

Sustainable Landscape Green Infrastructure

Project Title: Stormwater Capture and Re-Use
Property Name: North Shore Country Club
Location (City/State): Glenview, IL Cook County
Project Coordinator: Dan Dinelli, CGCS, Superintendent
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Type of Course: Private Country Club

One of the more vital resources to any golf course facility is water. Plant health and playability are dependent on quality water. Audubon International estimates the average course uses just over 300,000 gallons per day. This motivates North Shore Country Club to utilize technology in irrigation tools and equipment that provide an opportunity to conserve water and lower energy consumption. Which, in turn, translates into cost savings and an overall greener approach to landscape function. In-ground sensors around the course and daily use of site specific handheld soil moisture meters combined with the onsite weather station are just a few of the ways the North Shore C.C. measures evapotranspiration rate (ET) and water needs for each day. The best management practices (BMPs) for golf course water use are intended to promote water conservation, preserve or improve water quality and utilize stormwater. One of the unique ways the club demonstrates this is through the construction of a stormwater collection system. Utilizing storm water helps reduce stormwater treatment load, utilize quality water and reduce the need to harvest well water.

Project Description:

In an effort to optimize stormwater use, North Shore Country Club developed a system to capture rain water and recycle it throughout the course. The system utilizes existing course

drainage system and directs the flow of water to an underground holding tank and ponds for storage. In essence, acting like gigantic rain barrels.

Goals:

The main goal of this project was to capture and recycle rainwater in order to reduce the amount of well water used on the golf course. In addition to storing water, the constructed storage ponds are designed to provide beneficial habitat for wildlife. Storage ponds with shallow margins are planted with wetland vegetation, utilized by many wildlife species. These buffers also help reduce nutrient loads and improve water quality. Healthy amphibians and fish including rainbow trout that live year-round in the ponds demonstrate the high quality water.



Buffer plantings for habitat and water quality

Implementation and Maintenance:

The underground water detention tank (located on the South side of the 18th hole) uses the course's existing stormwater drainage to fill. Once collected and stored in the tank (473,000 gal capacity) the water is then gravity fed to retention ponds inside the course designated to hold water ready to be reused for irrigation purposes. In order to maintain this system, manual pumping is required from the course drainage system to fill the tanks. We plan to automate this process to enhance the operation.



Underground stormwater storage tank fits into the landscape supporting a bunker as part of the design

Results:

This system allows for us to capture rainwater before it leaves the property and be used for irrigation. Although it is difficult to calculate exactly how many gallons are being transferred

from stormwater to irrigation, we are able to make a significant impact in water conservation due to the size of the storage tank and two holding ponds.



Storm water main that carries water drained from the golf course into a sump in the manhole. A pump is used to pump the water into the tank storing it until it can be drained into ponds for irrigation.



Pump used to move storm water from manhole into underground line that feeds into storage tank.



Outlet filling storage tank is a 'waterfall' design to help aerate water during fill.



The outlet into the pond has an air gap to ensure no back siphoning.



Underground tank dimensions are 115' x 50' x 11' tall which holds 473,000 gallons of water.



Some modification was necessary to valve off line that drains into pond. All work was done in-house.



Part of our water BMP's are the green plants growing on the course. Turf and naturalized areas that require low inputs in out-of-play areas help filter and store stormwater.

Site Statistics

Analysis Area: Unknown CG Feature

Scenario: Current Conditions

Area:
0.28 sq. miles
176.90 acres
71.59 hectares

Landcover Distribution:

	Acres
0% Cropland	0.00
5% Impervious	9.62
93% Open Space/Pasture/Meadow	164.50
0% Shrubs	0.00
23% Tree Canopy	41.50
0% Urban Land Use	0.00
2% Water	2.79

Ecological Benefits

Air Pollution Removal

Air Quality Reference City: Milwaukee

	lbs Removed	Dollar Value
Ozone:	1,172	\$3,598
Sulfur Dioxide:	164	\$123
Nitrogen Dioxide:	457	\$1,402
Particulate Matter:	751	\$1,539
Carbon Monoxide:	73	\$32
Total:	2,617	\$6,695

Carbon Storage and Sequestration

Age Distribution of Trees:	Even Mix
Carbon Storage:	2,238 tons
Carbon Sequestration:	12,700 pounds/year

Stormwater Control

Average 2-yr, 24-hour Rainfall: 2.75 in.

Conditions:

Current w/o trees*

Residential Cooling Effect

Average Annual Cooling Cost per Home:	\$0.00
Number of Homes:	0
Savings from Trees:	\$0.00
Savings from Roofs:	\$0.00
Total Savings:	\$0.00
Savings per Home:	\$0.00
Kilowatt-hours Saved:	0.00
KWHs Saved per Home:	0.00
Carbon Generation Avoided:	0.00 lbs.
Carbon Generation Avoided per Home:	0.00 lbs.

Curve Number
Runoff (in.): 0.25 0.28

Storage volume needed to mitigate the change in peak: 19,264.34 cu. ft.

How:
Construction cost: \$15.00 per cu. ft.

Total \$288,965.13

* Replaced by default landcover: Meadow (Continuous grass, generally mowed, not grazed)

Economic Benefit Summary

Annual Air Pollution Removal Savings:	\$6,695
Annual Energy Savings:	\$0
Annual Stormwater Savings*:	\$25,193
Total Annual Savings:	\$31,888

* Annual Stormwater savings is based on financing over 20 years at 6%