

Evansville's \$13 million Bee Slough Relief Sewer Project involves building a 3,000-foot relief sewer to that will be used to drain the slough and prevent overflows. (Photography by Marc Lebryk)

# A NEW APPROACH TO OVERFLOW CONTROL

Renew Evansville will incorporate green infrastructure and alternative projects to manage combined sewer overflows

By *Jim Force*

**T**wenty-five years from now, rain events in Evansville, Indiana, will result in much less environmental damage than they cause today.

Instead of running off into an open sewer called Bee Slough, overwhelming the city's wastewater treatment plants, and pouring millions of gallons of untreated water into Pigeon Creek and the Ohio River, rain events will be managed through a comprehensive overflow control program called Renew Evansville.

The plan — agreed upon by the Evansville Water and Sewer Utility, EPA, and the state of Indiana in February 2016 — calls for the investment of \$729 million over the next 24 1/2 years to control combined sewer overflows. While overflow points will remain close to the 22 that exist now, the number of combined sewer overflows will be reduced from 50 to four per year. Based on typical rainfall data, overflows will total just 40 million gallons, down from 2 billion gallons

now, and CSO overflow capture rates will be increased to 98 percent from the current 35 percent. Bee Slough will be smaller and much cleaner, the city's two treatment plants will be upgraded

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– Lloyd Winnecke

and expanded, and green infrastructure — including what might be the nation's largest constructed combined sewer wetland — will reduce runoff from the urban area.

Director of utilities Allen Mounts and deputy director Mike Labitzke report the project is already in its first phase, with contracts awarded for inlet openings to be cut into the Bee Slough channel so it can be drained periodically to reduce stagnation and the associated odors.

“It’s smelly and unsightly,” Labitzke says of the slough that serves as a receptacle for more than 40 percent of the utility's sewer overflows, as well as the effluent from its East Side treatment plant.

“Plus, it runs right alongside the Veterans Memorial Parkway — a major roadway leading into the city from the southeast — and it’s close to a number of residences.”

## Compromise

Renew Evansville represents a compromise between the utility and environmental regulators hammered out over several years. Originally, the EPA wanted EWSU to reach a zero-discharge solu-

*(continued)*

## “The whole idea is to keep stormwater out of the sewer system in the first place.”

— Allen Mounts

tion (0 overflows), which would have required the utility to spend over a billion dollars to design and install a deep tunnel to capture and store the water. Evansville countered with a plan to spend around \$540 million to reduce overflow occurrences to 11 per year, with a stormwater capture of 92 percent.

Finally, after an analysis of the city’s ability to afford the remediation projects, the current plan was agreed upon.

Mounts says Evansville Mayor Lloyd Winnecke and state Department of Environmental Management officials were helpful in arriving at the compromise. “We had a difficult time convincing the authorities that the constructed wetlands would be effective and were a much less expensive way of meeting the requirements than the deep tunnel. Our mayor was actively involved in the discussions. Finally, we reached the point where we said, ‘this is it, and this is all we can do.’”

EWSU’s 24 1/2-year time frame differs from most U.S. cities’ 20-year plans, the mayor also noted. The extended time limit was negotiated to allow the city more time to fund the planned projects and reduce the rate increases that would have been greater throughout a 20-year period.

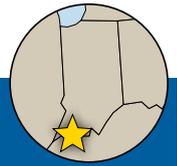
“Some cities are struggling to honor the terms of their federally mandated Consent Decrees, and we’re thankful that EPA worked with us to develop a mutually beneficial plan,” Mayor Winnecke said in a press release at the time. “After years of negotiation, (we) reached an agreement that’s great for our environment and less financially burdensome to the residents of Evansville than what the federal government proposed.”

### Plan elements

While the overflow control plan contains a number of elements the utility will be taking to reach discharge goals, the remediation of Bee Slough is the signature piece. That’s not only because of its visibility, but a citizen advisory council working with EWSU identified it as the top priority.

For years, the slough has served as a 1.1-mile-long channel for the collection of stormwater and combination sewer overflows, as well as treated effluent from the city’s East wastewater treatment plant. The slough is emptied into the Ohio River only when certain levels are reached and the local Levee Authority either opens its gates or pumps the water out. The water stagnates, and solids and sediment collect on the bottom, which must be removed by front-end loaders after the channel is emptied. Labitzke says the slough fills about 50 times a year, collecting nearly a billion gallons of combined sewer overflow annually — about half of the city’s total — which is discharged into the river.

(continued)



### PROFILE:

Evansville, Indiana,  
Water and Sewer Utility

### FOUNDED:

Water utility in late 1800s

### AREA AND POPULATION SERVED:

55 square miles, 180,000 people

### INFRASTRUCTURE:

830 miles of sewers,  
two wastewater treatment plants

### PROJECT:

“Renew Evansville” —  
integrated overflow control plan

### OBJECTIVE:

Reduce overflows to 98 percent, to  
no more than four occurrences per year

### COST AND TIMELINE:

\$729 million over 24 1/2 years.

### STAFF:

216 (Consolidated workforce for both  
water and sewer utilities, with many  
shared services)

### ANNUAL OPERATING BUDGET:

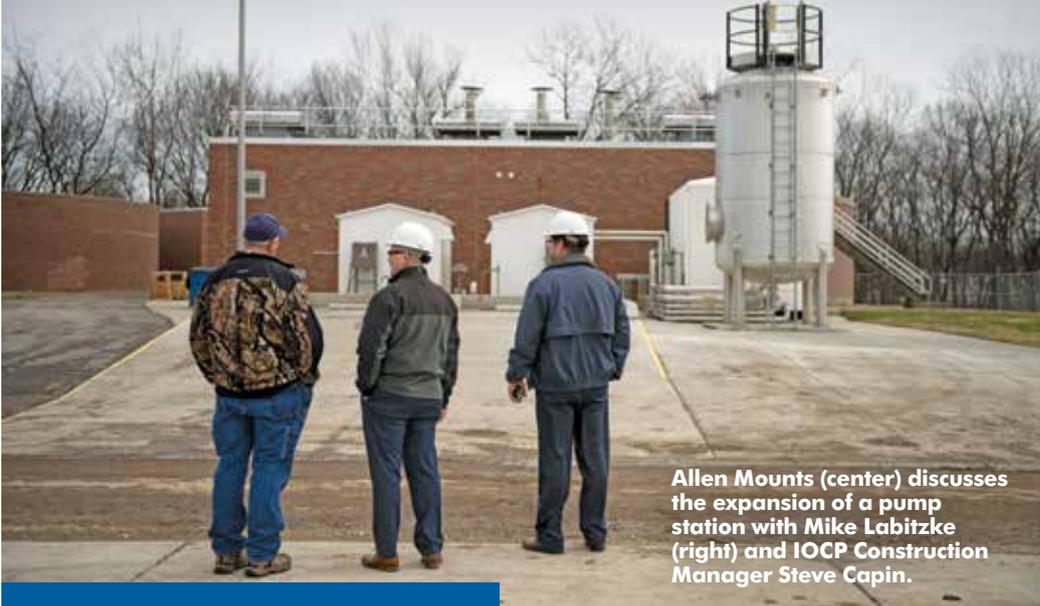
\$63 million

### WEBSITE:

[www.ewsu.com](http://www.ewsu.com)



Evansville Director of Utilities Allen Mounts (left) and Deputy Director of Engineering Mike Labitzke check work progress against the plans for the Bee Slough Relief Sewer Project. The 1-mile slough is an open concrete channel that carries wastewater overflow during wet weather events.



Allen Mounts (center) discusses the expansion of a pump station with Mike Labitzke (right) and IOCP Construction Manager Steve Capin.

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– Allen Mounts

Evansville is embarking on a project to construct its own effluent pumping station to transport treated effluent directly to the Ohio River instead of Bee Slough.

## CLEAR PATH TO SUCCESS

As the Evansville Water and Sewer Utility launches its huge stormwater control program, another project to improve the sewer infrastructure has been going on for the last six-plus years.

It’s called Clear Path, and it involves inspecting and cleaning all 630 miles of smaller sewer pipes (15 to 18 inches in diameter) as part of the utility’s CMOM (Capacity, Management, Operations and Maintenance) program. Deputy utilities director Mike Labitzke says the Clear Path project will wrap up this coming November, having examined and cleaned lines beneath backyards, alleys and easements that are often forgotten or overlooked.

To do the work, the EWSU deploys closed circuit TV trucks equipped with two CUES cameras and three Sewer Line Rapid Assessment Tools from Infosense. Cleaning is handled with four Vactor jet/vac trucks and two remotely operated easement machines that can extend hoses into private easements.

In some cases, old pipes are lined using the CIPP. The annual competitive bid project has involved several contractors including Insituform, Miller Pipeline and Layne Inliner.

As with the larger overflow control program, public outreach has been important. The utility’s Clear Path website ([www.ewsu.com/clearpath](http://www.ewsu.com/clearpath)) enables residents to see sewer lines on and around their property. Labitzke says it’s an educational tool to help people understand what might be in their backyard. “It helps people understand what’s around them.”



The situation will change soon. Currently, EWSU is constructing an interceptor sewer running parallel to the slough from Cass Avenue to Shawnee Drive. The 60-inch fiberglass pipe runs southeasterly for 3,000 feet. The new line is situated between homes and the slough, and will consolidate two CSOs and in the future will direct them to a satellite treatment location. For now, flow can be directed to a lift station and then the East treatment plant for treatment and disinfection. The current project — estimated at \$13.3 million — also includes the inlets that can be opened to drain the contents of the slough into the new sewer when necessary.

And while the interceptor is a key to eliminating the Bee Slough problem, it’s a double-edged sword, in Mounts’ words. “It backs up against neighborhoods and is highly visible,” he explains. “Neighbors are having to put up with the removal of many trees and 20 months of heavy construction in their backyards.”

### New pumping station

Next, the utility is embarking on a project to construct its own effluent pumping station to transport treated effluent directly to the Ohio River instead of the slough. The pump station is due for completion by 2019, and will be located near the East treatment plant. It will have a maximum capac-

ity of 68 mgd, including 40 mgd in reserve for treated effluent from the East treatment plant expansion and 28 mgd for pumping water from the satellite treatment facilities of Bee Slough.

“Construction of our own effluent pump station means we will be able to elevate and discharge treated water to the river without having to depend on the Levee Authority,” Mounts says.

The new pumping station will be just one of the improvements at the East treatment plant. “The plant is bottlenecked at the secondary stage,” says Labitzke. “The primaries can treat up to 40 mgd, and the agreement calls for expansion of the secondary train by 14 mgd (which would take it to 40 mgd capacity as well).”

He says the utility will hire a design firm to look at different technologies, including vertically configured aerated biofilters, which are in operation at the West plant. “They might be the solution,” he says, noting that the East plant is landlocked and a vertical treatment process would be best suited for that site. “We’re looking at a two- to three-story building, rather than additional aeration basins.”

The expansion will give the plant the ability to treat and then disinfect the first flush from the sewer system at the start of a rain event and before a CSO is activated. “When that project is finished,” says Mounts, “we’ll start seeing a real impact.”

## Wetlands

The wetlands, to be completed sometime in 2023, will be constructed next. At about 24 acres in size, they will be among the largest constructed combination sewer wetlands in the U.S., if not the world, Labitzke and Mounts believe. The wetlands will have the capacity to treat up to 42 mgd of overflow that will be settled, then “polished” with plants like bulrushes, sedges and prairie grass that take up pollutants and filter out metals, and finally disinfect. Water leaving the wetlands will return to Bee Slough and ultimately to the Ohio River.

Mounts says the wetlands solution followed extensive discussions with the EPA, convincing the agency that wetlands would work, and cost far less than brick-and-mortar solutions. “Wetlands were not among their set of solutions,” Mounts says.

Two associated projects include a 200 mgd pumping station to transport water to the wetlands, and a new 108-inch conveyance pipe to carry the CSO discharge under Bee Slough to the wetland pumping station. A new satellite vertical treatment and storage unit will also be installed to provide primary treatment and disinfection of up to 226 mgd of CSO discharge from the 60-inch consolidation sewer built previously. (The lift station directing water to the plant would be abandoned at this time.)

## Green solutions

In addition to the wetlands, the EWSU is looking to other green solutions to help reach their ambitious overflow control goals. In the downtown area, public as well as private spaces are being modified to include such features as permeable pavement, curb bump-outs to capture and infiltrate runoff, rain gardens, infiltration beds beneath surface parking lots, and more. “The whole idea is to keep stormwater out of the sewer system in the first place,” Mount says.

He says current green infrastructure projects total about \$9 million thus far, with more scheduled in the next few years. “We hope to have an entirely green street downtown.”

A key to implementing these solutions is getting the private sector to buy in. Evansville is using public-private partnerships to accomplish that, through public outreach and incentivizing private sector owners to include green infrastructure in their buildouts.

The program is known as the Green Infrastructure Participation Plan, and the utility has placed a higher priority for green infrastructure projects in the downtown area. For approved projects, the utility will pay a one-time 20-cents-per-gallon incentive for every gallon of stormwater redirected away from the combined sewer system.

Engineering projections and post-construction testing are being used to validate projects by the annual volume of stormwater that will be redirected. Future maintenance costs are often split between the property owner and EWSU, with the EWSU completing the underground maintenance and the property owner completing the surface maintenance.

“Public outreach is very important,” Mounts says. “I think our team has been really creative, using YouTube videos; our Leadership Evansville program, which develops community leaders; Twitter; and the mayor’s Facebook page. As well, the media have done a good job of reporting on the project.”

And while the community of Evansville is the main target of the utility’s message, the whole nation may be watching. The EWSU’s overflow control project could well be a textbook example of how a medium-size city can effectively address CSOs and stormwater runoff by combining green and grey solutions, and engaging the public, at an affordable cost. ♦

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