

Barker's Island Marina Protects Water Quality with Stormwater Wetland

How much did it cost?



\$25,000

Engineering and design

\$71,235

Construction, oversight
and erosion control



\$18,400

Plantings and
goose deterrent

\$3,700

Follow-up plant management
(years 1 and 2)

\$108,335

TOTAL

Note: Construction costs can vary greatly depending on availability of materials and local market conditions.



In 2022, Lake Superior's largest marina, Barker's Island Marina, became a Wisconsin Clean Marina. As part of their commitment to prevent pollution from entering Lake Superior, the marina partnered with Wisconsin Sea Grant, Wisconsin Coastal Management Program and city of Superior to improve stormwater runoff management using green infrastructure practices.

A stormwater wetland was constructed during 2021 in an under-used area along the coast to capture and treat runoff from the maintenance and service areas and parking lots. Previously, runoff from these areas flowed into a ditch and the harbor. The project included regrading the pavement to direct water toward the stormwater wetland, elevating the fuel tank and installing a boat wash filtration station.

Why a stormwater wetland?

Barker's Island Marina has a naturally high water table, causing flooding at the marina during high water level years. Since the elevation difference between the paved service area and water table is very small, infiltration-based green infrastructure practices, such as bioretention or tree box filters, were not practical.

Stormwater wetlands use natural hydrologic processes and vegetation to slow down stormwater and capture pollutants. Suitable locations include low areas, natural drainage areas or areas adjacent to water bodies, such as those at the marina. A wetland nearby also offered indications that wetland vegetation would work.

What makes it “green” infrastructure?

The Barker’s Island stormwater wetland was designed to improve water quality at the marina by capturing over 96,000 square feet of runoff from the maintenance building and paved service area. It was constructed as a two-pond system that includes a forebay (small settling basin) at the entrance, rock dams, two deep pools and a water level control box at its outlet. Locally sourced, native wetland wildflowers, grasses, sedges and shrubs were planted.



The first pond is designed to be a wetland at all times — it receives all the runoff and most of the sediment. The second pond acts like a wetland when lake levels are high, but will act more like a bio-infiltration basin during low-water years. For most small, frequent rains there may be little or no flow out of the second pond. Over time, two distinct plant communities should develop in each of the ponds because of the differences in hydrology.

Fun fact: Forebays (above) can capture up to 50% of the sediment, trash and debris entering a green infrastructure site. Easy access for sediment removal reduces maintenance costs and preserves performance over time.

Engineered stormwater treatment wetlands are considered “green” because they are designed to integrate natural features and processes to slow down runoff and capture pollutants. While not natural wetlands, stormwater wetlands can provide

excellent wildlife habitat for waterfowl, furbearers, turtles, frogs and pollinators. Once the vegetation has been established, they are beautiful too.

What pollutants are captured?

Researchers from The Ohio State University and the Lake Superior National Estuarine Research Reserve have been recording pre- and post-construction water quality at the site. The suite of parameters being monitored include:

- Hydrology (flow rate in and out, water level, water temperature, rainfall)
- Nutrients (ammonia, total Kjeldahl nitrogen, nitrate-nitrite, dissolved reactive phosphorus, total phosphorus)
- Metals (calcium, cadmium, chromium, copper, magnesium, lead, zinc)
- Alkalinity
- Hardness (dissolved calcium and magnesium)
- Total suspended solids (sediment)

Who made this possible?

Funding to support this project was provided by the Great Lakes Protection Fund to advance stormwater management at Great Lakes marinas. Barker’s Island Marina is one of four marinas in the states of Wisconsin, Michigan and Ohio chosen for installation of green infrastructure. Wisconsin Sea Grant would like to thank its many partners who made this project possible, including Barker’s Island Marina, Wisconsin Coastal Management Program, Great Lakes Clean Marina Network, city of Superior, Michigan Sea Grant, Ohio Sea Grant, The Ohio State University Stormwater Management Program, Ohio Department of Natural Resources and Lake Superior National Estuarine Research Reserve.

Contact: Julia Noordyk at jnoordyk@aqua.wisc.edu or 920-465-2795.

Learn more about integrating green infrastructure at your marina by visiting the Clean Marina Stormwater Toolkit at michiganseagrant.org/cmst.

