gallons of diesel fuel. The project's carbon footprint was further reduced by hydraulic pipeline transport (four miles long) of the dredged sediments to the CDF instead of by truck. Keeping trucks off the highways also made the project safer for the general public.

Bio-uptake studies have indicated that PCB-contaminated sediments are the major cause of the site-specific fish consumption advisories on the River Raisin, which include "do not eat" advisories for several species of fish. Removal of the PCB-contaminated sediments was one necessary step in the process toward eliminating these fish consumption advisories and delisting the River Raisin from the 43 Areas of Concern on the Great Lakes, 26 of which are located wholly in the U.S. It is the intent of MDEQ and the local community to apply to USEPA for AOC delisting when the other projects mentioned below are finished, which together with dredging were designed to help address beneficial use impairments on the river:

- Modifying several low-head dams in the city to renew upstream passage for fish and small boats.
- Installing erosion protection measures around the shoreline of Sterling Island and enhancing shallow water habitat.
- Repairing dikes and installing water quality control structures to restore 310 acres of marsh at Sterling State Park, providing habitat for shorebirds, and controlling invasive phragmites.
- Re-creating 25 acres of emergent and submergent Great Lakes marsh and 25 acres of lakeplain prairie at the Park.

A unique challenge faced by the dredging project team was encountering and responding quickly to unexpectedly high concentrations of PCBs in one dredge management unit after removing sediments to the project design grades. Required post-dredge confirmation samples by the team of the top 6 inches to determine compliance with the surface-weighted average concentration (SWAC) goal of 1 mg/kg found PCBs well in excess of the TSCA limit of 50 mg/kg. A few additional surface cores to help define the limits of the problem found PCBs approaching 2,000 mg/kg, as well as visible apparent non-aqueous phase liquid (NAPL) flecks and sheens in/on the undisturbed materials below the dredge cuts. More samples were then collected using push cores and a manually-driven split-spoon, but the elevated PCBs and visible apparent NAPL extended deeper than could be penetrated by these devices. Firm native clay and/or highly weathered limestone bedrock were generally encountered at the surface below the dredged soft sediments.

After holding a meeting with the project partners to discuss the initial investigation findings, and writing a draft sampling plan within 24 hours of the meeting, our team received agency approval to proceed with a supplemental investigation of the "NAPL hot spot." A conventional truck-

mounted rig was mobilized to drill six borings along the shoreline adjacent to the problem area, and 24 borings were drilled in a grid pattern from a barge in the river; all borings were continuously sampled to maximum depths of 45 feet on land and 50 feet below water (23 feet below mudline) on the barge. These borings defined the degree (as high as 14,000 mg/kg at 11.0-11.5 feet below mudline) and extent of the elevated PCBs (depths of 4.0 to 15.5 feet below mudline, covering an area of approximately 1.3 acres, with an estimated volume of 14,600 cy). The supplemental investigation also concluded a continuing upland source of PCBs was unlikely.

The team then developed for agency review a range of remedial alternatives and preliminary construction cost estimates to address the NAPL hot spot. The following factors prevented the agencies from a timely decision on which of the alternatives to choose:

- The underlying weathered bedrock, and not soft sediment, contained the highest PCB concentrations.
- Remaining project funds were insufficient to complete the work.
- A cost allocation agreement between the original project partners and a potentially responsible party had not been established.
- The existing project permits needed to be modified for the new work.
- It was late in the construction season (October-November), shortly before the onset of winter weather.
- Upland site support infrastructure would need to be upgraded before in-water work could proceed.
- A TSCA disposal site had not been selected, although the one used for disposal of earlier project TSCA sediments would likely have been suitable.
- Concerns by USACE for restrictions on potential deepening of their navigation channel had not been vetted for the array of potential remedial alternatives which included capping.

As an interim measure, the agencies decided upon a 4 to 6-inch thick sand cover pre-blended onshore with 5% Organoclay® by volume over the area while the parties continued to discuss options for a final remedy. The 1.4-acre interim cover was successfully applied using Brennan's patented broadcast capping system (BCS™) in a matter of two days.

## **INNOVATION**

The project team used its collective experience from numerous other similar projects to quickly and cost effectively execute the work, as well as to respond to the unexpected conditions associated with the NAPL hot spot. Innovation on this project included:

- Partnering with the USACE to provide the CDF for placement of project non-TSCA sediments, and with Ford Motor Company on beneficial reuse of existing CDF materials excavated so as to maintain capacity for navigational dredging.
- Custom fabrication of the environmental bucket and moon-pool silt curtain enclosure used to mechanically dredge TSCA sediments while controlling releases.

- Custom fabrication of the hydraulic paddle used to blend Portland cement with TSCA sediment to stabilize the sediment to meet landfill disposal criteria.
- Adapting the dredge confirmation sampling boat and tools to perform manual split-spoon sampling during early attempts to delineate the post-dredge NAPL hot spot.
- Using Brennan's BCS™ to quickly place the 6-inch residual sand cover and 4 to 6-inch interim reactive sand/Organoclay® cap with tight thickness tolerances and essentially no disturbance of the underlying materials. Also, the onshore system developed to blend the sand with Organoclay®, and the pipeline transport system to the spreaders, were proven precise by an independent third party who confirmed the as-placed Organoclay® mix ratio of 5% by volume to within 0.1%.

### **ECONOMIC BENEFITS**

A specific dollar value could not be found associated with the economic benefits of this project. However, the Port of Monroe is Michigan's only port on Lake Erie, located between ports at Detroit and Toledo, Ohio. The Port of Monroe is a deep-draft commercial harbor with authorized depth of 21 feet in Lake Erie extending 1-1/4 miles upstream to the turning basin, which has an 18-foot depth. Maintaining a clean and deep river is vital to the local community. This includes operations of Detroit Edison's Monroe Power Plant located at the mouth of the river. The facility is the second largest coal-fired plant in the U.S. and receives a large portion of its coal via lake freighter at 1,600 feet of river dock. The river also provides access to Lake Erie for recreational water sports and sailing, in addition to commercial fishing, numerous charter boats, and private fishing boats.

### **TRANSFERABILITY**

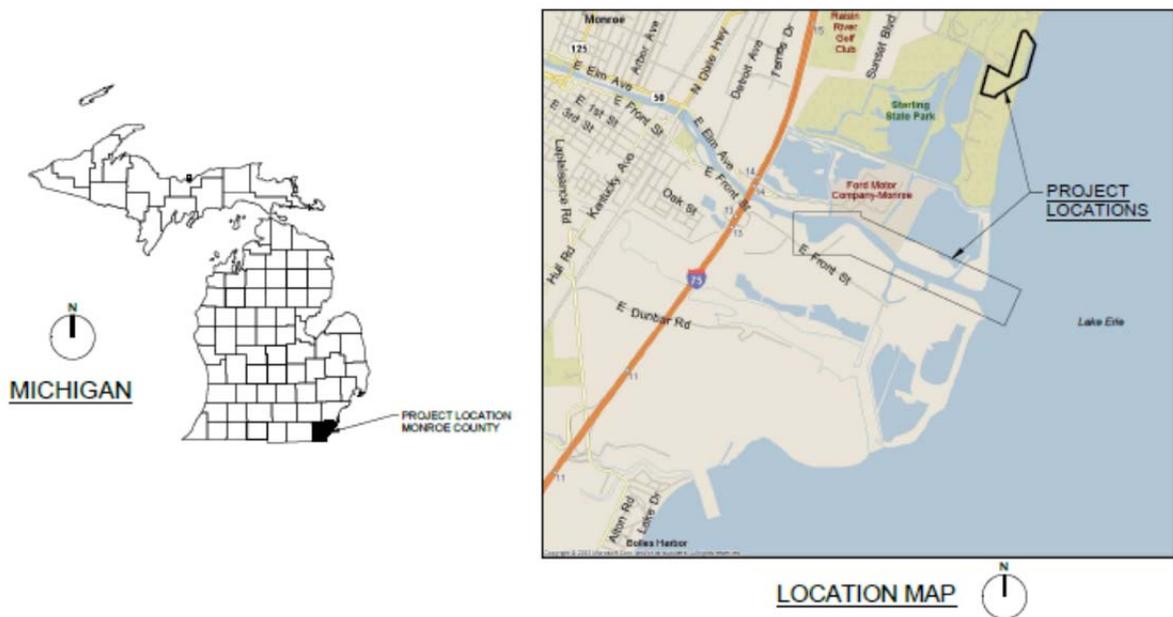
The project characteristics and lessons learned are transferable and can be used by others addressing similar environmental issues. In fact, team member J.F. Brennan has previously presented a project case study to attendees of the Battelle sediment conference in February of this year, and to the WEDA Midwest Chapter meeting in April.

### **OUTREACH AND EDUCATION**

The nominating team prepared collateral and attended an agency-led public meeting in June 2012 at the Monroe public library, shortly after CDF excavation began and in advance of river dredging operations. The purpose of the public meeting was not only to inform local residents of the environmental dredging project, but also to discuss the construction schedule for several other projects funded by the Great Lakes Restoration Initiative described above.



**PROJECT FIGURES AND PHOTOS**



**Figure 1. Vicinity and Location Maps of Raisin River Area of Concern, Monroe, Michigan.**



**Photo 1. Excavation of existing materials from confined disposal facility.**



**Photo 2: Mechanical dredge removing TSCA sediment within silt curtain containment.**



**Photo 3: Backhoe-mounted custom paddle to blend Portland cement with sediment.**



**Photo 4. Eight-inch swinging-ladder hydraulic dredge removing non-TSCA sediment.**



**Photo 5. Manual split-spoon sampling during NAPL hot spot investigation.**



Figure 6. Broadcast capping system™ placing residual sand cover.



Photo 7: Lake freighter unloading coal at Detroit Edison's Monroe power plant.



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