WISCONSIN RIVER AND PFIFFNER PIONEER PARK POND REMEDIATION

4/15/2016

Western Dredging Association (WEDA)
Environmental Excellence Award Submittal

SUMMARY

Environmental dredging and subaqueous capping was performed in the Wisconsin River (River) and the Pfiffner Pioneer Park Pond (Pond), at a Former Manufactured Gas Plant (MGP) site in Stevens Point, Wisconsin. The Remedial Action was initiated on October 5, 2015 and substantially completed by December 9, 2015. The Remedial Contractor was J.F. Brennan Company, Inc. (Brennan), and design and construction quality assurance was provided by Natural Resource Technology, Inc. (NRT).

The 3 month, $2 million construction project entailed several facets beyond traditional remediation as it was performed in a City Park located downtown Stevens Point, Wisconsin. Challenges were presented during the project requiring a high level of communication, innovation, teamwork, and ability.

Approximately 2,300 cubic yards of dredge material were removed from the Pond and River. The objective of the Remedial Action was to mechanically excavate and/or cap contaminated sediments in areas with elevated polycyclic aromatic hydrocarbons, xylenes, lead, and mercury concentrations.

Environmental control measures (e.g., erosion controls, turbidity curtain, oil boom, contact water management pad), were installed prior to commencement of Remedial Action operations and maintained throughout the duration of the Remedial Action. River turbidity and ambient air were monitored to confirm the effectiveness of these measures.

The River Remedial Action encompassed approximately 0.4 acres. River sediment dredging was performed to remove contaminated sediment followed by placement of a residual sand layer. A minimum 15-inch thick subaqueous cap consisting of sand mixed with activated carbon was placed in the River where sediment concentrations were above the remedial action level and slope stability limited further dredging. The River cap was overlain with armor stone.

The 0.3 acre Pond Remedial Action consisted of dredging approximately 15 inches of sediment prior to placement of a 15-inch thick subaqueous sand cap amended with activated carbon.

Dredge material was transported to the upland contact water management pad and stabilized prior to transportation to the landfill for disposal. Debris encountered during dredging was also landfilled. Dredge material contact water collected from the contact water management pad was batch-treated by Infrastructure Alternatives Inc. (IAI) with a mobile on-site treatment system to meet permit requirements prior to discharge to the Wisconsin River.

Over the course of the 3 month project, the remediation team worked diligently within the confined limits of construction and incorporated proven technologies to successfully remediate the contaminated waterway. As of the date of this submittal, the project has zero recordable injuries and zero lost time incidents among all contractors on-site.

Award Category

Environmental Dredging

PROJECT TEAM MEMBERS

Owners and Stakeholders

A private Midwest utility

City of Stevens Point

U.S. Environmental Protection Agency

Wisconsin Department of Health Services

Wisconsin Department of Natural Resources

Engineer of Record

Natural Resource Technology, Inc. – Designer and Owner's Representative – **WEDA Member**

Prime Contractor

J.F. Brennan Company, Inc. – Dredging, Excavation, Material Stabilization, Subaqueous Adsorptive Cap Installation – **Sustaining WEDA Member**

Key Subcontractors

Infrastructure Alternatives, Inc. – Mobile Contact Water Treatment System – **WEDA Member**

TestAmerica Laboratories, Inc. – Air Sample Chemical Analytical Laboratory

Pace Analytical Services, Inc. – Soil, Sediment, and Water Chemical Analytical Laboratory – **WEDA Member**

Wimme Sand and Gravel, Inc. – Backfill and Waste Material Trucking

Chief Industrial Services comprised of Chief Liquid Waste, Inc. and sister company Chief Waste Treatment Corp. – Contact Water Transportation and Disposal

Advanced Disposal Cranberry Creek Landfill, LLC – Dredge Material Disposal Facility

Nominating Entity

Natural Resource Technology, Inc.

Wisconsin River and Pfiffner Pioneer Park Pond Remediation

WESTERN DREDGING ASSOCIATION (WEDA) ENVIRONMENTAL EXCELLENCE AWARD SUBMITTAL

ENVIRONMENTAL BENEFITS

This project was a major component of the overall remediation and restoration of the former manufactured gas plant facility. The 3-month construction window accommodated the City Park's scheduled activities and was performed outside of the typical aquatic spawning season to protect wildlife.

The following statistics provide a scale of environmental benefits the project delivered.

- 2,500 tons of dredge material (sediment and debris)
- 112,700 gallons of contact water treated and discharged to the Wisconsin River
- 2,000 tons of sand placed to restore Pond and River
- 106 tons of granular activated carbon placed in River and Pond cap areas
- 46 tons of armor stone place over River cap
- 46 tons of riprap placed along Pond shoreline

The remediation project was located within a popular City Park and in close proximity to residential and commercial development. The project setting presented unique challenges because residents and visitors to the City were accustomed to using the Park facilities, which had to be closed to secure the site. Site security included signage at nearby boat landings notifying boaters of potential on-water hazards, and signage on sidewalks and roadways notifying motorists and pedestrians of alternate routes around the work area.

Prior to initiating dredging, the City expressed concerns for turtles in the Pond. Therefore, a net was run through the Pond to collect and relocate potentially present turtles. The effort did not result in collection of turtles and no evidence of turtles or other aquatic animals in the Pond were observed during dredging. Several logs in the Pond near an adjacent public arts center building were removed prior to dredging and replaced after cap installation to accommodate the fish and turtle habitat.

To the extent practical, vegetation and trees were preserved to maintain habitat and esthetics of the Park. Two small trees near the Pond required removal to provide equipment access and were replaced during site restoration.

Mechanical dredging with an environmental bucket (closed clamshell) was used to reduce sediment suspension, prevent release of contaminated sediment, and minimize residual contamination dispersion. The use of specialty dredging equipment and software ensured precise bucket placement and control of dredge cuts.

A lined contact water management pad provided an area for dewatering and stabilizing dredged sediment and prevented contaminant transfer to upland soils. The contact water management pad also provided an area for equipment decontamination at the end of site work.

Dredging equipment, methods, and a turbidity curtain were employed to minimize turbidity during dredging, capping, and residual sand layer placement. Solar powered real-time in-stream monitoring equipment and telemetry systems were used to verify remedial activities minimized turbidity.

In general, contaminated River sediments were addressed by dredging a localized area of the River. However, a small sediment area within the River was capped with sand amended with

activated carbon where removal of contaminated sediment could not be achieved due to the proximity to the shoreline and possibility of destabilizing upland features. Contaminated Pond sediments were addressed by pre-dredging and placing a subaqueous sand cap amended with activated carbon over the Pond sediment.

The overall environmental benefit is a remediated waterway through contaminant removal or capping.

INNOVATION

Project leadership took steps beyond traditional environmental protection efforts by working closely with the City and regulatory agencies. In addition, the project incorporated innovations in sequencing, mechanical dredging, temporary dredge material management, adsorptive cap installation, and environmental monitoring.

Sustainable approaches were applied to protect the environment, public health, human communities, and wildlife by implementing measures such as limitation of idling time for contractor vehicles and equipment, and use of biodegradable hydraulic oil in all marine equipment.

Sequencing

Sequencing and achieving milestones was critical to accommodating City Park activities and completing the work prior to freezing Wisconsin weather setting in. The City Park is a popular destination for residents and visitors due to the many activities held at the Park, which is located downtown and along the waterway. Therefore, work could not begin until October 2015, limiting the construction window to 3 months to avoid shutting down for the winter and extending into the City Park's planned public activities in the spring. Therefore, a specific construction sequence was required to achieve project milestones. Flexibility and modifications to the sequencing plan were necessary with regard to dredge confirmation sample turn-around times and contingency re-dredge requirements.

The general planned sequence of construction was to 1) dredge the Pond, 2) dredge the River, 3) cap the Pond, and 4) place the residual sand layer in the River. However, the presence of contamination deeper than anticipated for the design required additional dredging in the River. The extent of contamination was redefined through additional coring and conducting test pits, sending samples to the laboratory, and waiting for and assessing results.

Progress was maintained by shifting efforts from the River to the Pond and initiating Pond capping sooner than initially planned. As the River re-dredge surfaces became available work returned to River dredging because dredge confirmation sample results were the critical path to completing work within the established schedule and before freezing temperatures set in.

The onsite mobile water treatment plant (WTP) batch treated contact water, requiring the appropriate number of influent and effluent tanks to manage contact and dredge water, and be prepared for storm events contributing to contact water volume. Batch treatment allowed optimization of the treatment rate, resulting in constituent concentrations orders of magnitude less than the maximum discharge requirements.

Mechanical Dredging

Mechanical dredging was performed with an excavator with environmental bucket outfitted with state-of-the-art RTK-GPS positioning equipment, locational sensors, and Hypack Dredgepack®. The excavator completed Pond dredging from the ground surface or from a temporary causeway. Dredging the River required barge-mounted equipment.

Pond access was restricted by trees, landscaping, pedestrian walkways, and an art center building. Therefore, a temporary causeway was constructed in the Pond for heavy equipment to access and to mechanically dredge the Pond. The causeway was removed as Pond dredging was confirmed to achieve the design depth required for cap installation without reducing the Pond depth. Following dredging a minimum 15-inch thick adsorptive cap was installed in the Pond.

River dredging encountered unanticipated non-aqueous phase liquid (NAPL) in a small area below the design dredge prism. Additional dredging was not possible due to the proximity to the shoreline and possibility of destabilizing

upland features. Therefore, a cap consisting of sand mixed with activated carbon was placed over approximately 110 square yards of the River where removal of contaminated sediment could not be achieved. As planned, a minimum 6-inch thick sand layer was placed in the remaining River dredge areas to manage dredge residuals.

Mechanical dredge positioning equipment minimized over-dredging while ensuring removal of target material. Mechanical dredging optimized production due to the numerous debris encountered and the size of debris (e.g., large rocks and logs from previous forestry practices).

Bathymetric surveying was performed to document the dredge surface and develop elevation contours for comparison to the design dredge prism. Bathymetric surveys were performed using a 200 kHz single-beam echo sounder and a laptop PC with Hypack® Hydrographic Survey software was used for data acquisition and boat navigation.

Temporary Dredge Material Management System

To prevent contaminant transfer to upland soil, the contact water management pad was lined with a 30-mil (0.030-inch) thick scrim reinforced polyethylene covered with approximately 12-inch thick layer of gravel. The gravel provided drainage to the collection sump and protected the geomembrane from heavy equipment traffic. The perimeter of the pad was raised and protected by a robust concrete barrier to create a berm for water containment. The contact water management pad also provided an area for decontamination of equipment such as trucks, excavating equipment, barges, boats, etc. at the completion of site work.

The onsite portable mobile WTP was enclosed in two semi tractor-trailers and capable of 150 gallons per minute (gpm) capacity. The mobile WTP included an inclined plate separator, sand filters, bag filters, and granular activated carbon (GAC) vessels, pumps, hoses, and ancillary tanks. Effluent water was batch treated and held in a tank until laboratory analysis confirmed constituents were below the discharge limits. The onsite mobile water treatment system consistently treated water to well below the discharge limits.

Installation of Adsorptive Cap

In preparation for cap installation, the carbon was soaked approximately 24 hours to fill the void space and decrease buoyancy. The target carbon-sand ratio was 7% on a dry weight basis (e.g., 7 pounds of dry carbon per 100 pounds of dry sand). Sand and carbon were loaded into separate hoppers that dumped onto conveyor belts with scales. The hopper scales were setup with a leader/follower PLC, which continually controlled the mixing rate of the activated carbon and sand. Based on the individual weights of the carbon and sand, the belt speeds were adjusted to convey the proper carbon and sand volume to achieve the 7% carbon-sand ratio. The carbon-sand ratio was also verified based on the quantity of sand and carbon used. Finally, uniform mixing was visually observed during cap thickness checks.

Brennan's Broadcast Spreader System (BCS^{TM}) was used in the Pond and River to uniformly place a minimum 15-inch thick cap with an over placement allowance of 3 inches.

Environmental Monitoring

Solar powered remote monitoring buoys with nephelometer sondes were located upstream and downstream of the work area to ensure potential sediment disturbance during dredging and capping activities did not exceed the site-specific criteria of 70 NTU above upstream conditions. Site-specific turbidity was correlated to TSS concentrations through sampling and laboratory analysis. Upstream turbidity and downstream turbidity readings were continuously collected on 30-minute intervals throughout the duration of the project. Turbidity monitoring showed the remedial construction activities were performed to prevent significant impairment to the water quality.

Routine air monitoring consisted of a weather station, real-time air monitoring, and 24-hour perimeter air monitoring. A weather station was established onsite to record meteorological conditions during the Remedial Action. Real-time air monitoring of total volatile organic compounds (TVOCs) respirable particles (PM10) was performed at regular intervals, typically four times per day. Time-weighted average (24-hour) perimeter air monitoring benzene, toluene, ethylbenzene, and xylenes (BTEX) and

naphthalene samples were collected every workday during dredging and sediment management activities and twice per week during other remedial work. Air quality limits were not exceeded for the duration of the project.

ECONOMIC BENEFITS

Project Specific

There were several qualitative areas of economic benefit on this project, the first being the ability of all involved parties to work together to find ways to deliver better value to the stakeholders. This cohesive atmosphere minimized downtime when unforeseen challenges were encountered. New solutions were arrived at quickly, allowing the project to move forward without long delays.

Innovations listed previously were very effective in delivering economic value. Project sequencing and coordination provided the client the benefits of increased production rates, while avoiding costly implementation of a temporary road structure.

The implementation of the BCS™ showed the accuracy in which an absorptive cap could be placed, a task where few contactors are willing to take on substantial risk. This traditionally drives up the price of such a project, however a system such as the BCS™ in which there is confidence in accuracy, will consistently return cost savings to the stakeholders.

Surrounding Economy

The Wisconsin River is a recreational destination for camping, biking, fishing, and boating. Continued restoration, such as completed for this project will continue to improve the water quality for wildlife and users of the waterway. This type of environmental improvement further increases the desire to develop along the River. In addition, the project maximized use of local suppliers to limit the impact of transporting materials over long distances and support sustainability goals.

TRANSFERABILITY

Many of the innovations that were accomplished on this project are transferable to other projects. As stakeholders facing environmental projects look for new and economical ways to resolve the challenges they face, contractors and engineers are forced to think outside the box. In the environmental dredging industry, there is no “one size fits all” solution and it is imperative for a contractor to remain flexible and innovative. Many of the processes developed on this site can be used for future projects that are of different sizes and scale. All the equipment developed, and all of the approaches that were used here can be used on both very small sites and on the largest scale projects.

The largest takeaway from this project is remediation and restoration of a contaminated waterway located in a City Park, central to the downtown was restored in less than three months by a scalable, temporary, and economical approach. Several of the methods used were proven effective in the remedial outcome and economic returns.

OUTREACH AND EDUCATION

Community outreach began with the permitting process and included notifying the district Alderwoman and presenting the project scope at municipal public meetings. Public communication and outreach efforts continued throughout the entire project. Local television stations and newspapers ran stories with interviews of key project personnel and project footage and photos.

Notifications were posted at the construction site entrance and at the two local boat launches to educate recreationalists of the on water remedial activity. Signage provided a toll-free information line for the public to ask questions and provide any comments and concerns during construction.

Weekly construction progress meetings were held with team members, City representatives, and approval agencies to provide a project status update and address potential or upcoming construction issues.

PROJECT FIGURES, DIAGRAMS, AND PHOTOGRAPHS

Photo 1: Baseline survey of the Pond

Photo 2: Solar powered remote monitoring buoy

Photo 3: Checking Pond for turtles or other aquatic animals

Photo 4: Construction of temporary causeway in the Pond

Photo 5: Pond dredging

Photo 6: Sediment stabilization using Calciment

Photo 7: Collecting treated water sample for laboratory analysis

Photo 8: Calibrating turbidity buoy

Photo 9: River dredging

Photo 10: Debris removal from River

Photo 11: Hydrographic surveying River dredge area

Photo 12: Collection of dredge confirmation sampled for laboratory analysis

Photo 13: Sediment confirmation sample processing

Photo 14: Adsorptive cap (GAC and sand) mixing system

Photo 15: Adsorptive cap placement in the Pond using the BCS™

Photo 16: Adsorptive cap placement in the River using the BCS™

Photo 17: BCS™ control room

Photo 18: Armor layer placement in the River