

BRUNSWICK COUNTY PUBLIC UTILITIES

WASTEWATER ANNUAL PERFORMANCE REPORT

July 1, 2023 to June 30, 2024



BRUNSWICK COUNTY PUBLIC UTILITIES

250 Grey Water Road, Supply, NC 28462

910.253.2657

Brunswick County Public Utilities is pleased to share the fiscal year (FY) 2023-2024 annual wastewater performance report. House Bill 1160, the Clean Water Act of 1999, requires entities that own or operate wastewater treatment and collections facilities in North Carolina to provide customers with an annual performance report.

Physical copies of this report are available for viewing at the Brunswick County Public Utilities Operations Center located at 250 Grey Water Road in Supply. A hard copy of the report may be requested by calling (910) 253-2657, option 1. This report is also available online at the website below. Customers will be notified of report availability by printed notice on sewer bills and on the Brunswick County website.

Website link: <https://www.brunswickcountync.gov/DocumentCenter/View/5427/FY-23-24-Annual-Wastewater-Report>.

Questions and comments regarding this report should be directed to the Brunswick County Public Utilities Department at (910) 253-2657, option 1. This report has been completed by Utilities Department staff and is accurate to the best of their knowledge and belief.

CLIFFORD PHIPPS
Collections Superintendent

MATTHEW HENRY
Wastewater Operations Superintendent

ACRONYMS

ATAD: Autothermal thermophilic aerobic digestion

GPD: Gallons per day

FOG: Fats, oils, and grease

FY: Fiscal year

MGD: Million gallons per day

NCDEQ: North Carolina Department of Environmental Quality

NCWPCSOCC: North Carolina Water Pollution Control System Operators Certification Commission

NOD: Notice of deficiency

NOV: Notice of violation

NPDES: National pollutant discharge elimination system

ORC: Operator in responsible charge

PER: Preliminary engineering report

SBWASA: South Brunswick Water and Sewer Authority

SSO: Sanitary sewer overflow

SCADA: Supervisory control and data analysis

WRF: Water reclamation facility

WWTP: Wastewater treatment plant

HISTORY

Brunswick County operates six wastewater treatment plants (WWTP) with a total permitted wastewater treatment capacity of 13,355,000 gallons per day (GPD). Retail sewer service is provided within the municipalities of Boiling Spring Lakes, Bolivia, Calabash, Carolina Shores, Caswell Beach, Navassa, Northwest, Sandy Creek, St. James, Sunset Beach, Varnamtown, and the unincorporated areas of Brunswick County. Wholesale sewer treatment is provided to Holden Beach, Oak Island, Ocean Isle Beach, Shallotte, Southport*, and Brunswick Regional Water & Sewer H2GO. Brunswick County's wastewater history can be best described through the county's geographic regions.

**The City of Southport [merged](#) with Brunswick County on June 30, 2024*

Northern Brunswick County

Brunswick County began operating its first WWTP in the late 1990s to serve the Leland Industrial Park. During this time, developers in the area also began constructing small metallic “package” WWTPs to treat wastewater from their individual residential developments. In early 2000, Brunswick County began designing and constructing the Northeast Brunswick Regional Water Reclamation Facility (WRF) located in the Town of Navassa. This project was completed in the summer of 2003 with an initial treatment capacity of 1.65 million gallons per day (MGD).

Due to the increasing demand for sewer, the Northeast Brunswick Regional WRF treatment capacity was upgraded to 2.475 MGD in 2013. High residential growth in the facility's service area continued and an additional expansion was needed. In August of 2019, Brunswick County was granted an Authorization to Construct by the North Carolina Department of Environmental Quality (NCDEQ) for an additional 2.5 MGD upgrade of the facility, bringing the total treatment capacity to 4.975 MGD. The upgraded facility was certified on June 16, 2022. An expansion for an additional 3.75 MGD of treatment capacity is currently under design.

Currently, the Northeast Brunswick Regional WRF provides sewer treatment for northeastern Brunswick County including the Town of Leland, the Town of Navassa, the City of Northwest, and customers within Brunswick Regional Water & Sewer H2GO's district (Town of Belville, part of the Town of Leland, and some unincorporated areas). Both the City of Northwest and the Town of Navassa conveyed their systems to Brunswick County in 2016 and 2020, respectively.

Southern Brunswick County

In 2004, Brunswick County acquired assets of the South Brunswick Water and Sewer Authority (SBWASA) and Carolina Blythe Utilities which provided sewer service to communities in the southern part of Brunswick County including the Towns of Calabash and Carolina Shores. Carolina Blythe Utilities' Carolina Shores WWTP, originally constructed in the late 1970s, is an extended aeration tertiary treatment plant with a wastewater treatment capacity of 530,000 GPD. SBWASA's Sea Trail WWTP originally served the Sea Trail development in the Town of Sunset Beach and had a 200,000 GPD wastewater treatment capacity.

After acquiring the aging SBWASA and Carolina Blythe Utilities systems, Brunswick County has made significant improvements to both the sewer treatment facilities and the sewer collection systems. In 2007, Brunswick County expanded the treatment capacity of the Sea Trail WWTP to 300,000 GPD. In 2010, Brunswick County completed construction of a sewer collection system for those areas within the Town of Calabash that did not have sewer service. Two years later, in 2012, Brunswick County completed

construction of the Sunset Beach sewer collection system. Both of these systems convey wastewater to the Sea Trail WWTP. Numerous sewer pump stations that contribute sewer flow to the Carolina Shores and Sea Trail WWTPs have been rehabilitated and significant improvements have been made to the treatment facilities. These improvements include flow equalization, diversion pump stations with interconnection force mains, process enhancements, and capacity improvements.

The Town of Ocean Isle Beach reached an agreement with Brunswick County in 2012 to convey the Ocean Isle Beach WWTP to the County. This facility is permitted to treat 1.050 MGD and includes a diversion pump station and force main that allows a monthly average of 0.293 MGD to be transferred to the West Brunswick Regional WRF for treatment. Currently, a preliminary engineering report (PER) is underway for a 2 MGD expansion of the Ocean Isle Beach WWTP.

Central Brunswick County

The West Brunswick Regional WRF, located in Supply, is the largest wastewater treatment facility in Brunswick County. The facility was completed in 2006 to serve the unincorporated areas in central Brunswick County, Bolivia, and St. James as well as the wholesale customer Holden Beach. A septage receiving station for septic haulers pumping wastewater from septic systems can also be found at this facility.

When the West Brunswick Regional WRF was completed, the existing "package" plants that served Brunswick Community College, Winding River development, and the Town of St. James, along with a facultative lagoon serving the Brunswick County Government Complex, were taken out of service. All wastewater flow was then diverted to the new facility. In 2009, a 3 MGD expansion to the West Brunswick Regional WRF was completed to accommodate wastewater flow from the Town of Oak Island's sewer collection system. This brought the total sewer treatment capacity for the extended aeration tertiary treatment non-discharge facility to 6 MGD. To accommodate increasing sewer demand, an expansion to the West Brunswick Regional WRF is currently under design.

In 2006, Brunswick County entered into an agreement with the Town of Shallotte to assume ownership of the Town of Shallotte's WWTP. The Shallotte WWTP is a facultative lagoon, non-discharge facility with a treatment capacity of 500,000 GPD. Subsequent piping improvements constructed by Brunswick County allow excess flow to the Shallotte WWTP to be diverted to the West Brunswick Regional WRF.

In November of 2015, the Town of Caswell Beach conveyed its utility system to Brunswick County. The Caswell Beach sewer collection system is a combination of gravity, low pressure, and vacuum systems that send wastewater to the Town of Oak Island's Fish Factory Road WWTP for treatment. Brunswick County does not operate the Fish Factory Road WWTP.

In 2008, the City of Southport entered into an agreement with Brunswick County and subsequently completed a connection to the regional transmission system to convey wastewater to the West Brunswick Regional WRF for treatment. The City of Southport is currently helping fund the construction of a 0.75 MGD treatment plant known as the Mulberry Branch WWTP. The Mulberry Branch facility will be located on property owned by Brunswick County near the existing Shallotte WWTP. Construction has begun on the Mulberry Branch WWTP and is anticipated to be completed in late 2025. This year, the City of Southport merged its water and wastewater systems with Brunswick County. The official merging of systems began on June 30, 2024.

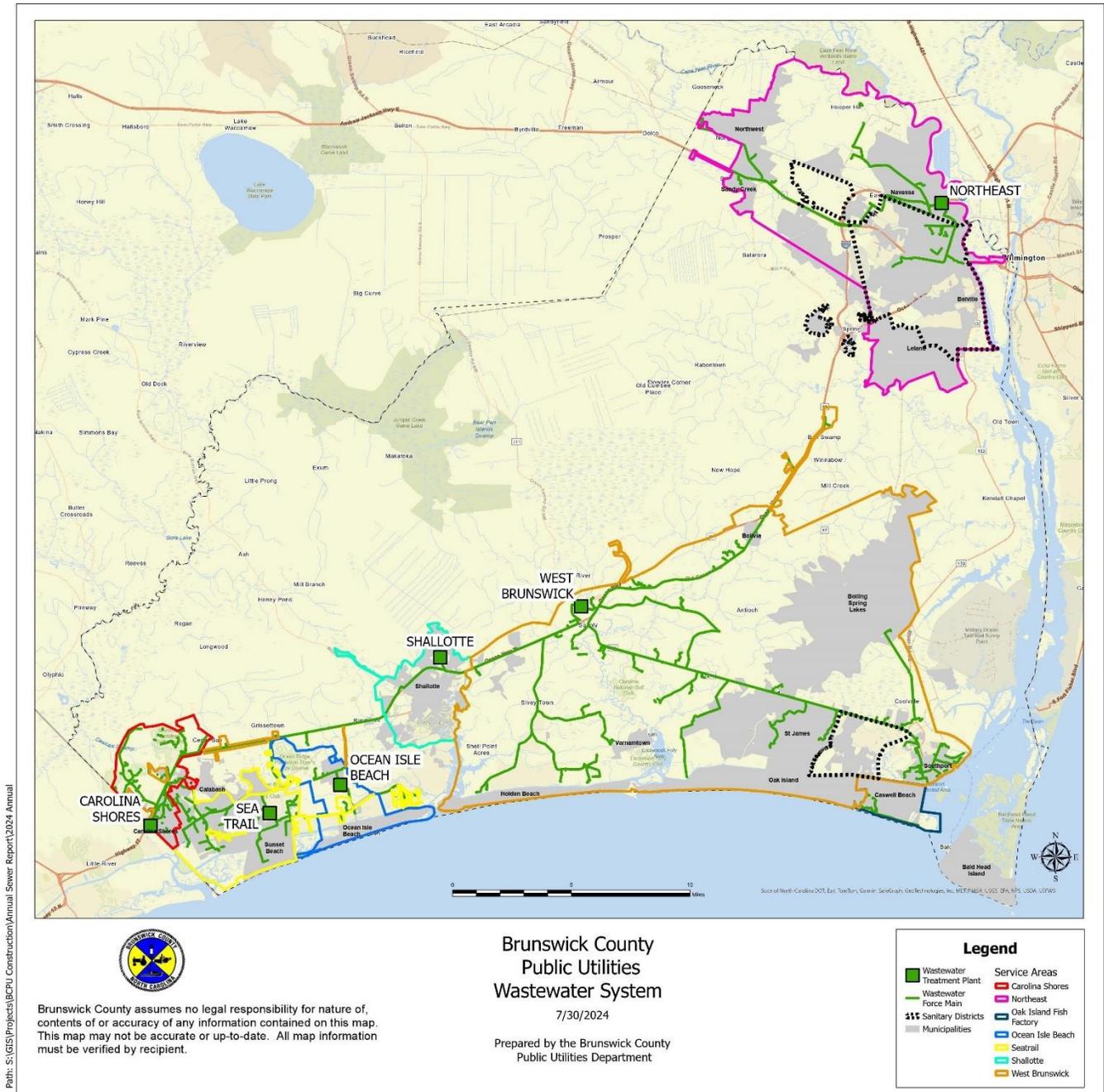


Figure 1: Map of the Brunswick County Public Utilities wastewater system.

CONNECTION PROGRAM

New developments in Brunswick County located in proximity to a sewer line are required to construct sewer collection facilities within the development. All new homes must make connections to these facilities. Existing structures are not required to connect to the sewer collection system when new sewer mains are constructed near them; however, property owners who would like to connect to the sewer system may do so.

Brunswick County has implemented a [Rural Sewer Program](#). The goal of this program is to “eliminate failing septic tanks and provide sewer service to existing lots of record that would not otherwise have sewer service due to (1) unsuitable land for an onsite septic disposal system (new construction) or (2) the inability to obtain a septic system repair permit from the Brunswick County Health Department (existing dwelling units). If either of these conditions exists, then a connection will be allowed to a county high pressure sewer transmission force main with the use of a high discharge head sewer grinder pump.”

For additional information on sewer connections, please contact the Brunswick County Engineering Department at (910) 253-2500 or visit <https://www.brunswickcountync.gov/229/Engineering>.

WASTEWATER AS A RESOURCE

Reuse Water Irrigation

Discharge wastewater treatment facilities are permitted to release their treated wastewater, also known as effluent, to surface waters such as rivers or streams. Two of Brunswick County’s WWTPs are discharge facilities, however, the other four are permitted as non-discharge facilities. Rather than discharging the effluent to a surface water body, a non-discharge facility uses the highly treated wastewater for large-scale irrigation. The highly treated wastewater is commonly referred to as “reuse” or “reclaimed” water. Brunswick County operates over 25 miles of reuse force mains that supply reuse water for irrigation at eleven golf courses and 1,040 acres of dedicated tree and turf farms.

Using reuse water for irrigation has several advantages. The biggest advantage is that reuse water can be used in place of potable water for irrigation. This reduces potable water demand and peak loading on the water system which ultimately reduces costs and helps to stabilize rates. Additionally, using reuse water for irrigation allows golf courses to reduce the amount of fertilizer utilized on the golf course. Golf courses utilizing reuse water for irrigation include those in Sea Trail, Carolina National at Winding River, and the Reserve and Members Clubs at St. James.

Biosolids Management

The Wastewater Treatment Division oversees the disposal of biosolids from each of the wastewater treatment facilities. In 2023, Brunswick County produced 861 dry tons of Class-A biosolids and 33 dry tons of Class-B biosolids. The biosolids are land-applied by Brunswick County’s residuals contractor as soil amendments on farm fields. The County continues to research additional disposal and treatment alternatives and has completed a study on long-term biosolids management to include the design of a Biosolids Processing Facility at the West Brunswick Regional WRF. The design and engineering phase is scheduled for completion by fall 2025.

FY 2023-2024 HIGHLIGHTS

Staff Training and Certification

Brunswick County's wastewater treatment facilities and collection system are comprised of a wide variety of materials and equipment that require a highly skilled and diverse staff for proper operation and maintenance. Wastewater Treatment and Collection System personnel are certified through the North Carolina Water Pollution Control System Operators Certification Commission (NCWPCSOCC) that is governed by the state of North Carolina and administered through the NCDEQ.

In order to become certified by the NCWPCSOCC and obtain a North Carolina electrician's license, individuals need to fulfill specific education and experience requirements, complete necessary coursework, and pass a state-administered exam. Once certified, wastewater operators and licensed electricians must participate in annual continuing education courses to retain their certification. Additionally, Brunswick County offers regular training in various areas such as safety, valves, generators, HVAC, system maintenance, regulatory updates, and other programs related to system operation and maintenance.

Brunswick County has over 70 dedicated staff members from four divisions that provide operation and maintenance of the system. In FY 2023-2024, staff received the following new certifications:

- Collections I- Eight certifications
- Collections II- Five certifications
- Collections III- One certification
- Wastewater Operator II- Three certifications
- Wastewater Operator IV- One certification

Laboratory Analysis

Over 15,600 laboratory tests are performed annually at the West Brunswick Regional WRF Laboratory by certified laboratory staff to ensure compliance with the Division of Water Resource's Water Quality Section requirements and National Pollutant Discharge Elimination System (NPDES) permits. Conducting on-site laboratory analysis enables quick operational adjustments to maintain efficient plant operation and ensure that the treated water leaving the plants meets permit limits.

Highlighting the Present, Looking Ahead to the Future

In addition to regular maintenance and operation, utility staff completed the following in FY 2023-2024:

- Installed 1189 grinder pump stations in low-pressure sewer areas
- Completed the required 10% cleaning and video inspection of the Brunswick County gravity sewer collection system for a total of 104,137 feet or 20 miles
- Installed an additional 20.8 miles of sewer line

For FY 2024-2025, the following Capital Improvement projects are planned:

- Design and construction of sewage lift station rehabilitation and upgrades for up to 11 stations
- Completion of the Ocean Isle Beach WWTP PER
- Development of PER for the expansion of the West Brunswick Regional WRF
- Construction beginning on numerous projects including:
 - Longwood Road Sewer Project
 - Southport Pump Station Rehab Project

- Southport Sewer Replacement Project
- Southport Find it and Fix it Project
- Bolivia By-Pass Force Main
- Navassa Sewer System Rehabilitation



Figure 2: Photos of utilities staff working at various locations throughout Brunswick County.

WASTEWATER TREATMENT FACILITY PERFORMANCE

Treatment Facility Information

Plant Name	Permit Number	Permit Type	Permitted Flow	ORC	Phone	Treatment Type
West Brunswick Regional WRF	WQ0023693	Non-discharge	6 MGD	Christian Coddington	(910) 253-2871	<ul style="list-style-type: none"> • Extended aeration • Tertiary treatment • Biological nutrient removal with ATAD process for solids handling
Northeast Brunswick Regional WRF	NC0086819	Discharge, Cape Fear River	4.975 MGD	Richard Brower	(910) 253-2484	<ul style="list-style-type: none"> • Extended aeration • Tertiary treatment • Biological nutrient removal with ATAD process for solids handling
Ocean Isle Beach WWTP	WQ0006085	Non-discharge	1.05 MGD	Scott Leonard	(910) 579-9365	Sequencing batch reactor
Carolina Shores WWTP	NC0044873	Discharge, tributary to Persimmon Swamp	0.53 MGD	James Morrison	(910) 253-1722	<ul style="list-style-type: none"> • Extended aeration • Tertiary treatment
Shalotte WWTP	WQ0000798	Non-discharge	0.5 MGD	Christian Coddington	(910) 253-2496	Facultative lagoon
Sea Trail WWTP	WQ0012748	Non-discharge	0.3 MGD	Scott Leonard	(910) 579-9365	<ul style="list-style-type: none"> • Extended aeration • Tertiary treatment

Table 1: Wastewater treatment facility information for each of Brunswick County’s six facilities.

Treatment Facility Corrective Action

In the FY 2023-2024, the West Brunswick Regional WRF, Carolina Shores WWTP, and the Shallotte WWTP did not receive any Notices of Violation (NOV) or Notices of Deficiency (NOD). Information on the NOV's and NOD's for the Northeast Brunswick Regional WRF, Ocean Isle Beach WWTP, and Sea Trail WWTP can be found below. Brunswick County is committed to complying with all permit and regulatory requirements and has taken corrective action in response to these violations.

Northeast Brunswick Regional WRF

- October 2023, NOV-2023-LV-0911
 - Daily maximum and monthly average effluent copper limit exceeded
- February 2024, NOD-2024-MV-0015
 - Monitoring frequency violations for total nitrogen and total phosphorus
- April 2024, NOV-2024-LV-0504
 - Monthly average copper limit exceeded

Ocean Isle Beach WWTP

- April 2024, NOV-2024-PC-0290
 - Mud and/or ponding on multiple spray irrigation fields, trees growing in southern lagoon

Sea Trail WWTP

- August 2023, NOV-2023-PC-0569
 - Safety hazard posed by deterioration and corrosion, diffusers not operating

Treatment Facility Performance Summary

Plant	Annual Average Daily Flow	Maximum Daily Flow	Total Annual Flow	Total Annual Flow Diversion*	Total Rainfall (inches)
West Brunswick Regional WRF	4,188,045	6,431,769	1,533,497,495		56.98
Northeast Brunswick Regional WRF	2,619,352	4,618,108	958,993,212		56.75
Ocean Isle Beach WWTP	393,534	875,745	144,174,317	27,484,703	56.69
Carolina Shores WWTP	451,196	500,500	165,144,578	51,639,571	54.43
Shallotte WWTP	339,534	955,561	124,437,407	53,117,626	49.35
Sea Trail WWTP	174,263	235,000	63,813,000	230,955,631	55.75
<i>*Wastewater flow diverted to the West Brunswick Regional WRF</i>					
<i>**All totals are in gallons unless otherwise specified</i>					

Table 2: Wastewater treatment facility performance numbers for each of Brunswick County's six facilities.

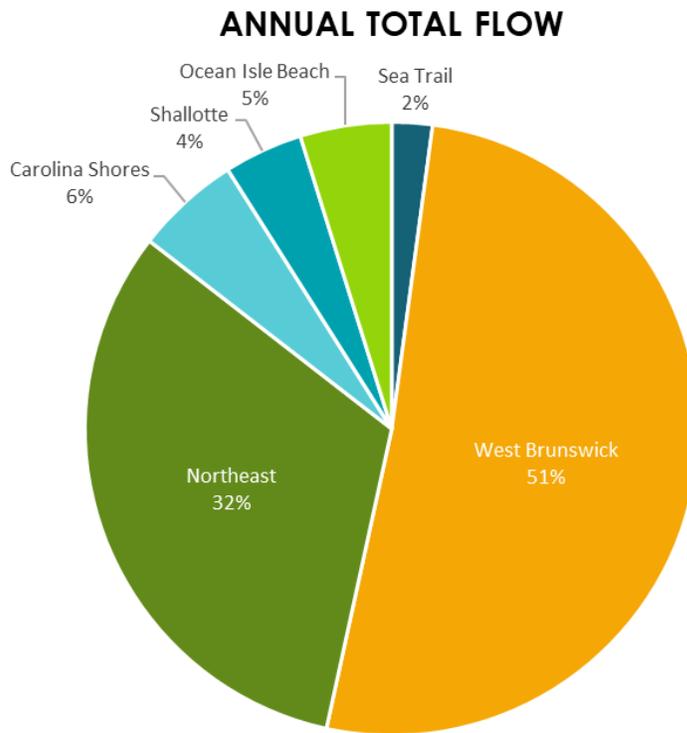


Figure 3: Percent of total annual flow by wastewater treatment facility.

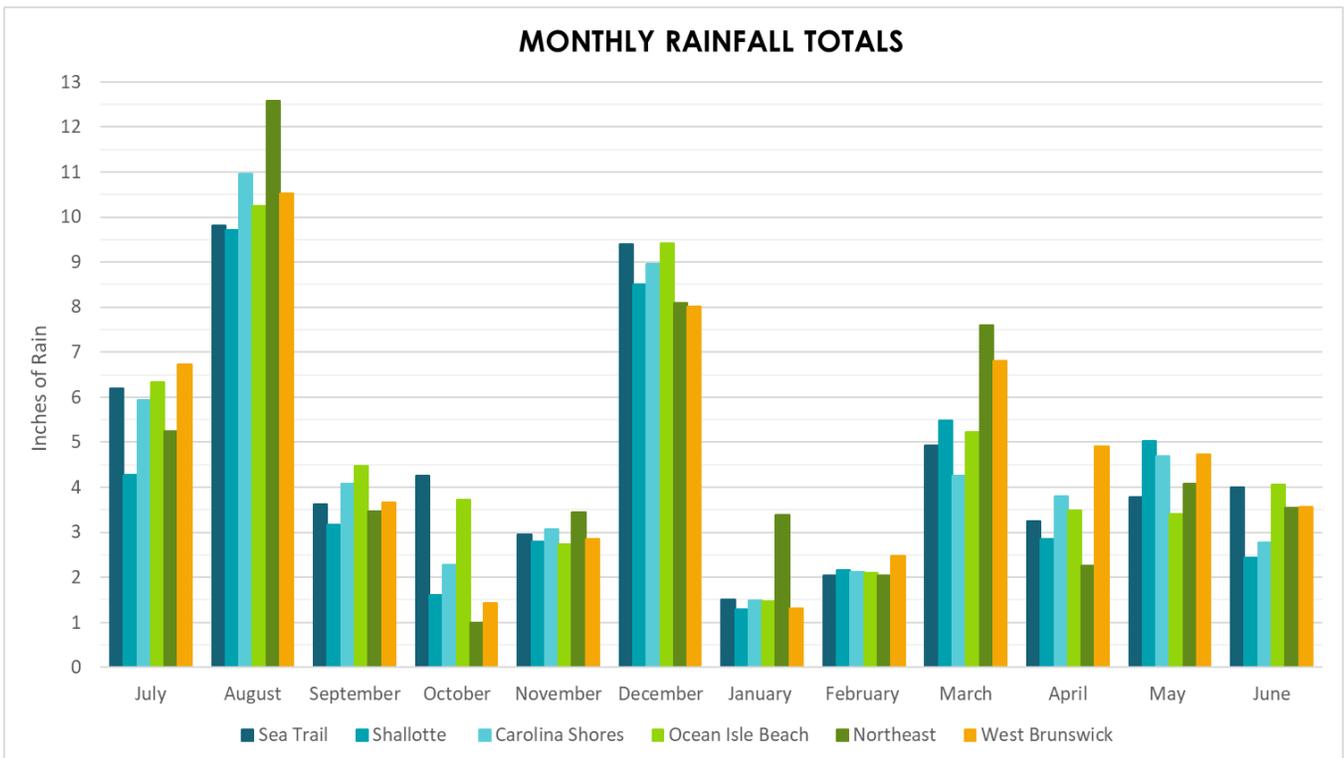


Figure 4: Rainfall totals at each wastewater treatment facility.

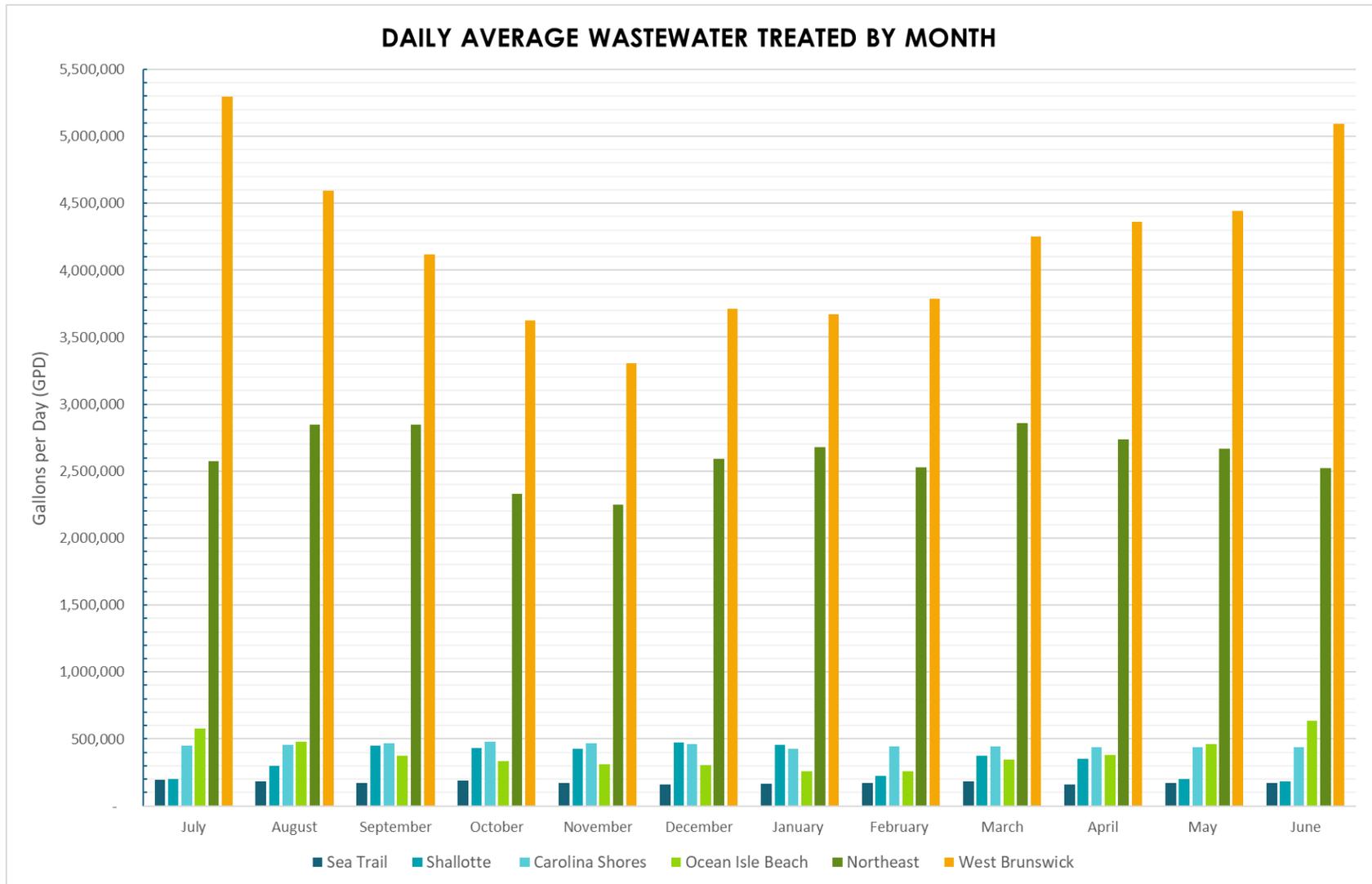


Figure 5: Daily average totals of wastewater treated per month at each wastewater treatment facility.

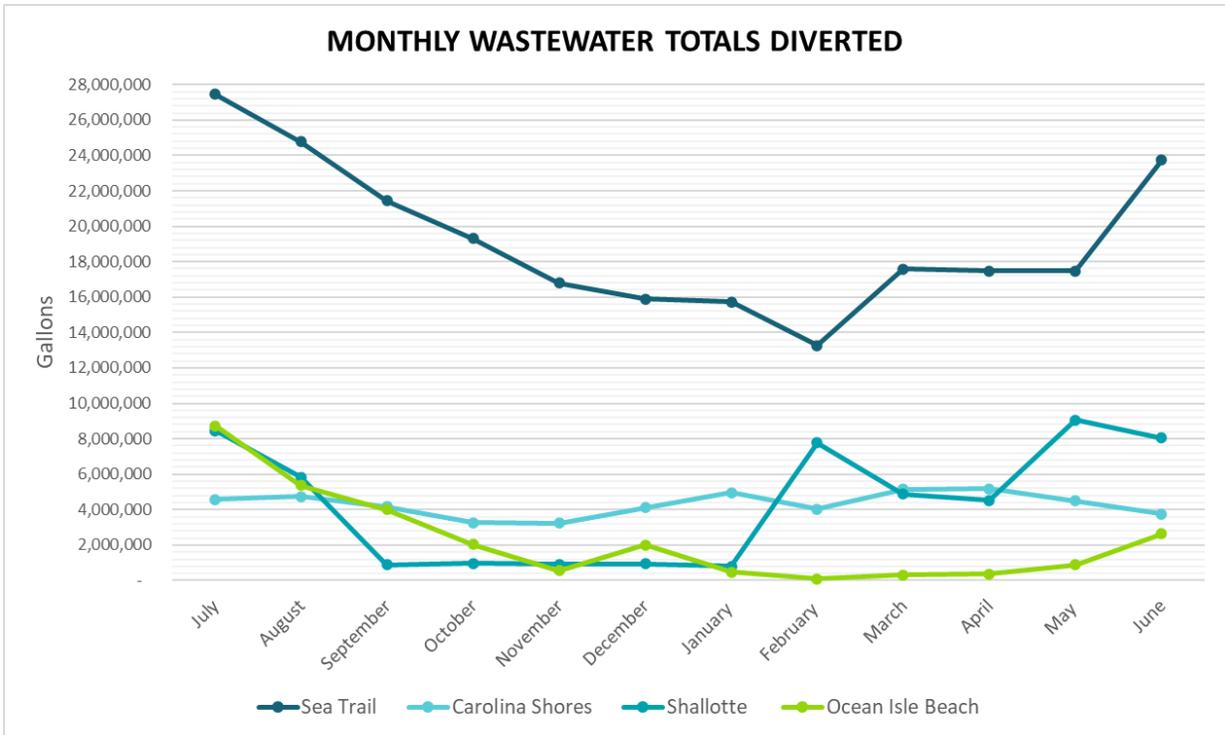


Figure 6: Monthly wastewater totals diverted to the West Brunswick Regional WRF from the Sea Trail WWTP, Carolina Shores WWTP, Shallotte WWTP, and Ocean Isle Beach WWTP. The Northeast Brunswick Regional WRF does not divert wastewater to the West Brunswick facility.

COLLECTION SYSTEM PERFORMANCE

Collection System Summary

Permit Number	WQCS00284
ORC	John Gregory
Phone	(910) 253-2706
Pump/Lift Stations	
	204
Grinder Pump Stations	
	11,961
Force Main Line	
	271.7 miles
Low Pressure Line	
	230.3 miles
Gravity Line	
	182.9 miles
Vacuum Line	
	20.9 miles
Collection Mains Total	705.8 miles

Table 3: Summary of Brunswick County’s collection system.

Sanitary Sewer Overflows

A sanitary sewer overflow (SSO) is defined as untreated sewage discharging before reaching a wastewater treatment facility. The most common cause of SSOs is the buildup of grease, which blocks sewer pipes and leads to the release of raw sewage through manholes, sewer cleanouts, and other entry points into the sewer collection system. Sewer blockages can also occur due to:

- Foreign objects being dropped into sewers and manholes
- Flushing non-biodegradable materials
- Growth of roots into piping
- Excessive, heavy rainfall
- Disturbance or cutting of sewer mains by contractors and property owners during excavation
- Failure of pipe or other mechanical equipment



Figure 7: *Photo on left-* Utility staff repairing a broken sewer line. *Photo on right-* Grease buildup in a sewer line.

Brunswick County continuously works to prevent SSOs in the collections system. All pump stations and wastewater treatment facilities are equipped with a Supervisory Control and Data Analysis (SCADA) system. The SCADA system provides automated reports and high-level alarms to operators assigned to monitoring the sewer system. Brunswick County staff are available 24 hours per day, 7 days per week to respond quickly to emergencies and prevent SSOs from occurring. Staff are responsible for conducting daily inspections and maintenance on the sewer system's piping, valves, pump stations, treatment facilities, generators, and other components to minimize failures and ensure backup power during outages. In the collections system, staff monitors system pressures, capacities, and conditions to recommend necessary rehabilitation and capital projects to ensure adequate capacity. Additionally, staff regularly maintains utility easements to ensure accessibility for inspections and repairs.

Brunswick County employs a contractor specializing in televised inspection of sewer mains to analyze a minimum of 10% of the Brunswick County gravity sewer system annually. When repairs and blockages are noted, Brunswick County performs the necessary repairs and maintenance using various construction and jetting equipment, vacuum trucks, and tanker trucks. Education is another key component in preventing SSOs. As part of the Fats, Oils, and Grease (FOG) Program, Brunswick County educates customers on the proper disposal of these items and encourages the public to contact the Utilities Department if they notice any deficiencies or misuse of the sewer system. Additionally, Brunswick County is part of the [NC 811](#) call system, which aims to prevent excavation-related utility

damage by providing proper notification and utility location services to the general public and contractors.

FY 2023-2024 Sanitary Sewer Overflows

Brunswick County seeks to be a good steward of the environment; however, even with due diligence, all utilities providing sewer service will experience SSOs from time to time. When an SSO occurs, Brunswick County takes the following corrective actions:

- Public notification following the Division of Water Resource’s Water Quality Section guidelines
- Removing blockages from piping
- Cleanup and disinfection of the spill area
- Repair, refurbish, and renovate damaged or inadequate facilities
- Increase inspection frequency as warranted
- Construct capacity improvements as warranted

Date	Total Volume Spilled (gallons)	Location	Probable Cause	Enforcement Action
10/18/2023	<i>1,300</i>	9975 Nance St, Calabash	Grease	Notice of Violation
10/25/2023	<i>300</i>	3133 Moss Hammock Wynd, St James	Pipe break	Notice of Violation
1/18/2024	5,000	2779 Saint James Dr, Southport	Pipe break, contractor strike	None
2/1/2024	<i>25,000</i>	2902 Old Ocean Hwy, Bolivia	Pipe break, contractor strike	Notice of Violation
2/20/2024	6,000	2779 Saint James Dr, Southport	Pipe break, contractor strike	None
3/13/2024	<i>31,500</i>	349 Forest St Ext, Shallotte	Pipe break, contractor strike	None
4/16/2024	1,500	Corner of Hwy 211 and Camarosa Blvd, Bolivia	Pipe break	Notice of Violation
4/16/2024	36,000	3978 Southport Supply Rd, Southport	Pipe break, contractor strike	None
4/23/2024	1,000	6539 Castlebrook Way, Ocean Isle Beach	Pipe break	Notice of Deficiency
5/7/2024	3,000	2779 Saint James Dr, Southport	Pipe break, contractor strike	None
5/14/2024	2,000	940 Calabash Rd, Calabash	Pipe break, contractor strike	None

Please note italicized, blue volume numbers indicate wastewater reached surface waters

Table 4: Summary of Brunswick County’s FY 23-24 SSOs. For more information on each SSO please visit <https://experience.arcgis.com/experience/4a50b5dc87844bab9930a5906522a779>.

What You Can Do to Prevent Sanitary Sewer Overflows

- Contact Brunswick County Public Utilities if you see a maintenance issue, SSO, or someone misusing the public sewer system.
- Never pour grease down sink drains or into toilets! Put grease in a disposable container and dispose of in the garbage or recycle where available.
- Put strainers in kitchen sinks to catch food and debris and empty them into the trash.
- Put wipes, napkins, cat litter, cotton balls, hygiene products, and latex products into the trash; never flush these down the toilet.
- Speak with your neighbors about how to keep grease and other materials out of the sewer. Sewer blockages from grease and other foreign materials do not just impact the person putting them down the drain!



DON'T FEED THE GREASE GOBLIN!

DO:

- ✓ Put oil and grease in collection containers
- ✓ Remove oil and grease from kitchen utensils, equipment, and food preparation areas with scrapers/towels/brooms
- ✓ Place food scraps in collection containers
- ✓ Keep grease out of wash water

DO NOT:

- ✗ Pour oil and grease down your drains
- ✗ Wash plates, fryers/griddles, and pots/pans with water until oil and grease are removed
- ✗ Use **hot** water to rinse grease off surfaces
- ✗ Put food scraps down your drains

FIND OUT MORE [BRUNSWICK COUNTY PUBLIC UTILITIES | BRUNSWICKCOUNTYNC.GOV/FOG-FLUSH](https://www.brunswickcountync.gov/FOG-FLUSH)

Figure 8: "Don't Feed the Grease Goblin!" FOG program outreach.