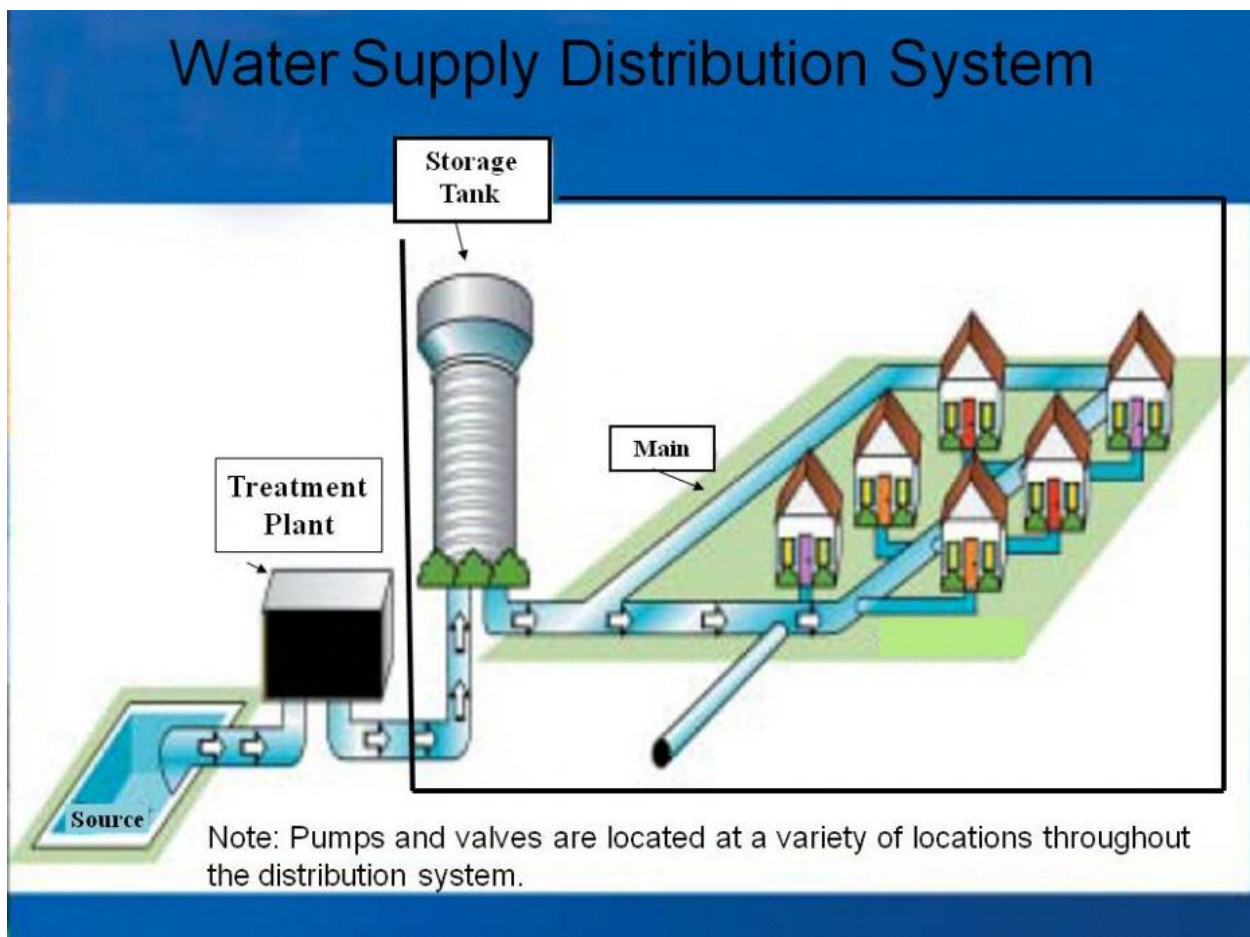


## Water System Update Spring 2019

There are four basic parts to the Town of Scituate's water system that are necessary to deliver drinking water to the residents of Scituate: Distribution, Treatment, Source and Storage. Each plays a vital role in our water system and each, in its own way, contributes to the "brown water" problem that has plagued the Town for many years.

Each component will need repairs and upgrades over the coming months and years to fix the problems of brown water and ensure that the Town can meet the demands of businesses and residents for clean, safe drinking water.

**DISTRIBUTION:** Water distribution system means an assembly of pipes, fittings, valves and appurtenances that conveys potable water from the source (well or surface water) to a home or business.



The distribution system is one cause of the brown water problem in Scituate. Years of inactivity in replacing system components such as old piping and a lack of a comprehensive flushing and maintenance plan has led to the build-up of years of sediment in the distribution system. This sediment, consisting mainly of iron and manganese, causes the discoloration of the water (brown)

for iron and black for manganese) that impacts many in town. It is discolored, smelly, tastes bad and can ruin laundry. The Town has made it a priority to resolve the brown water issue in Town.

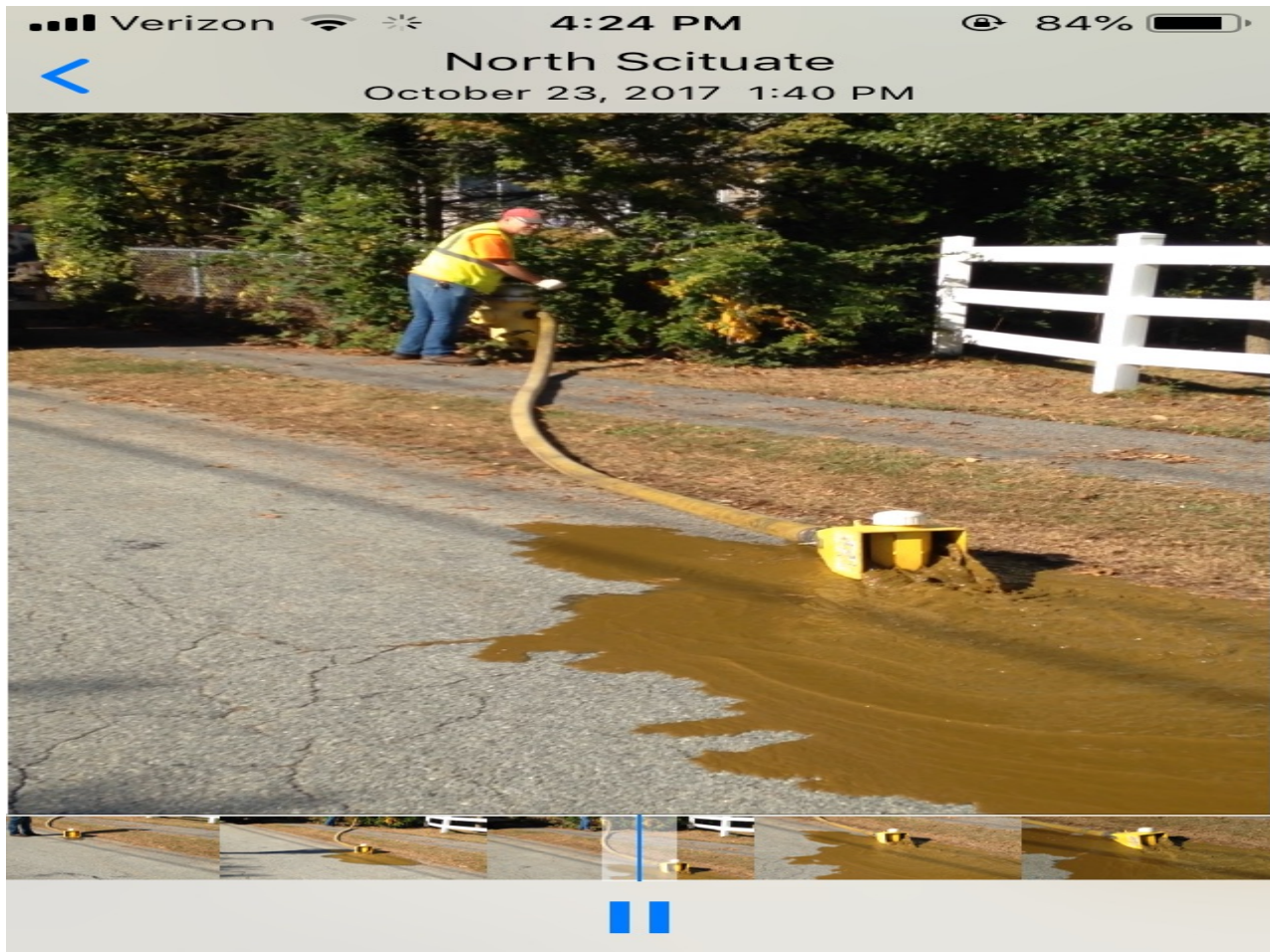
### **Action Plan:**

#### **Short term:**

1. Clean and flush the system to the extent possible to remove built up sediment and contamination in the pipes.
2. **Ice Pigging:** Ice pigging is a relatively new technology used to clean the inside of a water pipe and remove sediment. It is a highly effective and low-risk pipeline cleaning technology which cleans the inside of pipes using ice slurry. It is less invasive than conventional mechanical pigging and uses less water. By using system pressure (the existing pressure in the pipe used to move water) to move the ice there is no undue pressure or stress placed on the pipe. The first round of ice pigging was performed in October.



3. **Flushing:** A planned program of pipe flushing is essential to maintaining the cleanliness of a pipe. In a general sense, the Town should endeavor to flush 25% of the system on an annual basis. The Town recently completed a hydraulic analysis of the system. This analysis shows where the water in the system is coming from (treatment plant, standpipe, well, etc.) and the direction that the water is flowing. In some areas the water changes direction at different times based upon demand and whether the treatment plant is operating. Areas in which the water changes direction can experience higher incidents of brown water. The hydraulic analysis will assist the Town in developing a short-term flushing program and long term, unidirectional flushing program.



**Long Term:**

- 1. Continue pipe replacement program:** The Town has already committed more than \$22 million for the replacement of approximately 22 miles of pre-1935 unlined iron pipe. This pipe, installed before 1935, was not lined and over time experience a buildup of corrosion byproducts referred to as tuberculation. This restricts the flow and is a major contributor to brown water. The Town has replaced 20 miles of the pipe and will replace the remaining 2 miles in the spring/summer of 2019. Once that is finished, the Town will begin replacing smaller galvanized pipes that serve a particular street and older mains in the system that date to the 1930's and 40's. These pipes are getting to the end of their serviceable life and are prone to breaks which in term cause more brown water. When these pipes were installed hydrants were not always included on the roads which prevent flushing. These locations can store sediment which in turn creates brown water.
- 2. Institute annual, unidirectional flushing program:** The Town is looking to start a unidirectional flushing program. This is an excellent means for cleaning pipes but the Town has been prevented from doing this in the past and possibly the future do to available water.

**Capital Projects:**

- |  |             |
|--|-------------|
| 1. Pipe replacement (Balance of \$22m) | \$2,000,000 |
|--|-------------|

- |                                    |                    |
|------------------------------------|--------------------|
| 2. Annual Pipe Replacement         | \$1,000,000        |
| 3. 10 year Meter replacement cycle | \$175,000 annually |
| 4. Ice Pigging (annual)            | \$200,000          |
| 5. Humarock Water Main Replacement | \$4,200,000        |
| 6. Replace Galvanized Mains        | \$2,200,000        |

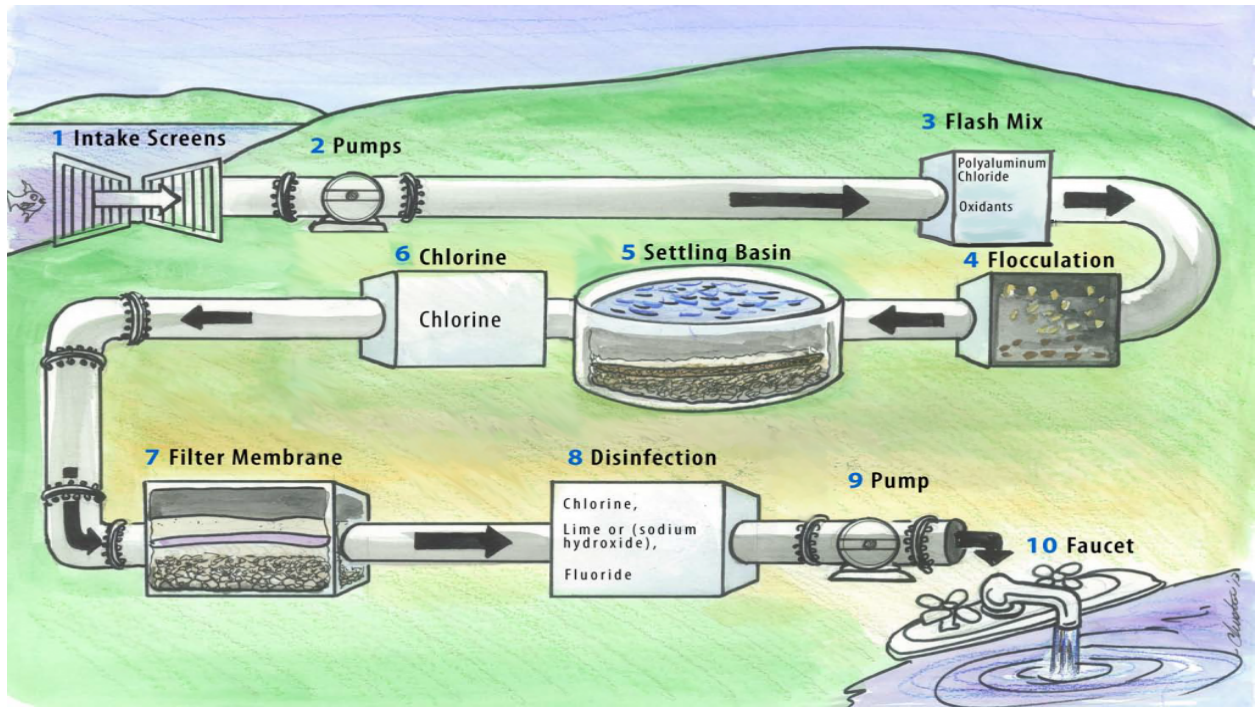


**TREATMENT:** Treatment is the process of removing any contaminants or impurities from the water supply and applying any required disinfectants and fluoride. In Scituate, water from the reservoir is treated at the Old Oaken Bucket (“OOB”) treatment plant, while the water from Town wells is generally treated at the well site before being added to the distribution system. Currently, the wells are chlorinated and the pH is balanced before being added to the system. Treatment of surface water at the Treatment Plant is more involved and more complicated as it contains more carbon matter and impurities than well water. In general, the treatment process at the Treatment plant involves screening as water leaves the reservoir to prevent fish and large matter from entering the plant, removing the organics and sediments and allowing them to solidify and settle to the bottom of tanks, processing through carbon and sand filters, disinfection through chlorination and distribution to the system. The OOB Treatment Plant was constructed in 1969 and has been in continuous service since that time. There are very limited periods where the demand for water eases enough to take the plant off line to do maintenance and make repairs. As a result, major components of the plant are at the end of their useful life and in need of repair and/or replacement. Because there is no redundancy in the system, a careful plan must be in place before the plant can be shut down for repairs.

1. The Town is in the process of doing a comprehensive review of the water treatment plant and its components. We are aware that we need to add redundancy to the system so that routine maintenance and repairs can be done to critical components of the plant with compromising our ability to deliver a sufficient amount of clean water for residents and businesses.
2. Install permanent green sand filters at wells 17A and 18. Currently, water from well 17A is sent to the reservoir and through the OOB Treatment plant to blend the well water with surface water to reduce manganese levels. Due to high levels of manganese in well 18, this well is not currently in use. The addition of a green sand filter system to remove the manganese will allow us to bring this supply back into the distribution system without the manganese which would only cause a re-emergence of brown water issues after the pipes had been cleaned.

**Capital Projects:**

- |                                      |              |
|--------------------------------------|--------------|
| 1. Treatment Plant Chemical Feed     |              |
| 2. Expand Water plant filtration     | \$2,500,000  |
| 3. Finish Water Pumps and VFD Drives | \$40,000     |
| 4. Water SCADA Upgrades              | \$88,000     |
| 5. Treatment Plant upgrades          | \$1,253,000  |
| 6. Design new/upgraded plant         | \$4,000,000  |
| 7. New Treatment Plant               | \$20,000,000 |
| 8. Water System Study                | \$100,000    |



**SOURCE:** Source is exactly what it sounds like, the source of our drinking water, or where the water comes from. The Town of Scituate gets its water from municipal wells situated in various places throughout the Town and from a surface water supply, the Town reservoir is fed by various streams, rain water and drainage from surrounding properties. The municipal wells are the main sources of manganese getting into the distribution system and causing brown water issues.

**Short Term:**

1. Complete permitting for raising the height for the weir that controls water exiting the reservoir, thereby increasing capacity and, possibly, allowing for a more aggressive flushing program to clean the pipes.
2. Complete permitting and install a green sand filter system on well 17A. This will remove the need to route the water through the OOB Treatment plant while removing the manganese from the water prior to entering the system, thereby eliminating a source of the brown water.

**Long Term:**

1. Permit and install a green sand filter on well 18 so that supply of water can be reintroduced into the distribution system.
2. Continue to explore new opportunities and areas to install additional wells, particularly in areas that are outside of the South Coastal Watershed where all of our current wells are located. These new sources may or may not need green sand filters to remove manganese from the water.
3. Continue to target and purchase land that is crucial to the protection of our water resources. This would include land surrounding well fields and that is adjacent to the reservoir or tributaries to the reservoir.

**Capital Projects:**

1. Redevelopment of Public Wells	\$50,000
2. Well 19 Chemical Upgrades	\$450,000
3. New Generator Well 10	\$175,000
4. Redevelopment of Public Wells	\$50,000
5. Design of New Treatment Well 17A	\$1,120,510
6. New Treatment Well 17A	\$8,000,000
7. Reservoir Expansion	\$1,790,000
8. Dolan Well Field Construction	\$2,500,000
9. West End Well Investigation	\$300,000
10. West End Construction	\$3,000,000





**STORAGE:** Storage in a water system refers to either a place where the water is collected and stored prior to treatment (the reservoir) or a place or places where the water is stored after it has been treated but prior to going into the system for use (water tanks). There are 2 water tanks in Scituate that combined hold 2 million gallons of treated water. This stored water is used to provide water pressure to the system through the water's own weight and as a reserve in case of a sudden spike in demand as may occur in a fire or if there is a water main break. The Town's water tanks were commissioned in 1940 and 1962, and like the treatment plant, have been in almost continuous use since they were constructed. Both water tanks were cleaned of sediment this past year. The Maple Street tank was scheduled two years ago to be taken offline for painting and repairs but could not because of system demands.

**Short Term:**

1. Establish a maintenance and cleaning plan for the Town's water tanks.
2. Make repairs necessary to ensure uninterrupted use of the tanks.

**Long Term**

1. Establish redundancy in the system through the construction of an additional water tank(s). This will increase the Town's storage capacity and allow existing tanks to be taken out of service while necessary, major repairs are made.
2. Make necessary, major capital investment in current tanks to ensure safety and reliability.



**Capital Projects:**

1. Valve Replacement Creelman Tank On Going

2. Repair Mann Lot Standpipe and Valve Vault	\$1,000,000
3. Maple Street Standpipe Rehab	\$710,000
4. New Water Tank	\$2,000,000