

**Annual Report for Wastewater Treatment Works / Wastewater Collection System  
Fiscal Year 2022-23**

I. General Information

Name of regulated entity:

Town of Carolina Beach

Responsible entity, person, or contact with phone number & address:

Name: William J. Raymond

Title: Wastewater Treatment Superintendent

Address: 404 S. Dow Road, Carolina Beach, NC

Phone: (910) 465-1946

Listing of applicable permits:

NPDES NC0023256 (ORC: William J. Raymond)

WWC WQCS00076 (ORC: Christopher D. Nichols)

Description of collection or treatment process:

The Town of Carolina Beach has fifteen lift stations in the collection system, 30 miles of 10" & 8" gravity sewer lines, 5 miles of force main lines, and a wastewater treatment facility that is permitted to discharge treated effluent into the Cape Fear River per NPDES Permit #NC0023256. Wastewater from the Town of Kure Beach and Fort Fisher is also treated by the Carolina Beach WWTP. The WWTP has a permitted flow of 3.0 million gallons per day (MGD) and consists of a mechanical bar screen, manual bar screen, mechanical grit removal, influent and effluent flow recorder & samplers, three extended aeration basins, dual clarifiers, aerobic digestion / dual sludge storage basins, dual equalization basins, three traveling bridge tertiary filters, gas chlorination / dechlorination system, chlorination / dechlorination contact chamber, dual outfall pipes, and dual emergency generators. The facility also produces residual biosolids from the treatment process that are both land applied on permitted agricultural sites and composted. The Town of Carolina Beach used Lewis Farms and Liquid Waste for contract residual biosolids land applications and McGill Environmental Services for contract residual biosolids composting during the 2022 calendar year. The Town of Carolina Beach submitted the required Biosolids Annual Report for 2022 to the U.S. Environmental Protection Agency and the N.C. Department of Environmental Quality during the 2023 fiscal year. The town reported that a total of 37.57 dry metric tons of biosolids were land applied by Lewis Farms and Liquid Waste from the WWTP and a total of 132.43 dry metric tons were composted by McGill Environmental Services from the WWTP during the 2022 calendar year.

## II. Performance

Text Summary System Performance for the 2023 fiscal year (beginning July 1, 2022):

The Town of Carolina Beach wastewater facility treated 359,792,000 gallons of wastewater during the 2023 fiscal year. The daily average flow treated during the 2023 fiscal year was 0.986 MGD, or 32.9 % of the 3.0 MGD treatment capacity. An annual effluent pollutant scan of 109 parameters is required three times during the five year permit cycle. One annual effluent pollutant scan was required during the 2023 fiscal year and was sampled on 2/6/2023.

The Town of Carolina Beach collections system had undergone numerous improvements during the 2023 fiscal year. The North End of Carolina Beach is the most problematic area for inflow and infiltration of stormwater and groundwater into the collections system. Town staff is in the process of performing system improvements to help address these issues. Two major improvements were performed during the 2023 fiscal year: 2162 feet of 8" sewer pipe on Florida Avenue was lined in May 2023, and 160 feet of 8" sewer pipe on Delaware Avenue was replaced in June 2023.

Staff also made the following improvements to the collections system lift stations: Sewer Lift Station #1 grinder chamber was rehabilitated and a new gantry crane was installed. Pumps were replaced in Sewer Lift Stations #2, #3, #7, and #12. New control cabinets and electrical components were replaced at Sewer Lift Stations #2, #3, #4, #7, #9, #10, #12, and #13.

List (by month) of the number and type of any violations of permit conditions, environmental regulations or environmental laws (i.e. date, type, permit limit violations, monitoring and reporting violations, (illegal) bypass of treatment facilities, sanitary sewer overflows and estimated total monthly volumes and locations of events in which more than 1000 gallons of waste reached surface waters), and describe corrective actions taken:

### Permit Limit Violations

There were two reportable permit limit violations during the 2023 fiscal year:

- In August 2022, both a weekly enterococcus geometric mean limit (Week #1) and a monthly enterococcus geometric mean limit exceeded permit limits. The Week #1 geometric mean was 902 MPN/100 mL, exceeding the weekly permit limit of 276 MPN/100 mL. The monthly geometric mean was 81 MPN/100 mL, exceeding the monthly permit limit of 35 MPN/100 mL. We worked on these enterococcus issues in coordination with the N.C. Division of Water Resources. We have performed the following improvements this fiscal year in order to address the enterococcus issues: relined the Effluent Contact Chamber with a protective coating, rehabilitated the Effluent chlorination mixing well, and made improvements to the chlorine/sulfur dioxide gas feed systems.

Monitoring and Reporting Violations or Deficiencies

There were no reportable monitoring and reporting violations or deficiencies during the 2023 fiscal year.

Sanitary Sewer Overflows

There were no reportable sanitary sewer overflow (SSO) events during the 2023 fiscal year.

Any known environmental impact of violations:

There were no known environmental impacts from violations.

III. Notification


Statement as to how users or customers have been provided access to the report:

A public notice is placed in the local newspapers stating that copies of the annual report for the wastewater treatment plant and collection system are available upon request at the Town of Carolina Beach administration building. The report is also available on the town's website.

IV. Certification

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

Mark Meyer, Public Utilities Director, Town of Carolina Beach  
Permittee (Name of permittee, Title, Entity)

  
\_\_\_\_\_  
Signature of Permittee

8/29/23  
\_\_\_\_\_  
Date

## IMPORTANT DEFINITIONS

NPDES Permit – National Pollutant Discharge Elimination System Permit is the regulatory agency document issued by a federal state agency designed to control all discharges of pollutants from point sources into U.S. waterways. NPDES permits regulate discharges into navigable waters from all point sources of pollution, including industries, municipal wastewater treatment plants, sanitary landfills; large agricultural feed lots and return irrigation flows.

Wastewater Collection (WWC) – The wastewater collection system is the permitted system of infrastructure (pump stations, force mains, gravity sewer lines) designed to convey wastewater to a wastewater treatment plant.

Operator in Responsible Charge (ORC) – The operator designated by the owner of the classified water pollution control system to be responsible for all operations of the system and to supervise all operators working in the system. The ORC must possess a valid certificate of the type and grade at least equivalent to the type and grade of the system.

Biochemical Oxygen Demand (BOD) – The rate at which organisms use the oxygen in water or wastewater while stabilizing decomposable matter serves as food for the bacteria and energy results from its oxidation. BOD measurements are used as a measure of the organic strength of wastewater.

Total Suspended Solids (TSS) – TSS are solids that either float on the surface or are suspended in water, wastewater, or other liquids.

Total Residual Chlorine (Tot. Cl<sub>2</sub>) – This is the amount of chlorine remaining after a given contact time. It is also the sum of the combined available residual chlorine and the free available residual chlorine.

pH – A liquid measurement range of acidity or basicity scaled from 0 to 14, with 0 being the most acidic, 14 being the most basic, and 7 being neutral. Natural water usually has a pH between 6.5 and 8.5. NPDES permits in N.C. do not ask for average pH values because pH is measured on a logarithmic scale and arithmetic or geometric means do not apply to the data. This is the reason only monthly maximum and minimum pH values are reported.

Dissolved Oxygen (DO) – Molecular (atmospheric) oxygen dissolved in water and wastewater.

Toxicity – This is a bioassay method of determining toxic effects of industrial or other wastes by using live organisms such as fish for test organisms. The town is required to use chronic toxicity testing to demonstrate that the effluent discharge shall at no time exhibit observable inhibition of reproduction or significant mortality to *Mysidopsis bahia* (mysid shrimps) at an effluent concentration of 17.9%.

Enterococci (ENTERO.) – Enterococci are indicator bacteria found in the feces of warm-blooded animals. The switch from fecal coliform to enterococci testing requirements on our discharge permit is a result of EPA studies which indicate enterococci to have a greater correlation with swimming-associated gastrointestinal illness than fecal coliform.

Ammonia Nitrogen (NH<sub>3</sub>-N) – Biological processes reduce NH<sub>3</sub>-N concentration. Concentration of NH<sub>3</sub>-N has permit limits because of its direct relation to fish toxicity.

Total Nitrogen, Total Phosphorus (TOTAL NITR., TOTAL PHOS.) – Nitrogen and phosphorus are important nutrients in the reproduction of microorganisms necessary for biological treatment of waste. However, the concentrations of these two nutrients are monitored because excessive amounts of these nutrients in an effluent can affect the oxygen demand in a receiving stream and cause algal blooms.

Total Copper (TOTAL Cu) – The concentration of copper is monitored because the metal is a commonly found pollutant that has toxic effects on a receiving stream in excessive amounts. Copper is found in receiving waters as a result of both natural and anthropogenic sources.

Total Nickel (TOTAL Ni) – The concentration of nickel is monitored because the metal is a commonly found pollutant that has toxic effects on a receiving stream in excessive amounts. Nickel is found in receiving waters as a result of both natural and anthropogenic sources.

Total Silver (TOTAL Ag) – The concentration of silver is monitored because the metal is a commonly found pollutant that has toxic effects on a receiving stream in excessive amounts. Silver is found in receiving waters as a result of both natural and anthropogenic sources.

Chlorodibromomethane (CDBM) – CDBM is a compound in the trihalomethane group that is considered an environmental pollutant in excessive concentrations. Trihalomethanes are formed as a by-product of chlorination.

Parts per million (ppm) or Milligrams per liter (mg/L) – one part per million corresponds to one minute in two years or a single penny in \$10,000.

Parts per billion (ppb) or Micrograms per liter (µg/L) – one part per billion corresponds to one minute in 2,000 years or a single penny in \$10,000,000.

Most probable number per 100 milliliters (MPN/100 mL) – These are the units designated to count the concentration of enterococci in a test sample.

PLANT PERFORMANCE FORM								
Plant Name: Carolina Beach Wastewater Facility								
YEAR	FLOW	BOD	BOD	TSS	TSS	Tot.CL2	DO	Temp.
2022/ 2023	OUT (MGD)	IN (ppm)	OUT (ppm)	IN (ppm)	OUT (ppm)	OUT (ppb)	OUT (ppm)	OUT (°C)
NPDES PERMIT LIMITS	3.000	X X X	S / 5.0 W / 10.0	X X X	30.0	50	5.00	X X X
JUL.	1.625	270	1	140	0.0	15	7.01	29.2
AUG.	1.158	247	2	188	0.0	16	6.93	29.3
SEPT.	1.042	207	0	143	0.0	13	8.05	27.9
OCT.	0.877	194	0	130	0.0	8	8.74	23.9
NOV.	0.758	229	0	163	0.0	8	9.20	21.7
DEC.	0.733	226	0	169	0.0	2	9.81	18.0
JAN.	0.766	238	0	174	0.0	8	9.80	17.4
FEB.	0.918	218	2	229	0.0	7	9.05	17.7
MAR.	0.865	235	2	169	0.0	10	8.42	19.0
APR.	1.047	274	2	171	0.0	8	8.65	21.6
MAY	0.917	252	3	190	0.0	12	8.33	23.8
JUN.	1.116	279	2	200	0.0	13	7.99	26.5
YEARLY AVG.	0.986	239	1	172	0.0	10	8.46	23.1
<b>Permit required sample frequency</b>								
Sample frequency - Daily: Tot. CL2, DO, pH, TEMP.								
2x/Week: BOD, TSS, ENTERO., NH3-N								
Monthly: TOTAL NITR., TOTAL PHOS., TOTAL CU								
Quarterly: CHRONIC TOX., CDBM, TOTAL Ni, TOTAL Ag								
* "S" represents the permitted summer months (April through October)								
* "W" represents the permitted winter months (November through March)								
<b>NOTE:</b> The N.C. Division of Water Resources considers all effluent total residual chlorine values reported below 50 ppb to be in compliance with the permit.								

**PLANT PERFORMANCE FORM**

Plant Name: Carolina Beach Wastewater Facility

YEAR	pH	ENTERO.	NH3-N	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	CDBM	TOXICITY
				NITR.	PHOS.	Cu	Ni	Ag		Mysidopsis
2022/ 2023	OUT (UNITS)	OUT (MPN/ 100 mL)	OUT (ppm)	OUT (ppm)	OUT (ppm)	OUT (ppb)	OUT (ppb)	OUT (ppb)	(ppb)	bahia OUT
NPDES PERMIT LIMITS	6.8 / 8.5	35/100mL	S: 2.0 W: 2.4	X X X	X X X	21	X X X	X X X	X X X	PASS/ FAIL
JUL.	6.9 / 7.3	22	0.0	36.6	4.99	12				
AUG.	6.9 / 7.3	81	0.0	26.2	5.82	10	<10	<0.1	111	
SEP.	7.0 / 7.5	20	0.1	19.4	2.86	<10				PASS
OCT.	6.9 / 7.5	14	0.0	19.3	4.20	<10				
NOV.	7.2 / 7.5	11	0.0	24.6	3.14	10	<10	<0.1	65	PASS
DEC.	7.1 / 7.4	21	0.0	19.8	4.91	<10				
JAN.	6.9 / 7.4	15	0.1	18.6	3.37	<10				
FEB.	6.8 / 7.3	17	0.0	23.4	3.53	<10	<10	<0.1	111	
MAR.	6.9 / 7.3	9	0.0	26.3	5.02	<10				PASS
APR.	7.1 / 7.6	32	0.8	11.4	3.09	<10				
MAY	6.9 / 7.4	16	0.0	30.8	3.04	<10	<10	<0.1	47	PASS
JUN.	7.0 / 7.3	15	0.1	32.8	4.21	<10				
YEARLY AVG.	X X X	20	0.1	24.1	4.02	3	0	0	84	X X X
* "S" represents the permitted summer months (April through October)										
* "W" represents the permitted winter months (November through March)										