University of Kentucky Receives Award for Onsite Stormwater Harvesting System

The stormwater harvesting wet well holds diverted stormwater for use in the University of Kentucky's Central Utility Plant, which is part of a chilled water loop used to air-condition campus buildings. Arden Barnes

A stormwater reuse system that helps offset water usage while cooling the University of Kentucky's campus (UK; Lexington) has earned the school's Utilities and Energy Management team a top award from the American Council of Engineering Companies of Kentucky (Frankfort).

"This award highlights the university's dedication to sustainability, innovation, and collaboration," said Britney Ragland, Associate Director of UK's Utilities and Energy Management team, in a release. "We are proud of the work that has gone into this project and look forward to its long-term impact on campus and beyond."

The team received the Grand Award, which recognizes projects that are innovative in their technical execution, demonstrate future value to the engineering profession, and are economically and environmentally sustainable, for their Central Utility Plant (CUP) stormwater harvesting system. The project met criteria because it reduces the campus' operational water use, improves runoff control, and involves students in real-world research.

After initial planning began in 2017, the CUP system went online in 2023 and can capture up to 95,000 m^3 (25 million gal) of stormwater runoff in a wet well from the approximately 640,000 m^3 (170 million gal) that flows into the nearby Wolf Run watershed each year. From the wet well, stormwater is treated and pumped into the CUP's cooling towers, which are part of a chilled water loop used to air-condition campus buildings.

The system uses industrial chillers to cool water and discharges the heat removed during this process through evaporative cooling towers, which is one of the most water-intensive parts of the system. The CUP is one of four interconnected cooling plants that consume more than 170,000 m^3 (45 million gal) of water annually.

The UK campus uses an average of 2 million m^3 (600 million gal) of water each year, which means the CUP stormwater harvesting system represents more than a 4% reduction in purchased water, according to a 2021 statistic.

"The stormwater harvesting system plays a critical role in helping us offset campus water usage and manage stormwater runoff," said Ragland. "If we can capture, reuse, and return this water to the environment, it reduces our footprint on the local water system while also benefiting the local watershed."

Students from the university's mechanical, civil, and biosystems engineering programs worked with Bell Engineering (Lexington) on the project, which was backed by the Stormwater Infrastructure Grant program from the Lexington-Fayette Urban County Government.

The stormwater harvesting system discharges where the treated water enters the cooling tower basin for use. University of Kentucky

North Texas Project Restores Streams, Boosts Ecosystem Health

A major restoration effort in North Texas is bringing long-lost waterways back to life. As part of the ongoing Lake Ralph Hall mitigation project, the Upper Trinity Regional Water District (UTRWD; Lewisville, Texas) has restored more than 9 km (6 mi) of natural streams near Ladonia, Texas. This project, one of the largest of its kind in the state, is transforming a region long impacted by river channelization and erosion into a healthy aquatic ecosystem.

The restored streams, which feed into the North Sulphur River, were disrupted by a 1920s-era project that straightened and channeled the river to protect farmland from flooding. Originally designed to be 4.9 to 6 m (16 to 20 ft) wide and 3 m (10 ft) deep, the North Sulphur River channel has expanded over the past century due to unchecked erosion. Prior to mitigation, the channel stretched more than 110 m (350 ft) wide and 20 m (60 ft) deep, causing bridge failure and ecological decline.

To reverse these unintended effects, UTRWD organized a team to design and construct natural stream channels that integrate hydrologic features and mirror historic flow paths.

"I'd say 80% of the [restored stream] length is within the existing floodplain," said Dustin Fitzgerald, Site Construction Manager, in a release.

Construction included mapping the original North Sulphur River tributaries, creating new channels in those areas, and implementing natural flood control measures such as woody riffles, which consist of logs and gravel placed across the stream. The team also incorporated a diverse mix of native trees and shrubs to stabilize banks, shade the stream, and filter runoff, while also expanding riparian buffers to improve nutrient filtration and organic matter retention.

Full-flowing streams now range from approximately 0.5 to 0.9 m (1.5 to 3 ft) deep and 2 to 3 m (8 to 10 ft) wide.

A 7-year monitoring program will track ecological outcomes using several different models. These include the Stream Watershed Assessment and Measurement Protocol Interaction Model, which integrates hydrologic and biogeochemical function, water quality, and habitat information to evaluate overall stream conditions; the Rapid Geomorphic and Stability Assessment to document channel form and stability; and the Bank Erosion Hazard Index to assess erosion risk. Additional monitoring will include ongoing pool inspections for aquatic habitat quality and vegetation surveys to measure riparian plant community development.

"It's been a rewarding project," Fitzgerald said. "Seeing these streams come back to life and knowing the long-term benefits makes all the effort worthwhile."

For more information on the stream restoration efforts, visit lakeralphhall.com.

The tributaries of North Texas' North Sulphur River are flowing again following a 1920s-era river channelization project that caused modern erosion issues. The transformation was one of the largest of its kind in the state. Upper Trinity Regional Water District