

**Annual Report for Wastewater Treatment Works / Wastewater Collection System  
Fiscal Year 2024-25**

**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 composted. The Town of Carolina Beach used McGill Environmental Services for contract residual biosolids composting during the 2024 calendar year. The Town of Carolina Beach submitted the required Biosolids Annual Report for 2024 to the U.S. Environmental Protection Agency and the N.C. Department of Environmental Quality during the 2025 fiscal year. The town reported that a total of 258.30 dry metric tons were composted by McGill Environmental Services from the WWTP during the 2024 calendar year.

## II. Performance

Text Summary System Performance for the 2025 fiscal year (beginning July 1, 2024):

The Town of Carolina Beach wastewater facility treated 393,306,000 gallons of wastewater during the 2025 fiscal year. The daily average flow treated during the 2025 fiscal year was 1.078 MGD, or 35.9 % 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 2025 fiscal year and was sampled on 2/7/2025.

In June 2024, the Effluent Launder Trough for Clarifier #1 was found to be severely corroded and the corrosion was too extensive to perform a permanent repair. Staff clamped a temporary repair to the trough and a full replacement of the Effluent Launder Trough was scheduled for the off season. Successful replacement of the trough and weirs was performed in February/March 2025.

The Town of Carolina Beach collections system staff supervised extensive smoke testing in the sewer collection system in problematic flooding areas this off season. The need to make improvements to inflow and infiltration (I&I) of stormwater and groundwater into the collection system was prioritized after elevated rainfall totals in August and September 2024 (14.94" rain in August 2024 and 19.38" rain in September 2024 culminated by the historic rain event on September 16 associated with Potential Tropical Cyclone Eight where some Carolina Beach rain gauges recorded rainfall amounts as large as 18" within a 12 hour period). Smoke testing and subsequent repairs were conducted in the sewer collection system that flows to the following lift stations this fiscal year:

- Lift Station #5 smoke tested 11/12-15/2024. The collection area for this station includes the blocks from Carolina Sands to Carolina Beach Lake and all of Carolina Beach Avenue South.
- Lift Station #1 smoke tested 11/21/2024 to 12/13/2024. The collection area for this station includes all of the Central Business District and Boardwalk areas, blocks between Plymouth Avenue/Ocean Ridge/Goldsboro Avenue to Birmingham Avenue (north to south) and Woody Hewett Avenue to Dow Road (east to west), as well as the North End streets from Oystershell Lane/800 block to the Boardwalk (north to south).
- Lift Stations #2 and #3 smoke tested 4/14-16/2025. The collection area for these stations include all the North End blocks on Canal Drive and Carolina Beach Avenue North from Seagull Lane north to Salt Marsh Lane and the blocks in Florida, Georgia, and Virginia Avenues extending to Oceana.

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 no reportable permit limit violations during the 2025 fiscal year:

#### Monitoring and Reporting Violations or Deficiencies

There was one reportable monitoring violation during the 2025 fiscal year. Composite samples were not collected on non-consecutive days due to issues with the sampler's refrigeration system, but the required weekly total was still met.

#### Sanitary Sewer Overflows

There were no reportable sanitary sewer overflow (SSO) events during the 2025 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

8/28/25  
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%. Four tests are required per permit cycle to include a second species, *Menidia beryllina*.

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 ( $\mu\text{g}/\text{L}$ ) – 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. |
| 2024/  | OUT   | IN    | OUT      | IN    | OUT   | OUT     | OUT   | OUT   |
| 2025   | (MGD) | (ppm) | (ppm)    | (ppm) | (ppm) | (ppb)   | (ppm) | (°C)  |
| NPDES  |       |       |          |       |       |         |       |       |
| PERMIT   | 3.000 | X X X | S / 5.0  | X X X | 30.0  | 50      | 5.00  | X X X |
| LIMITS   |       |       | W / 10.0 |       |       |         |       |       |
| JUL.   | 1.329 | 361   | 5        | 243   | 0.0   | 17      | 7.27  | 29.7  |
| AUG.   | 1.971 | 188   | 5        | 136   | 0.0   | 19      | 7.16  | 28.7  |
| SEPT.  | 1.842 | 179   | 4        | 133   | 0.0   | 16      | 7.78  | 26.7  |
| OCT.   | 1.048 | 214   | 4        | 152   | 0.0   | 15      | 8.33  | 24.5  |
| NOV.   | 0.842 | 242   | 4        | 200   | 0.0   | 13      | 8.79  | 22.5  |
| DEC.   | 0.628 | 278   | 3        | 209   | 0.0   | 14      | 9.66  | 18.2  |
| JAN.   | 0.644 | 261   | 3        | 195   | 0.0   | 14      | 10.26 | 14.2  |
| FEB.   | 0.658 | 288   | 3        | 199   | 0.0   | 17      | 9.58  | 15.7  |
| MAR.   | 0.956 | 260   | 3        | 218   | 0.0   | 11      | 8.90  | 17.8  |
| APR.   | 0.802 | 306   | 4        | 220   | 0.0   | 15      | 8.19  | 22.3  |
| MAY  | 0.949 | 284   | 3        | 209   | 0.0   | 14      | 7.79  | 25.3  |
| JUN.   | 1.235 | 307   | 4        | 222   | 0.0   | 15      | 7.87  | 28.0  |
| YEARLY   |       |       |          |       |       |         |       |       |
| AVG.   | 1.078 | 264   | 4        | 194   | 0.0   | 15      | 8.44  | 22.9  |

Permit required sample frequency

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)

**NOTE:** 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

| Plant Performance Form                         |             |                  |           |             |             |           |           |           |           |                     |                  |     |
|--|-------------|------------------|-----------|-------------|-------------|-----------|-----------|-----------|-----------|---------------------|------------------|-----|
| Plant Name: Carolina Beach Wastewater Facility |             |                  |           |             |             |           |           |           |           |                     |                  |     |
| YEAR   | pH          | ENTERO.          | NH3-N     | TOTAL NITR. | TOTAL PHOS. | TOTAL Cu  | TOTAL Ni  | TOTAL Ag  | CDBM      | TOXICITY Mysidopsis | TOXICITY Menidia |     |
|  |             |                  |           |             |             |           |           |           |           |                     |                  |     |
| 2024/2025                                      | OUT (UNITS) | OUT (MPN/100 mL) | OUT (ppm) | OUT (ppm)   | OUT (ppm)   | OUT (ppb) | OUT (ppb) | OUT (ppb) | OUT (ppb) | bahia               | beryllina        | OUT |
| NPDES PERMIT LIMITS                            | 6.8 / 8.5   | 35/100mL         | S: 2.0    | XXX         | XXX         | 21        | XXX       | XXX       | XXX       | PASS/FAIL           | PASS/FAIL        |     |
| JUL.   | 6.8 / 7.3   | 5                | 0.0       | 48.4        | 7.48        | 13        |           |           |           |                     |                  |     |
| AUG.   | 6.9 / 7.2   | 16               | 0.0       | 30.7        | 4.94        | <10       | <10       | <0.1      | 78        | PASS                |                  |     |
| SEP.   | 6.8 / 7.3   | 13               | 0.0       | 33.9        | 4.34        | <10       |           |           |           |                     |                  |     |
| OCT.   | 7.0 / 7.4   | 2                | 0.0       | 19.4        | 2.39        | <10       |           |           |           |                     |                  |     |
| NOV.   | 7.2 / 7.4   | 3                | 0.0       | 35.3        | 3.46        | <10       | <10       | <0.1      | 45        | PASS                | PASS             |     |
| DEC.   | 7.0 / 7.4   | 2                | 0.0       | 26.3        | 3.73        | <10       |           |           |           |                     |                  |     |
| JAN.   | 7.0 / 7.3   | 3                | 0.0       | 28.8        | 4.62        | 10        |           |           |           |                     |                  |     |
| FEB.   | 7.0 / 7.2   | 1                | 0.0       | 27.3        | 4.55        | <10       | <10       | <0.1      | 50        | PASS                | PASS             |     |
| MAR.   | 7.0 / 7.4   | 3                | 0.0       | 33.2        | 3.81        | <10       |           |           |           |                     |                  |     |
| APR.   | 7.0 / 7.3   | 2                | 0.0       | 42.4        | 4.96        | 11        |           |           |           |                     |                  |     |
| MAY  | 6.9 / 7.3   | 5                | 0.0       | 35.4        | 4.32        | 10        | <10       | <0.125    | 28        | PASS                | PASS             |     |
| JUN.   | 6.8 / 7.3   | 15               | 0.0       | 32.1        | 4.63        | 11        |           |           |           |                     |                  |     |
| YEARLY AVG.                                    | XXX         | 4                | 0.0       | 32.8        | 4.44        | 5         | 0         | 0         | 50        | XXX                 | XXX              |     |