

# Town of River Bend



## An Introduction to Water Treatment



November, 2019

## The Treatment Process

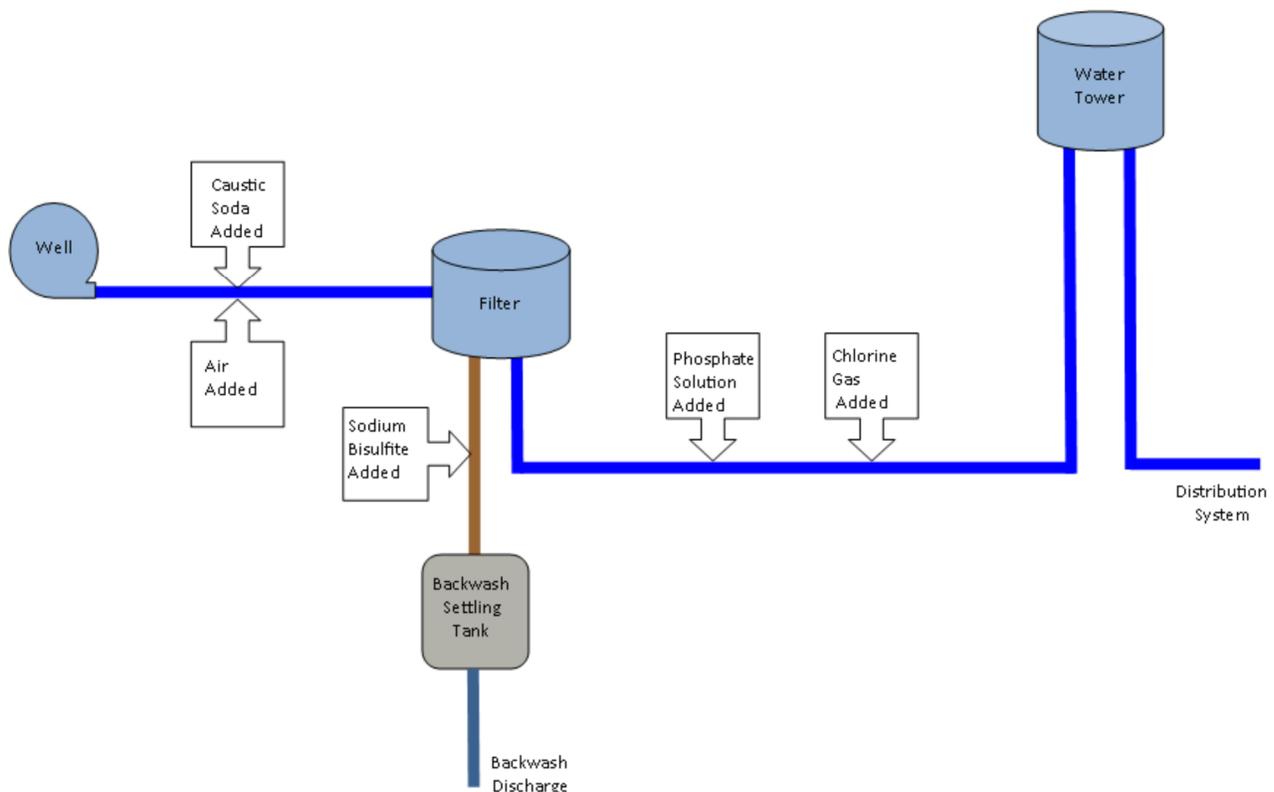
We withdraw water from the Castle Hayne aquifer under a permit granted by the North Carolina Department of Environmental Quality (DEQ). We do this using three wells with two submersible and one turbine pump. Two wells feed into one water treatment facility and the third feeds our other treatment plant. The goal of the treatment process is to remove impurities and disinfect the water to ensure it is safe to drink and, secondarily, to improve its aesthetic qualities (taste, hardness and color).

As water enters the treatment process our operators inject Caustic Soda (sodium hydroxide) to balance the pH and compressed air to aid in the iron removal process. The pH of our raw water is approximately 6.8. Injecting caustic soda increases the level to closer to 8 before it enters the filter. Making the water slightly basic helps in the filtering process. Chlorine, added later in the treatment process, reduces the pH to 7 or just slightly above a 7 in the finished water.

The water then enters a large pressurized filter containing filter media that removes any silt, iron, manganese, and other impurities. After leaving the filter, our operators add a blended phosphate solution, as an iron sequestering agent. This liquid chemical binds with the remaining iron in the water and allows it to be flushed out of the distribution system. The added benefit of this chemical is that, in proper concentrations, it can inhibit corrosion.

The last chemical added is chlorine, in gas form. Chlorine gas is injected into the water to disinfect it by killing any existing microorganisms that remain in the water. The amount of gas used depends on the amount of water being pumped, and the demand for disinfection. Our operators ensure there is some residual chlorine in the water as it is delivered to our customers. Water without residual chlorine could be a sign that the disinfection process is incomplete, as chlorine is “used” by the process of reacting with the organisms being removed.

The other chemical used in our water treatment process, and one that is not used to treat the finished water, is Sodium Bisulfite. This is a liquid that is injected into the waste water that is backflushed from our filters, a process that uses finished water to clean iron, manganese and other material from the filters. The chemical is needed in order to remove any residual chlorine from the water before it is discharged. This de-chlorination process is required by the wastewater discharge permits we hold for each of our two water treatment facilities.



## Testing

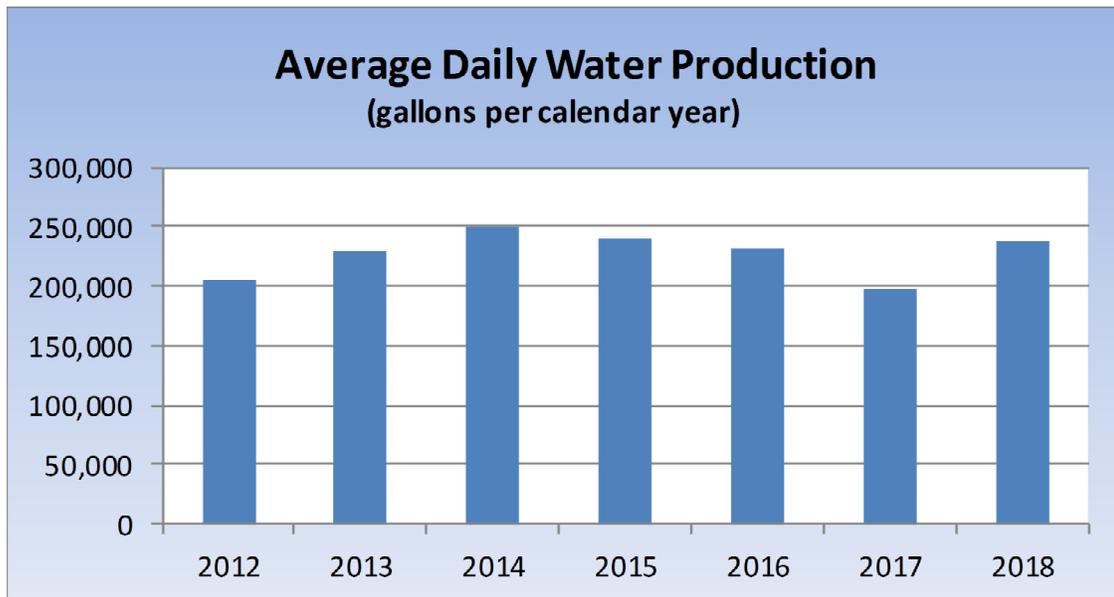
All sources of drinking water are subject to potential contamination by naturally occurring or man made substances. These substances can be microbes, inorganic or organic chemicals, and radioactive substances. All drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk. In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems.

One of the most important things our water operators do is test to ensure the water we are providing is safe to consume and well within the limits specified in our permit. This is accomplished using a combination of internal testing and an outside laboratory. Some of these tests are required by our permit, and some our operators do in the interest of process control. In-house tests are performed using equipment and various chemicals we have in our inventory. In FY18-19, we spent \$7,400 on external laboratory testing. We perform over 200 quality tests per year. As required by law, each year we produce a Water Quality Report, which documents our water quality, and make it available for public inspections. Each year, our water system is inspected by the State of North Carolina to ensure compliance with all applicable regulations.

## Water Treated and Delivered

Our permit from the DEQ, allows us to withdraw up to 925,000 gallons of water per day—over 337 million gallons per year. Our records show, as reflected on the graph below, that since 2012 we use less than 25% of our permitted capacity. On average, over the last five fiscal years, we treated and delivered just over 231,000 gallons of water per day.

Water is transmitted to over 1,450 households through 19 miles of pipe ranging in size from two to eight inches in diameter. In addition to providing water for consumption, our system also stands ready in the event of fire. There are 108 hydrants located throughout the system in order to give the fire department ample access to water for their work. All three of our wells have backup power supplied by fixed location generators.



Due to high levels of naturally occurring calcium and magnesium, the Castle Hayne aquifer is known to contain hard water. Hard water is measured in mg/L. Soft water is defined as 60 mg/L or less. Hard water is defined as 121-180 mg/L. Very hard water is defined as above 180 mg/L. The number varies, but our water usually contains 180 mg/L, which means that our water is classified as hard water. As described earlier, hardness is an aesthetic quality issue not a safety quality issue.

### **Historical Data**

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

CY	Gallons	Daily Avg	% of Capacity Used
2009	71,429,000	195,696	21.16
2010	78,267,000	214,430	23.18
2011	76,174,000	207,973	22.48
2012	74,829,000	204,440	22.10
2013	83,980,000	229,859	24.85
2014	90,987,000	249,204	26.94
2015	87,356,000	239,502	25.89
2016	82,688,000	231,292	25.00
2017	72,192,000	197,800	21.38
2018	86,794,000	237,534	25.68
5 year avg	84,003,400	231,066	24.98

### **Water 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

Sewer Certifications: Spray Irrigation

#### **James Jones, Jr., Operator**

Water Certifications: C-Well, B-Distribution, Cross Connection Control

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