GREEN STREET ELEMENTS

- Tree Wells
- Permeable Pavers

LEARN MORE

- http://www.msdlouky.org/aboutmsd/cross/cc_winter11.pdf
- http://www.msdlouky.org/aboutmsd/streamline/2014/StreamLine-sep.pdf
- http://www.msdlouky.org/aboutmsd/streamline/2013/StreamLine-Oct-2013.pdf
- http://www.msdlouky.org/aboutmsd/update/up10/10-oct10up.pdf
- http://msdgreen.org/Green-101/News-Archive/News-Details/ID/31/UofL-Partnership.aspx
- http://msdprojectwin.org/Portals/0/Library/Stormwater%20Quality/Green%20Infrastructure/confluence2014presentation.pdf
- https://louisville.edu/cepm/incorporating-water-management-into-the-community-planning-process-1/green-infrastructure-impact-assessment
- http://louisville.edu/speed/civil/ceeResearch/research-projects-1/archived-projects/assessment-of-green-storm-water-infrastructure

PROJECT PARTNERS

msd Safe, clean waterways

US EPA Office of Research and Development

URS

CSO130 GREEN INFRASTRUCTURE PROJECT

LOUISVILLE, KENTUCKY

The CSO130 project in the Story Avenue/Butchertown Area Includes Tree Wells and Permeable Pavers that infiltrate stormwater to off-load the sewer system

PROJECT DESCRIPTION

Pursuant to the federal consent decree issued in 2005, Louisville and Jefferson County MSD developed an Integrated Overflow Abatement Plan (IOAP) to correct violations of the Clean Water Act (CWA). The IOAP, which has been approved by the EPA and the Kentucky Division of Water, is a long-term plan to control combined sewer overflows, and to mitigate sanitary sewer overflows and other unauthorized discharges from our sewer system. A Wet Weather Team—composed of a community stakeholder group and environmental professionals—developed the cost-effective plan with estimated implementation expenses of $850 million for maximizing water quality improvements, while minimizing the impact on our ratepayers to the greatest extent possible.

The IOAP is a suite of projects—most of which utilize gray infrastructure like storage basins—to provide additional system capacity and reduce combined sewer overflows (CSOs). Louisville MSD, with the assistance of Heritage Engineering, modeled sewersheds utilizing the InfoWorks collection systems platform. The model results for some sewersheds supported replacing the proposed gray infrastructure with strategically placed green infrastructure, which would attain the original control level and CSO reductions as the planned gray projects.

The CSO130 area is a 28-acre watershed with urban non-point source pollution and CSOs. The receiving waterway is the South Fork of Beargrass Creek, which is utilized by the public for recreational activities such as canoeing. The initial plan for the CSO130 area called for a $1.6 million storage basin. Because of the small drainage area of the sewershed in this area and the potential cost-effectiveness of implementing green infrastructure, Louisville MSD decided to target this area for evaluating green infrastructure practices.

Louisville MSD determined the best placement for a suite of green infrastructure projects that would attain the original—or better—control level of the planned storage basin project at significantly lower costs.

PURPOSE/OBJECTIVE

The CSO130 Green Infrastructure Project goals included reducing the frequency and volume of CSOs to the control level identified in the IOAP, reducing the cost of CSO controls to ratepayers, and increasing project benefits to the community. Louisville MSD's CSO130 Green Infrastructure Project is the result of forward thinking to simultaneously achieve regulatory compliance and enhance the quality of life for Louisville's urban residents.

APPROACH

Louisville MSD monitored the performance of the permeable pavers and tree boxes using time-domain reflectometers, water level sensors, thermistors and passive capillary lysimeters.

RESULTS/OUTCOMES

Monitoring indicates dramatic improvements to CSO control and thus the amount of CSO-related pollutants entering the South Fork of Beargrass Creek. The CSO130 Green Infrastructure Project was designed to reduce the number of CSOs from 16 to eight, in a typical rainfall year. This level of control removes 6.5 million gallons of combined sewage from the South Fork of Beargrass Creek each year. Post-construction monitoring results indicate that overflow volumes have been reduced and project performance typically meets or exceeds modeled overflow reduction for a given rainfall amount. The reduction of CSOs thereby reduces the introduction of fecal coliform and other pollutants into the South Fork of Beargrass Creek.

The project enabled political support for new development requirements, aided participation in the green infrastructure financial incentive program, and demonstrated that green infrastructure can be standard practice instead of experimental design in stormwater control. The project was cited as "proof of concept" to the Building Industry Association of Greater Louisville (BIA) to garner support for future green infrastructure requirements for new developments as required by Louisville MSD's stormwater permit. Through the positive results of the CSO130 project, Louisville MSD was able to gain support from its Board for new regulation requiring all new developments disturbing one acre or greater in Jefferson County to implement green infrastructure.

While meeting regulatory requirements at a reduced cost to its ratepayers, Louisville MSD provided aesthetic improvements to the area streetscape. The initial plan for the CSO130 area called for a $1.6 million storage basin. By utilizing green infrastructure, like tree wells and permeable pavers, the project cost was reduced by more than $662,000. Louisville MSD coordinated with its Wet Weather Team to formulate a public outreach plan to communicate the intent of the project. E-Z Construction Co. Inc. was awarded the project with a bid of $792,115, or 12 cents per gallon of sewer overflow removed from South Fork Beargrass Creek per typical rainfall year.

Project impacts to the clean water industry have included local partners and national researchers. Leveraging partnership with the EPA Office of Research and Development, project research, planning, design, construction and post-construction monitoring efforts have been documented and disseminated to national peers. In addition, the University of Louisville Center for Infrastructure Research presented findings at the 2014 World Environmental & Water Resources Congress in Portland, Oregon. The green infrastructure knowledge gained from this project is a key component of a new graduate level class at the University of Louisville that focuses on effective design and implementation of green infrastructure.

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LESSONS LEARNED

The CSO 130 Green Infrastructure Project has served as an example of green infrastructure feasibility and cost-effectiveness in Jefferson County. This project enabled successful implementation of the consent decree to reduce CSO volume and frequency as well as key portions of Louisville MSD's stormwater permit program including requiring green infrastructure on new development; demonstrating viability of green infrastructure; outreach and education; and improvement of waste loads for a 303(d) listed waterway and TMDLs. The project has demonstrated a positive impact on the environment, the utility, the community and the clean water industry. Project impacts have been supported by the EPA, who recognized Louisville MSD's work utilizing green infrastructure in a memo titled "Protecting Water Quality with Green Infrastructure in EPA Water Permitting and Enforcement Programs" as a benchmark example of meeting regulatory requirements with the use of green infrastructure. Project impacts have been further validated by awards including the 2014 EPA Region 4 Rain Catcher Award and the American Public Works Association's 2013 Kentucky State Stormwater Award.

After performance losses were observed, maintenance methods such as sweeping, water jetting and pressurized vacuuming were applied to each pervious pavement practice. The performance gains associated with each maintenance method were recorded. Lessons learned through the project partnerships have aided in implementation of green infrastructure countywide.