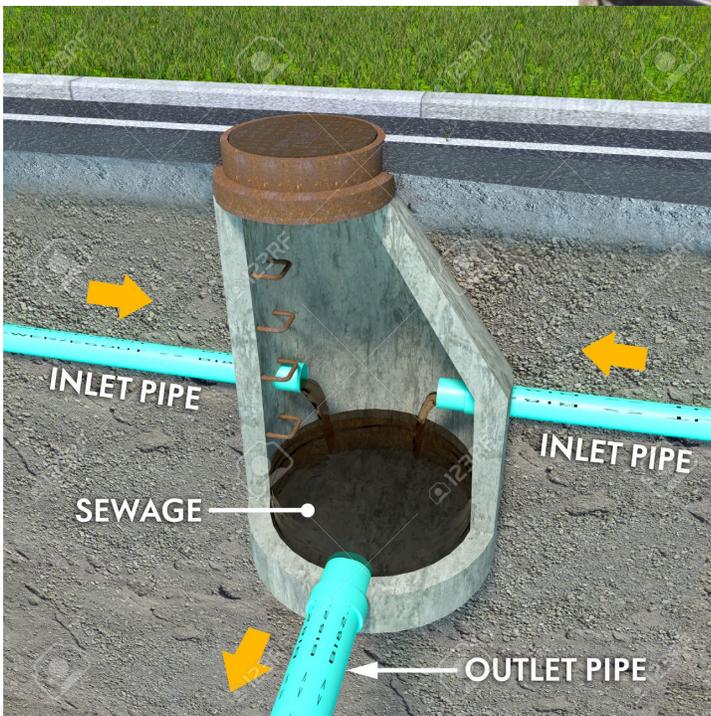


Town of River Bend



An Introduction to Wastewater Treatment



May, 2023

The Treatment Process

Sewage treatment is a multi-stage process to improve the quality of our wastewater before it is discharged to the sensitive waters of the Trent River. Our permit requires that we monitor and report the level of nutrients and other chemicals that we can discharge. The goal is to reduce or remove organic matter, solids, nutrients, disease-causing organisms, and other pollutants from wastewater. This process helps protect the Trent River.

Primary treatment

Upon arrival via the sewer system, the wastewater is sent through a bar screen which removes large solid objects such as sticks, rags, and other similar material, which is then sent to the landfill. Leaving the bar screen, the wastewater flow is slowed down entering the grit tank. This allows sand, gravel, and other heavy material that was small enough to pass through the bar screen to settle to the bottom for collection later. All the collected debris from the grit tank is pumped out every two to three years and disposed of off-site.

After leaving the grit chamber the wastewater goes to our “surge tank”. This large tank is where the waste is held pending movement into the next phase of the treatment process. While in the surge tank, the waste is aerated, using air produced by three high volume blowers, which are located in a building at the treatment plant. Using the surge tank, our operators are able to reduce the peaks and valleys of daily wastewater flow through the treatment facility. They do not want too much waste to enter at once and overwhelm the treatment capacity of the facility, nor do they want too little waste, which can also effect the quality of treatment. From the surge tank, waste is pumped through a splitter box to the two package treatment plants we operate for secondary treatment.

Secondary treatment

Secondary treatment is a biological treatment process that removes dissolved organic material from wastewater. Once in the package plant it is mixed, in an aeration tank, with solids containing micro-organisms that use oxygen to consume the remaining organic matter in the wastewater as their food supply. The aeration tank uses air bubbles, again supplied by the blowers described above, to provide the mixing and the oxygen, both of which are needed for the micro-organisms to multiply.

From here, the liquid mixture, composed of solids with micro-organisms and water, is sent to the clarifier portion of the package plant. Here, the solids settle to the bottom, where some of the material is sent to the solids handling process, and some is recirculated to replenish the population of micro-organisms in the aeration tank to treat incoming wastewater. The removal of solids to the digester is an operation that is called “wasting” of sludge. Our operators use their experience, various measurements, and test results to determine the best time to waste in order to maintain a good environment within the treatment process.

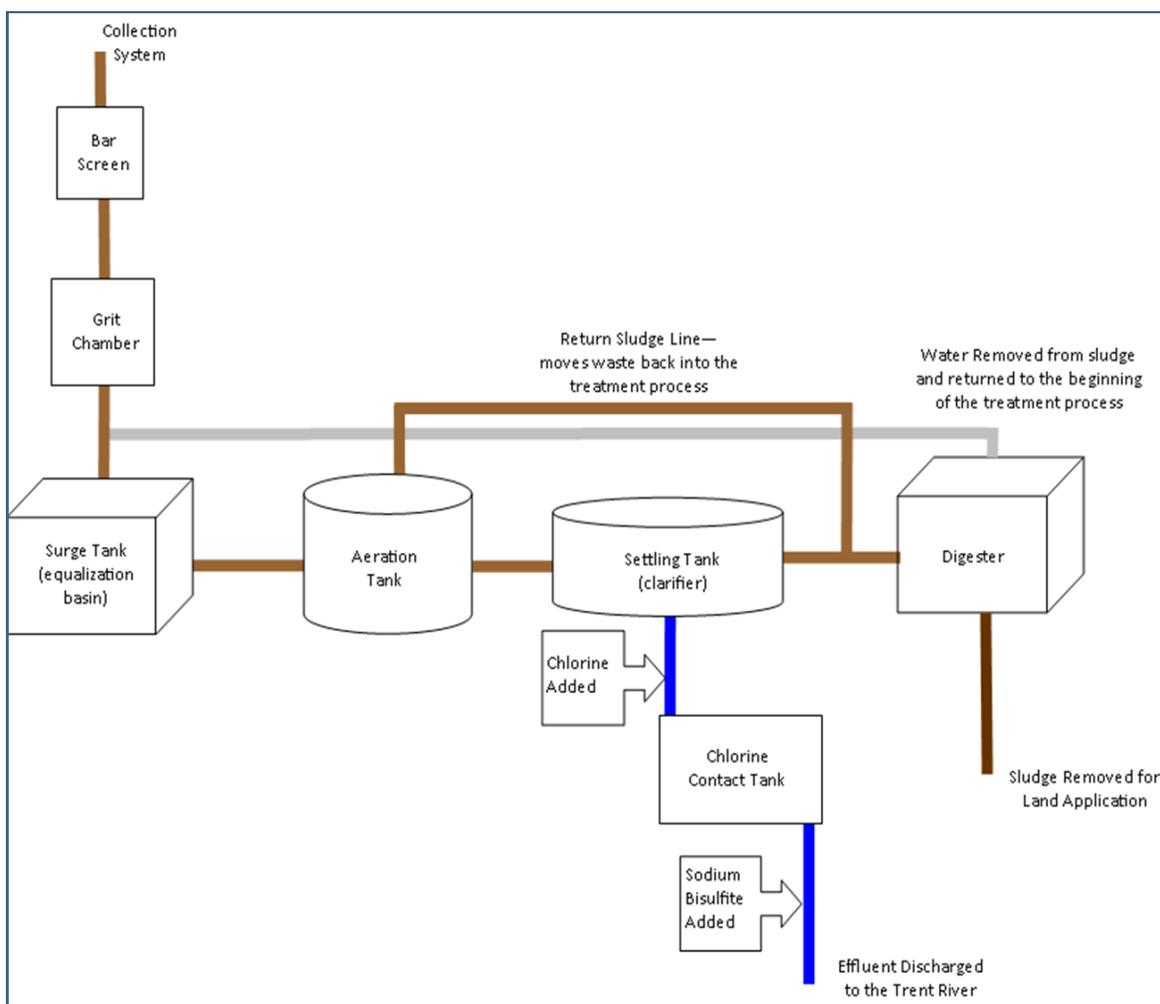
Disinfection

The now cleaner wastewater, coming from the clarifiers, is disinfected using Sodium Hypochlorite (bleach) liquid to kill harmful micro-organisms while being held in a large tank before moving on to the final step in the process. Because chlorine can be harmful in sensitive waters, we are required to remove any residual chlorine. Our operators accomplish this by injecting a Sodium Bisulfite solution to the effluent. The disinfected and dechlorinated water is then discharged to the Trent River. Chlorine and Sodium Bisulfite are the only chemicals used in our treatment process. It is entirely a biological and mechanical system that takes raw sewage and cleans it for discharge to the river. Our operators also use, as needed and very sparingly, chlorine “sticks” to clean the weirs on the clarifiers. This helps reduce the build-up of algae on the surface of the weirs, which could reduce their effectiveness.

Solids Handling

Solids from the clarifier are sent to the digester. In the digester, micro-organisms use the organic material present in the solids as a food source and convert it to by-products such as methane gas and water. Digestion results in a 90% reduction in pathogens and the production of a wet soil-like material called “biosolids” that contain 95-97% water. Our operators, prior to sludge removal, decant (remove) as much water as they can from the mixture to ensure we are not paying to transport and spread water. This decanted water is sent back to the head of the treatment process to mix with incoming waste. Our operators add powdered Hydrated Lime to adjust the pH of the remaining solids prior to their removal by a contractor. The solids are then applied to permitted agricultural fields by a contractor.

River Bend Wastewater Treatment Plant Flow Chart



Testing

Our operators, who are on duty seven days a week, are required by our permit to take samples each day and perform in-house analysis on some and ship others to a laboratory with which we contract. In addition to the required tests, our operators do additional tests to ensure that the treatment process is working as it should. We perform over 450 tests per year. As required by law, each year, we produce a Wastewater System Performance Report and make it available for public inspection. Each year, our wastewater treatment plant is inspected by the State of North Carolina to ensure compliance with all applicable regulations.

Historical Data

The chart to the right shows sewer flow data for the last ten years. It provides the total number of gallons treated for the calendar year (CY), the average daily amount treated and the percent of our permitted capacity that is used. The last line provides the 5-year average for every column.

Since 2018, our average yearly sewer flows have equaled 35.51% of our treatment capacity. This leaves us with a large percentage of reserve capacity at the facility.

CY	Gallons	Daily Avg	% of Capacity Used
2013	32,315,000	88,538	26.83
2014	36,359,000	99,668	30.20
2015	39,614,000	105,716	32.04
2016	39,587,000	108,210	32.79
2017	47,817,000	130,904	39.67
2018	50,423,000	138,160	41.87
2019	40,406,500	111,048	33.65
2020	39,139,000	107,043	32.44
2021	43,058,000	118,182	35.81
2022	40,627,000	111,479	33.78
5 year avg.	42,730,700	117,183	35.51

Wastewater Operations Staff

Water and wastewater utilities require professional staff to operate and maintain them. State regulations establish the minimum requirements for licensure of our operators and only allow certified people to operate either system. We are fortunate to have several licensed operators on staff. River Bend has enjoyed a long relationship with Lenoir Community College, which has a quality Environmental Science program for students who are interested in working in the water and wastewater field. Some of our current/past staff are products of that program. All operators are required to attend yearly training to maintain their licenses.

Brandon Mills, Director of Public Works

Associates Degree in Environmental Science Water Resources Management, Lenoir Comm. College
Water Certifications: B-Well, A-Distribution, Cross Connection Control
Sewer Certifications: Wastewater III, Collections III, Physical/Chemical I

James Jones, Jr., Operator

Water Certifications: C-Well, B-Distribution, Cross Connection
Sewer Certifications: Collections II, Wastewater II, Spray Irrigation, Physical/Chemical I

Delane Jackson, Town Manager

Bachelor's Degree in Political Science
Masters Degree in Public Administration
Water Certifications: B-Distribution
Sewer Certifications: Spray Irrigation

Wastewater Treated

Our permit from the Department of Environmental Quality (DEQ) allows us to discharge 330,000 gallons of wastewater per day into the Trent River—over 120 million gallons per year. On average, since 2016, we have used less than forty percent of our permitted capacity. On average, over the last five years, we treated and discharged 117,183 gallons of wastewater per day.

Our wastewater treatment and collection system serves approximately 970 households and businesses. Wastewater is collected from our customers

and transmitted via approximately 11 miles of gravity and force main pipes. Seven town-owned lift stations pressurize portions of the system so the waste is efficiently moved to our treatment facility on Gull Pointe Drive. Seven of these lift stations, and the treatment plant itself, have backup power supplied by fixed location generators. The other two lift stations can be powered by one of our mobile generators.

