This story was made possible by a grant from the Z. Smith Reynolds Foundation to examine environmental health issues in North Carolina.

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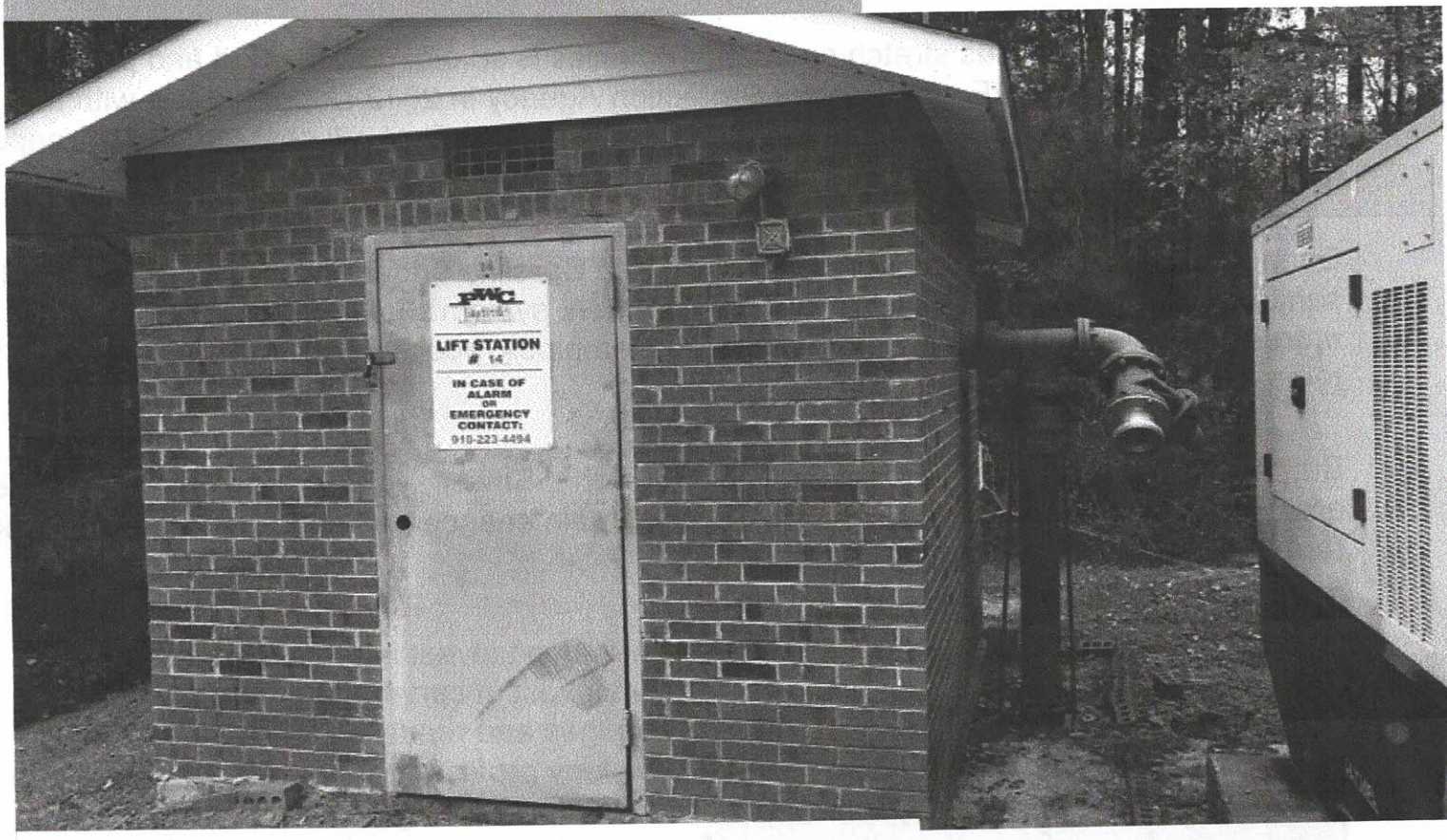


Aging Sewer Systems Spell Trouble Across North Carolina

An estimated 242,012 gallons of raw sewage spilled from this pump station off Three Wood Drive near Fayetteville during Hurricane Florence. Photo credit: Greg Barnes

November 27, 2018 by Greg Barnes Leave a Comment

A state master plan says up to $11 billion is needed to fix sewer systems and stop overflows, but in some cities and towns, little money is available to make even basic repairs.

By Greg Barnes

On its surface, Eden is much like any other small city in North Carolina, friendly, laid back and reeling from the loss of textile and manufacturing industries.

It's below the surface where the real problems lurk.

A labyrinth of sewer lines stretching about 180 miles is so old, deteriorated and poorly designed that the U.S. Environmental Protection Agency in 2012 slapped Eden with an administrative consent order to fix its entire sewer system. That will cost the cash-strapped city, near the Virginia border in western North Carolina, more than $33 million.

Eden is now the only city, county or town in North Carolina under an EPA order to stop all sanitary sewer overflows — a wastewater treatment system's unintended release of untreated sewage, commonly the result of broken pipes, poor design, extremely heavy rains or blockage caused by grease or debris.

But this city of about 15,000 people is far from alone. Sewer systems throughout the state are crumbling, largely because of age, deferred maintenance and a lack of money to make repairs or lay new sewer lines.

"We don't invest in storm systems the way we invest in certain other things," such as bridges and roads, said Larry Cahoon, a biology professor at the University of North Carolina-Wilmington. "Some of that is just what the public is willing to pay for. Sewer systems tend to be invisible. You flush the toilet and you never see it again … It's not going to get fixed until it's a disaster."

The state Department of Environmental Quality estimates that it will cost as much as

A cover for a municipal sewer access point. Municipal sewer systems transport human waste from homes and businesses, and treat it in centralized wastewater plants. But most folks don't think about where it all goes after they flush. Photo courtesy Wikimedia Commons

$11 billion to fix sewer systems statewide over the next 20 years.

Under the state's open records laws, N.C. Health News asked the state Department of Environmental Quality for all reported sanitary sewer overflows from Jan. 1, 2012 through Oct. 17 of this year. State law requires overflows of more than 1,000 gallons to be reported within 24 hours. Overflows that reach rivers, streams or other surface waters must also be reported within 24 hours, regardless of volume.

An analysis of the DEQ's records found that 8,510 sanitary sewer overflows were reported during that nearly seven-year span, spilling 432 million gallons of untreated sewage. Of that, the records show, 332 million gallons reached surface waters.

To put those numbers into perspective, 400 million gallons of sewage would fill 200 1-acre ponds to a depth of about 6 feet.

Of the 324 permitted WQCS facilities listed on the DEQ master list and map, 285 had some sort of overflow listed in the Sanitary Sewer Overflow data document. These are shown with a dot on our map, where you can click to see information about the water system and number of overflows.

1.7 billion gallons of sewage released

The DEQ's records show that 18 of the state's sewer systems had more than 100 overflows, including Eden with 173.

Charlotte had the most with 999, but the city's total release of 26 million gallons of sewage into surface waters was substantially less than some systems serving far fewer people. Johnston County had 45 overflows resulting in 57 million gallons of sewage reaching surface waters, the records show, while Kinston had 18 overflows with 46 million gallons reaching surface waters.

The state also requires municipalities to track wastewater treatment system bypasses. Sewer systems routinely become overwhelmed by extremely heavy rains, causing them to divert — or bypass — raw sewage from treatment until the plants can catch up.

The state provided figures for sewer system bypasses from Jan. 1, 2012 through Oct. 17 of this year. They show that 902 bypasses resulted in 1.7 billion gallons of untreated sewage being released during that time frame, with just over a billion gallons reaching surface waters.

A view of Little Sugar Creek, which runs through the urban heart of Charlotte to South Carolina. Sewer overflows have repeatedly caused raw sewage to spill into Little Sugar Creek and other streams in Charlotte. Photo Credit: Yen Duong

Hurricane Florence in September of this year, followed by Tropical Storm Michael a month later, account for some of the sewage discharges caused by bypasses. Figures from DEQ show that 79 bypasses happened between Sept. 14 and Oct. 16, a time period that includes the two storms. Those bypasses resulted in the release of nearly 50 million gallons of untreated sewage. The figure is lower than what actually was released because many municipalities couldn't determine the amount that spilled.

There's an old saying in the sewer industry: "dilution is the solution to pollution." The 30 inches of rain that fell during Hurricane Florence minimized health or environmental damage from the release of raw sewage, but experts in the field say any discharges are never good. Overflows potentially degrade water quality and threaten human health and wildlife.

'Not rocket science'

During and after Hurricane Florence, more than a half million people, most in southeastern North Carolina, were advised to boil their water because of contamination, much of it coming from sewage overflows or bypasses.

Cahoon, the UNC-Wilmington biology professor, said he wasn't surprised by the amount of raw sewage that escaped during the storms. Much of it is unavoidable, he said.

Explore further: *Scroll to the bottom of the story to see data documents on sanitary sewer overflows that NC Health News received from the Department of Environmental Quality.*

"A storm like this is a tremendous challenge," Cahoon said. "Stuff is going to happen."

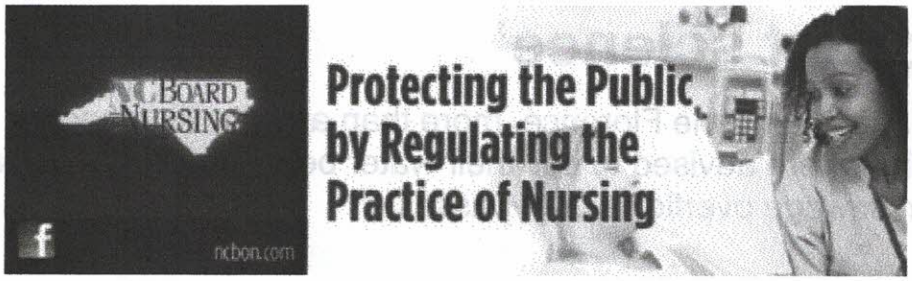
But Cahoon and other researchers say sanitary sewer overflows caused by disrepair or poor maintenance can and must be prevented by providing enough money so municipalities can fix the problems.

To do that wouldn't be cheap, or sexy, to a politician. Residents probably wouldn't support a tax increase to pay for it, largely because the problems aren't visible.

"Nobody's going to go for that, ever," said Rachel Noble, a UNC-Chapel Hill professor at the Institute of Marine Sciences in Morehead City.

Yet the consequences of doing little to nothing could be much more severe.

"It's only going to get worse if we do nothing," said Joel Decoste, a professor in the civil, construction and environmental engineering department at N.C. State University. "This is clearly not rocket science. We have simply got to invest in our infrastructure, otherwise we will be paying the price."



Eden is just one example of a vast number of aging and leaking sewer systems that can be found throughout the state. Eden's sewer pipes, some more than 80 years old, are constructed largely of terracotta, cast iron or something called Orangeburg, layers of wood pulp and pitch pressed together. Orangeburg was first used in the late 1800s.

Industry exodus

In its heyday, Eden was a vibrant small city nestled along the banks of the Dan River. Then came the loss of the city's lifeblood, its textile industry.

Mike Daugherty, Eden's economic development director, can tick off from memory the names and dates of textile industries that have left the city. Pluma Inc. in the late 1990s; Spray Cotton Mills in 2001; Fieldcrest Mills in 2003; Parkdale Mills in 2007; HanesBrands Inc. in 2008.

All of those industries used a lot of water, enough to help make the city's water and sewer systems self-sustaining and keep rates low for residents.

But their leaving paled compared with the loss of MillerCoors in December 2016. The brewery, which started as the Miller Brewing Co. in 1978, once employed about 1,500 workers. When it closed, employment had dropped to 520, still a sizeable workforce for any small city.

It wasn't just the high-paying jobs that MillerCoors provided. The company also used a tremendous amount of city water to brew its beer, and the city processed its wastewater. City officials estimate that MillerCoors generated $1 million in annual water and sewer revenues for Eden.

The city's sewer woes, however, existed long before MillerCoors left.

In 2007, documents show, the state's then-Department of Environment and Natural Resources issued a consent order to get the city to fix its sewer system.

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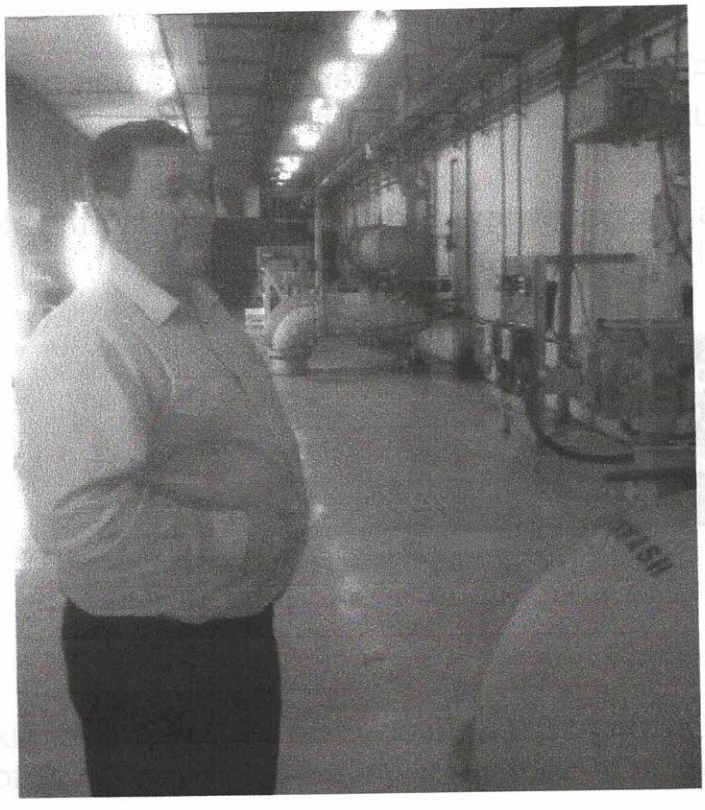
The order cited "frequent and repetitive" sanitary sewer overflows. The order indicates that the city had been making repairs to its sewer system at least since 2004.

In 2009, the state lifted the order, saying Eden had met all of its "requirements and deadlines."

The EPA didn't see it the same way. Two years after the state's order was lifted, the EPA placed the city under its own consent order, the one that will cost $33 million to make the necessary sewer upgrades by 2022.

About half of the money will come from a grant and the other half from a no-interest loan, both made possible through the $2 billion Connect NC Bond that voters overwhelmingly approved in 2016. More than half of the bond money was earmarked to improving the state's college system. Only 15 percent — about $309 million — went to water and sewer projects.



Partly as a way to repay the loan, Eden, with a population of around 15,000, has raised water and sewer rates 82 percent for residents living inside the city limits and 108 percent for customers outside of it, said Terry Shelton, Eden's public utilities director.

'Ridiculous' water rates

Robert Artis, 73, has lived in Eden his entire life. He said he made a decent living and can afford to pay his utility bills. But he wonders how others get by in a city where 31 percent of residents live below the poverty line.

Terry Shelton, the director of environmental services for Eden, explains the treatment process at Eden's drinking-water plant. Photo: Gabe Rivin

"I really don't see how minimum wage people make it," Artis said.

City officials said they know the increases in utility costs have caused a lot of frustration and anxiety. Residents have told them as much.

"Water bills are ridiculous," Lynn Hill said as she prepared to go grocery shopping at the Save-A-Lot.

Eden officials say they don't know why the city was singled out by the EPA when so many other communities have the same sewer problems.

A document from WK Dickson, the engineering consultants working with the city, says the EPA's Region 4, which consists of North Carolina and six other Southeastern states, was preparing to issue consent orders for most sewer systems serving populations of greater than 100,000 by 2016. Afterward, the document says, all systems serving between 50,000 and 100,000 people would fall under a consent order, and so on.

That never happened.

Davina Marraccini, a spokeswoman for EPA's Region 4, said Eden became a part of an EPA national enforcement initiative to reduce sanitary sewer overflows.

"These were prioritized because overflows of raw sewage and contaminated stormwater can pose risks to both human health and the environment," Marraccini said.

The EPA's initiative became effective in 2011 and expired two years later, documents show.

Of the thousands of sewer systems in the Southeast, Marraccini said only Eden and six other cities are currently under an EPA consent order. Like some other cities, Wilmington's

Cape Fear Public Utilities Authority had been under one, but it was lifted this year after the city made significant sewer system upgrades.

Those upgrades came after the EPA in 2013 filed a consent order and levied $300,000 in civil penalties against Wilmington, New Hanover County and the Cape Fear Public Utility Authority, which took over the area's water and sewer systems in 2008 because of the problems and quickly began making improvements.

"Through this agreement, the Authority, the City of Wilmington and New Hanover County are taking positive steps in correcting long-standing sewage overflow problems," EPA acting Regional Administrator Stan Meiburg said at the time. "Ultimately, this will benefit the local community and improve water quality in the Cape Fear River watershed."

Like Eden, the state had issued its own consent order to make sewer repairs in New Hanover County and then lifted it before the EPA stepped in. A federal judgeterminated the EPA's order in June of this year after finding that the authority had complied with all of its conditions.

Before the EPA issued its consent order, the Cape Fear Public Utilities Authority had spent $27.1 million in sewer improvements, said Beth Eckert, CFPUA's environmental and safety management director. The order resulted in another $85 million worth of work on the aging sewer system, Eckert said.

Although Wilmington managed to get some grants and low-interest loans, most of the costs fell on the utility's customers in the form of much higher water and sewer rates, she said.

The EPA consent order proved to be a painful experience, Eckert said, but its objective worked. From the 2013 through 2017 fiscal years, the number of the utility's sanitary sewer overflows fell 56 percent, and its volume of raw sewage released dropped by 94 percent.

Despite the improvements, Eckert acknowledged that Hurricane Florence caused the utility a high number of sewer overflows, largely in areas that hadn't experienced them before.

Smaller cities struggle most

Although sanitary sewer overflows are common in large cities, it's the small, rural municipalities that are really struggling, said Kim Colson, the director of the DEQ's Division of Water Infrastructure.

Most major cities have the means and the money to make repairs on their sewer systems, while many rural cities have to use general funds to bail out water and sewer services that are supposed to be self-sustaining. Some rural towns are so small, Colson said, that they cannot even afford to hire a utilities director.

As a consequence, he said, many have deferred maintenance, struggling just to mend broken pipes on sewer systems that were built in the 20s and 30s. Some were designed mainly to keep sewage from backing up into towns. Some released untreated sewer into creeks and rivers.

A lot of rural systems are "not meeting today's performance standards," Colson said. "It's decades and decades and decades of infrastructure put in prior to those expectations."

A view of the washout on Middle Sound Loop Road in Wilmington on Sept. 20, 2018 with pipes exposed. The challenges facing water system managers after storms come from both overflows and damage to infrastructure. Photo courtesy: NC Department of Transportation

The state hopes to accelerate efforts to combine sewer services in small, nearby towns with the belief that a larger customer base will provide more money for improvements.

Big cities have their share of problems, too. This month in Raleigh, heavy rains caused 7 million gallons of sewage to spill into streams or their tributaries, according to the Raleigh News & Observer. The city's Public Utilities Department had requested a 3 percent increase in water and sewer rates to repair more sewer lines, but the City Council granted only a 1.6 percent increase.

Up to $26 billion needed for water and sewer repairs

North Carolina isn't alone in its problems with aging sewer systems. Last year, a report card by the American Society of Civil Engineers gave the nation a "D+" on wastewater

infrastructure, saying demand on sewer systems will grow by 23 percent by 2032 as private septic systems continue to be phased out.

The society gave North Carolina a "C" on its last report card for the state in 2013. Though better than some states, the grade is not as good as for others.

"Many utilities are not covering their operating expenses, making it extraordinarily difficult to rehabilitate aging infrastructure, save for operating emergencies, finance system improvements and expansion," according to the report for North Carolina.

The state has begun to recognize the problem. In 2013, the General Assembly approved a statute to create the State Water Infrastructure Authority, which is now under DEQ.

The nine-member authority was established to assess the state's water and sewer infrastructure needs, the role of the state in funding those needs, and the funding programs available to local governments and utilities.

The authority was also responsible for developing a state water infrastructure plan, a task that resulted in 2017 in "North Carolina's Statewide Water and Wastewater Infrastructure Master Plan: The Road to Viability." The master plan has received accolades from EPA and other states.

Among its findings: Capital cost estimates for statewide water system needs over the next 20 years conservatively range from $10 billion to $15 billion; for sewer system needs, $7 billion to $11 billion.

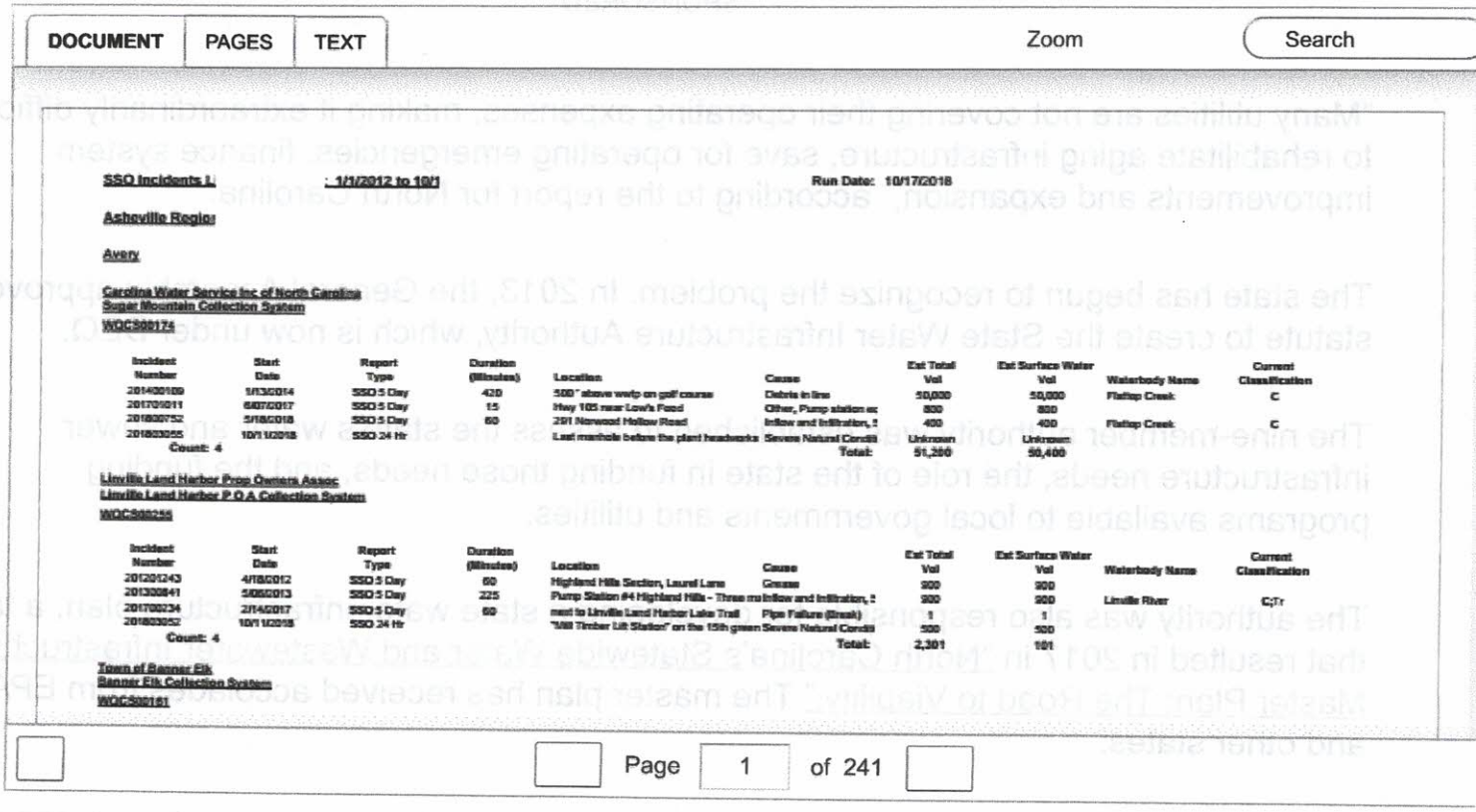
"Infrastructure investments that have been deferred year after year result in an infrastructure gap or deficit," according to the master plan. "The owners of utilities and other water professionals must be prepared to invest in their economic future by taking the steps needed to address infrastructure challenges and keep North Carolina ahead of other states in economic development."

But the authority also acknowledges that grants can meet only 7 percent of the state's drinking water infrastructure needs and 8 percent of its sewer infrastructure needs.

"The remaining needs – 92% for wastewater and 93% for drinking water – must be funded by the utility providers," the master plan says. "If not funded, these add to the backlog of infrastructure investments that continue to be deferred."

Colson acknowledged that it will be left largely up to residents of each city and town to pay for water and sewer system improvements in the form of higher utility bills. Many municipalities have been reluctant to do that, he said.

Others, such as Eden and Wilmington, were left with no choice.



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SSO Incidents L : 1/1/2012 to 10/1 Run Date: 10/17/2018

Asheville Regio

Avery

Carolina Water Service Inc of North Carolina
Sugar Mountain Collection System
WQCS00174

Incident Number	Start Date	Report Type	Duration (Minutes)	Location	Cause	Est Total Vol	Est Surface Water Vol	Waterbody Name	Current Classification
2014020109	1/13/2014	SSO 5 Day	420	500' above wwtp on golf course	Debris in line	50,000	50,000	Flattop Creek	C
2017010911	6/07/2017	SSO 5 Day	15	Hwy 105 near Lowe's Food	Other, Pump station ec	800	800		
2018007752	5/18/2018	SSO 5 Day	60	291 Norwood Hollow Road	Inflow and Infiltration, !	400	400	Flattop Creek	C
2018020255	10/1 1/2018	SSO 24 Hr		Last manhole before the plant headworks	Severe Natural Condit	Unknown	Unknown		
Count: 4					Total:	51,200	50,400		

Linville Land Harbor Prop Owners Assoc
Linville Land Harbor P O A Collection System
WQCS00256

Incident Number	Start Date	Report Type	Duration (Minutes)	Location	Cause	Est Total Vol	Est Surface Water Vol	Waterbody Name	Current Classification
2012021243	4/18/2012	SSO 5 Day	60	Highland Hills Section, Laurel Lane	Grease	900	900		
2013008941	5/06/2013	SSO 5 Day	225	Pump Station #4 Highland Hills - Three ma	Inflow and Infiltration, !	900	900	Linville River	C;Tr
2017009234	2/14/2017	SSO 5 Day	60	next to Linville Land Harbor Lake Trail	Pipe Failure (Break)	1	1		
2018003052	10/1 1/2018	SSO 24 Hr		"Mill Timber Lift Station" on the 15th green	Severe Natural Condit	500	500		
Count: 4					Total:	2,301	101		

Town of Banner Elk
Banner Elk Collection System
WQCS00181

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State data on sanitary sewer overflows taking place in North Carolina between 2012 and late 2018. State law requires overflows of more than 1,000 gallons to be reported within 24 hours. Overflows that reach rivers, streams or other surface waters must also be reported within 24 hours, regardless of volume.

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