

Project Name	Northland Ave. Water Quality and Storm Sewer Pipe Replacement	Date	1/3/2025
To / Contact info	Karen Kill / BCWD Administrator		
Cc / Contact info			
From / Contact info	Ryan Fleming, PE; Julia Lau, EIT / EOR		
Regarding	Assessment of Stormwater Runoff & Cost Share to Improve Brewers Pond Water Quality		

Background

BCWD and City of Stillwater staff identified a need to address erosion along a storm-sewer pipe from Northland Avenue to Brewers Pond (MnDNR ID #: 820022) that is experiencing washouts causing sediment to reach the pond.

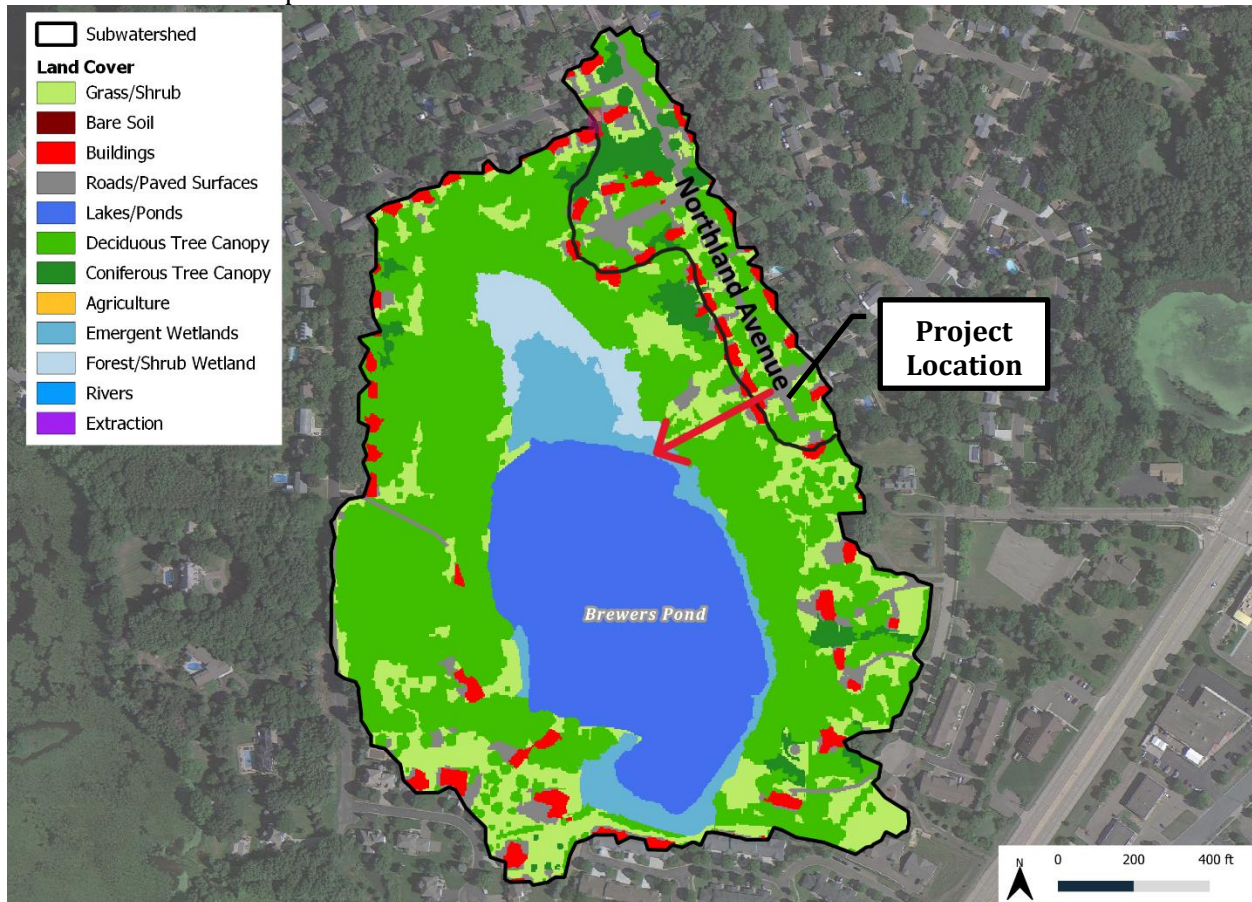


Figure 1: Brewers Pond watershed & Northland Avenue storm sewer catchment area

Brewers Pond is classified as a Lake in the BCWD Rules, with the BCWD function and value category of Manage 1 (high and medium MnRAM ratings). Over the past seven years, Brewers Pond has received Water Quality Grades ranging from F+ to C- as reported by the Brown’s Creek Watershed District Water Monitoring reports. The pond consistently exceeds impairment thresholds for chlorophyll- α , Secchi disk transparency, and total phosphorus.

Key Points of Concern:

- Chlorophyll- α : Eutrophic to hypereutrophic levels observed in 2017-2018, 2022-2023.
- Secchi Disk Transparency: Lower than threshold in 2017-2018, 2022-2023.
- Total Phosphorus: Above threshold 2017-2018, 2022.

Analysis

Northland Avenue Drainage Catchment

As shown in Figure 1, the Northland Avenue drainage catchment consists of the greatest amount of impervious surface, likely yielding the greatest number of pollutants discharging to Brewer's Pond. The runoff from this area does not have stormwater treatment and is piped directly to the pond. Minimum Impact Design Standards (MIDS) calculator modeling reports that the seven-acre Northland Avenue catchment area discharges 1,060 pounds of Total Suspended Sediment, and 5.8 pounds of phosphorus to Brewers Pond annually.

Stormwater Treatment Options Explored

During the pipe maintenance design development process, BCWD requested inclusion of stormwater treatment as part of the project to reduce the amount of pollutants entering Brewers Pond. The city explored several options, including a curb cut rain garden, stormwater pretreatment area next to Brewers Pond, and an in-line, flow through stormwater separating device. The separator was found to be the most workable as the other options exhibited real estate and slope challenges.

Performance Estimate

The Sizing Hydrodynamic Separators and Manholes (SHSAM) model was used to assess the removal performance of the stormwater separator device, which estimated that approximately 45 percent of the sediment would be trapped annually, or 480 pounds based on the MIDS calculator watershed loading. As sediment removal is the primary purpose of hydrodynamic separators, phosphorus removal estimates are not commonly reported. However, earlier analysis BCWD conducted to estimate the pollutant for catch basin flow through device for the McKusick Road BMP project, suggests that approximately one pound of phosphorous may be trapped in this stormwater separator annually.

Cost Analysis

A 25-year project life cost analysis resulted in an estimated \$2.00/lb of TSS removed, not including annual maintenance to be conducted by the city. The EPA stormwater BMP cost guidelines (2021) include a range of \$0.50-\$2.00/lb of TSS as being cost-effective range for pollutant removal. Given the site constraints of the narrow road right-of-way, at the dead-end of the street, and steep slope down to Brewer's Pond, the cost per pound removal is expected to be at the higher end of the range for what is considered cost effective pollutant removal.

The cost-share proposal is shown below between BCWD and City of Stillwater for storm sewer pipe replacement from Northland Avenue to Brewer's Pond.

Total cost-share requested: \$25,000.

- Requested Storm sewer separator: \$23,000.
- Mobilization: \$1,000
- City construction oversight: \$1,000

Conclusion

The inclusion of stormwater treatment in the pipe maintenance design is crucial for reducing pollutants entering Brewers Pond. The in-line stormwater separator device is the most feasible option, considering the site constraints. Continued monitoring and maintenance are essential for achieving desired water quality improvements.