FRESHWATER SOCIETY

MINNEHAHA CREEK
WATERSHED DISTRICT

Master Water Stewards

Minnehaha Creek Watershed Tour

Presented by: Minnehaha Creek Watershed District

April 16, 2013

9:00 AM – 3:00 PM

18202 Minnetonka Blvd., Deephaven, MN 55391

The Minnehaha Creek Watershed District covers 181 square miles, and parts or all of 29 different cities and towns are within the watershed. Minnehaha Creek Watershed District is broken down into 11 sub-watersheds. The Minnehaha Creek subwatershed, see Figure 1**,** encompasses all the Minnehaha Creek Watershed District (MCWD or District) downstream of the Grays Bay dam, and is commonly referred to as the "lower watershed." The cities of Plymouth, Wayzata, Minnetonka, St. Louis Park, Hopkins, Edina, Minneapolis, and Richfield have land within this subwatershed. The subwatershed is drained by the 22-mile long Minnehaha Creek, which outlets to the Mississippi River in Minnehaha Falls Park. The central subwatershed is drained by the Minneapolis Chain of Lakes that includes Brownie, Cedar, Lake of the Isles, Calhoun, and Harriet. Other major lakes in the subwatershed include Nokomis, Hiawatha, Diamond, and Powderhorn. Several other smaller lakes and wetlands dot the subwatershed.

> *The subwatershed is drained by the 22-mile long Minnehaha Creek, which outlets to the Mississippi River in Minnehaha Falls Park. The subwatershed includes many urban lakes including the iconic Chain of Lakes.*

While some of the lakes meet or nearly meet their water quality goals, six lakes have been designated Impaired Waters for excess nutrients. Total Maximum Daily Load (TMDL) studies are currently underway to diagnose the source of those excess nutrients and to prepare an implementation plan for reducing nutrient loading and achieving water quality goals. Water quality in Minnehaha Creek is about average for the ecoregion, although it too has been designated an Impaired Water for its impaired fish community. The Chain of Lakes and the Creek are regional

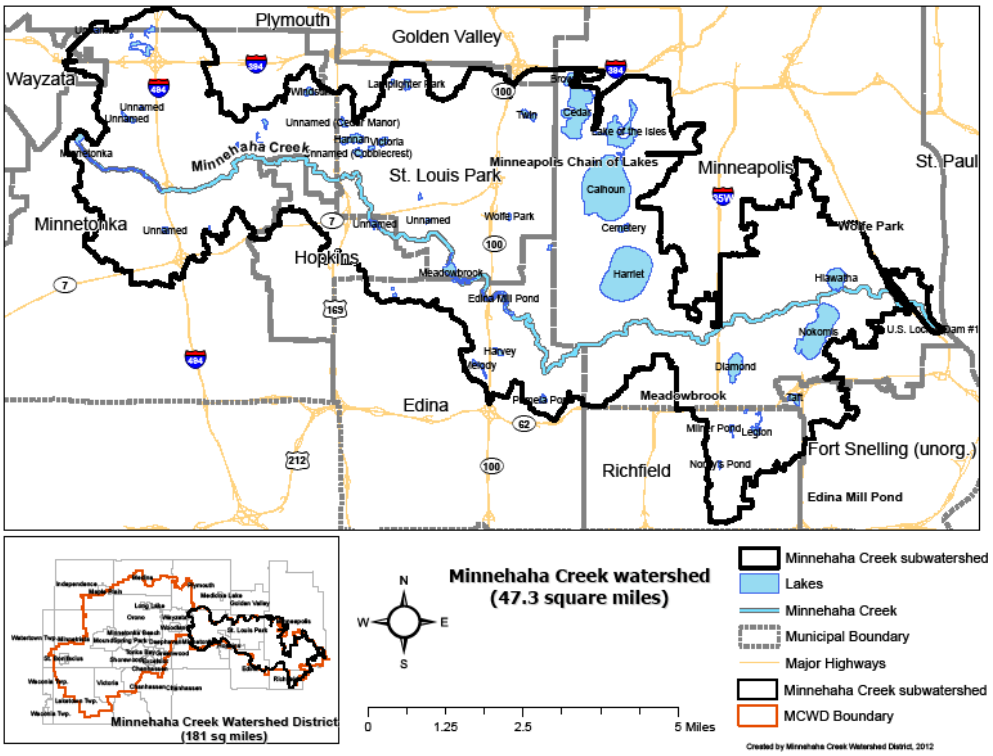

Figure 1. Map of Minnehaha Creek Subwatershed

recreational and water resources. Several high-value wetlands are present in the subwatershed. Springs and seeps abound in the Mississippi Gorge area, including the high-value groundwater resource Camp Coldwater spring.

Stormwater management is done by cities, counties, and watershed management organizations like Minnehaha Creek Watershed District. Cities manage most of the infrastructure. This consists of pipes, outlets, and often times stormwater ponds. Over the years more and more low impact development practices such as permeable pavements, raingardens, and other features that allow for a site to more closely mimic the natural hydrology of a site have been implemented. Lakes, creeks, and wetlands are no longer being allowed to be direct dumping grounds for polluted runoff. Historically the goal was to get water off the land as quickly as possible; today we have seen the error in this method and work to more closely mimic natural hydrology to support more healthy natural systems.

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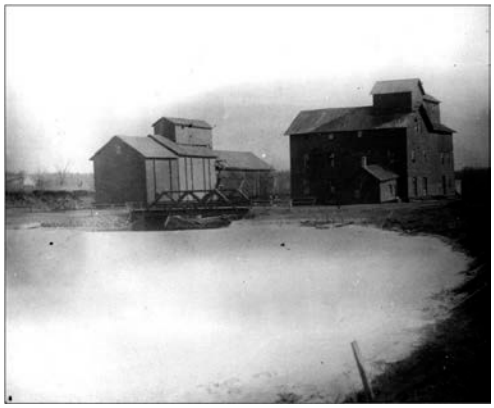

Figure 2. Old Mill along Minnehaha near the headwaters

The history of the Minnehaha Creek watershed begins with the settlement of Minnesota. Over the years Minnehaha Creek was used as a resource for mills in Minnetonka, Edina, Richfield, and Minneapolis. As the mills died off, unable to compete with mills along the river, the creek turned into a stormwater feature. It was channelized and used to drain the land for farming and eventually early suburban development. The Chain of Lakes in Minneapolis was more of a wetland complex before European development, today they have been dredged and nearby wetlands have been filled. Despite all these changes the quality in the Chain of Lakes is often regarded as a success story. Today improvement projects are looking to clean up Hiawatha and Nokomis, as well as ensuring that other impaired water features like Minnehaha Creek can sustain healthy ecosystems.

Figure 3. MCWD staff standing on a stormwater outlet along Minnehaha Creek.

In the early days regional treatment features like stormwater ponds were the solution to the pollution washing into local lakes, wetlands, and streams from stormwater. As development has continued many lakes, wetlands, and streams have been overwhelmed by polluted runoff, and have been listed as impaired. Today we use an assortment of tools to manage polluted runoff, which includes practices like raingardens to keep the water where it falls rather than letting it runoff the landscape into the stormwater sewer system. Once in the system it may be discharged to a pond to settle out sediment and nutrients, but it may discharge directly to a local watebody.

Key stormwater features:

Constructed wetlands: areas designed to mimic the natural features of wetlands to filter pollutants from runoff

- Examples in Minnehaha Creek sub-watershed
  - Cedar Meadows (at the west side of Cedar Lake)

Stormwater ponds

- Examples in Minnehaha Creek sub-watershed
  - Three-celled wetland pond on south west side of Lake Calhoun
  - 60th and First Street Pond
  - Lake Nokomis Ponds: Amelia Pond (Lake Nokomis's original European name), Gateway Pond (as a "gateway to the city") and Nokomis Knoll Pond

Raingardens, green roofs, tree trenches, permeable pavements, swales

- Examples in Minnehaha Creek sub-watershed
  - Diamond Lake Neighborhood Installations (raingardens and permeable pavements)
  - El Colegio (underground storage, permeable pavement, raingardens)
  - Bancroft Meadows (multipurpose park and flood water storage)

Enhancing key water features such as Minnehaha Creek or Lake Harriet to restore a more healthy ecosystem.

- Examples in Minnehaha Creek sub-watershed
  - Minnehaha Creek Urban Corridor Restoration work at Reach 20

Underground infrastructure: catchments, sewers, & outlets
Preventative measures such as rules to require permits for new construction project and redevelopment projects to ensure that the increased burden on natural systems and stormwater systems is addressed upfront.

Grays Bay

Lake levels and discharge have been controlled at the headwaters of Lake Minnetonka since 1897. Today, the Minnehaha Creek Watershed District manages the lake levels of both Lake Minnetonka and the Minnehaha Creek through the Headwaters Control Structure at Gray's Bay.

- Reduce flooding on the lake by stabilizing lake levels
- Reduce downstream flooding by controlling discharge
- Maintain historical conditions to decrease detrimental effects to creek or lake
- To enhance recreation, wildlife and aquatic life survival, and aesthetics, when feasible
- Improve and maintain the conditions of both the creek and the lake from conditions prior to the installation of the Headwaters Control Structure

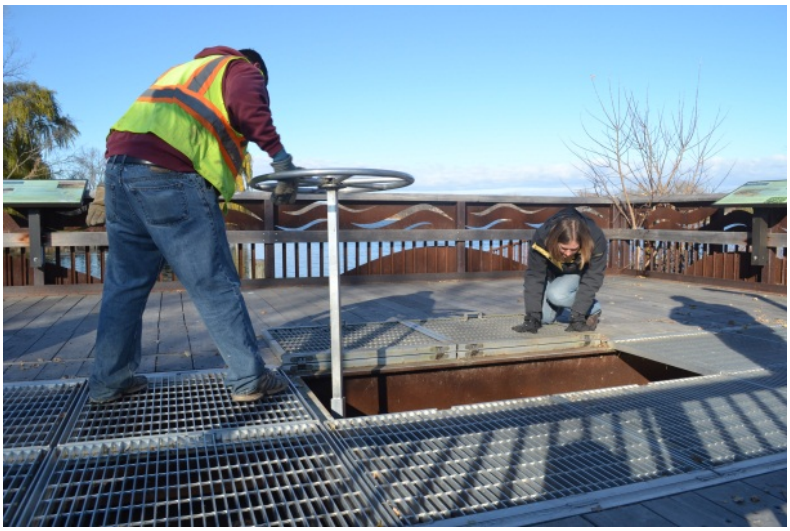

Figure 4. Closing the Grays Bay dam.

It is the policy of the District to operate the Headwater Control Structure to reduce flooding both on Minnehaha Creek and Lake Minnetonka. In addition the management policy was designed to match the hydraulic function of the fixed weir that existed before the dam was built. This is accomplished by controlling the discharge from Lake Minnetonka to Minnehaha Creek after ice-out (approximately April 15) until approximately mid-June. As a result, water is temporarily stored on the lake. The operation procedures were established by the Minnesota DNR and the US Army Corps of Engineers. Whenever the Lake Minnetonka water level is within physical limits of control discharge to the Minnehaha Creek is not to exceed the maximum carrying capacity of the creek. Stabilize lake levels between the elevation of the low point on the previous fixed weir (928.6) and the Ordinary High Water level (OHW), elevation 929.4. Temporarily increase or decrease discharge rates to

accommodate predictable and large volumes of runoff into Lake Minnetonka or downstream prior to the time such runoff occurs.

General Timeline

After ice-out (approximately April 15) until approximately mid-June, discharge is controlled from Lake Minnetonka to the Minnehaha Creek according to District policy.

After mid-June, water stored on the Lake is released during the summer and fall to account for normal spring snowmelt.

Historical Timeline

- **1853** first dam built by "Burwell's grantors" at Minnetonka Mills
- **1874** Hennepin Co completed creek excavation and strengthened the 1853 dam
- **1893** Hennepin Co built a new dam 100 feet upstream of the 1853 dam with license from Minnetonka Mills owners
- **1896** the 1893 dam was removed by court order
- **1974** MDNR Commissioner determines the Natural Ordinary High Water to be 929.40 MSL 1929 NGVD and the natural run-out elevation to be 928.6 MSL 1929 NGVD
- **1979** MCWD builds first major project - replaces the wooden structures with steel sheet pile at elevation 930 MSL 1929 NGVD and builds an adjustable tainter gate structure with an invert of 926.0. MDNR requires extensive public input and engineering analysis to develop an operating plan
- **1997** MCWD added riprap to weir, installs continuous steel weir cap and drives butt piles to keep weir level, large downed trees removed
- **2005** MCWD/Minnetonka joint project to remove boat launch, cover outlet control structure, re-vegetate shoreline

Figure 5. Restoration work in progress along Reach 20 of Minnehaha Creek

Reach 20

"If you've ever gone down the creek in a canoe, which I have, you'll notice that historically land use has turned its back on the creek," said St. Louis Park City Manager Tom Harmening. "You see the back sides of buildings on the creek. The creek wasn't seen as an asset; it was seen perhaps as more of a liability, or utility in terms of disposing stormwater. We're changing that. We want to turn toward the creek and enhance our use of the creek and view it as an asset."

Wetlands were drained and filled and the creek was moved out of the way during the post-World War II building boom. The result was a straightened waterway that's polluted, prone to flooding and lacks sufficient public access for recreation. The Minnehaha Creek Watershed District in partnership with the City of St. Louis Park is improving Reach 20 of Minnehaha Creek from Louisiana Avenue to Meadowbrook Road.

- 4,500 feet of Minnehaha Creek will be re-meandered to restore the creek to a more natural channel and slow the conveyance of water runoff, while improving the floodplain characteristics of the creek.
- Streambank stabilization will include live staking along sections of the creek as well as large wood stabilizations, which consist of trees that are partly exposed to the stream bed for habitat, but are anchored with cables and buried. They will be placed at the toe of the channel bank in some areas along the creek.
- Pools will be created on the outside of meander bends. These are known as scouring ponds, and will provide some space for storage of water, and introduce a more natural stream bed into the system.
- Stormwater management includes enhancement of two ponds: Excelsior Pond and Meadowbrook Pond. These ponds will be used during construction, but also in enhancing stormwater treatment in this area. Constructed wetlands will be placed along this reach of the creek to slow and provide treatment to stormwater runoff. Many stormwater outlets will be removed from direct discharge to the creek.
- An extensive plan to improve access to the creek includes a trail, boardwalk and new canoe landings. A lack of access has been chronic in this area since development, and now with plans for a new Southwest Light Rain Transit line and linage to the Cedar Regional Bike Trail for increased recreation and enjoyable green space for people.
- Vegetative restoration includes two types of seeding zones, tree and shrub planting, and several sections of live staking along the creek's new meander. These will provide habitat, and vegetative restoration to this area. There are many wetlands in this area, and they will be avoided during construction to reduce disturbance, and allowed to buffer and expand along the creek for improved floodplain characteristics.

Taken together, these improvements will reduce erosion around the creek, reduce the amount of sediment and nutrients entering the creek, and improve habitat characteristics for wildlife within the creek corridor. It will also provide a much needed link between the neighborhoods and the creek that has been missing in this area.

This project is the latest phase of a large-scale restoration of Minnehaha Creek. Restoration started with a creek re-meander and trail/boardwalk system at Methodist Hospital that was completed in 2009 and will continue with additional work upstream in Hopkins. When complete, the public will enjoy a restored Minnehaha Creek that has cleaner water, helps communities manage stormwater, provides trail linkages to the Cedar Regional Bike Trail and the planned Southwest Light Rail Transit line and is an amenity for the surrounding area.

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Diamond Lake

In South Minneapolis, the water quality of Diamond Lake has suffered in recent decades. In fact, the Minnehaha Creek Watershed District's analysis of water testing results designated the water quality grade as "F". This is largely a result of stormwater that drains off roofs, yards, and streets in the 690-acre Diamond Lake watershed and ends up in the lake - bringing pollutants, debris and dirt with it. Concerned citizens worked with the statewide nonprofit Minnesota Waters (through the MCWD Watershed Association Initiative) to form the Friends of Diamond Lake. The lake association completed a lake management plan which includes a goal to reduce stormwater runoff to the lake by encouraging home owners to capture and treat runoff on their property. The Friends of Diamond Lake partnered with MCWD to apply for Clean Water Fund grant money. The resulting Go Blue Community Makeover for Diamond Lake provided property owners with up to 50 percent cost share for a variety of storm-water mitigation projects, including the installation of raingardens, permeable pavers, rain barrels, trees and rainwater capture and reuse systems.

El Colegio School

El Colegio School received $124,362 for a Low Impact Development (LID) project. The improvements consist of remodeling and rerouting of internal roof drains and repurposing of the entire area north of the building. The area south of the building was reconstructed seven years ago and provides stormwater management through raingardens, infiltration swales and islands in and around the parking lot. The proposed work will reroute the internal drainage so that it will discharge to a newly created underground storage and infiltration system. This will eliminate roof water discharge to the street. The underground system is located immediately north of the building, in a low area that formerly served as a loading area for a grocery store which previously occupied the building. The largest portion of the open space on the north side will be used for a fenced play field. This is turf covered. The area west of the field and north of the paved service area is a student garden. The area over the underground system is an outdoor classroom space, with a pervious paver surface that will infiltrate to the underground system below. The site will handle greater than a 1.25 inch storm event through the usage of the BMPs on site.

Figure 6. Underground storage at El Colegio in Minneapolis

Minnehaha Park and Glen

With more than 850,000 visitors each year, Minnehaha Park's falls and lower glen is an important landmark in Minnesota for both residents and visitors. Its significance as a travel destination spans to a time before Minnesota was granted statehood. Over the years the park has been home to one of the principal mill sites in the region, a zoo, a racetrack, campgrounds, and more. Over time the area has degraded, and after a particularly heavy storm in 2005 problems were exacerbated. Problems included structural failures, erosion, unsatisfactory stormwater management, along with other issues that posed a threat to historic, cultural, and natural resources in the area.

Figure 7. Bioengineered streamline stabilization along Minnehaha Creek in Minnehaha Falls Park in Minneapolis.

Work to enhance and restore this landmark has been achieved through strong partnerships that utilize the expertise and resources of a number of different project partners including the Minneapolis Park & Recreation Board, the City of Minneapolis, the State of Minnesota Veterans Home, and the U.S. Army Corps of Engineers. This multifaceted project involves streambank and historic wall stabilization, trail improvements, and stormwater management.

Two main project components:

- Improved stormwater management at the Minnesota Veteran's Home
- Restoration of the Minnehaha Falls and Glen area

Outcomes

- Stabilize streambanks and bluffs around the creek
- Installed rock vanes and toe boulders in the creek
- Manage invasive species and reforest the area
- Construct trails and walkways
- Protect historical and cultural resources
- Manage stormwater throughout the site

Minnesota Veteran's Home

To remedy stormwater management issues at the Minnesota Veteran's Home a series of innovative best management practices (BMPs) were installed. Erosion problems were repaired and stormwater directed into a new rain garden. BMPs used include rain gardens, porous concrete, and infiltration areas to decrease the speed and amount of water flowing directly to the stream. Traditional stormwater structures will still be present to both handle stormwater and to direct it to the BMPs.

Minnehaha Creek

Along the Minnehaha Creek, near Minnehaha Falls, and in the area below the falls (Minnehaha Glen) repairs included a variety of practices:

- Creek and glen repair included the addition of retaining walls for stabilization
- Removed slumped concrete crib walls.
- Added bridge abutment protection
- Bio-engineered the bank for added stabilization
- To protect the stream and preserve the accessibility of the area the trail system needed to be revitalized. Solutions include:
- Sections of elevated boardwalk with metal decking
- Stabilizing stair systems
- Built up the trail to slow erosion and improve access

A great deal of vegetation restoration occurred in areas around the falls, but none was completed at the falls. Vegetation adds the benefit of habitat, strong and deep roots that stabilize soil, and are important to allow water to evaporate.