



# 01

## PROJECT OVERVIEW



**TAPLIN**  
GROUP, LLC  
Environmental Services

**TAPLIN**  
ENTERPRISES

**WEST MI  
SHORELINE**  
Regional Development Commission

WEST MI SHORELINE REGIONAL DEVELOPMENT COMMISSION

MUSKEGON LAKE NATURE PRESERVE

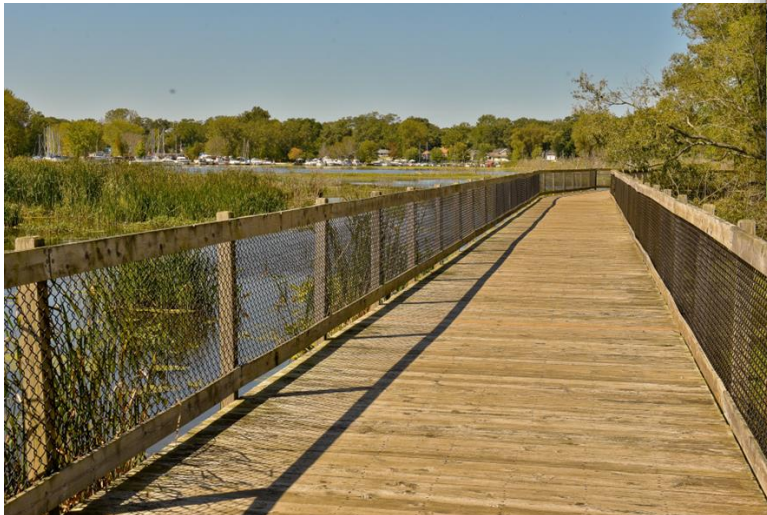


## WMSRDC: Muskegon Lake Nature Preserve

This project involved the restoration of a natural public area. The nature preserve was polluted from foundry sands and metal contamination, in addition to being heavily overgrown with invasive species.

### MAIN PROJECT OBJECTIVES

- Improve General Habitat
- Increase Biological Diversity and Vitality
- Improve Overall Aesthetic, Appeal and Accessibility for Public Use









## PROJECT BACKGROUND

- The Muskegon Lake project is located on the eastern shoreline of Muskegon Lake adjacent to the mouth of the Muskegon River within the Muskegon Lake Area of Concern. The property is owned by the Muskegon Environment, Research, and Education Society (MERES) and known as the Muskegon Lake Nature Preserve.
- This 27.0-acre shoreline property was once emergent and shrub wetland habitat. It was degraded over time with foundry fill, broken concrete, and sawmill waste. The site conditions have led to a proliferation of invasive species that has further reduced and degraded the native habitat on the east end of Muskegon Lake.





## PROJECT BACKGROUND

- Muskegon Lake AOC – designated an AOC in 1985 due to ecological problems caused by industrial discharges, shoreline alterations and the filling of open water and coastal wetlands.
- This project, along with three others in the works, will complete all management actions needed for the U.S. EPA to remove Muskegon Lake from the list of Great Lakes “toxic hotspots”.





## TAPLIN PROJECT OVERVIEW

- Wetland areas were created by removing soil and lowering the elevation of targeted areas
- New disconnected wetlands were generated where amphibious species can flourish without predation by fish
- Hydraulic connections were created to restore natural water migration within the preserve
- Intense invasive species removal was implemented to restore native species and natural diversity





## TAPLIN PROJECT OVERVIEW

The goal of this project was to improve the preserve habitat and return the area to a more natural setting allowing environmental conditions and wildlife diversity to rebound. At its completion, the area was restored to a clean, natural environment for residents and local wildlife to enjoy for years to come.

Wildlife habitat restoration was the top priority, giving new life to a previous industrial wasteland while creating a space for education and outdoor recreation for the public.





# 02

## PROJECT OBSTACLES





## PROBLEMS TO ADDRESS

- The area had been filled in the past with foundry debris showing elevated levels of various metals
- Miscellaneous concrete debris was present, detracting from the aesthetics of the preserve
- Invasive species had infiltrated the area and had dominated natural species
- Water levels were extraordinarily high and considerably higher than those present at time of bid



Project site (Photo by Jill Estrada/GLC)





## MEMORIAL TREE IN DESIGNATED WETLAND AREA

During the creation of one of the wetland areas the design of the pond required extensive clearing and unbeknownst to anyone there was a memorial tree planted within that area. It was denoted with a wooden post and a plaque, but no one realized it was there or that it would be in the way until after construction began.

During the construction phase of the wetland development the tree had to be removed but the post and plaque were saved. When it was brought to our attention by a patron of the park who knew the tree was a memorial, it was determined that a replacement memorial tree should be planted in a safe location and the saved wooden post and plaque could be reinstalled for the family. The preserve has a long-standing significance to the community and the team respected and honored that significance while still completing the construction objectives for the project.





## EXTREME HIGH-WATER LEVELS

- Extreme high-water levels at the start of the project caused a major issue and delay.
- Water levels were excessively higher than they were at the time of bid which resulted in having to build a higher access road.
- While troublesome at the start, the result was improved overall site conditions and the area ultimately being more accessible for a wide variety of public use.





## CONCRETE DEBRIS AND FOUNDRY SANDS, LIMITED ACCESSIBILITY

- Many areas of the preserve had extremely limited accessibility. Much of the material removed from the site had to be handled multiple times and moved incrementally.
- Original pedestrian bridge was not reinforced sufficiently to allow for emergency service vehicles to pass, limiting access to anywhere but the main parking lot.
- The wetland areas were created with a very gradual slope to make the site more accessible for water sampling and wildlife monitoring.





## INVASIVE SPECIES REMOVAL AND CONTROL

- Invasive species of plants, duckweed and algae had overtaken much of the shoreline, preventing more desirable native species from thriving.
- The lagoon was at one time connected to Muskegon Lake via makeshift passages and a very small diameter culvert that over time had collapsed and caved in. As a result, the area became cut off from the rest of the lake. The water in the lagoon did not flow and had significantly impaired introduction of new wildlife and limited the fish population.
- By adding 5 ft diameter culverts the fish population was able to replenish itself and become sustainable. A large quantity of old sawmill debris was also dredged out, opening a channel back out to Muskegon Lake.





# 03

PROJECT  
OUTCOME







## RESULTING SITE IMPROVEMENTS

- 5 ft diameter culvert installed for fish passage and reinforcement to the pedestrian foot bridge, creating an access road for emergency vehicles
- Dredging of contaminated soils and debris materials and removal from the site
- Wetland areas were created with a very gradual slope to make the site more accessible for water sampling and wildlife monitoring
- Trails and areas of the preserve with previously limited access were made accessible for all





## RESULTING SITE IMPROVEMENTS

- 42 habitat structures were placed to provide cover for fish and wildlife
- Planting of 2100 trees, 3400 shrubs and 30,400 herbaceous plants
- Invasive species eradication and control measures
- Aquatic restoration and connection to Muskegon Lake to allow for the movement of fish and water flow from the river/lake into the lagoon
- Over 100 native species reintroduced





## RESULTING SITE IMPROVEMENTS

- 171 tons of concrete and debris removed and recycled
- 6,490 tons of material disposed of at landfill
- 20 acres of specialty seed mix planted throughout the site
- Improved parking/vehicle accessibility
- Preservation and relocation of a memorial site/tree originally located within the newly created wetland area
- Primitive kayak launch created (handicap accessible)



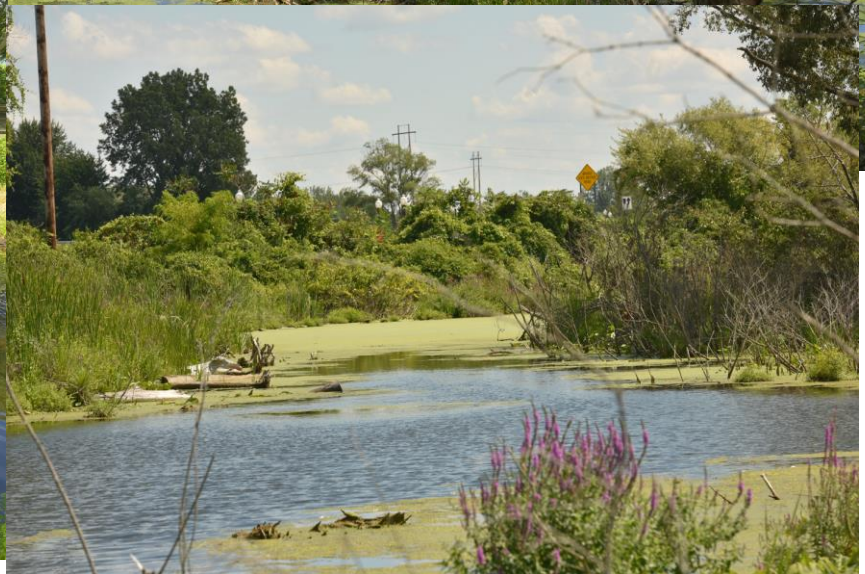
# 04

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## CONCLUSION









Through the collective efforts of Taplin Environmental Services, West MI Shoreline Regional Development Commission, the Muskegon Environmental, Research, and Education Society (MERES), the Muskegon Lake Watershed Partnership and funding opportunities from NOAA and Great Lakes Commission, the Muskegon Lake Nature Preserve has been fully restored and can now be removed as an EPA area of concern.

The preserve will continue to be a source of environmental education, outdoor recreation and public greenspace as well as a sustainable natural habitat for hundreds of species of birds, fish, aquatic animals and native plants. We are proud to have been a part of the project and its success.

<https://wmsrdc.org/>

<https://www.taplingroup.com/>

<http://muskegonlakenaturepreserve.com/>

