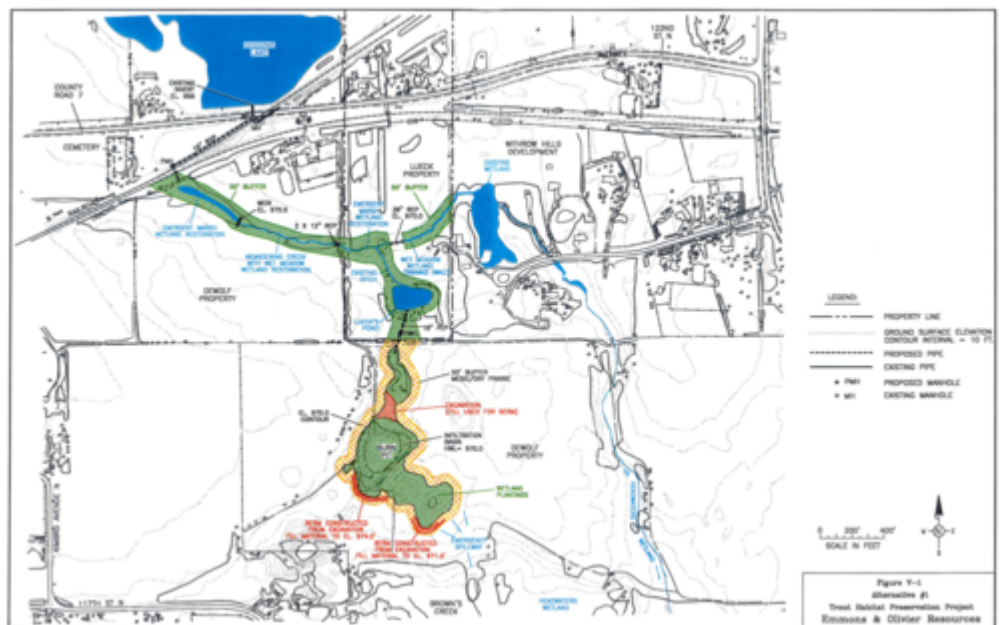




Brown's Creek trout habitat preservation project - thermal protection of a trout stream resource and infiltration within land-locked basins

Information: This page was created for the original Stormwater Manual in 2005. Information may be outdated.

Much of the headwater portion of the Brown's Creek Watershed contains land-locked lakes and wetlands. Many of these basins have no direct connection to Brown's Creek. Since the late 1980's the Goggins Lake-School Section Lake basin and several associated wetland basins have experienced high water conditions and had effectively merged to become a single basin. Since 1995, high water conditions have prevailed and flooded several homes, inundated roadways, flooded septic systems and wells in the City of Hugo. Because Goggins Lake had no outlet, lake elevations continued to rise and damage additional property. Providing an outlet to the system had the potential to adversely affect Brown's Creek, a designated trout stream, and its associated headwaters wetlands through thermal impacts, increased erosion and sedimentation.



Map showing the Brown's Creek study area

Project summary

- **Location:** Washington County
- **Landscape Setting:** Rural/Suburban
- **Drainage area:** 2,400 acres
- **Lake area:** 92 acres

- **Project timeline:** 2000 to 2001
- **Project cost:** \$613,230
- **More information:** Emmons and Olivier Resources, Inc. (<http://www.eorinc.com/>)

Contents

- 1 Background
- 2 Implementation
- 3 Results
- 4 Costs
- 5 Future actions
- 6 Links

Background

The goal of the Trout Habitat Preservation Project was to restore a controlled overflow to control lake elevations, while reducing the impact to Brown's Creek, a naturally producing trout stream, and other significant natural resources of the watershed. The Brown's Creek Watershed Management Organization (now the Brown's Creek Watershed District (<http://www.bcwd.org/>)) evaluated the feasibility of installing an outlet control structure on Goggins Lake that would drain, via open ditches, to the headwaters of Brown's Creek.

Standard engineering approaches (e.g., placement of an outlet pipe) did not prove to be suitable as a stand-alone solution to provide outlet control because of potential thermal and water quality/quantity impacts to the Brown's Creek trout fishery. An alternative design approach was necessary to address the trout stream impacts. Since thermal impacts to the trout fisheries of Brown's Creek was one of the primary concerns, the solution emphasized infiltration management to recharge ground water and reduce surface water runoff, while reducing the flooding problems on Goggins Lake.

Implementation

The Trout Habitat Preservation Project included an analysis of historic natural overland drainage routes and the design/implementation of a combined wetland creation-infiltration ground water recharge system. Normal overflow for the lake was determined to be approximately 970.5 feet. Modeling indicated that the 100-year event could bring lake levels up to 971.65 feet and lake levels could rise to 974 feet under extreme high water conditions. An infiltration analysis was completed based on considerable testing of surficial features and included the installation of monitoring wells and soil borings.



Photo showing the outlet from pond 2

To provide an outlet to Goggins Lake, an existing manhole structure was modified at County Road 7. A time and temperature-dependent valve was installed allowing the District an extra level of control when fluctuations in water temperature and rainfall amount could lead to negative impacts to either upstream residents or downstream Brown's Creek. This allows the lake to drain to an elevation of 970.5 feet with a potential low flow discharge to an elevation of 968.7 feet.

The trout fisheries of Brown's Creek were protected and enhanced by minimizing thermal impacts and promoting ground water recharge. This was accomplished through infiltrating and storing stormwater in a series of 3 created wetlands and 3 infiltration basins rather than discharging directly to Brown's Creek. Water from the lake discharges to a constructed wetland south of the lake, which is controlled by an overflow weir at an elevation of 970.5 feet. The wetland encompasses 2 acres and is surrounded by a 25-foot buffer. Outflow from the wetland flows through a second 2-acre constructed wetland drainageway and into a third constructed wetland that will be excavated to an elevation of 968.0 feet. When the water surface elevation is less than 970 feet within the third wetland, lake discharge will flow to a small infiltration basin with highly permeable soils (infiltration rate of 1 to 3 cubic feet per second) located on private property to the south that used to function as a tree burning and disposal area. When the elevation is higher, water will overflow via the weir into a reach of meandering channel, proceed downstream in existing drainageways through a residential development, and outlet into a headwaters wetland of Brown's Creek.



Photo showing a reinforced vegetated conveyance

Soft engineering that mimics the natural hydrology of the area was incorporated into the design. Placement of features was done to protect other natural resources of the Brown's Creek Watershed that could be negatively impacted by standard stormwater management practices. Taken as a whole, this provided for an efficient, non-intrusive system that can perform with very little maintenance needed.

Results

Goggins Lake now provides the outlet for the entire Plaisted/Goggins/School Section Lake hydraulic system, a drainage area of about 2,400 acres. Nine acres of wetland were created. The project (and follow up buy-out of one residence) achieved 100 percent of the goal to eliminate flooding of homes and properties and has addressed 100 percent of the goal to protect Brown's Creek from fluctuations in the inflow hydrograph and poor water quality (both pollutant concentration and thermal) coming off of the watershed to this lake system.



Photo showing the infiltration area for the study

Costs

Project: \$613,230; ongoing monitoring: \$38,775

Future actions

The Brown's Creek Watershed District has an ongoing monitoring program to ensure that the installed system continues to fulfill the objective of flood relief and natural resource protection. The annual District budget includes moneys for the continuous monitoring of water temperature and elevation at the outlet of Goggins Lake and throughout the system.

Maintaining a healthy stream currently provides an educational tool for the local high school as well. Stillwater High School (<http://www.stillwater.k12.mn.us/schools/high-school/stillwater-area-high-school>) has partnered with the Washington Conservation District (<http://www.mnwcd.org/>) to monitor and study macro-invertebrate populations within Brown's Creek.

The results of this project provide design standards and protocols to outlet stormwater from other land-locked basins in the Brown's Creek Watershed. The results may also be transferable to other similar (same geologic landform) land-locked basins within Washington County and sets the stage for environmentally sound stormwater management in other trout stream watersheds in Minnesota.

Links

- Fact sheet (<https://bcwd.org/vertical/sites/%7B64FB1BEC-A43C-4118-B98E-92A5C0551F17%7D/uploads/TroutHabitatPreservationProject.pdf>)
- Brown's Creek Watershed District project summary (<https://bcwd.org/?SEC=042CA606-F1DC-46C6-981F-BAEE16CA3AFB>)

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