

# Northwood Lake Water Quality Improvement Project

## Clean Water Partnership Grant #91385

Final Report  
July 25, 2018



Bassett Creek Watershed Management Commission

# I. Project Overview Form

## Grant project summary

---

Project title: Northwood Lake Water Quality Improvement Project

Organization (Grantee): Bassett Creek Watershed Management Commission

Project start date: 6/8/2015 Project end date: 6/30/2018 Report submittal date: 7/26/2018

Grantee contact name: Laura Jester Title: BCWMC Administrator

Address: c/o 16145 Hillcrest Lane

City: Eden Prairie State: MN Zip: 55346

Phone number: 952-270-1990 Fax: NA Email: Laura.jester@keystonewaters.com

Basin (Red, Minnesota, St. Croix, etc.) /Watershed & 8 digit HUC:: Mississippi River – Twin Cities 07010206 County: Hennepin

### Project type (check one):

- Clean Water Partnership
- Total Maximum Daily Load (TMDL)/Watershed Restoration or Protection Strategy (WRAPS) Development
- 319 Implementation
- 319 Demonstration, Education, Research
- TMDL/WRAPS Implementation

## Grant funding

---

Final grant amount: \$300,000 Final total project costs: \$1,678,060.10

Matching funds: Final cash: \$1,378,060.10\*\* Final in-kind: \$0 Final Loan: \$0

MPCA project manager: Rachael Olmanson and Brian Livingston

---

\*\*Matching Funds include \$400,000 Clean Water Fund Grant from BWSR

---

## **Executive Summary**

Northwood Lake is an impoundment of the North Branch of Bassett Creek in the City of New Hope and is directly tributary to the North Branch Bassett Creek which flows into the Main Stem of Bassett Creek and into the Mississippi River.

Northwood Lake was added to the State's Impaired Waters List (303(d) list due to high nutrients in 2004. A TMDL has not been completed for this lake. The lake's fully developed watershed of 1,341 acres has little or no stormwater treatment. Other pollutants impacting the lake include bacteria, solids, chlorides, PAHs, etc.

The Northwood Lake Water Quality Improvement Project treats storm water runoff from 110 acres of previously untreated urban land. At the east end of the lake in Northwood Park the project included design and construction of a pre-treatment device, a 160,000-gallon underground storm water re-use chamber, pump house, distribution system to irrigate 6.4 acres of adjacent ball fields, and an overflow structure directed into a series of linear rain gardens for treatment prior to discharging into Northwood Lake. At the west end of Northwood Lake, a wet ponding basin was constructed to treat storm water runoff from backyards and Jordan Avenue. The project was designed to reduce total phosphorus loadings to the lake by an estimated 22 pounds per year.

The Project was designed in late 2015 and constructed March 2016 to May 2017. The storm water re-use tank and irrigation system first operated in June 2017. To date, over 1.2 million gallons of water have been captured and re-used to irrigate ballfields. The rain gardens have captured and infiltrated overflow water from the tank and vegetation around the rain gardens is now well established. The pond on the west end of the lake is working well and vegetation surrounding the pond is also well established.

## **Partners**

City of New Hope – Through a cooperative agreement with the BCWMC, the city designed and constructed the project and is responsible for project maintenance and operation

Minnesota Board of Water and Soil Resources – Provided \$400,000 Clean Water Fund Grant

Friends of Northwood Lake – Local resident group that helped build community support for the project and educated residents about the project and their personal connections to clean water

## **Photos**

Please see photos attached in email to Project Manager.

## II. Executive Summary

**PROBLEM:** Northwood Lake is located along the North Branch of Bassett Creek in the City of New Hope immediately east of Highway 169. The North Branch of Bassett Creek flows directly into the lake at its northwest corner, and flows out of the lake through a control structure at its southeast corner. Therefore, the lake is directly tributary to the North Branch Bassett Creek which flows into the Main Stem of Bassett Creek and into the Mississippi River in downtown Minneapolis. Northwood Lake is classified as a shallow lake with a water surface area of 15 acres, a maximum depth of 5 feet, and a mean depth of 2.7 feet. The lake's watershed area is approximately 1,341 acres and lies within fully developed areas of the cities of Plymouth and New Hope.

Northwood Lake was added to the State's Impaired Waters List (303(d) list due to high nutrients in 2004. A TMDL has not been completed for this lake. Pollutants enter the lake from the fully developed watershed, much of which has little or no stormwater treatment. In addition to high phosphorus, pollutants entering the lake include bacteria, solids, chlorides, PAHs, and other toxins. The North Branch of Bassett Creek is impaired for bacteria.

**WATERBODY IMPACTS:** The Northwood Lake Water Quality Improvement Project treats storm water runoff from over 110 acres of previously untreated urban land. The project included the installation of a variety of practices at two different locations adjacent to the lake. At the east end of the lake in Northwood Park, a structural treatment device for pre-treatment of runoff was constructed as well as an underground storm water re-use chamber (160,000 gallons capacity), pump house, distribution system to irrigate 6.4 acres of adjacent ball fields, and an overflow structure directed into a series of linear rain gardens that treat storm water prior to discharging into Northwood Lake. At the west end of Northwood Lake, a wet ponding basin was constructed to treat storm water runoff from rear yard areas and Jordan Avenue before discharging into a storm sewer pipe tributary to Northwood Lake.

The project was designed to capture and treat storm water from over 110 acres of previously untreated urban area to reduce total phosphorus loadings to the lake by an estimated 22 pounds per year. Water quality monitoring through the BCWMC monitoring program and the Citizen Assisted Monitoring Program have not yet detected a change in water quality, however, the project has only been operational for 1 ½ years. Monitoring will continue to track water quality trends in the lake. The project will be maintained by the City of New Hope in accordance with their public works maintenance schedule and plan.

**PROJECT HIGHLIGHTS & RESULTS:** The Northwood Lake Water Quality Improvement Project was designed in late 2015 and constructed over several months from March 2016 to May 2017. The storm water re-use tank and irrigation system first operated in June 2017. To date, over 1.2 million gallons of water have been captured and re-used to irrigate ballfields. The rain gardens have captured and infiltrated overflow water from the tank and vegetation around the rain gardens is now well established. The pond on the west end of the lake is working well and vegetation surrounding the pond is also well established.

This capital improvement project was added to the 2004 Bassett Creek Watershed Management Plan through a plan amendment in 2015 and is also listed in the Capital Improvement Program of the 2015 Bassett Creek Watershed Management Plan. Additionally, this project was identified for implementation in the City of New Hope's Local Water Management Plan.

This project was implemented through a large group of partners and funding sources. The Bassett Creek Watershed Management Commission (BCWMC) funded the majority of the project through ad valorem

taxes levied on watershed residents by Hennepin County. The City of New Hope also contributed substantial funding to the project and worked to dovetail this project with already planned upgrades to its Northwood Park (where the project is located). The neighborhood group, Friends of Northwood Lake, provided support by educating residents and promoting the use of residential best practices to work in conjunction with the project. Additionally, the project received a Clean Water Fund grant through the Minnesota Board of Water and Soil Resources.

The project garnered explicit praise from community members – particularly because it works to improve lake water quality while using minimal park space due to the underground nature of the structure. The project was featured in a recent edition of the League of Minnesota Cities magazine. (<https://www.lmc.org/page/1/IdeasInActionMayJun2018.jsp?ssl=true>)

**ADJACENT & FUTURE PROJECTS:** In addition to the Northwood Lake Water Quality Improvement Project, the City of New Hope completed two major street reconstruction projects in the neighborhoods surrounding the lake in the last two years. These projects included the installation of sump structures with SAFL baffle and several iron-enhanced filtration sand trenches. These projects further reduce total phosphorus loadings to the lake by an estimated 14 pounds per year.

Additionally, the City of New Hope is currently investigating a method to treat the internal phosphorus loading of Northwood Lake. The city's consultant, Stantec, has been working with the University of Minnesota Saint Anthony Falls Laboratory to potentially conduct a research study at the lake. This study would aim to capture and treat the internal phosphorus in the lake bed.

### III. Work Plan Review

#### **Objective 1 Task A: Design storm water reuse system and raingardens – Completed January 2016**

In August through November 2015, the City and their consultant (Stantec) completed surveys and prepared engineering designs for various project components including the redirection of storm water on Boone Ave, a storm water treatment structure, the underground storage tank and water reuse system for ballfield irrigation, raingardens, a sump structure, curb cut, and emergency overflows. The 50% design plans were reviewed by the BCWMC engineer in September 2015 and were approved by the BCWMC at their September 2015 meeting. The 90% design plans were reviewed by the BCWMC engineer in November 2015 and were approved by the BCWMC at their November 2015 meeting.

#### **Objective 1 Task B: Design storm water treatment pond west of Northwood Lake – Completed January 2016**

In August through November 2015, the City and their consultant (Stantec) completed surveys and prepared engineering designs for the treatment pond west of Northwood Lake. Plans include a wet detention basin between Trunk Highway 169 and Jordan Ave. and an outlet structure from the pond to an existing storm sewer pipe tributary to Northwood Lake. The 50% design plans were reviewed by the BCWMC engineer in September 2015 and were approved by the BCWMC at their September 2015 meeting. The 90% design plans were reviewed by the BCWMC engineer in November 2015 and were approved by the BCWMC at their November 2015 meeting.

**Objective 2 Task A: Redirect storm sewer and install treatment structure - Completed Summer 2016**

Drainage flowing from the north of the project site was redirected through a new 36-inch storm sewer along the west side of Boone Ave. The new storm sewer was routed through a storm water treatment structure to capture coarse sediment as a means of pre-treatment of runoff prior to discharging to the underground storm water storage system.

**Objective 2 Task B: Install underground storage tank for water reuse – Completed Summer 2016**

Construction of the underground tank occurred in 2016. Excavation for the stormwater reuse tank on the corner of Boone Ave. and Ensign Ave. began in April; the concrete base and concrete walls were poured and completed in May; the roof of the structure was completed and the structure was buried in June; piping and electrical work will start was completed in July; the area around the tank was backfilled in August 2016.

**Objective 2 Task C: Install water reuse piping and pump house for irrigation – Completed Spring 2017**

By June 2016, piping and pumping mechanisms were partially installed so that storm water in the storage tank can be used for irrigating adjacent ball fields. The irrigation forcemain connection was installed in September of 2016. The system was successfully tested by the contractor in October 2016. Final installation and testing occurred in spring 2017. The irrigation system began operating in June 2017, pumping 127 gallons per minute and up to 17,000 gallons per irrigation session.

**Objective 2 Task D: Install overflow raingardens and construct curb cut – Completed Spring 2017**

Raingarden excavation began in June 2016. The raingardens were constructed to receive overflows from the water reuse system during large events when runoff volumes exceed storage capacity. A curb cut on Ensign Avenue was installed to direct street drainage into the raingardens.

Raingarden excavation and grading was completed in August 2016 and plantings on the 1st and 3rd rain gardens were installed at that time. Fescue seed was installed on the 2<sup>nd</sup> rain garden in spring 2017.

**Objective 3 Task A: Construct storm water treatment pond west of Northwood Lake – Completed June 2016**

Excavation of the treatment pond was completed in May 2016. Slope stabilization, installation of erosion control blanket, and vegetation seeding was completed in June 2016.

**Objective 4 Task A: Educational sign design – Completed June 2018**

The educational sign developed to describe the storm water reuse tank and provide information how residents can help improve water quality was designed and ordered in fall 2017 and installed June 2018.

**Objective 5 Task A: Provide project management and administration**

The BCWMC Administrator worked to manage the grant and coordinate certain components of the project including developing the grant work plan, drafting the agreement with the City of New Hope, tracking project progress, and reporting progress to the Bassett Creek Watershed Commissioners.

#### **Objective 5 Task B: Provide technical review of project – Completed May 2016**

The BCWMC Engineers reviewed the 50% and 90% designs for the Project (in September and November 2015, respectively) and developed corresponding memos with their comments and recommendations to the Commission.

#### **Objective 5 Task C: Perform grant reporting and invoicing – Completed July 2018**

The BCWMC Administrator completed and submitted interim grant reports by February 1<sup>st</sup> in 2016, 2017, and 2018 and by August 1<sup>st</sup> in 2016 and 2017. The Administrator completed this final report in July 2018.

## **IV. Grant Results**

MEASUREMENTS: According to the Northwood Lake Water Quality Improvement Project Feasibility Study (November 2014), this project is expected to remove 22 pounds of phosphorus per year in addition to other pollutants associated with storm water runoff and snowmelt. Additional benefits of the project include water conservation through the storage and use of storm water as irrigation water for adjacent ballfields. Since initial operation of the storm water reuse tank in June 2016, over 1.2 million gallons of storm water has been captured and used to irrigate adjacent ballfields.

The project is located on two different parcels of public land on the east and west ends of Northwood Lake. The use of public land maximizes the project area and allows for efficient (and appropriately sized) BMPs. Rather than squeezing smaller, less efficient BMPs between private properties, this project used parkland for a large-scale project that can be easily accessed and maintained by the City of New Hope.

PRODUCTS: The following products were developed for or about this project. They are all found on the project webpage at: <http://www.bassettcreekwmo.org/projects/all-projects/nwl-improvement>. Project photos during and after construction are attached as JPGs with transmittal of this report.

1. Project Feasibility Study (predates grant November 2014)
2. 50% Design Plans and BCWMC Engineer Memo (September 2015)
3. 90% Design Plans and BCWMC Engineer Memo (November 2015)
4. Virtual Tour of Project (October 2016)
5. MN Cities Magazine Article (May-June 2018)
6. Educational sign (installed June 2018)

PUBLIC OUTREACH & EDUCATION: This project was highlighted by multiple groups throughout its development and construction including:

1. BCWMC Project Webpage updated regularly: <http://www.bassettcreekwmo.org/projects/all-projects/nwl-improvement>.

2. Bassett Creek Watershed Tour June 21, 2016. Audience included BCWMC Commissioners, staff and council members from BCWMC member cities, interested residents. (Tour handout with this project site included as "stop #4" found at [http://www.bassettcreekwmo.org/application/files/7614/6807/0436/2016\\_Bassett\\_Creek\\_Tour\\_Handout.pdf](http://www.bassettcreekwmo.org/application/files/7614/6807/0436/2016_Bassett_Creek_Tour_Handout.pdf)).
3. Virtual tour of project site and BMPs completed in collaboration with photography and environmental studies students from The Blake School, Minneapolis. Final product includes 360-degree photo of Northwood Park and "call out" bubbles, each with information about the project and aspects of the environment. The project (which also included three other BCWMC CIP projects) was featured for several weeks on the BCWMC homepage. The press release is available here <http://www.bassettcreekwmo.org/news/new-perspective-blake-school-and-bcwmc-collaborate-photograp>. The virtual tour is located on the project webpage at: <http://www.bassettcreekwmo.org/index.php?CID=228>.
4. A grand re-opening of Northwood Park where the project is located was held on May 15, 2017. The non-profit Friends of Northwood Lake group disseminated water quality educational materials and engaged residents about the lake, its water quality, and this project designed to protect it.
5. In October 2017 a group of seventy 5th graders toured the park site with city staff to learn about the storage tank, the benefits of the rain gardens for water treatment and the benefits of flowering plants for butterflies and bees. The group also learned about how the storage tank and treatment pond hold all the runoff from their school.
6. In October 2017, city staff met with a local Lego League team (eight 4th and 5th graders) to learn about stormwater treatment in the park and how they could implement similar strategies at their own homes.

LONG TERM RESULTS: The primary and immediate results of this project will continue to be realized for the expected life of the project of 30 years or more. This project reduced the volume and improved the quality of storm water runoff reaching Northwood Lake. Additionally, it conserves drinking water by using captured storm water to irrigate adjacent ballfields.

The secondary benefits of the project will also continue for years to come. Visitors to Northwood Park where the project is located can read and learn about the project and how their own actions impact water quality. They can also watch the rain gardens work to infiltrate the overflow runoff during large precipitation events and can witness the growth and blooms of the native plantings in the rain gardens.

This project also resulted in a community conversation about the balance between the need for storm water management and the desire to maintain open space in the park (hence the use of the underground system rather than a storm water pond!). The community group "Friends of Northwood Lake" also become more active and involved due to this project.

The results of the project were shared with a variety of groups through the products and public outreach activities noted above. Other audiences that may benefit from this project are cities, watershed organizations, or private developers considering the use of underground storage and/or



storm water reuse. Since this project is located in a city park with good access, it could be used as a demonstration site.

CHALLENGES & LESSONS LEARNED: One of the primary issues encountered was a large amount of base flow (continual storm water flows, groundwater, sump pump discharge) in the storm sewer. In the wet fall and winter of 2016/2017, there was water flowing into the tank which was overflowing into the rain gardens. Water flowing continuously into the gardens created maintenance and vegetation establishment difficulties. This also posed a safety concern, as water would run into the rain gardens during the winter months and then freeze creating a significant amount of ice. To control the base flows, a “by-pass” valve was installed in spring 2017. During wet periods when the irrigation is not in use, such as the winter months, city staff can now adjust the valve to bypass the tank and gardens. The bypass valve also allows city staff to complete maintenance on the tank, pretreatment structures, and rain gardens without encountering the base flows. In 2018, the valve was open for approximately 2 weeks.