CSO!
Clean Solutions for Omaha

Green Infrastructure

Reducing combined sewer overflows by restoring and mirroring the natural water cycle

Pictured: The revitalized lake at Spring Lake Park.

City of Omaha, Nebraska
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In Omaha and many other cities, combined sewer overflows are a major cause of water pollution.

When it rains, stormwater drains from roofs, street inlets, storm sewers and other engineered collection systems. Eventually, it finds its way into the combined sewer system, which collects both stormwater and sewage. When the flows into the combined system become more than the pipes or the treatment system can handle, it overflows into the Missouri River and other nearby streams. These overflows contain raw sewage, trash, bacteria, heavy metals and other pollutants that impact water quality.

The City of Omaha is committed to reducing combined sewer overflows and their impact on the Missouri River and area streams. The City has a Long Term Control Plan (LTCP) that carefully lays out a series of Clean Solutions for Omaha (CSO) projects to address water quality concerns. All CSO projects are required to evaluate the inclusion of green infrastructure elements where possible.

Green infrastructure helps reduce overflows, often reduces cost and provides neighborhood amenities. Green infrastructure is a water management approach that protects, restores or mimics the natural water cycle. Green infrastructure is often soil- or vegetation-based and can include tree planting and preservation, installing porous pavements, and restoring natural landscapes.

These examples show how Omaha has effectively implemented green infrastructure projects in the CSO Program.

Fontenelle Park

As part of the Lake James to Fontenelle Project, what used to be a little-used golf course is now a sprawling park with walking trails and picnic areas. The park's **lagoon** was expanded and deepened, creating changes that naturally collect stormwater, keeping it from getting into the combined sewer and causing overflows to the river. **Native vegetation** was planted to increase filtration of rainfall into the ground.

Pictured below: Aerial view of the expanded lagoon.

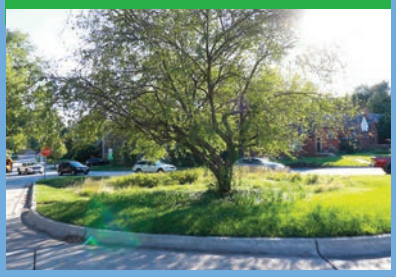
Photo courtesy Ryan L. Baker/Black and Veatch

Elmwood Park

Elmwood Park provided an excellent location for structures called **slotted weirs**, which were built through the park's ravine to reduce stormwater velocity and erosion. The weirs act like terracing, with bioretention gardens located between the vertical drops, to slow the stormwater. Native grasses were planted in the gardens to provide superior natural water absorption.

This strategy took stormwater out of the combined sewer system and diverted it to a natural stream. Not only did it improve water quality, it avoided additional costly sewer separation and neighborhood disturbance in the Aksarben Village CSO Project. This green infrastructure project saved more than $500,000 in overall cost.

Country Club Ave.



Working closely with the neighborhood to address its beautification concerns, the Country Club Sewer Separation project team developed a simple, yet effective, solution to waterflow. A **rain garden** was planted along Country Club Avenue. This garden contains a variety of plants designed to collect runoff, maximize filtration and exit water slowly to the nearest outlet. This reduces peak flows at manageable levels for the combined system. The garden has provided an effective solution, adding beauty and function to the neighborhood.

24th & Lake St.

Bioswales, which are shallow channels with sloping sides, were installed along 24th Street. Bioswales mimic natural water flows to more effectively manage water runoff so it infiltrates rather than entering the combined sewer system. Part of the 26th and Corby Sewer Street Separation project, these bioswales are both functional and attractive.

Spring Lake Park

In the late 1800s, Spring Lake Park was a thriving urban park. In the early 1900s, the lake was drained and became a dumping ground for trash, old appliances and tires. A vocal group of community advocates tried for years to bring the "lake" back to Spring Lake Park.

The CSO Program, which had included construction of a lake in the original 2009 LTCP, collaborated with the neighborhood to address its aspirations. As planning and design for the Missouri Avenue/ Spring Lake Park CSO project developed, the beautification of a neighborhood evolved along with a major water quality improvement project. Through the CSO Program, grants from Nebraska Environmental trust and collaboration with Omaha's Park Department, the **lake, wetlands and a broad range of green elements** transformed the area.

The incorporation of green infrastructure elements expanded the park's habitat, fishing and enjoyment, while leading to improved water quality. The project reduced the amount of gray infrastructure and resulted in a savings of $5 million.

Adams Park

An outgrowth of the North Omaha Villages Revitalization Plan, this project renewed focus on Adams Park and other areas in the community as a catalyst for urban growth and revitalization. The park's **wetlands and detention area** were designed to provide maximum practical stormwater storage to reduce combined sewer overflows, while adding community benefits and beautification elements to the park.

Pictured here: Adams Park wetlands and stormwater detention.

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Green Infrastructure Word Match

Draw lines to connect the CSO term on the left with the correct description on the right. All of the answers can be found in the attached Green Infrastructure brochure.

Part 1: Controls

Green Infrastructure	Shallow channels with sloping sides, that mimic natural water flows to more effectively manage water runoff so it infiltrates rather than entering the combined sewer system.
Slotted Weirs	Plants indigenous to a given area in geologic time.
Rain Garden	Are designed to provide maximum practical stormwater storage to reduce combined sewer overflows, while adding community benefits and beautification to parks.
Bioswales	Contains a variety of plants designed to collect runoff, maximize filtration and exit water slowly to the nearest outlet.
Native Vegetation	A water management approach that protects, restores or mimics the natural water cycle.
Wetlands and Detention Areas	Structures that act like terracing, with bioretention gardens located between the vertical drops, to slow the stormwater.

Part 2: Locations

Fontenelle Park	Through the CSO Program, grants from Nebraska Environmental trust and collaboration with Omaha's Park Department, the lake, wetlands and a broad range of green elements transformed this area.
Adams Park	Slotted weirs were built through this park's ravine to reduce stormwater velocity and erosion.
Country Club Avenue	This North Omaha Park project acted as a catalyst for urban growth and revitalization and includes wetlands and detention areas.
Spring Lake Park	Has a lagoon that was expanded and deepened, creating changes that naturally collect stormwater, reducing the rate of flow that gets into the combined sewer, thereby reducing the rate of overflow at at the downstream diversions to the river.
24th and Lake	The CSO Program worked with this neighborhood and added a rain garden to reduce peak flows.
Elmwood Park	Bioswales were installed in this area.