City of Providence
STATE OF RHODE ISLAND

RESOLUTION OF THE CITY COUNCIL

No. 417

Approved December 11, 2020

RESOLVED, That pursuant to R.I. Gen. Laws § 46-30-1 *et seq.*, the Providence Water Supply Board ("PWSB") is hereby authorized to annex the water distribution system of the Town of Johnston, Rhode Island ("Johnston") with the water distribution system of PWSB.

NOW, THEREFORE, BE IT RESOLVED, That His Honor the Mayor, is hereby authorized to execute an agreement between the City of Providence, on behalf of PWSB, and Johnston, for the annexation of Johnston's water supply system to the water supply system of PWSB, and to execute any other documents in furtherance of effectuating said annexation.

IN CITY COUNCIL

DEC 09 2020

READ AND PASSED

PRES.

CLERK

I HEREBY APPROVE.

Mayor

Date: 12/11/20

CLEAN WATER INFRASTRUCTURE REPLACEMENT PLAN FOR THE JOHNSTON WATER CONTROL DISTRICT

Prepared for:
Johnston Water Control District
1385 Hartford Avenue
Johnston, RI 02919

Prepared by:
C & E Engineering Partners, Inc.
342 Park Avenue
Woonsocket, RI 02895

January 2003

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Section 1.0 Introduction

1.1 Overview

This Clean Water Infrastructure Plan (Plan) has been prepared in accordance with the Rules and Regulations for Clean Water Infrastructure Plans promulgated pursuant to the requirements and provisions of RIGL Chapter 46-15.6 Clean Water Infrastructure of the General Laws of Rhode Island, as amended and maintains consistency with the Clean Water Infrastructure Act, Chapter 46-15.6 of the General Laws of Rhode Island, as amended.

This Plan was prepared in conformance with applicable provisions of State and Federal laws including the Federal Safe Drinking Water Act (42 USC Section 300 f eq. seq.) and Chapter 46-13 of the General Laws of Rhode Island, Public Drinking Water Supply.

Further, this Plan maintains consistency with the goals and policies of the Town of Johnston Comprehensive Community Plan and the Water Supply System Management Plan for the Johnston Water Control District.

1.2 Purpose of Plan

The Infrastructure Replacement Act, Title 46, Chapter 15.6 designates the Rhode Island Department of Health (RIDOH) as the primacy agency to administer the program for Clean Water Infrastructure Plans. This Act requires that all water purveyors that on an annual basis purchase or sell over 50 million gallons of water prepare, maintain and implement a detailed infrastructure plan of the principal components of the water system. Each water system is required to provide a mechanism for funding to replace and/or rehabilitate identified components at the end of their useful life within the framework of the regulations.

The Johnston Water Control District (District) contracted C & E Engineering Partners, Inc. (C&E) to prepare an Infrastructure Replacement Plan (Plan) for their water system. C&E, following a detailed engineering evaluation of the District's system infrastructure, has developed this document which provides an effective infrastructure rehabilitation management and planning tool for use by the District. By employing the methodologies presented in this Plan for infrastructure replacement/rehabilitation, the District can continue to efficiently and economically serve its customers over the next twenty years.

1.3 Goals of Plan

The District is committed to providing a safe, reliable, and adequate potable water supply to its customers. RIDOH's Rules and Regulations for Clean Water Infrastructure Plans require that Plans address all principal components of the water supply system. The District purchases 100 percent of its water on a wholesale basis from Providence Water. As such, the District's system consists solely of secondary transmission and distribution water mains, booster pump stations, and appurtenances (i.e. line valves, hydrants, service connections, etc.)

The goal of this Plan is to comply with the provisions of the Act as detailed in the Rules and Regulations for Clean Water Infrastructure Plans, by developing a comprehensive infrastructure plan for the District's Water Supply System. This was accomplished by reviewing and evaluating the condition of each of the major system infrastructure components. Each component was then assigned a life expectancy and necessary improvements were defined within the context of the regulations. Appropriately, a cost and schedule for identified improvements or replacements was developed. The funding will be completed through establishment of an Infrastructure Replacement Fund (IRF) as required by the Act or through the water system's general operation fund, budget surplus or bonding. It is intended that any improvements in the form of rehabilitation and/or replacement be completed through a program in which the water system is upgraded and maintained to ensure the present and future needs of the consumers.

Section 2.0 Water Supply System Description

This section describes the Johnston Water Control District's water supply system including legal and managerial aspects and physical infrastructure components of the water system.

2.1 Organization and Legal Structure

The following outlines a description of the organization and management framework of the District's system. Also provided is a legal basis for the system and a description of the system's service territory.

2.1.1 Organizational Chart

Table 2-1 provides a listing of the organization framework of the water system including job classifications and personnel.

TABLE 2-1

WATER SYSTEM ORGANIZATIONAL TABLE

Water Commissioner	George E. Corrente, PLS
Water Superintendent	Michael W. Martino
Assistant Water Superintendent	Joseph D. Martino
Office Secretary	Patricia Schiavitti
Computer / Billing Services	Paul Andreozzi

2.1.2 Description of Responsibilities

Water Commissioner

The individual tasked with the day to day business function of the water system is the Water Commissioner. This includes managing the District's operations staff, maintaining regulatory compliance, maintaining intergovernmental and customer relations, coordinating activities of the District's professional consultants, advising the Town and government officials and implementing policy decisions.

Water Superintendent

The individual tasked with the day to day responsibility of ensuring that the water system operates in accordance with the rules and regulations of the Rhode Island Department of Health, Office of Drinking Water Quality. This person is also a liaison to the public in facilitating response to concerns or complaints in regards to the water system. A working relationship with other departments and utility offices is a part of this persons function. A responsibility for overseeing all components of the water system on a round the clock basis to ensure the quality and safety of the water system is also under the umbrella of duties for this individual.

Assistant Water Superintendent

This individual is responsible for a working knowledge of the principles, procedures and techniques of the water distribution system. A knowledge of the materials and techniques required for construction, maintenance and repair of a water system, including facilities and structures, is required. There should also be an ability to keep accurate and legible records of the system. A strong mechanical background is necessary to ensure proper day to day maintenance of water system components. This person is required to demonstrate skill when operating the special equipment and tools related to water system maintenance. The ability to respond tactfully and with discretion to inquiries and complaints is also part of the day to day functioning in this role.

Business Office

Employees of the business office at Town Hall are responsible for daily functions of the office including interfacing with the District's customers, providing customer assistance and general information, preparation and mailing of water bills and collection of payments. These personnel report directly to the Water Commissioner.

The full time staff as described previously, is of adequate qualification, experience and number in order to effectively and efficiently perform duties necessary to operate and maintain the current water distribution system.

2.1.3 Legal Structure

The Town of Johnston, through the Johnston Water Control District (District), owns and operates a public water distribution system that serves a portion of the Town. In addition to the District water system, the Town is also served by its two neighboring water purveyors: the Greenville Water District (GWD) and

Providence Water. The Greenville Water District serves an isolated portion of the northwest corner of Town, in the vicinity of Slack Reservoir. Providence Water serves the area of Town generally located to the east of Interstate 295. Within this area several booster pump stations serve isolated developments at higher elevations.

The legal and mailing address for the District is: Johnston Water Control District
Town of Johnston, Rhode Island
1385 Hartford Avenue
Johnston, Rhode Island 02919

2.1.4 Service Area

Geographic Area

The Town of Johnston is located in central Rhode Island and comprises 23.7 square miles. It is bordered by the City of Cranston to the south; the Town of Smithfield to the north; the Town of Scituate to the west, and the City of Providence and Town of North Providence to the east. A map of the general service area and major infrastructure components is provided in Appendix A.

Water Services History

As of 2002, there exist approximately 1,640 customer accounts including residential, commercial, industrial and governmental.

Present Population Served

Given the nature of the District service area, an estimate of the present population served by the water system was developed based on a review of the 1991 *Town of Johnston Comprehensive Community Plan* and U.S. Census information provided by the Rhode Island Department of Administration, Statewide Planning Program.

In reviewing the above documents, it was discovered that at the time of the 2000 Census, the occupancy rate was 2.70 persons per household. However, due to an aging population, the increase of single-parent families, and a generally smaller household size, the occupancy rate was adjusted to 2.6 for the purpose of this Plan. A 1995 estimate by the Statewide Planning Program suggests this trend as well. Therefore, multiplying the adjusted occupancy rate by the number of total services, and incorporating the populations of Simmons Village and Briarcliff Nursing Home, it is estimated that the total population served is approximately 4,600.

Population Demographics

A review of the 1991 *Town of Johnston Comprehensive Community Plan* suggests that the housing industry experienced rapid growth (33.5 percent) in the 1970s. Since that time, while still increasing, the rate of growth has decreased. From 1980 to 1990 the number of housing units in Johnston increased by 18.6 percent, adding over 1,600 housing units. Based on the 2002 projection by the Statewide Planning Program, the 1990s experienced an 8.2 percent growth rate. It is expected that the growth rate will continue to slowly decrease over the next 20 years.

2.2 System Overview

The existing Johnston Water Control District water system was developed primarily as an off-shoot from the original water supply system that originated in the pre World War II era. Source of supply for the system originally was wholesale water purchased from the Cranston Water Department, via six (6) interconnections located off a 24-inch transmission main in Plainfield Pike. Today, this main is owned and operated by Providence Water. Each of the interconnections is equipped with a master meter assembly and bypass assembly on the larger interconnections. This pressure zone is operated at a hydraulic gradient of approximately 478 feet, which is determined by the water level in the Providence Water Lawton Hill Reservoir. The two primary interconnections (Green Hill Road and Simmonsville Avenue) account for approximately 95 percent of the District's source water. Each of the interconnections is evaluated in further detail in this Plan.

The average day demand of the District's system is 0.65 million gallons per day (MGD) and the maximum day demand is approximately 1.23 MGD. At present, the District does not treat any of the wholesale water that is purchased from Providence Water. Historically, this source has proven to be reliable and a generally high quality water supply source.

As the Johnston water system expanded, the need for a booster pump station became evident, so the Shun Pike booster station was constructed in the 1990's. Recent improvements to this station include a 4000-gallon hydro-pneumatic steel tank, a fire pump rated at 500 gpm, and a new emergency generator system. The capacity of this station is 0.144 mgd, and overall, the facility is considered to be in good condition.

The Central Avenue booster station was constructed in the 1987. Telemetry equipment relays the water level in the Golden View Drive water storage tank back to the Central Avenue Booster Station, which in turn is used to control the sequencing of the pumps. The station is fitted with two (2) 600-gpm pumps,

with the capability of being upgraded with a third. The areas located in the Town of Johnston to the north and west are supplied by this station.

Being that the vast majority of the transmission and distribution system was installed in the 1980s, the piping system is considered to be in excellent condition. Materials of construction include asbestos cement (AC), polyvinyl chloride (PVC), cement-lined ductile iron (DI), and unlined cast iron (CI). With the exception of CI, all of these materials offer excellent corrosion resistance and afford long-term durability. The oldest sections of the District consist of cast iron water mains installed sometime prior to 1950. These mains are located in the southeast region of the service area and represent less than 5% of the total water mains.

The District maintains one elevated storage tank located off of Golden View Drive. This 121-foot steel fluted tower tank has a 750,000-gallon capacity. Constructed in 1987, the structure was designed to provide a minimum of 35 psi in the Central Avenue pressure zone, and is reported to be in good condition.

The Town has recently instituted a semi annual billing system with a near complete replacement/upgrade of customer distribution meters to a semi-automated reading and billing system. Each service connection has a service, curb stop and meter. The District owns and maintains the tap, curb stop and service pipe up to the inside of the curbline at the approximate property line of the customer. The District also furnishes, installs and maintains individual meters. It is the responsibility of the consumer for the installation and maintenance of the service line from the curb stop to the building structure plumbing system.

The District has a staff of three (3) full time and two (2) part time employees that are responsible for the day to day operation and maintenance of the water system. These employees work out of the Town Hall or the field office located at the Central Avenue Booster Pump Station. The Water Department operates as an Enterprise Fund Agency within the municipal corporation of the Town of Johnston. All operations are financed from water revenues in the form of user fees. User fees and charges levied by the Water Department are established by the Town Council as an ordinance of the Town of Johnston. The Water Department seeks funding for capital improvements needs through the most cost effective financing available. Generally, this includes utilizing the Town's capability to issue General Obligation Bonds.

Section 3.0 System Infrastructure Component Analysis

3.1 General

This section provides an analysis and description of the major infrastructure components of the District's water system. Specifically, this includes a discussion related to component condition, function, and original date of construction, future life expectancy, and record of latest maintenance and repair. As allowed per the Regulations, small and numerous system components such as water mains, valves, hydrants and service connections, shall be evaluated collectively as a group.

Visual inspection and observation, inquiry with District staff, record plans, available engineering and inspection reports and studies were primarily utilized to determine component condition and future life expectancy. The source of the determination for each assessment is so noted. On this basis, life expectancy of a particular component may vary from the guidelines provided in the Regulations. In addition, by employing proper routine maintenance in combination with replacement of critical items and "wear use" components, the useful life expectancy of a particular system component may be extended significantly. Where applicable, estimated costs are provided for necessary rehabilitation/replacement of system components. These costs are provided in present day (year 2002) dollars.

3.2 Distribution Storage Components

The District maintains one water storage facility: the storage tank located off of Golden View Drive. The storage facility is maintained on a regular basis by District staff, which includes grounds keeping, fence repair, visual inspection, etc. In addition to this routine maintenance, the tank is scheduled to be extensively inspected in 2004 and at approximately subsequent five-year intervals, thereafter. This inspection will be performed by a subcontract firm and is scheduled to include a detailed inspection and report in relation to the structure and appurtenances, interior and exterior protective coatings and general condition of the tank with recommendations for maintenance, as applicable. The cost of this routine inspection, in order to maintain the functionality of the distribution storage facility, is to be included within the District's general operation and maintenance budget.

3.2.1 Golden View Drive Elevated Storage Tank

Construction Date /Age: 1987 / 15 years

Description: The District maintains one elevated storage tank located in the pressure zone supplied by the Central Avenue Booster Pump Station. As such, only this portion of the system is afforded the storage capacity of this tank for normal, fire and emergency conditions. The tank structure is located off of Golden View Drive and was constructed in 1987. The elevated structure consists of a steel fluted tower design of 750,000-gallon capacity.

The overflow elevation is equal to a hydraulic grade elevation of 650 feet with a height to the bottom capacity line of 66 feet. The overall tank height is 121 feet with a head range in the bowl of 44 feet and diameter of 58 feet. Usable storage is approximately 480,000 gallons and is premised on maintaining a 35-psi pressure in this portion of the system. The steel structure and exterior coating system are in good condition. The ground level in the fluted tower is utilized as storage space for equipment and materials.

Recent Rehabilitation/Repairs: There has been no major rehabilitation to the tank structure since construction in 1987. On the basis of the age and general appearance of the tank, no major work should be required for at minimum five to ten years and will likely consist of protective coating rehabilitation. The need and timing for rehabilitation shall be quantified during the tank inspection. The general structural appearance of the tank is good and the protective coatings applied to the surface are in fair to good condition. We find no need for major rehabilitation to be done for at least the next 5 years.

Component General Condition	*Life Expectancy*
Structure: Good to excellent per age and physical appearance	50 years +
Protective Coatings: Fair to Good per age and physical appearance	10 years
Concrete Foundation: Good to Excellent per age and physical appearance	50 years +
Piping/Vault: Fair to Good per visual inspection 2002	25 years +

Required or Scheduled Rehabilitation/Replacement

Time Interval/Year	Description	Estimated Cost
5 year/2007	--	--
10 year/2012	Interior / Exterior Recoating	$300,000.00
15 year/2017	--	--
20 year/2022	--	--

3.3 Booster Pump Stations

3.3.1 Shun Pike Booster Pump Station

Construction Date /Age: 1990's / 12+ years

Description: The Shun Pike booster station is located approximately one mile west of the intersection of Shun Pike and Green Hill Road. This station is designed to boost the hydraulic grade of water received from the Providence Water system from 478 to 660 feet. This station is designed to supply isolated higher elevations in vicinity to Peck Hill. The station was originally constructed in the 1990's and is fitted with a duplex booster pump system in an underground concrete vault. Each booster pump is rated for 100 gpm. Improvements were recently completed to the station in 1998 which included the addition of a 4000-gallon horizontal hydro-pneumatic steel tank, a fire pump rated at 500 gpm, and a new emergency generator system. All major components are now housed in an above-ground building structure. A pressure switch sequences the operation of the pumps and maintains pressure in the hydro-pneumatic tank.

Recent Rehabilitation/Repairs: The station has undergone a complete mechanical renovation in 1998 which included the addition of a larger pressure tank and new pumps. Minor architectural and site improvements along with a new emergency generator set were also completed at this time.

Component General Condition	*Life Expectancy*
Building Structure & Foundation: Good per visual inspection.	25 years +
Roof Covering: Good per visual inspection.	20 years +
Mechanical Systems: Good per visual inspection.	25 years +
Electrical: Good per visual inspection.	20 years +
Instrumentation and Control: Good per visual inspection.	20 years +

Required or Scheduled Rehabilitation/Replacement

Time Interval/Year	Description	Estimated Cost
5 year/2007	--	--
10 year/2012	--	--
15 year/2017	--	--
20 year/2022	--	--

3.3.2 Central Avenue Booster Pump Station

Construction Date /Age: 1987 / 15 years

Description: The Central Avenue Booster Pump Station located at the intersection of Central and Scituate Avenues supplies a major portion of the District. This station is designed to boost the hydraulic grade of water received from Providence Water from 478 to 660 feet and supplies all areas to the north and west of the station. The station was constructed in 1987 and is fitted with two 600 gpm electrical driven centrifugal pumps in an underground "can" style pre engineered steel vault. Allowances for addition of a third pump have been provided in the suction and discharge piping of the station. The pumps are set to operate in response to water levels at the Golden View Drive Tank via radio telemetry system.

The pump station is equipped with heat, dehumidifier and a sump pump. The station is also equipped with a 175 KVA Caterpillar diesel powered emergency generator set which is housed in a nearby above grade masonry structure. The generator can run the entire facility in the event of an emergency.

Recent Rehabilitation/Repairs: The station is relatively new (15 years) and is in excellent condition. Telemetry improvements consisting of the new radio telemetry were installed in 2000 to replace the land line telemetry system.

Component General Condition	*Life Expectancy*
Generator Structure & Foundation: Good per visual inspection.	35 years +
Generator Structure Roof Covering: Good per visual inspection.	20 years +
Pump Station Structure: Good per visual inspection.	25 years +
Mechanical Systems: Good per visual inspection.	25 years +
Electrical: Good per visual inspection.	20 years +
Instrumentation and Control: Recently converted to radio telemetry.	25 years +

Required or Scheduled Rehabilitation/Replacement

Time Interval/Year	Description	Estimated Cost
5 year/2007	--	--
10 year/2012	--	--
15 year/2017	--	--
20 year/2022	--	--

3.4 Interconnections

As previously indicated, the District obtains 100% of its water on a wholesale basis from Providence Water through a series of six (6) interconnections located off of Plainfield Pike. These interconnections which consist of underground vaults with meters and bypasses (on the major interconnections) are fed from Providence Water Lawton Valley Reservoir pressure zone and are supplied by a 24-inch water main that runs in Plainfield Pike. Two of the interconnections, Green Hill Road and Simmonsville Avenue, supply upwards of 95% of the total water to the District. The remaining 5% is obtained from the four remaining interconnections.

The physical interconnection (i.e. vault and piping) are owned and maintained by the District. The master meter assemblies are supplied and owned by Providence Water. There is a mutually acceptable agreement amongst both parties to permit reasonable access to the vault for purpose of reading, calibrating and maintaining the meter assemblies. The District also performs periodic upgrade and upkeep of the vault for functional purposes.

In regards to infrastructure improvements, the master meter assemblies would be covered under the Providence Water Infrastructure Replacement Plan. This is the result of a recent agreement between Providence Water an the District whereby the District transferred the ownership responsibility to Providence Water. It has been reported that Providence Water is intent on upgrading the master meter assemblies to comply with Providence standards which at minimum includes the addition of automated reading and billing systems which would preclude having to physically enter the vault to read the meter thereby reducing confined space entry requirements. The Providence Plan should be consulted for replacement schedules and upgrades. Currently, the master meter assemblies are reported to be in good working order and operational condition.

The physical below grade concrete vaults that house the master meter assemblies are maintained by the District. Periodic upkeep and maintenance is performed and is funded through the general operations budget. Most recently this included the replacement of access hatch covers at several of the vaults.

3.4.1 Green Hill Road Meter Pit

Construction Date /Age: 1997 / 5 years

Description: This underground "can" type meter vault is the primary interconnection to Providence Water and supplies the majority of the metered wholesale supply to the District. The vault is located off the paved roadway near the intersection of Green Hill Road and Plainfield Pike. A primary 16 inch transmission main feeds the vault which is reduced at the interior to accommodate an 8" compound meter with integral bypass.

Recent Rehabilitation/Repairs: The facility was completely replaced in 1997 and is in excellent condition.

Component General Condition	*Life Expectancy*
Structure: excellent and new in 1997	75 years +
Meter / Interconnections: good per visual observation	*
Mechanical Piping and Components: fair per visual inspection	20 years +

* Owned and maintained by Providence Water

Required or Scheduled Rehabilitation/Replacement

Time Interval/Year	Description	Estimated Cost
5 year/2007	--	--
10 year/2012	--	--
15 year/2017	--	--
20 year/2022	--	--

3.4.2 Simmonsville Avenue Meter Pit

Construction Date /Age: circa. 1970 / 30 years +/-

Description: This meter vault consists of a below grade concrete vault with 8" compound flow meter supplied by a 12" transmission supply line. The vault is located off the paved roadway near the intersection of Plainfield Pike and Simmonsville Avenue. This interconnection is considered the primary emergency interconnection in case of failure of the Green Hill Road interconnection.

Recent Rehabilitation/Repairs: The facility hatch cover and locking mechanism was replaced in 2000.

Component General Condition	*Life Expectancy*
Structure: good per visual observation	50 years
Meter / Interconnections: good per visual interconnection	*
Mechanical Piping and Components: fair per visual inspection	25 years

* Owned and maintained by Providence Water

Required or Scheduled Rehabilitation/Replacement

Time Interval/Year	Description	Estimated Cost
5 year/2007	--	--
10 year/2012	--	--
15 year/2017	--	--
20 year/2022	--	--

3.4.3 Nardolillo Street Meter Pit

Construction Date /Age: circa. 1970 / 30 years +/-

Description: This meter vault consists of a below grade concrete vault with 6 inch compound flow meter supplied by an 8" main supply line which services this dead end street. The vault is located off the paved roadway near the intersection of Plainfield Pike and Nardolillo Street. An estimate of the population served through this interconnection is 55 persons.

Recent Rehabilitation/Repairs: No recent improvements have been performed at this facility.

Component General Condition	*Life Expectancy*
Structure: fair per visual inspection	50 years
Meter / Interconnections: fair per visual inspection	*
Mechanical Piping and Components: fair per visual inspection	25 years

* Owned and maintained by Providence Water

Required or Scheduled Rehabilitation/Replacement

Time Interval/Year	Description	Estimated Cost
5 year/2007	--	--
10 year/2012	--	--
15 year/2017	--	--
20 year/2022	--	--

3.4.4 Capitol Street Meter Pit

Construction Date /Age: circa. 1970 / 30 years +/-

Description: This meter vault consists of a below grade concrete vault with a 6 inch compound flow meter supplied by an 8" main supply line which services this dead end street. The vault is located off the paved roadway near the intersection of Plainfield Pike Hill Road and Capitol Street. An estimate of the population served through this interconnection is 60 persons.

Recent Rehabilitation/Repairs: No recent improvements have been performed at this facility.

Component General Condition	*Life Expectancy*
Structure: fair per visual inspection.	50 years
Meter / Interconnections: fair per visual inspection.	*
Mechanical Piping and Components: fair per visual inspection	25 years

* Owned and maintained by Providence Water

Required or Scheduled Rehabilitation/Replacement

Time Interval/Year	Description	Estimated Cost
5 year/2007	--	--
10 year/2012	--	--
15 year/2017	--	--
20 year/2022	--	--

3.4.5 Taylor Road Meter Pit

Construction Date /Age: circa. 1970 / 30 years +/-

Description: This meter vault consists of a below grade concrete vault with 8 inch compound flow meter supplied by an 8" main supply line which services this dead end street. The vault is located off the paved roadway near the intersection of Plainfield Pike and Taylor Road. An estimate of the population served through this interconnection is 55 persons.

Recent Rehabilitation/Repairs: The facility hatch cover and locking mechanism was replaced in 2000.

Component General Condition	*Life Expectancy*
Structure: fair per visual inspection.	50 years
Meter / Interconnections: fair per visual inspection.	*
Mechanical Piping and Components: fair per visual inspection	25 years

* Owned and maintained by Providence Water

Required or Scheduled Rehabilitation/Replacement

Time Interval/Year	Description	Estimated Cost
5 year/2007	--	--
10 year/2012	--	--
15 year/2017	--	--
20 year/2022	--	--

3.4.6 Everbloom Drive Meter Pit

Construction Date /Age: circa. 1970 / 30 years +/-

Description: This meter vault consists of a below grade concrete vault with 6 inch compound flow meter supplied by an 8" main supply line which services this dead end street. The vault is located off the paved roadway near the intersection of Plainfield Pike and Everbloom Drive. An estimate of the population served through this interconnection is 48 persons.

Recent Rehabilitation/Repairs: The facility hatch cover and locking mechanism was replaced in 2000.

Component General Condition	*Life Expectancy*
Structure: fair per visual inspection.	50 years
Meter / Interconnections: fair per visual inspection.	*
Mechanical Piping and Components: fair per visual inspection	25 years

* Owned and maintained by Providence Water

Required or Scheduled Rehabilitation/Replacement

Time Interval/Year	Description	Estimated Cost
5 year/2007	--	--
10 year/2012	--	--
15 year/2017	--	--
20 year/2022	--	--

3.5 Transmission and Distribution System Components

3.5.1 Transmission and Distribution Water Mains

The water system's transmission mains are primarily responsible for the conveyance of water between the point of purchase, the water supply system service area and the system storage tank and booster stations. The transmission mains range in size from 8 to 16 inches in diameter. The distribution mains convey water to the customers throughout the system and range in size from 6 to 12 inches in diameter.

Materials of construction are a combination of cement-lined ductile iron (DI), asbestos cement (AC), polyvinyl chloride (PVC) and unlined cast iron (CI). Over ninety percent of the water mains in the system consist of DI that are less than 25 years in age. All three materials, with the exception of CI, offer an excellent resistance to corrosion and afford long-term durability. CI water mains are located predominantly in the older sections of the system in the southeast and comprise a small percentage of the overall system (i.e. less than 5%). These mains are subject to tuberculation thus reducing the carrying capacity of the main and are generally over 50 years in age. To date, there has not been a high incidence of reported reduced carrying capacity through these CI mains as demonstrated through adequate fire flows. It is anticipated that the CI mains have a remaining useful life of 50 years, minimum while all other pipe materials have useful life expectancies of 75 years or better.

3.5.2 Hydrants

Existing fire hydrants of which there are approximately 310 are owned, operated and maintained by the District. The District has standardized on "Mueller" and Kennedy" model fire hydrants. Generally, the hydrants are considered to be of the same age or newer than the water main on which they are located. There is a maintenance program in place whereby the District ensures the functionality of the hydrants. Hydrant replacement / repair occurs when a hydrant is found or reported to be inoperable, leaking or otherwise malfunctioning. The cost of replacement / repair is incorporated within the general operating budget.

The useful life of a particular hydrant is considered equal to the pipe section or hydrant assembly on which it is contained and is typically upgraded with the particular pipe section. The cost associated with hydrant replacement / repair will be included in the cost of the pipe replacement. Generally, the useful life of hydrants, based on interviews and inquiries with older water systems, which maintain infrastructure over 100 years in age, is expected to be at minimum 50 - 75 years, or longer.

3.5.3 Valves

The valves in the District's system were installed within the pipe section or hydrant assembly on which they are located, and consist of buried, double disk and resilient seated, wedge style gate valves. In general, they are of similar age of the pipe section or hydrant assembly on which they were installed. It is estimated that over 90% of the valves are less than 25 years in age which corresponds to the percentage of ductile iron water main that is less than 25 years in age.

There is a maintenance program in place whereby the District ensures the functionality of the valves. Valve replacement occurs when a valve is found to be inoperable, leaking or otherwise malfunctioning. The cost of repair/replacement is incorporated within the general operating budget.

The useful life of a particular valve is considered equal to the pipe section or hydrant assembly on which it is contained and will be upgraded with the pipe or hydrant, as required. The cost associated with valve replacement/upgrade will be included in the cost of the pipe or hydrant assembly. Generally, the useful life of valves, based on interviews and inquiries with older water systems, which maintain infrastructure over 100 years in age, is expected to be at minimum 75-80 years, or longer.

3.5.4 Customer Meters

The District owns, maintains and replaces all customer service water meters within the system. All of the District's small customer meters (i.e. 5/8 inch through 1 ½ inch) have been equipped with a semi automatic reading and billing register with remote receptacle for use with a hand-held, microprocessor based meter reading system. The disadvantage with this system is that while readings are recorded from an outside register at the residence the actual reading must be manually entered at the office into the District's billing software. Most large meters (2 through 6 inch) also have remote read receptacles, depending upon need. This allows District personnel the ability to automatically read the meters at the exterior of the building face without entering the building. The meter readings are recorded by customer account and manually transferred to the District's computerized billing system.

Every residential, commercial and industrial customer serviced by the District is metered, thus providing for 100 percent distribution system metering. The residential meters are read on a semiannual basis while commercial and industrial meters are read quarterly or monthly. In total, the system maintains approximately 1,640 metered connections.

The District also has an on-going meter replacement program which is included within the annual operation budget. It is estimated that approximately 75 – 80 of the 1,640 customer service meters are replaced annually beginning with the oldest meters. At this rate of replacement, all of the meters are replaced approximately every 20 years, which is within the useful life expectancy of the meter assembly.

3.5.5 Customer Services

The District owns and maintains that portion of the customer service that lies within the public right-of-way, generally from the corporation stop at the supply main to a curb stop valve located in the vicinity to the property line of the customer. This portion of the service is referred to as the curb stop. From the point of the curb stop valve to the internal plumbing system, the customer is responsible for ownership and maintenance of the line. This portion of the service is referred to as the customer service line or service line. There are approximately 1,640 customer service lines within the District's service territory.

Curb stops were generally installed to the customer's property line at the time of distribution main installation throughout a particular area and as development in an area occurred. The standard material for all curb stops and service lines is type "K" copper tubing. Copper Pipe (tubing) is a widely utilized

material for customer service connections in the water services industry. There are no records of lead service lines in the District system.

Currently, there is no program to upgrade or replace any customer service lines or curb stops. The useful life of these components is in the range of 50 - 60 years, or better. Any replacement deemed necessary through the failure of these system components is considered general system maintenance.

3.6 Administrative Components

3.6.1 Buildings

The District conducts operations from two (2) locations; the Town Hall which houses the main offices for administration, billing and customer service; and an operations and maintenance office, which is located at the Central Avenue Booster Pump Station in the generator building enclosure. Storage of spare system components (i.e. pipe, valves, hydrants, etc.) is within a fenced area in proximity to the Central Avenue Booster Station and within the base of the Golden View Drive Storage Tank.

The Town Hall offices are in good condition as are the operation and maintenance offices at the Central Avenue Booster Station. There are no required improvements / significant maintenance or rehabilitation required at either facility for the next 20 years.

3.6.2 Vehicles

The District owns and one service vehicle which consists of a general utility truck. The truck is replaced out at approximate five year intervals. An annual budget of $ 4,000.00 is appropriated for vehicle replacement. District vehicle(s) are maintained and serviced through the Town's Public Works Department. Should the need arise for the use of a backhoe and/or dump truck, the Water Department utilizes the resources of the Public Works Department or contracts the services of an outside water works contractor. Overall, the condition of the District vehicle is in good condition.

3.6.3 Computer Equipment/Billing Software

The District maintains and in-house computer customer service billing software system, which is in good condition. In addition, several personal computers are maintained by the Administrative Staff that are upgrade on an as needed basis. An annual appropriation of $ 2,000.00 is set aside for upgrades / maintenance of components and purchase of software and the cost of which is budgeted within the annual operation budget.

Section 4.0 Compliance with SDWA Regulations /Planning Documents

4.1 Water Quality Regulations

The District is cognizant of the requirements of the Safe Drinking Water Act (SDWA) and maintains a constant effort to ensure compliance. To a large extent, the District relies upon its wholesale supplier, Providence Water, to meet specific compliance requirements of the SDWA and to ensure that water quality standards are being met and maintained. The District periodically performs analytical testing of the wholesale source waters and requires analytical test results from the wholesale supplier. These test results allow the District to determine compliance standards and consequently potential changes in operations.

The Rhode Island Department of Health (RIDOH) is the primacy agency for enforcing these Regulations. The District is designated by the RIDOH as a community water supply system. As such, the District is required to sample water from the distribution system that is representative of that which consumers drink to assure conformance with these Regulations. For the District, this most notably includes the "Total Coliform Rule" whereby the District is required to collect samples from the distribution system to verify the presence/absence of total coliform bacteria. The District also performs sampling for lead and copper at select individual consumer taps in accordance with the Lead and Copper Rule (LCR). The District is in current compliance with the Total Coliform Rule and LCR.

4.2 Compliance with Planning Documents

This Clean Water Infrastructure Plan is intended to be consistent with the goals and policies outlined in the "Water Supply System Management Plan for the Johnston Water Control District" and the Town of Johnston Comprehensive Community Plan. Conversely, it shall be incumbent upon the District to promote consistency between the contents of this Plan and the policies of the Water Supply System Management Plan and as appropriate the Town's Comprehensive Community Plan.

Future land uses, zoning requirements, growth projections and other areas of mutual interest, with regard to service area expansion, shall be consistent with the ability of the water supply system to accommodate the expected potable water requirements of the system.

Section 5.0 Infrastructure Replacement Plan

5.1 General

The purpose of this Plan has been to identify water system infrastructure components within the District's system, which require rehabilitation and replacement in accordance with the requirements of the Rules and Regulations for Clean Water Infrastructure Plans. It is the obligation of the District that in combination with these infrastructure improvements and general system maintenance, operation and upkeep that the water system operate and provide a safe and reliable water supply for an indefinite period of time. Table 5-1 summarizes the five (5) year infrastructure improvement costs, and Table 5-2 summarizes the 5-20 year infrastructure improvement costs. All costs have been presented in present day (year 2002) dollars.

5.1.1 Operation / Organization

The Johnston Water Control District operates as an Enterprise Fund Agency within the municipal corporation of the Town of Johnston. The Town has established enterprise funds for operations that are organized to be self-supporting through user charges; i.e. the intent of the governing body is that all costs (expenses, including depreciation) of providing the services to the general public on a continuing basis be financed or recovered through user charges.

All operations of the Water Department are financed from water revenues in the form of user fees. The budget for the Water Department is prepared to incorporate all the costs of operating the Department and the water rates are established so that users pay for all the activities of the Water Department. User fees and charges levied by the Water Department are established by the Town Council as an Ordinance of the Town of Johnston.

The annual Town Financial Audit includes an audit of the financial accounts of the Water Department. The Water Department is audited separately as an enterprise fund. The enterprise fund audits are combined with the complete Town audit, but are shown separately in the Town's Annual Comprehensive Report.

The Town of Johnston provides various overhead services for the Water Department including personnel and payroll, billing and collections assistance, accounting, purchasing, financing, legal assistance, etc. In addition, the Town is responsible for the overall management and supervision of the Water Department.

The Town assesses these charges based upon actual costs incurred prorated using accounting that is appropriate to the function.

5.1.2 Funding

The District has available and utilizes a variety of sources for funding of water system improvements including those costs associated with infrastructure replacements. In general, the District seeks to secure funding through the most cost effective financing alternatives available. The District does not necessarily utilize each of the available funding sources detailed herein, but rather these are options that are currently available for consideration. The following are the major available sources of revenue/financing for the District.

5.1.3 Customer Charges

The District raises revenue through water use charges and service charges. This revenue is used to fund operations, capital improvements and to pay debt service on outstanding notes. The Town adjusts these charges as necessary when the annual budget is established to ensure an adequate source of revenue for the budgeted expenses.

5.1.4 General Obligation Bonds

The option is available to the Town for any of its financing needs including capital needs of the water enterprise fund. The Town assigns debt incurred for the enterprise fund to the appropriate fund, which in this case is the Water Department. The Town's Finance Department and Town Council must evaluate the desire to use General Obligation debt for future water projects.

5.1.5 Infrastructure Replacement Fund (IRF)

The Infrastructure Replacement Fund (IRF) would be funded through the collection of user fees from water bills to the District's customers. The IRF is a direct result of the requirements of the Rules and Regulations for Clean Water Infrastructure Plans. The fees to fund this account would necessarily be an increase to the Town's current water rate structure. The RIDOH has set no specific guidelines as to how the IRF fee must be calculated, however requirements per RIGL 46-16.6 are:

- Any monies collected must be deposited into a dedicated fund and;
- That the charge to the user be proportional to actual usage and:
- That funds collected are identified as a separate line item in the annual audit and;

- The IRF financing be reviewed , and adjusted if necessary on a bi-annual basis.

5.1.6 Cash Reserves

The Town maintains cash reserves for special projects, improvements and emergencies for which an immediacy of need is required. These reserves are accumulated through budget surpluses.

5.1.7 Rhode Island Water Resources Board

The Rhode Island Water Resources Board (RIWRB) has grant and loan programs available for implementing various water system projects. Under this program, the RIWRB finances and builds the improvements to the requirements of the water system and leases the improvements to the system charging enough to pay back the bonded indebtedness for the project. To date, the Town has elected not to pursue funding through this program, but is aware of its availability.

5.1.8 Rhode Island Clean Water Finance Agency

The State of Rhode Island passed legislation in 1993 creating the Safe Drinking Water Revolving Fund under the auspices of the Agency and the Department of Health. This program established a subsidized loan program for eligible publicly and privately organized drinking water supplies in the State of Rhode Island. In order to determine which projects are to be funded, the RIDOH annually prepares a Priority Project Listing. This listing is the basis for appropriation of funds. To date, the Town has not had the need to pursue funding through this program, but is aware of its availability.

5.2 Funding and Cash Flow Analysis

In order to meet the Rules and Regulations for preparation of a Clean Water Infrastructure Plan, a detailed analysis of the existing infrastructure of the Town's water system was completed. The previous sections have provided an analysis and discussion of the system infrastructure components related to condition, remaining useful life and anticipated replacement and/or rehabilitative costs. This specifically included those components for which a remaining useful life of 20 years or less was identified. In general, the infrastructure rehabilitation or replacement of any particular component has been prioritized by the time interval based on its expected useful life.

A discussion was also provided for those improvements categorized as general operations and maintenance expenses of the water system. These by definition of the Regulations do not qualify for

funding under the IRF, but rather must be funded through the general operating budget. This is consistent with current practices of the Town.

5.3 Financial Analysis

The Rules and Regulations for Clean Water Infrastructure Plans require that a financial element be addressed as a method to fund identified infrastructure improvements. The purpose of this financial analysis is to evaluate the financial impact of the identified infrastructure improvements on the water system and to identify appropriate funding source(s). The IRF qualified costs are presented in Tables 5-1 and 5-2 for the 5 and 20 year planning horizons, respectively. Table 5-1 provides a detailed breakdown for the five-year period that identifies no required infrastructure improvements. Table 5-2 provides a summary breakdown for the fifteen (5-20) year period that totals $ 300,000.00. This dollar value is specifically for the recoating (rehabilitation) of the steel water storage tank which is estimated to take place in the year 2012 or approximately 10 years from now. It is this dollar value that the Town must endeavor to collect through user fees in order to fund the necessary infrastructure rehabilitation and meet the requirements of the IRF.

Currently, the Town maintains a method of customer rate charges based on full cost of service allocation accounting. In other words, the Water System seeks to recover all the costs associated with administration, operation, and maintenance of the system through customer rate charges. This type of system establishes uniform rates for customers and maintains individual customer bills based on the actual volume of water used. In addition, all customers pay an annual service charge based on meter size to cover the cost of meter maintenance, administration and billing. Therefore, the final customer bill is comprised of two components, a minimum charge, which includes the service charge, and an overage charge for water use in excess of the minimum.

The Johnston Water Control District shall in accordance with the Regulations establish a separate account designated as the Infrastructure Replacement Fund (IRF) dedicated solely to fund the replacement and /or rehabilitation of infrastructure components at the end of their useful life. Funding for the IRF shall be based on a user surcharge rate which is directly proportional to the volume of water consumed by the individual customer. The IRF shall be administered and invested in accordance with current District policy and shall be an independently identified surcharge on the customer's bill.

The existing rate structure of the District has been developed to meet current operational and capital expenditures of the water system. This is currently established at a rate of $1.85 per hundred cubic feet

(HCF). Note that 1.0 cubic feet is equal to 7.48 gallons. The current wholesale purchase rate for water from Providence Water is billed to the District at a rate of $1,132.89 per million gallons. The District's current rate structure does not consider the requirements of the Infrastructure Regulations and as such any charges that would associated with funding the IRF would be in addition to the current rates.

The intent of the District shall be to adopt an additional surcharge to the usage rate component of the customer bill to fund the IRF. The IRF rate, once established and approved by the Town, could then be added to the next billing cycle for the water system. The IRF would then be incorporated into the Water Department's annual audit as a separate and independent line item. It is intended that the District review the IRF on a biannual basis and to make adjustments as deemed necessary. Documentation in regards to expenditures, current balances, etc. for the IRF shall be maintained consistent with requirements of the Regulations.

For purposes of developing a usage rate for funding the IRF a straight-line calculation approach was conducted. For example, the District will require $300,000.00 (in 2002 dollars) in approximately 10 years based on Table 5-2. This translates to an annualized cost of $30,000.00. The intent in developing the IRF usage rate is to develop a consistent semiannual usage rate that would not vary significantly from year to year but would be sufficient to accumulate the necessary funds when they are required. The benefit of this type of straight line calculation is not only in its simplicity, but it can easily be revised as circumstances warrant without sophisticated financial analysis. The District will have the ability to easily monitor the IRF account while considering such factors as return on investment, rate of inflation and additional identified infrastructure costs. Based on these factors, the District can determine if sufficient funds are being collected to offset identified infrastructure improvements or if an adjustment to the usage rate is necessary.

Given that the average yearly billable water use for the District is approximately 235 million gallons, this translates to approximately 314,170 HCF. Based on a proportional user charge and utilizing the ten year annualized cost of $30,000.00, the IRF surcharge equates to $0.10 per HCF ($30,000/314,170 HCF). For a typical residential customer that utilizes 250 gallons per day or approximately 122 HCF per year, this translates to an additional IRF surcharge of $12.20 per year. This surcharge will be periodically reviewed and adjusted accordingly to account for inflation, return on investment, additional infrastructure items, etc. In addition, it is the intent of the Town to review this Plan on an annual basis and to make any necessary adjustments to ensure compliance with the Infrastructure Replacement Regulations.

TOWN OF JOHNSTON, RHODE ISLAND
WATER SUPPLY SYSTEM MANAGEMENT PLAN

EXECUTIVE SUMMARY

OCTOBER 2008

Prepared for:

Town of Johnston, Rhode Island
1385 Hartford Avenue
Johnston, Rhode Island 02919

Prepared by:

C&E Engineering Partners, Inc.
342 Park Ave.
Woonsocket, Rhode Island 02895

C&E Project No. J0824.01

Executive Summary

This Water Supply System Management Plan (WSSMP) has been prepared as required under Rhode Island General Laws 46-15.3, as amended and titled "The Water Supply System Management Planning Act" (Act). The legislative authority to effectuate the goals and polices of this Act has been conferred to the Rhode Island Water Resources Board (RIWRB). To this end, the RIWRB has promulgated the Rules and Regulations for Water Supply System Management Planning, October 1998, as amended to implement the provisions of the Act.

Under this legislation, the Town of Johnston – Johnston Water Control District (JWCD), as a water purveyor supplying over 50 million gallons of water per year is responsible for the preparation and adoption of a WSSMP. It is also required that the Town update this WSSMP periodically (30 month updates) and every five years, or as otherwise stipulated in the Regulations.

This WSSMP has been prepared to provide the proper framework to promote the effective and efficient conservation, development, utilization and protection of the natural water resources of the State as utilized by the Town. Further, the overall goals shall be consistent with State Guide Plan Element 721, "Water Supply Policies for Rhode Island"; State Guide Plan Element 125, "Scituate Reservoir Watershed Management Plan" and State Guide Plan Element 724, "Rhode Island Drought management Plan". The purpose of this WSSMP is to outline the objectives of the Water Supply System Management Planning process for the Town of Johnston Water Control District, and to serve as a guide to employ the proper decision-making processes.

The WSSMP contains a detailed description of the water system and includes the policies and procedures related to the general operation and management of the water system. The Emergency Management section relates to the vulnerability assessment of the water system for use in emergency planning. It shall be incumbent upon the JWCD to implement the recommendations and procedures outlined in this WSSMP in order to comply with the overall requirements of the Act.

General

The completion of the year 2008 WSSMP was premised on data and records that were available from fiscal years 1997 through 2007. To a large extent prior to the year 2000, the water system had not maintained information and records relating to the water system that are commonly utilized to complete a WSSMP and any available records were not in a format that was readily transferable for use in the preparation of a WSSMP. In addition, critical aspects of water system operation required enhancement (i.e. data collection, billing procedures, etc.) and reassessment.

The Town in recognition of these facts and beginning in the fiscal year 1999/2000 initiated a review of the operation, management and staffing of the water system with the intent on improving overall system operation, financial self-reliance, reliability and regulatory compliance.

The Town is firmly committed to improving overall water system operation as is evidenced by the progress completed to date and as documented herein in this submission of October 2008. This is however a long and arduous process which will take several years or longer to fully implement. The Town initially prioritized the requirements for improvements and started on those items, which either due to protection of public health, financial stability and operation was determined to be most critical. There is a general plan to continue with the process however, it should also be noted that the water system might be encumbered financially to fully implement all the changes in a timely fashion. Nevertheless, these other items will be addressed in the future. The most significant items that were evaluated and addressed since completion of the 2002 Plan and are included in this 2008 Plan and include the following.

- Water system organization and staffing.
- Wholesale supply and demand metering and record maintenance.
- Billing and collections.
- Customer meter calibration, testing, maintenance and repair.
- Major system infrastructure inspection and evaluation.
- Preparation of a Clean Water Infrastructure Plan.
- Non-account or unaccounted for water and system leakage testing.
- Compliance with regulatory requirements (i.e. Safe Drinking Water Act).

The next step in the process will be to develop and implement these other programs in a manner and fashion as financial and manpower resources permit. As indicated previously, it is not practical to institute all changes in a short period of time. Certain programs require greater financial resources, operator training, equipment procurement, municipal bidding for services that cannot be completed in house, etc. A description and proposed implementation schedule is provided in the body of the Plan.

Background

The Town of Johnston was established by a home rule charter originally adopted on November 6, 1962 and has since been amended. The charter established an elected Mayor-Council type government, responsible for the enactment of local legislation and administration of the Town government. The Department of Public Works is responsible for all functions and services of the Town relating to the water supply system as well as numerous others. Figure 1 in the body of the Plan outlines the Town's organizational structure.

Water System Description

The existing Johnston Water Control District water system was developed primarily from the original water supply system that originated in the pre World War II era. Source of supply for the system originally was wholesale water purchased from the Cranston Water Department, via six interconnections located off a common 24-inch transmission main in Plainfield Pike. Currently, this 24-inch water main is owned and operated by Providence Water. Each of the interconnections is equipped with a master meter assembly and bypass. This pressure zone is operated at a hydraulic gradient of approximately 478 feet, which is determined by the water level in the Providence Water Lawton Hill Reservoir. The two primary interconnections (Green Hill Road and Simmonsville Avenue) account for approximately 95 percent of the JWCD source water. Each of the interconnections is discussed in further detail in Section 2.4 of this Plan.

As the Johnston water system expanded, the need for a booster pump station became evident, so the Shun Pike booster station was constructed in the 1970s. Improvements to this station were completed in the 1980's and included a 4000-gallon hydro-pneumatic steel tank, a fire pump

rated at 500 gpm, and a new emergency generator system. The capacity of this station is 0.144 mgd, and overall, is considered to be in good condition.

The Central Avenue booster station was constructed in the late 1990's. Telemetry equipment relays the water level in the Golden View Drive water storage tank back to the booster station, which in turn is used to control the sequencing of the pumps. The station is fitted with two (2) 600-gpm pumps, with the capability of being upgraded with a third. The areas located in the Town of Johnston to the north and west are supplied by this station.

Being that the vast majority of the transmission and distribution system was installed circa 1980, the piping system is considered to be in excellent condition. Materials of construction include asbestos cement (AC), polyvinyl chloride (PVC), cement-lined ductile iron (DI), and unlined cast iron (CI). With the exception of CI, all of these materials offer excellent corrosion resistance and afford long-term durability. The oldest sections of the JWCD consist of cast iron water mains installed sometime before 1950. These mains are located in the southeast region of the service area.

The JWCD maintains one elevated storage tank located off of Golden View Drive. The 121-foot steel fluted tower has a 750,000-gallon capacity. Constructed in 1987, the structure was designed to provide a minimum of 35 psi in the Central Avenue pressure zone, and is reported to be in good condition.

Policy and Procedure

The service population of the JWCD is comprised of residential, commercial, industrial and government customers of which there are approximately 1,760 metered accounts. It is estimated that approximately 5,067 out of the 27,000 residents in Town are serviced by the JWCD. Areas to the east of Interstate 295 are served by Providence Water with exception of the Simmonsville Avenue section to the north of Plainfield Pike. Also, the Greenville Water District services a small isolated area at the extreme northwestern reaches of Town. Estimates are not available to determine service populations for the aforementioned, or the number of private well owners. Current average day customer demand is 0.746 mgd. Under projected water use for the 5-year

planning period, it is expected that the average day demand will be equal to 0.753 mgd. For the 20-year planning period, it is expected that the demand will be 0.768 mgd. These projections are based primarily on population projections and do not account for significant water savings potentially realized through demand management techniques. They do, however, consider non-account water at the current rate of 8.1 percent.

It is anticipated that the existing wholesale supply source (i.e. Providence Water) will be adequate to meet anticipated future demands. There is currently no contract for purchase of wholesale water between the Town and Providence Water.

The Town has entered into agreement with Providence Water whereas the responsibility of ownership including calibration and/or replacement of the master meters will be the responsibility of Providence Water. The Town is responsible for maintaining the physical structure (i.e. meter vault) containing the master meter assembly. This agreement was completed in early 2003, which permits for accurate accounting of wholesale water purchases.

For three of the previous five years (2006 – 2005 and 2002), the JWCD has exhibited non-account water volumes of 0.23, 30.3 and 38 percent, respectively. This element of water supply management planning shall continue to be closely monitored in the future.

Over the course of the past several years, an aggressive program has been instituted to improve the reliability, monitoring and performance of major system infrastructure. The most significant modifications and improvements include the following.

- Address concerns / issues contained in RIDOH Sanitary Survey of Spring 2008. Improvements included alleviating flooding in pits, adding sampling ports, screening vents and miscellaneous clarifications to sample operations.
- Shun Pike Pump Station Upgrade: Improvements to the hydro pneumatic tank, pump system and emergency power supply.

- Water Storage Tank: Replace landline telephone communications line from storage tank to pump station with license free wireless signal telemetry system. This provides greater degree of reliability.
- Perform a comprehensive inspection of the water storage tank by an outside inspection firm
- Install UPS (uninterrupted power supply) at the tank level telemetry system
- Miscellaneous Maintenance and System Repair / Upgrades:
  - Two (2) hydrant replacements
  - Forty Eight (48) hydrant repairs
  - Seventy Five (75) encoder (meter read) repairs
  - Eleven (11) curb stop replacements
  - Replacement of Access Hatches on Master Meter Vaults
  - Water Main Extensions: approximately 3,000 feet of 8 inch ductile iron pipe
- Large User Master Meter Replacement: Replace existing 8 inch malfunctioning meter with new 6 inch meter. The new meter provides greater degree of accuracy at all flow ranges.
- Replacement of over 250 residential meters as well as implementation of meter testing and repair/replacement program.
- Comprehensive performance and maintenance of the Shun Pike and Central Avenue booster pump stations. Where required, components were replaced or rehabilitated.

The Emergency Management section of this Plan (Volume 2) establishes the responsibilities and authority within the JWCD for responding to most probable emergencies and outlines specific tasks for carrying out functional and constructive solutions based on a review of the potential emergencies and risks. The procedures outlined are consistent with the goals of the State Emergency Water Supply System Management Plan. It is also intended that this document provide guidance to ensure that the primary aspects of recovery from an emergency are addressed in an organized manner to aid in an efficient response and in maintaining drinking water quality and quantity.

TOWN OF JOHNSTON, RHODE ISLAND
WATER SUPPLY SYSTEM MANAGEMENT PLAN

VOLUME I

OCTOBER 2008

Prepared for:

Town of Johnston, Rhode Island
1385 Hartford Avenue
Johnston, Rhode Island 02919

Prepared by:

C&E Engineering Partners, Inc.
342 Park Ave.
Woonsocket, Rhode Island 02895

C&E Project No. J0824.01

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Preface

In 1991, the Rhode Island Legislature passed and put before the Governor for approval, an Act entitled "Water Supply Management." The Act which was subsequently signed into Law by Governor Sundlan required that all Rhode Island Water Purveyors, that deliver more than 50 million gallons of potable water per year, complete and file a detailed Water Supply Management Plan (WSMP) no later than July 1, 1992. Subsequent revisions to the law delayed implementation of the Act pending enactment of rules and regulations by the newly formed Rhode Island Department of Environmental Management (RIDEM), Division of Water Supply Management. These rules and regulations, along with a general guidance document, were developed by RIDEM in August and October of 1992, respectively. The "Rules and Regulations for Water Supply Management Planning," dated August 17, 1992 specified a submission schedule and guideline by which the plans were to be prepared and submitted for approval.

The Town of Johnston, in accordance with the regulations, completed and filed a WSMP. This Plan, prepared on behalf of the Town by the Ash Design Group, Inc. of Providence, Rhode Island in December 1993, failed to meet the requirements of the Water Supply Management Regulations, as they existed at that time, and was not approved. Since that time, the Rhode Island Water Resources Board (RIWRB) has "accepted" the WSMP, which is subject to completion for review and acceptance to meet the requirements of the Plan updated.

In the years subsequent to promulgation of the Water Supply Management Legislation, reorganization at RIDEM eliminated the Division of Water Supply Management at RIDEM. This resulted in the administrative duties associated with this legislation being brought under the auspices of the Rhode Island and Providence Plantations Water Resources Board (RIWRB).

The RIWRB has promulgated new regulations for preparation and update of WSMPs. The regulations titled "Rules and Procedures for Water Supply Systems Management Planning," of October 1998, were promulgated pursuant to the requirements and provisions of Chapter 42-35 and pursuant to Chapter 46-15.3 of the Rhode Island General Laws, as amended. The new regulations are to a large extent premised on the original regulations with significant changes occurring in the Water Quality Protection Component portion of the Plan. Under the new Regulations, the Town of Johnston was mandated to prepare and submit an updated Water

Supply System Management Plan (WSSMP) to the RIWRB, for review and approval, no later than April 1, 2000.

To that end, the Town of Johnston retained the firm of Pare Engineering Corporation to prepare and submit a Water Supply System Management Plan (WSSMP) to the Rhode Island Water Resources Board (Board) in accordance with Board Rules and Regulations governing the preparation of such plans. A copy of this WSSMP dated March 31, 2000 was filed with the Board. Subsequently, the Board through correspondence dated September 13, 2000 informed the Town of Johnston that the WSSMP as "written" was not acceptable. This was based on the Board's Public Drinking Water Protection Committee's review of comments from the various review agencies which identified deficiencies in the WSSMP. Review agencies responding to the Board included the Rhode Island Department of Administration Statewide Planning, Rhode Island Department of Environmental Management, and Rhode Island Department of Health.

As an alternative to addressing the comments on the WSSMP, the Board had temporarily suspended the requirement for submission of the WSSMP for a period of one-year effective March 12, 2002. In place of a formal WSSMP submission, the Board requested that the Town prepare quarterly reports in order that the Board may gage the progress of the Town in implementing water system improvements towards achieving compliance with WSSMP Rules and Regulations. The Board also provided the Town an opportunity to submit an updated WSSMP during this one-year suspension period. This resubmission was at the discretion of the Town when at such time it was deemed that sufficient progress toward meeting the WSSMP Rules and Regulations had been achieved.

The Town of Johnston retained the firm of C&E Engineering Partners, Inc. to assist in the preparation of an updated WSSMP and to prepare the requisite quarterly reports. The first quarterly report was submitted to the Board on June 12, 2002 and was formally accepted as indicated in correspondence dated July 9, 2002 from the Board to the Town. The Board based upon review of the report and in recognition of the fact that the Town of Johnston Water Department had and will continue to make significant strides in the management and operation of its water system permitted the preparation of a WSSMP update and submission for review at the request of the Town. Also, this was in recognition of the fact that the Board and other

designated review agencies (i.e. Rhode Island Department of Health, Rhode Island Department of Environmental Management, and Rhode Island Department of Administration) understand that the Town of Johnston was submitting an updated WSSMP with less than the required number of years of historical data (i.e. to thoroughly complete worksheets) and had unanimously accepted this limitation.

The most recent WSSMP was originally submitted on March 31, 2000, revised and resubmitted in November 2002 and subsequently approved by the Water Resources Board in July 2003. The Town also continues to submit the required annual reporting data worksheets to the RIWSB. A 30-Month update was submitted in September 2006 which was representative of data readily available through the calendar year ending December 31, 2005. This update provided status with respect to the Town's implementation and description of the progress of specific milestones and tasks that were outlined in the approved WSSMP.

The Town is firmly committed to improving overall water system operation as is evidenced by the progress completed to date and as documented in most recent submissions. It is intended that this WSSMP update provide documentation of the continued compliance goals and objectives outlined in the original WSSMP.

Executive Summary

This Water Supply System Management Plan (WSSMP) has been prepared as required under Rhode Island General Laws 46-15.3, as amended and titled "The Water Supply System Management Planning Act" (Act). The legislative authority to effectuate the goals and polices of this Act has been conferred to the Rhode Island Water Resources Board (RIWRB). To this end, the RIWRB has promulgated the Rules and Regulations for Water Supply System Management Planning, October 1998, as amended to implement the provisions of the Act.

Under this legislation, the Town of Johnston – Johnston Water Control District (JWCD), as a water purveyor supplying over 50 million gallons of water per year is responsible for the preparation and adoption of a WSSMP. It is also required that the Town update this WSSMP periodically (30 month updates) and every five years, or as otherwise stipulated in the Regulations.

This WSSMP has been prepared to provide the proper framework to promote the effective and efficient conservation, development, utilization and protection of the natural water resources of the State as utilized by the Town. Further, the overall goals shall be consistent with State Guide Plan Element 721, "Water Supply Policies for Rhode Island"; State Guide Plan Element 125, "Scituate Reservoir Watershed Management Plan" and State Guide Plan Element 724, "Rhode Island Drought management Plan". The purpose of this WSSMP is to outline the objectives of the Water Supply System Management Planning process for the Town of Johnston Water Control District, and to serve as a guide to employ the proper decision-making processes.

The WSSMP contains a detailed description of the water system and includes the policies and procedures related to the general operation and management of the water system. The Emergency Management section relates to the vulnerability assessment of the water system for use in emergency planning. It shall be incumbent upon the JWCD to implement the recommendations and procedures outlined in this WSSMP in order to comply with the overall requirements of the Act.

General

The completion of the year 2008 WSSMP was premised on data and records that were available from fiscal years 1997 through 2007. To a large extent prior to the year 2000, the water system had not maintained information and records relating to the water system that are commonly utilized to complete a WSSMP and any available records were not in a format that was readily transferable for use in the preparation of a WSSMP. In addition, critical aspects of water system operation required enhancement (i.e. data collection, billing procedures, etc.) and reassessment.

The Town in recognition of these facts and beginning in the fiscal year 1999/2000 initiated a review of the operation, management and staffing of the water system with the intent on improving overall system operation, financial self-reliance, reliability and regulatory compliance.

The Town is firmly committed to improving overall water system operation as is evidenced by the progress completed to date and as documented herein in this submission of October 2008. This is however a long and arduous process which will take several years or longer to fully implement. The Town initially prioritized the requirements for improvements and started on those items, which either due to protection of public health, financial stability and operation was determined to be most critical. There is a general plan to continue with the process however, it should also be noted that the water system might be encumbered financially to fully implement all the changes in a timely fashion. Nevertheless, these other items will be addressed in the future. The most significant items that were evaluated and addressed since completion of the 2002 Plan and are included in this 2008 Plan and include the following.

- Water system organization and staffing.
- Wholesale supply and demand metering and record maintenance.
- Billing and collections.
- Customer meter calibration, testing, maintenance and repair.
- Major system infrastructure inspection and evaluation.
- Preparation of a Clean Water Infrastructure Plan.
- Non-account or unaccounted for water and system leakage testing.
- Compliance with regulatory requirements (i.e. Safe Drinking Water Act).

The next step in the process will be to develop and implement these other programs in a manner and fashion as financial and manpower resources permit. As indicated previously, it is not practical to institute all changes in a short period of time. Certain programs require greater financial resources, operator training, equipment procurement, municipal bidding for services that cannot be completed in house, etc. A description and proposed implementation schedule is provided in the body of the Plan.

Background

The Town of Johnston was established by a home rule charter originally adopted on November 6, 1962 and has since been amended. The charter established an elected Mayor-Council type government, responsible for the enactment of local legislation and administration of the Town government. The Department of Public Works is responsible for all functions and services of the Town relating to the water supply system as well as numerous others. Figure 1 in the body of the Plan outlines the Town's organizational structure.

Water System Description

The existing Johnston Water Control District water system was developed primarily from the original water supply system that originated in the pre World War II era. Source of supply for the system originally was wholesale water purchased from the Cranston Water Department, via six interconnections located off a common 24-inch transmission main in Plainfield Pike. Currently, this 24-inch water main is owned and operated by Providence Water. Each of the interconnections is equipped with a master meter assembly and bypass. This pressure zone is operated at a hydraulic gradient of approximately 478 feet, which is determined by the water level in the Providence Water Lawton Hill Reservoir. The two primary interconnections (Green Hill Road and Simmonsville Avenue) account for approximately 95 percent of the JWCD source water. Each of the interconnections is discussed in further detail in Section 2.4 of this Plan.

As the Johnston water system expanded, the need for a booster pump station became evident, so the Shun Pike booster station was constructed in the 1970s. Improvements to this station were completed in the 1980's and included a 4000-gallon hydro-pneumatic steel tank, a fire pump rated at 500 gpm, and a new emergency generator system. The capacity of this station is 0.144 mgd, and overall, is considered to be in good condition.

The Central Avenue booster station was constructed in the late 1990's. Telemetry equipment relays the water level in the Golden View Drive water storage tank back to the booster station, which in turn is used to control the sequencing of the pumps. The station is fitted with two (2) 600-gpm pumps, with the capability of being upgraded with a third. The areas located in the Town of Johnston to the north and west are supplied by this station.

Being that the vast majority of the transmission and distribution system was installed circa 1980, the piping system is considered to be in excellent condition. Materials of construction include asbestos cement (AC), polyvinyl chloride (PVC), cement-lined ductile iron (DI), and unlined cast iron (CI). With the exception of CI, all of these materials offer excellent corrosion resistance and afford long-term durability. The oldest sections of the JWCD consist of cast iron water mains installed sometime before 1950. These mains are located in the southeast region of the service area.

The JWCD maintains one elevated storage tank located off of Golden View Drive. The 121-foot steel fluted tower has a 750,000-gallon capacity. Constructed in 1987, the structure was designed to provide a minimum of 35 psi in the Central Avenue pressure zone, and is reported to be in good condition.

Policy and Procedure

The service population of the JWCD is comprised of residential, commercial, industrial and government customers of which there are approximately 1,760 metered accounts. It is estimated that approximately 5,067 out of the 27,000 residents in Town are serviced by the JWCD. Areas to the east of Interstate 295 are served by Providence Water with exception of the Simmonsville Avenue section to the north of Plainfield Pike. Also, the Greenville Water District services a small isolated area at the extreme northwestern reaches of Town. Estimates are not available to determine service populations for the aforementioned, or the number of private well owners. Current average day customer demand is 0.746 mgd. Under projected water use for the 5-year planning period, it is expected that the average day demand will be equal to 0.753 mgd. For the 20-year planning period, it is expected that the demand will be 0.768 mgd. These projections are based primarily on population projections and do not account for significant water savings

potentially realized through demand management techniques. They do, however, consider non-account water at the current rate of 8.1 percent.

It is anticipated that the existing wholesale supply source (i.e. Providence Water) will be adequate to meet anticipated future demands. There is currently no contract for purchase of wholesale water between the Town and Providence Water.

The Town has entered into agreement with Providence Water whereas the responsibility of ownership including calibration and/or replacement of the master meters will be the responsibility of Providence Water. The Town is responsible for maintaining the physical structure (i.e. meter vault) containing the master meter assembly. This agreement was completed in early 2003, which permits for accurate accounting of wholesale water purchases.

For three of the previous five years (2006 – 2005 and 2002), the JWCD has exhibited non-account water volumes of 0.23, 30.3 and 38 percent, respectively. This element of water supply management planning shall continue to be closely monitored in the future.

Over the course of the past several years, an aggressive program has been instituted to improve the reliability, monitoring and performance of major system infrastructure. The most significant modifications and improvements include the following.

- Address concerns / issues contained in RIDOH Sanitary Survey of Spring 2008. Improvements included alleviating flooding in pits, adding sampling ports, screening vents and miscellaneous clarifications to sample operations.
- Shun Pike Pump Station Upgrade: Improvements to the hydro pneumatic tank, pump system and emergency power supply.
- Water Storage Tank: Replace landline telephone communications line from storage tank to pump station with license free wireless signal telemetry system. This provides greater degree of reliability.
- Perform a comprehensive inspection of the water storage tank by an outside inspection firm
- Install UPS (uninterrupted power supply) at the tank level telemetry system

- Miscellaneous Maintenance and System Repair / Upgrades:
  - Two (2) hydrant replacements
  - Forty Eight (48) hydrant repairs
  - Seventy Five (75) encoder (meter read) repairs
  - Eleven (11) curb stop replacements
  - Replacement of Access Hatches on Master Meter Vaults
  - Water Main Extensions: approximately 3,000 feet of 8 inch ductile iron pipe
- Large User Master Meter Replacement: Replace existing 8 inch malfunctioning meter with new 6 inch meter. The new meter provides greater degree of accuracy at all flow ranges.
- Replacement of over 250 residential meters as well as implementation of meter testing and repair/replacement program.
- Comprehensive performance and maintenance of the Shun Pike and Central Avenue booster pump stations. Where required, components were replaced or rehabilitated.

The Emergency Management section of this Plan (Volume 2) establishes the responsibilities and authority within the JWCD for responding to most probable emergencies and outlines specific tasks for carrying out functional and constructive solutions based on a review of the potential emergencies and risks. The procedures outlined are consistent with the goals of the State Emergency Water Supply System Management Plan. It is also intended that this document provide guidance to ensure that the primary aspects of recovery from an emergency are addressed in an organized manner to aid in an efficient response and in maintaining drinking water quality and quantity.

Acknowledgements

C&E Engineering Partners, Inc. would like to acknowledge the invaluable assistance provided by the following individuals from the Town of Johnston during the preparation of this update of the Water Supply System Management Plan.

Mr. Makram H. Megalli, PE, Director of Public Works

Ms. Lorraine Caruso, PE, Town Engineer

Ms. Patricia Schiavitti, Clerk

1.0 Goals Statement

The goal of this Plan is to comply with the provisions of the *Rules and Procedures for Water Supply System Management Planning*, by developing a comprehensive plan for the Johnston Water Control District water supply system. It is also intended for use in applying the components of the plan to successful execution for the purpose of achieving the effective and efficient conservation, development, utilization, and protection of the water system's resources in ways that satisfy the present and future needs of the Johnston Water Control District's customer base.

The goal of this Plan is furthermore consistent with the overall goal of the Rhode Island State Guide Plan No. 721, which is to develop a long range program to improve the quantity and quality of water required by the citizens within the service area in the most cost effective and environmentally sound manner.

2.0 System Description

2.1 Organization and Legal Structure

The Town of Johnston, through the Johnston Water Control District (JWCD), owns and operates a public water distribution system that serves a portion of Town. In addition to the JWCD water system, the Town is also served by its two neighboring water purveyors: the Greenville Water District (GWD) and Providence Water. The Greenville Water District serves an isolated portion of the northwest corner of Town, in the vicinity of Slack Reservoir. Providence Water serves the area of Town generally located to the east of Interstate 295 with exception of the Simmonsville Avenue are which is served by the Town. Within this area several booster pump stations serve isolated developments at higher elevations.

The JWCD maintains an extensive infrastructure consisting of transmission and distribution mains, two booster pump stations, an elevated water storage tank, hydrants, meters and appurtenances that serve a total of 1,760 metered accounts. Limits of the service territory of the distribution system are more clearly defined in Section 2.5 of this Plan and are also delineated on the accompanying Water System Map included as Attachment No. 1.

The JCWD water system is divided into three distinct pressure zones. The main zone is supplied through interconnections with the PWSB system. Water from this zone is boosted via two pump stations to serve outlying areas in Town, which are at a substantially higher service elevation. The pressure zones are as follows:

PWSB Pressure Zone: includes the area in the southeast corner of the system that is connected directly via several interconnections to Providence Water system. This zone accounts for approximately 55% of the total system demand.

Shun Pike Pressure Zone: includes the area west of Green Hill Avenue on Shun Pike and the streets off Shun Pike extending west to Peck Hill and Pippin Orchard Road. Pressure in this zone is boosted via a pump station located on Shun Pike. This zone accounts for approximately 5% of the total system demand.

Central Avenue Pressure Zone: includes the remaining area of the service district extending to the north and west of the Central Avenue pump station. This zone accounts for approximately 40% of the total system demand.

Organizational Structure

The Johnston Water Control District has formalized positions within the Department with the direct responsibility for operating and maintaining the water system. These include the positions of *Water Superintendent* and *Assistant Water Superintendent.* Personnel at these positions report directly to the Director of Public Works and Town Engineer. Figure 1 provides a general overview of the Town Organizational Structure. It should be noted that the positions of Water Superintendent and Assistant Water Superintendent are vacant and that the Town currently relies upon contract operations services for the daily operation and maintenance of the water system. The Town maintains a contract with LaFramboise Well Drilling, Inc. / Millenium Water, LLC for this purpose.

These positions (including contract operations personnel) consist of full time personnel directly committed to the operation and maintenance of the water system. The *Water Superintendent* shall maintain an appropriate Drinking Water Distribution Operator certificate from the Rhode Island Department of Health and have the requisite experience for operation and maintenance of a public water supply system. Similarly, the *Assistant Water Superintendent* shall maintain a Drinking Water Distribution Operator certificate from the Rhode Island Department of Health and contain the necessary experience in potable water systems operations.

These personnel shall be required to routinely participate in educational programs required by the RIDOH in order to maintain compliance with requirements of the certification program. A copy of the job descriptions, minimum qualification requirements and definition of the positions are contained in Attachment No. 5 of this document. The following table outlines the organizational framework of the water system including job classifications and personnel.

Director of Public Works	Makram H. Hegalli, PE
Town Engineer	Lorraine Caruso, PE
Water Superintendent *	Millenium Water *
Assistant Water Superintendent *	Millenium Water *
Office Secretary	Patricia Schiavitti

** Positions currently maintained through contract operations*

Director of Public Works / Town Engineer

The individuals tasked with the day-to-day business function of the water system. This includes managing the Town's operations staff, maintaining regulatory compliance, maintaining intergovernmental and customer relations, coordinating activities of the Town's professional consultants, advising the Town and government officials and implementing policy decisions.

Water Superintendent

The individual tasked with the day-to-day responsibility of ensuring that the water system operates in accordance with the rules and regulations of the Rhode Island Department of Health, Office of Drinking Water Quality. This person is also a liaison to the public in facilitating response to concerns or complaints in regards to the water system. A working relationship with other departments and utility offices is a part of this person's function. A responsibility for overseeing all components of the water system on a round the clock basis to ensure the quality and safety of the water system is also under the umbrella of duties for this individual.

Assistant Water Superintendent

This individual is responsible for a working knowledge of the principles, procedures and techniques of the water distribution system. Knowledge of the materials and techniques required for construction, maintenance and repair of a water system, including facilities and structures, is required. There should also be an ability to keep accurate and legible records of the system. A strong mechanical background is necessary to ensure proper day-to-day maintenance of water system components. This person is required to demonstrate skill when operating the special

equipment and tools related to water system maintenance. The ability to respond tactfully and with discretion to inquiries and complaints is also part of the day to day functioning in this role.

Business Office

Employees of the business office at Town Hall are responsible for daily functions of the office including interfacing with the Town's customers, providing customer assistance and general information, preparation and mailing of water bills and collection of payments. These personnel report directly to the Public Works Director and Town Engineer.

The full time staff as described previously is of adequate qualification, experience and number in order to effectively and efficiently performs duties necessary to operate and maintain the current water distribution system. All JWCF employees are under the charge of the Mayor of the Town of Johnston.

The legal and mailing address for the District is:

Johnston Water Control District
Town of Johnston, Rhode Island
1385 Hartford Avenue
Johnston, Rhode Island 02919

2.2 Water Supply Sources

The Johnston Water Control District relies upon the wholesale purchase of water from Providence Water as the water system's sole source of supply. Source water is supplied to the JWCD through two primary interconnections in the form of master meter vaults located at the intersections of Plainfield Pike and Green Hill Road and Simmonsville Avenue. Four additional interconnections in the form of master meter vaults to the PWSB are maintained off Plainfield Pike that serve several smaller isolated areas. These are located at the intersection of Plainfield Pike with Taylor Road, Nardillo Street, Capitol Street and Everbloom Drive. All interconnections are served from the same 24" transmission main in Plainfield Pike

A 24-inch water main located in Plainfield Pike, which is connected to the Lawton Hill Reservoir pressure zone of Providence Water, supplies each of the six interconnections. This pressure zone is

operated at a hydraulic gradient of approximately 478 feet, which is determined by the water elevation in the Providence Water Lawton Hill Reservoir. This determines the supply pressure to the JWCD and translates to a pressure of approximately 48 psi at the primary interconnection located at the intersection of Plainfield Pike and Green Hill Road. This interconnection is reported to be in good condition and consists of an eight inch compound meter with a bypass set in a below grade vault. The remaining interconnections are in good to fair condition and contain master meters with bypass arrangements.

2.3 Treatment, Transmission and Storage Facilities

Water Treatment

The JWCD purchases 100 percent of its source water from the Providence Water system. The purchased water receives no treatment upon entering the JWCD system and as such there are no treatment facilities in the system. Source water received from Providence Water is solely derived from surface water (Scituate Reservoir) and is treated by Providence Water. Treatment consists of buffering the water to a pH in the range of 9.5, disinfection (chlorine) and fluoride addition.

Transmission

The water system's transmission mains are primarily responsible for the conveyance of water between the point of purchase, the water supply system service area and the system storage tank and booster stations. The transmission mains range in size from 8 to 24 inches in diameter. The distribution mains convey water to the customers throughout the system and range in size from 6 to 18 inches in diameter. The following Worksheet No. 6 – Transmission System Description provides a detailed listing of the system's transmission pipelines.

Materials of construction are a combination of cement-lined ductile iron (DI), asbestos cement (AC), polyvinyl chloride (PVC) and unlined cast iron (CI). Over ninety percent of the water mains in the system consist of DI. All three materials, with the exception of CI, offer an excellent resistance to corrosion and afford long-term durability. CI water mains are located predominantly in the older sections of the system in the southeast and comprise a small percentage of the overall system. These

mains are subject to tuberculation thus reducing the carrying capacity of the main and are generally over 50 years in age.

Overall, the majority of the transmission and distribution system water mains are considered relatively new in terms of the typical useful life for water system components. Given that the expected life of water mains is in the range of 75 –100 years and that the majority of the system was installed in the early and mid 1980s, the piping system is considered to be in excellent condition.

Pumping Stations

Two booster pump stations are maintained by the JWCD for purposes of increasing the pressure to service specific areas within the system. These booster stations are required due to the service elevations in these areas that approach 530 feet Mean Sea Level (MSL). Each station is determined to be a vital component to proper operation of the water system in order to maintain an adequate level of customer service to the respective service territories. Without the stations, insufficient pressure and volume would occur within these service areas. Each station is equipped with an emergency generator in the event of power loss.

The Shun Pike booster station is located approximately one mile west of the intersection of Shun Pike and Green Hill Road. This station is designed to boost the hydraulic grade of water received from the PWSB system from 478 to 660 feet. This station is designed to supply isolated higher elevations in vicinity to Peck Hill. The station was originally constructed in the 1970's and is fitted with a duplex booster pump system in an underground vault. Each booster pump is rated for 100 gpm. Improvements were completed to this facility in the 1980's which included the addition of a 4000-gallon horizontal hydro-pneumatic steel tank, a fire pump rated at 500 gpm, and a new emergency generator system. The storage tank, fire pump and emergency generator are housed in an above grade building structure. The 100 gpm booster pumps are housed in a below grade vault located adjacent to the main building. A pressure switch sequences the operation of the pumps and maintains pressure in the hydro-pneumatic tank. Overall, the station is reported to be in good condition. The capacity of the pump station is determined to be the pumping rate with the largest pump out of service. This is determined to be 100 gpm or 0.144 mgd.

The Central Avenue booster station located at the intersection of Central and Reservoir Avenues and supplies a major portion of the JWCD system. This station is designed to boost the hydraulic grade from the PWSB system from 478 to 650 feet and supplies all areas to the north and west of the station. The station was constructed in 1990 and is fitted with two 600-gpm electric driven centrifugal pumps in an underground vault. Allowances for the addition of a third pump have been provided in the suction and discharge piping of the station. The pumps are set to operate in response to the water level in the Golden View Drive water storage tank. Telemetry equipment transfers a signal of the water level in the tank back to the booster station, which in turn is used to control the sequencing of the pumps.

The station is equipped with emergency power which is housed in a nearby above grade structure. The station is reported to be in good condition overall. AWWA standards rate the capacity of a booster station as the pumping rate with the largest pump out of service. This is determined to be 600 gpm or 0.864 mgd. The station can be upgraded with a third pump that would increase the rated capacity of the station to 1,200 gpm or 1.73 mgd. This is premised on two pumps operating with the third serving as an inline backup. Information relating to the above pumping facilities can be found in the following Worksheet No. 5A.

Storage Facilities

The JWCD maintains one elevated storage tank located in the pressure zone supplied by the Central Avenue booster station (Reference Worksheet No. 4A). As such, only this portion of the system is afforded the storage capacity of this tank for normal, fire and emergency conditions. The tank structure is located off of Golden View Drive and was constructed in 1987. The elevated structure consists of a steel fluted tower design of 750,000-gallon capacity.

The overflow elevation is equal to a hydraulic grade elevation of 650 feet with a height to the bottom capacity line of 66 feet. The overall tank height is 121 feet with a head range in the bowl of 44 feet and diameter of 58 feet. Usable storage is approximately 480,000 gallons and is premised on maintaining a 35-psi pressure in this portion of the system. The steel structure and the coating system are reported to be in good condition. The ground level in the fluted tower is utilized as

storage space for equipment and materials. The tank was most recently inspected in May 2003 and is scheduled for re-inspection in early 2009.

2.4 Interconnections

As previously mentioned, there are a total of six wholesale interconnections within the Johnston Water Control District that are maintained with Providence Water. The maximum rate of delivery through the interconnections has been determined based on a maximum velocity of 5 feet per second through the downstream water transmission mains, or the maximum capacity through the meter, whichever is the lesser.

These transmission mains consist of an 18-inch in Green Hill Avenue and an 12-inch in Simmonsville Avenue. The maximum rate of flow available through the Green Hill Avenue transmission main is determined to be approximately 4.5 million gallons per day (mgd) or 3,100 gpm. An 8-inch compound meter assembly is rated for a maximum flow in the range of 3.6 mgd or 2,400 gpm. The lesser value of 3.6 mgd will be utilized in this case to rate the maximum available capacity through this interconnection.

The Simmonsville Avenue interconnection maximum flow rate is determined to be approximately 1.1 mgd or 785 gpm based on the transmission main capacity. An 8-inch compound meter assembly is rated for a maximum flow in the range of 3.6 mgd or 2,400 gpm. The lesser value of 1.1 mgd will be utilized in this case to rate the maximum available capacity through this interconnection. This equates to a total available capacity of 4.7 mgd. The other four interconnections serve isolated areas and are not looped into the main portion of the system.

These interconnections are currently the only source of water to the District. The Greenville Water District services a small area of in the extreme northwest area of Town in vicinity to the Slack Reservoir but is limited in its service capability and cannot meet the needs of the remainder of the system in an emergency. Geographically, the Greenville Water service area and the JWCD service area are upwards of 6- 8 miles apart.

The following Worksheet No. 7 provides further information on the wholesale interconnections.

2.5 Present Service Area

Geographic Area

The Town of Johnston is located in central Rhode Island and comprises 23.7 square miles. It is bordered by the City of Cranston to the south; the Town of Smithfield to the north; the Town of Scituate to the west, and the City of Providence and Town of North Providence to the east. The JWCD only serves a portion of the Town. Areas to the east of Interstate 295 are served by Providence Water, and the Greenville Water District services the extreme northwestern reaches of Town. (See Attachment No. 1)

Water Services History

The following Worksheet No. 8 provides a breakdown of the customer account description for calendar years 1997 through 2007 for the JWCD water supply system.

Present Population Served

Given the nature of the JWCD service area, an estimate of the present population served by the water department was developed based on a review of the 1991 *Town of Johnston Comprehensive Community Plan* and U.S. Census information provided by the Rhode Island Department of Administration, Statewide Planning Program.

In reviewing the above documents, it was discovered that at the time of the 2000 Census, the occupancy rate was 2.47 persons per household. However, due to an aging population, the increase of single-parent families, and a generally smaller household size, the occupancy rate was adjusted to 2.4 for the purpose of this Plan. A 1995 estimate by the Statewide Planning Program suggests this trend as well. Therefore, multiplying the adjusted occupancy rate by the number of total services, and incorporating the populations of Simmons Village and Briarcliff Nursing Home, it is estimated that the total population served (as of December 2007) is approximately 5,067.

Population Demographics

A review of the 1991 *Town of Johnston Comprehensive Community Plan* suggests that the housing industry experienced rapid growth (33.5 percent) in the 1970s. Since that time, while still increasing, the rate of growth has decreased. The population for the Town as of April 1, 2000 was

28,195. This represented an increase of 6.23% (1,653 persons) from the 1990 population of 26,542. From 1990 (10,384 units) to 2000 (11,574 units) the number of housing units in Johnston increased by 11.5 percent, adding over 1190 housing units. Of the 11,574 housing units 377 were vacant. 48 of the vacant units were classified for seasonal or recreational use. It is expected that the growth rate will continue to slowly decrease over the next 20 years.

2.6 Source and Distribution Metering

All of the water purchased by the JWCD from Providence Water is metered at the point of purchase as it enters the water supply system. These are master meters providing for 100 percent source metering and are recorded by the PWSB for billing purposes on a monthly basis. Each interconnection is equipped with a master meter assembly. The ensuing Worksheet No. 9 lists detailed information concerning each of the master meter assemblies. An agreement between the District and Providence Water has formally transferred ownership of the six master meters to Providence Water. It is the responsibility of Providence Water to properly maintain, read and calibrate the master meter assemblies.

Every residential, commercial and industrial customer serviced by the JWCD is metered, thus providing for 100 percent distribution system metering. The meters are read on a semiannual basis. In total, the system maintains approximately 1,760 metered connections.

In accordance with good general water works practice, the Johnston Water Control District has instituted an increased frequency of consumer meter reading and billing. This provides the ability to monitor consumer usage as well as improve cash flow. Customer meters are read and billed on a semiannual basis.

The wholesale master meter meters at the interconnections with Providence Water are read by Providence Water on a monthly basis. These readings are utilized to reconcile wholesale billings from Providence Water.

2.7 System Production Data

As previously described, the Johnston Water Department obtains 100% of its source water via the interconnections to the Providence Water system. A review of billing record totals for the past eleven (11) years (1997 – 2007) reveals a generally increasing rate of water use, beginning in 1998 with a decreasing rate of water use in 2002 before increasing again in 2003. Table 2-1 illustrates the relative rate of increase in water usage from 2001 through 2007. Totals for both current and historic volumes of wholesale water purchases from this supply source are presented in the accompanying Worksheets No. 14 and 15.

TABLE 2-1

WHOLESALE WATER PURCHASES

YEAR	VOLUME PURCHASED (MG)	% CHANGE FROM PREVIOUS YEAR
2000	*	*
2001	*	*
2002	147.229	--
2003	161.675	9.8
2004	189.669	17.3
2005	287.891	51.8
2006	250.358	-13.0
2007	296.099	15.4

* Master meter readings at the six interconnections were found to be inaccurate during this period. Providence Water has assumed ownership of all six master meter assemblies and is responsible for calibrating and/or replacing these meters.

Based on the metered total of 296.099 million gallons for calendar year 2007, the current Average Day Demand for the JWCD computes to 809,000 gallons per day (gpd). Given the estimated service area population at the end of 2007 of 5,067 the current generalized per capita system demand for all

users computes to 159.7 gallons per capita day. This information is presented in the following Worksheet No. 18, which provides a breakdown of monthly production data for 2007.

Historic Annual Average Day Demand data for the most recent eleven (11) calendar years is presented in the following Worksheet No. 19. This worksheet also details the Maximum Daily and Peak Hour Demands, as they were available for these years.

2.8 System Water Use

2.8.1 System and Per Capita Use

The following Worksheet No. 20 indicates that JWCD customers consumed a total of 272.040 million gallons of water during calendar year 2007, which corresponds to an Average Day Demand of 0.746 MGD.

Current billing practices by the JWCD do not incorporate water use by user category as defined within the Standard Industrial Classification (SIC) System. The JWCD anticipates that in the future data collection procedures will be modified to include this information in accordance with Section 9.01 of the *Rules and Procedures for Water Supply System Management Planning*.

2.8.2 Major Users

A major user is defined as any organization that uses in excess of 3.0 million gallons of water per year. The JWCD supplies water to three (3) major users, who are involved in resource recovery, waste disposal, and residential services. Information pertaining to volumes of water consumed by these users for the most recently completed calendar year (2007) is unavailable. In the future, the JWCD will make every effort to assure that this information is readily available.

Historic water use by the system's major users is tabulated and presented in Worksheet No. 24 for calendar years 1997 through 2007.

2.8.3 Legal Obligations

In addition to the implied legal obligations associated with local ordinances defining the responsibility of the JWCD to furnish potable water to its customers, the JWCD is not bound by any contractual agreement regulating the body's provision of supplying water.

The Town of Johnston was established by a home rule charter originally adopted on November 6, 1962 and has since been amended. The charter established an elected Mayor-Council type government, responsible for the enactment of local legislation and administration of the Town government. The Department of Public Works is responsible for all functions and services of the Town relating to the water supply system as well as numerous others. Figure 1 outlines the Town's organizational structure.

2.8.4 Non-Account Water Use

Unaccounted for water use consists of the difference in the sum of the volume of water metered at the point of supply and that recorded at all points of sale. This unaccounted for water typically consists of water consumed for both authorized and unauthorized uses. Authorized uses include water main/storm drain flushing, sewer/street cleaning, landscaping in public areas, construction sites, etc. It also includes water which is metered but not billed, and therefore is not reflected in the recorded volumes of water sold. Unauthorized uses typically include system leaks, malfunctioning meters, meter pit bypasses, water theft, other un-metered public use, etc. Worksheet No. 25 summarizes the non-account water use of the JWCD water system for the previous ten years (1998 – 2007). This worksheet illustrates that the percentage of system non-account water has varied over the past 5 years, and is 8.1 percent as of year 2007. As indicated previously, the inaccurate wholesale purchase readings prohibit an accurate estimation of the non-account water for years 2000 and 2001. The following Worksheet No. 26 provides a breakdown of the estimated volumes of "lost" water associated with both authorized and unauthorized uses.

2.8.5 Water Conservation

Water conservation initiatives are defined as the *"methods, procedures and devices designed to promote efficient use of water and to eliminate waste of water."* The Town has initiated a residential retrofit program (RRP). For a detailed description of the program see Section 6.4.2 of this Plan.

2.9 Water System Deficiencies

The JWCD water system operates with minimal deficiencies. As previously discussed, improvements were completed to the Shun Pike booster station. These included the addition of a 4000-gallon horizontal hydro-pneumatic steel storage tank, a fire pump rated at 500 gpm, and a new emergency generator system. Prior to the rehabilitation of this station, pressures in the vicinity were inadequate. With the increased number of service connections and water main extensions, the original pumps were not keeping up with localized demands. Today, minimum pressures in the zone are in excess of 60 psi, according to hydraulic modeling simulations performed by PARE and recorded in the *Northwest Water Expansion Engineering Evaluation Report*, dated June 1999.

Based on the aforementioned computerized hydraulic analysis, as well as limited physical inspection of the JWCD water system, results have shown that the system, as a whole, has no major deficiencies in terms of supplying adequate volumes of water at a suitable pressure to its customers under various demand scenarios.

There currently exist no other interconnections to the JWCD other than those maintained with Providence Water along Plainfield Pike. Each of these interconnections operates on the same pressure zone as determined by Providence Water Lawton Hill Reservoir system. The Greenville Water District (GWD), which services the extreme northwest reaches of Johnston in the vicinity of Slack Reservoir, receives its source water on a wholesale basis from Providence Water Longview Reservoir system, and subsequently boosts the hydraulic grade to approximately 500 feet. If an interconnection were established here, the GWD could provide a minimum of 35 psi static pressure to elevations in Johnston up to 420 feet. However, at this time, there are no water mains between the neighboring systems in proximity to each other such that an interconnection could be established.

It is the intent of the JWCD to identify, address, and eliminate noted deficiencies within the water supply system, which will lead to improved reliability and performance, in addition to meeting the requirements of the RIWRB.

2.10 Major System Improvements

The JWCF has made continued progress and improvements towards meeting the goals and objectives outlined in the WSSMP. The following includes the most significant improvements, progress in meeting goals and objectives and overall water system modifications that have occurred.

Over the course of the past five (5) years, a program has been instituted to improve the reliability, monitoring and performance of major system infrastructure. The most significant modifications and improvements include the following.

A. Water Meter Replacement Program:

The JWCF water system owns, maintains and replaces all customer service water meters, which are 2 inches in size and smaller and which total approximately 1,078. Large water service meters, greater than 2 inches in size, are owned and maintained by the property owner per JWCF Regulations.

The JWCF does not maintain a meter replacement program due to a lack of available manpower and monetary resources whereby a meter replacement program is effected. Nonetheless, the JWCF replaces a certain number of customer meters per year that are primarily identified through a combination of the following: the billing department identifies those meters which are "stopped" by comparing previous readings with present readings; JWCF personnel physically identify a water meter from a service call, etc. in a residence; customer complaints or other potential inaccuracies in the customer bill either identified by the customer or JWCF staff.

B. Water Main Replacement / Upgrade Program:

The JWCF identifies those water mains that are problematic and seeks to replace them with ductile iron water mains based on available funding. Water mains that are determined to be leaking or "pipe breaks" are repaired immediately. Within the past several years, the JWCF has not replaced any significant lengths of water main but has addressed a number of identified leaks and provided repair.

C. Hydrant Replacement Program:

The JWCF seeks to upgrade its hydrant inventory on an annual basis, as needed. Hydrants that are identified as inoperable or malfunctioning by the fire department during the flushing program, or are otherwise damaged are replaced by the JWCF. This is part of the JWCF's Water Infrastructure Replacement program. In the past several years, a total of 250 hydrants have been repaired or replaced.

D. Water Main Flushing:

The JWCF understands that water main flushing is an important aspect to maintaining a high quality of water as well as maintaining the integrity of the JWCF's water system infrastructure. In the past several years the following areas have been flushed:

- Westbound Estates
- Rollingwood Drive
- Matthew Drive
- Shun Pike
- Greenwood Court
- Westbound Court
- Shun Pike Booster Pump Station Area
- Peck Hill Road
- Ashley Court
- Nicole Drive
- Castelli Drive
- Byron Randall Road
- Plainfield Pike

3.0 Anticipated Future Demands

3.1 Growth in Demand

The intent of this section is to project the future water demands expected of the JWCD water supply system for the 5- and 20-year planning periods. To best project future use, several factors must be considered and evaluated for the Town of Johnston service area; some of which include changes in population density, industrial and commercial water use and development, economic development, changes in the service area, land use, water quality, water use rates, and conservation measures.

In an effort to quantify the likely growth of demand within the JWCD during the planning horizons of this Plan, the *Johnston Comprehensive Community Plan*, completed in 1991, was reviewed. This document focuses primarily on current and future trends in Town, and allows a determination of the availability of opportunities for population and economic growth in Johnston. The potential impact that these opportunities will likely have on future growth within and nearby the JWCD will then be analyzed.

3.2 Legal Obligations

The implied legal obligation of the JWCD to provide water to its customers was previously discussed (Section 2.8.3). No mergers have been agreed to with neighboring water supply systems that could result in expansion of the existing system. There have been preliminary studies which involve supplying water to the adjacent community of Scituate. To date there is no firm agreement in place. However, the general long-term desire of the State to promote the development of regionalized water supply systems may at some point impact the JWCD system, by the potential for incorporation of adjacent localized smaller water supply systems.

3.3 Projected Water Demand

The projected 5- and 20-year water demands for the JWCD were developed utilizing data provided by the Rhode Island Statewide Planning Program. In addition to this source, the *Town of Johnston Comprehensive Community Plan* was also reviewed. The population projections

from the latter were used for conservative measures. Based on the projection of the *Comprehensive Community Plan*, the expected population of Johnston for the 5- and 20-year planning horizons is 29,118 and 30,690 respectively. The best available estimate places the current population of the Town at 28,654. Assuming that 90 percent of the Town's future growth will come from within the current service area, the JWCD will serve an estimated 5,118 and 5,220 people in 2012 and 2027, respectively.

At the current rate of per capita consumption (159.7 gpcd), the Average Day demand for the 10-year planning period computes to 0.753 mgd.

In an effort to accurately predict the 20-year (2020) future demands, certain assumptions regarding the use of the Rhode Island Resource Recovery Corporation - Central Landfill. For purposes of planning, it is assumed that the RIRRC will continue to use a near equal annual use of water (14 MGY). Hence, the Average Day and Maximum Daily demands for the 20-year planning period compute to 0.886 MGD and 1.680 MGD, respectively.

It should be noted that these future demand estimates reflect the current rate (8.1%) of unaccounted-for water, and do not account for future water conservation measures that are to be implemented by the JWCD. Additionally, the calculations are based on populations derived from the most recent census, projections, an occupancy rate that does not account for industrial or commercial users, and subsequently a per capita consumption rate that does not account for the same

3.4 Major Users Future Demand

The JWCD currently serves three (3) major users, which together form a diversified usage pattern. A summary of the historic annual demand for each of these users was presented previously in Worksheet No. 24. The Worksheet suggests that water demand has remained fairly constant. It is expected that this trend will continue into the future. The Town will encourage the RIRRC to seek various alternatives to water conservation and to assist in the future through the MUTAP program.

3.5 Unaccounted-for Water Use

Available data on the historic and current volumes of unaccounted-for water was presented in Section 2.8.4 of this Plan. As discussed, the current (8.1 percent as of 2007) and recent historic percentages of non-account water use are very close to the State goal of 15 percent. It is expected that as a result of ongoing system maintenance and rehabilitation efforts, that the percentage of unaccounted-for water use will at minimum be maintained or reduced over the 5- and 20-year planning periods. A breakdown of current and future Fire Fighting and Non-Account water use estimates was developed, and is presented in Worksheet No. 26.

3.6 Non-potable Water Use

Many facilities including commercial and industrial plants may have the potential to utilize non-potable water sources for irrigation and/or cooling water applications. The completion of a detailed water use audit by the particular user, with assistance from the JWCD, will likely furnish the information needed to evaluate the viability of such an approach.

4.0 Available Water

4.1 General

It is the overall objective of the JWCD to ensure the availability of an adequate supply of potable water to meet the existing and future needs of its customers. This section will focus on presenting the quantities of potable water available to the water supply system at present, and at the projected 5- and 20-year planning periods. The information will then be used to compare available water with average and maximum day demand for existing and expected future system conditions. Also included is a discussion of the system's overall ability to meet the future system needs including as necessary, identification of timing and quantity of additional supplies and associated facilities.

The JWCD does not operate any surface or groundwater sources of supply, but instead, purchases 100 percent of its water on a wholesale basis from Providence Water. As such, sections of the regulations pertaining to the calculations of surface water and groundwater safe yields are not pertinent to this Plan

4.2 Available Water Analysis

The intent of this section is to compare available water supplies with the current (2007) system average and maximum day demands, in an effort to determine the adequacy of the available supply volumes. In addition, a comparison of available water supplies with the projected average day and maximum day demands for the 5- and 20-year planning horizons will also be conducted in order to evaluate the adequacy of the available supply in terms of future water supply needs. For the purpose of this analysis and in accordance with the applicable Water Supply System Management regulations, additional considerations will be included in the future demands analysis, to account for the expected "water savings" resulting from application of the detailed supply, demand and system management practices discussed elsewhere in this Plan.

4.2.1 Existing Demand Analysis

System demands for average and maximum day were previously presented in Sections 2.7 and 2.8, and Worksheets No. 18 and No. 19 of Section 2.0 of this Plan. Based on water source

production, the 2007 average day demand was determined to be 0.809 mgd. The existing capacities of the Green Hill Road and Simmonsville Avenue interconnections (the two primary sources) are 3.6 mgd and 1.1 mgd, respectively. Together, these interconnections combine to provide a total capacity of 4.7 mgd. This quantity of available water appears to be sufficiently adequate to meet the current average and maximum day demands of the JWCD system.

4.2.2 Future Demand Analysis

The following Worksheet No. 29-A details the total water supply in relation to the existing supply and proposed average and maximum day system demands. It should be noted that the development of future projections assumed maintaining the existing unaccounted-for water percentage (8.1) and would therefore reflect the total amount of water supply needed (i.e. total pumping supply) to meet overall system demands.

5.0 Supply Management

5.1 General

The objective of the Supply Management section of this Plan is to detail and describe the measures necessary for the protection of present and future sources of drinking water supply in adequate quantity and quality to meet existing and projected demands for the 5- and 20-year planning horizons.

Due to the fact that the JWCD operates with no supply sources of its own, but instead purchases water directly from Providence Water, a Pollution Source Inventory and Management (PSIM) plan, and Water Quality Protection program, are not applicable to the operations of this system.

5.2 Alternative Water Supply Sources

Although the JWCD water system would appear to possess sufficient available water supply volumes to accommodate existing and future user demands, the continued potential for system expansion as well as the need for prudent system planning, dictates an approach which seeks to maintain adequate quantities of available water into the future. Also, additional supply sources would assure reliable source availability rather than a complete dependence upon one interconnection. The current Available Water to the system was discussed in Section 4.0 of this Plan, and then compared to anticipated future demands, as outlined in Worksheet No. 29A. Although the information presented would appear to portray favorably on the operations of the water supply system, it remains incumbent on the JWCD to be aware of the possible alternative water supply sources available.

5.3 Supply Augmentation

The purpose of a supply augmentation study is to investigate and recommend alternative water supply sources due to anticipated shortfalls in the quantity and/or quality of existing supplies to meet 90 percent of current, or 100 percent of future demands. The JWCD currently has the ability to increase the volume of wholesale water purchased from Providence Water. As the need arises, the JWCD will seek to increase the limit of the contractual agreement in order to meet the demands of their customer base. There is little alternative for the JWCD to seek

alternative or backup supply in the event of an emergency. The Greenville Water District (GWD), which services the extreme northwest portion of Town, also relies solely on Providence Water as its only source of supply. In short, the only available and reliable source of supply to the JWCD is Providence Water.

6.0 Demand Management

6.1 General

Demand Management consists of those conservation measures that achieve long-term water savings by providing incentives and technical assistance to consumers as a means of improving efficiency of water use and reducing waste. Such water conservation measures, whereby suppliers and/or local water utilities and government, work to influence water consumption, is the most fundamental approach to water conservation, since the ability to conserve water lies primarily with the water user. Consequently, the success of these measures is highly dependent upon consumer participation and cooperation.

The demand management program herein will therefore focus predominantly on those measures and approaches that achieve permanent long-term water savings without requiring major user habit changes. The five (5) basic demand management techniques are as follows:

- Installation of water conservation, low-flow plumbing devices (retrofit) and revision of plumbing code regulations.
- Promotion of water recycling and efficient use and reuse; provision of technical assistance to industrial, commercial, and government users.
- Public education on water conservation and water supply issues.
- Appropriate use of fees, rates, and charges.
- Water use regulations and restrictions.

The most effective measures are those that achieve long-term water savings without great expense, effort, or inconvenience to water users (i.e. installation of water-saving devices and technologies, manufacturing process changes, or pressure reduction). In comparison, the effectiveness of water use restrictions and other methods that require intensive participation or habit changes are likely to diminish over time.

The purpose of this section of the Water Supply System Management Plan is to outline the efforts to be made within the following areas for the purpose of reducing inefficient water use

throughout the JWCD water distribution system, utilizing the Residential Retrofit Program (RRP), the Major Users Technical Assistance Program (MUTAP), public education and information efforts, pressure reduction, and appropriate use of fees, rates, and charges.

The JWCF is cognizant of the programs and policies outlined in its WSSMP and seek to implement these where appropriate. These programs are largely in effect and / or implemented when necessary. The following is an update with respect to the Demand Management Programs.

6.2 Goals

The demand management goals of the JWCD are divided into short-term and long-term goals, as follows:

Short-term Goals

1. Minimize peak demand use requirements
2. Implement system-wide residential retrofit program

Long-term Goals

1. Minimize average demand use requirements
2. Provide water-use audit services to all major users

6.3 User Metering

One hundred (100) percent of the water delivered to the JWCD water system customers is metered. Reference Worksheet No. 8. It should be noted that several meters supply multiple users, as in residential apartment buildings and condominium cluster-type developments for example.

6.4 Residential Retrofit Program (RRP)

A review of the most recent annual water consumption data (calendar year 2007) indicates that JWCD customers consumed approximately 272 million gallons of water. At least two thirds (67%) of that water is consumed for domestic use. Typically, inside a home (domestic), most water is consumed in the bathroom, where toilets, showers, and faucets often use or deliver more

water than is actually necessary. As described earlier in this Plan, a residential retrofit program replaces or modifies these fixtures with low-flow devices that automatically use less water, thus reducing waste while resulting in minimal cost, effort and inconvenience to the consumer.

6.4.1 Existing Program

A. Residential Retrofit Program and Revision of Plumbing Code for Low Flow Fixtures:

The JWCF supplies residential retrofit kits to residential customers at cost. These kits are intended to help customers conserve water and consequently reduce their water and sewer bills. Every newly constructed residence is also supplied with a residential retrofit kit upon meter installation.

Each kit contains a low flow showerhead, low flow faucet aerators for the kitchen and bathroom, two toilet displacement bags, a drip gauge, a lawn sprinkler gauge, leak detecting dye tablets and teflon tape to be used in the installation of the shower head and faucet aerators.

This program is advertised in the water bills and in press releases and overall has been well received by the customers.

6.4.2 Proposed Program

Due to the fact that an extensive number of the JWCD's current customers are residential, the implementation of an effective system-wide RRP should be an important demand management component of water supply system management planning. The following is an outline of the current program.

(a) *Notification of System-Wide Program*

The JWCD shall distribute a brochure to all of its residential customers during a billing cycle; the intent of which will be to educate the public on the importance of water conservation and to introduce the proposed program.

(b) *Establish Implementation Schedule*

The RRP shall be fully implemented no later than one (1) year after plan approval date and shall be phased in over a ten-year period. On average, a minimum goal of 10 percent of all residential dwelling units shall be targeted annually for kit distribution and installation as outlined herein.

(c) *Retrofit Kits*

The JWCD will offer kits containing water saving plumbing devices and information on installation of said devices at cost to all targeted residential users. Such kits shall contain at a minimum, two (2) low-flow faucet aerators; one (1) low-flow shower head; one (1) toilet displacement device, and complete illustrated installation instructions; one (1) package of leak detection tablets and illustrated leak detection pamphlet; a re-order card for obtaining additional equipment; and a survey form to evaluate the potential for long-term water conservation.

(d) *Retrofit Kit Distribution*

As many as possible of these kits shall be distributed directly to the residential dwelling units through door-to-door delivery. In cases where such delivery is not feasible, the JWCD shall mail kits to the respective customers or the customers may pick up the kit at the JWCD office. During all hand deliveries, JWCD staff shall remain cognizant of the need to educate all customers of the intent and importance of the retrofit kits, as well as offer installation assistance to homeowners.

Distribution of kits to residential users in apartments and multi-family housing units serviced by single meters shall be made to the owner or manager of the apartment or multi-family unit. Multi-family kit request cards shall be developed and distributed. The JWCD shall not be obligated to offer installation assistance to such customers. However, the JWCD may offer demonstrations as appropriate.

Within 30 to 60 days of distribution of the retrofit kits, customers shall be reminded of the importance of water conservation and of the need to install the water saving plumbing

devices. The JWCD shall publish reminders in the local newspaper, and subsequently inspect each targeted user for compliance.

It should be noted that the actual number of water-saving plumbing devices installed effectively will be greatly influenced by the JWCD's level of effort in distributing the retrofit kits, educating the public on its use and related benefits, and assisting in installation when necessary.

(e) *Public Education and Information*

An effective Public education and information program is critical to the successful implementation of the RRP. The general techniques discussed in Section 6.8 – Public Education, of this plan will be utilized as appropriate to educate the residential user population regarding the proposed program.

The JWCD's approach to public education shall focus on two (2) main goals; the first being the education of its users into becoming well informed about the JWCD water supply system, its day-to-day operations, and the costs associated with the delivery of such water. This will be undertaken in the manner suggested in Section 6.8 at the end of this section. Such awareness can only lead to increased customer response to the second goal of this element of the plan, which is to promote complete acceptance of the RRP.

As detailed later, a number of effective methods have already been utilized by the JWCD for public education. It is likely that bill stuffers will be the most effective method of imparting public education and information to the targeted residential customers of the water supply system. An initial mailing advising of the impending program should be distributed to the targeted group followed by a second informational flier included in the retrofit kit. These fliers could be developed in-house or with assistance from the regulatory authorities of the State. They may also be purchased from the American Waterworks Association (AWWA). Typical bill stuffers and other public education data (such as the Annual Drinking Water Quality Report) as currently utilized by the JWCD, are included in Attachment No. 2, for reference.

Additional initiatives such as presenting articles or advertisements on local cable television stations or in the local newspaper, as well as exhibiting posters and public displays, should further reinforce customer awareness and acceptance of the retrofit program. Consideration should also be given to the development of a water conservation theme or logo synonymous with the water conservation efforts of the JWCD.

In-school programs are also an effective means of educating the water-using public, as the programs provide an important and successful means of teaching water awareness and developing an ethic of individual responsibility for resource conservation among young people.

(f) *Other Efforts*

To further promote water conservation efforts, the JWCD is encouraged to work with local merchants, plumbers and builders to impel them to stock and use water conserving fixtures. In addition to those items contained in the retrofit kit, the JWCD should promote the availability, at cost if possible, of devices such as replacement toilets that use 1.6 gallons per flushing cycle. Once the RRP has been sufficiently established, the JWCD shall consider pursuing the inclusion of a toilet replacement policy as part of the Program.

Additional building code revisions by the Town of Johnston, mandating the use of water saving devices upon replacement of existing plumbing fixtures during renovation, and the provision of pressure reducing valves on all new services where normal supply water pressure exceeds a pre-determined threshold value, shall be considered by the JWCD. Consideration shall also be afforded to mandating the insulation of hot water pipes in all new construction.

It should be noted that revisions to plumbing codes are generally accepted by the public. It is likely that they will become self-enforcing over a period of time because local suppliers will tend not to carry non-conforming fixtures, as there will be little demand for them.

(g) *Program Evaluation*

The JWCD will maintain a data file of all customers targeted as part of this program. As Worksheet No. 30 illustrates, information such as owner address, dates, owner responsiveness, changes in consumption, etc. will be monitored.

6.5 Major Users Technical Assistance Program (MUTAP)

6.5.1 General

As reported previously in Section 2.8.2, the JWCD supplies water to three (3) major users, all of whom are involved in operations such as resource recovery and domestic and health services.

Since each industrial user has somewhat specialized needs and facilities, and since some of the other commercial and services users may have relatively large volumes of both sanitary and cooling use, an individual targeted approach is generally considered to be more cost effective than broad regulations or water use restrictions.

The JWCD is also encouraged to provide technical assistance to its many agricultural water users where applicable. Information on water saving irrigation techniques and practices for example is available from the local Soil Conservation Services and others.

The intent of the MUTAP detailed herein is to provide a means for extending the benefits of retrofitting and conservation to multiple unit housing developments, major commercial, industrial, institutional, agricultural, and municipal water users. Whereas each major user consumes by definition at least 3 million gallons of water a year, here lies an opportunity for conservation, of a sizable volume of water by increasing the efficiency of such water uses.

The JWCF has several major commercial water users (laundromat, schools, elderly complex, etc.) as well as the RIRRC Central Landfill and a Power Plant located on Scituate Avenue west of Route 295. As yet, there is no formal MUTAP program however the JWCF seeks to educate these commercial users in methods to reduce water consumption through the use of low flow fixtures, etc., which is also supported through the plumbing code. Ultimately, the goal is to encourage these customers in developing more efficient means of using water.

The JWCD will consider, as a long-term goal, performing water-use audits and providing assistance with the planning and implementation of sanitary device retrofits to its major water users. A water-use audit is defined as a process of accounting for and identifying and quantifying the volume of wasted water, and generally involves:

- determining the scope of the audit;
- gathering necessary data;
- verifying the data;
- testing meters;
- measuring of estimated volumes of individual types of water use and unaccounted-for water;
- preparing a summary sheet and determining what actions to take as a result of the audit.

This work will require on-site analyses, close coordination with the user management and staff, and evaluation of the specific user classification water consumption processes. Water-use audits accomplish several functions, they:

- pinpoint water consumption within the organization and indicate which functions and sites consume the most water;
- provide details regarding the cost of water used in the following essential areas; sanitary, domestic, heating and cooling, process use and outdoor use;
- establish the peak water consumption times over each 24-hour period (and possible water leakage during non-working hours);
- identify those job sites and functions which can most readily conserve water;
- aid in defining operational/maintenance procedures which are wasteful and could be changed to yield greater savings.

The water-use audit would utilize the existing service meters to quantify the volume of water supplied to the user. These meters would be field tested to determine how many are broken,

under-registering, or otherwise malfunctioning. The JWCD is considering hiring outside consultants to look at all industrial and commercial water meters in Town. The purpose of the consultants would be to confirm that all meters were reading accurately and in the proper units. The JWCD bills its customers according to usage per 100 cubic feet of water, not gallons. Additionally, the consultants would ensure that all meters were properly installed. On a few occasions in the past, it was discovered that a water meter was installed backwards and therefore the meter readout was decreasing instead of increasing. In a case like this, all that could be done was to estimate usage. The JWCD seeks to rid their water supply system of problems such as this example.

6.5.2 Program Set-up

During application of this program, some degree of expertise will be necessary in order to provide meaningful technical assistance to the major users in the JWCD water supply system. This may include the utilization of in-house resources and training, or the hiring of consultants or additional staff.

In either case, a water auditor should be knowledgeable, able to communicate and motivate others, and must be committed to the desired end result; that being, the efficient use of water.

The JWCD shall develop a list of goals and objectives for this program and establish a database of targeted users. A baseline of historical water demand for each user shall be prepared for use in tracking and evaluating the success of each effort.

The JWCD will also consider conducting water-use audits of all Town owned facilities to improve the efficiency of its own water use; set a good example for its customers; and establish in-house awareness and support of the MUTAP and its objectives. Finally, publicizing and promoting the program shall focus on developing increased awareness among major users through education of the potential savings in capital investments, water, energy, chemicals and wastewater treatment, attainable by participation in this program.

6.5.3 Prioritized Schedule

As this program develops, a prioritized schedule for conducting the water-use audits and application of sanitary device retrofits shall be prepared. It may prove advantageous from a public education perspective to publicize this program in conjunction with the residential retrofit program discussed previously, and with the dissemination of general water conservation information. The use of bill stuffers to the targeted users should also be considered as an early step in the implementation process of this program.

6.5.4 Water Use Audit Procedure

The following procedure is presented as a suggested approach to conducting water-use audits of the major customers within the Johnston Water Control District:

Task 1 - Identify Customers

- Identify customer through connection number, building name or number, assessor's parcel number, street address, account number, meter serial number, or some other system.

Task 2 - Quantify Customer Water Use

- Select a water-use audit study period. Typically, a 24-hour period is long enough to analyze and evaluate customer water use.
- Choose the measurement units for the audit.
- Record the necessary service meter readings to determine the quantity of water used during the study period.
- Verify and adjust meter readings (when applicable). Given the current meter replacement program, it is unlikely that meter inaccuracy will be a frequent problem.

Task 3 - Identify Customer Categories of Water Use

- Inspect customer premises as required, or provide questionnaire (checklist) to customer (when applicable) for the purpose of categorizing customer water use: process, sanitary, domestic, heating, cooling, research, experimental, outdoor, and other such uses. These questionnaires should be provided to the respective user's management personnel.

Task 4 - Identify Water Use Improvements

- Once information is available from Tasks 1-3, the customer's water use should be carefully reviewed to highlight areas in which overall efficiency of water use can be improved, and minimization of use achieved. It is likely that this data will present desirable opportunities for the replacement or retrofitting of existing equipment and processes among these users.

  Some typical examples of water conservation opportunities are as follows:

  (1) Recycling and reuse of cooling and process water.

  (2) Pressure reduction.

  (3) Increased efficiency of application of process water.

  (4) Use of wastewater from one product as process water for another.

  (5) Leak detection and repair.

  (6) Modification of process to reduce or eliminate water use; for example, switching from water to air cooling.

  (7) Substitution of self-supplied, lower quality water for processes that do not require potable quality.

  (8) Changes in landscaping and external water use.

  (9) Use of water conservation techniques in sanitary facilities to reduce consumption by employees.

Task 5 - Identify Peak Demand Reduction Opportunities

- Peak demand in the supply system typically occurs during the months of June, July and August. Peak daily use occurs during the early morning and early evening hours. It is important, therefore, during the application of a water-use audit program, that existing processes be thoroughly defined in order to provide information on the quantity and durations of water use. Opportunities will likely become apparent for the potential reduction in average daily and average monthly water use requirements. Information should be collected regarding the flexibility of such processes to allow possible revisions in order to permit altering significant water use to off-peak hours. Water uses such as irrigation and general maintenance, for example, are not, in most cases, time-dependent nor critical in nature and such uses should be streamlined for occurrence during non-peak

demand hours. The water-use audit should identify other such uses that could likewise be revised.

Task 6 - Provide Consumers with Leak Detection Services

- An important component of demand management is the identification of system leaks. It is imperative that user leaks be minimized as much as possible. Part of a water-use audit procedure should thus involve disseminating appropriate leak detection services to all the major users. The water-use audit of the major users should include information on leak detection services that could be referred or offered to these customers.

Task 7 - Provide a Written Audit Report to the Customer

- Once the system's major users have been audited and the subsequent information has been reviewed, a written audit report to each customer shall be prepared in cooperation with the major user. Such reports should summarize the scope of the audit, compile process information, and include specific recommendations for more efficient water use and minimization of waste.

  The audit report should also include data on implementation costs, projected water savings, and payback periods. Typical guidance documents used for estimating these variables (and which are included in such a report) are included in water-use audit booklets available from the Connecticut Department of Environmental Protection - Natural Resources Center. System users should be encouraged to pursue the implementation of the report recommendations, and the potential cost savings in water, sewer, heating and/or operating costs should be highlighted as an incentive to these users. It may be both worthwhile and effective to offer additional incentives to the recipients of the audit, such as designating a special award or certificate of appreciation in recognition of a specific user's water conservation efforts.

The audit shall also evaluate the potential within each facility for matching the end uses of water to the quality necessary for that purpose. On-site processes where existing potable water use could be replaced with non-potable water by using raw, partially treated or

recycled water/wastewater, shall be identified and targeted. Such process revision/retrofitting shall include provisions for cross-connection control and backflow prevention as required to minimize the threat to the distribution system.

The JWCD should also consider entering into a cooperative agreement with the owners or management of these major users, for the preparation of specifications, bulk purchase, and installation of sanitary device retrofit and other equipment identified by the audits.

6.6 Fee Schedule

The JWCD bills its customers utilizing a "flat rate" billing structure. Customers are billed semi-annually. Currently the JWCD charges $1.85 per 100 cubic feet of water consumed, as well as a $45.00 service charge. A sample water bill is included as Attachment No. 3 of this Plan.

6.7 Public Education Program

As mandated by law, the JWCF on a yearly basis publishes and sends to every customer account a Consumer Confidence Report (CCR) that provides a detailed accounting of the water quality with respect to the Safe Drinking Water Act Regulations. In addition, the JWCF maintains informational brochures available to the general public. These are aimed at general water use, conservation and water savings. The JWCF utilizes its quarterly water billing and annual CCR to provide customers with water conservation and general water system information.

6.8 Water Use Restrictions / Regulations

The JWCF on occasion is required to implement outdoor water use restrictions in an effort to reduce peak demands. This is only implemented when necessary and is not part of normal operations. Generally, when required, the Water Commissioner will implement an odd/even water use restriction or based on the severity of need will implement a total outdoor water use restriction. In addition, the JWCF would also consider implementation of such an action in conjunction with any such measures employed by the wholesale provider, Providence Water. JWCF customers are also encouraged to perform voluntary outside water use.

7.0 System Management

7.1 General

Water conservation practices involving system management initiatives are directed at improving the efficiency of and eliminating waste in the production and distribution of water within a supply system. Such practices are necessary to ensure that the physical components of the water system are properly operated and maintained, and include the following:

- Meter Management:
  - source metering
  - consumer metering
- Leak Detection and Repair
- Preventive Maintenance
- Infrastructure Rehabilitation
- Pressure Reduction

It is essential for water utilities such as Johnston's to continually look ahead in order to prepare for needed capital improvements and treatment upgrades. The development of criteria for service area extensions, analysis of Safe Drinking Water Act requirements, and the identification of necessary system rehabilitation projects will help ensure success of the system management program.

System management practices are generally considered by utility personnel to be more desirable than demand management practices because they are almost entirely non-dependent upon user cooperation. Such practices are under the direct control of the purveyor and are relatively straightforward to develop. In addition, implementation of such programs typically results in the reduction of utility operating costs and the recovery of lost revenues due to the decrease in lost and unaccounted-for water.

System management practices, however, tend to be labor intensive and require long lead time for implementation. These water conservation methods are in most cases, expensive, but in general,

they are cost-effective due to the recovery of lost revenues and the relaxing or delaying of the need for new source development. The following discusses these practices as they pertain to the JWCD system.

7.2 Goals

The system management goals for the JWCD system are, to determine the cause and extent of sources of unaccounted-for water, reduce or eliminate these losses, and improve the overall efficiency of the water supply system. Given that the JWCD currently is just under the statewide goal of maintaining non-account water at 15 percent or less, it shall be the immediate goal of the JWCD to maintain an unaccounted-for level of less than 10 percent through the year 2027.

7.3 Meter Installation, Maintenance and Replacement (MIMR) Plan

As a general rule, metering in and of itself is not considered a water conservation measure; however, it does provide an accurate accounting of all water uses throughout the system, and indeed, several other water conservation programs discussed in this plan, such as water audits, leak detection and repair, pricing, etc., are dependent upon appropriate system metering.

As referenced earlier in this Plan (Section 2.6.2), every residential, commercial, industrial and government customer serviced by the JWCD water supply distribution system is metered, thus providing 100 percent distribution metering. The wholesale production supply meter from Providence Water is read monthly and the JWCD is billed monthly. Residential, and the majority of commercial and industrial users, are read and billed semi-annually.

In 2003, the JWCD identified several major commercial water users including schools, assisted living and elderly care complexes for meter evaluation. The intent was to evaluate the existing meter for age, accuracy and proper size. As a result, all of these facilities and many of which had multiple service connections were replaced with new downsized one-inch meter assemblies.

During the past three years the Water Department has embarked on a very aggressive and highly successful meter replacement program. During this period approximately one hundred fifty

seven (157) meters have been replaced. The program continues with an approximate change out of 4 – 6 meters per month.

In order to determine the replacement of meters a meter-testing program has been implemented. When a meter is determined to be reading inaccurately the meter is replaced. A meter change out and testing program has been established as follows.

- 5/8" to 1" meter, tested and if necessary replaced every ten (10) years
- 1 ½" to 2" meter, tested and if necessary replaced every four (4) years
- 3" to 12" meter, tested and if necessary rebuild / replace every two (2) years

It should be noted that this program is ambitious and costly but has been determined to be essential to obtaining accurate water usage readings. The program is funded entirely through the existing operating fund of the water system.

Ranges of meter accuracy should be in line with the latest revisions of the AWWA standards (C700 series) and State Plumbing Code. Where an AWWA standard for a meter is not available, the JWCD shall demonstrate to the satisfaction of the Rhode Island Water Resources Board that the meter is capable of measuring not less than 95 percent and not more than 105 percent of the water that passes through the meter.

7.4 Leak Detection and Repair (LDR) Plan

7.4.1 General

A common and unavoidable fact in the water supply industry is that all water supply systems waste water due to leaks. Detection of such leaks can be determined by the systematic method of using listening equipment to survey a water distribution system, identifying leak sounds and pinpointing the exact locations of hidden underground leaks. Leak detection and repair thus involves the analysis of unaccounted-for water. Leaking sources of unaccounted-for water include defective hydrants, abandoned services, leaking meters, illegal hookups, and leaks in mains and services.

7.4.2 Existing Program

At the present time there exists no formal leak detection and repair program. The reason for this has been a combination of budgetary limitations, the relatively low unaccounted-for water and also because most of the infrastructure is less than thirty (30) years old.

7.4.3 Proposed Program

The JWCD is making great strides in improving its data collection and routine maintenance procedures. Hopefully, in the not too distant future, the start-up of such an LDR program will become a reality. The immediacy for need of implementation of this program will largely be determined upon the percentage of unaccounted water. This is currently being determined as a result of the other meter replacement, billing, etc. programs. If less than 10%, the program will be delayed pending implementation of other programs. If between 10 – 15%, the program will be implemented. If greater than 15%, the program will be initiated immediately and most likely performed by an outside contractor that is specialized in this type of service.

7.5 Preventive Maintenance (PM) Plan

7.5.1 General

Maintenance of a water supply system is a demanding ongoing task for water managers. A well-planned preventive maintenance program will not only prevent the deterioration of water quality and system capacity, but will also reduce the probability of unexpected disasters, and enhance system reliability, operational efficiencies, and overall system economics. All equipment eventually wears out, but unexpected breakdowns and emergency repairs can be very costly.

Planning a system-wide preventive maintenance program is usually not difficult; however, it is difficult to sustain such a program annually, especially if water system growth is high and maintenance forces are not similarly increased to meet the growing demands for maintaining an expanding system. Often, as workload increases, routine maintenance works are deferred or even abandoned. Therefore, a well-planned preventive maintenance system program must include adequate budgetary allowances for manpower and material to meet changing or expanding needs.

The critical components of the JWCD system to be considered in the development of this Plan include: Pumps, structures, stand-by equipment and emergency power sources, valves and alarms of the supply facilities; Pipes, pressure reduction valves, isolation valves, hydrants, meters of the distribution system; Storage tanks, and all electrical/mechanical control systems. These types of components typically fail prematurely as a result of the inability to detect detrimental conditions such as friction, vibration, improper operating conditions, inadequate lubrication, dirt, etc. which lead to the failures. The main goal of the preventive maintenance plan, therefore, is to monitor equipment operations so that adjustments, repairs or replacement of such equipment can be detected prior to a failure condition being reached.

7.5.2 Existing Program

A formal Preventive Maintenance program is currently being developed. JWCD staff routinely patrol the service area and inspect vital components that comprise the water system. Major distribution mains are flushed and mainline valves exercised, annually, and emergency power equipment is operated from time to time. Since most of the infrastructure is fairly new, problems do not often arise. Nonetheless, the JWCD recognizes the need for a sound preventive maintenance plan.

7.5.3 Proposed Program

As previously mentioned, JWCD staff routinely perform preventive maintenance on the water supply system. The JWCD, under the direction of the Water Commissioner, is currently reviewing Preventive Maintenance procedures in an effort to develop a plan that complies with the requirements of these regulations.

As previously indicated, the District has implemented some fundamental programs that were necessary to achieve a greater degree of water use metering, billing and general management of the system. The success of these changes is evidenced by the growing financial stability as reported in the last three enterprise fund year-end statements.

Other significant programs for the near future are aimed at system infrastructure repair, maintenance and management. These programs all fall under the general category of a Preventive Maintenance Plan (PMP) and are as detailed below.

- *Water Main Flushing Program:* As previously discussed, water main or hydrant flushing is performed on a routine basis in the spring and consists of unidirectional flushing. The procedure is to start at a tank or interconnection and progressively work outward into the distribution system. Dead ends are also flushed. The intent of this program is to flush the water mains in order to remove any loose or tuberculated sediment and maintain water quality. It should be noted that the severity of water drought conditions and any water use restrictions that are in place might impact this program.
- *Valve Maintenance Program:* There is a maintenance program in place whereby the JWCF ensures the functionality of the valves in the distribution system. A valve is replaced when it is found to be inoperable, leaking or otherwise malfunctioning. Valves throughout the distribution system are primarily checked and operated during implementation of the water main flushing program. This requires that valves be operated in order to isolate particular sections of water main for flushing purposes. Valves that are found to be inoperable, troublesome, etc. are repaired or replaced.
- *Hydrant Maintenance Program*: The JWCF attempts to operate as many hydrants as possible during the annual hydrant-flushing program. In addition, Fire Department personnel are required to periodically operate hydrants throughout the year either as part of routine drills or to extinguish fires. Hydrants that are found to be inoperable or malfunctioning are replaced or rebuilt by JWCF Personnel. Hydrants are painted as necessary.
- *Backflow / Cross Connection Program*: The JWCF is cognizant of the importance of a successful backflow/cross connection program. Since the previous WSSMP, notices were sent to all customers with testable backflow prevention devices requesting that their equipment be tested and reports sent to the JWCF. A list of certified testing companies was also provided. The JWCF is also actively following up on this request to those who have not replied. The JWCF also requires the installation of backflow prevention devices for all new construction and in meter replacements (where practical).

- All commercial establishments are required to install backflow prevention including laundromats, assisted living and elderly care complexes and other medium to high hazard cross connection facilities in the service territory. This program encourages the use of approved backflow prevention devices at points of metered sale. It is especially critical to maintain backflow prevention devices in areas where there exists a high hazard risk of contamination potential (i.e. industrial facilities, landfill, etc.). The success of this program is dependent upon proper training and certification of operators. Operators will be receiving proper training and certification through the New England Water Works Association (NEWWA) in the future.
- *Water Tank Inspection*: The JWCF's storage tank was inspected in May of 2003. The JWCF will continue to utilize a certified tank inspection company to inspect the existing storage tank structures on a routine basis and roughly at five-year intervals. This includes both a structural and coatings inspection of both the interior and exterior. Improvements and maintenance will be completed in accordance with the recommendations of these inspections. Note: A telephone communications carrier that leases space on the tower has committed $30,000.00 to defray costs associated with repainting the tank structure.
- *General Infrastructure Components*: Remaining infrastructure components such as pumps, piping, building structures, etc. are routinely inspected and maintained. A written record of maintenance and improvements is maintained for each component.

7.6 Rehabilitation of Infrastructure & Miscellaneous Improvements

The Johnston water system as a whole is fairly new with the majority of the infrastructure less than 30 years in age. As such, to date not much has been done in the way of infrastructure rehabilitation. As mentioned above, the JWCD will embrace a plan that will prevent the deterioration of its water system by periodical preventive maintenance.

The information contained herein provides documentation as to the status of the implementation of a number of capital and infrastructure water system modifications and improvements over the past five years that have been geared towards improving the operational, management and financial stability of the JWCF water facilities.

- A policy has been instituted with respect to Drought Management. In the event of a drought, the initial demand management protocol would mimic the Providence Water. Should these measures prove inadequate, Johnston Water Control Facilities will institute a water use restriction based on the odd/even numbering system for exterior water usage. In the event of an extended drought, exterior water usage may be prohibited until further notice.
- The area around the water tower has been cleared of undergrowth and many trees. Fencing and barbed wire surrounding the property has also been repaired. These measures have enhanced the security of the water system.
- A reserve fund has been created to provide for future capital improvements on the water system. Funds will be used to perform tasks which will be required such as painting the water tower and inspecting the water tower as required in 2009.
- On occasion, customers experience low pressure in the area of Peck Hill Road. Johnston Water Control Facilities is considering contracting a consultant to study improvements to the pressure in this area.
- The Johnston Water Control Facilities' Vulnerability Assessment was submitted to the Environmental Protection Agency in accordance with regulations.
- The Emergency Response Plan was submitted to FEMA in accordance with the appropriate regulations.
- There are four streets currently served by the Johnston Water Control Facility that are not looped. These streets are: Nardillo Street, Capitol Street, Taylor Road, and Everbloom Drive. JWCF is currently exploring two options regarding these mains with the Providence Water Supply Board. The first option is to request the Providence Water Supply Board to take jurisdiction of the lines. The second option is to create separate water districts for each main that would be serviced by the Johnston Water Control Facilities.
- The Town has not conducted discussions with adjacent water suppliers regarding interconnections to increase water supply redundancy in that there are no water supplies close enough to make such an interconnection economically justifiable.

- The Johnston Water Control Facilities has worked hard to move forward in achieving the goals expressed in the Water Supply Management Plan. While improvements are not accomplished all at once, steady progress is being made in all areas requiring attention.

7.7 Pressure Reduction

Pressure reduction is a method employed by many water utilities to physically suppress consumer water use by simply reducing the amount of water passing through the distribution mains. This method is generally applied in areas with excessively high pressures to reduce wasting of water. The process usually involves the installation of pressure reducing valves on subsystem water mains or at individual user services. This practice has the potential for reducing both average and peak water use on a long-term basis, but potential reductions are however system specific.

In the JWCD water supply system, current operating pressures throughout the system vary from 40 to 150 psi. Pressures greater than 100 psi are generally regarded as excessive, and it is considered useful to regulate pressure in such situations. It is reasonable to suspect that there exist a number of locations in the distribution network especially at the system low points that are subject to excessive operating pressures ultimately contributing to unauthorized water loss. The application of the network hydraulic model in conjunction with sufficient C-value testing throughout the system, is capable of presenting desirable locations where either system or service pressure-reducing valves should be installed to reduce line pressures.

7.8 Service Area Extensions

The water supply system's existing service area is defined in the system map included as Attachment No. 1 and depicts the geographical area in which service connections to the JWCD customers are currently available or will be available in the very near future. Identifying extensions to the existing JWCD service area will permit the efficient and well planned spatial growth of the water supply system while providing a basis for making demand and supply predictions, as well as planning facility improvements. The Town does not anticipate instituting a program of progressive outward expansion of the water system but does however entertain

proposals for development. Consistent with the CCP, the Town will consider expansion of the water system most notably in the northwest area of Town.

In June 1999, Pare Engineering Corporation completed the *Northwest Water Expansion Engineering Evaluation Report* for the Town of Johnston. This document serves as the guideline for future expansion of the water supply system in the northwest region of Johnston. Additionally, this document is beneficial in determining growth related impacts to the water system, as new facility infrastructure is required, as well as providing insight as to construction costs associated with infrastructure improvements. Attachment No. 6 – Environmental and Physical Constraints Map, illustrates features such as wetlands, open space, historical districts, protected public lands, etc., considered critical factors in determination of the location, nature, and type of any future development. Information on this map was compiled from the Rhode Island Geographic Information System (RIGIS), United States Geologic Service (USGS) Quadrangle maps, and USGS Bedrock and Geology mapping.

7.9 Safe Drinking Water Act Requirements

The Safe Drinking Water Act (SDWA) and its 1986 amendments significantly strengthened and expanded the 1974 SDWA, setting water quality standards for drinking water supplies throughout the United States. The statutory provisions of the SDWA amendments bring a large number of previously unregulated or minimally regulated water supply systems under significant regulatory control. Careful planning is necessary for successfully accommodating this growing body of SDWA regulations. This plan section shall focus on evaluating the components of the SDWA regulations as they apply to the Johnston Water Control District. This will allow the JWCD to determine its potential for non-compliance and consequently the necessity for major operational changes, so that appropriate engineering/financial planning can begin. The following presents the most significant components of this Act.

7.9.1 Surface Water Treatment Rule (SWTR)

This Rule as administered by the Rhode Island Department of Health – Division of Drinking Water Quality (RIDOH/DWQ), requires water utilities to evaluate its groundwater supply sources for surface water influence. Where necessary, as a result of surface water influence

determination, filtration and disinfection would be required at the source within 18 months of that determination. Since the JWCD does not operate any groundwater supply sources, it does not fall under the SWTR regulation.

7.9.2 Lead and Copper Rule

In July 1993, the water department in conjunction with the RIDOH completed a lead and copper testing program within the water system. Test results indicated compliance with this Rule. The system is currently on a reduced frequency monitoring program.

7.9.3 Phase II – Inorganic and Synthetic Chemicals and Phase V – 24 Inorganic and Synthetic Organic Chemicals

The JWCD system is susceptible to contamination through cross-connections, piping breaks, inadequate circulation of stored water, or deliberate vandalism. Guidance will be available from the RIDOH/DWQ as to the monitoring requirements of this Rule, as well as to assessing vulnerability of the system to determine whether or not the JWCD would be eligible for a waiver from monitoring.

7.9.4 Radionuclides in Drinking Water

Again, the JWCD does not maintain groundwater sources, and is therefore exempt under this Rule.

7.9.5 Phase Via – Disinfectants and Disinfection By-Products

This rule impacts supplies for which disinfection is applied to the raw water source. As the JWCD only purchases finished water from Providence Water, and does not own or maintain any raw water sources, it is exempt under this rule.

7.9.6 Groundwater Disinfection Rule

Since the JWCD does not own or maintain any groundwater sources, it is therefore exempt under this Rule.

7.9.7 RIDOH Sanitary Survey Results / Compliance

The Rhode Island Department of Health – Division of Drinking Water Quality (RIDOH) completed a *Sanitary Survey Report* for the Johnston Water Control Facilities water system in spring of 2008. By definition this survey is conducted by RIDOH for "an on-site review of the water source, facilities, equipment, operation, and maintenance of a public water system for the purpose of evaluating the adequacy of such source, facilities, equipment, operation and maintenance for producing and distributing safe drinking water." A complete copy of the Sanitary Survey Report is available at the RIDOH or at the JWCD offices.

The results of this survey were generally favorable in that no major problems or deficiencies were identified by the RIDOH. A section on "General Deficiencies" was contained in the Sanitary Survey which identified items to be addressed and / or corrected within 45 days. Again, these were generally administrative and / or minor infrastructure related problems (i.e. ponding of water in vaults, etc.). Water system personnel addressed these issues in an appropriate fashion and in accordance with RIDOH requirements.

The Sanitary Survey made note of an outstanding issue with respect to the classification of certain areas within the distribution system that receive water from four (4) separate interconnections. Currently, the system receives upwards of 95% of its source water from two (2) primary interconnections with Providence Water. The remaining four (4) interconnections, also supplied by Providence Water, are not interconnected with each other or the main two (2) interconnections. The RIDOH is contemplating a reclassification of these four (4) service areas as separate public water systems. In total these four (4) interconnections have approximately 83 service connections and serve an estimated population of 200.

The implication of this potential reclassification is that each of the four (4) service areas may be treated as independent water systems from which routine bacteriological sampling must be completed. Presently, bacteriological sampling is completed throughout portions of the main system in accordance with the RIDOH approved plan. This will be an issue that the Town and RIDOH contend with in the future however the Town currently maintains compliance with coliform sampling requirements.

Currently, the water system maintains full compliance with all SDWA requirements and the specific requirements of RIDOH Rules and Regulations. This was recently confirmed with representatives of the RIDOH and includes compliance with programs for routine bacteriological monitoring (Coliform Rule), the Lead and Copper Rule (currently on reduced frequency monitoring) and distribution disinfection residual monitoring.

The Johnston Water Control District is committed to the continuance of maintaining a proper policy and procedure to sustain compliance with SDWA and RIDOH Rules and Regulations.

8.0 Emergency Management

8.1 General

The Emergency Management section for the Johnston Water Control District system is detailed in Volume II of this Plan.

9.0 Plan Implementation

9.1 General

The purpose of this entire Plan is to outline the goals of the water supply management planning process for the Johnston Water Control District system, and to serve as a guide for decision-making procedures. The purpose of this section is to catalog actions necessary for the implementation of the Plan's recommendations in a timely fashion, and for identification of the individuals responsible for taking those actions. The implementation section will therefore serve to link those recommendations resulting from comprehensive study, to policy, so that actual improvements can be made to the water supply system.

The information contained within this Plan provides documentation as to the status of the implementation of a number of water system modifications and improvements over the past four (4) years towards improving the operational, management and financial stability of the Johnston Water Control District. There is also a firm commitment to initiate additional programs as manpower, training and financial resources permit. The most significant improvements are as retailed herein along with the positive results that they have produced.

Data collection to demonstrate the success of these programs has and continues to be collected. This information can however take a relatively long time to collect due to semi annual bill cycles, the time it takes to fully implement a plan, etc. As a result, indications of the success of these programs in the form of positive data are generally deferred by several years. Based on the level of effort and significant improvements in virtually every aspect of water system operations, it has been demonstrated that the water system continues to make improvements in the operation, maintenance and financial aspect of the water system.

10.0 Financial Management

10.1 General Policies

The JWCD, as it exists within the organizational structure of the Town of Johnston, does not have an operating budget. Historically it has been operated as an enterprise fund entitled, "Water Control Facility." Revenues that have been generated through metered water use, user fees, and the sale of new meters, are processed through the Town's general fund and credited to the "Water Control Facility" enterprise fund. All operating and maintenance costs associated with the JWCD water system are accountable to the enterprise fund and financed through the Town's Finance Department. The following Worksheet No. 38 indicates the JWCD's revenues and expenses for the last three fiscal years.

As indicated above, the water system is operated as an enterprise fund within the organizational structure of the Town of Johnston. The intent is that the Water System operates to be financially self-sufficient and to generate sufficient revenue through collection of user fees to cover all operating, maintenance and infrastructure improvement costs. In the past, year-end statements, which reconcile revenues and expenses of the "Water Control Fund", have demonstrated that the water system was not a self-supporting and financially stable entity.

Recent improvements however have created a water system which is not only financially stable but is generating sufficient operating revenue to in turn reinvest into infrastructure improvements. This is demonstrated through the last three fiscal year statements (07/08, 06/07 and 05/06) for the water system enterprise fund. The results of the last three years of improvements in the management changes of the water system are reflected in the bottom line of the statements. Each year has shown a successive increase in the net income from a loss in 1999 to a positive cash flow in 2001, as follows.

Fiscal Year	Net Income
2007/08	$ 315,878
2006/07	$ 304,783
2005/06	$ 310,518

Due to the lag in time from implementing positive improvements and modifications to actual resulting benefits in the financial bottom line, it has taken two (2) years in order to positively stabilize the finances of the water system. The resulting effects of these changes will result in positive financial stability for the water system as it continues to move forward.

11.0 Coordination

11.1 General Policies

This Water Supply System Management Plan is intended to be consistent with the goals and policies of the Town of Johnston Comprehensive Plan, as it pertains to water supply management. Conversely, the JWCD with the Town's Engineering personnel shall promote consistency between the contents of this Plan and the policies of this document. Also, new developments, which will expand the JWCD service area, require approval from the local planning board.

Future land uses, zoning requirements, growth projections and other areas of mutual interest, with regard to service area expansion, shall be consistent with the ability of the water supply system to accommodate the expected potable water requirements of the system.

In addition, the JWCD shall continue to pursue the accommodation of the current and future needs of its water supply system through the coordination of its efforts with those of its neighboring water supply utilities, specifically Providence Water. In the case of an emergency, joint efforts will be employed to allow each utility to help one another. Future endeavors shall include efforts in regard to regional cooperation with respect to additional system interconnections, service area expansion, capabilities to assist in the response to water supply emergencies, the potential for regionalization, etc.

Finally, it has been found that an approach involving the use of a joint billing technique, for water and sewer services based on metered water consumption, possesses the ability to dramatically affect the perceived cost of water and subsequently provide significant long-term changes in water use. The JWCD should investigate utilizing such a joint billing technique as a method of promoting water conservation.

Attachment No. 1

Johnston Water Control District - Water System Map

Attachment No. 2

Annual Drinking Water Quality Report

Attachment No. 3

Sample Water Bill

Attachment No. 4

Non-Applicable Worksheets

Attachment No. 5

Employee Qualifications, Certifications, Job Descriptions

Attachment No. 6

JWCD – Environmental & Physical Constraints Map

TOWN OF JOHNSTON, RHODE ISLAND
WATER SUPPLY SYSTEM MANAGEMENT PLAN

VOLUME II

OCTOBER 2008

Prepared for:

Town of Johnston, Rhode Island
1385 Hartford Avenue
Johnston, Rhode Island 02919

Prepared by:

C&E Engineering Partners, Inc.
342 Park Ave.
Woonsocket, Rhode Island 02895

C&E Project No. J0824.01

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I. INTRODUCTION

A. Plan Summary

The Emergency Management section of the Johnson Water Control District (JCWD) Water Supply System Management Plan is described completely in this volume.

This section was specifically developed and tailored for conformance with the latest edition of the Rules and Procedures for Water Supply System Management Planning, by the State of Rhode Island and Providence Plantations, Water Resources Board.

The general description of the water system, including sources of supply, treatment, and transmission facilities, and system supply and demand data is defined in earlier sections of the Water Supply System Management Plan, (Volume I). The vulnerability assessment portion of this volume describes the types of disaster/emergency events that could potentially affect the JWCD water system, along with a general description of these effects. Through the use of critical path, schematic system components were evaluated for their potential impacts on the water system in regard to their being removed from service by a disaster/emergency event. These impacts were classified in accordance with a tiered ranking system for the reduction in both service water qualities and quantities. In this manner, the loss of specific system components would be evaluated in accordance with their impact upon the system and quantified through the resulting tiered water condition, thereby allowing critical system components to be identified.

Upon identification of critical water system components, the goal of the remaining sections of this plan is to present emergency response scenarios that minimize impacts to the water system and its users. This shall include general responses for specific identified tiered water conditions, specific responses for identified disaster/emergency events, and responses tailored to addressing the losses of particular critical components. Remaining portions of the Emergency Management Plan consist of emergency preparedness planning, requirements for training, and guidelines for periodic updates of these documents. In this manner, the overall goal of providing the maximum water supply service to the Johnston Water Department customers during emergency events will be served.

B. Consistency with Other Local Plans

This plan establishes the relative responsibility and authority within the Johnston Water Control District organization for responding to the most probable emergencies, and outlines specific tasks for carrying out functional and constructive solutions based on a review of such potential emergencies and risks.

The procedures set forth are consistent with the goals of the State Emergency Water Supply System Management Plan. This plan intends to:

1. Establish situational parameters for involvement in water emergencies.
2. Identify courses of action that should be taken in the most probable types of water emergency.
3. Define responsibility and determine levels where state action is appropriate.
4. Describe communication responsibilities and procedures among state agencies, water suppliers, and other entities so that public communication and warnings of emergency situations is accomplished in a timely and efficient manner.
5. Define common terminology used during water emergencies.

Adherence to these guidelines should ensure that primary aspects of recovery are addressed in an organized manner, thus enabling a more efficient response and in turn helping to maintain drinking water quantity as well as quality.

II. EMERGENCY/DISASTER EVENTS

The potential emergency/disaster events that could affect the JWCD water system components include those natural causes (i.e. weather, earthquakes, etc.); those caused by manmade vents (i.e. civil disorder, strike, etc.) or those caused by accidental occurrences (i.e. vehicle accidents, equipment failure, etc.). The following is a general description of the anticipated potential emergencies/disasters, along with the typical type of effects that could be expected to result from such events.

A. Natural Causes

1. Hurricane

A hurricane is an intense storm that forms over a tropical ocean with winds in a counterclockwise rotation. A tropical storm is technically defined as a hurricane when wind speed reaches 74 miles per hour. Wind speeds of 100 to 150 miles per hour are not uncommon in severe hurricanes. The consequences of a hurricane striking the eastern coast of the United States are: heavy rainfall (several inches per hour), severe winds, tidal surges (see Section II.A.5) and the potential for spawning tornados (see Section II.A.4). The intensity of a hurricane is rated 1-8, with 8 being the least intense. Hurricane season for the eastern coast of the United States is typically late summer/early fall (August, September and November).

The potential effects of a hurricane that makes landfall in New England include:

- Wind damage
- Flooding (from both tidal surges and rainfall)

The resultant effects of wind damage on components of the Johnston Water Control District (JWCD) system include:

- Above ground structure damage
- Loss of electrical power/wired communications
- Disruption of vehicle access to facilities
- Disruption of person access to facilities

The resultant effects of flooding from a hurricane are detailed in Section II.A.2.

2. Flooding

As previously discussed, flooding can be associated with severe ocean storms such as hurricanes, and caused by both tidal surges and heavy rainfall occurring during a relatively short period of time which, in turn, overwhelms existing storm drainage facilities. Floods can also occur in localized low-lying areas of existing water bodies that have seen extended rainfall or snow melt events. They

are also associated with the more dramatic event of a catastrophic dam failure.

The potential effects of floods include the inundation with floodwater of belowground and ABOVEGROUND structures in low-lying areas. The resultant effects of flooding on components of the JWCD water system include:

- Potential for removing below and ABOVEGROUND structures from service for the period of the flood.
- Loss of electricity/telephone communications
- Equipment damage (electrical/mechanical)
- Contamination of raw water supplies
- Restriction of access (both person and vehicle)

3. Earthquake

Earthquakes are seismic events caused by the shifting of the earth's geologic plates deep below the earth's surface to release built-up stresses. The U.S. Geological Survey (USGS) uses an intensity scale of one to seven (I - VII), with seven (VII) being the most destructive. The USGS has also divided the continental United States into Seismic Risk Zones which rate the probability of an earthquake occurring and causing a degree of damage. The ratings are from zones 0-4, with zone 0 being no damage, and zone 4 being extreme damage. All of Rhode Island lies within a Zone 2 area, which rates the probability of a damaging earthquake occurring as moderate.

The effects of a damaging earthquake can be devastating. The severity of damage is directly related to the proximity of the epicenter (or the area directly above the focus of an earthquake). The direct effects of an earthquake include:

- Structural damage (both above and below ground)
- Utility damage/loss (i.e. gas, water, telephone, sewer)
- Fire from piped gas; utility disruption
- Restricted access due to structural damage to roads and bridges

The resultant effects on the JWCD system include:

- Structural damage to transmission and distribution facilities and loss of all or a portion of transmission/distribution capabilities of finished water
- Contamination of finished water supplies due to damaged water/sewer utilities
- Loss of electrical/telecommunications utilities
- Rapid consumption of storage supplies through heavy fire fighting demand

4. Tornado/Severe Storm

Tornados and associated severe thunderstorms are small, violent atmospheric disturbances that have the capability of causing severe localized damage to aboveground structures. Wind speeds

associated with tornados can range from 120 to 400 miles per hour. Thunderstorms, though typically not as destructive as a tornado, are storms with dramatic vertical air currents that result in prolific lightning strikes and hail ranging in size up to 3 inches in diameter. The direct effects of tornados and severe storms include:

- Power outages
- Aboveground structural damage
- Restricted vehicle access due to downed limbs and power lines
- Fire from lightning strikes
- Minor structural damage from hail

The direct effect on the JWCD facilities would include:

- Loss of electrical power to treatment and transmission facilities (i.e. pumping stations)
- Disruption of telecommunication facilities
- Aboveground damage to transmission facilities
- Restricted vehicle access to transmission and distribution facilities

5. Extreme Tide

Extreme tide is usually associated with another event such as a coastal storm. The effects of an extreme tide are very similar to those described in Section II.A.2, except that the flooding is usually restricted to coastal areas. Due to the fact that the JWCD is not located within a coastal zone, severe tide will have little effect on the JWCD transmission/distribution system.

6. Blizzard/Severe Snow or Ice Storm

Severe winter storms do not typically have the potential for widespread destruction of structures or facilities, but they do have the ability to disrupt daily activities due to restricting vehicle access, and the disruption of electrical/telecommunications service. Heavy snowfalls severely affect the New England area's transportation systems. This condition, depending upon the severity of the storm, can last from several hours to several days. Ice storms have a similar effect on transportation, though typically short lived (a few hours). The direct effects of blizzards/severe snow or ice storms include:

- Restricted vehicle access (auto, truck, plane)
- Power outages
- Restricted person access
- Telecommunication disruption

The direct effects of blizzards/severe snow or ice storms on the JWCD system include:

- Restricted access to pumping stations and facilities
- Operations and maintenance labor disruptions due to restricted vehicle access

- Loss of electrical power at system facilities
- Disruption of telemetry systems for system facilities.

7. Drought

A drought event is not immediate, but occurs over a period of time. Generally, a drought is defined as a continuous period of time in which rainfall is significantly below the norm for a particular area. This period of time could be as short as one summer, or as long as several years. The ability of a water system to withstand a drought is dependent upon the demands for water supply, the size of the storage facilities, and the length of the drought period. The direct effects of drought are:

- Reduction of available water to meet the demands of the using public.
- Reduction of surface water levels in the supplier's reservoirs.
- Reduction of operating income due to reduced delivery of water to the customers.

The direct effect of drought on the JWCD system include:

- Reduction of wholesale water to meet the demands of the using public.

B. Manmade/Caused Emergencies

1. Civil Disorder Events

In the general group of emergency events discussed as civil disorder, are those events which collectively are termed as "people-induced actions". The potential causes include: political dissidence; civil/social unrest; and wanton destructive activities. The particular events termed civil disorder include:

- Strike/work stoppages
- Vandalism/terrorism
- Demonstrations

Strike/work stoppages could include actual JWCD system workers directly, or other organized labor groups which, through either sympathy or threatened violence, would affect the labor force of a water utility.

Vandalism or terrorism, either organized or unorganized, results in damage to water system facilities and has the potential for wide spread disruption of water service.

Demonstrations, similar to strikes and work stoppages, mainly affect access to facilities for operations or maintenance activities, though these are typically more short-lived than an organized strike.

The effects of civil disorder events on the JWCD system can include, to varying degrees, the following:

- Disruptions in manpower needed for operation, maintenance and emergency response for all water system facilities.
- Large-scale loss or wasting of finished water.
- Disruption of utility services for water works facilities (i.e. electric, telephone, etc.).

2. Miscellaneous Emergency Events

The term Emergency Events relates to major accidental occurrences that do not directly relate to water system facilities but due to their circumstantial proximity to a water system component, have a direct impact on the water system. These would include explosions of various causes (i.e. electrical transfer, fuel storage tanks, etc.); plane and automobile crashes; fires, both building structure and forest brush; and general disruption of utilities (i.e. power failures, telephone blackout, gas main failure, etc.).

The impacts of explosions on the water system would naturally depend upon the exact location of the event. Typically, damage would be to adjacent structures caused by the force of the explosion or any resulting fires that may be associated with the blast. Automobile and plane crashes, though dramatic events have a relatively low potential for impacting water works facilities. Auto crashes, though relatively common, usually do not impact water works facilities due to most of the facility locations being away from well-traveled thoroughfares. Pump stations that are located within population centers usually have site design characteristics that minimize the probability of a high speed crash directly into a facility structure. Plane crashes, which are infrequent, have a potential for impact due to the vicinity of the North Central State Airport to water works components or facilities.

Fires, either brush or structure, have the potential to destroy water works facilities.

Disruption of utility service will have the potential general effect of disrupting certain water system components that rely upon the impacted utility.

In general, the potential consequences and effects of manmade/caused emergency events are as follows:

- Destruction of structures, both above and below ground
- Contamination of water supplies
- Temporary disruption of water works facilities due to losses in utility service

C. Accidental Occurrences

1. General

Accidental occurrences are those events that directly include water works facilities or their components and through non-intentional means, impact water service. These would include: water system equipment failures (operations, maintenance, communication or computer/instrumentation equipment); major water main failures; and distribution/trans-mission system contamination.

2. Equipment Failures

All water system facilities that utilize mechanical components are subject to equipment failure. The exact nature of the failure and whether the system has built-in redundancy will govern the extent of the impact.

3. Water Transmission Main Failures

Loss of the capability to transmit water throughout the JWCD service area has the potential for causing localized water shortages of finished water, resulting in both pressure and volume deficiencies. Although a limited portion of transmission mains, lying within the JWCD system are gridded, there are critical areas within the system that, through the loss of a single transmission main, could face shortfalls in water service. Main breaks fall into two basic types: first are those related to age, in which older pipes simply fail due to operational stresses and their reduced integrity which can diminish with age depending upon various factors. These can include pipe material, installation practices, and characteristics of use and length of service. The other type of failure is directly related to construction activities in which the installation of other utilities or structures inadvertently cause damage to water mains, necessitating repairs. Again, both types of water main failures, depending upon their exact location, can result in the loss of high volumes of finished water and, until repaired, could result in reduced service capabilities in localized areas.

4. Distribution/Transmission System Contamination

State plumbing codes mandate adequate construction practices to safeguard public water distribution systems from contamination. These codes particularly require the installation of backflow prevention devices to prevent water system contamination through service connections. If these devices fail to operate properly or if illegal connections exist between a public water system and a non-potable water source, the public water system can become contaminated with a wide range of potential compounds ranging from industrial chemicals to bacterial infection. Depending upon the type and extent of contamination, such an event could make vast quantities of finished water non-potable. In addition, major facilities such as storage tanks, pump stations and transmission lines may require removal from service to empty and decontaminate, or clean prior to reuse.

III. EMERGENCY/DISASTER EVENT EFFECTS

General

The term Emergency/Disaster Event signifies an event which, when it occurs, has a detrimental effect upon the water system. These effects are typically measured by a loss of the level of service to the various system users. Due to the fact that water systems typically have incorporated into them a certain level of redundancy for a measured level of operational safety, the reduction of level of service could also mean a reduction in the level of operational safety. For example, if a system has two storage tanks and, if one becomes disabled, although the other can still provide a level of service to the system user, the loss of one tank would still be considered a detrimental effect even though the user may not see a level of reduction in service. The detrimental effect would be the reduction of the level of operational safety.

This leads to the concept of a hierarchy of impacts or effects. A particular event may have an effect that causes the temporary disruption of a single system component with little or no impact on the level of service of the system users, while other events may cause the effect of widespread damage to the system with serious public health and safety concerns. The subject of the hierarchy of effects is discussed further within Section VII.

A. Inability to Purchase and Supply Wholesale Water

The inability to purchase and supply finished wholesale water could be caused by a variety of events that could possibly disable water system components directly related to the physical connection of the system to Providence Water. As the entire system is supplied through interconnections with Providence Water, these components are highly vulnerable to disruption as opposed to other portions of the distribution system.

B. Inability to Transmit Finished Water to Outlying Storage Facilities

In an emergency/disaster scenario in which transmission of finished water is affected, the consequences result in a reduction of the level of service to system users. The reduction of this level of service would be directly influenced by the nature of the disturbance in transmission capabilities. Typically, this would consist of the loss of a major transmission conduit or pipeline, or the loss of a pumping facility needed to boost water pressure into a higher pressure zone, or to a higher elevation within a storage facility. The extent of the impact to the system of such an event would naturally depend upon the production capacity lost, the location of the component failure and the ability to transmit finished water to affected areas through alternate transmission routings.

C. Inability to Utilize Distribution Storage Facilities

The inability to utilize the Goldenview Drive Storage Tank could cause particular localized hydraulic problems for portions of the system. These would typically relate to peak demand periods where demand exceeds production capacity and the supplemental volumes required from storage are not available.

The loss of a storage facility could result from an emergency event which caused structural damage to the facility; contamination of the water within the facility, requiring it to be removed from service for decontamination; or the loss of a transmission component from the system which made the filling of a particular facility impossible. The portion of the system affected would depend on the portion of the system relying on the impacted storage volumes for peak demand supplemented flows.

D. Contaminated Finished Water

Contamination of finished water, once within the distribution system, could be caused by a cross-connection between potable water lines and a non-potable water service; a piping break; or less than adequate circulation in a storage facility, causing finished water to stagnate. The effects of finished water contamination includes the loss of the finished water volumes contaminated as well as loss of the use of components of the water system contaminated, such as a portion of a transmission line or a storage facility which may be affected. These would be out of service until the source of contamination is found and corrected and the areas of contamination flushed and cleared. This could result in the potential loss of several thousands of gallons of finished water needed for flushing lines or to clean a storage facility.

E. Inability to Supply Water to Wholesale Customers

A variety of events could possibly disable water system components directly related to the physical connection of the JWCD system to other water systems relying upon the JWCD system for source of supply. What is unique to this type of service, as opposed to other similar problems within the transmission distribution system, is that typically wholesale customers usually are supplied through a single connection or sometimes just a few isolated connections. This is so that these flows can be bulk metered. These isolated connections tend to make them more vulnerable to disruption as opposed to other portions of the distribution system that have a higher degree of "looping" of mains which allows for alternating the routing of flows.

Consequences of the inability to serve wholesale customers would depend upon the actual customer. Some customers have multiple connections that are less susceptible to this type of event; others have their own alternate sources of supplies (either other wholesale sources or their own sources of supply, (i.e. wells, etc.)) that make this loss of supply less of a dramatic event. The worst

case scenario would be the loss of supply to a wholesale customer without an alternate source of supply and also, with minimal or no storage within their own system, so that the loss of JWCD supply would have an immediate and dramatic effect on this wholesale customer's service area in regard to providing for public health and safety.

F. Environmental Contamination

The resultant effects of environmental contamination would include the specific consequences of a failure of a water system component that leads to a detrimental impact on the environment. This would include the failure of a water supply structure, causing an uncontained release of a large volume of water (i.e. storage facility); or other activities related to the operation or maintenance of water system components that generally degrade environmental quality.

The consequences of environmental contamination may not necessarily have the effect of interrupting service to the water system users but consideration must be given to the potential liabilities associated with pollution or degradation of environmental quality and the requirements of rectifying such a situation.

G. Public Safety

This includes the overall general effects of the failure of the water system including a storage facility failure in regard to the potential need for public evacuation. Not included within this general system effect are the impact of a reduction in water service and the resultant impact on fire fighting services. The requirements for adequate fire flows within the system are considered part of the general effects of system transmission and distribution.

IV. JWCD SYSTEM COMPONENTS

A. Supply System Schematic

The JWCD system has been broken down into two (2) separate areas of operation based upon a common function of the components within each. These are as follows:

1. Wholesale Water Purchase
2. Finished Water Transmission/Distribution

The wholesale water purchase area includes all the major components needed to support the purchase of potable water from the system's suppliers. The finished water transmission/distribution system includes all major components required to deliver finished water to the service and wholesale customers of the JWCD water system. These would include major transmission mains, booster pumping stations, storage facilities, and wholesale connections.

Attachment No.1 - Water Supply System Map, in Volume I of this Plan, depicts these two areas of operation. In addition it also shows the inter-relation between the various components, both within the areas of operation and between the different areas of operation. The general purpose of this schematic, aside from showing the various inter-relationships of components, is to enable evaluation of the system operation in relation to the loss of one or more components. By showing the inter-relationship for the various system components, assessments can be made as to how a single impacted component will affect the various related components.

B. Wholesale Water Purchase

As previously referenced, the operational areas of the JWCD system described as wholesale water purchase, includes a grouping of the major components which are associated with the supply of potable water to the JWCD system. The major components within the wholesale water purchase area of operation are as follows:

- Providence Water Interconnection and meter assembly at Green Hill Road
- Providence Water Interconnection and meter assembly at Simmonsville Avenue

These components comprise the major facilities that are utilized in the purchase of wholesale water for the JWCD system.

To determine the vulnerability of these components to specific emergency events, it is first necessary to determine the operational factors that the components rely upon for proper operation. These factors, termed operational factors/requirements, are those things that may be interrupted during an emergency event, thereby impacting a component(s). For example, if a meter chamber

relies upon a belowground structure for proper operation (i.e. the chamber structure itself), and then this component would have a dependent factor of a belowground structure. If an emergency event occurs which typically affects belowground structures (i.e. an earthquake), then a correlation can be drawn that an earthquake will affect the meter chamber. Though this exercise may seem to point out the obvious, a similar analysis of other components will show that this type of evaluation is a useful tool in categorizing which of the various components will be impacted during certain emergency events.

Matrix No. 1A lists the identified wholesale water purchase component along with its operational requirements/dependent factors. It should be noted that for the vulnerability assessment for emergency operation, the operational requirements/dependent factors identified, were those factors that were absolutely necessary for the proper operation of the particular component. Necessity was determined by the evaluation of whether the component would continue to function if the dependent factor was suddenly removed or seriously impacted. Through a review of Matrix No. 1A, it is possible to identify which dependent factors are necessary to maintain use of the wholesale water purchase component.

C. Finished Water Transmission/Distribution

The operational area termed Finished Water Transmission/Distribution consists of the following general grouping of components:

- Booster Pumping Stations
- Storage Facilities
- Transmission/Distribution System Components (i.e. conduit, pipes, gravity chambers, regulating valve chambers, etc.)

Together, these components all relate to distributing finished water from the purchase interconnection to the various parts of the service area, and to the wholesale connection, for use by the system's service customers. The components that comprise the operational area of the Finished Water Transmission/Distribution System consist of the following:

1. Booster Pumping Stations

- Central Avenue Booster Pump Station
- Shun Pike Booster Pump Station

2. Storage Facilities

- Goldenview Drive Storage Tank

3. Critical Water mains

- 18" Water main on Green Hill Road from Plainfield Pike to Shun Pike
- 16" Water main on Shun Pike from Green Hill Rd to Scituate Avenue
- 16" Water main on Scituate Avenue from Shun Pike to Reservoir Avenue
- 12" Water main on Scituate Avenue from Shun Pike to Kimball Avenue
- 12" Water main on Bishop Hill Road from Central Avenue to Hartford Avenue
- 12" Water main on Reservoir Avenue from Scituate Avenue to Hartford Avenue
- 12" Water main on Hartford Avenue from Bishop Hill Road to Reservoir Avenue
- 12" Water main on Simmonsville Avenue from Plainfield Pike to Kimball Avenue

In the evaluation of these components to determine their specific operational requirements, dependent factors in which interruption could result in a debilitating effect on each component was reviewed in regard to its operational needs. Again, only those factors that would cause an immediate debilitating effect were considered to be dependent factors. For example: though a booster pump station may need periodic manual labor for periodic operation and maintenance procedures, the station would not immediately cease to operate if this manual labor was interrupted. Therefore, in this case, manual labor (or manpower) would not be considered a dependent factor. Matrix No. 1B details the outcome of the evaluation of the operational requirements/dependent factors for the various components which comprise the operational area of finished water transmission/distribution.

V. SYSTEM COMPONENT EFFECT ANALYSIS

A. Methodology

Prior to assessing the vulnerability of a water system in regard to the potential for disruption in service resulting from the loss of a system component(s), it was first necessary to determine the potential emergency/disaster events that could affect a water system. This was the exercise that was carried out in Sections II and III of this document. In Section II the potential emergency events that could occur were identified. In Section III the resultant effects and consequences to the water system arising from these events were identified and discussed. Upon identification of the various components that comprise the water system and the corresponding dependent factors, the next step was to determine which of the dependent factors would be affected by a specific emergency event. The determination of effects on the various dependent factors was assessed through an intuitive evaluation of the typical effects of a specific emergency/disaster event. For example, it is known from past experience that a hurricane impacting the Rhode Island area has the potential to cause power outages, flooding, high winds resulting in structural damage, etc. By evaluating each emergency event described in Section II, it can be determined which of these events have common effects (i.e. all cause power outages).

The next step consisted of grouping all those events that have common effects. By determining which of those common effects impact various system components, a correlation can be drawn as to emergency events affecting specific components. Matrix No. 2 shows a detailing of the results of the evaluation of the emergency events described in Section II and these events' effects upon the various dependent factors needed by the system components. By comparing Matrices 1 and 2, a correlation can be drawn as to which emergency event affects which component through their common relation to the dependent factors. For example, if Matrix 1A shows that the availability of potable water depends upon a wholesale water purchase interconnection, and Matrix 2 indicates that the occurrence of an earthquake can affect system interconnections, a correlation is drawn that an earthquake can affect the availability of potable water. Matrices 3A and 3B detail the summary of these correlations between emergency events and the system component that they affect.

In review of these matrices it is evident that major emergency events such as earthquakes and hurricanes have the potential for major impacts upon many system components while other more isolated emergency events such as a building fire, would have the effect of disrupting only a single component (or an isolated few). Regardless, this single component must be evaluated in later phases of the vulnerability assessment to determine the impact of its loss, and to what extent this event would affect the level of service to system users.

The purpose of developing the matrices that depict the relationship between emergency events and the impacts to system components is to determine the most vulnerable components. In reviewing Matrices 3A, and 3B, and reading vertically along the component's column, the components with

the most marks are those affected by the greater variety of emergency events and are therefore considered the most vulnerable.

B. Component Vulnerability Ranking

Based upon the data put forth in Matrices 3A, and 3B, the following ranking (Rank 1 = greatest vulnerability) was developed for each of the systems major components identified:

Wholesale Water Purchase

	Ranking
• Providence Water Interconnections	1

Finished Water Transmission/Distribution

	Ranking
1. Booster Pumping Stations	
• Central Avenue Booster Pump Station	1
• Shun Pike Booster Pump Station	1
2. Storage Facilities	
• Goldenview Drive Storage Tank	2
3. Critical Water mains	
• 18" main on Green Hill Road from Plainfield Pike to Shun Pike	4
• 16" main on Shun Pike from Green Hill Road to Scituate Avenue	4
• 16" main on Scituate Avenue from Shun Pike to Reservoir Avenue	4
• 12" main on Scituate Avenue from Shun Pike to Kimball Avenue	4
• 12" main on Bishop Hill Road from Central Avenue to Hartford Avenue	4
• 12" main on Reservoir Avenue from Scituate Avenue to Hartford Avenue	4
• 12" main on Hartford Avenue from Bishop Hill Road to Reservoir Avenue	4
• 12" main on Simmonsville Avenue from Plainfield Pike to Kimball Avenue	4

C. System Redundancy

As the JWCD's system is totally dependent upon a single source, and the transmission and distribution system is not very well gridded, the system lacks redundancy. As an analysis of the system will suggest, the JWCD does not maintain the ability to accommodate the loss of one or more critical components of its system with minimal to moderate impact on customer service. Later sections of this report will identify such critical components of the system, the loss of which

have the potential to impact system operation under a given set of circumstances. As is the case for all water purveyors however, it is not economically feasible to provide for complete redundancy throughout the entire system (for example, to counteract the loss of critical water mains in localized areas).

In the event of the loss of a critical supply component, the system could rely on storage for 24-28 hours, or approximately one day. Even longer supply could be available with the initiation of critical water conservation measures.

VI. IDENTIFICATION OF MINIMUM SYSTEM OPERATIONAL REQUIREMENTS

In evaluation of the minimum requirements for the operation of the Johnston Water Control District water supply system, consideration must be given to both quality of water purchased for distribution and consumption, and the quantity of water purchased as opposed to the normal demands to the system. Based upon the assumption that under certain emergency conditions which affect the JWCD's system, and also realizing the potential for procuring potable water from neighboring water supply systems through existing interconnections may not be viable during such emergencies, it is necessary to establish minimum goals of service relative to both quality and quantity as reductions in the level of service to system users will be necessary to provide a minimal level of service to the system as a whole in regard to public health and safety.

A. Quality

The minimum level of quality of water provided to the JWCD system users will be based upon a tiered approach that may require the implementation of emergency measures to insure public health and safety. This tiered quality ranking is as follows:

Tier 1 Water Quality Condition.
Quality consistent with current water quality standards:

Tier 1 water quality would be consistent with the quality of potable water purchased on a normal basis from the system's wholesale suppliers. Tier 1 water quality would be a normal operating condition or the operating condition during an emergency event when a system component not associated with the purchase of potable water was being affected.

Tier 2 Water Quality Condition.
Quality consistent with the degradation of wholesale water quality that would make the system unsafe for human consumption:

The Tier 2 water quality condition would be considered an extreme emergency condition. This condition would be under the authority of the RI Department of Health, Division of Drinking Water Quality as a Public Health Emergency. The implementation of emergency measures, such as the distribution of potable water and emergency acquisition of supplies, would be implemented as required.

It should be noted that the tiers of water quality conditions do not necessarily need to be considered system-wide conditions. For example, in the case of isolated finished water contamination these same water quality constraints could exist in certain portions of the system, depending upon the

impacts to certain water components during emergency/disaster events.

B. Quantity

Similar to the water quality constraints imposed upon the system by the loss of various system components, the JWCD system could also be impacted by losses of supply volumes through the loss of system components affected by emergency events. The loss of varying degrees of supply volumes is also addressed in a tiered approach in which reductions in available supply volumes would be classified as different quantity conditions.

To determine the specific supply volume, which would comprise the various water quantity tiered condition, an evaluation of the system usage by user classification was performed. This included industrial/commercial, residential, public use, and health related uses. First, a base line flow was determined utilizing the average demands during non-summer months. This allowed the development of flow volumes typical for the JWCD system and its wholesale customers, without the typically non-essential summertime usages (i.e. lawn watering, recreation, etc.). This was termed a base line usage. From this volume percentages were removed for reduction in industrial/commercial, residential and public use demand which could be implemented during water quantity emergencies. These reductions were developed in the form of a tiered approach that allows for a systematic step-by-step curtailment or elimination of specific non-critical system demands, consistent with the severity and impact of the emergency event. These resultant quantities were then used to identify the different tiered water quantity conditions. The Tiers presented represent an estimated best management approach to demand regulation during such situations, and will likely fluctuate on a case-by-case basis. Table 6.1 shows a summary of the volumes for the water quantity tiers.

The tiered water quantity conditions are as follows:

Tier 1 Water Quantity Condition.
Quantity volumes consistent with the current demands upon the JWCD system:

Tier 1 water quantities would be consistent with the identified base line demand volumes currently supplied to the JWCD service area and its wholesale customers. Basic demand is defined as the average daily flow during non-summer months. These would be as detailed below. A Tier 1 water quantity condition would exist when the system could supply, at minimum, the following base line flows:

Total Minimum Quantity for Tier 1: **0.471 MGD**

Tier 2 Water Quantity Condition.
Quantity volumes reduced due to a disruption in supply capacities. Recreational/industrial and commercial usage curtailed:

A Tier 2 water quantity condition would exist if the abilities or capacities of the supply works were reduced in such a manner that it was impossible to supply all the required volumes to meet a Tier 1 quantity condition. In this case, emergency measures would be implemented to reduce system demand. Tier 2 demands would curtail non-essential public, industrial and commercial usage. It may require the closing of industrial facilities dependent upon this usage. A Tier 2 water quantity emergency would need to be coordinated with State and local regulatory authorities as well as with the RI Department of Health Division of Water Quality. Anticipated Tier 2 quantity volumes would be described as follows:

Total Minimum Quantity for Tier 2: **0.414 MGD**

Tier 3 Water Quantity Condition.
Quantity volumes consistent with major losses in supply and distribution capabilities in which, in addition to Tier 2 reduction, there is the further curtailment of residential water usage:

During a Tier 3 water quantity emergency, public health and safety users would be given first priority, followed by residential usage for potable and minimal sanitary usage purposes. A Tier 3 quantity emergency would be consistent with a major public health emergency and would necessarily need to be coordinated with State and local emergency management authorities, as well as the RIDOH Division of Drinking Water Quality. The anticipated Tier 3 quantity volumes are described below. A Tier 3 water quality condition exists when water volumes available are below the Tier 2 water quantity condition (0.414 MGD), but above the following minimum Tier 3 requirements:

Total Minimum Tier 3 Volume: **0.203 MGD**

Tier 4 Water Quantity Condition.
Quantity volume consistent with a complete inability to supply even minimal water volumes to the service area or wholesale customers.

During a Tier 4 water quantity emergency it is assumed that a major disaster has occurred, completely decimating the system's water supply and/or transmission capabilities. Major emergency measures would need to be implemented to distribute potable water to citizens in the service area including the mobilization of emergency agencies, National Guard troops, etc. The Tier 4 water quantity volumes are the approximate volumes that have been estimated to meet the minimum required needs of the system in regard to public and residential potable water requirements. It should be noted that during a Tier 4 water quantity emergency, it is envisioned that the water distribution system may not be operational. Therefore, the volumes described may have

to be distributed by alternate means (i.e. set up of local potable water distribution centers, etc.). Following are the minimum requirements for a Tier 4 condition:

Total Minimum Tier 4 Volume: **0.009 MGD**

NOTE: The assumptions that were utilized in developing the tiered water quantity volumes are included within Table 6.1. It is important to note that the information present in Table 6.1 was derived from the assumption that 66.7 percent of usage is residential, 20.0 percent is industrial, 12.3 percent is commercial, and 1.0 percent is governmental.

TABLE 6.1
WATER QUANTITY TIERS

	Total System (mgd)
Tier 1 - Base Demand	**0.471**
Includes:	
Residential	0.314
Commercial	0.058
Industrial	0.094
Government	0.005
Tier 2 - Base Demand	0.471
Reduce:	
Commercial by 50%	0.029
Industrial by 75%	0.024
Government by 20%	0.004
Subtotal:	0.057
TOTAL:	**0.414**
Tier 3 - Base Demand	0.471
Reduce:	
Commercial by 75%	0.015
Industrial by 100%	0.094
Government by 60%	0.002
Residential by 50%	0.157
Subtotal:	0.268
TOTAL:	**0.203**
Tier 4 - Critical Users Only	**0.009**

NOTE: Critical Supply Volumes are based on providing 2.0 gallons per capita per day. Critical population (4,601) was estimated based on sum of 1,559 households served using an occupancy rate of 2.4 persons per service, and survey of multi-unit major consumers.

VII. VULNERABILITY ASSESSMENT

A. Methodology

The methodology for performing the vulnerability analysis for the Johnston Water Control District water system consists of the sequential performance of six (6) crucial steps. The previous sections of this report were developed to meet the specific requirements as referenced below. The steps of the System Vulnerability Analysis are as follows:

Step 1 Identify system components that comprise the two basic areas of operation for the system (i.e. Wholesale Water Purchase, Transmission/ Distribution). (See Section IV).

Step 2 Determine effects of specific disasters/emergency events that can affect system operation. (See Sections II and III).

Step 3 Determine the operational requirements/factors for the specific components identified in Step #1 and assess the effects of the disaster/emergency events on these components. (See Section V).

Step 4 Estimate system quantity and quality requirements during and immediately following the specified disaster events. (See Section VI).

Step 5 By critical review and analysis of information developed within Step #3; determine the functional operation capabilities of the system based upon the loss of components during an emergency/disaster event. These capabilities will be evaluated in respect to their ability to meet the minimum tiered requirements set forth in Step #4.

Step 6 If a system fails to meet the minimum requirements of the specific tiers for quantity and quality, those components responsible shall be identified as critical components. Critical components are those in which specific responses are required to minimize the impact of emergency events to the water system.

It should be noted that there are specific emergency events that can occur that result in reduction in the water system's capabilities that are not a consequence of a specific component failure. Examples of such events would be contamination of raw water or finished water supplies or a drought condition. In these cases the reduction in water quality and quantity may not be the result of a system component failure but rather a one-time emergency/disaster event. Though these items will not be addressed with the vulnerability assessment, they will be addressed within the Emergency Response Plan under responses to emergency/disaster events.

B. Vulnerability Assessment Evaluation

1. Emergency Event Groupings

The Johnston Water Control District water system as described within Section I have been broken into two areas of operation: (1) Wholesale water purchase; (2) Transmission/Distribution. These two areas of operation along with their inter-relation are shown on the Water Supply System Map (see Attachment No. 1).

To simplify the vulnerability analysis, the disaster/emergency events with common effects were grouped together for evaluation of these effects on the various system components. These general emergency/disaster groupings are as described below. It should be noted that some of the events such as earthquakes, were placed in stand-alone groups due to the fact that their effects are unique.

Group 1 Earthquake	**Disaster Events**: earthquake
Group 2 Severe Storm/Heavy Weather	**Disaster Events**: tornado, blizzard, flooding, severe tides, hurricane
Group 3 Civil Unrest	**Disaster Events**: strike, work stoppage, vandalism, demonstration, terrorism
Group 4 Equipment Failure	**Disaster Events**: equipment failure
Group 5 Drought	**Disaster Events**: drought
Group 6 Emergency Accident	**Disaster Events**: explosion, plane crash, auto crash, building fire, forest fire
Group 7 Water Contamination	**Disaster Events**: distribution system contamination

Of the seven event groupings, each will have a specific response within the JWCD Emergency Response Plan. In addition, each group's effects will be utilized to evaluate the various system components to determine the critical components. These critical components will also have their own specific responses to minimize the impacts to the system.

2. Emergency Event Disaster Effects Evaluation

The following is an evaluation of the various groupings as to their effects on system components and the resulting anticipated tier water quantity or quality condition.

Group 1 - Earthquake - Based upon the fact that an earthquake, depending upon severity, has the potential to damage or disrupt almost all components which rely upon above or below ground structures, it can be assumed that on a worst case scenario, a Group 1 emergency event could result in a Tier 2 water quality and Tier 4 water quantity condition.

Group 2 - Severe Storm/Heavy Weather - In the evaluation of Matrix No. 2 it can be seen that the events which comprise this group will most likely affect components which rely upon electric utilities for power, and those which rely on vehicle and man access for manual operation. There is also potential for finished water contamination due to flooding of below grade structures. As all booster pumping stations are equipped with emergency power generators, it is assumed that only below grade structures, such as the master meter chamber, would most likely be affected during a Group 2 event.

Based upon this evaluation it appears that a Group 2 emergency event has the ability to cause localized Tier 2 water quality, depending upon the which facility is impacted.

Group 3 - Civil Unrest - The main component effect of the emergency events within this group consist of the potential loss of manpower to operate and maintain the various system components, and the potential of damage to the system components through vandalism, sabotage, or terrorism.

No significant operational components of the water distribution system will be affected by the short-term loss of personnel. Such a loss of manpower will mostly impact data recording, maintenance schedules, etc.

The effect of vandalism, sabotage or terrorism is more difficult to quantify. Although, essentially all system components are subject to such acts, the likelihood of such occurrences impacting the JWCD water distribution system is limited. This is due to all storage and booster pump facilities being fenced and the main components of the transmission/distribution system are buried underground. However, these illegal and unauthorized acts could also include water contamination. For a more precise explanation of the effects of the loss of equipment and the potential effects of water contamination, see Groups 4, 6, and 7 which deal with these types of emergency events (though in these groups the events may not be specifically caused by civil unrest).

Group 4 - Equipment Failures - The loss of specific pieces of equipment could result in effects ranging from negligible to a complete failure of the water system. In this section each component is evaluated as to the potential harm it could cause to the operation of the system through the immediate loss of this component. Some specific guidelines to this evaluation follow:

- Emergency equipment components are assumed to fail during the emergency event (i.e. an emergency generator during a power failure).
- For system components with built-in redundancy (i.e. at least one (1) in-line backup), it will be assumed that components don't fail simultaneously.
- The failure of critical transmission/distribution mains will be assessed by reviewing the water supply system map to determine specific pipelines with less than adequate looping or alternate feeds to specific locations within the system.

In evaluation of the various system components subject to failure, the resultant effects of the failure to the system or portion of the system are grouped in accordance with the classification of the resulting tiered water quality or quantity condition (i.e. all components which cause a Tier 2 water quantity condition are grouped together). These are listed as follows:

Tiered Quality Condition: If system components were damaged in a way as to expose the water system to contamination resulting in tier 2 quality conditions, the source of contamination would be isolated and the agency would revert to tier 2 quality emergency procedures.

Tiered Quantity Condition:

Tier 4 - Quantity Condition

The following components if lost through equipment failure could result in a Tier 4 water quantity condition:

- 18" Water main on Green Hill Road from Plainfield Pike to Shun Pike
- 16" Water main on Shun Pike from Green Hill Rd to Scituate Avenue
- 16" Water main on Scituate Avenue from Shun Pike to Reservoir Avenue
- 12" Water main on Simmonsville Avenue from Plainfield Pike to Kimball Avenue

Tier 3 - Quantity Condition

The following components if lost through equipment failure could result in a Tier 3 water quantity condition:

- 12" Water main on Scituate Avenue from Shun Pike to Kimball Avenue
- 12" Water main on Bishop Hill Road from Central Avenue to Hartford Avenue

Tier 2 - Quantity Condition

The following components if lost through equipment failure could result in a Tier 2 water quantity condition:

- Central Avenue Booster Pump Station (Localized)
- Goldenview Drive Storage Tank (Localized)
- 12" Water main on Reservoir Avenue from Scituate Avenue to Hartford Avenue
- 12" Water main on Hartford Avenue from Bishop Hill Road to Reservoir Avenue

Group 5 - Drought - The potential effects of a drought or seasonal water shortage, though not typically instantaneous, could nevertheless cause an impact upon the amount of available water for purchase by the JWCD water system. Depending upon the severity of the drought, there is the potential for a Tier 2 water quantity condition, though it is envisioned that measures for voluntary water conservation could be implemented, thereby avoiding this condition. It is not envisioned that water quality would be affected to the point that a reduction in the Tier 1 water quality condition would occur.

Group 6 - Emergency Accident - Obviously, the extent of the impact of an emergency accident event, such as a plane crash, explosion or fire, would naturally depend upon the impacted facility. Similar to the evaluation of the potential equipment failures within the system, the loss of system components have been evaluated in terms of their potential to affect a change in the tiered water quality or quantity condition. The specific system components are grouped in accordance to the effect their loss would have on the system's water quality or quantity condition. It should be noted that if a component is not listed it has been determined that its loss will not dramatically affect these tiered conditions.

Tiered Quality Condition: None.
Tiered Quantity Condition

Tier 4 - Water Quantity Condition

The following components if lost through an accidental occurrence have the potential for resulting in a Tier 4 water quantity condition:

- 18" Water main on Green Hill Road from Plainfield Pike to Shun Pike
- 16" Water main on Shun Pike from Green Hill Rd to Scituate Avenue
- 16" Water main on Scituate Avenue from Shun Pike to Reservoir Avenue
- 12" Water main on Simmonsville Avenue from Plainfield Pike to Kimball Avenue

Tier 3 - Water Quantity Condition

The following components, if lost through an accidental occurrence, have the potential for resulting in a Tier 3 water quantity condition:

- 12" Water main on Scituate Avenue from Shun Pike to Kimball Avenue
- 12" Water main on Bishop Hill Road from Central Avenue to Hartford Avenue

Tier 2 - Water Quantity Condition
The following components, if lost through an accidental occurrence, have the potential for resulting in a Tier 2 water quantity condition:

- Central Avenue Booster Pump Station (Localized)
- Goldenview Drive Storage Tank (Localized)
- 12" Water main on Reservoir Avenue from Scituate Avenue to Hartford Avenue
- 12" Water main on Hartford Avenue from Bishop Hill Road to Reservoir Avenue

Group 7 - Water Contamination - This group of emergency scenarios includes conditions which impact finished water contamination. Obviously, depending upon the type and extent of the contamination event, the effects to the system can range from minimal to a Tier 2 water quality event. There is also the potential for a finished water contamination event which would cause reduction in water quantity status. This would result from the contamination of a storage facility or a particular section of piping which would require these components to be taken off-line to be decontaminated. In these cases the effect of the tiered water qualities would be similar to that of loss of these components through an accidental event (see Group 6).

C. Identification of Critical Components

In the identification of critical components for the Johnston Water Control District distribution system, the previously developed vulnerability assessment was utilized to identify those components which are affected by emergency/disaster events, resulting in a reduction in the tiered water quality or quantity condition. If a specific component can be affected, but without reduction in the Tier 1 water quality and quantity condition, then it is deemed non-critical. That is not to say that these non-critical components are not necessary for proper operation of the water system, but rather that they would not require immediate response during an emergency event in order to maintain adequate water quality and quantities.

Critical components are derived from the vulnerability evaluation of the various groups of emergency/disaster events. In these evaluations, critical components are presented in respect to the specific resulting tiered water quality or quantity condition caused by the event's impact (i.e. components loss). In the identification of critical components these elements are summarized and grouped in accordance with their affect on water quality or quantity, as quantified through the tiered classifications. It should be noted that the presented reduction in water quality or quantity (i.e. tier condition) is based on a realistic assumption of its affect on the water system in regard to the loss of particular components listed. In some cases the actual effect will naturally depend upon the extent of the emergency event and the ability to implement emergency corrective measures. In some cases the tier condition presented would only affect a portion of the JWCD service area, depending upon the location of the critical component impacted. The following are identified critical components of the JWCD water system.

TABLE 7.1
CRITICAL COMPONENTS
WATER QUANTITY RELATED COMPONENTS

Tiered Water Quantity Condition

Tier 4 Quantity Condition Components:	*Operational Area:*
18" Water main on Green Hill Road from Plainfield Pike to Shun Pike	Transmission/Distribution & Wholesale Purchase
16" Water main on Shun Pike from Green Hill Rd to Scituate Avenue	Transmission/Distribution & Wholesale Water Purchase
16" Water main on Scituate Avenue from Shun Pike to Reservoir Avenue	Transmission/Distribution & Wholesale Water Purchase
12" Water main on Simmonsville Avenue from Plainfield Pike to Kimball Avenue	Transmission/Distribution & Wholesale Water Purchase
Tier 3 Quantity Condition Components:	*Operational Area:*
12" Water main on Scituate Avenue from Shun Pike to Kimball Avenue	Transmission/Distribution
12" Water main on Bishop Hill Road from Central Avenue to Hartford Avenue	Transmission/Distribution
Tier 2 Quantity Condition Components:	*Operational Area:*
Central Avenue Booster Pump Station	Transmission/Distribution
Goldenview Drive Storage Tank	Transmission/Distribution
12" Water main on Reservoir Avenue from Scituate Avenue to Hartford Avenue	Transmission/Distribution
12" Water main on Hartford Avenue from Bishop Hill Road to Reservoir Avenue	Transmission/Distribution

D. Cost Estimates to Address Critical Vulnerabilities

In the vulnerability assessment of the Johnston Water Control District system it was clear that critical components of the system were identified, which when disabled, could have a debilitating effect on the water system, and resultant service to its users. These include those events that would result in a Tier 2, 3 or 4 water quantity or quality condition.

In addition to the identification of these critical components, the vulnerability assessment also included an evaluation of improvements to the water system where possible, to minimize or eliminate the vulnerability of these components. In the case of this system, it was found that historically where improvements could be made to enhance system reliability, they already had been completely or partially addressed. Where it has been deemed technically or cost feasible, critical component redundancy has been employed. In cases where no redundancy is possible, efforts to safeguard against the loss of a specific critical component has been intensified throughout the emergency management initiatives of this plan.

Appropriate cost estimates for technically feasible actions and/or improvements designed to reduce critical component vulnerability, are included in Table 13.1 - plan implementation.

VIII. General Responses

A. Introduction

The previous sections of this Volume (I to VII), detailed specific disaster/emergency events which may result in detrimental impacts to a particular component, or components, thereby resulting in the reduction in the level of service provided by the water system. This reduction of service was detailed in a tiered approach in which certain levels of service were defined for the various tiered conditions for both service water quality and quantity available for supply.

The remaining sections will now consist of a phased approach that includes the following general response activities.

- Problem Identification
- General Response
- Specific Disaster/Emergency Event Response
- Critical Component Response

These steps would be followed sequentially in such a manner that would identify the specific problem at hand; determine the general response based upon the identified tiered water quality or quantity condition; respond to the specific event causing the identified problem; and, as required, initiate the proper action(s) in regard to the critical component affected.

B. Problem Identification/Assessment

The key to problem identification and assessment is a clear understanding of the different tiered condition of water quality and quantity as presented in Section VI, which could result from an emergency/disaster event and the resultant impact upon a critical component. These descriptions of the emergency conditions that could affect the water system should be utilized as criteria for the evaluation of a specific emergency condition.

Upon identification of an emergency event, and subsequent loss of critical system components, the system should be assessed as to the impacts to the system's capabilities in regard to water quality and available supply quantities. This assessment can be quantified through establishment of the resulting tiered water quality or quantity condition.

The next step would be to initiate the general responses relating to the identified water conditions as detailed later within this Section. In addition, depending upon the exact nature of the emergency (i.e. storm, earthquake, etc.), specific responses may be implemented as described in Section IX.

The final phase of emergency response would result from identification of the specific critical

component(s) impacted. This would be a response specific to the component(s) impacted (in regard to removing it from service, returning it to service, bypassing, etc.) as detailed within Section X.

C. Background Information

The vulnerability assessment detailed earlier in this plan, quantified the potential impacts to the water system in regard to the system's ability to produce the required quantities of and quality needed during various emergency conditions. This quantification was detailed through a tiered approach to both water quantity and quality. The specific water quantity or quality conditions are detailed in Section VI of this plan - Identification of Minimum System Operational Requirements. Upon identification of a specific emergency event in which the water conditions are reduced from Tier 1 (the normal operating condition for the system), specific responses should be implemented to insure that the system operates in the most efficient manner with the supplies available during, and immediately following, the emergency event.

In the case of reduction in the water quality condition for the system, the general responses would deal with mitigating the consequences of having water within the system of less than normal quality. This may necessitate the notification of users to take special precautions concerning potable usage or, in a worse case scenario, the distribution of potable water to supplement the finished water supply.

In the case of reduction in water quantities condition for the system, the general responses would basically consist of insuring that the available supplies would be utilized to meet the most pressing needs of the service area (i.e. public health and related uses). The responses in this case would be the phased reduction of non-potable/non-health related water usage (i.e. industrial, commercial, government, non-essential residential, etc.), to allow for the available water quantities to be best utilized until the system could be returned to normal.

The following elements within this section detail the general responses for the identified reductions in water quality or quantity conditions. It should be noted that these are general responses and should be utilized as a guideline for the actual responses needed as determined by a critical evaluation of the emergency situation and the extent to which the system is affected.

D. Water Quality Conditions

The following are general responses to an emergency event which has the effect of reducing the water quality condition of the system as described in earlier in Section VI. It should be noted that the general response steps described herein should be performed as deemed necessary in addition to those required by current regulatory statute (i.e. RIDOH requirement regulations).

1. Tier 1 - Water Quality Condition

A Tier 1 water quality condition consists of a normal state of readiness for the system. Tier 1

quality would be consistent with the normal quality available from the wholesale suppliers and delivered to the system users. To ensure a proper state of preparedness for potential reductions in water quality conditions, the following steps should be ongoing:

a. Monitor water quality purchased from the system's supplier at the supply interconnection to insure Tier 1 water quality. NOTE: current, normal water quality monitoring actions should suffice for this task.

b. Carry out the required emergency preparedness training as detailed in Section XII-A of this plan.

c. Carry out the required plan updates as detailed within Section XII-C of this section to insure an up to date emergency response plan and proper responses in regard to water quality emergencies.

2. Tier 2 Water Quality Condition

Tier 2 water quality condition is considered to be a severe water emergency event. In a Tier 2 water quality condition, the water being distributed within the system is considered non-potable and not fit for human consumption. In addition, it could also be assumed that major portions of the distribution system may be partially or completely incapacitated.

In the event of a Tier 2 water quality condition, the following general steps should be initiated as deemed necessary:

a. Notify the RIDOH of the impending public health emergency condition.

b. Notify the Rhode Island Emergency Management Agency to coordinate state resources including the RI National Guard, State Police, RI Department of Public Works.

c. Investigate the potential of isolating the affected supply source and utilizing only potable water from distribution storage. NOTE: Only feasible for emergency condition of very short duration where storage facilities are not affected. It also should be considered that the water quantity tier be reduced to reduce non-essential water usage.

d. Investigate the potential for isolating non-contaminated water within distribution storage facilities from non-potable sources of supply, for later distribution efforts.

e. Implement the proper emergency notification procedures through the Statewide Emergency Broadcast System to instruct system users of the emergency water event.

f. Implement the proper emergency notification procedures through the Rhode Island Law Enforcement Telecommunications System to activate local emergency response

procedures for special needs individuals.

g. Notify the wholesale customer of the Tier 2 water quality condition.

h. Determine available volumes of potable water for distribution from in-system storage, as well as from other in-state water systems.

i. If deemed necessary, utilize state resources (i.e. National Guard, State Police, etc.), to implement potable water distribution in affected areas for the expected duration of the Tier 2 water quality event. The estimated volumes for distribution for a system-wide Tier 2 water quality event would be approximately equivalent to that of a Tier 4 water quantity event (estimated 0.009 MGD).

j. Implement Annex No. 1 Management, as required.

k. Implement Annex No. 2 Communications, as required.

l. Implement Annex No. 3 Public Information, as required.

m. Identify the critical components affected and implement the specific responses identified in Section X.

n. Within 10 days of the implementation of the Tier 2 water quality condition, submit a situation report to the RIDOH.

o. Upon resolution of the Tier 2 water quality condition, flush and clean all water facilities prior to returning them to a lower quality condition. Perform testing as required to insure adequate elimination of non-potable water from the system.

E. Water Quantity Conditions

The following are general responses to an emergency event that has the effect of reducing the water quantity condition of the water quality of the system as described in Section VI of this plan. It should be noted that the general responses described herein should be performed as deemed necessary in addition to those required by current regulating statutes (RIDEM, RIDOH requirements/regulations).

1. Tier 1 Water Quantity Condition

A Tier 1 water quantity condition is consistent with the normal operating condition of the water system in regard to the ability to produce and distribute potable water during non-summer months. This relates to the ability of the water system to produce water in excess of 0.471 MGD, the approximated normal commercial, industrial, residential, government, and public health demands.

To ensure a proper state of preparedness for a potential reduction in water delivery capabilities (i.e. a lower water quantity condition, i.e. 2, 3 or 4), the following steps should be ongoing.

a. Monitor delivery capacities of all critical components and implement repair and maintenance procedures to insure that maximum delivery capacities are available as much as possible or practical.

b. Carry out the required emergency preparedness training as detailed in Section XII-A of this plan.

c. Carry out the required plan updates as detailed within Section XII-C of this section to insure an up-to-date emergency plan and proper responses in regard to water quantity emergencies.

It should be noted that variations of water supply above the Tier 1 quantity limit (0.471 MGD) would be handled through normal demand management practices (i.e. reduce recreational and non-essential usage). The implementation of normal demand management techniques to conserve water should not be considered emergency management, but rather good operations practices.

2. Tier 2 Water Quantity Condition

A Tier 2 water quantity condition relates to an emergency event in which the maximum production capacity of the system has been reduced to less than 0.471 MGD but greater than 0.414 MGD. In this case, emergency measures would be needed to reduce the system demand during a Tier 2 water quantity condition. In the event of a Tier 2 water quantity condition, the following steps should be implemented as deemed necessary:

a. Notify the Rhode Island Department of Health of the potential emergency situation.

b. Notify the system wholesale customers of the potential short fall in supply volumes.

c. Implement steps to reduce industrial demand by 75%, commercial demand by 50%, and government demands by 20%. These steps should include:

- Closing all non-public safety or non-essential state and town offices.
- Close all non-essential water related industries.
- Contact all large system industrial users to request curtailment of water usage.
- Notify commercial users over public airways to curtail water usage during the emergency event.

d. Coordinate with wholesale customer system operators and inform them of the desire to reduce their water usage to the same target levels described in item (c.) above. They should be instructed to follow the same steps to induce reduction within their service

area.

e. Dispatch operation personnel to critical points within the service area (i.e. storage facilities, usual areas of low pressure) to determine if reductions in water quantities are resulting in extreme adverse conditions to services related to residential and public health usage.

f. Implement Annex No. 1 Management, as required.

g. Implement Annex No. 2 Communication, as required.

h. Implement Annex No. 3 Public Information, as required.

i. Identify the critical components affected and implement specific responses detailed in Section X.

j. Within 10 days of the implementation of the Tier 2 water quantity condition, submit a situation report to the RIDOH.

3. Tier 3 Water Quantity Condition

A Tier 3 water condition is consistent with the system water production capacity being incapable of meeting the minimum requirements of a Tier 2 condition (0.414 MGD), but capable of producing volumes greater than 0.203 MGD.

During a Tier 3 water quantity condition, measures for the further reduction in system demands would be implemented. The target levels in demand reductions would include 100% reduction in industrial flows; 75% reduction in commercial flows; 60% reduction in government flows; and a 50% reduction in residential baseline usage. During a Tier 3 water quantity condition the following steps would be implemented:

a. Notify the Rhode Island Department of Health of the potential emergency situation.

b. Notify the system wholesale customers of the shortfall in supply volumes.

c. Implement steps to reduce water demand to Tier 3 target levels, including the following:

- Close all industrial facilities and coordinate with the RI Emergency Management Agency to strictly enforce closure, with State Police, National Guard, or other resources available.

- Close all non-essential commercial facilities and enforce water curtailment to only that necessary to serve public health using resources of the RI Emergency Management

Agency.

- Close all government offices within the service area boundaries not associated with public health and safety.

- Utilize the RI Public Emergency Broadcasting system to notify all residential customers of the emergency condition and request an immediate curtailment of residential usage to only that necessary for potable and minimum sanitary uses.

d. Coordinate with wholesale customer system operators and inform them of the need to reduce demand within their system to Tier 3 target levels. Coordinate and assist them in implementing similar steps to reduce demand as described within Item (c.) above.

e. Implement Annex No. 1 Management, as required.

f. Implement Annex No. 2 Communication, as required.

g. Implement Annex No. 3 Public Information, as required.

h. Identify the critical components affected and implement the specific responses detailed in Section X.

i. Within 10 days of the implementation of the Tier 3 water quantity condition, submit a situation report to the RIDOH.

4. Tier 4 Water Quantity Condition

A Tier 4 water condition assumes that the water system production system is severely incapacitated and volume available for distribution is at or below minimum levels needed for potable water usage and public health related needs (0.009 MGD estimated Tier 4 volume).

The Tier 4 condition also assumes that as with a Tier 3 condition, all measures have been implemented to curtail industrial and commercial usage and that supplies still cannot meet minimum demands. To address the need of public health and potable water for residential users, the following steps should be implemented:

a. Notify the RIDOH of the public health emergency

b. Notify all system users utilizing the Statewide Emergency Broadcast system of the water system emergency and that all water usage except for amounts for potable use should be eliminated.

c. Investigate alternate means of obtaining additional supply from emergency

interconnections or other water systems within the state for emergency distribution. The Tier 4 baseline volume (0.009 MGD) should be used as a minimum.

d. Utilize resources of the RI Emergency Management Agency to distribute or set up emergency distribution centers for potable water in selected residential areas, as well as specific public health facilities and public institutions within the service area.

e. Implement the proper emergency notification procedures through the Rhode Island Law Enforcement Telecommunications System to activate local emergency response procedures for special needs individuals.

f. Implement Annex No. 1 Management, as required.

g. Implement Annex No. 2 Communications, as required.

h. Implement Annex No. 3 Public Information, as required.

i. Identify the critical components affected and implement the specific responses detailed in Section X.

j. Within 10 days of implementing the Tier 4 water quantity condition, submit a situation report to the RIDOH.

IX. Specific Emergency/Disaster Event Responses

A. General

Aside from general responses for the particular water quality or quantity condition of the Johnston Water Control District system resulting from an emergency/disaster event, there are specific responses that are tailored to addressing and mitigating consequences of the emergency events themselves. These responses are broken down into the emergency grouping detailed within the vulnerability assessment (see section VII). These groups are as follows:

Group 1 - Earthquake
Group 2 - Severe Storm/Heavy Weather
Group 3 - Civil Unrest
Group 4 – Equipment/Piping Failures
Group 5 - Drought
Group 6 - Emergency Accident
Group 7 - Water Contamination

The event-specific response detailed within this section would be implemented as necessary, depending upon the emergency situation, in addition to the general response in regard to the resulting water system conditions detailed in Section VIII, and the responses dictated by the critical components affected (detailed in Section X). In this manner, a multi-phase response is utilized to minimize the overall impacts to the system.

B. Group 1 Emergency Event - Earthquake

PURPOSE

This section describes action to be taken in the event that a natural disaster such as a major earthquake, and the associated effects, is expected or has occurred. This section specifically describes actions to be taken in regard to the various operational areas of the system.

BACKGROUND

The effects of a major natural disaster such as an earthquake has the potential to impact the majority of the water system components and, in a worst case scenario, could incapacitate the system totally. Response to such an event would depend upon the operation area affected (i.e. wholesale water purchase, transmission/distribution). General response actions would be as follows, in accordance with the specific responses for each area of operation.

RESPONSE ACTIONS

General Responses

1. Activate the Primary or Secondary Control Center as appropriate.
2. Notify the Mayor of the situation and request assistance as required.
3. Notify the Rhode Island Department of Health.
4. Activate the Public Information Annex No. 3.

Wholesale Water Purchase

A Group 1 emergency event's impact upon the wholesale water purchase components of supply would most likely affect the structural components of the system. This would include pump station and meter chamber. Upon identification of a Group 1 emergency event, the following specific actions should be undertaken.

1. Inspect critical components of the wholesale water purchase system, including the following:

    - The purchase interconnection
    - Meter chamber

2. Initiate responses detailed in Section X for specific critical components impacted.

3. Assess the anticipated water quality and quantity conditions based upon specific impacted components and initiate the responses for appropriate tiered conditions described in Section VIII.

Finished Water Transmission/Distribution

A Group 1 emergency event's impact upon components of the operational area of the transmission/distribution system would most likely disrupt water utilities through the damage to underground water mains. These effects could be widespread throughout the system. In addition, the system's critical components could also be affected through structural damage to distribution storage facilities. Upon identification of a Group 1 emergency event, the following specific actions should be undertaken:

1. Inspect critical components of the transmission/distribution system, including:

    Storage Facilities

    - Goldenview Drive Storage Tank

    Critical Water mains

    - 18" main on Green Hill Road from Plainfield Pike to Shun Pike
    - 16" main on Shun Pike from Green Hill Rd to Scituate Avenue
    - 16" main on Scituate Avenue from Shun Pike to Reservoir Avenue

- 12" main on Scituate Avenue from Shun Pike to Kimball Avenue
- 12" main on Bishop Hill Road from Central Avenue to Hartford Avenue
- 12" main on Reservoir Avenue from Scituate Avenue to Hartford Avenue
- 12" main on Hartford Avenue from Bishop Hill Road to Reservoir Avenue
- 12" main on Simmonsville Avenue from Plainfield Pike to Kimball Avenue

2. Initiate responses detailed in Section X for the critical components impacted.

3. Assess the anticipated water quality and quantity conditions based upon the impacted components. Initiate the specific responses for the appropriate tiered conditions described in Section VIII.

4. Mobilize the Engineering and Water Department personnel at the Primary Control Center.

5. Dispatch engineering team and Water Board maintenance personnel to assess damage and to establish areas of isolation.

6. Mobilize the distribution system crews and dispatch to the general area of damage for purposes of closing valves in accordance with area limits established.

7. Distribution system crews will re-establish service when the situation has been neutralized.

ASSOCIATED INFORMATION
Management - Annex No. 1
Communications - Annex No. 2
Public Information - Annex No. 3
Resources - Annex No. 4

C. Group 2 Emergency Event - Severe Storm/Heavy Weather

PURPOSE
This section describes the actions to be taken in the event that a natural disaster specifically identified as a hurricane, tornado, severe storm with heavy rain or snow, and/or high winds occurs affecting the ability of the water system to operate normally.

Each of the natural disasters in this grouping will probably occur only after some amount of forewarning is provided. Upon forewarning, the JWCD should mobilize the employees; test emergency equipment and communication systems; top off fuel tanks; provide for critical materials and equipment; and provide for personal needs of employees who may be expected to be on duty continuously. The JWCD shall also evaluate the possible effects of the situation and assign personnel at appropriate locations to minimize problems associated with getting to critical facilities.

Further, the JWCD shall prepare to implement any emergency actions necessary (as described in Section VIII) in the event reduction of supplies, or water quality or quantity associated with the various tiered water quality and quantity conditions occurs.

The effects of any of the natural disasters in this grouping will probably require coordination with local municipal and state response personnel to address common goals in regard to the effects of non-water system related facilities. Effects include downed trees, causing transportation difficulties and possible structural failures; power outages, either general or localized; high water levels in rivers and streams, possibly inundating equipment adjacent to the water bodies.

RESPONSE ACTIONS

In the event of Group 2 emergencies, or the forewarning of an impending Group 2 emergency, the following actions should be undertaken. These actions are grouped in accordance with the action required prior to such an event with forewarning, and the actions that should be undertaken after such an event to minimize the impacts to facilities and water services.

Pre-event Actions with Storm Forewarning

1. Activate the Primary and Secondary control center as appropriate (see Annex No. 1).

2. The Town Engineer and Public Works Director or designate shall assess the situation using reports from personnel throughout the system, as well as weather reports and reports of other emergency personnel.

3. The Town Engineer and Public Works Director or designate shall establish and maintain contact with critical system users within the Town in order to appraise them of the JWCD's actions which may affect the supply of water.

4. The Town Engineer and Public Works Director shall dispatch personnel to inspect critical components to assess preparedness. These facilities shall include the following:

    - All pump stations
    - Emergency power generating for facilities
    - Interconnection and meter chamber
    - All storage facilities

5. Personnel dispatched to assess preparedness of critical components shall initiate activities to insure the highest state of readiness practical. These activities may include:

    - Topping off fuel tanks
    - Securing facilities for heavy weather
    - Removing weak or dead tree limbs in danger of falling and damaging components

- Insuring operation of emergency power generating facilities

Post Event Activities

1. Dispatch personnel to critical system components to assess damage from Group 2 emergency event.

2. Assess potential change in water quality or quantity condition as dictated by impacts to critical components.

3. Implement water quality/quantity response actions as detailed in Section VIII.

4. Implement Communication - Annex No. 2 as appropriate in response to the specific emergency condition.

5. Implement Public Information - Annex No. 3 as appropriate in response to the specific emergency condition.

6. Initiate the specific responses for the individual critical components impacted by the Group 2 event as detailed in Section X.

7. Coordinate activities with the appropriate state and local agencies to return facilities to normal state of operation, including the following:

   - Johnston Department of Public Works - Street Clearing
   - State of Rhode Island Department of Transportation - Highway Clearing

8. Implement Annex 4 - Resources to repair facilities, including the use of outside contractors as necessary to return water system facilities to normal state of operation.

ASSOCIATED INFORMATION
Management - Annex No. 1
Communications - Annex No. 2
Public Information - Annex No. 3
Transportation - Annex No. 4

D. Group 3 Emergency Event - Civil Unrest

PURPOSE
This section describes actions to be taken in the event that a riot, civil disorder or work stoppage occurs, affecting the ability of the water system to operate normally.

BACKGROUND

Riots, civil disorders, or work stoppages can affect the ability of the water system to operate normally. In addition to the possible loss of operating and maintenance personnel, the JWCD will be required to provide security for its facilities in order to assure that sabotage actions are not implemented. Riots and civil disorders may be localized and may only affect a portion of the water system, but work stoppages will generally affect the entire system due to a lack of the normal complement of operations and maintenance personnel.

Work stoppages (strikes) can occur in two scenarios: strikes voted upon by the union membership of any union representing JWCD workers or wildcat strikes that occur immediately as the result of an alleged serious problem. Normally, strikes voted upon by the union membership occur at the end of a contract term and are known or expected to occur. Wildcat strikes occur without warning and are generally one-issue oriented. Wildcat strikes are usually concluded rapidly and seldom affect the continuous operation of the water system unless they occur during an emergency situation. Strikes occurring at the conclusion of a contract can last for a period of time and can affect the continuous operation of the water system. Strikes also have the potential for sabotage if relations between JWCD officials and the union are particularly strained.

Riots and civil disorders will generally be the result of a disaffected group of people. The development of a civil disorder that may lead to a riot could generally be expected through a rise in tensions in the town, with the occurrence of vandal-type actions. The location and cause of the civil disturbance may affect the ability of JWCD personnel to report to the designated work area.

RESPONSE ACTIONS

Response actions to these two types of Group 3 events will be addressed separately.

Work Stoppage (Water System Related)

The Town Engineer and Public Works Director or designate shall direct the following actions:

1. Assess the situation to determine the threat to the facilities and the safety of non-union personnel. Consult with the local police and/or State police and other JWCD officials in this assessment.

2. Suspend all non-essential operations and direct available manpower to essential operations.

3. Maintain minimum necessary operations using non-union employees who have training in operation of water system equipment and access needed non-union personnel to continue further operation of system.

4. Establish contracts with private contractors and/or contracted services to conduct essential operations (see Annex 4 - Resources).

5. Consider increased security (around the clock if necessary) to prevent vandalism to critical system components.

6. Assess the potential of reductions in water quality or quantity conditions, and implement the appropriate response actions as detailed within Section VIII.

Riots/Civil Disorder (non-water system related)
The Town Engineer and Public Works Director or designate shall direct the following actions:

1. Assess the situation to determine the threat to the facilities and the safety of the operations, maintenance and office personnel. Consult with the local police and/or State police and other JWCD officials in this assessment.

2. Request police escorts and/or police security for personnel at the outlying facilities, as deemed necessary.

3. Dispatch personnel with escorts, if deemed prudent, to the major facilities, including:
   - Pumping Stations
   - Storage Facilities

4. Increase security at critical components as necessary to reduce the potential of related acts of vandalism or willful destruction.

5. For identified acts of vandalism or willful destruction against critical system components, assess the impacts to water system quality and/or quantity condition and implement the appropriate actions as detailed in Section VIII.

E. Group 4 Emergency Event - Equipment/Piping Failures

PURPOSE
This section describes action to be taken in the event of the failure of mechanical equipment associated with the various components of the water system. This also includes the potential for a pipeline failure within the distribution system.

BACKGROUND
The water system is comprised of various facilities that rely upon mechanical components for proper operation. This is common to all the areas of operation of the water system. These include water transmission/distribution pipelines, meters, regulating valves, pumps, instrumentation and control equipment. The following are general steps that should be carried out in the event of an equipment/piping failure connected with the water system facilities.

RESPONSE ACTIONS

Equipment Failures

1. Notify the Field Supervisor in charge of the facility in which the specific component failed.

2. The Field Supervisor shall insure that maintenance personnel trained in the appropriate disciplines (i.e. mechanical, electrical, computer technician, etc.) are dispatched to evaluate the specified piece of equipment.

3. These maintenance personnel shall in turn report to the Field Supervisor, the specifics of the failure and the anticipated length of time the equipment will be out of operation.

4. The Field Supervisor shall assess the effects of the equipment failure and affect the appropriate operational changes required to minimize the loss of equipment.

5. Based upon the extent of these effects, the following general actions will be implemented as deemed necessary:

   - Activate Annex No. 1 - Management
   - Activate Annex No. 2 - Communications
   - Activate Annex No. 3 - Public Information

6. The loss of equipment shall be assessed as to its impact on water quality and quantity. If a change in water quality or quantity condition is warranted, initiate the specific responses detailed in Section VIII, associated with the appropriate anticipated conditions.

7. If the equipment that failed is an identified critical component or is part of a critical component, and causes an impact upon that critical component, see the specific response for critical components in Section X.

8. The Field Supervisor responsible for the equipment shall insure that the equipment is repaired/replaced as necessary to return the system to normal operation.

9. The Town Engineer and Public Works Director or designate shall complete an after-action report describing the nature of the emergency situation, the preliminary actions, the effects of the emergency, and the recovery operations. Any lessons learned should be identified.

After acceptance by the Town Council, the report should be used as a training tool for all personnel of the Water Department staff.

Piping Failures

1. Notify the Town Engineer at the first sign of piping failure.

2. The Town Engineer shall assess the situation and institute the appropriate measures to isolate the failure (i.e. valve off area of main break) to prevent loss of potable water.

3. The Town Engineer shall assess the pipe failure and determine if isolation of this pipe is likely to result in anything more than isolated hydraulic bottlenecks.

4. If the location of this piping failure is determined to be critical to the system operation, then the Town Engineer, Public Works Director and Field Supervisor shall evaluate and implement measures to re-route flows around the pipe failure location.

5. The distribution system repair crews shall implement the necessary repairs to the piping to return it to service. They shall utilize the resources detailed in Annex 3 as necessary.

6. If the failed piping is determined to be one of the critical pipe elements (components), see Section X for specific response.

7. Prior to returning any repaired pipe section to service, all connecting piping sections shall be thoroughly cleaned and disinfected to prevent system contamination.

F. Group 5 Emergency Event - Drought

PURPOSE

This section describes the responses associated with an extended period of less than normal precipitation that in turn reduces the available water for purchase by the JWCD distribution system. A review of the Water Supply System Management plan for the system's wholesale supplier, or consultation with the supplier's Engineering staff, will provide relevant information of the estimated safe yield of the supply sources. The following are rather general actions that should be carried out during drought periods to insure proper management of the system source water resources.

BACKGROUND

Based upon the previously identified base line water usage during non-summer months of 0.471 mgd, it can be assessed that during a severe drought condition, a deficiency in source water below these base line demands may develop. Such a situation would be a regional emergency as over half of the state's population is served by the same source, Providence Water. As previously described, this base line demand does not include peak summer usage. The difference between the base line demands and peak summer usage can normally be attributed to recreation and non-essential residential usages (i.e. lawn watering, car washing, etc.), in addition to seasonal usage by commercial/industrial application (i.e. water cooled air conditioning). The reason these summer

volumes were not included within the emergency base line volumes for emergency response is that curtailment of such activities during periods of sustained peak demands are not considered emergency events, but rather normal water management practices.

The localized effect to the water system during these peak summer demand periods may have consequences which affect system users in regard to isolated low system pressure and less than adequate supply volumes. For these reasons, the following general responses should be implemented as deemed necessary during drought periods to minimize flow and pressure problems within the system, as well as other general effects of a lengthy drought period.

RESPONSE ACTIONS

1. The Field Observer shall monitor system pressure in critical locations throughout the system to identify localized pressure or flow problems.

2. Increase surveillance in residential areas to identify unauthorized water usage (i.e. hydrants) and take corrective action necessary (i.e. install locking caps).

3. The Town Engineer shall communicate with the system's supplier on a daily basis to monitor the potential impacts of the drought event.

4. If, during drought conditions, sustained peak demands have a detrimental effect on the system, the Town Engineer and Public Works Director may consider the following actions:

   - Voluntary restriction of outside water usage
   - Mandatory alternate day scheduling of outside water usage
   - Mandatory restricting of outside water usage

5. The Town Engineer and Public Works Director shall coordinate with wholesale customers during periods of sustained peak demand to insure they also implement demand management measures as described in Item 4, as necessary.

6. Monitor the supply source's quantity and quality condition during periods of extended drought and sustained peak demand periods to identify any reduction in tiered water quality and quantity condition.

7. Implement general responses in tiered water quality or quantity condition as described in Section VIII, as deemed necessary.

8. Implement Annex No. 1 - Management, as necessary.

9. Implement Annex No. 2 - Communication, as necessary.

10. Implement Annex No. 3 - Public Information, as necessary.

11. Implement Annex No. 4 - Resources, as necessary.

G. Group 6 Emergency Event - Emergency Accident

PURPOSE

This section describes the response actions associated with Emergency Accident events affecting the water supply system. These would include vehicular crashes (i.e. plane, auto, truck, etc.); fires (building and forest/brush); or explosion, which might occur in the vicinity of a water supply component, thereby having an impact on the system.

BACKGROUND

Accidents and emergency situations resulting from incidents such as vehicular collisions can occur at any time and, almost always, they occur without any advanced notice. Therefore, the minimization of impacts of such events usually relates to a rapid and proper response by trained emergency personnel.

Fire can occur for many reasons; a motor vehicle accident as described above; an action resulting from another type of disaster, such as an earthquake; as the result of an electrical failure; as the result of an accident; or as the result of deliberate actions such as sabotage or arson. Normally, because a fire occurs without prior warning, the JWCD will not have had prior opportunity to mobilize personnel to test emergency systems. The effects of a fire (if it were to occur at a JWCD facility) would be localized and generally would require the facility on fire to be taken out of service for a period of time. Damage to the facility and equipment would need to be assessed prior to recovery operations. A fire occurring due to other accidents would necessarily need to be dealt with in concert with the general responses of the associated event (i.e. vehicular crash). An explosion is a dramatic event that could be the result of the accident, the unintentional accumulation of an extremely flammable substance (i.e. fuel oil, gas) or the placement of an explosive device as part of a willful act of violence. Both are likely to occur without warning. The response would be similar to that of a fire and, indeed, a fire may result from such an act, along with structural damage.

The following are general response actions that should be enacted to minimize the effects of a Group 6 Emergency Accident event. These responses are broken down into different types of potential events, as well as general responses that would be common to all of the types of events as they affect water systems.

RESPONSE ACTIONS

Building Fires

1. Evacuate the building immediately.

2. Notify the local fire department for emergency fire fighting response.

3. If the building houses critical water system components, see Section X for specific critical system equipment response.

4. Dispatch system operations personnel to the scene to assess the resultant impacts on the water system operation due to the loss of the facility.

Forest Fire/Brush Fire

1. Notify local fire department for emergency response of fire fighting personnel.

2. If the fire endangers buildings, dispatch personnel to the area to remove equipment, if possible. If building contains critical components, see Section X for specific responses for the components impacted.

Motor Vehicle Accident (auto, plane, etc.)

1. Notify local emergency response personnel to address the immediate needs of vehicle occupants.

2. Assess the damage to adjacent water system components.

3. If the water system component is a critical component, see Section X for the specific critical system component response.

4. Upon assessment of the water system component involved, remove the vehicles involved utilizing a local vehicle transport vendor. Initiate repairs to the water system components as necessary. See Annex 4 - Resources, for materials, vendors, contractors list, etc.

Explosion

1. Notify local police or Rhode Island State Police immediately of the incident, to allow investigation of the cause.

2. Notify local emergency personnel to address the immediate needs of the personnel in the area (i.e. fighting fires, aid injured, etc.).

3. Investigate and assess damage to the water system facilities. If critical components are affected, see Section X for specific critical component response.

4. Upon completion of initial response, and addressing safety concerns and assessment of the damage to the facilities caused by the explosion, initiate the required repairs to the facilities to return to normal operating condition. See Annex No. 4 - Resources, as necessary.

General Responses to All Group 6 Emergency Accident Events

1. Assess the impacts of all Group 6 events in regard to changes in the water quality and quantity conditions, and implement the appropriate response for the anticipated water system condition.

2. Implement Annex No. 1 - Management, as necessary to address the needs of the specific emergency.

3. Implement Annex No. 2 - Communication to address the needs of the specific emergency.

4. Implement Annex No. 3 - Public Information to address the needs of the specific emergency.

5. After the emergency conditions have abated, the Town Engineer and Public Works Director or designate, shall conduct a damage assessment and assign personnel, hire contractors, and/or take other actions to effect a recovery of the system.

6. The Town Engineer and Public Works Director shall complete an after-action report describing the nature of the emergency situation, the preliminary actions, the effects of the emergency, and the recovery operations. Any lessons learned should be identified. After acceptance by the Town Council, the report should be used as a training tool for all personnel of the JWCD staff.

ASSOCIATED INFORMATION
Management - Annex No. 1
Communications - Annex No. 2
Public Information - Annex No. 3
Resources - Annex No. 4

H. Group 7 Emergency Events - Water Contamination

PURPOSE

This section describes action to be taken in the event that contamination of water in the distribution system is expected, threatened or has occurred.

BACKGROUND

Contamination of finished water in source and/or distribution system will generally be limited to a portion of the system. After treatment of water by the wholesale supplier, the finished water is transported in piping systems that are buried sufficiently to preclude entry of contaminants directly into the piping system. Should a leak develop in the system, water in the pipes is generally under pressure so that contaminants would tend to be flushed away with the leak. The most likely event of finished water contamination would be due to the deliberate introduction of a contamination, or the accidental introduction of a contamination, causing substance through backflow resulting from a suction event in the distribution system.

Prevention against backflow events is generally provided by requiring backflow prevention devices to be installed on all water connections to facilities utilizing substances that may create a contamination condition should backflow occur.

RESPONSE ACTIONS

In the event finished water contamination is expected, threatened or has occurred, the Town Engineer and Public Works Director or designated representative shall take the following actions:

1. Activate the Primary or Secondary Control Center as appropriate (see Annex 1).

2. Notify the Town Manager of the situation and request assistance as required.

3. Notify the Rhode Island Department of Health.

4. Activate the Public Information Annex 3 as necessary.

5. Mobilize Public Works Director and JWCD personnel at the activated Control Center. The Commissioner and his staff shall immediately assess the situation, develop limits for isolation of the contamination, pinpoint the location, identify the contaminant, and develop methods of eliminating the situation.

6. Implement the required tiered water quality condition as detailed in Section VIII and as applicable for the water contamination condition.

7. Contact Laboratory to assist the Public Works Director as required, for the purpose of determining the extent of contamination and to insure efforts for isolation are effective.

8. JWCD personnel will perform the required repairs, the necessary system flushing and cleaning procedures, and re-establish service when the situation has been neutralized.

9. The Town Engineer and Public Works Director shall complete an after-action report describing the nature of the emergency situation, the preliminary actions, the effects of the emergency, and the recovery operations. Any lessons learned should be identified. After acceptance by the Town Council, the report should be used as a training tool for all personnel of the JWCD staff.

SPECIFIC FACILITIES

1. *Goldenview Drive Storage Tank:* Specific information for isolating the Goldenview Drive Storage Tank located off Golden View Road is included in Section X.

ANTICIPATED IMPACTS

Impacts associated with contamination of finished water would generally be confined to a relatively small area that would probably be out of water service for the period of time necessary to correct the situation. In the event that the contamination reached homes or other facilities where human consumption occurred before detection, isolated impacts on health could occur ranging from mild effects to serious effects. The responses detailed in this section as well as the general water quality responses in Section VIII, and specific critical component responses, are geared to minimizing the possibility of finished water contamination reaching the system users.

ASSOCIATED INFORMATION

Management - Annex No. 1
Communications - Annex No. 2
Public Information - No. 3
Resources - No. 4

X. CRITICAL COMPONENT RESPONSES

A. General

In previous sections of this Emergency Management Plan, specific response scenarios were described in regard to emergencies that included Johnston Water Control District water system. These included general responses to address the particular tiered water quality or quantity condition imposed by the emergency event. Also included were specific responses to specific emergency/disaster events (i.e. hurricane, fire, flood, etc.) relating to emergency preparedness and the implementation of mitigating measures. The final type of response is termed "Critical Component Responses" and involves specific reaction measures to critical components of the water system to facilitate water system operation or to mitigate impacts of an emergency event upon the water system.

Critical components of the JWCD water distribution system were described in Section IV of this Plan as those components which, if suddenly removed from service, would have an immediate detrimental impact upon the water system, as determined by a reduction in the system's tiered water quality or quantity condition. Following are the critical components within the JWCD system in the order of their significance and effect upon the system's water quality or quantity condition. The listed components are grouped in accordance to their operational area (i.e. wholesale water purchase, transmission/distribution). Attachment No.1 (Water Supply System Map) details how these systems are inter-related in the overall schematic of the water supply system.

The goals of the critical component responses are to outline general steps that can be undertaken in the event of an emergency that affects an identified critical component. In the case of a storage facility for example, it might involve emptying it and cleaning it in response to a contamination event.

It should be recognized that in some cases, due to the nature, location or design of the specific component, which no practical component response is available and, therefore, mitigative measures must rely upon the general and specific emergency/disaster event responses identified previously within this plan.

B. Critical Components Lists

1. Wholesale Water Purchase

- Providence water Interconnections (Green Hill Road & Simmonsville Avenue)

2. Finished Water Transmission/Distribution

Booster Pumping Stations

- Central Avenue Booster Pump Station
- Shun Pike Booster Pump Station

Storage Facilities

- Goldenview Drive Storage Tank

Critical Water mains

- 18" Water main on Green Hill Road from Plainfield Pike to Shun Pike
- 16" Water main on Shun Pike from Green Hill Rd to Scituate Avenue
- 16" Water main on Scituate Avenue from Shun Pike to Reservoir Avenue
- 12" Water main on Scituate Avenue from Shun Pike to Kimball Avenue
- 12" Water main on Bishop Hill Road from Central Avenue to Hartford Avenue
- 12" Water main on Reservoir Avenue from Scituate Avenue to Hartford Avenue
- 12" Water main on Hartford Avenue from Bishop Hill Road to Reservoir Avenue
- 12" Water main on Simmonsville Avenue from Plainfield Pike to Kimball Avenue

C. Critical Components Responses

1. Component: PWSB Interconnection at Green Hill Road
Area of Operation: Wholesale Water Purchase
Tiered Water Condition: Tier 4 Water Quantity Condition

Response:
Discussion:
This interconnection to Providence Water located at the intersection of Green Hill Road and the Plainfield Pike is the primary supply source of the Johnston Water Control District system. This interconnection is capable of providing 3.6 MGD through the compound meter assembly to the JWCD. If this interconnection were out of service, a tier 2 situation would arise in which the District would be solely reliant on the interconnection at Simmonsville Avenue to maintain the average to maximum daily usage of the system.

2. Component: PWSB Interconnection at Simmonsville Avenue
Area of Operation: Wholesale Water Purchase
Tiered Water Condition: None

Response:
Discussion:
This interconnection to Providence Water system is capable of providing 1.1 MGD to the JWCD,

as previously discussed in Volume I of this Plan. The loss of this chamber during an emergency event is not critical to service supply. The Green Hill Road interconnection is capable of meeting current system demands at the rate of 3.6 MGD. If this were not sufficient to meet existing demands, the meter assembly could be run in by-pass mode, in turn providing an additional 0.9 MGD.

3. Component: Central Avenue Booster Pump Station
Area of Operation: Transmission/Distribution
Tiered Water Condition: Tier 2 Water Quantity Condition

Response:
Discussion:
The Central Avenue Booster Pump Station is utilized to supply areas north and west of the station. The station pumps water supplied by the providence Water interconnections and fills the Goldenview Drive Storage Tank. The pump station is equipped with two 600 gpm centrifugal pumps. The pumps are automatically controlled to operate based upon storage levels within the tank via telemetry. Since successful operation of this pump station depends on reliable pump and equipment operation, the critical type of responses relate to those emergency actions which would necessarily be undertaken during a failure of a piece of equipment within the pump station during operation.

Failure of a Piece of Equipment within the Pump Station During Operation
Although the pump station is equipped with two pumps, and thus capable of absorbing the short-term loss of a single pump, an emergency situation involving the failure of all pumps will be examined. Such a loss during peak demand periods will result in a reduction of the level of service to portions of the service area, as the entire area will be dependent upon available storage within the Goldenview Drive Storage Tank.

Upon such an occurrence, a Tier 2 water quantity condition shall be immediately implemented for the affected area and coordinated with the RIDOH, Division of Drinking Water Quality, in addition to other state and local emergency management authorities. Care shall be taken to monitor drawdown of the Goldenview Drive Storage Tank. The failed pumps shall then be isolated and an emergency response team from the Town's Engineering Department and Water Department staff shall assess the situation and determine the repairs necessary to return the failed pumps to service. Resources detailed in Annex 4 shall be utilized as necessary to affect the needed repairs.

In addition, Sections 3.5 and 3.7 pages 3.29 and 3.40, "Mechanical Failure" and "Water Shortage", of the State Emergency Water Supply System Management Plan (State Guide Plan #723) shall be consulted for additional emergency measures required of the water supplier (JWCD).

4. Component: Goldenview Drive Storage Tank
Area of Operation: Transmission/Distribution

Response:

Discussion:

The Goldenview Drive Storage Tank is a steel reservoir structure located off Golden View Drive in Johnston, in the west and central region of the supply system. The facility provides for service area distribution storage throughout the system and has a capacity of 750,000 gallons. A telemetry system between the facility and the Central Avenue Booster Pump Station controls filling of the tank and a drain line is provided for emergency decanting. An 8-inch diameter water main supplies water to the tank from the 8-inch water main on Golden View Drive.

The storage facility provides for flexibility in water supply operation and facility storage that is required for normal operation during localized peak demand periods. Storage also provides for localized fire flow demands.

Loss of this storage facility could result from an emergency event causing structural damage to the facility or contamination of stored water within the tank, requiring it to be removed from service for decontamination. Short-term loss of storage provided by this tank will have only a minor effect on local day-to-day system supply capabilities and fire flow storage.

Tank Damaged and Out of Service

Upon severe structural damage and collapse of the tank, the facility shall be bypassed and taken off-line. In addition, the local Fire Department shall be notified of the loss of this storage, and the facility drained. Local system demand shall be monitored during periods of peak demand while the facility is out of service.

In addition, Sections 3.5 and 3.7 pages 3.29 and 3.40, "Mechanical Failure" and "Water Shortage", of the State Emergency Water Supply System Management Plan (State Guide Plan #723) shall be consulted for additional emergency measures required of the water purveyor (JWCD).

Once the damaged tank is isolated, an emergency response team from the Town's Engineering Department and Water Department shall assess the situation and determine the repairs necessary to return the damaged tank to service. Resources detailed in Annex 4 shall be utilized as necessary to affect the needed repairs.

Tank Contaminated and Out of Service

Should the tank become contaminated in any way, bacteriologically or otherwise, the facility shall be bypassed and taken off line. In addition, the local Fire Department shall be notified of the loss of this storage.

In addition, Sections 3.4 page 3.20 and 3.7 page 3.40 "Contamination" and "Water Shortage", of the State Emergency Water Supply System Management Plan (State Guide Plan #723) shall be

consulted for additional emergency measures required of the water purveyor (JWCD).

Once the contaminated facility is isolated, an emergency response team from the Town's Engineering Department and Water Department shall assess the situation and determine the necessary mitigative action. Recommended procedures for adequate decontamination shall then be implemented and coordinated with the RIDOH, Division of Drinking Water Quality, and other state and local emergency channels. This will involve disinfection, draining of the tank, sampling, testing and refilling of the facility.

It should be noted, that under these conditions, the local portion of the distribution system is in a precautionary Tier 2 water quantity condition and, aside from moving to effect repairs to this facility, action should be undertaken to impose local service restrictions on water usage until normal system storage can be reinstituted.

D. Critical Water Mains

The criteria established to determine critical mains is: *If the main or any section of the main is out of service, a large and significant number of customers would be out of water service for an extended period of time.*

A critical evaluation of the water distribution system operated by the JWCD indicates that a fair portion of the system is not looped. Therefore, breaks along these non-looped mains will result in local areas being out of water until repairs are affected. The sections of the system that contain critical mains are those mains or portions of mains that are:

- The only mains from the supply source to the storage facilities;
- The only mains from supply or storage facilities to major sections of the distribution system.

Using this criterion, the lines that qualify as critical are identified on Attachment No. 1 - Water Supply System Map and detailed as follows:

5. Component: 18" water main on Green Hill Road from Plainfield Pike to Shun Pike
Area of Operation: Transmission/Distribution/Wholesale Purchase
Tiered Water Condition: Tier 4 Water Quantity Condition

Response:
Discussion:
The 18" main on Green Hill Road from Plainfield Pike to Shun Pike is a critical component of the Johnston Water Control District water distribution system. This water main is the sole means of conveying water from the primary interconnection to the Providence Water system. This water main typically carries 55% of daily water production to the system. Loss of this water main would

result in a Tier 4 water quantity condition.

Loss of water main on Green Hill Road from Plainfield Pike to Shun Pike
If severe structural damage and collapse of this line occurs due to an earthquake or sabotage, flow of potable water through this line to the service distribution area will be acutely restricted. In such circumstances a tier 4 water quantity condition shall be implemented and coordinated with the RIDOH, Division of Drinking Water Quality, as well as with other state and local emergency management authorities. Preliminary mitigative action shall then be taken: first, consult the local system maps and isolate the water main by closing the pertinent 18" valves in the area; second, monitor drawdown of all distribution service area storage facilities.

In addition, Sections 3.5 and 3.7 pages 3.29 and 3.40, "Mechanical Failure" and "Water Shortage", of the State Emergency Water Supply System Management Plan (State Guide Plan #723) shall be consulted for additional emergency measures required of the water purveyor (JWCD).

Once the damaged line is isolated, an emergency response team from the Town's Engineering Department and Water Department shall assess the situation and determine the repairs necessary to return the damaged line to service. Resources detailed in Annex 4 shall be utilized as necessary to affect the needed repairs.

6. Component: 16" Water main on Shun Pike from Green Hill Road to Scituate Avenue
Area of Operation: Transmission/Distribution/Wholesale Purchase
Tiered Water Condition: Tier 4 Water Quantity Condition

Response:
Discussion:
The 16" main on Shun Pike from Green Hill Road to Scituate Avenue is a critical component of the Johnston Water Control District water distribution system. This water main is the sole means of conveying water from the primary interconnection to the Providence Water system. This water main typically carries 55% of daily water production to the system. Loss of this water main would result in a Tier 4 water quantity condition.

Loss of water main on Shun Pike from Green Hill Road to Scituate Avenue
If severe structural damage and collapse of this line occurs due to an earthquake or sabotage, flow of potable water through this line to the service distribution area will be acutely restricted. In such circumstances a tier 4 water quantity condition shall be implemented and coordinated with the RIDOH, Division of Drinking Water Quality, as well as with other state and local emergency management authorities. Preliminary mitigative action shall then be taken: first, consult the local system maps and isolate the water main by closing the pertinent 16" valves in the area; second, monitor drawdown of all distribution service area storage facilities.

In addition, Sections 3.5 and 3.7 pages 3.29 and 3.40, "Mechanical Failure" and "Water Shortage",

of the State Emergency Water Supply System Management Plan (State Guide Plan #723) shall be consulted for additional emergency measures required of the water purveyor (JWCD).

Once the damaged line is isolated, an emergency response team from the Town's Engineering Department and Water Department shall assess the situation and determine the repairs necessary to return the damaged line to service. Resources detailed in Annex 4 shall be utilized as necessary to affect the needed repairs.

7. Component: 16" water main on Scituate Avenue from Shun Pike to Reservoir Road
Area of Operation: Transmission/Distribution/Wholesale Purchase
Tiered Water Condition: Tier 4 Water Quantity Condition

Response:
Discussion:
The 16" main from on Scituate Avenue from Shun Pike to Reservoir Road is a critical component of the Johnston Water Control District water distribution system. This water main is part of the sole means of conveying water from the PWSB interconnections to the Central Avenue Booster Pump Station, and ultimately, to the northern distribution service area. An emergency situation similar to the loss of the Green Hill Road interconnection would be created by the loss of this water main as it transports upwards of 60% of the system's total supply to distribution customers and storage facilities.

Loss of water main on Scituate Avenue from Shun Pike to Reservoir Road
If severe structural damage and collapse of this line occurs due to an earthquake or sabotage, flow of potable water through this line to the service distribution area will be acutely restricted. In such circumstances a tier 4 water quantity condition shall be implemented and coordinated with the RIDOH, Division of Drinking Water Quality, as well as with other state and local emergency management authorities. Preliminary mitigative action shall then be taken: first, consult the local system maps and isolate the water main by closing the pertinent 16" valves in the area; second, monitor drawdown of all distribution service area storage facilities.

In addition, Sections 3.5 and 3.7 pages 3.29 and 3.40, "Mechanical Failure" and "Water Shortage", of the State Emergency Water Supply System Management Plan (State Guide Plan #723) shall be consulted for additional emergency measures required of the water purveyor (JWCD).

Once the damaged line is isolated, an emergency response team from the Town's Engineering Department and Water Department shall assess the situation and determine the repairs necessary to return the damaged line to service. Resources detailed in Annex 4 shall be utilized as necessary to affect the needed repairs.

8. Component: 12" Water main on Simmonsville Avenue from Plainfield Pike to Kimball Avenue

Area of Operation: Transmission/Distribution/Wholesale Purchase
Tiered Water Condition: Tier 4 Water Quantity Condition

Response:
Discussion:
The 12" main on Simmonsville Avenue from Plainfield Pike to Kimball Avenue is a critical component of the Johnston Water Control District water distribution system. This water main is the sole means of conveying water from this interconnection to the Providence Water system to this area of the distribution system. Loss of this water main would result in a Tier 4 water quantity condition.

Loss of water main on Simmonsville Avenue from Plainfield Pike to Kimball Avenue
If severe structural damage and collapse of this line occurs due to an earthquake or sabotage, flow of potable water through this line to the service distribution area will be acutely restricted. In such circumstances a tier 4 water quantity condition shall be implemented and coordinated with the RIDOH, Division of Drinking Water Quality, as well as with other state and local emergency management authorities. Preliminary mitigative action shall then be taken: first, consult the local system maps and isolate the water main by closing the pertinent 12" valves in the area; second, monitor drawdown of all distribution service area storage facilities.

In addition, Sections 3.5 and 3.7 pages 3.29 and 3.40, "Mechanical Failure" and "Water Shortage", of the State Emergency Water Supply System Management Plan (State Guide Plan #723) shall be consulted for additional emergency measures required of the water purveyor (JWCD).

Once the damaged line is isolated, an emergency response team from the Town's Engineering Department and Water Department shall assess the situation and determine the repairs necessary to return the damaged line to service. Resources detailed in Annex 4 shall be utilized as necessary to affect the needed repairs.

9. Component: 12" Water main on Scituate Avenue from Shun Pike to Kimball Avenue
Area of Operation: Transmission/Distribution
Tiered Water Condition: Tier 3 Water Quantity Condition

Response:
Discussion:
The 12" main on Scituate Avenue from Shun Pike to Kimball Avenue is a critical component of the Johnston Water Control District water distribution system. This 3,400-foot long water main is the backbone of the distribution system as it conveys water from the Providence Water interconnection to the western portions of the distribution system. The JWCD does not maintain the capability of bypassing this water main. As such, a tier 3 water quantity condition will be implemented as a precautionary measure.

Loss of water main on Scituate Avenue from Shun Pike to Kimball Avenue

If severe structural damage and collapse of this line occurs due to an earthquake or sabotage, flow of potable water through this line, the distribution service area will be acutely restricted. Loss of this line during average demand periods will result in a marginal degradation of system performance.

In such circumstances a tier 3 water quantity conditions shall be implemented and coordinated with the RIDOH, Division of Drinking Water Quality, as well as with other state and local emergency management authorities. Preliminary mitigative action shall then be taken: first, consult the local system maps and isolate the water main by closing the pertinent 12" valves in the area.

In addition, Sections 3.5 and 3.7 pages 3.29 and 3.40, "Mechanical Failure" and "Water Shortage", of the State Emergency Water Supply System Management Plan (State Guide Plan #723) shall be consulted for additional emergency measures required of the water purveyor (JWCD).

Once the damaged line is isolated, an emergency response team from the Town's Engineering Department and Water Department shall assess the situation and determine the repairs necessary to return the damaged line to service. Resources detailed in Annex 4 shall be utilized as necessary to affect the needed repairs.

10. Component: 12" Water main on Bishop Hill Road from Central Avenue to Hartford Avenue

Area of Operation: Transmission/Distribution
Tiered Water Condition: Tier 3 Water Quantity Condition

Response:

Discussion

The 12" main on Bishop Hill Road from Central Avenue to Hartford Avenue is a critical component of the Johnston Water Control District water distribution system. This 9,100-foot long water main is the backbone of the distribution system as it conveys water from the Central Avenue Booster Pump Station, the Goldenview Drive Storage Tank, and the central and northern regions of the distribution system. An emergency situation would be created by the loss of this water main. The 12-inch main on Reservoir Avenue provides redundancy to the system such that the crisis will be localized. A tier 3 water quantity condition will be implemented.

Loss of water main on Bishop Hill Road from Central Avenue to Hartford Avenue

If severe structural damage and collapse of this line occurs due to an earthquake or sabotage, flow of potable water through this line to the northern portion of the distribution area will be acutely restricted. In such circumstances a tier 3 water quantity conditions shall be implemented for the area affected and coordinated with the RIDOH, Division of Drinking Water Quality, as well as with other state and local emergency management authorities. Preliminary mitigative action shall then be taken: first, consult the local system maps and isolate the water main by closing the pertinent 12" valves in the area; second, monitor drawdown of all distribution service area storage facilities.

In addition, Sections 3.5 and 3.7 pages 3.29 and 3.40, "Mechanical Failure" and "Water Shortage", of the State Emergency Water Supply System Management Plan (State Guide Plan #723) shall be consulted for additional emergency measures required of the water purveyor (JWCD).

Once the damaged line is isolated, an emergency response team from the Town's Engineering Department and Water Department shall assess the situation and determine the repairs necessary to return the damaged line to service. Resources detailed in Annex 4 shall be utilized as necessary to affect the needed repairs.

11. Component: 12" Water main on Reservoir Avenue from Scituate Avenue to Hartford Avenue

Area of Operation: Transmission/Distribution
Tiered Water Condition: Tier 2 Water Quantity Condition

Response:

Discussion

The 12" main on Reservoir Avenue from Scituate Avenue to Hartford Avenue is a critical component of the Johnston Water Control District water distribution system. This 6,340-foot long water main is the backbone of the distribution system as it conveys water from the Central Avenue Booster Pump Station to the central and northern regions of the distribution system. An emergency situation would be created by the loss of this water main. The 12-inch main on Bishop Hill Road provides redundancy to the system such that the crisis will be localized. A tier 2 water quantity condition will be implemented.

Loss of water main on Reservoir Avenue from Scituate Avenue to Hartford Avenue

If severe structural damage and collapse of this line occurs due to an earthquake or sabotage, flow of potable water through this line to the northern portion of the distribution area will be acutely restricted. In such circumstances a tier 2 water quantity conditions shall be implemented for the area affected and coordinated with the RIDOH, Division of Drinking Water Quality, as well as with other state and local emergency management authorities. Preliminary mitigative action shall then be taken: first, consult the local system maps and isolate the water main by closing the pertinent 12" valves in the area; second, monitor drawdown of all distribution service area storage facilities.

In addition, Sections 3.5 and 3.7 pages 3.29 and 3.40, "Mechanical Failure" and "Water Shortage", of the State Emergency Water Supply System Management Plan (State Guide Plan #723) shall be consulted for additional emergency measures required of the water purveyor (JWCD).

Once the damaged line is isolated, an emergency response team from the Town's Engineering Department and Water Department shall assess the situation and determine the repairs necessary to return the damaged line to service. Resources detailed in Annex 4 shall be utilized as necessary to affect the needed repairs.

12 Component: 12" Water main on Hartford Avenue from Bishop Hill Road to Reservoir Avenue

Area of Operation: Transmission/Distribution

Tiered Water Condition: Tier 2 Water Quantity Condition

Response:

Discussion

The 12" main on Hartford Avenue from Bishop Hill Avenue to Reservoir Avenue is a critical component of the Johnston Water Control District water distribution system. This 11,600-foot long water main is the backbone of the distribution system as it conveys water from the east and west portions of the Central Avenue Booster Pump Station pressure zone. An emergency situation would be created by the loss of this water main. A tier 2 water quantity condition will be implemented.

Loss of water main on Hartford Avenue from Bishop Hill Road to Reservoir Avenue

If severe structural damage and collapse of this line occurs due to an earthquake or sabotage, flow of potable water through this line to the northern portion of the distribution area will be acutely restricted. In such circumstances a tier 2 water quantity conditions shall be implemented for the area affected and coordinated with the RIDOH, Division of Drinking Water Quality, as well as with other state and local emergency management authorities. Preliminary mitigative action shall then be taken: first, consult the local system maps and isolate the water main by closing the pertinent 12" valves in the area; second, monitor drawdown of all distribution service area storage facilities.

In addition, Sections 3.5 and 3.7 pages 3.29 and 3.40, "Mechanical Failure" and "Water Shortage", of the State Emergency Water Supply System Management Plan (State Guide Plan #723) shall be consulted for additional emergency measures required of the water purveyor (JWCD).

Once the damaged line is isolated, an emergency response team from the Town's Engineering Department and Water Department shall assess the situation and determine the repairs necessary to return the damaged line to service. Resources detailed in Annex 4 shall be utilized as necessary to affect the needed repairs.

XI. REVERSE TRIGGERS

A. General

The method of recovery from a water emergency will vary according to the tier condition and responsible trigger. In general, once the situation or condition that initiated the emergency is rectified, the emergency can be considered contained and normal system operating conditions can resume. A discussion on the "Reverse triggers" to be employed during the recovery from a Water Emergency follows:

- In the case of ***equipment failure or a power outage***, the reverse triggers signaling the end of the emergency shall be completion of the repair or resumption of normal electric service as appropriate.

- In the event of ***contamination*** of any system component, the reverse trigger will be the successful decontamination to the satisfaction of the RIDOH and RIDEM.

- In the event of ***low production supply levels/depleted storage*** the reverse trigger will be upon restoring production supply to normal levels with system storage facilities at or above 70% capacity. Recovery from failure of a critical component shall generally be upon the completion of repairs and reactivation of the component taken out of service. Although it should be noted that the resumption of "normal" operation from drought conditions will not generally be clear cut; recovery will likely occur over several weeks and care must be exercised in relaxing emergency conservation measures so that demand does not exceed supply.

B. Reverse Trigger Actions

The steps to be taken to step down from particular water emergency stages will be as follows:

- **Tier 4 Water Quantity Condition**

1. Contact the Rhode Island Department of Health to report that the system is being upgraded from a Tier 4 Water Quantity to a Tier 3 Water Quantity condition.
2. Relax Town Water Restriction Ordinances
   - Reduce residential curtailment from critical only to 50%
   - Reduce government curtailment from critical only to 60%
3. Notify all systems users, utilizing the Statewide Emergency Broadcast System of Emergency Condition upgrading.

- **Tier 3 Water Quantity Condition**

1. Contact the Rhode Island Department of Health to report that the system is being upgraded from a Tier 3 Water Quantity to a Tier 2 Water Quantity condition.
2. Relax Town Water Restriction Ordinance
   - Reduce residential curtailment from 50% to 0%
   - Reduce government curtailment from 60% to 20%
   - Reduce commercial curtailment from 75% to 50%
   - Reduce industrial curtailment from 100% to 75%
3. Notify all systems users, utilizing the Statewide Emergency Broadcast System of Emergency Condition upgrading.

- **Tier 2 Water Quantity Condition**

1. Contact the Rhode Island Department of Health to report that the system is being upgraded from a Tier 2 Water Quantity to a Tier 1 Water Quantity condition.
2. Suspend curtailment of all use.
3. Notify all systems users, utilizing the Statewide Emergency Broadcast System of Emergency Condition upgrading.

- **Tier 2 Water Quality Condition**

1. Contact the Rhode Island Department of Health to report that the system is being upgraded from a Tier 2 Water Quality to a Tier 1 Water Quality condition.
2. Suspend emergency measures such as the distribution of potable water, use of emergency supplies, sampling, etc.
3. Notify all systems users, utilizing the Statewide Emergency Broadcast System of Emergency Condition upgrading.

- **Tier 1 Water Quality/Quantity Condition**

1. Contact the Rhode Island Department of Health to report that the system is resuming normal operating routines.
2. Notify all systems users, utilizing the Statewide Emergency Broadcast System of Emergency Condition abatement and resumption of normal system operations.
3. Return water division operations to normal
   - Provide maintenance for equipment that was delayed;
   - reschedule hydrant and main flushing that was delayed;
   - resume fire training programs;
   - resume normal sampling procedures;
   - resume normal meter reading schedule; and
   - resume normal academic schedule.

XII. PREVENTIVE MEASURES

General

An important aspect of emergency response is system preparedness. To adequately respond to an emergency/disaster event affecting the system, knowledge of the system and the proper response action, as well as adequate resources, must be available. The preparedness of the system relates to insuring that knowledge of the proper response actions is thoroughly ingrained within the system operator's personnel and that the resources needed for the implementation of response actions are available under all reasonably expected circumstances. The aspects of system preparedness fall into three basic components: Training, Resource Coordination, and Plan Updates. The basic requirements of these updates are as described in the following sections:

A. Training

All Managerial, Technical, and Operations Personnel must be properly trained and organized in order to ensure an efficient and effective response to emergency conditions. This training shall be conducted utilizing a combination of outside consultants, in-house staff, and informational videos. A complete training program should include the following components:

1. Trainee Personnel - All new personnel should be given, at minimum, a single orientation training session that should include the following:

- A general description of the water system and its facilities
- A brief overview of Emergency Management Plan
- A detailed description of the employee's anticipated involvement in emergency response (i.e. location of emergency control centers; who and where to report in case of emergency; etc.)

It is suggested that all employees, regardless of their length of service, be given this minimum trainee personnel training session. It is also suggested that upon hiring, all personnel have their specific, individual skills catalogued for proper utilization during an emergency response. Skills of particular interest include: life safety training, fire fighting, etc.

2. Management Training - All employees acting in a supervisory or management role in the water system operation, and expected to be utilized as a resource during an emergency response, should be thoroughly trained in all aspects of the emergency plan. This training should, at minimum, include the following:

- A thorough review of the Emergency Management Plan for the Johnston Water Control District. If possible, they each should have their own copy (or access to a central copy)

for immediate use during a water system emergency.

- All water system management personnel should be cross-trained in system operations outside their own areas of expertise (i.e. raw water supply/treatment trained in transmission/distribution operations) for emergency response in the areas as required.

- Lower level management personnel should be trained in management decision-making procedures in the event of an emergency response, without senior management personnel present.

The main goals of management training are to make all management thoroughly aware of emergency preparedness and to ensure that an adequate response does not rely upon a single decision maker who may not be available during an emergency event.

3. Specialized Training - Specialized training should be carried out among a sufficient quantity of operations personnel to ensure an adequately trained work staff during an emergency event. The specialized training for system emergency response personnel should, at minimum, include the following:

- OSHA 40-hour training for hazardous material response including S.C.B.A. training.
- OSHA 8-hour supervisor training for hazardous material response (for supervisory personnel).
- OSHA 8-hour refresher course for hazardous material response including S.C.B.A. training.
- AWWA Seminar for Emergency Planning for water quality management.
- AWWA Cross-Connection Control and Backflow Prevention courses.
- AWWA Water Quality/Microbiology Seminar (for water quality personnel).

In addition to these specialized training seminars listed, water system management should insure that system operations personnel maintain an active and ongoing program of skills training through local trade associations such as the New England Water Works Association.

4. Mock Emergency Exercises - Mock training exercises should be performed to ensure that, in the event of an emergency, personnel are able to respond adequately to identified problems and ensure that equipment and resources are adequate prior to an actual event. By utilizing mock exercises as part of the overall training program, and as part of the periodic review and revision activity, individuals will obtain firsthand experience with the response plan. Mock exercises can also indicate necessary areas of improvement for the plan. There are three specific types of mock exercises:

- **Tabletop Exercise:** This activity is designed to identify problems based upon the emergency response procedures. Elected or appointed officials with emergency

management responsibilities (primarily the command group) are gathered together to act out various simulated emergency situations. The exercise scenarios should test the performance of duties, tasks, or operations in a manner similar to the way they would be performed in a real emergency. Modifications to the emergency response procedures usually occur in response to this activity.

- **Functional Exercise:** This activity is designed to test or evaluate the capability of personnel to respond to individual or multiple functions. This type of exercise is more complex than a tabletop exercise in that activities are under time constraints and involve an extensive evaluation/critique at the end of the exercise. An example of a functional exercise would be an activity designed to test and evaluate the centralized emergency operations capability and timely response of one or more units of government under a given scenario. Functional exercises should be conducted from the emergency operations center and should accurately simulate the use of outside agencies and resources.

- **Full Scale Exercise:** This activity should evaluate the operational capability of emergency management systems in an interactive manner over a substantial period of time. It involves the testing of a major portion of the basic elements existing within emergency operation response plans. This type of exercise includes mobilization of personnel and resources, and the actual movement of emergency workers, equipment, and resources required to demonstrate emergency coordination and resource capability. The emergency operations center should be activated and field command posts may be set up. Extensive use of outside agencies should occur, as if this were an actual disruptive event.

B. Resource Coordination

1. Resource Coordination

The essence of a proper response is ensuring that resources are available to meet the needs of the water system during an emergency event. Due to the fact that it is impractical for the Johnston Water Control District to keep on hand all of the manpower and material resources for any and all possible emergencies that may arise, to allow proper emergency response, the concept of Resource Coordination should be utilized.

Resource Coordination realizes that it is impossible for one single entity to properly manage the resources required for any and all possible emergency conditions that may arise, but through the utilization of the resources of several separate entities, and proper coordination, an adequate response can be initiated. In the case of emergencies involving the JWCD system, these resources (aside from those in-house) would include the State of Rhode Island (various agencies); local municipalities (within the service area); and the private sector (to provide manpower, equipment, and material resources on short notice).

The State of Rhode Island maintains several full time staffed agencies that could be utilized during an emergency event. These would include the following:

- RI Emergency Management Agency - Emergency Management
- RI State Police - Public Safety
- RI National Guard - Manpower Resources
- RI Department of Transportation/Department of Public Works - Road Maintenance/Repair
- RI Department of Environmental Management - Technical Expertise in Environmental Matters
- RI Department of Health - Public Health and Safety
- RI Water Resources Board - Water Supply/Management

In addition to the various state agencies, local governments within the water system service area have their own resources that may be of use during certain emergency events. These include the following:

- Johnston Police Department - Public Safety
- Johnston Fire Department - Emergency Response/Public Safety
- Johnston Department of Public Works - Road Maintenance/Utility Repair

A complete phone listing of critical agencies can be found in Appendix B - Alert Listings.

The local and state agencies can supply material, equipment, and manpower in emergency situations. The private sector may also be called upon to supplement resources on an as-needed basis. For listing of private entities and their respective available resources, see Annex 4.

The various state, local and private agencies would be utilized as necessary in an emergency event to provide technical expertise, manpower, and materials, and to ensure proper coordination of emergency activities. To ensure that these identified resources can be brought to bear in an effective manner, the completed Johnston Water Control District Emergency Management Plan should be reviewed by the appropriate agencies to familiarize them with their involvement in the emergency management program. These agencies should also be involved, to the extent deemed necessary, in the required training detailed within Part A of this section. It should be noted that there are also several federal agencies which may also be involved in emergency response, including: USEPA, FEMA, etc. Due to the fact that coordination with these agencies is done on the state level (i.e. USEPA with RIDEM; FEMA with RI Emergency Management Agency), these federal agencies are not included directly within this plan.

C. Maintenance of the Emergency Response Plan

The emergency response plan should be reviewed and revised periodically to insure relevance to changing conditions. Appropriate measures include:

1. An annual review of the plan to ensure its relevance and viability.

2. An annual update of all designated emergency personnel (including the command group, special purpose units, the assessment groups, and the human health reporting system contacts), including names, telephone number(s), job titles, and relevant skills or certifications.

3. Providing copies of the updated plan to appropriate personnel.

4. Making necessary additions to the plan as changing conditions and circumstances warrant.

5. Incorporation of lessons learned through the implementation of actual response procedures.

6. As new facilities are brought on line, or existing facilities undergo major modifications, the response plan should be updated accordingly. If new system components are added which significantly change the mode of the system operation, or if demand characteristics of the system dramatically change the vulnerability assessment of the system, they should also be updated as appropriate.

XIII. PLAN IMPLEMENTATION

A. General

The purpose of the Emergency Management section of the Water Supply System Management Plan, is to present and discuss emergency situations that could impact the JWCD distribution system, and outline response and mitigative actions to be taken prior to and during these events. The intent of this particular section is to catalog the Water Department actions required in order to plan effectively for reducing system vulnerability, as well as limiting the impacts of possible emergency events. This plan includes an estimated timetable for implementation, and identifies as well as possible the individuals responsible for taking those actions. The implementation section will therefore serve to link those recommendations resulting from comprehensive study, to policy and financial decisions required for actual emergency event preparedness.

A detailed schedule outlining the individuals responsible, timing, and estimated costs associated with recommendations of this plan has been developed and is presented in Table 13.1 below. Where the Johnston Water Control District itself can accomplish work, the responsibility has been designated as "in-house (JWCD)". It is intended that where outside consultants and/or contractors are required, the JWCD shall take the necessary steps to advertise for and contract with such resources. The costs developed for each recommendation includes an estimate of the capital, operating and maintenance costs associated with each implementation.

TABLE 13.1
5-YEAR IMPLEMENTATION SCHEDULE (2005-2010)
JOHNSTON WATER CONTROL DISTRICT EMERGENCY MANAGEMENT PLAN

ACTIONS	RESPONSIBILITY	TIMING	COST	FUNDING
A. Vulnerability Assessment Water System Improvements to Relieve Critical Status - Loop Water Mains - Peck Hill Road to Central Avenue - Central Avenue to suction side of Central Avenue Booster Pump Station - Matthew Drive (connecting Rollingwood Drive to Elizabeth Ann Drive	In-House (JWCD)/Outside Consultant	Planning Phase	N/A	Enterprise Fund
B. Notification and Communication	See Annex #3	Planning Phase	N/A	Enterprise Fund
C. Priority of Responses	See Plan, Alert Listing	Planning Phase	N/A	Enterprise Fund
D. Inventory of Equipment, Supplies and Personnel	See Annex #4	Planning Phase	N/A	Enterprise Fund
E. Mitigation Situations - Emergency Spending Authorization	In-House (JWCD/Accounting)	Planning Phase	N/A	Enterprise Fund

ACTIONS	RESPONSIBILITY	TIMING	COST	FUNDING
F. Training Program	In-House (JWCD); Seminars	Planning Phase	N/A	Enterprise Fund
G. Trigger Levels and Responses	In-House (JWCD)	Planning Phase	N/A	Enterprise Fund
H. Recovery Stages	See Plan	Planning Phase	N/A	Enterprise Fund
I. Update Emergency Response Plan	In-House (JWCD)	Planning Phase	N/A	Enterprise Fund

ANNEXES

ANNEX NO. 1
MANAGEMENT

Purpose

The Management Annex describes the location, organization and function of the overall management effort for controlling efforts by the JWCD in assuring minimal disruption and to expedite recovery operations from any emergency situation.

Method

The management effort shall be exercised by physically locating the decision making managers at a common control center, directing the damage assessment efforts, allocating the resources, directing the corrective efforts, and controlling the entire operation.

Primary Control Center

Location

The JWCD shall utilize the Department of Public Works Office located at 100 Irons Avenue in Johnston, Rhode Island, as the Primary Control Center. The office shall serve as the primary control area although most personnel shall function from their normal workspaces.

Organization

All personnel shall report to the Primary Control Center as directed and shall function at the direction of the Public Works Director/Town Engineer, or next most senior person at the Control Center.

Secondary Control Center

Location

The JWCD shall utilize the Town Hall or the field office at the Central Avenue Booster Pump Station, located on Central Avenue in Johnston, Rhode Island as the Secondary Control Center. Personnel shall be notified by telephone or in person as to where to report. The Secondary Control Center shall assume the function of directing the efforts of the JWCD in the event that the Primary Control Center is incapacitated or otherwise unable to direct or control activities. The Secondary Control Center shall act at the direction of the Primary Control Center.

Organization

All personnel shall report to the Secondary Control Center as directed and shall function at the direction of the Public Works Director/Town Engineer, his designate, or the next senior person at the Secondary Control Center.

Management

The general chain of command by department for the Town of Johnston in response to a water system emergency shall be as follows:

Management/Administration	Name
Mayor	Joseph M. Polisena
Water Department	
Director of Public Works	Makram Megalli, PE
Field Personnel	Millenium Water LLC
Engineering	
Town Engineer	Lorraine Caruso, PE

In the event of an emergency, personnel not contacted by the emergency system management personnel, shall call the JWCD office at (401) 231-4000 to obtain reporting instructions.

Annex #1

Contact Numbers

Primary Control Center	Main Office/Johnston Water Control District 100 Irons Avenue, Johnston, Rhode Island	
Basic Telephone Number:	401-231-4000	Water Department Office
Alternate Telephone Numbers:	401-231-4000 401-231-4065 401-553-8800	Public Works Director Town Engineer Town Hall
Radio Call Signals	(#1) 401 (#2) 401 (#4) 401	Main Office-JWCD Field Supervisor Public Works Director
Secondary Control Center	Central Avenue Booster Pump Station/ Town Hall	
Basic Telephone Number:	401-553-8800	Town Hall
Additional Contacts	401-737-2999 401-949-9964 401-732-1702 401-467-4448	A. E. Bragger Construction Boyle & Fogarty Construction Process Engineers & Const. Alco Engineering

Activation

The activation of this Annex shall consist of the system's emergency management personnel convening an emergency planning session in the event of an emergency event. Upon activation of this Annex, the Mayor with the assistance of the Public Works Director and/or Town Engineer, shall take the appropriate actions to initiate the needed response to the specific emergency situation. These shall include the following:

1. Assess the extent/impacts of the emergency event.
2. Coordinate the necessary communication activation.
3. Direct the necessary manpower/resources to respond to the emergency event.
4. Coordinate activities of other responding agencies.

ANNEX NO. 2
COMMUNICATIONS

Purpose

The Communications Annex has a two-fold purpose:

1. Provides a listing of those personnel and/or offices that must be alerted to an emergency situation.
2. Provides a listing of names and contact points for a variety of personnel and organizations that might be required to provide assistance during an emergency situation.

Background

Notification of certain personnel and/or organizations will be required in the event that an emergency situation may affect their area of responsibility. The Alert Listings (see Appendix B) provides a listing for use in the Control Centers.

The prevention of development of an emergency situation and the corrective actions required in an emergency situation may require assistance and action by a variety of personnel and organizations. This Annex is developed to serve as a guide for establishing the proper communication links with the various agencies and individuals needed in the specific emergency response scenario.

Alert List

Appendix B provides a listing of names and organizations that are to be notified in the event that an emergency situation develops which may affect their area of responsibility. The Alert List is organized as follows:

1. ***JWCD Personnel:*** Provides a listing of names, job titles and contact telephone numbers for JWCD personnel.

2. ***Town of Johnston Personnel:*** Provides a listing of departments, job titles, incumbents and work, and home contact telephone numbers for key town personnel that may be required to be notified and/or to assist the JWCD in an emergency situation.

3. ***State of Rhode Island Personnel:*** Provides a listing of departments or agencies, job titles, incumbents and work, and home contact telephone numbers for key State of Rhode Island personnel that may be required to be notified and/or to assist the JWCD in an emergency situation.

4. ***U.S. Government Personnel:*** Provides a listing of agencies, job titles, incumbents and work,

and home contact telephone numbers for key U.S. Government personnel that may be required to be notified and/or to assist the JWCD in an emergency situation.

5. ***Adjacent Communities Personnel:*** Provides a listing of key personnel and agencies of adjacent communities that may be impacted by an emergency situation within the JWCD.

6. ***Priority Users:*** Provides a listing of priority facilities as well as names and contact numbers for key personnel of the priority facility. The necessity to contact these facilities is dependent upon the emergency situation. The Field Supervisor shall make the determination as to what facilities and personnel shall be notified.

7. ***Major Users:*** Provides a listing of major users that are not critical facilities but that may be affected significantly by the situation. The Public Works Director shall make the determination as to which users will be notified.

Alert Activation

Depending upon the exact extent of the emergency event/condition, the Public Works Director or his designate shall determine the exact nature of the response of this Annex and to what extent the Communication Annex is activated. The following worksheet No. 36 outlines the Johnston Water Control District Emergency Contacts.

ANNEX NO. 3
PUBLIC INFORMATION

Purpose

The Public Information Annex describes actions to be taken in the event of implementation of the plan.

Background

Emergency situations will greatly affect the public and its need for and use of water. Great stress may be placed upon the water supply for fighting fires or for other needs not usual in a normal situation. At the same time the water utility may have a reduced ability to provide supplies of water and these supplies may not necessarily be usable for sanitary purposes even if they could be used for other reasons (e.g. fighting fires).

During these situations it is imperative that timely and accurate information be distributed broadly and frequently to the public. This will primarily be accomplished through the extensive media outlets available. Situation reports can be distributed to radio, television and newspaper outlets as needed. Public Safety and Disaster control personnel will be kept appraised of the existing situation in order to assist in enforcing compliance with requirements, for the benefit of all.

Media Contacts

Attachment 1 to Annex No. 3 - Public Information, provides a listing of media outlets with contact points.

Situation Report

Attachment 2 to Annex No. 3 - Public Information, provides a sample Situation Report (SITREP) with suggested contacts for providing information.

Responsibility For Maintaining

The Public Works Director/Town Engineer is responsible for maintaining and updating this Annex.

MEDIA CONTACTS

Purpose

The purpose of this Attachment is to provide a listing with contact telephone numbers of the media outlets that may be utilized in an emergency situation in the Johnston Water Control District service area. The electronic media can be instrumental in providing the JWCD an opportunity to inform the public about the problem, the extent of the problem, the need for and type of actions required by the water consuming public and the anticipated actions to recover from the emergency situation. The print media can be instrumental in explaining to the public the actions taken by the JWCD to control and/or recover from the emergency situation(s).

Electronic Media

Television

WJAR-TV (Channel 10) NBC	Newsline 455-9105
	General 455-9100
WLNE-TV (Channel 6) ABC	General 453-8000
WPRI-TV (Channel 12) CBS	General 438-7000

Radio

WHJY	News Room 438-6110
WNRI	769-6925
WPRO	News Room 433-4200
WWON	766-1240
WWON	438-6110

Print Media

Providence Journal	Northwest 943-6400
	Blackstone Valley 334-5900
	Providence 277-7303

SITUATION REPORT

Purpose

The purpose of this Attachment No. 2 is to provide a standardized format for disseminating information to the public regarding the emergency situation.

Discussion

The dissemination of information regarding the emergency situation will be critical to the Johnston Water Control District and its ability to recover rapidly and continue to serve the public in a normal manner. During the course of the emergency situation there will be many demands for both general information and specific information. The levels of need will develop from the control center through the Board's management levels, the regulatory authorities, and to the general public that will be represented primarily by the local and/or regional media. The affected population will also seek information directly from the Johnston Water Control District.

Information at "official levels" (i.e. control center to Town and/or regulatory authorities) will generally be handled by the official in charge at the designated control center. Information for general dissemination will be handled through press conferences or other arranged situations in order to maintain efficiency and to assure the maximum exposure. The Situation Report included with this Attachment No. 2 provides a standardized format for use when disseminating information to the general public through media conferences.

Additional sample information forms for use as guides in the development of similar forms to aid in the implementation of emergency management plans, are attached in Appendix C.

JOHNSTON WATER CONTROL DISTRICT
Situation Report
(Sample format for Media Conferences)

Situation Report No. _____

Date and Time of Report: _____

Situation:

_____
_____
_____
_____

Facilities Affected:

_____
_____
_____
_____
_____

Areas Affected:

_____
_____
_____
_____
_____

Number of People Affected:

_____
_____
_____
_____
_____

JWCD Actions to Date:

_____
_____

Situation Report/
Annex #3

Anticipated Immediate Actions:

Anticipated Schedule for Restoration of Service in the Following Affected Areas:

Requested Actions to the Public:

Other Items of Importance:

Questions:

Next Scheduled Briefing:

ANNEX NO. 4
RESOURCES

Purpose

The Resources Annex describes the number, type, and location of the various materials, pieces of transportation and construction equipment available to the JWCD from its own stock. The Annex also describes those vendors/contractors/suppliers that have equipment and that can be called upon for its use by the JWCD.

Background

The JWCD utilizes a variety of materials, transportation, and construction equipment and materials during the course of its normal activities. In the event of an emergency serious enough to warrant implementing the Emergency Response Plan, the Primary and Secondary Control Centers must have immediate access to the availability of equipment and material in order to expeditiously implement preventative and/or corrective actions.

The resources listed within this Annex are broken down into two separate listings as follows:

1. Equipment/Supplies/Vendors.
2. Inventory of Emergency Support and Stand-By Equipment

Supplementary Resources

A broader listing of these resources are contained in a document entitled Emergency Resource Directory for Water Supply Management, available from the Rhode Island Department of Administration, Division of Planning.

ANNEX NO. 4
JOHNSTON WATER CONTROL DISTRICT
Equipment/Supplies/Vendors

INDEX

1. EQUIPMENT/SUPPLIES/VENDORS

2. INVENTORY OF EMERGENCY SUPPORT AND STAND-BY EQUIPMENT

HAZARDOUS MATERIAL SPILLS

A number of industrial organizations exist that have been established to assist in emergency situations involving hazardous materials. These include the following -

CHEMTREC: CHEMTREC (Chemical Transportation Emergency Center) is the chemical information and communications system of the Chemical Manufacturer's Association. It provides chemical information to emergency services and when appropriate, contacts shipper, manufacturer and user for information. CHEMTREC is affiliated with the NRC (National Response Center) and can be contacted at 1-800-424-9300.

CHEMNET: CHEMNET is a mutual aid network of chemical shippers and "for hire" contractors. A network of industry emergency response teams has been established. For Rhode Island the response team is maintained by OHM Remediation Services Corp., 88 C-Elm St., Hopkinton, MA 01748, Tel: 1-800-242-4644.

CHLOREP: CHLOREP is a response network of chlorine manufacturers and packagers formed to respond to chlorine emergencies. For Rhode Island the Industry Emergency Response Team is Jones Chemical Co., Box 280, Warwick, NY 10990, Tel: 1-800-424-1367.

PSTN: PSTN (Pesticide Safety Team Network) is a response network of pesticide manufacturers formed to respond to pesticide accidents. The nearest safety team is: FMC Corp., Middleport, NY. PSTN is notified by CHEMTREC.

LNG Trucking Emergency Trucking Plan: The LNG plan is a response network for Liquified Natural Gas/Liquified Methane (LNG) transportation accidents sponsored by the New England Gas Association. The Response Teams for Connecticut are -

National Grid, Providence, RI	General: (800) 870-1664 Emergency: (800) 640-1595
Transgas, Inc., Lowell, MA	Tel: (508) 454-7831 Tel: (508) 459-4311
L.P. Transport, Chester, NY	Tel: (800) 431-7123 Tel: (914) 469-2188

The LNG plan is activated by CHEMTREC.

APPENDIX A

RHODE ISLAND HURRICANE PREPAREDNESS GUIDE FOR PUBLIC WATER SYSTEMS

EMERGENCY PREPAREDNESS FOR RI COMMUNITY WATER SYSTEMS

APPENDIX B

ALERT LISTINGS

ALERT LISTING

National

• US Environmental Protection Agency (EPA) - Eastern Region	617-223-7265
• National Response Center	1-800-424-8802

State of Rhode Island

• RI Department of Environmental Management (RIDEM)	401-222-3961
• RI Emergency Management Agency (EMA)	401-946-9996
• RI Emergency Response Commission (SERC)	401-274-7745
• Rhode State Police	401-647-3311
• RI Department of Health	401-222-6867

Additional State Resources continued on the following pages.

APPENDIX C

EMERGENCY MANAGEMENT - SAMPLE INFORMATION FORMS

Town of Johnston

RESOLUTION OF THE TOWN COUNCIL

No. 2020-24

In Favor: 5 Opposed: 0

Council President — Date: 10/28/20

Be it resolved that:

Whereas, *The Town of Johnston is desirous of entering into a Merger and Annexation Agreement with the City of Providence and Providence Water Supply Board (hereinafter referred to as "PWSB") for the purpose of conveying all assets of the Town of Johnston Water Department to the City of Providence and PWSB; and*

Whereas, *The administration has undertaken extensive review of the operation and assets of the Town of Johnston Water Department; and*

Whereas, *The administration has determined that it is in the best interest of the Town of Johnston and for the customers of the water department to enter into the Merger and Annexation Agreement with the City of Providence and PWSB; and*

Whereas, *The City of Providence and PWSB is desirous of entering into a Merger and Annexation Agreement with the Town of Johnston for the purpose of conveying all assets of the Town of Johnston Water Department to the City of Providence and PWSB;*

Now, therefore, be it resolved that we, the members of the Johnston Town Council authorize Mayor Joseph M. Polisena to engage in all actions and enter into all agreements as may be necessary to effectuate the following:

1. *Petition the Providence Water Supply Board on behalf of the Town of Johnston to merge and/or annex, and thereby convey, assign, transfer and deliver to Providence Water Supply Board all of the assets of the Johnston System, including but not limited to:*
   a. *All facilities;*
   b. *Pumping stations;*
   c. *Pipes;*
   d. *Mains;*
   e. *Valves;*
   f. *Connections;*
   g. *Conduits;*
   h. *Hydrants;*
   i. *Machinery;*
   j. *Equipment;*
   k. *Inventory;*
   l. *Materials;*
   m. *Records;*
   n. *Miscellaneous devices;*
   o. *Appurtenances;*
   p. *All water rights in connection with the System;*
   q. *All rights and benefits accrued in relation to the System arising out of Federal assistance of federal funding available in relation to the System; and*
   r. *All other tangible property related to operation and maintenance, improvement and management of the System, including without limitation, all right, title and interests in all real estate, real property leases, licenses and easements held by the Town for the purpose of the System.*
2. *Negotiate an Agreement on terms the Mayor deems necessary or proper;*
3. *Take any and all additional action required under R.I.G.L. §46-30-1 et seq.; and*

4. *Cause the Town to effectuate the Merger and Annexation Agreement in substantially the form as attached hereto as Exhibit A.*

Resolution 2020-24 shall become effective immediately upon the date of its passage.

Robert V. Russo- President
District-4

Joseph M. Polisena, Jr., Vice-President
District-3

Linda L. Folcarelli, Councilwoman
District-1

David J. Santilli, Jr., Councilman
District-2

Robert J. Civetti., Councilman
District-5

Attest:

Vincent P. Baccari, Jr., Town Clerk

A TRUE COPY ATTEST NOV 03 2020

Vincent P. Baccari Jr.

Town Clerk

TOWN OF JOHNSTON, RHODE ISLAND
COMPUTERIZED HYDRAULIC MODEL REPORT

JANUARY 2009

Prepared for:

Town of Johnston, Rhode Island
1385 Hartford Avenue
Johnston, Rhode Island 02919

Prepared by:

C&E Engineering Partners, Inc.
342 Park Ave.
Woonsocket, Rhode Island 02895

C&E Project No. J0824.00

Contents

Section 1.0 Introduction

1.1 Authorization and Purpose

The development of a computerized hydraulic model of the Johnston Water Control District (JWCD) Transmission and Distribution System was completed by C&E Engineering Partners, Inc. (C&E) under authorization of the Town of Johnston (Town). The need for this project stems from the Town's desire to develop an accurate and representative computerized hydraulic model of the water system in order to evaluate overall water system performance and operational techniques and to replicate the hydraulic capabilities of water system operation.

The purpose of the model development phase was to develop an accurate and calibrated hydraulic model of the major infrastructure facilities and pipelines of the water transmission and distribution system. This was accomplished utilizing a computer software program entitled "WaterCAD Version 8". This program is intended for the design and analysis of pressurized pipe flow systems such as municipal potable water systems.

1.2 Project Background

C&E was retained by the Town to develop an accurate, complete and representative hydraulic model of the water system, which would serve as a means to evaluate the overall system performance and operational techniques as well as replicate the hydraulic capabilities of system operation. The completed hydraulic model presented in this report is a "tool" that can be utilized in the future planning, current operation and maintenance, and emergency studies. Modifications to system facilities can also be evaluated using the model. Typical examples of model utilization include:

- Future demand projections and impact on the system
- Investigate the size and routing of proposed water mains
- Sizing and locating future pumping and storage facilities
- Determining the effects of improving pipelines (i.e. clean and line, replace, etc.)
- Development of emergency operating procedures
- Removal of facilities from service for maintenance
- Evaluation of fire flow availability

- Analysis of interconnections with neighboring water systems
- Modifications of pressure zones

The completed model is also ready for use in an extended period (i.e. hour-by-hour) simulation process. This type of analysis simulates the hydraulic behavior of water system facilities over a selected period of time in sequential time increments. For example, the system can be viewed over a 24-hour period in time steps of one-hour increments. Hydraulic behaviors include changing system demand and movement of water storage volume. The extended period simulation is extremely useful for detailed hydraulic analysis including system component sizing and operational modes.

1.3 Overview of Study

The development of this hydraulic model consisted of investigation and research into the major hydraulic facilities, customer demands, and operating practices of the water system. The practices used in the development of this model include five major categories of activities that are further detailed within this report:

1. System operations
2. Demand zone allocation system
3. Junction node system
4. Pipeline system
5. Model calibration and simulation

Production and consumption data from the most recent one year period was reviewed in order to determine consumer demand and flow data that was most representative of the existing water system. The completed hydraulic model accurately depicts the Average Day, Maximum Day, and Peak Hour conditions of the supply and distribution system.

1.4 Acknowledgements

C&E wishes to acknowledge the information and assistance provided by the following individuals of the Town of Johnston during this project and without whose input the hydraulic modeling study could not have been accurately developed:

Mr. Makram H. Megalli, PE, Director of Public Works
Ms. Lorraine Caruso, PE, Town Engineer
Ms. Patricia Schiavitti, Clerk

Section 2.0 Existing Water System Description

2.1 General Service Area

The Town of Johnston, through the Johnston Water Control District (JWCD), owns and operates a water distribution system that provides potable water service to a portion of the Town of Johnston. In addition to the JWCD water system, the Town is also served by two neighboring water purveyors: the Greenville Water District (GWD) and Providence Water. The Greenville Water District serves an isolated portion of the northwest corner of Town, in the vicinity of Slack Reservoir. Providence Water provides water service to the area of Town generally located to the east of Interstate 295 with exception of the Simmonsville Avenue area which is also serviced by the Town water system. The Town also maintains two booster pump stations within the service area that serve isolated areas of development at higher elevations.

The JWCD maintains water works infrastructure consisting of transmission and distribution mains, two booster pump stations, an elevated water storage tank, hydrants, meters and appurtenances that serve a total of 1,760 metered accounts.

The Town's existing piping system consists of approximately 38 miles of water main with pipe sizes ranging from 6 to 24 inches in diameter (exclusive of customer service connections). For purposes of the model, transmission mains are defined as water mains of 12-inches or greater in diameter.

Elevations throughout the Town's water system range from approximately 180 feet Mean Sea Level (MSL) to 568 feet MSL in the northwest portion of the system.

Based on historical data, the Town serves a residential population of approximately 4,600 persons. A majority of the large users consist of large industrial enterprises, residential and health care facilities, etc.

2.2 Distribution Pipelines

As previously indicated, the Town's transmission and distribution system consists of approximately 38 miles of water main. All of this piping has been incorporated into the hydraulic model pipeline database, exclusive of customer service connections. The water system's transmission mains are primarily responsible for the conveyance of water between the point of purchase, the water supply system service area and the system storage tank and booster stations. The transmission mains range in size from 12 to 24 inches in diameter. The distribution mains convey water to the customers throughout the system and range in size from 6 to 12 inches in diameter.

Materials of construction are a combination of cement-lined ductile iron (DI), asbestos cement (AC), polyvinyl chloride (PVC) and unlined cast iron (CI). Approximately ninety percent of the water mains in the system consist of DI. All three materials, with the exception of CI, offer an excellent resistance to corrosion and afford long-term durability. CI water mains are located predominantly in the older sections of the distribution system in the southeast and comprise a small percentage of the overall system. These mains are subject to tuberculation thus reducing the carrying capacity of the main and are generally over 50 years in age.

Overall, the majority of the transmission and distribution system water mains are considered relatively new in terms of the typical useful life for water system components. Given that the expected life of water mains is in the range of 75 –100 years, or greater and that the majority of the system was installed in the early and mid 1980s, the piping system is considered to be in excellent condition.

2.3 Sources of Supply and Wholesale Interconnections

The Johnston Water Control District relies upon the wholesale purchase of water from Providence Water as the water system's sole source of supply. Source water is supplied to the JWCD through two primary interconnections consisting of master meter vaults located at the intersections of Plainfield Pike and Green Hill Road and at Plainfield Pike and Simmonsville Avenue. Four additional interconnections also maintained as master meter vaults to Providence Water are maintained off Plainfield Pike that serve several smaller isolated areas within Town.

These are located at the intersection of Plainfield Pike with Taylor Road, Nardolillo Street, Capitol Street and Everbloom Drive. All six interconnections are served from the Providence Water transmission main located in Plainfield Pike

The 24-inch Providence Water owned water main located in Plainfield Pike, which is connected to the Lawton Hill Reservoir pressure zone of Providence Water, supplies each of the six interconnections. This pressure zone is operated at a hydraulic gradient of approximately 478 feet, which is determined by the water elevation in the Lawton Hill Reservoir. This water elevation determines the supply pressure to the JWCD and translates to a pressure of approximately 29 psi at the primary interconnection located at the intersection of Plainfield Pike and Green Hill Road.

2.4 Pressure Zones

All six interconnections to the Providence Water system operate at the same pressure which is determined by the water elevation in the Lawton Hill Reservoir. Additionally, the Green Hill Road interconnection zone contains two booster pump stations that serve outlying areas in Town which are at substantially higher service elevations. The pressure zones are as follows:

Providence Water Pressure Zone: includes the area in the southeast corner of the system that is connected directly via the six interconnections to the Providence Water system. This includes the areas in Town that are serviced directly from the master meter vaults / interconnections at the following locations at intersections with Plainfield Pike: Green Hill Road, Simmonsville Avenue, Taylor Road, Nardolillo Street, Capitol Street and Everbloom Drive.

Shun Pike Pressure Zone: includes the area west of Green Hill Road on Shun Pike and streets located off Shun Pike extending west to Peck Hill Road and Pippin Orchard Road. Pressure in this zone is boosted via a pump station located on Shun Pike. Water supply for this pressure zone is obtained from the Green Hill Road interconnection with Providence Water.

Central Avenue Pressure Zone: This includes the remaining area of the service district extending to the north and west of the Central Avenue pump station. Pressure in this zone is boosted via a

pump station located near the intersection of Central Avenue and Reservoir Avenue. Water supply for this pressure zone is obtained from the Green Hill Road interconnection with Providence Water.

2.5 Storage Facilities

The Town owns and maintains one elevated storage tank located in the pressure zone supplied by the Central Avenue booster station. As such, only this portion of the system is afforded the storage capacity of this tank for normal, fire and emergency conditions. The tank structure is located off of Golden View Drive and was constructed in 1987. The elevated structure consists of a steel fluted tower design of 750,000-gallon capacity.

The water level in this tank controls the operation of the Central Avenue pump station. This tank serves to maintain a constant pressure in this portion of the service area, provides storage volume for peak and fire flow demand and provides an emergency supply of water.

The overflow elevation is equal to a hydraulic grade elevation of 650 feet with a height to the bottom capacity line of 66 feet. The overall tank height is 121 feet with a head range in the bowl of 44 feet and diameter of 58 feet. Usable storage is approximately 480,000 gallons and is premised on maintaining a 35-psi pressure in this portion of the system.

2.6 Booster Pump Stations

The Town owns and maintains two (2) water system booster pump stations for purposes of increasing the pressure to service specific areas within the system serviced by the Green Hill Road interconnection. These booster stations are required due to customer service elevations in these areas that approach 530 feet Mean Sea Level (MSL). Without these stations, insufficient pressure and volume would occur within these service areas. Each station is also equipped with an emergency generator in the event of power loss.

Central Avenue Booster Pump Station

This facility is located at the intersection of Central and Reservoir Avenues and is designed to boost the hydraulic grade from the Providence Water system from 478 to 650 feet and supplies

service areas to the north and west. The station was constructed in 1990 and is fitted with two 600-gpm electric driven centrifugal pumps in an underground vault.

Allowances for the addition of a third pump have been provided in the suction and discharge piping of the station. The pumps are set to operate in response to the water level in the Golden View Drive water storage tank. Telemetry equipment transfers a signal of the water level in the tank back to the booster station, which in turn is used to control the sequencing of the pumps.

The station is equipped with emergency power which is housed in a nearby above grade structure. The rated capacity of this station which is determined to be the pumping rate with the largest pump out of service is 600 gpm or 0.864 mgd.

Shun Pike Booster Pump Station

This facility is located approximately one mile west of the intersection of Shun Pike and Green Hill Road and is designed to boost the hydraulic grade of water received from the Providence Water system from 478 to 660 feet. This station is designed to supply isolated higher elevations in vicinity to Peck Hill. The station was originally constructed in the 1970's and is fitted with a duplex booster pump system in an underground vault. Each of the booster pumps is rated for 100 gpm.

Improvements were completed to this facility in the 1980's which included the addition of a 4000-gallon horizontal hydro-pneumatic steel tank, a fire pump rated at 500 gpm, and a new emergency generator system. The storage tank, fire pump and emergency generator are housed in an above grade building structure. The 100 gpm booster pumps are housed in a below grade vault located adjacent to the main building. A pressure switch sequences the operation of the pumps and maintains pressure in the hydro-pneumatic tank. Pressure at the tank is maintained in a range of 40 to 60 psi. The capacity of the pump station is determined to be the pumping rate with the largest pump out of service which is 100 gpm or 0.144 mgd.

2.7 Wholesale Interconnections

There are a total of six wholesale interconnections which the Town maintains with Providence Water for the purchase of water supply. The maximum rate of delivery through the two primary interconnections (Green Hill and Simmonsville) has been determined based on a maximum velocity of 5 feet per second through the downstream water transmission mains, or the maximum capacity through the meter, whichever is the lesser.

The transmission mains consist of an 18-inch in Green Hill Road and a 12-inch in Simmonsville Avenue. The maximum rate of flow available through the Green Hill Road transmission main is determined to be approximately 4.5 million gallons per day (mgd) or 3,100 gpm. An 8-inch compound meter assembly is rated for a maximum flow in the range of 3.6 mgd or 2,400 gpm. The lesser value of 3.6 mgd will be utilized in this case to rate the maximum available capacity through this interconnection.

The Simmonsville Avenue interconnection maximum flow rate is determined to be approximately 1.1 mgd or 785 gpm based on the transmission main capacity. An 8-inch compound meter assembly is rated for a maximum flow in the range of 3.6 mgd or 2,400 gpm. The lesser value of 1.1 mgd will be utilized in this case to rate the maximum available capacity through this interconnection.

This equates to a total available capacity of 4.7 mgd. The other four interconnections serve isolated areas and are not looped into the main portion of the system.

These interconnections are currently the only source of water to the Town water system. The Greenville Water District services a small area of in the extreme northwest area of Town in vicinity to the Slack Reservoir but is limited in its service capability and cannot meet the needs of the remainder of the system in an emergency. Geographically, the Greenville Water service area and the JWCD service area are upwards of 6- 8 miles apart.

Section 3.0 System Demand

3.1 Demand Allocation Zones

A proper allocation and accounting of consumer water system demands is crucial to the development of an accurate hydraulic model. The demand allocation zones are a method that applies the realistic distribution of consumer system demands to the hydraulic model database. The demand allocation zones correlate the water consumer demands in each portion of the service territory to a particular demand situation (i.e. average day, maximum day, and peak hour).

To establish and allocate the water demands, the service territory was divided into smaller sections referred to as demand allocation zones. The Johnston system is inherently maintained with separate service areas through the six interconnections which will also serve as customer demand allocation zones. Also, the Green Hill Road interconnection is further divided into two separate and distinct pressure zones as supplied by the Shun Pike and Central Avenue Booster Pump Stations. These two pressure zones will also be defined as individual customer demand allocation zones.

In this hydraulic model, each interconnection and pressure zone was designated and tracked as a separate customer demand allocation zone. The water demands from water meter records for each street within the water system were incorporated into each customer demand allocation zone which are designated as follows.

DEMAND ZONE	DESCRIPTION
1	Nardolillo Street
2	Capitol Street
3	Simmonsville Avenue
4	Taylor Road
5	Everbloom Drive
6	Green Hill Road
7	Shun Pike BPS
8	Central Avenue BPS

The Town provided consumer demand information for all customer accounts in the water system. This information was provided in the form of consumption data totaling the metered use by each street for the latest available annual billing period. This incorporated the 2nd half of 2007 and the 1st half of 2008 thus providing one year worth of customer meter records. This time period was selected for the model base year due to the completeness of the data and that these consumer demands best represented the system's water consumption patterns.

It was also necessary to account for unaccounted (or unmetered) water that typically occurs within every water system. Unaccounted water consists of the difference in the sum of the volume of water metered at the point of supply and that recorded at all points of sale. This unaccounted for water typically consists of water for authorized use such as sewer and street cleaning, main flushing, etc. and unauthorized use such as system leaks, malfunctioning meters, water theft, other un-metered public use, etc. This unaccounted water, as the name implies, is not metered or billed but must be considered in development of the model.

It was necessary to obtain representative periods of metered billing and wholesale purchase records in order to calculate unaccounted water. The calendar year of 2007 was selected for this purpose as Town records were readily available. Unmetered water was calculated by subtracting the total volume of metered water at the point of sale from the total volume of water purchased from all six wholesale interconnections with Providence Water as follows:

Unaccounted: 296,099,000 gal (wholesale) – 272,040,000 gal (metered) = 24,059,000 gal
Percent Unaccounted: 24,059,000 / 296,099,000 = 8.1%

The total annual usage corresponds to an average day rate of 0.730 million gallons per day (MGD). The percentage of unmetered water in the system was determined to be 8.1% which was added to the consumption demand data to account for water that is not billed. Adding this unmetered demand brings the total average day demand to 0.789 MGD. The 0.789 MGD served as the base demand for the average day demand that was utilized in the model. It should be noted that these demands also include system large users.

The following table depicts the breakdown of the consumption totals for the water demand zone allocation for the Town's water supply system. The total annual water consumption for this period is 287.99 million gallons (MG).

DEMAND ZONE	DAILY DEMAND GPD	UNMETERED GPD	TOTAL (DAILY + UNMETERED) GPD	GPM
NAR – 1	8,910	722	9,632	6.69
CAP – 2	6,119	496	6,615	4.59
SIMM – 3	116,083	9,403	125,486	87.14
TAY – 4	11,431	926	12,357	8.58
EVB – 5	4,697	380	5,077	3.53
GH – 6	261,866	21,211	283,077	196.58
SP – 7	34,949	2,831	37,780	26.24
CEN – 8	285,719	23,143	308,862	214.49
TOTALS	**729,774**	**59,112**	**788,886**	**547.84**

3.2 Characteristics of Customer Consumption

The consumer classification makeup of each demand allocation zone must be determined in order to develop appropriate usage multipliers for maximum day and peak hour. These usage multipliers are used in the model to develop simulations for maximum day and peak hour demand allocations in each demand zone. Generally speaking, residential users typically have a higher maximum day and average day multiplier than commercial and industrial users because of the irrigation of lawns and larger number of water-using appliances. Low and medium density residential customers have a higher maximum day and average day multiplier than high-density residential customers also due to the irrigation of lawns and large number of water-using appliances.

For predominately residential areas, the maximum day multipliers are characteristically high. These high multipliers are due to lawn watering, bathing and pool facility demands. These activities usually cause greater system demands during the dry, warmer periods of the year. Lawn watering and bathing and pool facility demands have the ability to increase the per capita water demand during periods of the year when maximum day demands occur. Daily peaks during these periods occur in the morning between the hours of 5 AM and 7 AM and again in the evening between the hours of 5 PM and 9 PM. These peaks are generally highest in the evening hours of the summer months.

In order to determine multipliers, it is necessary to review available historic water use records including pump, tank and meter records.

3.3 Supply/Demand Rates

Consumption data was correlated with actual flow records from all points of wholesale purchase to develop the maximum day and peak hour demand allocations. All of the water for the distribution system is received directly from interconnections with Providence Water. Each of these six interconnections is metered and read on a monthly basis.

The 2007 monthly wholesale totals for all six interconnections from Providence Water are as follows

January	21,217,000 gal
February	15,477,000 gal
March	11,197,000 gal
April	13,452,000 gal
May	28,103,000 gal
June	32,625,000 gal
July	50,319,000 gal
August	40,112,000 gal
September	35,070,000 gal
October	22,900,000 gal
November	16,079,000 gal
December	9,548,000 gal
Totals	296,099,000 gal.

The average day demand for the water distribution system was determined as 548 GPM (0.789 MGD) which also includes the unaccounted for water volume of 8.1%. This demand serves as the "base demand" and is simply an average of all water consumption over a 365 day period for the base year. This actual base demand was utilized as the average day demand scenario that was incorporated into the model.

Due to the fact that locations of unmetered water use are difficult to predict, the calculated value of unmetered water was distributed across the system service territory evenly amongst the demand allocation zones.

Multipliers are developed to represent the fluctuation in water use within the water system on a day when demands vary significantly from the average demand. Varying demand patterns are examined in order to determine the multipliers. This is accomplished primarily by reviewing meter recordings and charts for sources of supply, storage facilities and booster pump stations.

In order to calculate a maximum day demand for the water system, the wholesale meter records from Providence Water were reviewed. These provided the best indication of the variation in use throughout the year. The July 2007 meter records indicate a total of 50.32 MGD which divided over a 31 day period equates to a daily use of 1.48 MG. While this is not likely the largest single day water usage during this monthly period it provided a general indication of the overall increase in use during this period as compared to the average daily use. Ideally, daily totalized

readings during this monthly period would have provided the best indication of variations in daily use however this information was not available.

The ratio of maximum to average daily use was computed as 1.88 (1.48 MGD divided by 0.789 MGD).

While it is most likely that the maximum daily use is higher than 1.48 MGD, there is no historical information available to make an accurate determination. For purposes of developing a maximum to average day multiplier an assumption was made that the maximum daily use would be higher than the average daily demand of the sample month. Therefore, a maximum day multiplier of 2.25 was utilized which is approximately 20% greater than the calculated ratio of 1.88. It is recommended that daily meter readings be collected at the points of interconnection during an expected maximum daily usage period (i.e. July and August) to gauge actual maximum water usage rates.

In order to develop a peak hour demand multiplier it was necessary to review historical records as available during periods of maximum use (i.e. maximum days). This included obtaining flow data for pump stations, tank charts, and other available data related to system operation during this period. The best source of information for determining peak hourly use in this instance would be from the readings of the master meters. This information was not however available from historical records. Generally, it is not common to collect meter readings at intervals less than a daily basis for general water works practice unless a sophisticated computerized meter reading system is employed.

An alternate means to examine peak usage rates is to review tank charts during known periods of high daily demand. Peak hourly usage rates are usually coincident with maximum day usage. As such, a review of the weekly tank charts from the Golden View Drive storage tank during for the months of July and August (2007 and 2008) was completed. This was done to determine maximum rates of withdrawal from the tank that would be associated with increased customer demand. These were also times when the pump station was off line such that any water depletion was strictly associated with consumer demands. As other similar information was not

available from other areas in the distribution system, the data obtained from the tank charts was considered the best available and most representative of the usage patterns for other areas in the distribution system as well.

It was determined that the maximum draw from the tank occurred during a period on Saturday July 7, 2007 between 12:00 and 3:00 PM in which a total of 90,000 gallons was utilized. A similar withdrawal occurred on Friday July 6, 2008 between 4:00 and 7:00 AM in which a total of 102,000 gallons was utilized. Using the largest withdrawal rate of 102,000 gallons (34,000 gallons per hour) and equating this to the average hourly usage rate in the Central Avenue Pump Station of 11,880 gallons per hour, the ratio of peak hour water use was calculated as 2.86. This was rounded to a value of 3.0 which would be the peak hour multiplier for the model.

It should be noted that the unaccounted for water is assigned a multiplier of 1.0, as it is not considered to vary significantly with customer demands during maximum day and peak hour demand periods.

DEMAND ZONE	AVERAGE DAILY DEMAND (GPM)	MAXIMUM DAILY DEMAND (GPM)	PEAK HOUR DEMAND (GPM)
NAR – 1	6.69	14.42	19.06
CAP – 2	4.59	9.91	13.09
SIMM – 3	87.14	187.91	248.37
TAY – 4	8.58	18.50	24.46
EVB – 5	3.53	7.60	10.05
GH – 6	196.58	423.90	560.28
SP – 7	26.24	56.57	74.78
CEN – 8	214.49	462.51	611.32
TOTALS	**547.84**	**1,181.32**	**1,561.42**

Section 4.0 Hydraulic Model Development

4.1 Representation of System Facilities

All of the major facilities of the Town's water distribution system are represented in the mathematical hydraulic model. This includes all sources of supply (wholesale interconnections), booster pumping and storage facilities and water mains. Information describing the characteristics of each of the water system facilities was acquired from available records of the Town. This also included meetings and discussions with staff during development of the model to verify system geometry including pipeline layout, size, age, material, etc. A general overview of the operation of the system including pump sequencing, booster pump operation, manual and automatic operation of facilities, etc. was also obtained from staff in order to properly establish initial operating conditions for model scenarios. The following is a general description of the facilities and the method by which they are represented in the WaterCAD hydraulic modeling software program.

Junction Nodes – Junction nodes connect two or more pipe segments together and are a point at which flow is introduced or removed from the water distribution system. This is the location where consumer demands are assigned to the model. A junction node must also be inserted in the model at points where the size, age, or material of a pipe section changes. Junction nodes are assigned a prefix of "J-"followed by an identifying number. Each junction node is also assigned an elevation in feet (mean Sea Level). These elevations allow the model to compute pressures at the junction node. Each junction node in the model has been assigned an elevation that was obtained from United States Geological Survey (USGS), 7.5-minute series topographic maps.

In addition, each junction node is further identified in the "Notes" column of the model by an identifying location. For example, "NAR" represents all junction nodes that are assigned to the Nardolillo Street interconnection, "CAP" for Capitol Street and so on. This also aids in identifying the location of a particular junction node within the model.

Pipelines – Pipelines are model elements that have a constant diameter, material, and age and are connected to a junction node. Pipelines can also be connected to tanks, reservoirs and pumps.

The characteristics of each pipeline in the model include size or diameter, length, material, age, Hazen-Williams C-Value coefficients, and connection nodes, tanks, reservoirs and pumps.

Each pipe segment was also identified in the model database with material of construction (i.e. ductile iron, cast iron, etc.) and the street name. All pipeline characteristics were obtained from maps and pipeline databases provided by the Town.

Similar to the junction nodes, all pipe segments are further identified in the "Notes" column of the model by an identifying location. For example, "NAR" represents all pipe segments that are located within the Nardolillo Street interconnection, "CAP" for Capitol Street and so on. This also aids in identifying the location of a particular pipe segment within the model.

The C-values of the pipelines are dependent on the age, material, and diameter of the pipe. Pipes that are made from asbestos cement (AC), polyvinyl chloride (PVC), and ductile iron (DI) have higher C-values due to the fact that they are generally free from corrosion and deterioration. Pipes that are constructed from cast iron (CI) have lower C-values because they are typically older and subject to tuberculation. In addition, CI pipe segments that experience low flows (i.e. in residential neighborhoods or on dead ends) exhibit higher rates of tuberculation and are therefore assigned lower C-values. CI pipes that are considered transmission mains and have higher flow rates typically exhibit less tuberculation and have a higher C-value. The following table contains the values of C-factors used for the pipelines in the hydraulic model.

MATERIAL	C-VALUE
Ductile Iron (DI)	140
Polyvinyl Chloride (PVC)	140
Asbestos Cement (AC)	125
Cast Iron (CI) Transmission	75
Cast Iron (CI) Distribution	60

The junction nodes and pipe segments within the model are grouped by a numbering sequence that allows easier identification and relation to the node and pipeline plan (Attachment 1). The

numbering sequence was performed by demand allocation zone in which the junction node or pipeline is located. This assignment of numbers by location allows future expansion for additional pipe and junction node segments within each zone as the water system is expanded. The following is the general numbering sequence and reserved numbers for future system additions that was incorporated into the model.

DEMAND ZONE	JUNCTION NUMBERS	PIPE SEGMENTS
1 - Nardolillo Street	J-1 to J-9	P-1 to P-9
2 - Capitol Street	J-10 to J-29	P-10 to P-29
3 - Simmonsville Avenue	J-30 to J-109	P-30 to P-109
4 - Taylor Road	J-110 to J-129	P-110 to P-129
5 - Everbloom Drive	J-130 to J-139	P-130 to P-139
6 - Green Hill Road	J-140 to J-199	P-140 to P-199
7 - Shun Pike BPS	J-200 to J-299	P-200 to P-299
8 - Central Avenue BPS	J-300 to J-599	P-300 to P-599

Reservoirs – In the model, a reservoir represents a source of water that is not readily depleted and offers a constant source of supply. The Providence Water Lawton Hill Reservoir is represented as a reservoir set equal to the hydraulic grade of 478 feet. This represents a continual uninterrupted source of supply available to the six interconnections that would not vary even under extended period simulation.

Tanks – A total of two (2) water storage tanks have been represented in the model. Critical information for each tank includes the type of tank, overflow elevation, initial water level, base elevation, height, and diameter. This information is essential especially for performing extended period simulations. The following tanks and labeling scheme have been incorporated into the model.

LABEL	DESCRIPTION
T-1	Golden View Drive Storage Tank
T-2	Shun Pike Hydropneumatic Tank

Pumps – Pumps are hydraulic elements that add hydraulic head (power) to the water system. They generally represent booster stations and transmission pump stations. Several pump systems have been incorporated into the model to represent the booster pump systems at Central Avenue and Shun Pike.

Each of the pumps has been represented in the model by a pump curve, which correlates head and flow for a particular pump at each facility. These pump curves were obtained from available Town records. A copy of these pump curves are provided in Appendix A – Booster Pump Station Pump Curves.

4.2 Simulations Overview

Demands from the consumption data provided by the JWCD were sorted by street for each of the interconnection areas. Demands were correlated to a street in each interconnection area and applied to the junction nodes in each of the respective demand allocation zones. The junction node and pipeline database directories for the system serve as the basis of information for input to the model. All information regarding pipelines (i.e. length, diameter, material, C-value, etc.), junction nodes (i.e. demand, elevation, etc.), pumps (i.e. pump curves, etc.), tanks (i.e. overflow elevations, level in tank, etc.) and reservoirs (i.e. initial hydraulic grade line, etc.) can be found in Appendix B for the Average Day scenario. Also included in Appendix B is a summary sheet of the Calculation Results for this particular scenario.

When viewing the pipe and junction node result tables, the calculated values consist of each pipeline segment in the system along with a solved flow, head loss, and velocity. The results for each junction node in the system consist of the demand, elevation, solved pressure and hydraulic grade line. It should be noted that a pipeline that has a "minus" sign preceding the flow rate simply means that flow is occurring in the direction opposite to the direction in which the pipeline was originally entered in the database. As demand situations change the direction of flow in pipelines may also change. This is especially evident when pipelines supplying tanks are filling or draining or when conducting fire flow scenarios.

Appendix C and D contain Calculation Results that summarize both the maximum day and peak hour scenarios, respectively. The critical information for these scenarios is included which includes total system demand, pipelines, junction nodes, tank fill and draw rates, reservoir supply rates, booster pumping rates and total dynamic head.

4.3 Average Day Simulation

A complete summary of this simulation is provided in Appendix B.

Initial Modeling Conditions:

The following is a summary of the initial model conditions (i.e. tank levels, pumps on / off, etc.) categorized by the various pressure gradients:

Facility	Status/Control Set Points
Providence Water (478') Pressure Gradient	
- Providence Water Interconnections	Active – Open
Green Hill Road	Active – Open
Everbloom Drive	Active – Open
Taylor Road	Active – Open
Simmonsville Avenue	Active – Open
Capitol Street	Active – Open
Nardolillo Street	Active – Open
Central Avenue Pump Station (650') Pressure Gradient	
- Golden View Drive Tank	645 feet
- Central Avenue Booster Pump Station	On – One Pump Active
Shun Pike Pump Station (660') Pressure Gradient	
- Shun Pike Hydro-pneumatic Tank	616.7 feet
- Shun Pike Booster Pump Station	Active

Results Summary:

This scenario was premised on a total system demand of 549 gpm or 0.791 MGD, which is the total system demand. The scenario indicates that the total volume of flow being stored in the tanks (aggregate volume going to storage tanks) is equal to 223 gpm or 0.321 MGD. Overall, the hydraulic gradients for the various pressure zones were calculated to be in the range in which these pressure zones are normally operated.

Facility	Output Results Summary
Providence Water (478') Pressure Gradient	
- Providence Water Interconnections	
Green Hill Road	552 gpm output, 29 psi pressure
Everbloom Drive	4 gpm output, 47 psi pressure
Taylor Road	9 gpm output, 56 psi pressure
Simmonsville Avenue	195 gpm output, 67 psi pressure
Capitol Street	5 gpm output, 96 psi pressure
Nardolillo Street	7 gpm output, 109 psi pressure
Total Providence Water Interconnections	771 gpm output
Central Avenue Pump Station (650') Pressure Gradient	
- Golden View Drive Tank	Filling at 248.95 gpm
- Central Avenue Booster Pump Station	463.95 gpm output
Shun Pike Pump Station (660') Pressure Gradient	
- Shun Pike Hydro-pneumatic Tank	Draining at 26.25 gpm
- Shun Pike Booster Pump Station	Active

4.4 Maximum Day Simulation

A complete summary of this simulation is provided in Appendix C.

Initial Modeling Conditions:

The following is a summary of the initial model conditions (i.e. tank levels, pumps on / off, etc.) categorized by the various pressure gradients:

Facility	Status/Control Set Points
Providence Water (478') Pressure Gradient	
- Providence Water Interconnections	Active – Open
Green Hill Road	Active – Open
Everbloom Drive	Active – Open
Taylor Road	Active – Open
Simmonsville Avenue	Active – Open
Capitol Street	Active – Open
Nardolillo Street	Active – Open
Central Avenue Pump Station (650') Pressure Gradient	
- Golden View Drive Tank	645 feet
- Central Avenue Booster Pump Station	On – One Pump Active
Shun Pike Pump Station (660') Pressure Gradient	
- Shun Pike Hydro-pneumatic Tank	616.7 feet
- Shun Pike Booster Pump Station	Active

Results Summary:

This scenario was premised on a total system demand of 1,182 gpm or 1.70 MGD, which is the system demand including unmetered water volume. The scenario indicates that the total volume of flow being depleted from the tanks (aggregate volume draining out of storage tanks) is equal to 63 gpm or 0.091 MGD. Overall, the hydraulic gradients for the various pressure zones were calculated to be in the range in which these pressure zones are normally operated.

Facility	Output Results Summary
Providence Water (478') Pressure Gradient	
- Providence Water Interconnections	
Green Hill Road	774 gpm output, 29 psi pressure
Everbloom Drive	8 gpm output, 47 psi pressure
Taylor Road	18 gpm output, 56 psi pressure
Simmonsville Avenue	291 gpm output, 67 psi pressure
Capitol Street	10 gpm output, 96 psi pressure
Nardolillo Street	14 gpm output, 109 psi pressure
Total Providence Water Interconnections	1,119 gpm output
Central Avenue Pump Station (650') Pressure Gradient	
- Golden View Drive Tank	Draining at 7 gpm
- Central Avenue Booster Pump Station	456 gpm output
Shun Pike Pump Station (660') Pressure Gradient	
- Shun Pike Hydro-pneumatic Tank	Draining at 57 gpm
- Shun Pike Booster Pump Station	Active

4.5 Peak Hour Simulation

A complete summary of this simulation is provided in Appendix D.

Initial Modeling Conditions:

The following is a summary of the initial model conditions (i.e. tank levels, pumps on / off, etc.) categorized by the various pressure gradients:

Facility	Status
Providence Water (478') Pressure Gradient	
- Providence Water Interconnections	Active – Open
Green Hill Road	Active – Open
Everbloom Drive	Active – Open
Taylor Road	Active – Open
Simmonsville Avenue	Active – Open
Capitol Street	Active – Open
Nardolillo Street	Active – Open
Central Avenue Pump Station (650') Pressure Gradient	
- Golden View Drive Tank	645 feet
- Central Avenue Booster Pump Station	On – One Pump Active
Shun Pike Pump Station (660') Pressure Gradient	
- Shun Pike Hydro-pneumatic Tank	616.7 feet
- Shun Pike Booster Pump Station	Active

Results Summary:

This scenario was premised on a total system demand of 1,561 gpm or 2.25 MGD, which is the system demand including unmetered water volume. The scenario indicates that the total volume of flow being depleted from the tanks (aggregate volume draining out of storage tanks) is equal to 236 gpm or 0.340 MGD. Overall, the hydraulic gradients for the various pressure zones were calculated to be in the range in which these pressure zones are normally operated.

Facility	Output Results Summary
Providence Water (478') Pressure Gradient	
- Providence Water Interconnections	
Green Hill Road	906 gpm output, 29 psi pressure

Everbloom Drive	10 gpm output, 47 psi pressure
Taylor Road	24 gpm output, 56 psi pressure
Simmonsville Avenue	348 gpm output, 67 psi pressure
Capitol Street	13 gpm output, 95 psi pressure
Nardolillo Street	19 gpm output, 108 psi pressure
Total Providence Water Interconnections	1,325 gpm output

Central Avenue Pump Station (650') Pressure Gradient

- Golden View Drive Tank	Draining at 161 gpm
- Central Avenue Booster Pump Station	450 gpm output

Shun Pike Pump Station (660') Pressure Gradient

- Shun Pike Hydro-pneumatic Tank	Draining at 75 gpm
- Shun Pike Booster Pump Station	Active

Section 5.0 Model Calibration

5.1 General

As stated previously, every effort was made to mathematically reproduce the JWCD's water supply and distribution system in such a manner as to realistically simulate existing physical operation of the water system under various flow and operating conditions. The completed hydraulic model as described herein accurately represents the physical system infrastructure of the water system facilities in order to perform simulations to realistically simulate the existing operation practices of the JWCD water supply and distribution system. To accomplish this task, all readily available system operation data was reviewed (i.e. flow records, consumption data, drawings and cut sheets of infrastructure, mapping, etc.) and applied to each scenario in the model in order to represent actual system operating conditions. This was supplemented by information obtained from operations personnel. The data provided by the JWCD was applied to an average day, maximum day and peak hour scenario in the model.

Calibration is achieved by comparing results of various scenarios in the model with the performance of the physical system. Actual recorded system conditions (i.e. flow records, tank charts, pressure readings, etc.) are compared to calculated values in the model during a time when the system is most closely experiencing a particular demand scenario. The model is considered "calibrated" when it is concluded that the actual physical conditions as evidenced through historic and current records are within an acceptable tolerance to the model output results. According to the American Water Works Association (AWWA) Distribution Network Analysis for Water Utilities, a model is acceptably calibrated if "... it predicts performance within 5 to 10 percent of observed performance". For purposes of completing and calibrating the model for the JWCD system, it is expected that the completed model is able to predict observed performance in the system to 5 percent or better thus achieving a relative accuracy of upwards of 95 percent.

An inherent problem in calibrating a hydraulic computer model is the vast number of system infrastructure changes that occur routinely through ongoing capital and infrastructure improvement projects. For example, when reviewing historic data with which to compare computed results, it is critical to consider that various improvements are likely to have occurred

since the recording of the data. This may impact the results in that the improvements are likely to have been included in the model yet the historical data was collected when these improvements were not in place. Most critical are pipeline improvement projects involving large water transmission mains. Such improvements can dramatically alter the flow patterns throughout the water system. Nevertheless an attempt was made to correlate historic data with actual model results in order to achieve a relative accuracy of the model that is consistent with standard hydraulic modeling practices.

For purposes of calibration, it is ideal to collect operational data during the periods at which the maximum day and peak hour demands occur. The system experiences the greatest head losses at times when these maximum demand conditions occur and are most measurable by the model. The model calculates head losses at specific demand conditions therefore, field measurements of operational conditions will be more accurate due to the fact that there is more head loss during periods at which the flows are highest. To establish data in the base scenario of the model, it is best to collect physical data when demands are low to ensure that interference with system operations is minimized.

Further verification as to the relative accuracy of the model was achieved through a review of the historical tank chart data supplied by JWCD. The comparison of the computer outputs from the Golden View Drive Tank have been found to be near accurate to historic data.

PROVIDENCE WATER

Tap Water Delivers

November 12, 2020

Council President Sabina Matos
Providence City Hall
25 Dorrance Street
Providence, RI 02903

Re: Merger and Annexation of the Johnston Water District into the Providence Water Supply Board System

Dear President Matos:

Since 2007, the Town of Johnston (Town) has periodically approached Providence Water (PW) to discuss the possibility of PW acquiring the Johnston Water Department (JWD), a wholesale customer of Providence Water, on a retail basis. In 2019, various conditions including the current analysis of the system and successful negotiations with the Town have resulted in a proposed merger and annexation agreement with the following terms:

- Ownership of the JWD will be transferred (merger and acquisition) to PW and the JWD, as an entity, will cease to exist. PW will not be paying a fee to acquire the JWD.
- The acquisition of the JWD will generate approximately $1,000,000 of additional annual revenue for PW.
- All assets of the JWD will be transferred to PW. No employees will be transferred from the JWD to PW.
- Following the merger and annexation, PW will assume responsibility for the operations, maintenance and upgrades of the JWD system.
- PW has sole discretion to determine required system upgrades.
- Following the merger and acquisition, approximately 1,700 JWD retail customers will be directly charged current PW retail water rates. Per State law, JWD customers will also be charged a monthly assessment/annexation fee to fund any system infrastructure improvements required to conform to applicable regulations and/or PW system standards.

At the meeting of the Providence Water Supply Board held on August 19, 2020, all Board members present voted to approve the merger and annexation of the Johnston Water Department into the Providence Water Supply Board system. On October 28, 2020, the Johnston Town Council approved the merger and annexation of the Johnston Water Department into the Providence Water Supply Board system.

We are requesting that this matter be placed on the November 19, 2020 City Council meeting docket for approval. A copy of the Merger and Annexation Agreement is attached.

Respectfully,
PROVIDENCE WATER SUPPLY BOARD

Ricky Caruolo
General Manager

(401) 521-6300

125 Dupont Drive
Providence, RI 02907

www.provwater.com

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MERGER AND ANNEXATION AGREEMENT

THIS MERGER AND ANNEXATION AGREEMENT ("Agreement") is entered into as of the __ day of November, 2020 by and between the City of Providence, a municipal corporation, for and through the Providence Water Supply Board, with a principal business address at 125 Dupont Dr, Providence, Rhode Island 02907 ("PWSB"), and the Town of Johnston, a municipal corporation with a principal address at 1385 Hartford Avenue, Johnston, Rhode Island ("Johnston"). Johnston and PWSB are sometimes individually referred to herein as a "Party" and, collectively, as "Parties."

W I T N E S S E T H:

WHEREAS, Johnston owns and operates a water distribution system serving portions of the Town of Johnston, Rhode Island (the "Johnston System"); and

WHEREAS, PWSB owns and operates a large water distribution system ("PWSB System") serving diverse localities within the State of Rhode Island ("State"), as well as the Scituate Reservoir which serves as a critical source of potable water for much of the State; and

WHEREAS, Johnston is a wholesale customer of PWSB in that the Johnston System has no source of potable water of its own and is supplied water solely by PWSB through the PWSB System; and

WHEREAS, Rhode Island General Laws § 46-30-1 *et seq*. provides a mechanism to merge small public water bodies and their supply systems and/or annex small systems to adjacent water supplies and systems in order to provide viable water supplies capable of meeting federal and state drinking water regulations; and

WHEREAS the Parties desire to annex the Johnston System to and into the PWSB System pursuant to Rhode Island General Laws § 46-30-1 (the "Annexation") in order to (i) continue to provide a viable water supply capable of meeting federal and state drinking water regulations to the Johnston System users, (ii) to bring the Johnston System on parity with that of the PWSB System, and (iii) to remove the administrative and financial burden for Johnston related to the operation of the Johnston System.

NOW, THEREFORE, in consideration of these premises, the respective representations, warranties, covenants, consideration and agreements of PWSB and the Johnston set forth below, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, and intending to be legally bound hereby, the Parties agree as follows:

ARTICLE I
TRANSFER OF OWNERSHIP, MERGER AND ANNEXATION

1.01 Transfer. Subject to the provisions of this Agreement, at the Closing (as defined in Section 1.07 hereof), Johnston shall convey, assign, transfer and deliver to PWSB, and PWSB

shall acquire and accept from Johnston, all of the assets of the Johnston System, including but by no means limited to the following (collectively, the "Annexed Assets"): all facilities, pumping stations, pipes, mains, valves, connections, conduits, machinery, equipment, inventory, meters, hydrants, materials, records, miscellaneous devices, appurtenances, all water rights in connection with the Johnston System, all rights and benefits accrued in relation to the Johnston System arising out of federal assistance or federal funding available in relation to the Johnston System, and all other tangible property related to the operations maintenance, improvement and management of the Johnston System (the "Business"), and also including, without limitation, the Real Estate (as hereinafter defined) and all other items set forth on Schedule 1.01 attached hereto, but explicitly excluding the Excluded Liabilities

1.02 Assumption of Certain Liabilities. In connection with the acquisition of the Annexed Assets, PWSB shall not assume any existing or prospective liabilities of Johnston, except for the obligations of Johnston set forth on Schedule 1.02 attached hereto ("Assumed Liabilities").

1.03 Excluded Liabilities. "Excluded Liabilities" shall mean all liabilities and obligations of any nature, fixed or contingent, known or unknown, of Johnston and the Johnston System other than the Assumed Liabilities.

1.04 Annexation. It is the intent of the Parties hereto that the Annexation be treated as an annexation pursuant to the Public Water Supply Systems Act of 1995, Rhode Island General Laws § 46-30-1 *et seq.* (the "Act"). Accordingly, the Parties hereby agree that the provisions of the Act shall supplement this Agreement, and in the event any term of this Agreement conflicts with the requirements of the Act, the requirements of the Act shall be deemed to govern so as to effectuate the annexation of Johnston System to and into the PWSB System in order to continue to provide a viable water supply capable of meeting federal and state drinking water regulations to the Johnston System users. PWSB shall be the "governing agency" (as defined in the Act) following the annexation.

1.05 Effect of Annexation. Following the Annexation contemplated herein:

(a) The identity, existence, purposes, powers, objects, franchises, rights and immunities of PWSB shall continue unaffected and unimpaired by the Annexation hereby provided for, and the Annexed Assets, franchises, rights and immunities of the Johnston System shall be continued in and be annexed into the PWSB System, and PWSB shall be fully vested therewith;

(b) PWSB shall possess all rights, privileges and powers of Johnston as the same relates to the Johnston System, including but not limited to all rights of sole, exclusive and unencumbered ownership in the Annexed Assets, the Johnston System and the Real Estate; and

(c) All property, rights, privileges, powers and franchises of Johnston in and to the Johnston System, the Annexed Assets and the Real Estate shall be thereafter and effectually the property of PWSB in accordance with, and to the extent permitted, under Rhode Island General Laws § 46-30-1 *et seq* .

1.06 Time and Place of Closing. The closing and effective date of the Annexation provided for in this Agreement (the "Closing") shall be held on November 30, 2020 at the offices

of Pannone Lopes Devereaux & O'Gara LLC, 1301 Atwood Avenue, Suite 215N, Johnston, Rhode Island 02919, or such time and place as may be mutually agreed upon by the Parties in writing ("Closing Date"); or alternatively, the Closing will take place by an exchange of closing documents to be coordinated by PWSB's counsel.

1.07 Transfer of Annexed Assets. At the Closing, Johnston shall deliver or cause to be delivered to PWSB, or its nominee, through good and sufficient instruments of assignment or transfer to PWSB, or its nominee, title to all the Annexed Assets, any beneficial rights or privileges related to the same or the Johnston System, as well as all right, title and interests in all real estate, real property leases, licenses and easements held by Johnston, all of which are set forth and identified by Johnston in Schedule 1.01 (the "Real Estate").

Such instruments of transfer shall include, without limitation:

(a) Bills of Sale and Assignment for all Annexed Assets duly executed by Johnston, in substantially the form of Exhibit A;

(b) Assignment and Assumption Agreements duly executed by Johnston, in substantially the form of Exhibit B; and

(c) Deeds or Assignments, as applicable, of all the Real Estate as attached as Exhibit C.

The instruments of transfer identified in this Section 1.07 shall effectively vest in PWSB, good and marketable title to all the Annexed Assets, and all rights, title and interest in and to the Real Estate, free and clear of all liens, restrictions and encumbrances not specifically disclosed hereunder or in the applicable Schedules hereto.

1.08 Delivery of Records and Contracts. At the Closing, Johnston shall deliver or cause to be delivered to PWSB, or its nominee, all copies of Johnston's business records, books and other data relating to the Annexed Assets, the Real Estate and the Business. Johnston shall take all requisite steps to put PWSB in actual possession, ownership and operating control of the Annexed Assets and the Real Estate. After the Closing, Johnston shall afford to PWSB and its accountants and attorneys, at PWSB's sole expense, reasonable access to the books and records of Johnston related to the Business and shall permit PWSB to make extracts and copies therefrom for the purpose of preparing such tax returns of PWSB as may be required after the Closing and for other proper purposes approved by PWSB.

1.09 Rules, Regulations and Rates. Following the Closing, and subject to the annexation fee provided for in Section 1.10, and the Rhode Island Public Utilities Commission's direction, Johnston customers will be subject to the same rates, rules, regulations, municipal, state and federal laws to which all other customers of PWSB are subject.

1.10 Annexation Fee. In accordance with R.I.G.L. § 46-30-4 of the Act, it is intended by the Parties that a fee be imposed on Johnston service area customers, following the Annexation, over and above the existing PWSB water rate per HCF (the "Annexation Fee"). The Annexation Fee shall be sufficient to cover any expressly assumed debt payments hereunder, and such other

capital costs, operational expenses and management support costs associated with upgrades to the Johnston System, operational and management responsibilities of PWSB to bring the Johnston System into compliance with the applicable regulations and on parity with the existing facilities of PWSB, and for such other purposes as are permitted under the Act. The Annexation Fee shall be $0.34 per HCF. The Annexation Fee shall cease upon the earlier of: (i) the full payment of: (A) such expressly assumed debt (if any), capital costs, operational expenses and management support costs associated with upgrades to the Johnston System, (B) operational and management responsibilities of PWSB to bring the system into compliance with the applicable regulations and on parity with the existing facilities of PWSB, and (C) any Assumed Liabilities or which are deemed assumed by PWSB as a matter of law following the merger and Annexation; or (ii) the outside termination date set forth in R.I Gen. Laws § 46-30-4(c).

1.11 Merger. The Parties agree that, following the Closing, PWSB shall have the right, but not the obligation to file with the Rhode Island Office of Secretary of State, a certification ("Merger Certificate") that the Johnston System has been merged into the PWSB System in accordance with R.I.G.L. § 46-30-5 of the Act.

1.14 Further Assurances. In the unexpected event that the Annexation contemplated herein is not effectuated, or any rights, title or interest in the Annexed Assets or Real Estate are not fully or properly vested, Johnston, from time to time after the Closing at the request of PWSB and without further consideration, shall execute and deliver further instruments of transfer and assignment (in addition to those delivered under Section 1.07) and take such other action as PWSB may reasonably require to more effectively transfer and assign to, and vest in, PWSB each of the Annexed Assets and the Real Estate, to effectuate the Annexation, and to otherwise carry out the tenor and purposes of this Agreement. To the extent that the assignment of any contract, commitment or right shall require the consent of other parties thereto, this Agreement shall not constitute an assignment thereof; however, Johnston shall use best commercial efforts before and after the Closing to obtain any necessary consents or waivers to assure PWSB of the benefits of such contracts, commitments or rights, provided, nothing herein shall be deemed a waiver by PWSB of its right to receive at the Closing an effective assignment of each of the contracts, commitments or rights of the Johnston with respect to the Annexed Assets.

1.15 Bulk Transfer Laws. PWSB and Johnston waive compliance with any applicable bulk transfer laws in connection with the transactions contemplated hereby.

ARTICLE II
REPRESENTATIONS AND WARRANTIES OF THE JOHNSTON

2.01 Making of Representations and Warranties. Johnston makes to PWSB the representations and warranties contained in this Article II.

2.02 Organization; Qualifications of Johnston. Johnston is a municipal corporation, incorporated by municipal charter - duly organized, validly existing and in good standing under the laws of the State with full power and authority to own or lease its properties and to conduct its business in the manner and in the places where such properties are owned or leased or such business is conducted by it. Johnston is not a public utility within the meaning of State law.

2.03 Authority of Johnston. Johnston has full right, authority and power to enter into this Agreement and each agreement, document and instrument to be executed and delivered by Johnston pursuant to this Agreement and to carry out the transactions contemplated hereby, including the Annexation. All necessary action has been taken by Johnston to authorize the execution, delivery and performance of this Agreement (including but not limited to such authorizations required in the Act, Johnston's charter and ordinances), and the same is the valid and binding obligation of Johnston in accordance with its terms. The execution, delivery and performance of this Agreement do not and will not:

(a) violate any provision of the Johnston's home rule charter, ordinances, nor any other controlling governance document or agreement of Johnston;

(b) violate any federal laws or laws of the state of formation or other jurisdiction that applies to Johnston or requires Johnston to obtain any approval, consent or waiver of, or make any filing with, any person or entity (governmental or otherwise) that has not been obtained or made;

(c) except as set forth in Schedule 2.03, violate any provision of, or result in a breach of or a default under, any mortgage, lien, lease agreement, contract, Material Contract (as defined herein), instrument, order, arbitration award, judgment or decision to which the Johnston is a party or by which it is bound; or

(d) result in the imposition of any lien or other encumbrance upon any of the Annexed Assets.

2.04 Title to Properties; Liens. Except as specifically disclosed in Schedule 2.04 attached hereto, Johnston has good and marketable title to the Annexed Assets and the Real Estate. Johnston has all right, power and authority to convey, assign, transfer, and deliver the Annexed Assets and the Real Estate to PWSB in accordance with the terms of this Agreement. Except as set forth in the attached Schedule 2.04, none of the Annexed Assets or Real Estate will be subject to any mortgage, pledge, lien, conditional sale agreement, lease, security title, encumbrance or other charge upon transfer of title to PWSB.

2.05 Financial Statements.

(a) Johnston has delivered to PWSB the following financial statements, copies of which are attached hereto as Schedule 2.05:

(i) An General Ledger Account Summary of Johnston for the fiscal year 2018-2019 ("Base Balance Sheet"), and statements of income, retained earnings and cash flows for such period, together with appropriate footnotes, if any, as prepared by Johnston (collectively the "Financial Statements").

(ii) To Johnston's knowledge, said financial statements are prepared in accordance with GAAP except to the extent that the Johnston's historical method for calculating its inventory obsolescence reserve is not in accordance with GAAP.

(b) Except as set forth on Schedule 2.05(b), as of the date of the Base Balance Sheet, Johnston has had no liabilities of any nature, whether accrued, absolute, contingent or otherwise, asserted or un-asserted, known or unknown (including, without limitation, liabilities as guarantor or otherwise with respect to obligations of others, or liabilities for taxes due or then accrued, or to become due or contingent, relating to activities of Johnston or the conduct of its business prior to the date of the Base Balance Sheet, regardless of whether claims in respect thereof had been asserted as of such date), except liabilities stated or adequately reserved against on the Base Balance Sheet.

2.06 Payment of Taxes. Except as set forth on Schedule 2.06, Johnston has caused to be paid all federal, state, local, foreign, or other taxes, including without limitation, income, transfer, sales, excise, use, value-added, franchise, employment and payroll-related, withholding, environmental, property, or other taxes payable by Johnston (collectively, "Taxes") to any jurisdiction through the date hereof, whether disputed or not, except for Taxes which have not yet accrued or otherwise become due, the non-payment of which would not result in a lien upon the Annexed Assets. Neither the Internal Revenue Service nor any other taxing authority is now asserting, or to the knowledge of Johnston threatening to assert against Johnston, any deficiency or claim for additional Taxes or interest thereon or penalties in connection therewith. There are no security interests on any of the Annexed Assets that arose in connection with any failure (or alleged) failure to pay any Taxes. Johnston agrees that it shall pay the entire tangible tax bill related to all tangible assets of Johnston, if any, at or prior to the Closing Date.

2.07 Absence of Certain Changes. Except as disclosed in Schedule 2.07, since the date of the Base Balance Sheet there has not been, with respect to the Annexed Assets:

(a) any mortgage, encumbrance or lien which remain in existence on the date hereof or on the Closing Date;

(b) any obligation or liability incurred by Johnston in connection with the Johnston System, and the operation, maintenance or management thereof, other than obligations and liabilities incurred in the ordinary course of business consistent with the terms of this Agreement;

(c) any purchase, sale or other disposition, or any agreement or other arrangement for the purchase, sale or other disposition, of any of the properties or assets of the Business other than in the ordinary course of business;

(d) any damage, destruction or loss, whether or not covered by insurance, materially and adversely affecting the properties, assets or business of Johnston;

(e) any labor trouble or claim of unfair labor practices involving Johnston or in connection with the Johnston System, and the operation, maintenance or management thereof, nor any change in the compensation payable or to become payable by Johnston to any of its officers, employees, agents or independent contractors other than normal merit increases in accordance with its usual practices, or any bonus payment or arrangement made to or with any of such officers, employees, agents or independent contractors; or

(f) any other transaction entered into by Johnston other than transactions in the ordinary course of business.

2.08 Ordinary Course. Since the date of the Base Balance Sheet, Johnston has conducted its Business only in the ordinary course and consistent with historical practices.

2.09 Material Contracts. Except for contracts, commitments, plans, agreements and licenses described in Schedule 2.09 ("Material Contracts") (true and complete copies of which have been delivered to PWSB), Johnston is not a party to or subject to:

(a) Any plan or contract providing for bonuses, pensions, options, stock purchases, deferred compensation, retirement payments, profit sharing, collective bargaining or the like, or any contract or agreement with any labor union;

(b) Any employment contract with any employee to be employed by PWSB or contract for services that requires the payment of more than Fifteen Thousand and 00/100 ($15,000.00) Dollars annually or that is not terminable within thirty (30) days by Johnston without liability for any penalty or severance payment;

(c) Any contract or agreement for the sale or lease of products or services not made in the ordinary course of business;

(d) Any contract with any sales agent or distributor of products or services of the Johnston;

(e) Any contract containing covenants that limits the freedom of Johnston to compete in any line of business or with any person or entity;

(f) Any license agreement (as licensor or licensee);

(g) Any indenture, mortgage, promissory note, loan agreement, guaranty or other agreement or commitment for borrowing money;

(h) Any contract granting any person a lien on all or any part of the Annexed Assets;

(i) Any contract granting to any person a first refusal, first offer, or similar preferential right to purchase or acquire any of the Annexed Assets;

(j) Any joint venture or partnership agreement; and

(k) Any contract or agreement with any officer, employee, director or partner of the Johnston or with any persons or organizations controlled by or affiliated with the Johnston.

Except as set forth in Schedule 2.09, to Johnston's knowledge, each Material Contract is a valid and binding obligation of Johnston, enforceable in accordance with its terms, and is in full force and effect, subject only to bankruptcy, reorganization, receivership and other laws affecting creditors' rights generally and equitable principles generally and limitations on the availability of equitable remedies. Except as set forth in Schedule 2.09, Johnston is not in default under or in breach of any of the Material Contracts and Johnston has no knowledge of conditions or facts that, with notice or passage of time, or both, would constitute a breach or default thereunder.

2.10 Annexed Assets. The Annexed Assets are operable, in good working order, and fit for the purpose(s) for which they are presently used. To the best of Johnston's knowledge none of the Annexed Assets have been subjected to deferred maintenance, are below quality for the industry or otherwise are defective or are anticipated to be defective following the Closing. All of the Real Estate is owned in fee simple by Johnston and is not subject to any lien encumbrances or other claims.

2.11 Litigation. Except for matters described in Schedule 2.11 attached hereto, there is no litigation, governmental or administrative proceeding, or investigation pending or, to the knowledge of Johnston, threatened against or affecting the Johnston System, or in connection with the Johnston System, and the operation, maintenance or management thereof, or the Annexed Assets which may have any material adverse effect on the respective properties, assets or business of the Johnston or which would prevent or hinder the consummation of the Annexation or any other transaction contemplated by this Agreement. With respect to each matter set forth therein, Schedule 2.11 sets forth a description of the matter, the forum (if any) in which it is being conducted, the parties thereto and the type and amount of relief sought.

2.12 Compliance with Laws. Except as set forth in Schedule 2.12 attached hereto,

(a) Johnston is in full compliance in all material respects with all laws and regulations which apply to the conduct of the operation of the Johnston System, including all laws and regulations relating to employment and the environment;

(b) Johnston has not received notice of any asserted past or present failure to comply with any law, ordinance, regulation, permit, order or requirement;

(c) Johnston is not subject to any judgment, writ, injunction, decree or other judicial order; and

(d) Johnston is not aware of or does not know of any proposed law or regulation or any event or condition of any character which would or could materially and adversely affect the Johnston System, and the operation, maintenance or management thereof, nor the future operation, maintenance or management of the Johnston System.

2.13 Warranty or Other Claims. Except as disclosed in Schedule 2.13, there are no existing or, to the knowledge of Johnston, warranty or other similar claims, or any facts upon which a material claim of such nature could be based, against Johnston for services that are defective or fail to meet any service warranties. No claim has been asserted against Johnston for renegotiation or price redetermination of any business transaction, and there are no facts upon which any such claim could be based.

2.14 Intentionally Omitted.

2.15 Permits; Burdensome Agreements. Johnston holds all licenses, permits, franchises, certifications, authorizations, rights, permissions and other approvals (collectively, "Approvals") which are required to permit Johnston to conduct its Business and to operate, maintain and manage the Johnston System and the Real Estate and all such Approvals are valid and in full force and effect. Except as disclosed in Schedule 2.15, all such Approvals will be available and assigned to PWSB and remain in full force and effect upon PWSB's purchase of the Annexed Assets and the Real Estate, and no further Approvals will be required in order for PWSB to conduct the business currently conducted by Johnston nor to operate, maintain and manage the Johnston System subsequent to the Closing. Except as disclosed in Schedule 2.15, Johnston is not subject to or bound by any agreement which may materially and adversely affect the business or prospects of Johnston, condition, financial or otherwise, or any of the Annexed Assets and the Real Estate.

2.16 Compliance with R.I. Gen Laws § 46-30-5. Johnston has fully complied with R.I. Gen Laws § 46-30-5 by making the disclosures set forth in the Johnston disclosure schedules to this Agreement.

2.17 Environmental Matters. Johnston has been and is presently fully in compliance with all applicable Environmental Laws relating to the Annexed Assets and the Real Estate. Johnston has never entered into or been subject to any judgment, consent decree, compliance order or administrative order with respect to any environmental or health and safety matter or received any request for information, notice, demand letter, administrative inquiry or formal or informal complaint or claim with respect to any environmental or health and safety matter or the enforcement of any Environmental Law involving the Real Estate or Annexed Assets, and has no knowledge or reason to know that any of the foregoing will be forthcoming. For purpose of this Agreement, the following terms shall be ascribed the corresponding meanings:

(i) "Hazardous Material" shall mean and include any hazardous waste, hazardous material, hazardous substance, petroleum product, oil, toxic substance, pollutant, contaminant or other substance that may pose a threat to the environment or to human health or safety, as defined or regulated under any Environmental Law;

(ii) "Hazardous Waste" shall mean and include any hazardous waste as defined or regulated under any Environmental Law; and (iii) "Environmental Law" shall mean any environmental or health and safety-related law, regulation, rule or ordinance at the foreign, federal, state or local level, including without limitation the Occupational Safety and Health Act of 1970, as amended, whether existing as of the date hereof, previously enforced or subsequently enacted.

2.18 Copies of Documents. Johnston has made available for inspection and copying by PWSB and its agents and representatives true and correct copies of all documents referred to in this Article II or in the Schedules delivered to PWSB pursuant to this Agreement. Johnston shall also make available for inspection and copying by PWSB and its agents and representatives true and correct copies of other business records that would assist in PWSB's operation of Johnston's Business and to operate, maintain and manage the Johnston System.

2.19 Disclosures. No representation or warranty in this Agreement, and no statement contained in any Schedule, Appendix, Exhibit, Certificate or other document furnished or to be furnished to PWSB pursuant hereto or in connection with the transactions contemplated hereby contains or at the Closing will contain any untrue statement of a material fact or omits or will omit to state a material fact necessary to make it not misleading.

ARTICLE III
REPRESENTATIONS AND WARRANTIES OF PWSB

3.01 Making of Representations and Warranties. PWSB hereby makes the representations and warranties contained in this Article III.

3.02 Organization of PWSB. PWSB is validly existing and in good standing under the laws of the State of Rhode Island with full power to conduct its business in the manner and in the places where such properties are owned or leased or such business is conducted by it.

3.03 Authority of PWSB. All necessary action has been taken by PWSB to authorize the execution, delivery and performance of this Agreement, and this Agreement is the valid and binding obligation of PWSB in accordance with its respective terms, subject to bankruptcy, insolvency or other laws of general application affecting creditor's rights.

3.04 Transaction Not a Breach. The execution, delivery and performance by PWSB of this Agreement, or any other agreement or instrument contemplated hereby, and the consummation of the transaction contemplated hereby and thereby will not violate the provisions of, or constitute a breach or default whether upon lapse of time and/or the occurrence of any act or event or otherwise under PWSB's enabling legislation.

ARTICLE IV
COVENANTS OF THE JOHNSTON

4.01 Making of Covenants and Agreements. Johnston makes the covenants and agreements set forth in this Article IV.

4.02 Access. Johnston will authorize and permit PWSB and its representatives (which term shall be deemed to include its independent accountants and counsel) to have reasonable access during normal business hours, upon reasonable notice and in such manner as will not unreasonably interfere with the conduct of the Business, to all of its books, records, operating instructions and procedures, and all other information with respect to each of the above only to the extent such information relates solely to the Business as PWSB may from time to time reasonably request, and to make copies of such books, records and other documents and to discuss the Business with Johnston's respective directors, officers, employees, accountants and counsel, as PWSB considers necessary or appropriate for the purposes of familiarizing itself with the Business, obtaining any necessary approvals of or permits for the transaction contemplated by this Agreement and conducting an evaluation of the Business. All information provided by Johnston to PWSB pursuant to this Section 4.02 shall be subject to the confidentiality provisions contained in Section 10.06 hereof.

4.03 Conduct of Business. Between the date of this Agreement and the date of the Closing, Johnston will do the following (unless PWSB shall otherwise consent in writing, which consent shall not be unreasonably withheld):

(a) conduct the Business only in the ordinary course and refrain from changing or introducing any method of management or operations except in the ordinary course of business and consistent with past practices;

(b) refrain from making any purchase, sale, liquidation, or other disposition of any of the Annexed Assets and from mortgaging, pledging, subjecting to a lien or otherwise encumbering any of the Annexed Assets;

(c) unless such act is in the ordinary course of business, not amend, terminate, renew/fail to renew or renegotiate any Assumed Contract or Material Contract and not default in any of Johnston's obligations under any Assumed Contract or Material Contract and not enter into any new Material Contract;

(d) refrain from incurring any contingent liability as a guarantor or otherwise with respect to the obligations of others, and from incurring any other contingent or fixed obligations or liabilities except those that are usual and normal in the ordinary course of business;

(e) unless such act is in the ordinary course of business, refrain from making any changes in the compensation payable to any of Johnston's respective officers, employees or agents;

(f) use commercially reasonable efforts to keep intact its business organization, to keep available the present employees of the Business and to preserve the goodwill of all suppliers, customers and others having business relations with the Business;

(g) have in effect and maintain at all times all insurance policies maintained by or for the benefit of Johnston;

(h) not fail to maintain or repair any of the Annexed Assets in accordance with past procedures;

(i) furnish PWSB with unaudited monthly balance sheets and statements of income and retained earnings and cash flows of Johnston within twenty (20) days after each month end, for each month ending more than ten (10) days prior to the Closing; and

(j) consult with PWSB in good faith prior to Johnston opening any new employment positions related to the Business or terminating such positions with Johnston, interviewing candidates for such employment position openings, or make any employment hiring or termination of employment decisions.

4.04 Authorization from Others. Prior to the date of Closing, Johnston will have obtained all authorizations, approvals, consents and permits of others required to permit the consummation by Johnston of the transactions contemplated by this Agreement; except that Johnston shall use commercially reasonable efforts to obtain consents of Johnston's vendors and consumers prior to the Closing Date to the extent the same are necessary. If any such authorization, approval, consent or permit is not obtained prior to the Closing and PWSB elects nevertheless to close, Johnston shall continue to use best efforts to obtain such authorization, approval, consent or permit to effectuate the Annexation.

4.05 Consummation of Agreement. Johnston shall use commercially reasonable efforts to perform and fulfill all conditions and obligations on their part to be performed and fulfilled under this Agreement, to the end that the transactions contemplated by this Agreement shall be fully carried out.

4.06 Intentionally Omitted.

4.07 Breach of Representations and Warranties. At any time prior to the Closing, promptly upon the occurrence of, or promptly upon Johnston becoming aware of the impending or threatened occurrence of any event which would cause or constitute a breach, or would have caused or constituted a breach had such event occurred or been known to Johnston prior to the date hereof, of any of the representations and warranties of Johnston contained in or referred to in this Agreement or in any Schedule referred to in this Agreement, Johnston shall give detailed written

notice thereof to PWSB and shall use its reasonable best efforts to prevent or promptly remedy the same.

4.08 Customer Relationships. Immediately prior to or concurrently with the Closing, Johnston shall notify its consumers of the transaction contemplated herein and to the extent not disclosed on Schedule 1.01 hereof, shall furnish PWSB a list of each consumer's name and contact information. Johnston shall in good faith encourage each consumer to utilize PWSB after Closing.

4.09 Johnston's Liabilities/Payment of Debts. Johnston shall discharge, at or prior to the Closing, all debts and other liabilities concerning the Johnston System which are not Assumed Liabilities hereunder.

ARTICLE V
COVENANTS OF PWSB

5.01 Making of Covenants and Agreements. PWSB makes the following covenants and agreements set forth in this Article V.

5.02 Authorization from Others. Prior to the Closing, PWSB will have obtained all authorizations, consents and permits of others required to permit the consummation by PWSB of the transactions contemplated by this Agreement.

5.03 Consummation of Agreement. PWSB shall use its commercially reasonable efforts to perform and fulfill all conditions and obligations on its part to be performed and fulfilled under this Agreement, to the end that the transactions contemplated by this Agreement shall be fully carried out.

ARTICLE VI
CONDITIONS

6.01 Conditions Precedent to the Obligations of PWSB. The obligation of PWSB to consummate this Agreement and the transactions contemplated hereby are subject to the fulfillment, prior to or at the Closing, of the following conditions precedent:

(a) Representations; Warranties; Covenants. Each of the representations, warranties contained in Article II of this Agreement shall be true and correct as though made on and as of the Closing Date; Johnston shall, on or before the Closing Date, have performed all of its respective obligations and complied with all covenants and conditions hereunder which by the terms hereof are to be performed on or before the Closing Date; and Johnston shall have delivered to PWSB a certificate dated as of the Closing Date to the foregoing effect ("The Johnston's Closing Certificate"). Notwithstanding the foregoing, to the extent any of the representations and warranties of Johnston are not true and correct as of the Closing Date, or to the extent Johnston has not performed any of its obligations and complied with any covenants and conditions hereunder which are to be performed on or before the Closing Date, Johnston shall disclose the inaccuracy of such

representation and warranties and their failure to perform such covenants or satisfy such conditions on Johnston's Closing Certificate;

(b) Consent to Assumed Contracts. PWSB shall have received consent from the parties to any Assumed Contract, commitment or right being assigned to PWSB hereunder in form and substance satisfactory to counsel to PWSB and Johnston and stating that such contract is in full force and effect in accordance with its terms and is not in default and consenting to the assignment of same by Johnston to PWSB;

(c) Approvals and Permits. Johnston shall have obtained and provided to PWSB evidence of the receipt of all Approvals required by PWSB under Section 2.15 of this Agreement;

(d) Additional Deliveries. At the Closing, Johnston shall have delivered to PWSB:

(i) Approvals. A copy of all necessary votes and approvals required under the Act, Johnston's charter, ordinances and the like certified as having been duly and validly adopted and as being in full force and effect and authorizing execution and delivery of this Agreement and performance by Johnston of the transactions contemplated hereby;

(ii) Opinion of The Johnston's Counsel. The opinion of counsel for Johnston as to the authorization, execution and delivery of this Agreement and performance by Johnston of the transactions contemplated hereby; and

(iii)Other Documents. Such other documents and instruments as PWSB or its counsel reasonably shall deem necessary to consummate the transaction contemplated hereby.

(e) Approval of PWSB's Counsel. All actions, proceedings, instruments and documents required to carry out this Agreement and all related legal matters contemplated by this Agreement shall be approved by Pannone Lopes Devereaux & O'Gara LLC, counsel for PWSB, provided that the approval of such counsel shall not be unreasonably withheld;

(f) Licensing, Registration, and Certification. PWSB having obtained, at or prior to the Closing Date, all licenses, registrations, certifications and/or permissions, as the case may be, in order to acquire the Annexed Assets and effectuate the Annexation;

(g) Intentionally Omitted;

(h) Real Estate. Johnston having prepared and executed all Deeds, Assignments or other transfer documents for the Real Estate, previously defined, which is owned by the Johnston;

(i) PWSB having received valid authorization from the Providence City Council to annex the Johnston System and consummate the transactions contemplated within this Agreement; and

(j) the transaction contemplated herein, and the consummation thereof, meeting the requirements of R.I. Gen. Laws § 46-30-1 et seq.

(k) notice of the Annexation and transfer of assets having been given to the Rhode Island Department of Labor and Training as provided for by applicable law;

(l) notice of the Annexation and transfer of assets having been given to the Rhode Island Division of Taxation as may be required by applicable law;

(m) All employees of Johnston expressly identified herein (if any) as anticipated by the Parties as transferring over to PWSB, having begun employment with PWSB;

(n) Johnston, having provided proof of general liability tail policy coverage for a term of no less than three (3) years;

(o) PWSB and its counsel being satisfied, with due diligence conducted following the execution of this Agreement.

6.02 Conditions Precedent to Obligations of Johnston. Johnston's obligation to consummate this Agreement and the transactions contemplated hereby is subject to the fulfillment, prior to or at the date of Closing, of the following conditions precedent:

(a) Representations; Warranties; Covenants. Each of the representations and warranties of PWSB contained in Article IV hereof shall be true and correct as though made on and as of the date of Closing; PWSB shall, on or before the date of Closing, have performed all of its obligations and complied with all covenants and conditions hereunder which by the terms hereof are to be performed on or before the date of Closing; and PWSB shall have delivered to Johnston a certificate dated as of the date of Closing to the foregoing effect.

ARTICLE VII
TERMINATION OF AGREEMENT

7.01 Termination. At any time prior to Closing, this Agreement may be terminated:

(a) by mutual agreement of the Parties hereto;

(b) by PWSB if there has been a material misrepresentation, breach of warranty or breach of covenant by Johnston in its representations, warranties and covenants set forth herein;

(c) by Johnston if there has been a material misrepresentation, breach of warranty or breach of covenant by PWSB in its representations, warranties and covenants set forth herein;

(d) by PWSB if the conditions stated in Section 6.01 have not been satisfied at or prior to the Closing Date; or

(e) by Johnston if the conditions stated in Section 6.02 have not been satisfied at or prior to the Closing Date.

7.02 Effect of Termination. In the event that this Agreement shall be terminated pursuant to Section 7.01, all further obligations of the Parties under this Agreement shall terminate without further liability of any Party to another. Notwithstanding the foregoing, a termination under Section 7.01 shall not relieve any party of any liability for a material breach of, or for any misrepresentation under this Agreement, or be deemed to constitute a waiver of any available remedy (including specific performance if available) for any such breach or misrepresentation. Nothing in this Section 7.02 shall relieve either Party to this Agreement of liability for a breach of a material covenant or obligation under this Agreement prior to the Closing; provided, however, that such liability in all events shall be limited to the non-breaching Party's reasonable out-of-pocket expenses incurred in connection with the investigation of the transaction contemplated hereby, the negotiation and preparation of this Agreement and the preparation for the closing of the transaction contemplated hereby. In the event that this Agreement is so terminated, each Party will return, within five (5) days of the termination, all papers, documents, financial statements and other data furnished to it by or with respect to each other Party to such other Party (including any copies thereof or work product based thereon and made by the first Party).

ARTICLE VIII
RIGHTS AND OBLIGATIONS SUBSEQUENT TO CLOSING

8.01 Survival of Representations and Warranties. The representations and warranties contained in or made pursuant to this Agreement shall survive indefinitely.

8.02 Post Closing Obligations of the Parties. Johnston and PWSB each agree that after the Closing they will hold in trust and promptly transfer and deliver to the other, from time to time as and when received by them, any cash, checks with appropriate endorsements (and will not convert such checks to cash), or such other property as belongs to the other Party, and will account not less than monthly to the other for all such receipts. In furtherance of the foregoing, Johnston agrees that any payments received by Johnston relating solely to services fulfilled by PWSB on and after the Closing shall be endorsed to PWSB and transmitted to PWSB by an overnight delivery service. PWSB's and Johnston's obligations set forth in this Section 8.02 shall survive indefinitely.

ARTICLE IX
INDEMNIFICATION

9.01 Indemnification by Johnston. Subject to the knowledge and other qualifications contained in the Agreement, including the limits of liability outlined in Sections 9.04 and 9.05, Johnston agrees to defend, indemnify and hold PWSB harmless from and against any damages, liabilities, losses and expenses (including reasonable counsel fees) of any kind or nature whatsoever which may be sustained or suffered by PWSB based upon a breach of any

representation, warranty or covenant made by Johnston in this Agreement or in any Schedule, Exhibit, Closing Certificate or Financial Statement delivered hereunder and attached to or specifically referred to in a Schedule attached to this Agreement, or by reason of any third party claim, action or proceeding asserted or instituted in a matter which is a breach of such representations, warranties or covenants, including without limitation amounts which PWSB has paid or are payable with respect to tax liabilities of Johnston for any periods and other liabilities of Johnston not disclosed to PWSB or existing in breach of Johnston's representations, warranties or covenants hereunder. Johnston shall also indemnify PWSB for any and all claims from the Excluded Liabilities.

9.02 Indemnification by PWSB. Subject to the knowledge and other qualifications contained in the Agreement, PWSB agrees to defend, indemnify and hold Johnston harmless from and against any damages, liabilities, losses and expenses (including reasonable counsel fees) of any kind or nature whatsoever which may be sustained or suffered by Johnston based upon a breach of any representation, warranty or covenant made by PWSB in this Agreement or in any Schedule, Exhibit, or Closing Certificate delivered hereunder and attached to or specifically referred to in a Schedule attached to this Agreement, or by reason of any third party claim, action or proceeding asserted or instituted in a matter which is a breach of such representations, warranties or covenants.

9.03 Notice; Defense of Claims. Any Party seeking indemnification under this Article IX ("Indemnified Party") shall give prompt written notice to the other Party ("Indemnifying Party"), of each claim for indemnification hereunder, specifying the amount and nature of the claim, and of any matter which in the opinion of the Indemnified Party is likely to give rise to an indemnification claim. The Indemnifying Party shall have the right to participate at their own expense in the defense of any such matter or its settlement. Failure to give notice of a matter which may give rise to an indemnification claim shall not affect the rights of the Indemnified Party to collect such claim from the Indemnifying Party so long as such failure does not materially adversely affect the Indemnifying Party's ability to defend such claim. Johnston agrees that PWSB has the absolute right to set off, against all or any portion of amounts to be paid by PWSB hereunder (if any), the full undisputed amount due under Section 9.01 hereof.

9.04 Limitations on Indemnification. Notwithstanding the foregoing, PWSB shall not be liable to Johnston for any claims for indemnification or breaches of representations and warranties hereunder until such claims (including reasonable counsel fees) exceed Fifty Thousand and 00/100 ($50,000.00) Dollars.

9.05 Survival of Indemnification Obligations; Releases.

(a) Johnston's obligation to indemnify PWSB hereunder shall survive the Closing and remain in full force and effect for a period through the expiration of the applicable statute of limitations (or, if a claim has been asserted prior to such expiration, until three (3) months after its final resolution).

(b) PWSB's obligation to indemnify Johnston hereunder shall survive the Closing and remain in full force and effect for a period through the expiration of the applicable statute of limitations

(or, if a claim has been asserted prior to such expiration, until three (3) months after its final resolution).

ARTICLE X
MISCELLANEOUS

10.01 Fees and Expenses. Subject to Article IX hereof, each of the Parties will bear its own expenses in connection with the negotiation and the consummation of the transactions contemplated by this Agreement, and no expenses of Johnston relating in any way to the Transaction shall be charged to or paid by PWSB or included in any account of Johnston as of the Closing.

10.02 Law Governing; Jurisdiction. This Agreement shall be construed under and governed by the laws of the State of Rhode Island and the state courts of the State of Rhode Island shall have jurisdiction with respect to any disputes between the Parties hereto.

10.3 Notices. All notices and communications hereunder shall be in writing and shall be deemed to have been duly given upon receipt of (i) hand-delivery; (ii) United States mail (certified mail, return receipt requested); (iii) overnight courier service; or (iv) telecopy transmission with confirmation of receipt, to the party to whom notice should be given at the address set forth below:

If to PWSB:

Providence Water Supply Board
125 Dupont Drive
Providence, Rhode Island 02907
Attention: General Manager
Telephone: (401) 521-5070

With a copy to (not constituting notice):

Pannone Lopes Devereaux & O'Gara LLC
1301 Atwood Avenue, Suite 215N
Johnston, Rhode Island 02919
Attention: William E. O'Gara, Esquire
Telephone: (401) 824-5100
Facsimile: (914) 824-5123

If to Johnston:

Town of Johnston
1385 Hartford Avenue
Johnston Rhode Island 02919
Attention: Mayor's Office
Telephone: (401) 351-6618

With a copy to (not constituting notice):

Law Office of William J. Conley, Jr.
123 Dyer Street, Unit 2B

Providence, Rhode Island 02903
Attention: William Conley
Telephone: (401) 415-9835
Facsimile: (401) 415-9834

or to such other address of which the parties may, by registered mail or overnight courier service, notify the other party or parties.

10.04 Entire Agreement. This Agreement, including the Schedules and Exhibits referred to herein constitutes the entire Agreement among the Parties pertaining to the subject matter hereof and supersedes all prior agreements, understandings, representations, warranties, covenants and conditions of the Parties in connection therewith; and all promises, representations, understandings, warranties and agreements with reference to the subject matter hereof, and all inducements to the making of this Agreement relied upon by either Party hereto, have been expressed herein or in such Schedules or Exhibits.

10.05 Assignability. This Agreement may not be assigned by either Party without the prior written consent of the other. This Agreement shall be enforceable by, and shall inure to the benefit of, the Parties hereto and their permitted successors and assigns, and no others.

10.06 Confidentiality. The following shall be subject to applicable law concerning access to public records: Each of the Parties hereto agree that PWSB and Johnston, and their respective officers, directors, agents and representatives, as applicable, will hold in strict confidence, and will not use any confidential or proprietary data or information obtained from the other Party with respect to the business or financial condition of the other Party except for the purpose of evaluating, negotiating and completing the transactions contemplated hereby. Information generally known in Johnston's industry or that has been disclosed to PWSB by third parties who have a right to do so shall not be deemed confidential or proprietary information for purposes of this Agreement. If the transactions contemplated by this Agreement are not consummated, each Party shall return to the other Party (or certify that it has destroyed) all copies of such data and information, including, but not limited to, financial information, customer lists, business and corporate records, worksheets, test reports, tax returns, lists, memoranda and other documents prepared by or made available to each Party in connection with the transaction contemplated by this Agreement as well as any work product produced or made from productions of the other Party.

10.07 Publicity and Disclosures. No press releases or public disclosure, either written or oral, of the transactions contemplated by this Agreement, shall be made without the prior knowledge and written consent of the Parties hereto.

10.08 Counterparts. This Agreement may be executed in multiple counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. In the event that any signature is delivered by facsimile transmission or PDF, such signature shall create a binding obligation of the party executing (or on whose behalf such signature is executed) the same with the same force and effect as if such facsimile or PDF signature were the original thereof.

[THIS SPACE INTENTIONALLY LEFT BLANK; SIGNATURE PAGE FOLLOWS]

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed as of the date set forth above by their duly authorized representatives.

WITNESS:

JOHNSTON:

The Town of Johnston:

_____

By: Joseph M. Polisena
Its: Mayor

Approved as to form:

_____

By: William Conley
Its: Legal Counsel

PWSB:

City of Providence:

_____

By: Jorge O. Elorza
Its: Mayor

Providence Water Supply Board:

_____

By: Ricky Caruolo
Its: General Manager

Approved as to form:

_____

By: William E. O'Gara
Its: Legal Counsel to Providence Water Supply Board

Schedule 1.01
Annexed Assets

All facilities, pumping stations, pipes, mains, valves, connections, conduits, machinery, equipment, hydrants, meters, miscellaneous devices and all other appurtenances, including all water right in connection with the Johnston System.

Real Estate includes all right, title and interest in and to any and all real property, leases, licenses, easements, options or the like held by Johnston in connection with the Johnston System, including but not limited to those related to:

(1) The property known as 23 Golden View Drive AP 45 lot 242 – Golden View Water Tower (the "Golden View Water Tower").
(2) The property known as 85 Shun Pike AP lot 586 – Water Booster Distribution System.

Schedule 1.02
Assumed Liabilities

Maintenance of the 12-inch water main along U.S. Route 6, as further defined in that certain Construction and Maintenance Agreement Non-Participating by and between the State of Rhode Island and the Johnston Water Department, as referenced in the agreement (the "Route 6 Project Agreement"). Johnston does not possess a signed copy of the Route 6 Project Agreement, however, all parties have performed their obligations pursuant to the Route 6 Project Agreement.

Schedule 2.03
Violations/Defaults

None.

Schedule 2.04
Liens/Encumbrances

The Golden View Water Tower is encumbered by two leases:

(1) That certain PCS Site Agreement, dated June 2, 2000, by and between Sprint Spectrum, L.P., as lessee, and Johnston, as lessor, regarding the lease of space on Golden View Water tank for use as a cell phone tower antenna (the "Sprint Agreement").
(2) That certain PCS Lease, dated January 20, 1998, by and between T-Mobile Northeast, LLC, as successor in interest to Omnipotent Communications MB Operations, Inc., as lessee, and Johnston, as lessor, regarding the lease of space on Golden View Water tank for use as a cell phone tower antenna, as amended, pursuant to the First Amendment to PCS Lease, dated April 8, 2019 (the "T-Mobile Agreement").

Schedule 2.05
Financial Statements

See attached Financial Statements.

Schedule 2.05
Financial Statements

None.

Schedule 2.06
Unpaid Taxes

None.

Schedule 2.07
Undisclosed Changes

None.

Schedule 2.09
Material Contracts

(1) The Sprint Agreement
(2) The T-Mobile Agreement
(3) That certain Water System Maintenance & Service Contract, dated July 1, 2012, by and between LaFramboise Water Service, Inc. and Johnston regarding maintenance of the system, as extended, by amendment through June 30, 2017 (the "Millennium Agreement"). The Millennium Agreement expired as of June 30, 2017, however, the parties have continued to operate under the terms of the Millennium Agreement.

Schedule 2.11
Litigation

None.

Schedule 2.12
Compliance with Laws

None.

Schedule 2.13
Warranty Claims

None.

Schedule 2.15
Approvals

None.

Exhibit A
Bills of Sale and Assignment

Attached Hereto.

BILL OF SALE AND ASSIGNMENT

THIS BILL OF SALE AND ASSIGNMENT ("Bill of Sale") is entered into as of the ___ day of November, 2020 by and between the City of Providence, a municipal corporation, for and through the Providence Water Supply Board, with a principal business address at 125 Dupont Dr, Providence, Rhode Island 02907 ("PWSB"), and the Town of Johnston, a municipal corporation with a principal address at 1385 Hartford Avenue, Johnston, Rhode Island ("Johnston"). Johnston and PWSB are sometimes individually referred to herein as a "Party" and, collectively, as "Parties."

W I T N E S S E T H:

WHEREAS, Johnston and PWSB entered into that certain Merger and Annexation Agreement dated as of the ____ day of November, 2020 ("Annexation Agreement"); and

WHEREAS, pursuant to the Annexation Agreement, Johnston has agreed to assign, convey, transfer and deliver to PWSB, and PWSB has agreed to accept from Johnston, all of the Johnston's right, title and interest in and to the Annexed Assets as defined in the Annexation Agreement, and as further described in Exhibit A.

NOW THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties hereby agree as follows:

1. Johnston does hereby assign, convey, transfer and deliver, as of the date hereof pursuant to the terms and subject to the conditions of the Annexation Agreement, all of its respective right, title and interest in and to the Annexed Assets, free and clear of any and all liabilities and any and all liens, unto PWSB.

2. This Bill of Sale is subject in all events to the terms and conditions of the Annexation Agreement and shall not in any way expand, alter or limit any of the rights, obligations and responsibilities of any of the Parties to the Annexation Agreement.

3. In the event of a conflict or inconsistency between this Bill of Sale and the Annexation Agreement, the terms of the Annexation Agreement shall prevail. Notwithstanding anything herein to the contrary, the terms and conditions of the Annexation Agreement shall survive the execution and delivery of this Bill of Sale in accordance with the terms of the Annexation Agreement.

4. This Bill of Sale inures to the benefit of PWSB and its successors and assigns and shall be binding on Johnston and its successors and assigns.

5. This Bill of Sale is governed by and construed in accordance with the laws of the State of Rhode Island, without regard to any conflict-of-laws provisions thereof.

6. All capitalized terms not otherwise defined herein shall have the respective meanings provided them in the Annexation Agreement.

7. This Bill of Sale may be executed in any number of counterparts, each of which shall be deemed to be an original as against any party whose signature appears thereon, and all of such shall together constitute one and the same instrument.

(Signature Page Follows)

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed as of the date set forth above by their duly authorized representatives.

WITNESS:

JOHNSTON:

The Town of Johnston:

_____

_____
By: Joseph M. Polisena
Its: Mayor

Approved as to form:

_____
By: William Conley
Its: Legal Counsel

PWSB:

City of Providence:

_____

_____
By: Jorge O. Elorza
Its: Mayor

Providence Water Supply Board:

_____

_____
By: Ricky Caruolo
Its: General Manager

Approved as to form:

_____
By: William E. O'Gara
Its: Legal Counsel to Providence Water Supply Board

Exhibit B
Assignment and Assumption Agreements

Attached Hereto.

ASSIGNMENT AND ASSUMPTION AGREEMENT

THIS ASSIGNMENT AND ASSUMPTION AGREEMENT (this "Assignment") is entered into as of the __ day of November, 2020 by and between the City of Providence, a municipal corporation, for and through the Providence Water Supply Board, with a principal business address at 125 Dupont Dr, Providence, Rhode Island 02907 ("Assignee"), and the Town of Johnston, a municipal corporation with a principal address at 1385 Hartford Avenue, Johnston, Rhode Island ("Assignor"). Johnston and PWSB are sometimes individually referred to herein as a "Party" and, collectively, as "Parties.".

Recitals

A. Assignor is a party to those certain contracts identified on Schedule 1 hereto (the "Contracts").

B. Assignor and Assignee are parties to that certain Merger and Annexation Agreement dated as of November ____, 2020 (the "Agreement"), pursuant to which Assignor has agreed transfer Assignor's water distribution system and appurtenance to Assignee, and Assignee has agreed to accept and annex said distribution system and appurtenances to Assignee's water distribution system.

For valuable consideration, the and sufficiency of which is hereby acknowledged, Assignor and Assignee agree as follows:

1. Assignor assigns to Assignee all of the right, title and interest of Assignor in the Contracts.

2. Assignor hereby agrees to indemnify, defend and hold Assignee harmless from any liability, claim, demand, loss, expense or damage suffered, sustained or incurred by Assignee including, without limitation, reasonable attorneys' fees and expenses, arising out of or attributable to any claims made against Assignee relating to obligations not assumed by Assignee under said Contracts, and/or related, directly or indirectly to events occurring prior to the date of this Assignment. The indemnification obligations of Assignor under this Assignment shall survive the Closing.

3. This Assignment shall be binding on, and inure to the benefit of, the parties hereto, their successors in interest, and assigns.

4. Nothing herein shall be deemed to alter, expand or supersede any rights of obligations of the Parties under the Agreement. Where any conflict exists between this Assignment and the Agreement, the terms of the Agreement shall be deemed to prevail.

[signature page to follow]

IN WITNESS WHEREOF, Assignor and Assignee have executed this Assignment as of the day and year first hereinabove written.

WITNESS:

ASSIGNOR:

The Town of Johnston:

_____

_____
By: Joseph M. Polisena
Its: Mayor

Approved as to form:

_____
By: William Conley
Its: Legal Counsel

ASSIGNEE:

City of Providence:

_____

_____
By: Jorge O. Elorza
Its: Mayor

Providence Water Supply Board:

_____

_____
By: Ricky Caruolo
Its: General Manager

Approved as to form:

_____
By: William E. O'Gara
Its: Legal Counsel to Providence Water Supply Board

Exhibit C

Real Estate Transfer Instruments

To be provided by Johnston and approved by PWSB and its counsel prior to Closing.

General Ledger Account Summary

Town of Johnston
From 7/1/2018 To 12/2/2019 (Effective Date)

Account Number	Account Description	Begin Balance	Debits	Credits	Ending Balance
A-451-45-0000-11010-00	CASH CHECKING - WTR CNTRL F	$0.00	$0.00	$0.00	$0.00
A-451-45-0000-11010-01	CASH - WATER FUND DRAWS CO	$200.00	$0.00	$0.00	$200.00
A-451-45-0000-11030-00	WATER SERVICES RECEIVABLE	$1,296,072.08	$1,706,320.45	$1,799,284.22	$1,203,108.31
A-451-45-0000-11040-00	UNCOLL WATER SERVICE	$0.00	$0.00	$0.00	$0.00
A-451-45-0000-11070-00	ACCUM DEPR.-WTR DISTRB	($3,576,300.41)	$0.00	$252,218.74	($3,828,519.15)
A-451-45-0000-11090-00	ACCUM DEPR-MOTOR VEHICLES	($37,477.00)	$0.00	$0.00	($37,477.00)
A-451-45-0000-11325-00	AR OTHER	$0.00	$0.00	$0.00	$0.00
A-451-45-0000-11510-00	LAND	$40,000.00	$0.00	$0.00	$40,000.00
A-451-45-0000-11550-00	MOTOR VEHICLES	$37,477.00	$0.00	$0.00	$37,477.00
A-451-45-0000-11601-00	WATER DISTRIBUTION	$13,507,561.23	$84,351.92	$0.00	$13,591,913.15
A-451-45-0000-11800-00	DEFERRED REVENUE	$0.00	$0.00	$0.00	$0.00
	Assets.....	**$11,267,532.90**	**$1,790,672.37**	**$2,051,502.96**	**$11,006,702.31**
L-451-00-0000-21009-00	ACCRUED INTEREST	$0.00	$0.00	$13,704.00	$13,704.00
L-451-00-0000-21021-00	BONDS PAYABLE	$0.00	$170,000.00	$1,725,000.00	$1,555,000.00
L-451-45-0000-21000-00	STATE PENSION LIABILITY	$0.00	$0.00	$0.00	$0.00
L-451-45-0000-21020-00	FICA LIABILITY	$0.00	$0.00	$0.00	$0.00
L-451-45-0000-21030-00	A/P-WATER CONTROL	$0.00	$0.00	$0.00	$0.00
L-451-45-0000-21444-00	DUE TO/FROM WATER CONTROL	($3,344,922.97)	$1,293,946.49	$1,309,792.40	($3,329,077.06)
I-451-45-0000-21444-01	DUE TO POLICE DETAIL FUND	$0.00	$0.00	$0.00	$0.00
L-451-45-0000-21500-00	ACCRUED VACATION AND SICK T	$0.00	$0.00	$0.00	$0.00
L-451-50-0000-31600-00	ACCRUED PAYROLL	$0.00	$0.00	$0.00	$0.00
L-451-50-0000-31700-00	ACCRUED EXPENSES	$0.00	$0.00	$0.00	$0.00
L-451-50-0000-31800-00	ACCRUED SEVERANCE	$0.00	$0.00	$0.00	$0.00
L-451-50-0000-31900-00	NET OPEB OBLIGATION	$0.00	$0.00	$0.00	$0.00
	Liabilities.....	**($3,344,922.97)**	**$1,463,946.49**	**$3,048,496.40**	**($1,760,373.06)**
X-451-00-0000-50000-00	EXPENDITURE CONTROL	$0.00	$1,542,078.94	$1,326,829.98	$215,248.96
	Expenditures.....	**$0.00**	**$1,542,078.94**	**$1,326,829.98**	**$215,248.96**
R-451-00-0000-40000-00	REVENUE CONTROL	$0.00	$2,987,333.23	$2,987,333.23	$0.00
	Revenues.....	**$0.00**	**$2,987,333.23**	**$2,987,333.23**	**$0.00**
E-451-45-0000-31100-00	NET INVESTMENT IN CAPITAL AS	$9,971,260.00	$1,115,977.60	$1,163,270.47	$10,018,552.87
E-451-45-0000-31230-00	RESERVED FOR REPAIRS	$41,235.44	$0.00	$0.00	$41,235.44
E-451-45-0000-31240-00	RESERVED FOR INFRASTRUCTU	$360,311.90	$0.00	$0.00	$360,311.90
E-451-45-0000-31250-00	UNRESERVED	$4,239,648.53	$1,725,000.00	$47,575.59	$2,562,224.12
	Equities.....	**$14,612,455.87**	**$2,840,977.60**	**$1,210,846.06**	**$12,982,324.33**
	Fund 451 - ENTERPRISE FUND - WATER CONTROL FA		**$10,625,008.63**	**$10,625,008.63**	

General Ledger Account Summary

Town of Johnston

From 7/1/2018 To 12/2/2019 (Effective Date)

Account Number	Account Description	Begin Balance	Debits	Credits	Ending Balance
Report Total			**$10,625,008.63**	**$10,625,008.63**	

9E

PROVIDENCE WATER

Tap Water Delivers

MEMORANDUM

To: Providence City Council – Finance Committee

From: Ricky Caruolo & Gregg Giasson P.E., Providence Water

Re: PW – JWD Merger Summary of Revenue and Expenses

Date: December 1, 2020

Revenue

PW currently collects approximately **$500,000** per year in revenue from JWD as a wholesale customer. If the merger is approved, PW will collect approximately **$1,500,000** per year in revenue from the additional 1,700 JWD retail customers. The change in classification from a single wholesale customer to 1,700 retail customers will net PW an additional **$1,000,000** in revenue. Please note, the change in customer classification has been recognized by the Public Utilities Commission in our most recent rate filing effective August 2020.

Expenses

JW currently pays approximately **$255,000** per year in operational expenses. The expenses include utilities and contractor operations. PW anticipates that the contractor will no longer be needed after year two. There are three parcels of property that will be transferred to PW and we anticipate an expense of approximately **$35,000** per year for taxes. Please refer to the attached Table 1.

Summary:

PW will utilize the additional **$1,000,000** in revenue to cover the annual operational expenses. The revenue from the annexation fee charged to the new retail customers (1,700) will pay for upgrades to bring the system to PW standards. The annexation fee will generate **$100,000** in revenue and it's anticipated to remain in place for approximately 10 years. Please refer to the attached Table 2.

cc: file

(401) 521-6300

125 Dupont Drive
Providence, RI 02907

www.provwater.com

Follow us @provwater

Like us at:
facebook.com/Providencewater

Table 1 - JWD Annual Operational & Maintenance Costs

Expenses	Annual Cost
Utilities	$40,000
Projected Property Taxes (1)	$35,000
Contractor Operations (2)**	$180,000
Projected Annual Cost:	$255,000

Projected operational & maintenance costs are expected to be $255,000 in year 1.

Aditional Revenue from the rate change will cover the expenses listed above.

(1) Projected poperty taxes is for the land where the pump stations and storage tank is located.

(2) Contractor Operations are for the management company currently operating the JWD system.

** PW anticipates that we will utilize their services for a period of 2 years.

Table 2 - JWD Assets Transferred

Assets	Current Age	Life Expectancy	Replacement Needed	Time Line	Estimated Cost
Storage Tank (1)	32	50	Yes	3-5 Years	$750,000
Shun Pike Pump Station	8	25	No	N/A	
Central Ave. Pump Station (2)	32	25	Yes	2-3 Years	$100,000
Water Mains & Appurtenances	40	100	No	N/A	
Water Meters	3	20	No	N/A	
Meter Reading System	3	20	No	N/A	
SCADA System (3)***	N/A	10	Yes	1-2 Years	$250,000
				Projected Cost:	**$1,100,000**

Potential expenses incurred by Providence Water in years 1-5 to bring the JWD up to our specifications are estimated to be $1,100,000.

Revenue from the annexation fee charged to JWD customers only will cover the upgrade costs.

The annexation fee is projected to raise $100,000 annually and may be in effect for approximately 10 years.

(1) PW may replace or eliminate the storage tank. Cost estimated is worst case scenario.

(2) PW may replace or eliminate the Central Avenue Pump Station. Cost estimated is worst case scenario.

(3) A New SCADA System will be required.

*** JWD does not have a SCADA system so this is not an asset to be transferred to PW.

Department of Health
Three Capitol Hill, Rm. 209
Providence, RI 02908-5097
TTY: 711
www.health.ri.gov

CERTIFIED MAIL

July 9, 2020

Roberty Parker
1385 Hartford Avenue
Johnston, RI 02919

7020 0640 0000 7195 8724

RE: Sanitary Survey for RI2980434 - Johnston Water Ctrl Fac. - Nardolillo St

Dear Mr. Parker:

The Rhode Island Department of Health (RIDOH) would like to thank you and the site visit participants for the assistance and information provided during the June 15, 2020 sanitary survey inspection for Johnston Water Ctrl Fac. - Nardolillo St Public Water System. Enclosed please find our Sanitary Survey Report that was conducted in accordance with the Rules and Regulations Pertaining to Public Drinking Water (216-RICR-50-05-1) Section 1.13.2 – Sanitary Surveys for Ground Water Systems.

NOTICE OF DEFICIENCIES:

Significant Deficiencies need to be corrected as soon as possible. They are identified by field staff and will be included in the attached Survey Report.

Minor Deficiencies need to be corrected within a timely manner. They are identified by field staff and will be included in the attached Survey Report. You are required to notify the RIDOH Center for Drinking Water Quality with a written response of completion and/or submit a corrective action plan by Aug 13, 2020.

Failure to provide a status or complete the corrective actions by the due date will result in referral to the enforcement program where a treatment technique violation will be issued against the Licensee (PWS).

Please feel free to contact the Center for Drinking Water Quality at (401)222-6867 with questions or to obtain additional guidance regarding this report and our findings. Thank you for your continued cooperation and efforts in ensuring that your customers are provided with safe and reliable drinking water.

Sincerely,

Garth Hoxsie-Quinn
Senior Environmental Scientist
Rhode Island Department of Health
Center for Drinking Water Quality

Cc: Main File
Sanitary File
Town Of Johnston
Eric Laframboise, Laframboise Water Services

2020 SANITARY SURVEY REPORT

RI2980434 - Johnston Water Ctrl Fac. - Nardolillo St

Required System Operator Classification: D-2

PARTIES PRESENT

NAME	ORGANIZATION
Eric Laframboise	Laframboise Water Services
David R. Zanfagna	Center For Drinking Water Quality

The Administrative Contact (AC) or Designated Operator (DO – if applicable) must provide written confirmation that all identified sanitary deficiencies have been corrected. A copy this form must be submitted with the required written response and/or photographic evidence.

This office must be notified of any modifications to your system as per 216-RICR-50-05-1, Sec.1.5. An **Application for Approval** form must be submitted for any planned significant modifications including equipment upgrades and design improvements to your system. Routine maintenance on a water system, such as pipe and valve replacement or repair does not need to be reported.

An **In-Kind Replacement** form must be submitted for replacement of pumps, storage/pressure tanks or treatment components that are functionally equivalent to the original components

SECTION I - SIGNIFICANT DEFICIENCIES

No significant deficiencies were observed at this time.

SECTION II - MINOR DEFICIENCIES

Deficiencies listed below must be noted in a Corrective Action Plan submitted by Aug 13, 2020. If repairs have been made, please provide an itemized contractors invoice and/or photograph of the work done.

ITEM NO.	MINOR DEFICIENCY & CORRECTIVE ACTION REQUIRED
1	The Johnston PWS was required to submit paperwork prior to the sanitary survey being conducted. This paperwork required population update, water storage age and inspection information for tanks, water usage etc. If the PWS requires this information request to be resent, please contact RIDOH immediately.
2	The last CWIRP that was submitted for Johnston Water Systems is dated 2004. The next CWIRP is due within 1 year from the date they system's WSSMP is due to the Water Resources Board. According to our records, the last WSSMP was due in 2018 which means the CWIRP should have been submitted in 2019. You must contact the Water Resources Board at 401-397-7053 prior to the 2020 Sanitary Survey to determine when the WSSMP needs to be submitted. The PWS must notify this office by the assigned date above when the WSSMP is due and when the CWIRP will be submitted.
3	The water system must have an Emergency Response Plan (ERP) as required by Section 1.9.9 of the Rules and Regulations Pertaining to Public Drinking Water [216-RICR-50-05-1]. The ERP must outline what actions will be taken and by whom during a time of emergency. This plan should include, but not be limited to, an Emergency Personnel Contact List, a system wide disinfection procedure, templates for Precautionary Boil Water and/or Mandatory Boil Water notification, Standard Operating Procedures, sample plans and procedures, pre-approved alternate sources (well, reservoir or bulk water delivery), etc. This plan must be updated when contact information or significant procedure or water system equipment changes. It must also be made available for inspection by RIDOH staff. Additional info can be found at https://health.ri.gov/water/for/publicwatersystemsduringemergency/ under the Emergency Response Plan section. If you have already completed the ERP, and have not submitted the ERP Certification form, please click the link below. The completed certification form must be returned to RIDOH by July 1, 2020. https://health.ri.gov/forms/certification/ERP-Certification-NTNC-and-CWS.pdf

All written responses regarding corrective actions required in Sections I-III for RI2980434: Johnston Water Ctrl Fac. - Nardolillo St must be submitted to the following address:

David R. Zanfagna ,
Rhode Island Department Of Health
3 Capitol Hill, Rm 209
Providence, RI 02908
david.zanfagna@health.ri.gov

SECTION III - GENERAL REQUIREMENTS AND RECOMMENDATIONS

An In-Kind Replacement form must be submitted to the Engineering Program for replacement of pumps, pipes, valves, storage/pressure tanks or treatment components that are functionally equivalent to the original components.

A Coliform Sample Plan must be current and kept on-site at all times. If changes are required, an updated Coliform Sample Plan must be submitted to the Coliform Rule Manager for approval within ten (10) days of the water system being notified. If you have any questions, contact our office at 401-222-6867 and ask to speak with the Coliform Rule Manager.

RIDOH recommends maintaining a binder with all required pertinent water system information and records. This includes, but is not limited to your Emergency Response Plan, Well Information, Water System disinfection procedures, Sample Plans, blank log sheets, etc. Additionally, this binder can be used to house recent records including sample results, completed logs, seasonal start up forms, etc.

Be aware of the risks, responsibilities, and liabilities of confined space entry. For more information on confined space entry call the National Institute for Occupational Safety & Health (NIOSH) at 800-35-NIOSH; or the Occupational Safety & Health Administration (OSHA) at 800-321-OSHA; or the RI Division of Labor.

This system should maintain a list of on-call operators that know how to maintain this water system. This list should be kept up to date in case of an emergency.

Be aware of potential cross connections within your system. All hot water heaters, tanks, pools, submerged hoses or any other device that connects to the potable water supply which could contaminate the supply must have an air gap, proper anti-siphon device and/or backflow prevention device installed in accordance with Rhode Island Department of Health Cross-Connection Control pursuant to the provisions of §46-13-22 of the General Laws and must conform to section 608 of the codes.

Proper disinfection must be practiced whenever intrusive work on the system is performed or your system is dewatered. After appropriate disinfection and flushing, additional bacteriological samples may be required to verify the water is safe for consumption.

This office must be notified of modifications to the system per 216-RICR-50-05-1, Sec. 1.5. An Application for Approval form must be submitted for significant modifications including equipment upgrades and design improvements to the system. Routine maintenance on a water system, such as pipe and valve repair does not need to be reported but must be recorded in a logbook.

Five Year Compliance History

Below is a list of the PWSs five (5) year compliance history. If you have questions or concerns about your compliance history, it is recommended that you contact the RIDOH-DWQ Compliance and Enforcement team.

The most common violations are monitoring violations. One easy way to avoid monitoring violations is to check RI Drinking Water Watch for your sampling schedules. Check your schedules regularly, make sure you or your sampler are collecting the samples per the schedules. Setting reminders before the end of the month or quarter to check if samples have been collected may also be helpful. RIDOH sends reminders from time to time so be sure to check your email once per day.

POSITIVE TCR SAMPLES

No positive samples were reported in the past year.

REJECTED TCR SAMPLES

No rejected samples were reported in the past year.

MONITORING VIOLATIONS

Violation Determination Date	Analyte	Compliance Period	
8/22/2017	0200 - Swtr	7/1/2017	7/31/2017

MCL VIOLATIONS

No maximum contaminant level violations were reported in the past year.

OTHER VIOLATIONS

Violation Date	Violation Type	Compliance Period	
8/9/2016	71 -Ccr Report		
2/20/2018	72 -Ccr Adequacy/Availability/Content		
10/10/2018	72 -Ccr Adequacy/Availability/Content		

SECTION IV - SYSTEM OVERVIEW

System Operator Classification: D-2
Eric Laframboise,

GENERAL:
The Johnston Water Control Facilities (JWCF) public water systems (PWSs) are classified as five separately licensed community public water systems (West End, Nardolillo St, Everbloom St, Taylor Rd, and Capitol St). This small, town owned water supply's main office is situated within the Johnston Town Hall, located at 1385 Hartford Avenue. JWCF-Nardolillo St PWS **(RI2980434)** provides potable water to the western portion of the Town of Johnston which is approximately _____ service connections, all of which are metered. The PWS provides potable water to approximately _____ consumers on an average daily basis. There are four (4) additional interconnects in this area that serve individual system within the Town of Johnston. The PWS purchased _____-million gallons of water per day from PW. Unaccounted, lost revenue water for 2980434 was ___% in 2019.

SOURCES:
An 8 in. diameter main supplies the ___ service connections on Nardolillo St. A compound meter allowing for high and low flows is read by the PW to bill the JWCF. The interconnection is with a 24-inch (in.) main between the Lawton Hill Reservoir and the associated booster station.

Source ID	Facility Name	Local Name	Type	Availability
CC001	Cc-City Of Providence	NARDOLILLO ST	CC	P

Type: WL=Well CC=Consecutive Connection
Availability: P=Permanent E=Emergency S=Seasonal I=Interim O=Other

TREATMENT:
There is no treatment associated with this PWS.

STORAGE:
There is no storage tank associated with this PWS.

PUMPS/PUMP FACILITIES:
There are no pumps associated with this PWS.

OPERATION AND MAINTENANCE:
In future inspection the PWS' operations and maintenance (O&M) manual will be reviewed by the inspector(s). The O&M manual should address the operation and maintenance of the following water system components as applicable to the PWS: well(s)/source, well/source pump(s), pressure tanks(s), booster pump(s), and treatment system. The O&M manual should define how often components are changed and replaced, and what the operating conditions should be (such as pressure settings and what treatment chemicals are used, including dosing requirements). If your PWS does not have an O&M manual, you must create one. RIDOH may be able to direct you to resources to provide assistance.
Initial here if the PWS has an O&M manual:_____

DISTRIBUTION:
This PWS consists of the following distribution pipe materials:
Unlined Cast Iron: 1,727 linear feet along Nardolillo St.

OTHER:
There is no auxiliary power associated with this PWS.

Department of Health
Three Capitol Hill, Rm. 209
Providence, RI 02908-5097
TTY: 711
www.health.ri.gov

CERTIFIED MAIL

July 9, 2020

Robert Parker
1385 Hartford Avenue
Johnston, RI 02919

7020 0640 0000 7195 8755

RE: Sanitary Survey for RI2980183 - Johnston Water Ctrl Fac. - West End

Dear Mr. Parker:

The Rhode Island Department of Health (RIDOH) would like to thank you and the site visit participants for the assistance and information provided during the June 15, 2020 sanitary survey inspection for Johnston Water Ctrl Fac. - West End Public Water System. Enclosed please find our Sanitary Survey Report that was conducted in accordance with the Rules and Regulations Pertaining to Public Drinking Water (216-RICR-50-05-1) Section 1.13.2 – Sanitary Surveys for Ground Water Systems.

NOTICE OF DEFICIENCIES:

Significant Deficiencies need to be corrected as soon as possible. They are identified by field staff and will be included in the attached Survey Report.

Minor Deficiencies need to be corrected within a timely manner. They are identified by field staff and will be included in the attached Survey Report. You are required to notify the RIDOH Center for Drinking Water Quality with a written response of completion and/or submit a corrective action plan by Aug 13, 2020.

Failure to provide a status or complete the corrective actions by the due date will result in referral to the enforcement program where a treatment technique violation will be issued against the Licensee (PWS).

Please feel free to contact the Center for Drinking Water Quality at (401)222-6867 with questions or to obtain additional guidance regarding this report and our findings. Thank you for your continued cooperation and efforts in ensuring that your customers are provided with safe and reliable drinking water.

Sincerely,

Garth Hoxsie-Quinn
Senior Environmental Scientist
Rhode Island Department of Health
Center for Drinking Water Quality

Cc: Main File
Sanitary File
Town Of Johnston
Eric Laframboise, Laframboise Water Services

2020 SANITARY SURVEY REPORT

RI2980183 - Johnston Water Ctrl Fac. - West End

Required System Operator Classification: D-2

PARTIES PRESENT

NAME	ORGANIZATION
Eric Laframboise	Laframboise Water Services
David R. Zanfagna	Center For Drinking Water Quality

The Administrative Contact (AC) or Designated Operator (DO – if applicable) must provide written confirmation that all identified sanitary deficiencies have been corrected. A copy this form must be submitted with the required written response and/or photographic evidence.

This office must be notified of any modifications to your system as per 216-RICR-50-05-1, Sec.1.5. An **Application for Approval** form must be submitted for any planned significant modifications including equipment upgrades and design improvements to your system. Routine maintenance on a water system, such as pipe and valve replacement or repair does not need to be reported.

An **In-Kind Replacement** form must be submitted for replacement of pumps, storage/pressure tanks or treatment components that are functionally equivalent to the original components

SECTION I - SIGNIFICANT DEFICIENCIES

No significant deficiencies were observed at this time.

SECTION II - MINOR DEFICIENCIES

Deficiencies listed below must be noted in a Corrective Action Plan submitted by Aug 13, 2020. If repairs have been made, please provide an itemized contractors invoice and/or photograph of the work done.

ITEM NO.	MINOR DEFICIENCY & CORRECTIVE ACTION REQUIRED
1	The Johnston PWS was required to submit paperwork prior to the sanitary survey being conducted. This paperwork required population update, water storage age and inspection information for tanks, water usage etc. If the PWS requires this information request to be resent, please contact RIDOH immediately.
2	The last CWIRP that was submitted for Johnston Water Systems is dated 2004. The next CWIRP is due within 1 year from the date they system's WSSMP is due to the Water Resources Board. According to our records, the last WSSMP was due in 2018 which means the CWIRP should have been submitted in 2019. You must contact the Water Resources Board at 401-397-7053 prior to the 2020 Sanitary Survey to determine when the WSSMP needs to be submitted.
3	The water system must have an Emergency Response Plan (ERP) as required by Section 1.9.9 of the Rules and Regulations Pertaining to Public Drinking Water [216-RICR-50-05-1]. The ERP must outline what actions will be taken and by whom during a time of emergency. This plan should include, but not be limited to, an Emergency Personnel Contact List, a system wide disinfection procedure, templates for Precautionary Boil Water and/or Mandatory Boil Water notification, Standard Operating Procedures, sample plans and procedures, pre-approved alternate sources (well, reservoir or bulk water delivery), etc. This plan must be updated when contact information or significant procedure or water system equipment changes. It must also be made available for inspection by RIDOH staff. Additional info can be found at https://health.ri.gov/water/for/publicwatersystemsduringemergency/ under the Emergency Response Plan section. If you have already completed the ERP, and have not submitted the ERP Certification form, please click the link below. The completed certification form must be returned to RIDOH by July 1, 2020. https://health.ri.gov/forms/certification/ERP-Certification-NTNC-and-CWS.pdf

4	The overgrown brush/trees against the fencing at Shun Pike Station compound must be cut down in order to improve security at this station. Grooming should be incorporated into the yearly operation and maintenance program. Photographic evidence or itemized contractor invoice is required to be submitted by the assigned due date.
5	The overgrown brush/trees against the fencing at the Golden View Drive elevated storage tank compound must be cut down in order to improve security at this station. Grooming should be incorporated into the yearly operation and maintenance program. Photographic evidence or itemized contractor invoice is required to be submitted by the assigned due date.
6	The exterior of the Golden View Drive Elevated storage tank appeared to be in need of painting. It was indicated that this tank was inspected but has not yet had any major rehabilitation planned or scheduled for the future. A copy of this inspection report must be submitted to this office, which will then follow with issuance of a compliance schedule to address concerns and recommendations highlighted by said inspection report. The water system operator indicated that the water system was weighing the options of rehabilitation versus removing from service. Please be advised that no work is to be done without obtaining approval from the Center of Drinking Water Quality engineering section.

All written responses regarding corrective actions required in Sections I-III for RI2980183: Johnston Water Ctrl Fac. - West End must be submitted to the following address:

David R. Zanfagna ,
Rhode Island Department Of Health
3 Capitol Hill, Rm 209
Providence, RI 02908
david.zanfagna@health.ri.gov

SECTION III - GENERAL REQUIREMENTS AND RECOMMENDATIONS

An In-Kind Replacement form must be submitted to the Engineering Program for replacement of pumps, pipes, valves, storage/pressure tanks or treatment components that are functionally equivalent to the original components.

A Coliform Sample Plan must be current and kept on-site at all times. If changes are required, an updated Coliform Sample Plan must be submitted to the Coliform Rule Manager for approval within ten (10) days of the water system being notified. If you have any questions, contact our office at 401-222-6867 and ask to speak with the Coliform Rule Manager.

RIDOH recommends maintaining a binder with all required pertinent water system information and records. This includes, but is not limited to your Emergency Response Plan, Well Information, Water System disinfection procedures, Sample Plans, blank log sheets, etc. Additionally, this binder can be used to house recent records including sample results, completed logs, seasonal start up forms, etc.

This office is taking this opportunity to remind all water suppliers that standard operating procedures are in place to help ensure appropriate movement of potable water within their storage tanks. Current AWWA guidance recommends that water supplied to storage tanks be cycled/turned over in three days or less. RIDOH, Center for Drinking Water Quality requires that storage tanks be internally and externally cleaned and inspected per AWWA standards. Thus, we recommend a policy be developed for performing inspection of all water storage facilities that includes the following practices: • Conduct an external visual inspection of the storage facility at least seasonally to assess and repair environmental damage and verify the integrity of vents and screens. • The tank must be isolated from the system; • All materials entering the tank should be disinfected per ANSI/AWWA to minimize the potential for contamination; • The tank must be disinfected per ANSI/AWWA; and • A satisfactory microbiological sample must be obtained prior to the tank being reactivated. At the time of sampling the residual chlorine concentration in the tank cannot exceed 0.5 ppm, except in those cases in which the chlorine concentration in the tank may equal that found in the distribution system. Proper sampling procedures including the use of a dechlorination agent in the sample bottle are required.

The well/pump/tank house must be maintained and kept free of debris, miscellaneous chemicals/cleaners and waste. They must also be properly insulated and sealed to prevent insects and rodents from nesting within the area of water storage and other water system facilities.

This system should maintain a list of on-call operators that know how to maintain this water system. This list should be kept up to date in case of an emergency.

A logbook documenting equipment testing, findings and/or maintenance must be available on-site for use by system personnel and review by state inspectors.

Be aware of potential cross connections within your system. All hot water heaters, tanks, pools, submerged hoses or any other device that connects to the potable water supply which could contaminate the supply must have an air gap, proper anti-siphon device and/or backflow prevention device installed in accordance with Rhode Island Department of Health Cross-Connection Control pursuant to the provisions of §46-13-22 of the General Laws and must conform to section 608 of the codes.

Proper disinfection must be practiced whenever intrusive work on the system is performed or your system is dewatered. After appropriate disinfection and flushing, additional bacteriological samples may be required to verify the water is safe for consumption.

This office must be notified of modifications to the system per 216-RICR-50-05-1, Sec. 1.5. An Application for Approval form must be submitted for significant modifications including equipment upgrades and design improvements to the system. Routine maintenance on a water system, such as pipe and valve repair does not need to be reported but must be recorded in a logbook.

Five Year Compliance History

Below is a list of the PWSs five (5) year compliance history. If you have questions or concerns about your compliance history, it is recommended that you contact the RIDOH-DWQ Compliance and Enforcement team.

The most common violations are monitoring violations. One easy way to avoid monitoring violations is to check RI Drinking Water Watch for your sampling schedules. Check your schedules regularly, make sure you or your sampler are collecting the samples per the schedules. Setting reminders before the end of the month or quarter to check if samples have been collected may also be helpful. RIDOH sends reminders from time to time so be sure to check your email once per day.

RI2980183: JOHNSTON WATER CTRL FAC. - WEST END
08/09/2016: CCR REPORT for "No CCR by 7/1."
08/22/2017: MONITORING, RTN/RPT MAJOR (SWTR-FILTER) for "Late reporting of Table 3 chlorine July 2017"
11/20/2017: FOLLOW-UP OR ROUTINE TAP M/R (LCR) for "Late reporting of 20 LCR samples for 06/01/2017-09/30/2017. Received samples 11/18/2017."
02/20/2018: CCR ADEQUACY/AVAILABILITY/CONTENT for "Failed to submit 2017 CCR (calendar year 2016) certification by 10/1/2017."
10/10/2018: CCR ADEQUACY/AVAILABILITY/CONTENT for "failed to CCR certification by 10/1/2018 deadline"
07/18/2019: REPORT SAMPLE RESULT/FAIL MONITOR RTCR for "failed to report June 2019 TC results by 07/10/19 (submitted late on 07/11/19)"

POSITIVE TCR SAMPLES

No positive samples were reported in the past year.

REJECTED TCR SAMPLES

No rejected samples were reported in the past year.

MONITORING VIOLATIONS

Violation Determination Date	Analyte	Compliance Period	
1/23/2015	2950 - Tthm	10/1/2014	12/31/2014
1/23/2015	2456 - Total Haloacetic Acids (Haa5)	10/1/2014	12/31/2014
8/22/2017	0200 - Swtr	7/1/2017	7/31/2017
11/20/2017	5000 - Lead & Copper Rule		

MCL VIOLATIONS

No maximum contaminant level violations were reported in the past year.

OTHER VIOLATIONS

Violation Date	Violation Type	Compliance Period	
8/9/2016	71 -Ccr Report		
2/20/2018	72 -Ccr Adequacy/Availability/Content		
10/10/2018	72 -Ccr Adequacy/Availability/Content		
7/18/2019	4B -Report Sample Result/Fail Monitor Rtcr		

SECTION IV - SYSTEM OVERVIEW

System Operator Classification: D-2
Eric Laframboise,

GENERAL:
The Johnston Water Control Facilities (JWCF) public water systems (PWSs) are classified as five separately licensed community public water systems (West End, Nardolillo St, Everbloom St, Taylor Rd, and Capitol St). This small, town owned water supply's main office is situated within the Johnston Town Hall, located at 1385 Hartford Avenue. JWCF-West End PWS **(RI2980183)** provides potable water to the western portion of the Town of Johnston which is approximately _____ service connections, all of which are metered. The PWS provides potable water to approximately _____ consumers on an average daily basis.
This water system purchases water via two (2) interconnections with Providence Water (PW) along Planfield Pike at the intersections of Green Hill Rd and Simmonsville Ave. The interconnections are with a 24-inch (in.) main between the Lawton Hill Reservoir and the associated booster station. There are four (4) additional interconnects in this area that serve individual system within the Town of Johnston.
In FY2019 the PWS purchased _____ - million gallons of water from PW. Unaccounted, lost revenue water for **2980183** was ___% in 2019.

SOURCES:
Simmonsville Avenue Metering Pit: An 8 in. diameter main supplies this connection. Upon leaving the metering pit, this main increases to 12 in. diameter and is looped with the Green Hill Road system, both serving the majority of the JWCF system. A compound meter allowing for high and low flows is read by PW to bill the JWCF, which consequently bills the 22 service connections on this street. Total water purchased from PW through this meter in FY 2019 is _____ MG.
Green Hill Road Avenue Metering Pit: This underground "can" station meter pit is the primary interconnection to the JWCF system. Approximately 96% of the water supplied by PW to the JWCF is obtained through this 8 in. compound meter/16 in. diameter supply main. Total water purchased from PW through this meter in FY 2019 is _____ MG.

Source ID	Facility Name	Local Name	Type	Availability
CC001	Cc-City Of Providence	SIMMONSVILLE AVE	CC	P
CC002	Cc-Cc-City Of Providence	GREEN HILL RD	CC	P

Type: WL=Well CC=Consecutive Connection
Availability: P=Permanent E=Emergency S=Seasonal I=Interim O=Other

TREATMENT:
Water for this PWS is done by PW.

STORAGE:
The Golden View Drive (ST001) elevated storage tank has an approved design capacity of 0.75-million gallons (MG) with a usable capacity of 0.48-MG. The overflow elevation of the Golden View Drive tank is 650 ft. mean sea level and it maintains a pressure of 35-psi for the area served upstream of the Central Ave Pump Station.

Storage ID	Facility Name	Local Name	Storage Type	Construction Material	Comments
ST001	St-Storage Tank	GOLDEN VIEW DRIVE TANK	Elevated	Steel	750K-GALS, OVERFLOW ELEVATION 660 FT MSL

PUMPS/PUMP FACILITIES:

Central Ave Pump Station:

The Central Avenue Station (PF001) was recently rehabilitated went back on line in January 2017 and is located near the intersection of Reservoir Ave and Central Avenue. Supply to this station is obtained from the Green Hill Road 16 in. gravity feed interconnection with PW. This main traverses along Green Hill Road after being metered, turns east along Shun Pike and then northwest along Scituate Avenue, where it then reduces to a 12-in. suction line for the booster station. This line also serves many customers, including the Rhode Island Resource Recovery, prior to the Central Avenue Station.

The station houses two (2) 100 HP Baldor VFD, each with a capacity of 500-gallons per minute (gpm). Provisions exist for a third pump should the need arise. The station is equipped with appropriate heaters, dehumidifiers, and ventilation system (air movers). There is 300 KVA, propane powered generator, which is automatically tested weekly. The generator can run the entire booster station in the event of an extended power outage. The purpose of this station is to supply water to the Golden View Drive Tank.

Shun Pike Booster Station:

The Shun Pike Booster Station (PF002) is located on Shun Pike, approximately 1,800 ft. west of its intersection with Green Hill Avenue. Supply to this station is obtained from the Green Hill Road 16 in. gravity interconnection with PW, which after being metered traverses along Green Hill Road to the intersection of Shun Pike where the 8 in. main turns west along Shun Pike.

The Shun Pike Station houses thee (3) 10 HP, Goulds, VFD pumps with a capacity of ___ gpm, and three (3) 50 HP, Goulds VFD pumps with a capacity of ___ gpm. The station supplies a small residential area of approximately 90 homes along Shun Pike and Peck Hill Road service area. The "can" station is equipped with appropriate heaters, dehumidifiers, sump and ventilation system (air movers). There is ___ KVA, propane powered generator, which is automatically tested weekly. The generator can run the entire booster station in the event of an extended power outage.

Pump Facility ID	Facility Name	Local Name
PF001	Pf-Pump Facility 1	CENTRAL AVE BOOSTER PUMP STATION
PF002	Pf-Pump Facility 2	SHUN PIKE BOOSTER PUMP STATION

OPERATION AND MAINTENANCE:

In future inspection the PWS' operations and maintenance (O&M) manual will be reviewed by the inspector(s). The O&M manual should address the operation and maintenance of the following water system components as applicable to the PWS: well(s)/source, well/source pump(s), pressure tanks(s), booster pump(s), and treatment system. The O&M manual should define how often components are changed and replaced, and what the operating conditions should be (such as pressure settings and what treatment chemicals are used, including dosing requirements). If your PWS does not have an O&M manual, you must create one. RIDOH may be able to direct you to resources to provide assistance.

Initial here if the PWS has an O&M manual:_____

DISTRIBUTION:

2980183 provides water to most Johnston west of Rt. 295 and some portions east of 295 that are off of Central Ave, Scituate Ave and Simmonsville Ave. RIDOH does not have a copy of the distribution materials breakdown for this PWS.

OTHER:

See information under Pump Facilities regarding auxiliary power.

Department of Health
Three Capitol Hill, Rm. 209
Providence, RI 02908-5097
TTY: 711
www.health.ri.gov

CERTIFIED MAIL

July 9, 2020

Robert Parker
1385 Hartford Avenue
Johnston, RI 02919

7020 0640 0000 7195 8731

RE: Sanitary Survey for RI2980433 - Johnston Water Ctrl Fac. - Everbloom St.

Dear Mr. Parker:

The Rhode Island Department of Health (RIDOH) would like to thank you and the site visit participants for the assistance and information provided during the June 15, 2020 sanitary survey inspection for Johnston Water Ctrl Fac. - Everbloom St. Public Water System. Enclosed please find our Sanitary Survey Report that was conducted in accordance with the Rules and Regulations Pertaining to Public Drinking Water (216-RICR-50-05-1) Section 1.13.2 – Sanitary Surveys for Ground Water Systems.

NOTICE OF DEFICIENCIES:

Significant Deficiencies need to be corrected as soon as possible. They are identified by field staff and will be included in the attached Survey Report.

Minor Deficiencies need to be corrected within a timely manner. They are identified by field staff and will be included in the attached Survey Report. You are required to notify the RIDOH Center for Drinking Water Quality with a written response of completion and/or submit a corrective action plan by Aug 13, 2020.

Failure to provide a status or complete the corrective actions by the due date will result in referral to the enforcement program where a treatment technique violation will be issued against the Licensee (PWS).

Please feel free to contact the Center for Drinking Water Quality at (401)222-6867 with questions or to obtain additional guidance regarding this report and our findings. Thank you for your continued cooperation and efforts in ensuring that your customers are provided with safe and reliable drinking water.

Sincerely,

Garth Hoxsie-Quinn
Senior Environmental Scientist
Rhode Island Department of Health
Center for Drinking Water Quality

Cc: Main File
Sanitary File
Town Of Johnston
Eric Laframboise, Laframboise Water Services

2020 SANITARY SURVEY REPORT

RI2980433 - Johnston Water Ctrl Fac. - Everbloom St.

Required System Operator Classification: D-2

PARTIES PRESENT

NAME	ORGANIZATION
Eric Laframboise	Laframboise Water Services
David R. Zanfagna	Center For Drinking Water Quality

The Administrative Contact (AC) or Designated Operator (DO – if applicable) must provide written confirmation that all identified sanitary deficiencies have been corrected. A copy this form must be submitted with the required written response and/or photographic evidence.

This office must be notified of any modifications to your system as per 216-RICR-50-05-1, Sec.1.5. An **Application for Approval** form must be submitted for any planned significant modifications including equipment upgrades and design improvements to your system. Routine maintenance on a water system, such as pipe and valve replacement or repair does not need to be reported.

An **In-Kind Replacement** form must be submitted for replacement of pumps, storage/pressure tanks or treatment components that are functionally equivalent to the original components

SECTION I - SIGNIFICANT DEFICIENCIES

No Significant Deficiencies were observed at this time.

SECTION II - MINOR DEFICIENCIES

Deficiencies listed below must be noted in a Corrective Action Plan submitted by Aug 13, 2020. If repairs have been made, please provide an itemized contractors invoice and/or photograph of the work done.

ITEM NO.	MINOR DEFICIENCY & CORRECTIVE ACTION REQUIRED
1	The Johnston PWS was required to submit paperwork prior to the sanitary survey being conducted. This paperwork required population update, water storage age and inspection information for tanks, water usage etc. If the PWS requires this information request to be resent, please contact RIDOH immediately.
2	The last CWIRP that was submitted for Johnston Water Systems is dated 2004. The next CWIRP is due within 1 year from the date they system's WSSMP is due to the Water Resources Board. According to our records, the last WSSMP was due in 2018 which means the CWIRP should have been submitted in 2019. You must contact the Water Resources Board at 401-397-7053 prior to the 2020 Sanitary Survey to determine when the WSSMP needs to be submitted. The PWS must notify this office by the assigned date above when the WSSMP is due and when the CWIRP will be submitted.
3	The water system must have an Emergency Response Plan (ERP) as required by Section 1.9.9 of the Rules and Regulations Pertaining to Public Drinking Water [216-RICR-50-05-1]. The ERP must outline what actions will be taken and by whom during a time of emergency. This plan should include, but not be limited to, an Emergency Personnel Contact List, a system wide disinfection procedure, templates for Precautionary Boil Water and/or Mandatory Boil Water notification, Standard Operating Procedures, sample plans and procedures, pre-approved alternate sources (well, reservoir or bulk water delivery), etc. This plan must be updated when contact information or significant procedure or water system equipment changes. It must also be made available for inspection by RIDOH staff. Additional info can be found at https://health.ri.gov/water/for/publicwatersystemsduringemergency/ under the Emergency Response Plan section. If you have already completed the ERP, and have not submitted the ERP Certification form, please click the link below. The completed certification form must be returned to RIDOH by July 1, 2020. https://health.ri.gov/forms/certification/ERP-Certification-NTNC-and-CWS.pdf

All written responses regarding corrective actions required in Sections I-III for RI2980433: Johnston Water Ctrl Fac. - Everbloom St. must be submitted to the following address:

David R. Zanfagna ,
Rhode Island Department Of Health
3 Capitol Hill, Rm 209
Providence, RI 02908
david.zanfagna@health.ri.gov

SECTION III - GENERAL REQUIREMENTS AND RECOMMENDATIONS

An In-Kind Replacement form must be submitted to the Engineering Program for replacement of pumps, pipes, valves, storage/pressure tanks or treatment components that are functionally equivalent to the original components.

A Coliform Sample Plan must be current and kept on-site at all times. If changes are required, an updated Coliform Sample Plan must be submitted to the Coliform Rule Manager for approval within ten (10) days of the water system being notified. If you have any questions, contact our office at 401-222-6867 and ask to speak with the Coliform Rule Manager.

RIDOH recommends maintaining a binder with all required pertinent water system information and records. This includes, but is not limited to your Emergency Response Plan, Well Information, Water System disinfection procedures, Sample Plans, blank log sheets, etc. Additionally, this binder can be used to house recent records including sample results, completed logs, seasonal start up forms, etc.

Be aware of the risks, responsibilities, and liabilities of confined space entry. For more information on confined space entry call the National Institute for Occupational Safety & Health (NIOSH) at 800-35-NIOSH; or the Occupational Safety & Health Administration (OSHA) at 800-321-OSHA; or the RI Division of Labor.

This system should maintain a list of on-call operators that know how to maintain this water system. This list should be kept up to date in case of an emergency.

Be aware of potential cross connections within your system. All hot water heaters, tanks, pools, submerged hoses or any other device that connects to the potable water supply which could contaminate the supply must have an air gap, proper anti-siphon device and/or backflow prevention device installed in accordance with Rhode Island Department of Health Cross-Connection Control pursuant to the provisions of §46-13-22 of the General Laws and must conform to section 608 of the codes.

Proper disinfection must be practiced whenever intrusive work on the system is performed or your system is dewatered. After appropriate disinfection and flushing, additional bacteriological samples may be required to verify the water is safe for consumption.

This office must be notified of modifications to the system per 216-RICR-50-05-1, Sec. 1.5. An Application for Approval form must be submitted for significant modifications including equipment upgrades and design improvements to the system. Routine maintenance on a water system, such as pipe and valve repair does not need to be reported but must be recorded in a logbook.

Five Year Compliance History

Below is a list of the PWSs five (5) year compliance history. If you have questions or concerns about your compliance history, it is recommended that you contact the RIDOH-DWQ Compliance and Enforcement team.

The most common violations are monitoring violations. One easy way to avoid monitoring violations is to check RI Drinking Water Watch for your sampling schedules. Check your schedules regularly, make sure you or your sampler are collecting the samples per the schedules. Setting reminders before the end of the month or quarter to check if samples have been collected may also be helpful. RIDOH sends reminders from time to time so be sure to check your email once per day.

POSITIVE TCR SAMPLES

Type	Date Collected	Comment	Free Chlorine Residual	Total Chlorine Residual
RT	6/11/2019			0.07

REJECTED TCR SAMPLES

Type	Date Collected	Comment	Rejection Reason
RT			

MONITORING VIOLATIONS

Violation Determination Date	Analyte	Compliance Period	
8/22/2017	0200 - Swtr	7/1/2017	7/31/2017

MCL VIOLATIONS

No maximum contaminant level violations were reported in the past year.

OTHER VIOLATIONS

Violation Date	Violation Type	Compliance Period	
6/8/2016	4B -Report Sample Result/Fail Monitor Rtcr		
8/9/2016	71 -Ccr Report		
2/20/2018	72 -Ccr Adequacy/Availability/Content		
10/10/2018	72 -Ccr Adequacy/Availability/Content		

SECTION IV - SYSTEM OVERVIEW

System Operator Classification: D-2
Eric Laframboise,

GENERAL:
The Johnston Water Control Facilities (JWCF) public water systems (PWSs) are classified as five separately licensed community public water systems (West End, Nardolillo St, Everbloom Dr, Taylor Rd, and Capitol St). This small, town owned water supply's main office is situated within the Johnston Town Hall, located at 1385 Hartford Avenue. JWCF-Everbloom Dr PWS (RI2980433) is an 8-inch diameter main that provides potable water to the Everbloom Dr which is approximately _____ service connections, all of which are metered. The PWS provides potable water to approximately _____ consumers on an average daily basis. There are four (4) additional interconnects in this area that serve individual system within the Town of Johnston. In FY2019 the PWS purchased _____-million gallons of water from PW. Unaccounted, lost revenue water for RI2980435 was ___% in 2019.

SOURCES:
This water system purchases water via an 8-inch main that interconnects with Providence Water (PW) at the intersection of Plainfield Pike and Everbloom Rd.

Source ID	Facility Name	Local Name	Type	Availability
CC001	Cc-City Of Providence	EVERBLOOM RD	CC	P

Type: WL=Well CC=Consecutive Connection
Availability: P=Permanent E=Emergency S=Seasonal I=Interim O=Other

TREATMENT:
There is no treatment associated with this PWS.

STORAGE:
There is no storage associated with this PWS.

PUMPS/PUMP FACILITIES:
There are no pumps associated with this PWS.

OPERATION AND MAINTENANCE:
In future inspection the PWS' operations and maintenance (O&M) manual will be reviewed by the inspector(s). The O&M manual should address the operation and maintenance of the following water system components as applicable to the PWS: well(s)/source, well/source pump(s), pressure tanks(s), booster pump(s), and treatment system. The O&M manual should define how often components are changed and replaced, and what the operating conditions should be (such as pressure settings and what treatment chemicals are used, including dosing requirements). If your PWS does not have an O&M manual, you must create one. RIDOH may be able to direct you to resources to provide assistance. Initial here if the PWS has an O&M manual:_____

DISTRIBUTION:
This PWS consists of the following distribution pipe materials:
Ductile Iron: 5,121-linear feet along Everbloom Rd

OTHER:
There is no auxiliary power associated with this PWS.

Department of Health
Three Capitol Hill, Rm. 209
Providence, RI 02908-5097
TTY: 711
www.health.ri.gov

CERTIFIED MAIL

July 9, 2020

Robert Parker
1385 Hartford Avenue
Johnston, RI 02919

7020 0640 0000 7195 8717

RE: Sanitary Survey for RI2980435 - Johnston Water Ctrl Fac. - Capitol St.

Dear Mr. Parker:

The Rhode Island Department of Health (RIDOH) would like to thank you and the site visit participants for the assistance and information provided during the June 15, 2020 sanitary survey inspection for Johnston Water Ctrl Fac. - Capitol St. Public Water System. Enclosed please find our Sanitary Survey Report that was conducted in accordance with the Rules and Regulations Pertaining to Public Drinking Water (216-RICR-50-05-1) Section 1.13.2 – Sanitary Surveys for Ground Water Systems.

NOTICE OF DEFICIENCIES:

Significant Deficiencies need to be corrected as soon as possible. They are identified by field staff and will be included in the attached Survey Report.

Minor Deficiencies need to be corrected within a timely manner. They are identified by field staff and will be included in the attached Survey Report. You are required to notify the RIDOH Center for Drinking Water Quality with a written response of completion and/or submit a corrective action plan by Aug 13, 2020.

Failure to provide a status or complete the corrective actions by the due date will result in referral to the enforcement program where a treatment technique violation will be issued against the Licensee (PWS).

Please feel free to contact the Center for Drinking Water Quality at (401)222-6867 with questions or to obtain additional guidance regarding this report and our findings. Thank you for your continued cooperation and efforts in ensuring that your customers are provided with safe and reliable drinking water.

Sincerely,

Garth Hoxsie-Quinn
Senior Environmental Scientist.
Rhode Island Department of Health
Center for Drinking Water Quality

Cc: Main File
Sanitary File
Town Of Johnston Click or tap here to enter text.
Eric Laframboise, Laframboise Water Services

2020 SANITARY SURVEY REPORT

RI2980435 - Johnston Water Ctrl Fac. - Capitol St.

Required System Operator Classification: D-2

PARTIES PRESENT

NAME	ORGANIZATION
Eric Laframboise	Laframboise Water Services
David R. Zanfagna	Center For Drinking Water Quality

The Administrative Contact (AC) or Designated Operator (DO – if applicable) must provide written confirmation that all identified sanitary deficiencies have been corrected. A copy this form must be submitted with the required written response and/or photographic evidence.

This office must be notified of any modifications to your system as per 216-RICR-50-05-1, Sec.1.5. An **Application for Approval** form must be submitted for any planned significant modifications including equipment upgrades and design improvements to your system. Routine maintenance on a water system, such as pipe and valve replacement or repair does not need to be reported.

An **In-Kind Replacement** form must be submitted for replacement of pumps, storage/pressure tanks or treatment components that are functionally equivalent to the original components

SECTION I - SIGNIFICANT DEFICIENCIES

No Significant deficiencies were observed at this time.

SECTION II - MINOR DEFICIENCIES

Deficiencies listed below must be noted in a Corrective Action Plan submitted by Aug 13, 2020. If repairs have been made, please provide an itemized contractors invoice and/or photograph of the work done.

ITEM NO.	MINOR DEFICIENCY & CORRECTIVE ACTION REQUIRED
1	The Johnston PWS was required to submit paperwork prior to the sanitary survey being conducted. This paperwork required population update, water storage age and inspection information for tanks, water usage etc. If the PWS requires this information request to be resent, please contact RIDOH immediately.
2	The last CWIRP that was submitted for Johnston Water Systems is dated 6/1/2004. The next CWIRP is due within 1 year from the date they system's WSSMP is due to the Water Resources Board. According to our records, the last WSSMP was due in 2018 which means the CWIRP should have been submitted in 2019. You must contact the Water Resources Board at 401-397-7053 prior to the 2020 Sanitary Survey to determine when the WSSMP needs to be submitted. The PWS must notify this office by the assigned date above when the WSSMP is due and when the CWIRP will be submitted.
3	The water system must have an Emergency Response Plan (ERP) as required by Section 1.9.9 of the Rules and Regulations Pertaining to Public Drinking Water [216-RICR-50-05-1]. The ERP must outline what actions will be taken and by whom during a time of emergency. This plan should include, but not be limited to, an Emergency Personnel Contact List, a system wide disinfection procedure, templates for Precautionary Boil Water and/or Mandatory Boil Water notification, Standard Operating Procedures, sample plans and procedures, pre-approved alternate sources (well, reservoir or bulk water delivery), etc. This plan must be updated when contact information or significant procedure or water system equipment changes. It must also be made available for inspection by RIDOH staff. Additional info can be found at https://health.ri.gov/water/for/publicwatersystemsduringemergency/ under the Emergency Response Plan section. If you have already completed the ERP, and have not submitted the ERP Certification form, please click the link below. The completed certification form must be returned to RIDOH by July 1, 2020. https://health.ri.gov/forms/certification/ERP-Certification-NTNC-and-CWS.pdf

All written responses regarding corrective actions required in Sections I-III for RI2980435: Johnston Water Ctrl Fac. - Capitol St. must be submitted to the following address:

David R. Zanfagna ,
Rhode Island Department Of Health
3 Capitol Hill, Rm 209
Providence, RI 02908
david.zanfagna@health.ri.gov

SECTION III - GENERAL REQUIREMENTS AND RECOMMENDATIONS

An In-Kind Replacement form must be submitted to the Engineering Program for replacement of pumps, pipes, valves, storage/pressure tanks or treatment components that are functionally equivalent to the original components.

A Coliform Sample Plan must be current and kept on-site at all times. If changes are required, an updated Coliform Sample Plan must be submitted to the Coliform Rule Manager for approval within ten (10) days of the water system being notified. If you have any questions, contact our office at 401-222-6867 and ask to speak with the Coliform Rule Manager.

RIDOH recommends maintaining a binder with all required pertinent water system information and records. This includes, but is not limited to your Emergency Response Plan, Well Information, Water System disinfection procedures, Sample Plans, blank log sheets, etc. Additionally, this binder can be used to house recent records including sample results, completed logs, seasonal start up forms, etc.

Be aware of the risks, responsibilities, and liabilities of confined space entry. For more information on confined space entry call the National Institute for Occupational Safety & Health (NIOSH) at 800-35-NIOSH; or the Occupational Safety & Health Administration (OSHA) at 800-321-OSHA; or the RI Division of Labor.

This system should maintain a list of on-call operators that know how to maintain this water system. This list should be kept up to date in case of an emergency.

Be aware of potential cross connections within your system. All hot water heaters, tanks, pools, submerged hoses or any other device that connects to the potable water supply which could contaminate the supply must have an air gap, proper anti-siphon device and/or backflow prevention device installed in accordance with Rhode Island Department of Health Cross-Connection Control pursuant to the provisions of §46-13-22 of the General Laws and must conform to section 608 of the codes.

Proper disinfection must be practiced whenever intrusive work on the system is performed or your system is dewatered. After appropriate disinfection and flushing, additional bacteriological samples may be required to verify the water is safe for consumption.

This office must be notified of modifications to the system per 216-RICR-50-05-1, Sec. 1.5. An Application for Approval form must be submitted for significant modifications including equipment upgrades and design improvements to the system. Routine maintenance on a water system, such as pipe and valve repair does not need to be reported but must be recorded in a logbook.

Five Year Compliance History

Below is a list of the PWSs five (5) year compliance history. If you have questions or concerns about your compliance history, it is recommended that you contact the RIDOH-DWQ Compliance and Enforcement team.

The most common violations are monitoring violations. One easy way to avoid monitoring violations is to check RI Drinking Water Watch for your sampling schedules. Check your schedules regularly, make sure you or your sampler are collecting the samples per the schedules. Setting reminders before the end of the month or quarter to check if samples have been collected may also be helpful. RIDOH sends reminders from time to time so be sure to check your email once per day.

POSITIVE TCR SAMPLES

No positive samples were reported in the past year.

REJECTED TCR SAMPLES

No rejected samples were reported in the past year.

MONITORING VIOLATIONS

Violation Determination Date	Analyte	Compliance Period	
8/22/2017	0200 - Swtr	7/1/2017	7/31/2017

MCL VIOLATIONS

No maximum contaminant level violations were reported in the past year.

OTHER VIOLATIONS

Violation Date	Violation Type	Compliance Period	
8/9/2016	71 -Ccr Report		
2/20/2018	72 -Ccr Adequacy/Availability/Content		
10/10/2018	72 -Ccr Adequacy/Availability/Content		

SECTION IV - SYSTEM OVERVIEW

System Operator Classification: D-2
Eric Laframboise, LaFramboise Water

GENERAL:
The Johnston Water Control Facilities (JWCF) public water systems (PWSs) are classified as five separately licensed community public water systems (West End, Nardolillo St, Everbloom St, Taylor Rd, and Capitol St). This small, town owned water supply's main office is situated within the Johnston Town Hall, located at 1385 Hartford Avenue. JWCF-Capitol St PWS **(RI2980435)** is an 8-inch diameter main that provides potable water to the Capitol St, Mascio Dr and Violet St which is approximately _____ service connections, all of which are metered. The PWS provides potable water to approximately _____ consumers on an average daily basis. There are four (4) additional interconnects in this area that serve individual system within the Town of Johnston. In FY2019 the PWS purchased _____-million gallons of water from PW. Unaccounted, lost revenue water for RI2980435 was ___% in 2019.

SOURCES:
This water system purchases water via an 8-inch main that interconnects with Providence Water (PW) at the intersection of Plainfield Pike and Capitol St.

Source ID	Facility Name	Local Name	Type	Availability
CC001	Cc-City Of Providence	CAPITOL ST	CC	P

Type: WL=Well CC=Consecutive Connection
Availability: P=Permanent E=Emergency S=Seasonal I=Interim O=Other

TREATMENT:
There is no treatment associated with this PWS.

STORAGE:
There is no storage for this system.

PUMPS/PUMP FACILITIES:
There are no pump associated with this PWS.

OPERATION AND MAINTENANCE:
In future inspection the PWS' operations and maintenance (O&M) manual will be reviewed by the inspector(s). The O&M manual should address the operation and maintenance of the following water system components as applicable to the PWS: well(s)/source, well/source pump(s), pressure tanks(s), booster pump(s), and treatment system. The O&M manual should define how often components are changed and replaced, and what the operating conditions should be (such as pressure settings and what treatment chemicals are used, including dosing requirements). If your PWS does not have an O&M manual, you must create one. RIDOH may be able to direct you to resources to provide assistance. Initial here if the PWS has an O&M manual:_____

DISTRIBUTION:
This small water system consists of the following distribution pipe materials:
Asbestos Cement: 1,177-linear feet along Capitol St.
Ductile Iron: 610-linear feet along Masico Dr.
Ductile Iron: 635-linear feet along Violet Dr.

OTHER:
There is no auxiliary power associated with this PWS.