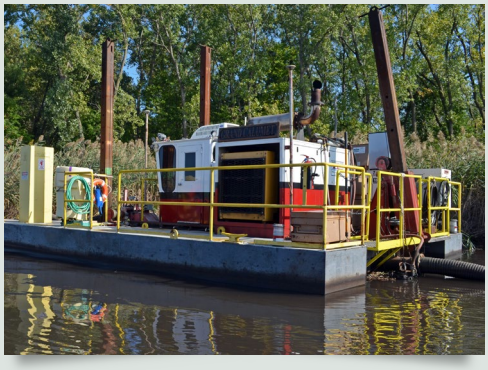
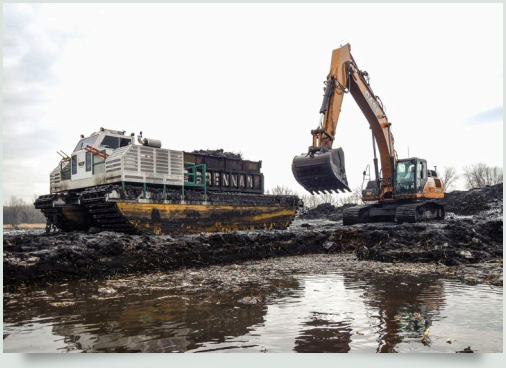
2015 WEDA Environmental Excellence Award

East Branch Grand Calumet River Remediation
Reaches 4a and 4b





GLSR

GREAT LAKES SEDIMENT REMEDIATION, LLC

Summary

The East Branch Grand Calumet River (EBGC) Project, Reaches 4a and 4b involves the remediation and restoration of a 1.8 mile track of the Grand Calumet River and its adjacent Seidner Marsh near East Chicago, IN. This project is facilitated by the U.S. EPA Great Lakes National Program Office (GLNPO) under the Great Lakes Legacy Act (GLLA) to address PCB, PAHs, and Heavy Metals contamination from historical industrial activities.

Great Lakes Sediment Remediation (GLSR) was the prime contractor on this project which is a joint venture between Environmental Restoration, J.F. Brennan Company, and Natural Resource Technology. Two key subcontractors that have contributed to this project's success are Infrastructure Alternatives and Cardno. The project was designed by SulTRAC who also serves as the client representative and oversight during the remediation and restoration.

This 2 year, $80 million project entailed several facets that go beyond a traditional remediation as it is a complete restoration of a 1.8 mile stretch the EBGC River and surrounding wetlands. Several challenges were presented during this project that required a high level of communication, innovation, teamwork, and ability.

Site preparation began with the treatment of 40 thickly-covered acres of invasive phragmites. Demolition was required before dredging began, which included the systematic removal of an abandoned railroad bridge located at the upstream (eastern) end of the designated dredge area. Also, a sheet pile wall with sealed interlocks was driven across the upper end of the project boundary to create an isolation barrier.

Next, two 8-inch hydraulic dredges were used simultaneously to remove a total of 145,000 cubic yards of contaminated sediment and transport them to a temporary dewatering site. Here the dredged material was pumped directly into a total of 60 geotextile tubes measuring 75-80 feet in circumference. All water drained to a sump, where a temporary water treatment plant was located. This plant was scalable, and could handle a maximum of 3,500 GPM during dredging, but afterwards could be scaled down to treat decant water (approximately 50 GPM) from the bags and any rain water that collected in the sump.

GLSR introduced new and innovative amphibious equipment to mechanically excavate and transport approximately 215,000 cubic yards from the adjacent wetlands and Seidner Marsh. Large customized amphibious dump trucks capable of carrying 45,000 pound payloads were used, eliminating the need for temporary roads or mat placements.

This project also entailed a large quantity of capping and sand cover throughout all the areas that were either hydraulically dredged, or mechanically excavated. A total of 16,000 tons (approx. 14,500 cubic yards) of Aquagate + Organoclay™ were transported by barge and spread in the EBGC channel using the patented Broadcast Spreader System (BCS™). Also, roughly 288,000 tons of clean sand were used to rebuild the wetlands and marshlands after dredging took place. During final restoration over 170,000 native plant plugs were planted in addition to reseeding.

Over the course of two years, the GLSR team and partners have worked diligently to challenge the status-quo, and push the edges of traditional dredging techniques, to successfully restore a part of one of the nation's most contaminated waterways. As of the date of this submittal this project has had **ZERO** recordable injuries and **ZERO** lost time incidents among **ALL** contractors on site.

Project Team Members

Owners and Stakeholders

1. U.S. Environmental Protection Agency, Great Lakes National Program Office
2. Indiana Department of Environmental Management
3. Indiana Department of Natural Resources
4. U.S. Army Corps of Engineers
5. U.S. Fish and Wildlife Service
6. Shirley Heinze Land Trust
7. The Nature Conservancy
8. Save the Dunes Conservation Fund
9. E.I du Pont de Nemours and Company
10. Resco Products Supply

Engineer of Record

SulTRAC – Designer and owners' representative

Prime Contactor

Great Lakes Sediment Remediation, LLC (GLSR)

GLSR is a **joint venture** between:

- Environmental Restoration – Excavation and load out **– WEDA Member**
- J.F. Brennan Company – Dredging and excavation – **Sustaining WEDA Member**
- Natural Resource Technology – Testing and environmental monitoring – **Sustaining WEDA Member**

Key Subcontractors

1. Infrastructure Alternatives – Dewatering and water treatment – WEDA Member
2. Cardno – Invasive species eradication, new planting and seeding – WEDA Member
3. Aquablock – Absorptive capping material supply – WEDA Member

Environmental Benefits

This project was a complete remediation and restoration that took place over the course of two years. Beginning with the eradication of an aggressive invasive species called phragmites that had overtaken the area, the EBGC River Project has returned a polluted, discarded waterway into a viable area of recovery for native plants and animals. Below is a statistical snapshot of the scale of environmental benefits in which this project has delivered.

Statistics:

1. All manmade debris and abandoned structures have been removed, returning this stretch of river back to a natural condition.
2. Approximately 360,000 cubic yards of contaminated material has been removed, and disposed of in licensed landfills.
3. A total of 40 acres of wetlands have been remediated and restored.
4. 190,000 tons of clean sand were brought in to restore the Seidner Marsh habitat.
5. 16,000 tons of absorptive cap, and 22,000 cubic yards of armament were placed to ensure continued recovery of underlying sediments.
6. Over 170,000 plant plugs were used in addition to complete re-seeding of the remediated and restored wetlands and marshlands.

A unique challenge encountered during this project was the location of the remediation. Though located in a heavily industrialized area, there was little access to the EBCG River due to the proximity of highways, bridges, active industry, and railroad tracks. This required GLSR to use creative approaches such as floating bridges and amphibious equipment to access various areas. Also, the upstream section of the EBCG River has not been remediated yet. To protect the project area from migrating contaminated sediments, a 4,400 square foot sheet pile barrier wall with interlock sealant was driven across the channel.

Another unique challenge was the presence of abandoned structures that required removal before dredging could begin. For instance, an abandoned railroad bridge was located at the upstream (eastern) end of the designated dredge area. This timber structure spanned the river and had to be carefully removed so that as little disturbance as possible was done to the underlying sediments. GLSR crews systematically dismantled the rail, ties, girder beams, abandoned natural gas line, and abutments before pulling the timber piling and pile bents that have supported this structure for over a century.

Before the remediation project could begin, work had to be done to prepare the degraded wetland habitat for dredging. Invasive species of vegetation, such as phragmites, grew thickly along the embankments of the river. To begin eradicating this problem, subcontractor Cardno began herbicide treatment throughout the project. Phragmites are an aggressive species, and would grow back quickly if not eradicated correctly. A total of 40 acres were treated along this section of the Grand Calumet River.

Finally, the use of amphibious equipment has resulted in the elimination of temporary roads, or the use of temporary mats. When these options are used the amount of contaminated material is increased. For an example, as clean fill is used to create temporary roads it must be disposed of as contaminated material when the project is complete. By using amphibious equipment, GLSR did not create additional contaminated material that would require specialized disposal.

Innovation

The successful results of the EBGC River Remediation Project have challenged the status-quo and pushed the edges of traditional dredging techniques to successfully restore a part of one of the nation's most contaminated waterways. Here are some examples of the innovations used on this project.

1. Use of a scalable, temporary hydraulic dredging and dewatering system

During this project, a hydraulic dredge system had to be configured in such a way that two 8-inch dredges could be used at the same time, while removing thin faces. This required a dewatering and water treatment system that could treat a maximum of 3,500 GPM. When dredging operations were finished, the system could be scaled down to only treat decant water from the geotextile tubes and any rainwater that was collected in the sump at roughly 50 GPM. On projects similar in size and scope as the EBGC River Project, dewatering and water treatment is a considerable part of the overall cost. New innovations such as the scalable water treatment plant can lead to substantial cost savings.

2. Hydraulic dredging in thick groves of invasive phragmites

When hydraulic dredging is considered for projects, it is typically discounted in areas of heavy debris and vegetation. On this project however, there was very limited land access to the river, requiring a new approach. The GLSR team was able to push the limits and hydraulically dredge much of the phragimites using highly customized hydraulic dredges.

Two 8-inch hydraulic dredges were used simultaneously during the dredging portion of the project. Each dredge was outfitted with state-of-the-art RTK-GPS positioning equipment, locational sensors and Hypack Dredgpack®. Both were swinging ladder style dredges with an articulating ladder which allows for greater precision to minimize over-dredging while ensuring removal of designated material. Both dredges were also outfitted with an innovative shearing apparatus on their cutterheads to macerate the thick vegetation encountered in the wetlands. This greatly reduced pump cavitation and work stoppages due to debris. Also, operators were able to implement a technique where phragmites were removed at the roots, and then collected with a floating mechanical plant for disposal.

3. Introduction of large-scale amphibious equipment

Traditionally, during a wetland and marshland dredging project, temporary roads have to be built because the ground is too soft for ground equipment to walk, and too dense to allow for floating plant access. Also typically, amphibious equipment found on the rental market does not have the capacity to deliver the production rates and operational efficiencies that could be gained with temporary roads or a matting system. On this project, GLSR worked closely with suppliers to design and build a set of 3 customized dump trucks that were large enough to reach production goals. These amphibious dump trucks are configured to hall 45,000 pounds, or roughly 15 cubic yards, of material over extremely soft ground.

4. Installation of a costly absorptive cap in precise thicknesses

The EBGC River Project was the first project in which Aquagate + Organoclay™ was used in such large quantities. Here, a total of 16,000 tons (approx. 14,500 cubic yards) were transported by barge and spread using the patented Broadcast Spreader System (BCS™). A minimum of 5 inches was required in all areas, with over placement allowance of 1.5 inches. This placed a large amount of risk on the contactor due to the cost of the material. GLSR successfully met the minimum placement, while avoiding any overruns in material by using the patented BCS™.

5. Temporary Floating Bridge

Another innovation that was successfully accomplished during this phase was a creative method for truck access to the transloading sites located at the edges of the wetlands. In Wetland A, the transloading area was boarderd by a highway and a railroad, eliminating any access by land to the site. GLSR designed and installed a floating bridge made from sectional barges to allow dump trucks to cross the river. This eliminated multiple handlings of the sediment as it could be loaded directly into over-the-road dump trucks and hauled directly to the designated landfill.

Economic Benefits

Project Specific

There were several 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.

Also, the innovations listed previously were very effective in delivering economic value. Though amphibious equipment has been around for several years, its customization and implementation has not been used in this scale, on this type of project. The client therefore received the benefits of increased production rates, while avoiding the costly implementation of a temporary road structure.

This contract placed a large amount of risk on the contractor as the absorptive cap was a costly item. Given only a 1-1/2 inch tolerance in which the contractor could get paid, a small mistake could have large consequences. The implementation of the BCS™ showed the accuracy in which a large scale absorptive cap could be placed, a task where few contactors are willing to take on substantial risk. This traditionally drives the price of such a project upwards, 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 Grand Calumet River is one of the most polluted rivers in the United States. For over 100 years it has flowed through heavy industrial operations of many types. This has left the river contaminated, as well as the surrounding area in disrepair. In an effort to revitalize the area, and increase the quality of life in the surrounding neighborhoods several government entities have taken an interest in restoring the river to a more natural condition. This is being done in several phases, and has already generated a new sense of interest in the river.

Native species of birds have returned to the river for nesting grounds. Also surrounding towns have plans to continue restoration and create access areas such as walking and bike paths along the river so people can enjoy the restored marshlands and wildlife. As this area was once a favorite recreation spot for area residents before industry took its toll, the East Branch Grand Calumet River Remediation Project is another step in the right direction to return it to its former beauty.

Transferability

Many of the innovations that were accomplished on this project are transferable to other projects. As all 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 that a COMPLETE remediation and restoration of a highly contaminated river surrounded by a thick population of invasive species has been completely restored in less than two years by a scalable, temporary, and economical approach. Several of the methods used are proven to be very effective, both in the remedial outcome and economic returns.

Outreach and Education

During the project the U.S. EPA GLNPO project coordinated outreach and educational events. Two were conducted at the East Chicago Library to inform local residents of the project. Several site tours were also given to community groups during various phases of the project.

In addition to this, a GLSR-organized open house was held during the 2014 Sediment Management Workgroup Meeting. During this time over 100 industry participants were invited to tour the site and view different phases of work as they were in progress. This gave stakeholders, engineers, and contractors a chance to see the different approaches that were being conducted on the EBGC River site. Additional information has been shared at industry organizational events throughout the life of the project, as well as by the U.S. EPA as an example of a successful project that addresses one of GLNPO's largest Areas of Concern.

Project Figures, Diagrams and Photographs

1. Total cost of remediation: Approx. $80 million
2. Number of years: 2
3. Number of acres of wetlands restored: 40 acres
4. Total quantity hydraulically dredged from the river: 145,000 cubic yards
5. Number of geotextile tubes: 60
6. Total quantity mechanically dredge from wetlands and marshlands: 215,000 cubic yards
7. Total quantity of contaminated sediment removed: Approx. 360,000 cubic yards
8. Tons of Aquagate + Organoclay™ placed: 16,000 tons
9. Total quantity of ¾" stone armament placed on absorptive cap: 22,000 cubic yards
10. Total quantity of clean sand placed in wetlands and marshlands: 288,000 tons (approx.. 186,000 cubic yards)
11. Total number of native plant plugs used in restoration: 170,000 plant plugs

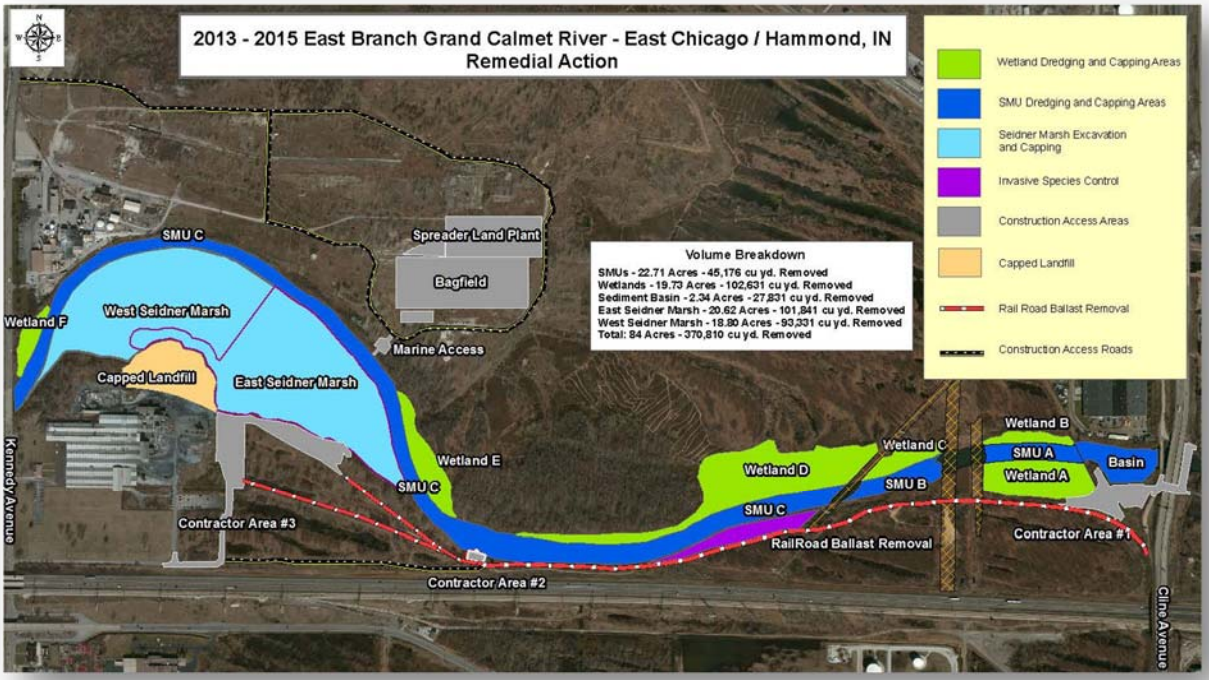


Figure 1: Sheet pile barrier wall

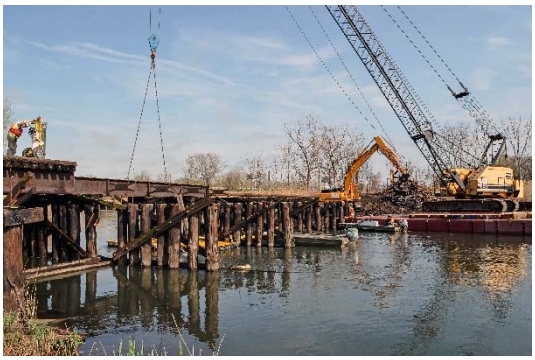


Figure 2: Demolition of the railroad bridge

Figure 3: 8-inch Hydraulic Dredge

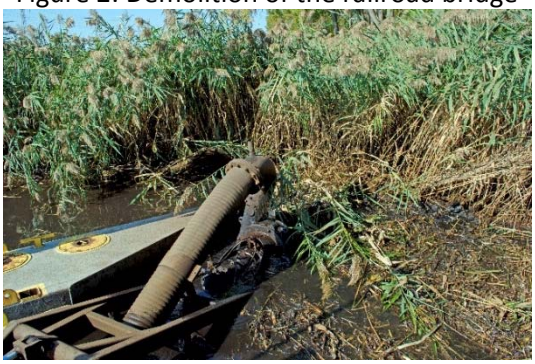


Figure 4: Dredging in the invasive phragmites

Figure 5: Geotextile dewatering

Figure 6: Aerial view of dewatering area

Figure 7: Water treatment plant

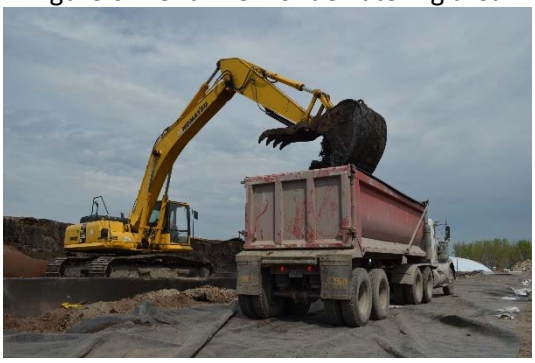


Figure 8: Load out

Figure 9: East Seidner Marsh before

Figure 10: East Seidner Marsh during

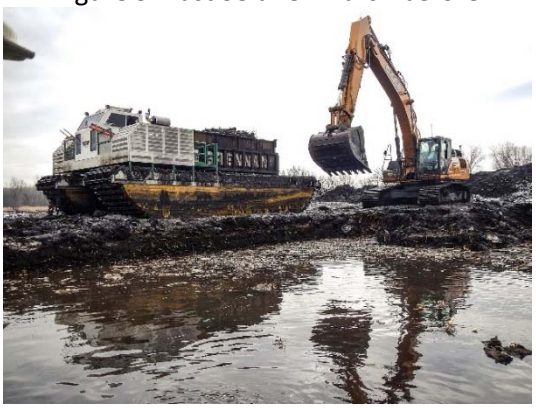


Figure 11: Amphibious excavation of wetlands

Figure 12: Temporary floating bridge

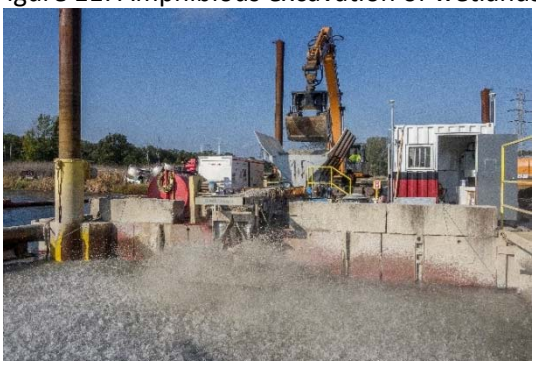


Figure 13: Broadcast Capping System

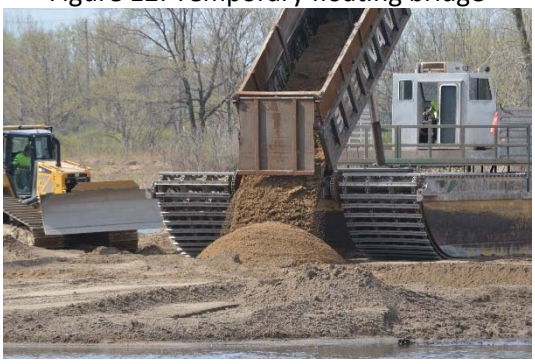


Figure 14: Seidner Marsh sand placement

Figure 15: Restored Seidner Marsh

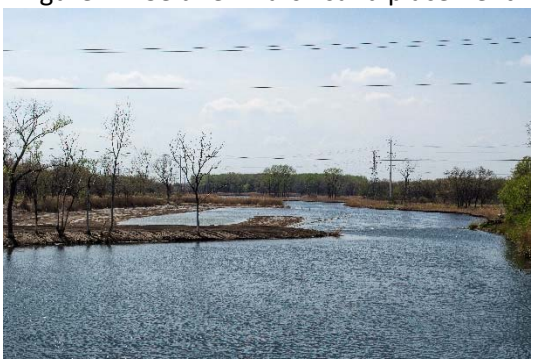


Figure 16: Wetland A Complete