



2021

Annual Performance Report

Roanoke River Waste 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, Dan Brown, 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 L 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 158 miles of sewer lines and six lift stations that serve Roanoke Rapids, Gaston, and portions of Halifax and Northampton Counties, which serves an approximate population of 17,600. The sewer lines within Roanoke Rapids, Gaston, and all sub-divisions, which connect to two primary Interceptors (outfalls), range in size from 8" to 18". There are two primary 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's centralized sanitary sewer system. The Town of Gaston (Gaston basin), is within the Sanitary District boundary, and Northampton County's decentralized sanitary sewer system are served by this interceptor. Northampton County discharges to the Gaston basin via force main connections in four locations: 525 NC 48 HWY (Manhole PC-93), 529 Lawrenceville Rd (Manhole PC-177), Enviva's connection at 211 Grant St. (Manhole PC-135), and 5957 NC 46 HWY (Manhole PI-47). The Interceptor begins just west of 100 Gaston Road (NC 48 HWY/Roanoke Ave) in Roanoke Rapids. There are 3 primary basin pump stations and 2 secondary pump stations served by the Roanoke River interceptor whose pipe sizes range from 18" to 30".

The Chockoyotte Creek Interceptor serves the southside of the Sanitary District's centralized sanitary sewer system, Halifax County's decentralized sanitary sewer system, and three subdivisions located outside the City of Roanoke Rapids: Lake View Park, Greenbriar, and Lincoln Heights, which are within the Sanitary District boundary. The Interceptor begins adjacent to 1100 Zoo Road. Halifax County discharges via force main at three locations: Manhole-129A (1100 Zoo Road), Manhole-Q84 (2064 NC 125 HWY), and Manhole-Q85A (1072 County Rd). There is one primary basin pump station, Greenbriar, 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. The Old Emporia Road Pump Station serves the Roanoke Chowan Housing Authority, and pumps to the HWY 46 Pump Station. HWY 46 Pump Station serves a Northampton County School, and pumps to the HWY 48 Pump Station via Gardner Drive. NC HWY 48 Pump Station pumps all flows from Gaston and Northampton County via an 8" force main suspended from the NC 48 HWY bridge spanning the Roanoke River to the Roanoke River Outfall. 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 Outfall 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 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 performance of the system in 2021 was particularly good. There were no permit violations or monitoring and reporting violations. The District's Fat, Oil, and Grease (FOG) Program performed 15 inspections of area restaurants and food preparation facilities (FSE). Full facility inspections were limited due to the ongoing COVID-19 pandemic. 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 were no Sanitary Sewer Overflows (SSO) out of the three total SSOs during the period attributed to FOG in 2021.

The District contracted with USDA wildlife services 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 2021, the Roanoke River Wastewater Plant operated very efficiently. There was one permit violation and no monitoring or reporting violations. The plant flows ranged from a daily maximum of 12.68 MGD to a minimum of 1.80 MGD. The average daily flow was 3.39 MGD. The plant treated 1,237,100,000 gallons of wastewater throughout the year, which was discharged to the Roanoke River.

Throughout 2021, there was 2,530,366 gallons of wastewater that was equalized due to 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 2021. 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	2017	2018	2019	2020	2021
Max Day (MGD)	8.2	9.0	11.4	12.4	12.68
Avg. Daily Flow - MGD	2.96	3.34	3.24	3.58	3.39
Estimated I & I - MGD	1.06	1.54	1.48	1.86	1.6
Annual Rainfall - in.	41.33	60.5	46	66.3	44.10

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%	96.2%	7.6mg/L	19.6mg/L	3.6mg/L
TSS	30mg/L	45mg/L	85%	91.1%	18.2mg/L	142.5mg/L	7.4mg/L
Fecal Coliform	200 Colonies	400 Colonies	N/A	N/A	42.5 Colonies	>300 Colonies	1 Colony
NH ₃ -N	N/A	N/A	N/A	N/A	<2.7mg/L	13.4mg/L	<0.5mg/L
Total-N	N/A	N/A	N/A	N/A	<17.6mg/L	49.1mg/L	6.5mg/L
Total-P	N/A	N/A	N/A	N/A	1.1mg/L	3.5mg/L	0.53mg/L

The wastewater treatment plant, a vital asset in the community, relies heavily on electricity to operate all its treatment units. The Sanitary District entered a contract with Gregory Poole Caterpillar for the purchase and installation of a new full load generator. The new generator was installed in 2021 and is complimentary to the existing full load generator to provide redundant emergency back-up power while reducing air and noise pollution.

During 2021, the District accepted proposals from biosolids management companies to land apply the District’s residuals. The contract was awarded to Granville Farms, Inc. A total of 1,535.15 applicable acres is permitted. There were 2,759,061 pounds, or 537.25 dry tons of biosolids applied to 207.18 Acres. There were no permit violations for the land application program in 2021.

One of the main treatment units at the wastewater plant is the activated sludge basins. This is where most 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 a contract with RK&K Engineering to prepare design plans for a new blower system required to provide air to the secondary treatment basins in a more efficient manner. Design and permitting are expected to be complete to start construction in 2022-23.

A. Permit limit violation

1. C.S.: None
2. WWTP: There were two Notices of Violation in February 2021 for Effluent TSS weekly average limit and monthly average limit violation and March 2021 for a TSS monthly average limit violation. The weekly average limit is 45mg/L and monthly average limit is 30mg/L. The violations were 48.16mg/L weekly average and 30.6mg/L monthly average in February and 31.76mg/L monthly average for March. These violations were attributed to high flows and wet weather. Specifically, the wet weather led to land application to be halted and an excess of solids built up in the plant. Once land application resumed, the solids were regulated at the proper levels and the plant had no trouble meeting compliance.

B. Monitoring and Reporting Violations

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

C. 2021 Sanitary Sewer Overflows

1. C.S.: There were 3 reportable SSO's in 2021.
 1. Manhole 109 at WestRock Paper Mill on 2/12/2021; 1200 Gal.
 2. Manhole K419 at Smith Church Rd and Chockoyotte Creek on 6/23/2021; 300 Gal.
 3. Manhole I6 at W. Ridgecrest Rd. and W 10th St on 10/14/2021; 975 Gal.

There was an estimated total of 2475 gallons spilled in SSO's in 2021. Spill number 1 was the result of capacity exceedance due to wet weather conditions, spill number 2 was caused by rags, and spill number 3 was the result of a broken manhole cover in the pipe due to a faulty paving operation. This correlates to 1.89 spills per 100 miles of pipe for this reporting year.

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 2021.

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, SSES, and outfall clearing discussed above, RRSD 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 Vac-con Truck, which cleans the line more effectively and proves to be more reliable than the old unit.

District employees completed one Sanitary Sewer Point Repair in 2021. The location was 1300 Julian R Allsbrook Hwy.

District employees completed 25 total new replacement taps in 2021. All 25 were 4" service lateral replacement taps throughout the district service area.

District employees cleaned 24.37 miles of sewer lines and CCTV'd all suspect problem areas.

District employees utilized the District's excavator mounted flail mower in conjunction with NC Wildlife Solutions LLC to cut and clear 18.33 miles of interceptor rights-of-way and cross-country lines in 2021.

The District contracted with Tri-State Utilities at a cost of \$177,000 to clean and CCTV a segment of the Roanoke River interceptor including 925 feet of 21" and 48 feet of 24" clay pipe. The interceptor, crossing through the Westrock Papermill property, also had 973 ft of Cured in Place Liner installed by Tri-State Utilities.

The District also installed nine flow meters in select manholes in January of 2021 to monitor flow levels during weather events. These meters were installed by Hydro-Structures.

RRSD contracted with Tri-State to clean and prepare CCTV report and corresponding video for the Upper Chockoyotte Creek Interceptor. This section of the interceptor includes approximately 12,200 linear feet of 12-inch and 15-inch line. Approximately 7,700 linear feet of line was cleaned and evaluated.

RRSD's consultant, Freese and Nichols, Inc. (FNI), completed its Roanoke River Outfall/Sub-Basin 'A' sanitary sewer evaluation (SSES) using flow meters and modeling at a total cost of \$116,895.00. The study included a desktop analysis of the existing system, development of existing sanitary sewer flows, review of previous study information, and hydraulic modeling of the Roanoke River Outfall (RRO) to evaluate capacity in these areas. After evaluating alternatives, FNI concluded that the most feasible option was upgrading the Belmont PS to better handle peak flows from Sub-Basin A and re-routing the force main discharge further downstream based on available capacity in the sewer collection system. The modeling evaluation recommended that RRSD continue to monitor the RRO utilizing level only sensor at key locations to capture manhole levels during wet weather events. RRSD continues to manage the pumped flows from the WTP backwash to the outfall only under dry weather conditions.

RRSD completed the project design and permitted the replacement of a segment of 8" main which crosses Chockoyotte Creek in the vicinity of Smith Church Road between Manholes K419 and K417 at a design cost of approximately \$24,700. The segment is known to be a significant source of inflow due to the deteriorated condition of the pipe. Construction is anticipated to be completed in 2022.

Budgetary constraints and priority projects prevented 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.


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

III. Notification:

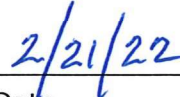
This System Annual Performance Report will be noted on the monthly bill and available to customers via the Roanoke Rapids Sanitary District's Webpage at www.rrsd.org.

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.



R. Danieleley Brown, PE
Chief Executive Officer



Date