

Northwood Lake Improvement Project

BCWMC Project NL-1



FINAL REPORT
September 12, 2018

I. Project Area

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.

As identified on the map on the front of this report, this project identified two areas of storm water treatment (Concept A and Concept C) adjacent to Northwood Lake. This storm water project was combined and completed in conjunction with the City of New Hope's Northwood Park and Playground Reconstruction Project and the Jordan Avenue Reconstruction project.

II. Project Description and Outcomes

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 filtered 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.

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 in a city park with good access, it could be used as a demonstration site.

III. Project Timeline and Key Documents

- This project was originally identified in the city's 2008 Local Water Management Plan. The plan can be found on the city's website shown below. On Table 6.2, Existing Stormwater Management Issues and Possible Corrective Actions, staff identified an area in Northwood Park (BC – P2.5C) as an area for potential stormwater ponding in the future.

https://www.newhopemn.gov/city_hall/public_works/utilities/storm_water/

- 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.
- Feasibility Report: In 2015, the city began preparation of a feasibility study for this project. During this process, many stakeholders identified the high priority of keeping the available green space at Northwood Park. The feasibility report identified three concepts for water treatment at Northwood Lake. Concepts A and B located in the original area identified at Northwood Park, and Concept C located on a vacant city owned lot on the other side of the lake. These concepts and the full feasibility report can be viewed on the Bassett Creek Watershed project page. In November 2014, the Commission approved the feasibility study and set the project budget. The project was officially ordered by the Commission after a public hearing in August 2015 and the Commission entered an agreement with the City of New Hope to design and construct the project.
- Resolution Ordering the Project:
<http://www.bassettcreekwmo.org/application/files/4514/4692/0568/Resolution-15-04-Ordering2016projects-NorthwoodLakeImprov-NewHope.pdf>
- 50% Plans
<http://www.bassettcreekwmo.org/application/files/1314/4692/0568/5G-Full-50-PERCENT-REVIEW-SET.pdf>
- 90% Plans
http://www.bassettcreekwmo.org/application/files/7914/7913/7257/Item_5C_NW_Lake_90_Plans_Full_Set_11-2-15.pdf
- Construction Timeline: Construction began in May of 2016. Substantial completion of the project work was completed by the fall of 2016. Numerous punch list items extended this project through 2017. The project was ultimately closed out by the New Hope City Council in February of 2018. The final MPCA grant report was processed in the summer of 2018.
- 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>

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)
 - o The City of New Hope received the 2017 Sustainable City Award from the League of Minnesota Cities and Minnesota GreenStep Cities
6. Educational sign (installed June 2018)

IV. Funding

The funding sources for the storm water project related items are shown in the table below. Funding sources included the BCWMC, Clean Water Partnership Grant from the Minnesota Pollution Control Agency, Clean Water Fund grant from the Minnesota Board of Water and Soil Resources, and the City of New Hope.

Funding Sources for BCWMC Project Costs	Funding Amount
BCWMC	\$769,667.47
MPCA Grant	\$300,000.00
BCWMC – BWSR Grant Portion	\$315,600.00
City – BWSR Grant Portion (21.1% of \$400,000 Grant Share)	\$84,400.00
City – Storm Fund	\$326,406.20
Total BCWMC Storm Water Related Costs	\$1,796,073.67

In relation to the original construction costs, this project incurred an overrun for the BCWMC storm water related items of approximately \$50,000. This overrun was primarily due to the following items:

- Installation of temporary construction fence to alleviate excessive public foot traffic while the restoration work was underway
- Grading revisions and export of common excavation materials offsite to avoid impacts to 100-year floodplain.
- Installation of a weir and valve to control storm water flows entering the underground storage tank and rain gardens.

V. 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.

VI. Maintenance

The City of New Hope Public Works department has incorporated a variety of new maintenance activities at the tank. In the spring and fall staff vacuum out the debris collected in the swirl grit chambers located where stormwater enters the tank. This spring, staff removed about 1 cubic yard of debris from the swirl chambers.

This year, Stantec Consulting volunteered to perform the maintenance required at the 3 rain gardens installed at Northwood Park. Consulting and city staff met with area residents, once in the spring and once again upcoming in the fall. Staff and residents worked together to remove invasive plants and weeds from the rain gardens. Next year, staff has hired a maintenance contractor to perform the necessary maintenance at the gardens.

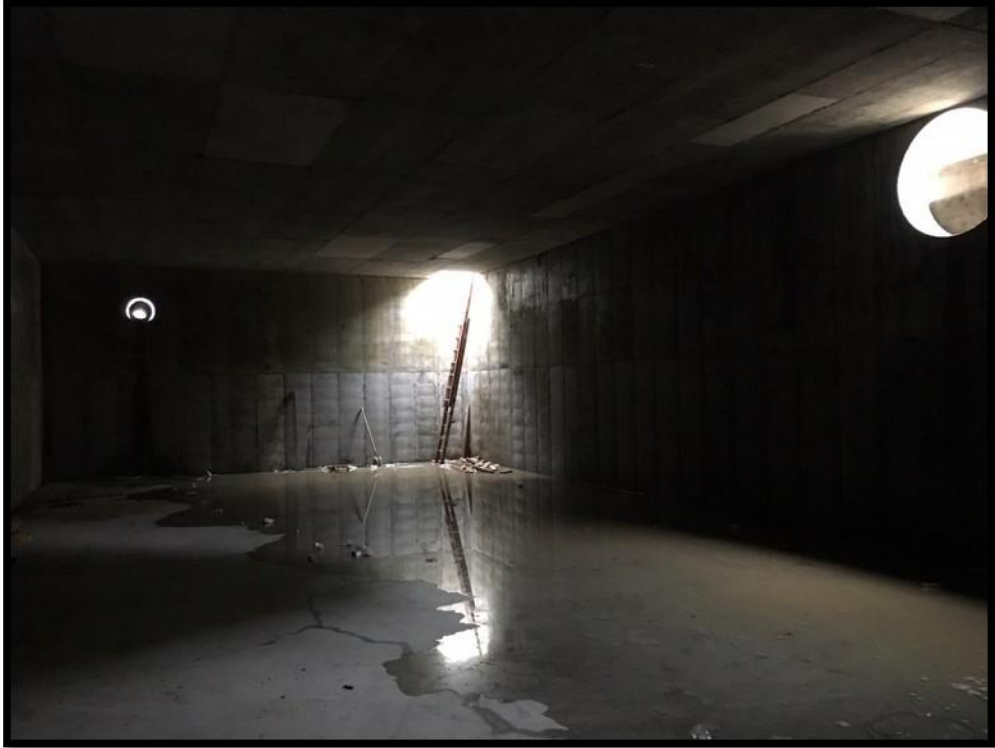
Staff will review interior inspection of the tank annually. In approximately 10 years the tank will be fully drained, and any debris at the bottom of the tank will be vacuumed out.

VII. Photos



Underground Storm Water Reuse Tank





Inside Underground Storm Water Reuse Tank



Rain Garden Construction



Rain Garden Planting



Rain Garden Maintenance Training to Friends of Northwood Lake Association



Rain Garden Maintenance





Rain Garden Following Rain Event



Finished Rain Garden



Finished Rain Garden



Educational Sign

City of New Hope Rainwater Harvesting (Stormwater Re-use) Water Quality System

Project Description

In 2016, the City of New Hope implemented several Best Management Practices (BMPs) to improve the water quality of Northwood Lake and downstream waters. Currently the lake does not meet State standards for water quality due to excessive nutrients. So, it was a priority for the city and the watershed organization to install improvements to help clean the water.

This project was constructed in coordination with the Bassett Creek Watershed Management Commission (BCWMC) to capture, treat, and reuse stormwater with the underground tank and a series of biofiltration basins (rain gardens). Now instead of rainwater polluted with fertilizers, grass clippings and pet waste flowing directly into the lake, it's captured, cleaned and reused or infiltrated into the ground.

Northwood Park Stormwater Harvesting Map

We All Have Waterfront Property! Here's How You Can Help Keep Our Lakes and Streams Clean:

- Sweep up debris like fertilizer, grass clippings and winter salt from your driveway and sidewalks so it doesn't flow downstream.
- Pick up your pet's waste in your yard and dispose of it in the trash.
- Direct downspouts away from pavement. Install a rain garden! Make a "bathtub" for rain in your yard.
- Cleanout stormdrains in front of your home to prevent potential flooding and pollutants from entering the storm sewer system.

Area Drainage Map

Rainwater Harvesting System Diagram

Water Conservation Benefits

- Uses recycled runoff to irrigate the 6.4 acres Northwood Park ball fields and soccer field.
- Reduce the City's annual water usage by up to 2.5 million gallons.

Runoff Control Benefits

- Redirect runoff from approximately 100 acres, including 22 acres of impervious surfaces to the rainwater harvesting tank.
- Recycle up to 335,000 cubic feet of stormwater runoff volume annually.
- Stores runoff from a 1-inch rainfall in the 160,000 gallon rainwater harvesting tank.

Water Quality Benefits

- Helps prevent pollutants from entering Northwood Lake.
- Prevents approximately 16 lbs. of phosphorus per year from entering Northwood Lake, ultimately reducing the amount of algae in the lake.
- Prevents approximately 4,600 lbs. of suspended solids (trash, debris, erosion, etc.) per year from entering Northwood Lake, ultimately improving the clarity of the water.

Irrigation System: Recycled rainwater is pumped from the rainwater harvesting system to irrigate the Northwood Park ballfields and soccer fields.

Rainwater Filter: The rainwater filter will undergo annual structures.

Tank: A 160,000 gallon tank provides rainwater storage.

Pump: Draws rainwater out of tank and feeds the

Fine Filter: Provides fine filtration of smaller particles.

Rain Gardens: Three rain gardens provide treatment of the

This rainwater harvesting project was made possible through the partnership and funding from Minnesota Pollution Control Agency Clean Water National Program, the Minnesota Board of Water and Soil Resources, Clean Water Fund (CWR), Bassett Creek Watershed Management Commission, and the City of New Hope.

Educational Sign



Saving Northwood Park Green Space



Jordan Avenue Pond Construction

