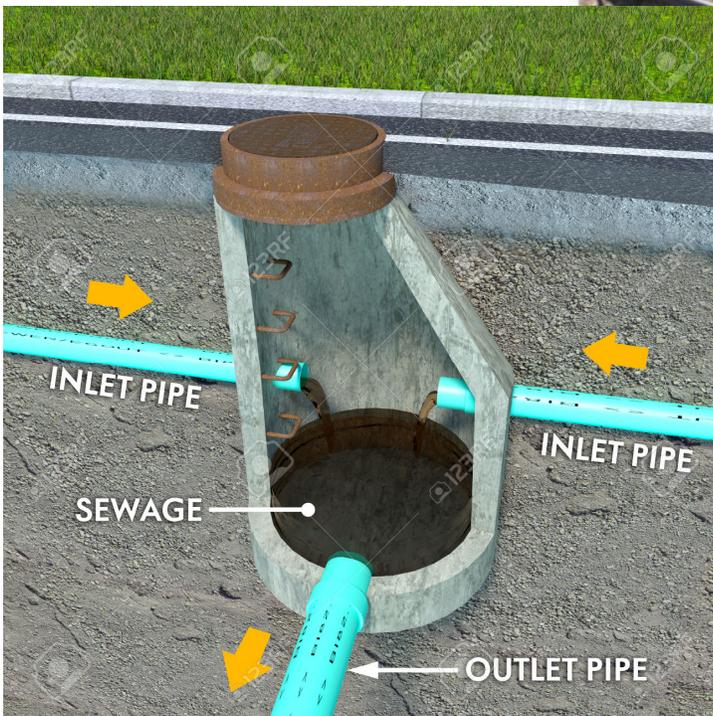


Town of River Bend



An Introduction to Wastewater Treatment



November, 2019

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 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.

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 we maintain in an enclosed building at the treatment plant, in order to keep it aerated. 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.

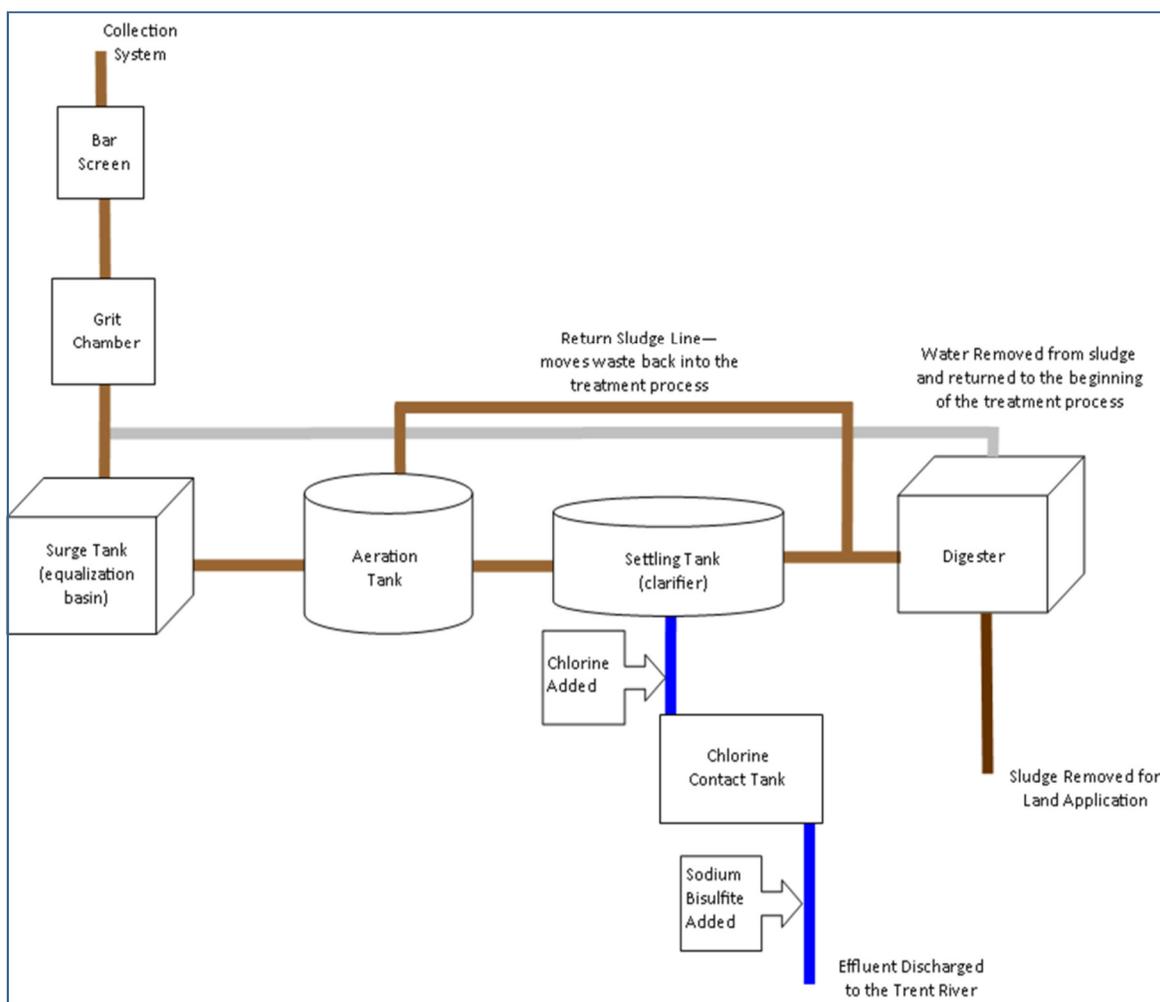
Disinfection

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, that 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. In FY18-19, we spent \$11,200 on external laboratory testing. 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, the average daily amount treated and the percent of our permitted capacity that is used. The last line provides an average for every column. Over the last five year period.

Since 2014, our average yearly sewer flows have equaled 35.31% of our treatment capacity. This leaves us with a large percentage of our capacity at the facility in reserves.

CY	Gallons	Daily Avg	% of Capacity Used
2009	49,300,000	135,068	40.93
2010	46,230,000	126,658	38.38
2011	41,954,000	114,917	34.82
2012	33,669,000	92,089	27.91
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
5 year avg.	42,760,000	116,532	35.31

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 from where we get quality students from their Environmental Science program who are interested in working in the water and wastewater field. Many of our current staff are products of this 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. Col.
Water Certifications: B-Well, A-Distribution, Cross Connection Control
Sewer Certifications: Wastewater III, Collections III, Physical/Chemical I

Tommy Harper, Operator

Associates Degree in Environmental Science Water Resources Management, Lenoir Comm. Col.
Water Certifications: B-Well, B-Distribution
Sewer Certifications: Wastewater II, Collections II, Physical/Chemical I

James Jones, Jr., Operator

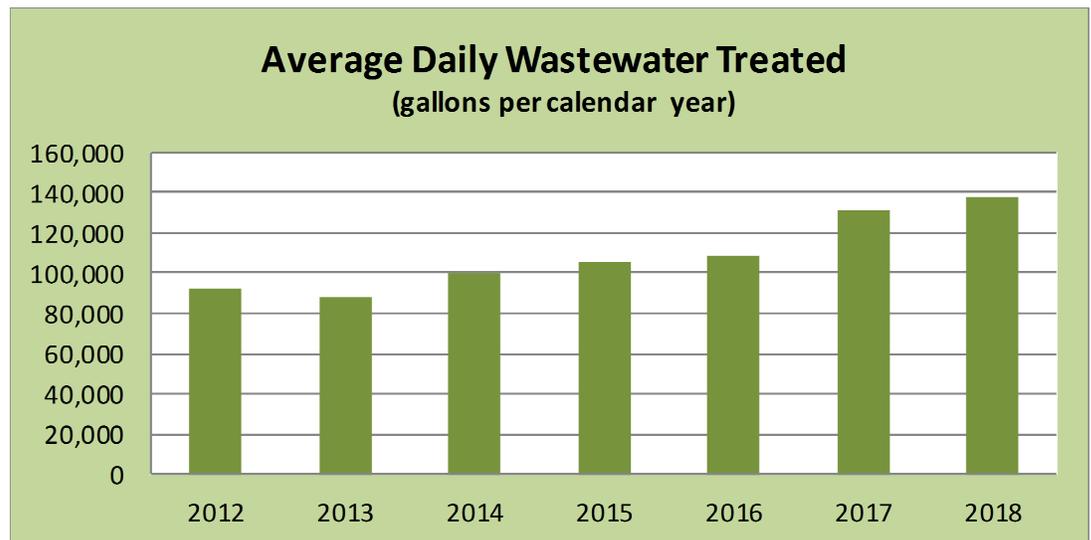
Water Certifications: C-Well, B-Distribution, Cross Connection
Sewer Certifications: Collections II, Wastewater II, Spray Irrigation

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. As reflected on the graph to the right, since 2012, we use under thirty percent of our permitted capacity. On average, over the last five years, we treated and discharged just under 117,000 gallons of water per day.



Our wastewater treatment and collection system serves approximately 966 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.