

Underground project irrigates ballfield, protects Lake McCarrons

October Snapshots 2017



FROM LEFT: Most of the work to construct a cistern and a series of pipes under the softball field and part of the parking lot at Upper Villa Park in Roseville was completed in late fall 2015. The softball field at Upper Villa Park in Roseville is now irrigated with rainwater collected in an underground cistern. A series of underground pipes perforated with thousands of holes will allow rainwater to seep into the ground. Photo Credits: Capitol Region Watershed District

The players likely don't think about it as they're rounding first or chasing fly balls. But the high-tech irrigation system that keeps the Upper Villa Park softball field green, taps weather forecasting data and stores water underground could help clear up adjacent Lake McCarrons.

The \$1.2 million project – funded partly through a \$360,000 Clean Water Fund grant from the Minnesota Board of Water and Soil Resources – was designed to keep Lake McCarrons from turning green and to conserve drinking water.

BWSR estimates the system will capture and filter 18.7 million gallons of runoff, preventing 50 pounds of phosphorous from entering the lake annually. Phosphorous fuels algae blooms that turn lakes green. Reusing rainwater for irrigation will save up to 1.1 million gallons of drinking water annually.

“Within Roseville, we have a lot of drainage problems. Water quality is also an issue,” said Ryan Johnson, city environmental specialist. “For this project, we’re getting a really big bump in water quality, and we’re also getting a really big water reduction out of it.”

Rainwater from about 250 acres in Roseville drains through Upper Villa Park and, eventually, into Lake McCarrons. A popular recreation lake, McCarrons is one of the cleanest lakes in the metro. According to a Capitol Region Watershed District news release, the project was deemed a priority because lake health was trending downward. The watershed district and city collaborated on the project.

Now, irrigation for the 1.7-acre field and perimeter draws from rainwater collected in an underground cistern. Rainwater also filters through thousands of holes in underground pipes measuring 10 feet in diameter. The pollutants that otherwise would have flowed through storm drains, into Villa Park wetlands and into Lake McCarrons now are filtered out as the water moves through the soil.

Most of the work was completed in late fall 2015 after the softball season, and finished in spring 2016. In summer 2017 staff was fine-tuning the irrigation system.

“The one aspect that’s most unique to us, that we’re most excited about, is the adaptive management,” Johnson said.

Forrest Kelley, regulatory division manager with the Capitol Region Watershed, explained how the system works:

Optimized Real Time Controls uses weather forecasting to automatically open a valve and drain the 100,000-gallon cistern before storms. That happens if the National Oceanic and Atmospheric Administration predicts at least a 60 percent chance of rain within 48 hours. The automated drainage creates more space to collect and filter runoff beneath the ballfield and parking lot before it reaches Lake McCarrons.

“This technology is proving to be a very powerful tool to increase the effectiveness of stormwater practices at a relatively low cost,” Kelley said.

UPPER VILLA STORMWATER REUSE PROJECT

Underground system cleans and reuses runoff to protect Lake McCarrons

Polluted stormwater from nearly 250 acres of land in Roseville drains through Villa Park to Lake McCarrons. The City of Roseville and Capitol Region Watershed District installed a system below ground that collects and cleans 18.7 million gallons of runoff and reuses that water for irrigation, conserving 1.1 million gallons of drinking water each year.

Advances in Technology

Opti

A new technology known as Optimized Real-Time Controls (OptiRTC) uses weather forecasting to automatically open a valve and drain the cistern before storms. This creates space to collect and clean more runoff before it reaches the lake.

1 During storms, runoff flows into the cistern beneath the park.

2 Once the cistern is full, water flows into a series of 10-foot pipes with thousands of holes and slowly soaks into the ground.

3 During large rain storms, excess water bypasses the system and flows downstream untreated to the Villa Park Wetland System and Lake McCarrons.

4 Water from the cistern is pumped and filtered before irrigating the grass.

Why? Rainwater carries dirt, oil, trash, pet waste, grass and leaves to the Mississippi River when it flows from streets into storm drains. The system at Upper Villa Park captures, cleans and reduces runoff and the pollution it carries before it reaches Lake McCarrons.

Logos for Roseville, Capitol Region Watershed District, and Minnesota State Parks & Recreation are visible at the bottom.

The Capitol Region Watershed District erected this sign at Upper Villa Park to explain the project. Most of the system is underground. Image Credit: Capitol Region Watershed District

Johnson said before Roseville was developed, wetlands contained water on the landscape. Starting in the 1940s, farmers filled in wetlands. The city, which sits on a hill and drains into three watersheds, grew faster than its storm sewer system. Development left no room for retention ponds.

“Any time we get intense or heavy rainfalls, we see a lot of flooding issues with our streets,” Johnson said.

The wetlands downstream of Upper Villa Park contain weirs, which Kelley said were meant to create pools that slow the flow of water. Sediment accumulates in them. The wetland was dredged in 2013.

The underground system at Upper Villa Park provides both space and sandy soils ideal for drainage. The system also helps alleviate localized flooding during large storms and reduces the frequency of dredging required to maintain the ponds. A small sign posted by the watershed district explains the project.

In addition to the BWSR grant, a Minnesota Pollution Control Agency Clean Water Partnership grant provided \$275,000. Additional funding came from the Capitol Region Watershed District and city of Roseville.