



2023

Annual Performance Report

Roanoke River Wastewater Treatment Plant
NC0024201 & Collection System WQCS00027

[Abstract](#)

The Annual Performance Report provides key performance information that demonstrates the POTW's accountability to ensure Roanoke Rapids Sanitary District's stewardship and prosperity by addressing its environmental, operations, and maintenance challenges through transformative process and technology solutions.

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I. General Information:

A. Regulated entity: Roanoke Rapids Sanitary District, Collection Systems (C.S.) and Wastewater Treatment Plant (WWTP), together Publicly Owned Treatment Works (POTW)

B. Responsible entity: Roanoke Rapids Sanitary District, Thomas Wrenn, CEO
PO Box 308
Roanoke Rapids, NC 27870
Phone: 252-537-9137

C. Person in charge/contact

1. C.S.: David Warren Scott, Operator in Responsible Charge (ORC)
Eric Wes Deaton, Back-up ORC
Roanoke Rapids Sanitary District, Distribution & Collection
425 East 11th St.
Roanoke Rapids, NC 27870
Phone: 252-537-9747

2. WWTP: Steven Lee Ellis, Operator in Responsible Charge (ORC)
Timothy Skipper, Back-up ORC
Roanoke River Wastewater Treatment Plant
135 Aqueduct Road
Weldon, NC 27890
Phone: 252-536-4884

D. Applicable Permit(s)

1. C.S.: North Carolina Environmental Management Commission System-wide Wastewater Collection System Permit No. WQCS00027
2. WWTP: - National Pollution Discharge Elimination System (NPDES): NC0024201
- Land Application (L.A.): WQ0001989
- Stormwater (General): NCG110000

E. Description of C.S.:

The collection system consists of approximately 146 miles of sewer lines and six lift stations that serve Roanoke Rapids, Gaston, and portions of Halifax and Northampton Counties, which serve an approximate population of 17,600. The sewer lines within Roanoke Rapids, Gaston and all subdivisions, which connect to two main Interceptors, range in size from 8" to 12". There are two main 30" diameter Interceptors transporting wastewater to the WWTP.

The Roanoke River Interceptor collects wastewater from basins located on the north side of the Sanitary District. The Gaston basin and Northampton County are also served by this interceptor. The Interceptor begins just west of 100 Gaston Road (NC HWY 48) in Roanoke Rapids. There are 3 primary basin pump stations and 2 secondary pump stations served by the interceptor whose pipe sizes range from 18" to 30".

The Chockoyotte Creek Interceptor serves the south side of the Sanitary District and three subdivisions located outside the Roanoke Rapids city limits: Lake View Park, Greenbriar Terrace, and Lincoln Heights. The Interceptor begins adjacent to 1100 Zoo Road. There is one primary basin pump station along the route. The interceptor pipe sizes range from 12" to 30".

The system has six sewer lift stations. Three stations are in the Gaston basin. HWY 46 Pump Station serves a Northampton County School. The Old Emporia Road Pump Station serves the Roanoke Chowan Regional Housing Authority and the Hwy 48 Pump Station pumps all flows from Gaston and Northampton County via an 8" force main suspended from the NC HWY 48 Bridge spanning the Roanoke River to the Roanoke River Interceptor. The remaining three pump stations are located within Roanoke Rapids basins and serve residential and some light commercial customers. Two of the stations, Belmont and Poplar Springs, discharge to the Roanoke River Interceptor while the Greenbriar Pump Station discharges to the Chockoyotte Creek Interceptor.

F. Description of WWTP:

The wastewater treatment plant is rated at 8.34 million gallons per day (MGD). Peak flow is rated at 12.5 MGD.

Treatment processes at the wastewater plant include grit and rag removal. This is followed by primary clarification, trickling filter BOD buffering, biological secondary treatment, activated solids treatment, secondary clarification, final effluent chlorination/de-chlorination processes, and final pH adjustment.

During these processes, solids are removed from two locations. Primary clarification removes settleable solids from incoming wastewater to an anaerobic digestion unit. Here, the solids in the absence of oxygen, receive pH adjustment, mixing, and heating to produce a stabilized material suitable for land application. Once the solids are stable, excess water is decanted and returned to the plant for further treatment. The stabilized, thickened solids are treated with lime for odor control and then removed to a holding tank prior to transportation for land application.

Secondary clarification removes solids from the activated solids process. Here, solids in the presence of oxygen and mixing, accumulate in excess. They are removed, chemically stabilized, and added to a holding facility. All stabilized solids are analyzed, and land applied according to their nutrient value, ceiling limit (mg/kg) and cumulative requirements.

There are two pumping stations distributing wastewater into and through the plant. They are the Influent Pump Station, which includes an equalization pump, and the Trickling Filter Effluent Pump Station. The Influent Pump Station has the capacity to pump 20 MGD, the equalization pump 6 MGD, and the Trickling Filter Effluent Pump Station 27 MGD. Standing by in conjunction with these pump stations is the Emergency Flood Pump Station with a capacity of 21 MGD to remove treated effluent from the plant during high river stages which prevent normal gravity flow discharge. Also, a storm water pump station has been installed. This station intercepts site runoff, an unnecessary treatment load and potential site flooding condition, and removes it before entry to the plant. It has the capacity to pump 11.5 MGD. Numerous other pumps and mixers are located throughout the plant to facilitate process control.

II. Performance:

1. C.S:

The collection system performed well in 2023, however there were 15 permit violations in the form of Sanitary Sewer Overflows and no monitoring and reporting violations. The District's Fat, Oil, and Grease (FOG) Program performed 26 inspections of area restaurants and food preparation facilities (FSE). Full facility inspections are now handled by the Northampton and Halifax County Health Departments. The District continues outside visual inspections for exterior traps, and interior inspections for potential problem areas as well as interior separators. There were no notices of violation. All FSE were advised to continue following "Best Management Practices" and maintain maintenance records. The District FOG program is continuing our public education program. There was one Sanitary Sewer Overflow (SSO) out of the 15 total SSOs during the period attributed to FOG in 2023. The District talked to the local businesses in the area and urged them to follow our "Best Management Practices" as well as passed out notes of our FOG Policy to residential customers.

The District contracted with NC Wildlife and Timber Solutions, LLC for outfall cutting, stream debris removal and beaver management from Chockoyotte Creek located adjacent to its interceptor. This ongoing work improved access to the interceptor and helped minimize flooding of manholes along the easement.

2. WWTP:

Over the course of 2023, the Roanoke River Wastewater Treatment Plant operated very efficiently. There were no violations for 2023. The plant flows ranged from a daily maximum of 11.5 MGD to a minimum of 1.80 MGD. The average daily flow was 3.0 MGD. The plant treated 1,094,200,000 gallons of wastewater throughout the year, which was discharged to the Roanoke River.

Throughout 2023, there was 4,213,937 gallons of wastewater that was equalized due to high flows and maintenance and later returned to the plant for treatment.

The efforts to repair the collection system and reduce Inflow and Infiltration from prior years continued in 2023. This work has led to lower peak flows for shorter durations and reduced the number of bypasses from the plant as illustrated in the following table:

Year	2018	2019	2020	2021	2022	2023
Max Day (MGD)	9.0	11.4	12.4	12.68	9.30	11.5
Avg. Daily Flow - MGD	3.34	3.24	3.58	3.39	2.78	3.00
Estimated I & I - MGD	1.54	1.48	1.86	1.6	1.70	.912
Annual Rainfall - in.	60.5	46	66.3	44.10	47.4	48.7

The following table illustrates the treatment performance of the wastewater plant and its ability to meet and comply with the NPDES permit requirements:

PARAMETER	MONTHLY LIMIT	WEEKLY LIMIT	REQUIRED REMOVAL	ANNUAL REMOVAL	ANNUAL AVERAGE	DAILY MAX	DAILY MIN
CBOD	25mg/L	37.5mg/L	85%	96.8%	7.3mg/L	20.8mg/L	3.4mg/L
TSS	30mg/L	45mg/L	85%	92.8%	15.1mg/L	60.0mg/L	6.4mg/L
Fecal Coliform	200 Colonies	400 Colonies	N/A	N/A	79.8 Colonies	772 Colonies	1 Colony
NH ₃ -N	N/A	N/A	N/A	N/A	2.1mg/L	9.9mg/L	<0.5mg/L
Total-N	N/A	N/A	N/A	N/A	14.4mg/L	22.9mg/L	7.8mg/L
Total-P	N/A	N/A	N/A	N/A	1.2mg/L	3.6mg/L	0.4mg/L

During 2023, the District continued its contract with Granville Farms, Inc. for the management of biosolids. A total of 1,535.15 applicable acres is permitted in the Land Application Program. There were 2,760,777 gallons, or 596.95 dry tons of biosolids applied to 364.01 Acres. There were no permit violations for the land application program in 2023.

One of the main treatment units at the wastewater plant is the activated sludge basins. This is where the majority of the biological treatment occurs. It is also one of the largest energy consumers at the plant due to the large centrifugal blowers needed to supply air to the process. In 2021, the District entered into contract with RK&K Engineering to do design work on a new blower system to provide the air needed to the basins in a more efficient manner. Work has continued on the design phase in 2023 and plans should be ready for bidding by the end of fiscal year 2023-24.

Another part of the District’s NPDES permit is our Mercury Minimization Plan. The district held a mercury collection week October 2nd-6th to collect mercury containing items from the public. The event was advertised in local news media and online, however, no items were collected. The wastewater plant continues to monitor quarterly for mercury and has been achieving low results.

A. Permit limit violation

1. C.S.: None
2. WWTP: None

B. Monitoring and Reporting Violations

1. C.S.: None
2. WWTP: None

C. 2023 Sanitary Sewer Overflows

1. C.S.: There were 15 reportable SSO's in 2023.
 1. MH E 42, 2/22/23, 450 gallons.
 2. MH PC-18b ,420 Tabb Dr. Gaston, 4/18/23, 750 gallons.
 3. MH 254 Basin 1, Key St. Outfall Line, 6/9/23, 1,500 gallons.
 4. MH K 33, 7/8/23, 50 gallons.
 5. MH C 41, 7/24/23, 900 gallons.
 6. MH 54, Land St., 9/23/23, 16,200 gallons. (Tropical Storm Ophelia)
 7. MH B-46, 3rd and Starke Dr., 9/23/23, 4,800 gallons. (Tropical Storm Ophelia)
 8. MH B-52, 3rd and Rapids St., 9/23/23, 2,400 gallons. (Tropical Storm Ophelia)
 9. MH M 10GB, 11/13/23, 300 gallons.
 10. MH 54. Land St., 12/17/23, 84,000 gallons.
 11. MH B-46, 3rd and Starke Dr., 12/17/23, 18,900 gallons.
 12. MH B-52, 3rd and Rapids St., 12/17/23, 9,000 gallons.
 13. MH B-136, 4th and Franklin St., 12/18/23, 600 gallons.
 14. MH D 190, 12/27/23, 1,500 gallons.
 15. MH 54, Land St., 12/27/23, 30,000 gallons.

There was an estimated total of 171,350 gallons spilled in SSO's in 2023. These spills are the result of capacity exceedance due to wet weather conditions. This correlates to 10.27 spills per 100 miles of pipe.

2. WWTP: N/A

D. Bypass of Treatment Facility

1. C.S.: N/A
2. WWTP: There were no bypasses at the Wastewater Treatment Plant in 2023.

E. Description of any known environmental impact or violations.

1. C.S.: None
2. WWTP: None

F. Description of corrective measures taken to address violations or deficiencies.

1. C.S. : Along with the wildlife control, FOG program and outfall clearing discussed above, RRSB continues to perform preventative sewer backup maintenance by cleaning with Jetter and Root Cutter; which is attached to the Jetter hose, followed by Closed Circuit TV (CCTV) camera to inspect the lines after cleaning. The District also uses its Combination Truck, which cleans the line more effectively and proves to be more reliable than the old unit. The District also continues to use the Rausch CCTV van purchased in 2018 extensively.

District employees completed six Sanitary Sewer Point Repairs in 2023. The locations were as follows:

1. 1402 West Circle Dr., 3/6/23
2. 1302 Hamilton St., 7/18/23
3. 1111 East 7th St., 8/6/23
4. 1135 East 10th St., 9/21/23
5. 403 Oakwood Ave., 10/10/23
6. 702 Washington St., 11/13/23

District employees installed 10 new taps and replaced 18 existing taps in 2023. All 28 were 4" service lateral replacement taps throughout the district service area. There were seven 4" cleanouts installed as well.

District employees cleaned 22.025 miles of sewer lines and used CCTV to inspect all suspected problem areas.

District employees utilized the District's excavator mounted flail mower in conjunction with NC Wildlife Solutions LLC to cut and clear 16.43 miles of interceptor right-of-way's and cross-country lines in 2023.

The District contracted with Owens Construction to relocate and replace 1018 ft of 12" sewer line and 374 ft of 18" sewer line on Watkins Dr. Owens also installed 118 ft of new 8" ductile iron pipe with 401 liner, 30 ft of new 8" SDR35, and one new manhole on the outfall line on Smith Church Rd.

The District contracted with Extreme Infrastructure for Poly-Triplex lining of 7 manholes from 11/13/23 to 11/20/23 in the following locations:

1. 534 NC HWY 48, PC-77
2. NC HWY 46, PI-47
3. Zoo Rd. North, I-29A
4. Zoo Rd. North, I-29
5. 701 East Littleton Rd., K-391
6. 115 Charles Cir., K-214
7. 115 Charles Cir., K-222

1. Construction was completed in October 2023 on the replacement of a segment of 8" main which crosses Chockoyotte Creek in the vicinity of Smith Church Road between Manholes K419 and K417. The segment was known to be a significant source of inflow and SSOs due to the deteriorated condition of the pipe. Line deficiencies involved excess inflow in the portion crossing Chockoyotte Creek, and misalignment caused during Smith Church Road widening that contributed to hydraulic flow problems.

Priority projects continue to prevent RRSd from performing desired improvements and rehabilitation work in Collection System Sub-Basin 'K'. Sanitary Sewer Evaluation Survey (SSES) was completed in 2020 to assist RRSd in identifying areas within the sub-basin where inflow & infiltration (I/I) is occurring. Sub-Basin 'K' contains mostly 8" and 10" gravity collection lines with a 30" main interceptor (Chockoyotte Creek Outfall) that serves the basin. The sub-basin contains approximately 435 manholes, and approximately 100,000 feet of gravity pipe.

In April 2022 RRSd entered an agreement with Freese and Nichols, Inc. to assist RRSd by providing evaluation and develop a Preliminary Engineering Report (PER) for the rerouting of the existing force main and the associated Belmont Pump Station improvements. The PER was completed in March of 2023.

Subsequently, the RRSd requested funding assistance from the NC Department of Environmental Quality, Division of Water Infrastructure in the Fall 2023 Application for Funding to address the severe Inflow & Infiltration (I&I) issues in one of its primary drainage basins in its Wastewater collection system located in Roanoke Rapids. The purpose of this project is to eliminate a chronic I&I condition by transferring wet weather flows utilizing the existing duplex Belmont Pump Station. The project will specify reconfiguring its 200 GPM wastewater pumps with 600 GPM flood transfer pumps. Additionally, the project will construct 4,700 LF of 8-in. ductile iron force main that will divert the combined stormwater and wastewater, influent to the Belmont Pump Station, from the sub-basin collection system to an existing parallel 12" and 18" interceptor within the sub-basin that is of sufficient capacity to transport the combined sewer directly to the Roanoke River Outfall for treatment at the Roanoke River Wastewater Treatment Plant. The Belmont Pump Station is located on Laurel Street in Roanoke Rapids and the 8-inch ductile iron force main will be constructed on Laurel Street, W. 4th Street and connect with an existing manhole and 12" gravity sewer that extends along Taylor Street to W. 2nd Street, at which point, the interceptor merges with parallel sewer interceptors. The requested funding assistance has not been awarded.

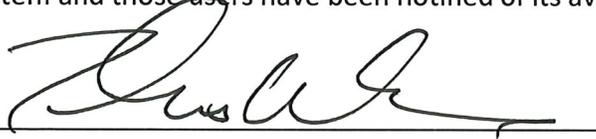
2. WWTP: All repairs to minimize Inflow & Infiltration are being made to correct known system deficiencies.

III. Notification:

This System Annual Performance Report will be noted on the monthly bill and available to customers via the Roanoke Rapids Sanitary District's Webpage at www.rrsd.org.

IV. Certification:

I certify, under penalty of law, that this document is complete and accurate to the best of my knowledge. I further certify that this report has been made available to the users of the named system and those users have been notified of its availability.



Thomas Wrenn
Chief Executive Officer



Date