Wastewater Collection & Resource Recovery Report

Raleigh Water

2024-2025

raleighnc.gov

Raleigh

Wastewater systems have undergone significant transformation, evolving from rudimentary designs in the 1800s to the intricate and advanced systems in use today. While the fundamental purpose has always been to collect and transport human waste away from populated areas to safeguard public health, early systems simply discharged wastewater into nearby streams. Modern wastewater systems are now tasked with protecting both public health and the environment.

A pivotal moment for environmental protection in wastewater management was the U.S. Congress's passage of the Clean Water Act in 1972. This landmark legislation established environmental protection as a performance benchmark for all wastewater systems. Even before this act and consistently since, Raleigh Water's wastewater system has operated with the dual standard of protecting public health and the environment.

This report details the performance of Raleigh Water's three wastewater treatment plants — Neuse River Resource Recovery Facility (NRRRF), Smith Creek Resource Recovery Facility (SCRRF) and Little Creek Resource Recovery Facility (LCRRF) — as well as the wastewater collection system. The reporting period covers July 1, 2024, through June 30, 2025.

For more information about the wastewater collection system or treatment facilities, contact Raleigh Water at 919-996-3245 or visit **www.raleighnc.gov/water**.

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Collection and Treatment Services

Raleigh Water provides wastewater collection and treatment services for areas within the City's corporate limits and many areas in the City's Extraterritorial Jurisdictional area (ETJ). Raleigh Water also provides wastewater collection and treatment services for Garner, Rolesville, Wake Forest, Knightdale, Wendell and Zebulon. Temporary contracts are also in place to treat specific amounts of wastewater from the Towns of Clayton, Middlesex and Johnston County.

Wastewater Collection System

The wastewater collection system functions primarily by gravity flow and it consists of approximately 2,711 miles of pipeline ranging in diameter from six inches to eight feet. For this reporting period an average of 51 million gallons per day (MGD) of wastewater traveled through the sanitary sewer collection system to our three Resource Recovery Facilities.

The sewer pipes of the collection system are connected by a series of sewer manholes needed for maintenance and access. Manholes in the street are level with the pavement, while manholes near streams are built higher to minimize impacts during flood events. Some pipes, known as sewer aerials, are exposed above the ground often crossing streams or other low-lying areas. Ventilation is necessary at most manholes and is provided through vent holes in the lids or separate vent stacks. Although the collection system functions primarily by gravity, 125 pump stations are necessary to keep the wastewater flowing to the Resource Recovery Facilities. Raleigh Water also uses odor control systems on many large volume lift stations and manhole vents near public greenways to improve air quality in these areas.

In order to continually improve our sewer services, the Sewer Maintenance Division fully implemented an ISO 14001:2015 Environmental Management System (EMS). The Sewer Maintenance Division's EMS is a commitment to prevent pollution through continual improvements in environmental performance and compliance with all regulatory requirements, by identifying aspects of activities having significant environmental impacts, setting performance objectives and targets and establishing standards and training for staff, including metrics for measuring performance. These processes allow the Sewer Maintenance Division to operate the collection system in a sustainable manner while contributing to the economic, social and environmental vitality of the communities it serves.

Sanitary Sewer Overflows (SSOs)

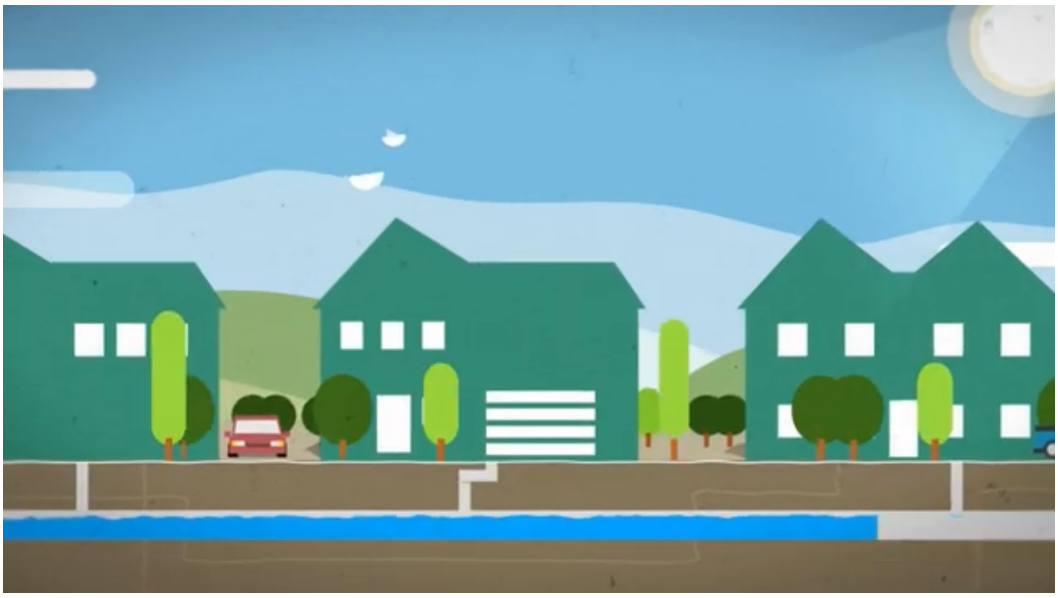
Sanitary sewer overflows (SSOs) occur when blockages in the collection system cause sewage to come out of the sewer collection system, which is usually at manhole locations.

During the period from July 1, 2024, through June 30, 2025, the collection system experienced 28 SSOs that were considered reportable, meaning 1,000 gallons or greater or that reached surface waters.

Raleigh Water continues to pursue its goal of reducing the number of SSO's by investing millions of dollars to replace sewer lines in poor condition, employing a fleet of 17 sewer flusher trucks to clear blockages and proactively maintaining pumping equipment to reduce the chance of failure. Debris can be such items as rags, paper towels, "flushable" wipes, feminine hygiene products, etc., all of which are illegal to discharge into the sanitary sewer system. Cooking grease is also not appropriate to pour down the drain as it quickly congeals underground and creates blockages.

Raleigh Water has an ongoing education program to educate residents and business owners regarding the need to keep grease and other inappropriate materials out of the sewer system.

This year, our team maintained an SSO rate of 1.03 and is a key indicator of our operational efficiency in preventing sanitary sewer overflows. Raleigh Water also continued our vital work in asset management, inspecting a total of 1,379 easements, which includes 1,074 sewer and 305 water easements. These easements are crucial for ensuring we have access needed to maintain and repair our utility lines.



A proactive approach has also been a focus, with our crew successfully flushing 441 miles of sewer lines, representing about 16% of our entire system. This effort helps to prevent blockages and maintain the overall function of our wastewater network.

The chart below details the number of reportable sanitary sewer overflows (SSOs) that occurred during the last fiscal year.

Date	Location	Estimated Volume	SSO Root Cause
2024-08-09 09-31 AM	716 Pebblebrook Dr Raleigh, NC 27609	2450	Roots
2024-08-23 06:23 AM	3400 Fernwood Dr Raleigh, NC 27612	675	Grease
2024-08-24 04:51 PM	701 Harris Rd Wake Forest, NC 27587	615899	Grease
2024-08-26 01:33 PM	417 Gardner St Raleigh, NC 27607	365	Asset Failure
2024-09-09 08:06 AM	1523 Crest Rd, Raleigh NC 27606	870	Grease
2024-10-12 07:05 PM	620 Cutler St Raleigh, NC 27603	100	Roots
2024-10-21 08:23 AM	8120 Owenston Ct Raleigh, NC 27612	1210	Vandalism
2024-10-22 12:52 PM	1815 Lake Wheeler Rd Raleigh, NC 27603	31900	Grease
2024-10-30 08:01 AM	2709 Benson Rd Garner, NC 27529	13500	Contractor Damage
2024-11-18 08:55 AM	1521 Graduate Ln Raleigh, NC 27606	22500	Grease
2024-11-27 03:28 PM	2600 Bristol Pl, Raleigh, NC 27610	3200	Grease
2024-12-22 12:49 PM	1318 New Bethel Church Rd Garner, NC 27529	6780	Asset Failure
2024-12-30 12:19 PM	517 Parks Village Rd Zebulon, NC 27597	17194	Asset Failure

2025-01-16 07:33 PM	543 Green Willow Ci Wendell, NC 27591	832	Debris
2025-01-19 08:50 AM	3423 Turnbridge Dr Raleigh, NC 27609	7500	Roots
2025-02-18 09:26 AM	1200 Springview Trl Garner, NC 27529	1890	Grease
2025-02-24 02:53 PM	2220 Fox Ridge Manor Rd, Raleigh, NC 27610	6232	Debris
2025-02-25 11:36 AM	612 Frank St, Raleigh, NC 27604	23	Debris
2025-03-03 09:11 AM	7048 Knightdale Blvd, Knightdale, NC 27545	1530	Contractor Damage
2025-03-27 10:26 AM	1705 W Garner Rd, Garner, NC 27529	1775	Roots
2025-03-30 07:16 PM	4901 Arkose Dr Raleigh, NC 27610	1365	Debris
2025-04-10 07:17 AM	705 Bragg St Raleigh NC 27610	2940	Debris
2025-04-10 07:27 AM	101 Teresa Dr Rolesville, NC 27571	3105	Asset Failure
2025-04-10 12:15 PM	12116 North Exeter Way Raleigh, NC 27613	13650	Contractor Damage
2025-06-05 12:30 PM	1901 Clark Ave Raleigh, NC 27605	1250	Asset Failure
2025-06-15 09:30 AM	1611 Buffaloe Rd Garner, NC 27529	82000	Asset Failure
2025-06-17 12:58 PM	1930 Alexander Rd	365	Debris
2025-06-20 12:50 PM	8020 Knightdale Blvd	12000	Asset Failure

Resource Recovery

The Resource Recovery Division includes three "wastewater treatment plants," and other facilities that produce beneficial reuse products that are generated from the treatment process. The Neuse River Resource Recovery Facility (NRRRF), Smith Creek Resource Recovery Facility (SCRRF), and the Little Creek Resource Recovery Facility (LCRRF) process and treat wastewater for approximately 630,000 residents each day.

At our resource recovery facilities, wastewater is treated both physically and biologically. As the wastewater enters the plant it goes through the area called preliminary treatment which is a physical process to remove debris, sand, and other inorganics that can't be biologically treated.

The first stage of treatment is referred to as primary treatment and is a physical process to remove the settleable and floatable organics. The second stage of treatment is a biological process referred to as "activated sludge" in which microorganisms consume organic matter (suspended and dissolved) and convert ammonia nitrogen to nitrogen gas through the process of nitrification/denitrification.

The microorganisms are separated from the treated water by secondary clarification and returned to the biological process. In the final stage, the clarified water is filtered by sand filters and disinfected by UV disinfection before it is metered and returned to the Neuse River. Ultimately, the goal for each resource recovery facility is to produce outstanding treated water that protects downstream communities and the aquatic environment of the Neuse River.

The table below represents our permit limits and how our facilities performed during the review period:

Parameter	Permit Limit	Neuse River Resource Recovery Facility	Little Creek Resource Recovery Facility	Smith Creek Resource Recovery Facility
Ammonia-Nitrogen (mg/L)	2.00/1.00/1.0	0.16	0.31	0.13
Fecal Coliform (col/100mls)	200	2.8	1.0	1.1
Biological Oxygen Deman (mg/L)	5.00	0.7	0.2	1.1
Total Suspended Solids (mg/L)	30.00	0.6	0.1	1.6
Total Phosphorous	2.00/1.00/2.0	1.19	0.22	0.29
Total Nitrogen (annual pounds)		Permit Limit 713,373 pounds	Permit Limit 26,660 pounds	Permit Limit 70,814 pounds
		Actual Pounds 309,475	Actual Pounds 5,034	Actual Pounds 40,695
Average Daily Flow (MGD)	75.0/2.20/3.0	50.69	1.13	2.56

Neuse River Resource Recovery Facility (NRRRF)

The NRRRF was designed to serve the City of Raleigh and surrounding communities. The facility is located in Wake County, approximately 12 miles southeast of Raleigh, near the Johnston County line and currently has a treatment capacity of 75 million gallons per day (MGD).

The NRRRF did not experience any permit (NC0029033) performance violations during the reporting period, while treating approximately 50.7 million gallons of wastewater per day. Through improvements and continued excellent operation of the facility, the NRRRF has had 22 consecutive years of 100% compliance, resulting in the facility's Platinum Award issued by the National Association of Clean Water Agencies.

The biosolids treatment process is being converted from aerobic digestion to anaerobic digestion, a conversion that will provide a renewable fuel source for approximately 70 natural gas-powered vehicles in the City's bus fleet and reduce overall biosolids volume by approximately 50%. The reduction in biosolids volume will significantly reduce the City's carbon footprint through a reduction in hauling and handling services.

Smith Creek Resource Recovery Facility (SCRRF)

The Smith Creek Resource Recovery Facility was designed to serve the Town of Wake Forest and was transferred to the City of Raleigh on July 1, 2005.

The plant is located in Wake Forest, approximately 14 miles north of Raleigh and operates with a treatment capacity of 3.0 MGD with plans to increase capacity to 4.0 MGD. The SCRRF did not experience any NPDES permit (NC0030759) performance violations during the past fiscal year, while treating an average of 2.6 MGD of wastewater.

As a result of the SCWWTP maintaining 100% compliance, it received the Platinum Award, which is issued by NACWA for 20 consecutive years of compliance.

Little Creek Resource Recovery Facility (LCRRF)

The LCRRF was designed to serve the Town of Zebulon and was transferred to the City of Raleigh on October 1, 2006. The plant is in Zebulon, approximately 24 miles east of Raleigh, and operates with a capacity of 2.20 MGD. The LCRRF did experience one NPDES permit (NC0079316) violation of ammonia in March 2025. The facility treated an average of 1,1 MGD of wastewater. The LCRRF earned the NACWA Platinum Award for the calendar year 2024 with no discharge violations since 2015

Reuse Water Program

An Evolving Role: From Drought Resilience to Nutrient Management

Reuse or reclaimed water [used interchangeably] is defined in North Carolina as effluent from a wastewater treatment plant that is treated to an exceptionally high level. Traditionally, reuse or reclaimed water has been utilized primarily to replace potable water in applications where non-potable water is sufficient such as golf course irrigation and industrial cooling towers. Following the severe droughts of 2002, 2005 and 2007, the construction of a reuse water system was an important part of the City's overall strategy to reduce potable water demand and improve drought resilience. This benefit remains a critical element of the City's future drinking water supply plans, as there is also potential to use direct potable reuse water at the Dempsey E. Benton Water Treatment Plant to augment current drinking water resources.

Reuse Water Tank on Sunnybrook Road

Additionally, due to a federally promulgated nutrient management strategy implemented in 2003 for the Neuse River basin, reuse water has increasingly become a highly valuable tool to help municipal wastewater treatment facilities comply with federal rules. The Neuse River nutrient management strategy strictly limits nutrient (total nitrogen) discharges from wastewater sources such as the Neuse River Resource Recovery Facility. The City of Raleigh was allotted a total nitrogen allocation, or total maximum discharge limit (TMDL), which translates to a total nitrogen poundage limit on an annual basis. In response, Raleigh Water upgraded its treatment facilities to comply with the requirements and has been a national leader in nitrogen removal performance. The ongoing expansion of the reuse system is also a crucial part of this effort, as it diverts treated wastewater and the associated nitrogen poundage from being discharged to the Neuse River.

Reuse Distribution System

The NRRRF uses reuse water for irrigation of the agricultural land that serves the facility. From July 1, 2024, to June 30, 2025, approximately 26 million gallons of reuse water were used to irrigate cropland. The reuse system has bulk reuse water loading stations at the Neuse River Resource Recovery Facility and Little Creek Resource Recovery Facility. Bulk distribution of reuse water allows certified landscape contractors or citizens to obtain reclaimed water at no cost provided they will transport and responsibly use the reclaimed water for approved purposes.

The location of the bulk reuse facilities is as follows:

- Neuse River RRF - 8500 Battle Bridge Road, Raleigh, North Carolina
- Little Creek RRF HWY 39 (behind the Mudcats Stadium), Zebulon, North Carolina

The Raleigh Water service area system also includes a reuse pipeline distribution system and an elevated storage tank. Reuse water is provided to North Carolina State University for use at their main campus for non-potable demands.

Raleigh Water also operates the Zebulon service area reclaimed water distribution system, which takes treated effluent from the Little Creek Resource Recovery Facility and provides the product to six permitted customers through 21,400 linear feet of distribution pipe and a 250,000-gallon elevated storage tank. The following chart shows the total amount of reuse water distributed by the various reuse systems for the reporting period of July 1, 2024, through June 30, 2025.

NRRRF Bulk Reuse Flow	LCRRF Reuse Distribution Flow (includes bulk)	NRRRF Reuse Irrigation Flow	NRRRF Reuse Distribution (off-site)
1,315,989	36,367,012 gal	26,036,000 gal	186,362,795 gal

Biosolids Program

Sludge is a by-product of all wastewater treatment plants. Biosolids are defined as treated, stabilized sludge and are produced at two of the City's wastewater treatment plants. The City of Raleigh beneficially reuses these biosolids by processing them into products that can be utilized by local farmers, landscapers and homeowners on both public and privately owned land. Close monitoring of these biosolids product constituents, environmental conditions, and the utilization of extensive pretreatment methodologies allows Raleigh Water to ensure that these products are safe for their intended use.

Putting Biosolids to Work

The Bioenergy Recovery Project is a massive undertaking to convert biosolids, a byproduct of the wastewater treatment process, into a renewable energy source. Nearing completion in 2025, this project at the Neuse River Resource Recovery Facility (NRRRF) has transformed the way Raleigh Water processes biosolids, creating a more sustainable and efficient system. The project transitioned the facility from older methods—like Class B aerobic digestion and liquid land application, and Class A alkaline stabilization—to a comprehensive system that produces only Class A biosolids using thermal hydrolysis pretreatment (THP) and mesophilic anaerobic digestion.

Project Benefits

Green Energy Production: The new process generates biogas which is cleaned and converted into Renewable Natural Gas (RNG). This RNG is then used to fuel the City's GoRaleigh bus fleet. This transition helps the City meet its sustainability goals and reduce its reliance on fossil fuels.

High-Quality Biosolids: The advanced treatment process produces a high-quality, low-odor Class A biosolids product. These biosolids can be easily marketed and distributed for beneficial reuse as a nutrient-rich fertilizer on agricultural crops, including the NRRRF's own farm.

Fats, Oils, and Grease (FOG) Management: Co-digesting FOG with other solids boosts the production of biogas in the anaerobic digesters and reduces the risk of costly and disruptive clogs and spills in the City's sewer system.

Operational Efficiency: The new process reduces the energy needed to treat the stronger ammonia load generated during digestion. This also eliminates the need for supplemental carbon, further boosting the project's efficiency and cost-effectiveness.

Further information concerning the biosolids program can be obtained by calling 919-996-3700 or by emailing **Biosolids@raleighnc.gov.**

ISO 14001:2015 Environmental Management System

An Environmental Management System integrates environmental considerations into day-to-day decision making and operations. It is also used for improving organizational performance over time. The Resource Recovery Facilities are 14001:2015 certified facilities. The Environmental Management System is verified annually by an independent third-party auditor. Recertification occurs every three years with surveillance audits of the program conducted annually. This certifies the Neuse River Resource Recovery Facility has an effective environmental management system that:

- Supports continual improvement of environmental performance
- Meets regulatory compliance obligations
- Uses good management practices
- Creates meaningful opportunities for public participation.

FY25 Strategic Focus: Audit, Compliance and Objectives

In February of 2014, the Resource Recovery Division received ISO 14001:2004 certification for its wastewater Environmental Management System. Each year, the system is audited, by a third-party agency, to ensure compliance with the ISO 14001:2015 operational standards and is recertified on a three-year cycle. Results of the third-party audits are available by contacting Gracelyn Sanders, Utilities Coordinator at: **Gracelyn.Sanders@raleighnc.gov** or calling 919-996-2310.

Regulatory Compliance:

- 100% regulatory compliance by NRRRF & SCRRF
- All the City's biosolids contractors achieved 100% compliance with City contract requirements
- Contractor activities include hauling, spreading, and composting. Routine observations are performed by City staff to ensure contractor adherence to applicable regulations.
- All biosolids produced and distributed met all EPA 40 CFR 503 compliance requirements
- NRRRF, SCRRF, and LCRRF received Platinum awards from the National Associations of Clean Water Agencies (NACWA) for 100% regulatory NPDES compliance for the 2024 calendar year.
- Received recertification of ISO 14001 EMS

How You Can Help!

Raleigh Water is committed to protecting the quality of the Neuse River and the environment.

The water returned to the Neuse River from our Resource Recovery Facilities is of higher quality water by most parameters than the water in the river itself.

While grease continues to be a significant cause of sanitary sewer overflows in the sewer collection system, you can help Raleigh Water reduce the number of overflows by following these simple steps:

- ***Collect grease, fats and oils from cooking in a container and dispose of it in the garbage instead of pouring it down the drain.***

- ***Place a wastebasket in each bathroom for the disposal of solid waste, disposable diapers, baby wipes, disinfecting wipes, condoms and personal hygiene products. These products DO NOT belong in the sewer system.***

Wastewater collection systems are designed to handle *only three things: used water, human body waste and toilet paper. It is very important to keep all foreign materials, such as grease and other household debris from entering the system, as these can cause blockages. Most sewer backups occur between the house and the City's sewer main.* ***The property owner is responsible for correcting this problem.***

Many disinfecting wipes and baby wipes are touted as disposable, and some are even labeled as flushable, but both contribute to sanitary sewer overflows (SSOs) throughout the sanitary sewer system. Their cloth-like material doesn't break down in the sanitary sewer system like toilet paper but rather blocks sewer lines and clogs pumps throughout the system, which increases maintenance and repair costs. Please help the City reduce costs and protect the environment by disposing of these items in the trash rather than in the sewer system.

Managing unused or expired medications is a safety and an environmental concern. Proper disposal will prevent medications from entering soil and groundwater. Where available, take unwanted or expired medications to a local collection site. The following link includes medication drop locations: **Drop Box Locations** *(visit the Wake County government website and search "Medicine Drop Box Locations").*

Contact Raleigh Water

Report Sanitary Sewer Overflows (SSOs) or Water Main Breaks

To report a sanitary sewer backup, overflow or a water main break please call Raleigh Water at **919-996-3245** (24/7) or email customercare@raleighnc.gov. Thank you for your help!

SSO Reward Program

Raleigh Water has a Sanitary Sewer Overflow (SSO) Reporting Reward Program. In this program, citizens who are the first to notify Raleigh Water of an SSO that they observe are rewarded with a **$50** check. By promptly reporting the overflow, Raleigh Water staff can minimize the impact of the overflow on the environment.

Illegal Dumping Reward Program

Raleigh Water's service area currently has approximately 2,000 Food Service Establishments (FSEs) that generate grease and that are required to install grease interceptors. There is concern that some of this wastewater from grease interceptors will be illegally dumped into the sanitary sewer system. Grease and other materials illegally dumped can lead to sanitary sewer overflows (SSOs), which are a public health, environmental and regulatory concern. Reporting a problem or an illegal dumping incident may be rewarded with a **$5,000** check if you are the first to notify Raleigh Water of an illegal dumping incident. To report anything suspicious or a suspected illegal dumping incident, contact the City of Raleigh Public Utilities Department at 919-996-3245 (24/7).

Property Manager Grease Management Kit

If you reside in an apartment or condo community, make sure your property manager is aware of our Grease Management Kit, which is available to any multi-family community in our service area. The kit is free of charge and includes grease pan scrapers, universal can lids (for grease storage), brochures and informational thumb drives that can be distributed to residents. Keeping grease out of the drain not only can help prevent SSO's in the sewer system but can also help keep facility plumbing clear and avoid expensive plumbing bills. More information is available at our website (search "grease") or call 919-996-2334.