BRISTOL COUNTY WATER AUTHORITY

Bristol, Barrington and
Warren, Rhode Island

WATER SUPPLY SYSTEM MANAGEMENT PLAN

EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

Introduction

The Bristol County Water Authority was formed for the purpose of:

- Purchasing the private Bristol County Water company and operating the water system
- Rehabilitating and upgrading the distribution system
- Building and operating a connection to the Providence Water supply system

The three goals established for the Authority are all within the overall goal of providing a sufficient supply of potable water to meet the needs of the resident of Bristol County.

In order to supply the citizens of Bristol County with sufficient supplies of potable water to meet their needs, the Authority prioritizes to the following activities:

- Comply with all applicable laws and regulations
- Implement the Bristol County Water Supply Act including:
    - Maintain the East Bay Pipeline
    - Maintain the emergency connection and pump station with the City of East Providence
    - Rehabilitate the water transmission line to its existing reservoirs (Shad Factory Pipeline)
    - Upgrade the child Street Treatment Plant to meet Safe Drinking Water Act requirements at high rates of production and above 3MGD
    - Rehabilitate, upgrade, renovate as necessary, the surface water system of reservoirs, dams, dikes, etc. to provide for a reliable long term supply
    - Maintain the distribution system of pipes and storage tanks in good, sound and safe condition

- Provide for service to all locations within the service area
- Conform to the overall goals for water suppliers established in the State Guide Plan Element No. 721

Water Supply System Description

Organization and Legal Structure

The Bristol County Water Authority (BCWA) was organized in February 1984 for the purpose of acquiring the private Bristol County Water Company and solving persistent problems associated with insufficient water supply, insufficient water pressure and unpleasant water quality as described in the Historical Perspective section. The BCWA is a public corporation created by an Act of the Rhode Island Legislature, Chapter 102 of the Public Laws of 1981 as amended. The Act required authorization by the Towns of Barrington, Warren and Bristol, which was completed by referendum in each of the Towns in November 1983. The referendum was approved by greater than 80% of the voters in each of the three towns.

The legislation called for each of the Town Councils to appoint three members to the Authority and each of the Town Councils appointed the initial members in early 1984. Since the organization of the Bristol County Water Authority in early 1984 the Board of Directors has completed the following actions from the charge of the Bristol County voters:

- Purchased the Bristol County Water Company,
- Established programs and procedures, continually worked on the rehabilitation and upgrading of the distribution system, completing the upgrade of nearly 60 miles of pipelines in the distribution system through fiscal year 2011 and
- Successfully completed in 1998 construction of the East Bay Pipeline, along with the associated booster pumping station at Nayatt Road in Barrington and the emergency connection and pumping station in East Providence.

The Board of Directors establishes policies and budgets. Control of operations is vested in the Executive Director. All employees of the BCWA are subject to the direction of the

Executive Director. The BCWA currently has 32 employees, down from 42 in 1992.

The BCWA organizational chart is included in the following page.

Water Supply Sources

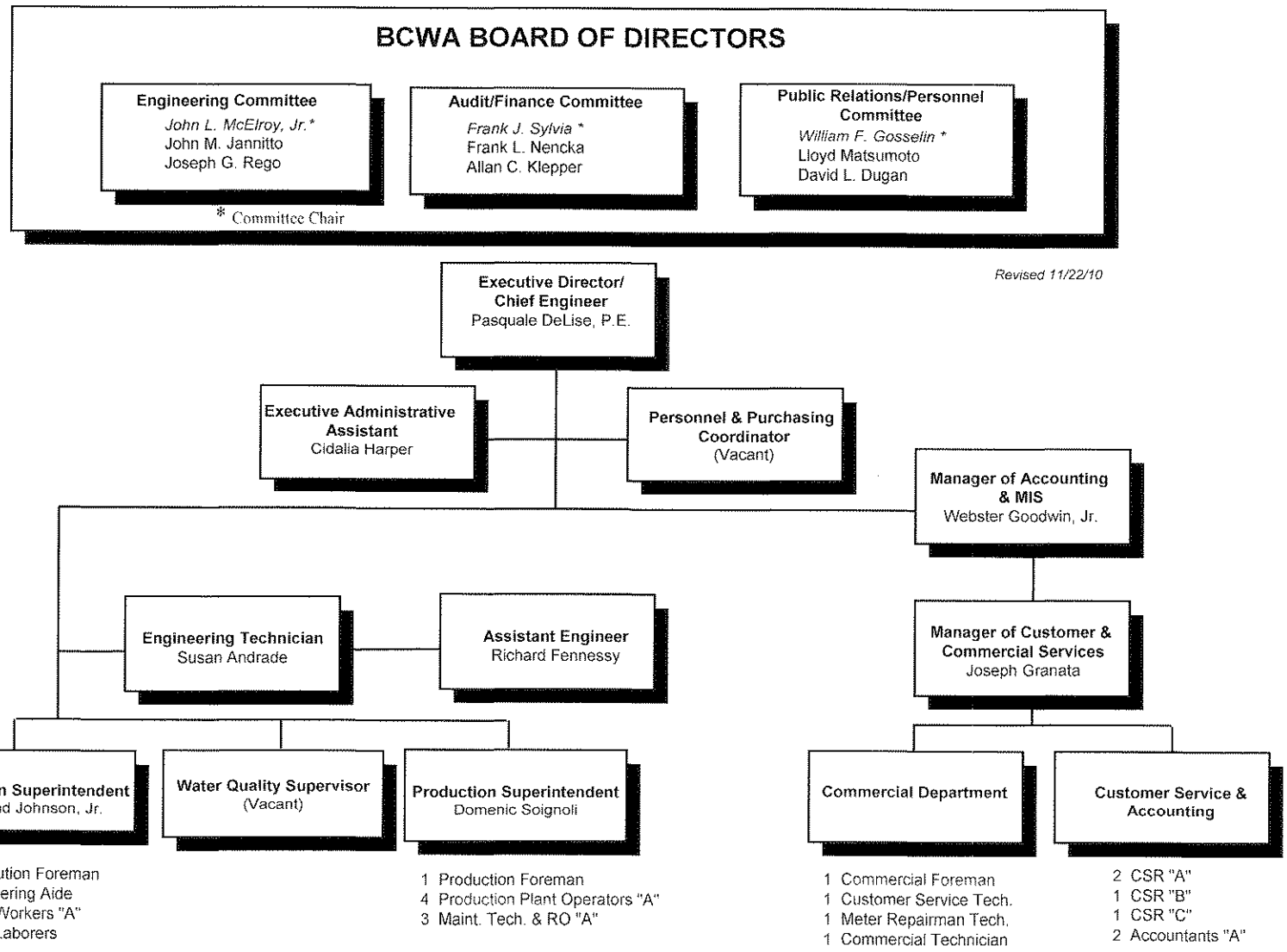
The BCWA operates and maintains a surface water supply consisting of a total volume of 356 million gallons and, which on the basis of safe yield, is capable of providing 70% to 80% of the average daily demand. However, at this time, this supply only provides approximately 30% of the County demand, due to the limitations of the Water Treatment Plant, with 70% of the demand purchased from Providence and transported through the East Bay Pipeline. These proportions will change after completion of Phase II Improvements at the Child Street Water Treatment Plant.

The BCWA surface water supply consists of four separate water bodies:

Kickemuit Reservoir located in Warren, RI	35 million gal
Swansea Reservoir located in Swansea, MA	154 million gal
Shad Factory Reservoir located in Rehoboth, MA	39 million gal
Anawan Reservoir located in Rehoboth, MA	128 million gal
Total	356 million gal
Massachusetts portion	90%
Rhode Island portion	10%

The water from all surface water bodies noted above is collected at the Kickemuit Reservoir in Warren, RI.

BRISTOL COUNTY WATER AUTHORITY



Treatment, Storage, and Transmission Facilities

Historically, BWCA has effectively operated two separate but interconnected water systems. One system, primarily servicing Warren and Bristol, obtained its water from the surface water sources through the Child Street Treatment Plant. The other portion obtained its water mainly from the Nayatt Road well field, a groundwater source, through the Nayatt Road Treatment Plant. However, by October 2001 at the Nayatt Road well field, the average daily production was approximately 290,000 GPD. Increasing levels of Iron/Manganese at the Wells had reduced the output down to this low production. Rehabilitation of the Wells became more and more frequently necessary and yet resulting with lesser capacity. The overall cost to operate the Plant and maintain the Wells was deemed non-economical. BCWA decided to shut down the Plant on November 6, 2001, making up for the loss of production with water from the East Bay Pipeline; and then would at some point do an analysis of the well field and Plant. The initial analysis by BCWA deemed the current status not efficient and relatively cost prohibitive. It should also be noted that annual testing by the DOH indicated that Sodium levels were increasing each year, indicating underground intrusion of salt water.

The system serving Warren and Bristol operates at a hydraulic grade line (HGL) established by the elevation of the Bay View storage tank (approximately 176 feet), located in Bristol, while the system serving Barrington operates at an HGL established by the Fountain Avenue standpipe (approximately 150 feet) located in Barrington, 26 feet lower than the Warren/Bristol system. The two systems are interconnected as follows:

- On Baker Street in Warren, crossing the Palmer River with a 12-inch main, to Mathewson Road in Barrington. (Inactive)
- Through one 12-inch main crossing the Palmer River at the North Main Street bridge from Warren to Barrington.
- Through a 24-inch main (the East Bay Pipeline) crossing the Warren River from Ferry Lane, Barrington to Water Street, Warren, to a 12-inch main at the intersection of Campbell Street and Main Street, in Warren.

Historically, flow through the 12-inch main in Baker Street was controlled by a pressure regulating valve on the Warren side; however, since the installation of the East Bay Pipeline, this 12-inch main was no longer needed and therefore was taken off service. The 12-inch main can be reactivated in the event it is needed for whatever reason.

A small portion of the Warren/Bristol system is serviced by a higher HGL of approximately 255 feet. This area consists primarily of residential units in the higher elevations of Bristol, east of Metacom Avenue. The area is served from the Metacom elevated storage tank located in Bristol, which receives its water from a booster pump station connecting to the Warren/Bristol system.

The normal pattern of water flow for either the Barrington or Warren/Bristol systems is from the Child Street Treatment Plant and is then pumped into the distribution system and storage tanks. In addition, water from the East Bay Pipeline is pumped at the Barrington Booster station into the system through the pipeline and a 12" main on North Main Street in Warren. The storage tanks feed water into the system and flows/pressure zones are controlled by the water level in the storage tanks. For the Barrington system, the Fountain Avenue standpipe is the controlling tank and for the Warren/Bristol system, the Bay View tank is the controlling tank. The high elevation service area is controlled by the elevated Metacom storage tank.

Treatment

The Child Street Treatment Plant is located adjacent to the Kickemuit Reservoir in Warren and is used to treat the surface water supplies. The plant was built in 1908 with additions in 1921 and 1947. The Plant was shut down on December 21, 2001 for the implementation of Phase I Improvements, and the entire County was supplied with Providence water transported from Providence across Narragansett Bay through the East Bay Pipeline until December 2005, at which time the Plant was put back on line.

The Child Street Treatment Plant can draw water from both the Kickemuit Reservoir and/or the Shad Factory Pipeline. The plant is continuously staffed and was originally built with a design capacity of approximately 4.0 million gallons per day. The water is treated with the following conventional process: coagulation, flocculation, sedimentation and filtration. The various chemicals that are added are: potassium hydroxide to raise the pH; aluminum sulfate and a polymer to enhance coagulation; chlorine dioxide to pre-disinfect; powdered activated carbon to control taste and odors; blended phosphate to control corrosion; sodium fluoride to prevent dental decay and sodium hypochlorite to post-disinfect and to provide a disinfectant residual.

Currently, the Child Street Water Treatment Plant is limited to operating at an average rate of approximately 1.4 MGD, due to its limited chemical treatment capacity in meeting current EPA Standards. Production above this level results in water quality deterioration.

Storage

The water distribution system includes approximately 220 miles of water mains ranging in size from 1-inch to 16-inch, with the majority of pipe being between 2-inch and 8-inch. Pipes are ductile iron and either unlined or cement lined cast iron. Major 12-inch transmission mains in Barrington extend from the Nayatt Road Booster Station in a northwesterly direction toward the Fountain Avenue storage tank and connect to the Bristol-Warren system in northern Warren. Major 12-inch and 16-inch transmission mains in the Bristol-Warren system extend from the Child Street Treatment Plant south in Metacom Avenue and Hope Street to south Bristol.

There are five distribution storage facilities in the distribution system, as follows:

- Hope Street Standpipe, located in Bristol, was built in 1908 and has a capacity of 500,000 gallons
- Bay View Storage Tank, located in Bristol, was built in 1928 and has a capacity of 2 million gallons
- Fountain Avenue Standpipe, located in Barrington, was built in 1952 and has a

capacity of 846,000 gallons

- Metacom Avenue Tank, located in Bristol, was built in 1970 and has a capacity of 250,000 gallons
- Ferry Road Storage Tank, located in Bristol, was built 2010 and has a capacity of 300,000 gallons

The total distribution system storage is 3.9 million gallons, or approximately one day's average demand on the system.

Pumping

The following pump stations are part of the BCWA system:

- Nayatt Road Pump Station (Inactive)
- Child Street Pump Station
- Barrington Booster Pump Station
- East Providence Emergency Pump Station
- Rehoboth Pump Station

The Nayatt Road Ground Water Treatment Plan is located at Nayatt Road in Barrington and is inactive. The Barrington Booster Pump Station, on the East Bay Pipeline, is also located at Nayatt Road, Barrington and raises the hydraulic gradeline (HGL) to the BCWA distribution system HGL. The Child Street Pump Station is located at the Child Street treatment plant in Warren and is used to pump treated surface water into the system.

The East Providence Emergency Pump Station is located on Pawtucket Avenue in East Providence.

The Rehoboth Pump Station is located in Rehoboth, MA and connects to the Shad Pipeline.

Transmission

Raw water is transported from the surface water reservoirs to the Child Street Treatment Plant through the Shad Pipeline and natural waterways in the watershed. The BCWA can transport raw water from the Shad Factory reservoir to the plant directly through the Shad Factory Pump station and pipeline. Water from the Anawan Reservoir flows to the Shad Factory Reservoir through the Bad Luck Brook. This transmission system has been the subject of much concern in the recent past. The Shad pipeline is in need of significant upgrading if it is to be effectively used by the BCWA. The Shad Factory pump station and transmission main originally had a design capacity of 3 mgd. This capacity has been limited by the age (more than 100 years) and the poor condition of the pipe, which limits the current operational pressure to approximately 40 psig.

In 2004 - 2005, a major portion of the existing Shad Pipeline was repaired at a cost of approximately $115,000 and recently Dewberry Engineering was hired for the engineering and design of a new Shad Pipeline. This project is expected to have a 6-year duration at an anticipated cost of $8.0 Million for a new pipeline and pump station, however this estimate is dependent upon the economics at the time when the project is actually bid. The BCWA is in the process of obtaining local permitting for the project and engineering is 90% complete.

The system is at present mainly supplemented by the East Bay Pipeline, which was put into operation in December 1998. The pipeline connects the Providence Water Supply System with the BCWA system from Providence to Warren, with a Booster Station located in Barrington. BCWA purchases water from Providence on a daily basis as needed.

The East Bay Pipeline is a 50,000 linear foot water main consisting of mainly 24-inch and 30-inch diameter ductile iron. It connects to the Providence Water supply system at Virginia Avenue in Providence. A 30-inch diameter water main extends from Virginia Avenue to the Columbia Park Meter Vault. After the meter vault and Harbourside

Boulevard, the pipeline reduces to 24-inch steel pipe and crosses the Providence River. After the Providence River, the pipe increases to a 30-inch diameter pipe and enters the Pawtucket Avenue Meter Vault/Pump Station. At this meter vault, an emergency connection and pumping station is connected to the East Providence system.

After the Pawtucket Avenue Pumping Station, the 30-inch pipeline continues to the Barrington Booster Pumping Station at Nayatt Road. After the Barrington Booster Pumping Station, the pipe reduces to a 24-inch pipeline to the Warren River. At the Warren River Crossing, the pipeline enlarges to a 28-inch diameter high density polyethylene (HDPE) pipeline. After the Warren River, the pipeline reduces to a 24-inch ductile iron pipe and connects to the BCWA system at its terminus at Main Street in Warren.

Distribution

BCWA surface water supply is treated at the Child Street Treatment Plant and delivered to the distribution system through 12-inch and 16-inch mains along Child Street and Metacom Avenue (Rte. 136) and Main Street/Hope Street (Rte. 114). Treated water from the East Bay Pipeline, through the Nayatt Road Booster Station is delivered along Nayatt Road and Washington Road to the Fountain Avenue standpipe and to Rumstick road, then along Rumstick Road to finally connect to the Bristol/Warren System on Main Street in Warren.

Interconnections

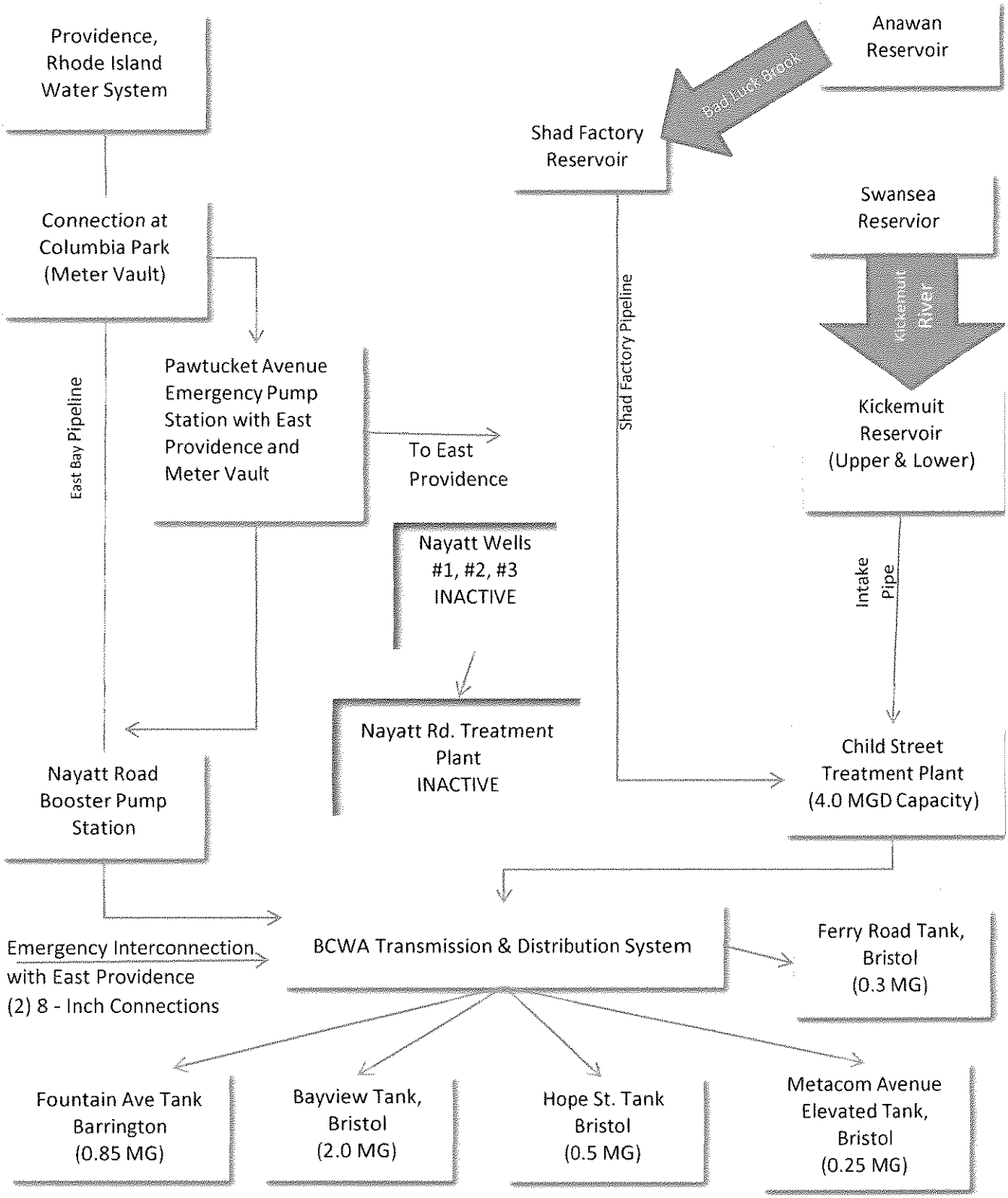
The BCWA has two additional 8-inch connections to the City of East Providence water system. One connection was completed in July 1987 and the second connection was completed in August 1987. The connections are classified as "emergency connections" and have been used when supplies in Bristol County were temporarily inadequate. The total available supply from these connections without pumping is approximately 1.0 million gallons per day. Theoretically, with pumping, the water available from these

connections is more than 1MGD; however, the BCWA considers the pumping scheme to be unreliable and therefore would only attempt to obtain more than 1.0 million gallons per day in an extreme drought situation or a dire emergency. To date, the pumping of more than 1.0 million gallons per day has not been needed or attempted. Water has been drawn from the East Providence connections to supplement supplies during some part of the early and mid 1990's for various reasons. Since the completion of the East Bay Pipeline, these two 8-inch connections have not been needed; however, they have not been disconnected or abandoned.

The East Providence Emergency Pump Station is supplied directly from the East Bay Pipeline. The East Providence system is connected to the East Providence Emergency Pumping Station through a 16-inch cast iron main in Pawtucket Avenue.
Studies are in progress at present time to improve emergency connections between BCWA and East Providence with the goal of interconnecting all crossings across Narragansett Bay. BCWA has engaged CDM to evaluate this piping schematic and the preliminary results are very favorable.

The interconnections with East Providence are controlled jointly by East Providence and BCWA. Use of these connections must be justified by an emergency situation or to conduct testing, and must not have any adverse effect on the East Providence and/or the BCWA systems. A graphical representation of the existing supply system is presented on the following page.

Bristol County Water Authority
Water Supply Management Plan
Existing Water Supply System Schematic



Service Area

The BCWA's service area consists of substantially all of Bristol County, 24.9 square miles in area, having a population of 50,648, according to the 2000 census.

The BCWA serves virtually the entire population of the County at present. Service is provided through 16,820 residential, commercial and industrial connections. The only areas in Bristol County not served by the BCWA include areas served by the Touisset Community Water system and the area commonly referred to as the Poppasquash section of Bristol, which is served by individual wells.

Source and Distribution Metering

The master meters are located in several locations throughout the system; two at the Child Street Plant, one at the Nayatt Road Booster Station, one at the Pawtucket Avenue, East Providence site and one at the Columbia Park, Providence site. The master meters at the plant measure flow from the plant (withdrawn from BCWA surface water supplies and treated at the Plant) into the transmission/distribution system.
Water drawn from the surface water sources is not separately metered. Plant use is determined by a combination of metering, in various places, and calculated flow rates where metering is not currently available.

In July, 2007, BCWA instituted a Three-Year Meter Modernization Plan to replace the remaining non radio-read meters. Between June, 2007 and July, 2010 BCWA replaced 8,557 non-radio read meters with Badger Orion Radio Read Meters. (See Exhibit #2). This program was funded through a Clean Water Financing loan, for a total cost-to-date of $1,504,817.09.

As of October 1, 2010, BCWA had 16,820 active metered accounts. Following is an analysis of the types of meters currently in use:

Active Accounts Meter Analysis:

Meter Register Type	# of Accounts	Percent
Orion Radio Read	8,582	51
Trace Radio Read	6,862	41
Manual Read	67	0.5
Telephone AMR	84	0.5
Remote Read	1,225	7
Total	16,820	100

System Production Data

The BCWA currently obtains water from its own surface water supplies, which is treated at the Child Street Treatment Plant, and treated water from Providence through the East Bay Pipeline.

Under the General Laws of Rhode Island, BCWA is allowed to purchase up to a maximum of 7.5 MGD from the City of Providence.

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SUPPLY	PRODUCTION (MGD)
Surface Water – Child Street	1.4 (Varies)
Purchased Water – Providence	7.50(Max)
Total Available Water	8.9
Average Daily Demand	3.5 – 4.0
Maximum Daily Demand	4.5 – 7.2

Major Users

The BCWA serves 10 major users, based on 2009 usage, as follows:

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Major Users	Uses of Water
Roger Williams University Ferry Rd., Bristol	Residential University
North Homeowners Association Hope Street, Bristol	Multi Residential
Blount Seafood Corp. 333 Water St., Warren	Seafood Processing
Cove Condo Association Baggy Wrinkle Cover, Warren	Multi Residential
St. Elizabeth Manor 1 Dawn Hill Rd., Bristol	Residential Nursing Home
R.I. Veterans Home Metacom Ave., Bristol	Residential Nursing Home
MMF Realty LLC 91 Main St., Warren	Multi Residential
Silver Creek Manor 7 Creek Lane, Bristol	Residential Nursing Home
Warren Housing Authority 20 Libby Ln., Warren	Multi Residential
Waterview Condo Association 510 Child Street, Warren	Multi Residential

Legal Obligation to Provide Water

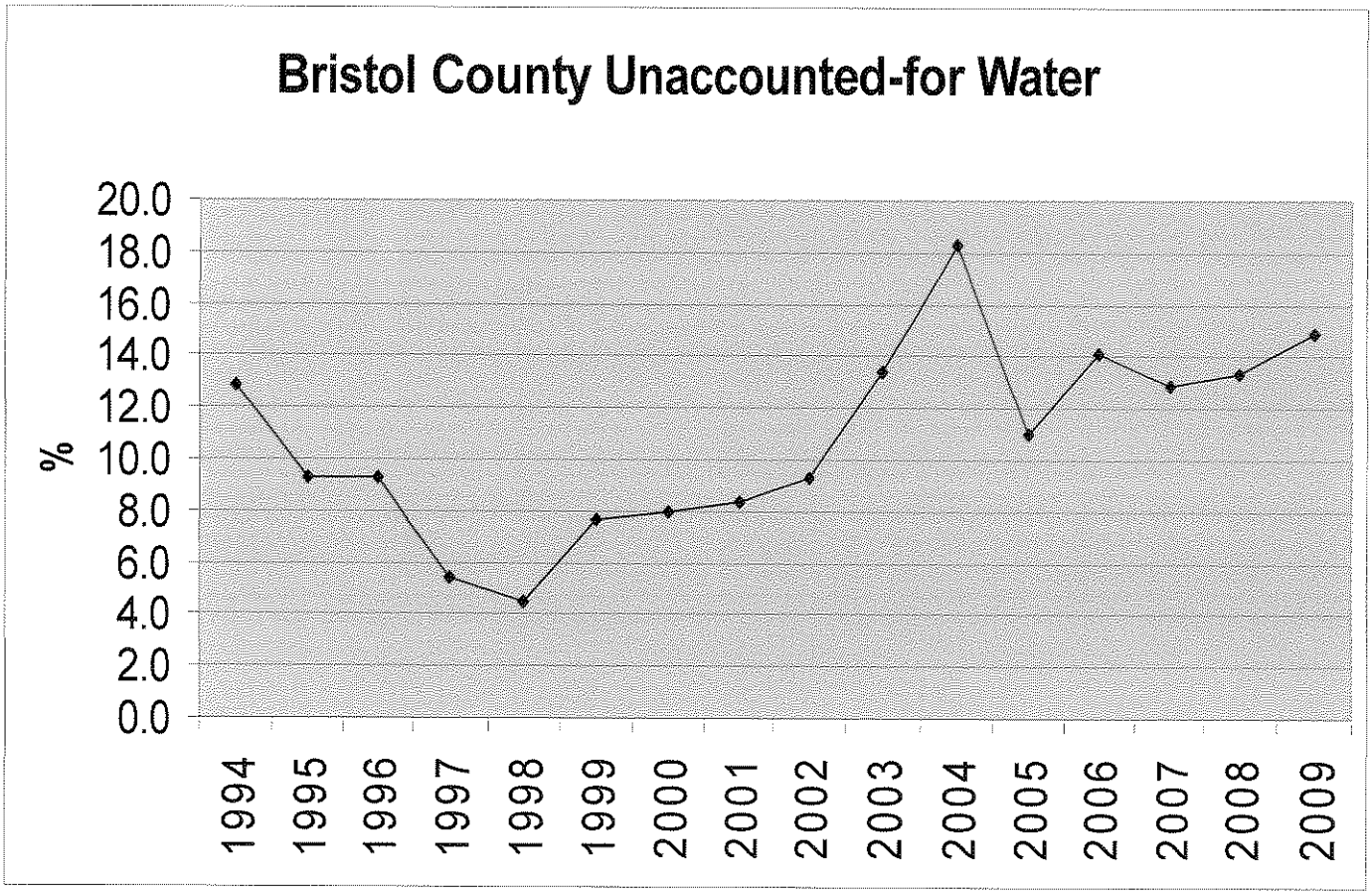
BCWA is authorized to provide water to the residents of Bristol County. BCWA has no legal obligation to provide water outside of Bristol County and has no specific legal obligation within Bristol County beyond the implied contract with each service connection.

BCWA has an existing contract with the PWSB that requires Providence to provide water to the BCWA via the East Bay Pipeline.

Non-Account Water Use

The BCWA has been aggressive in implementing programs that are designed to reduce non-account water; i.e. leak detection, meter replacement and distribution system rehabilitation. Every year, unless limited by funds, 50% of the transmission and distribution system is surveyed for leaks. All leaks that are found are promptly repaired. The BCWA intends to continue to perform leak detection surveys of 50% of the system each year.

The following diagram shows non-account water use trends since1994:



Water Conservation Program

The BCWA has also aggressively pursued water conservation programs to minimize as much as possible elevated maximum day demands. These programs, along with a water rate structure that is specifically designed to discourage inefficient uses of water, have resulted in one of the lowest, if not the lowest, per capita residential use of drinking water in the State.

Informational flyers are distributed at the Administrative office, along with home low-use water retro-fit kits.

Water Quality Protection and Management

The BCWA has completed a Water Quality Protection Plan (WQPP) in accordance with the Rhode Island Water quality Protection Act of 1987. The original plan was submitted to and approved by the RIWRB in 1989. All subsequent updates, latest submitted in 2001, are on file with RIWRB.

The WQPP includes:

- Delineation of source water protection area
- Inventory of significant potential sources of contaminants in source water protection area
- Determination of source water susceptibility
- Identification of protection strategies

The WQPP along with the policies of the State of Rhode Island, the Towns of Barrington, Bristol and Warren, RI, the State of Massachusetts, the Towns of Swansea and Rehoboth, MA, provide the basis for protection of the watershed and water supply management actions. The intent of water supply management is to prevent any significant degradation of raw water quality through protection of water shed areas.

The following are ongoing programs for protection of the watershed and recharge area:

- Management and maintenance of the land owned by the BCWA.
- Maintaining a liaison with enforcement agencies dealing with various aspects of control in watershed areas such as local police, planning, zoning and health boards, EPA and Rhode Island Department of Environmental Management, Massachusetts Department of Environmental Protection, and local conservation commissions as applicable.
- Participation in public meetings regarding planning and zoning for all land in watershed areas.
- Involvement with all federal and state agencies and all adjacent Rhode Island and Massachusetts Towns regarding any aspects of land use that may affect water quality.

The WQPP, as updated, further identifies the vulnerability of the sources of water to contamination from ongoing land uses and indicates the BCWA's utilization of the funds available from the Water Quality Protection Fund to purchase land and/or development rights and the implementation of other programs to reduce inappropriate flows to water resources. A specific example of protection of raw water quality is the use of copper sulfate in surface water sources to control algae growth.

BCWA's goal is to minimize potential deterioration of the raw water quality in the surface water and groundwater sources. The BCWA's efforts since development of the WQPP and subsequent updates are summarized in the following subsections, and were included in the 2001 WQPP and are on file with RIWRB.

Protection Strategies for Source Water Protection

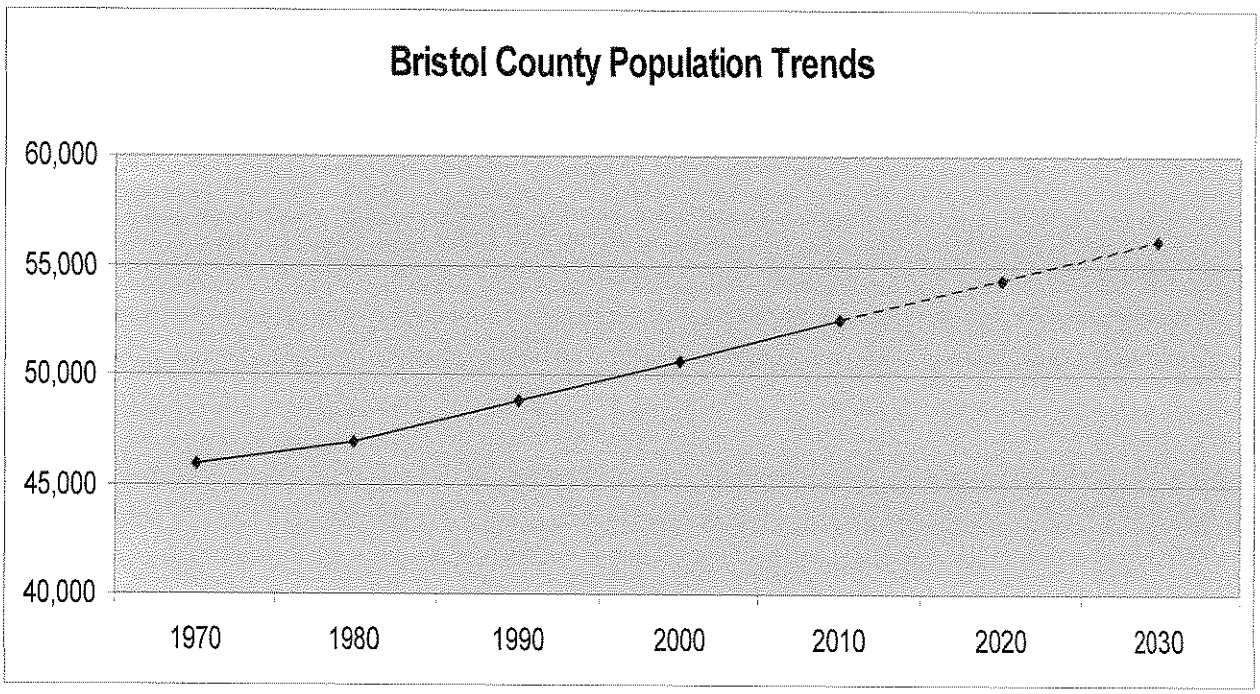
Actions to Date	
Patrolling water shed and groundwater recharge areas	BCWA personnel make daily inspection rounds of their watershed areas; this work is on-going.
Acquiring Land or Development Rights in Watershed	BCWA has identified 265+ acres of land in the surface water watersheds strategic to water quality protection. With the funding available from the Water Quality Protections programs, BCWA has purchased approximately 87 of these strategic properties. Detail information on the exact properties is on file at the RIWRB.
Regulatory protective actions	In a joint effort with Swansea, new fencing with a remote control gate was installed, which prohibits public vehicles from direct access to the property and water body of the Swansea Reservoir. Fencing has been installed around farm properties along the Kickemuit Reservoir to restrict and control access of farm animals to the water body. The Rehoboth Pump Station is BCWA's property and is fenced with locked gates. Continue to monitor activities in the Town of Barrington to insure that development of Town area over the groundwater recharge area is in accordance with best practices, in the event of future use of the Nayatt Rd. wells.
Other watershed protection activities	Construction of fish ladders at Shad Factory Reservoir and the Kickemuit Reservoir has been completed and are in full operation. The Executive Director/Chief Engineer and Assistant Engineer continue to monitor activities surrounding the Massachusetts

	watershed area and any proposed development in the area in the Towns of Swansea and Rehoboth, MA, and play an active role in Town meetings relating to existing conditions or future development.

Anticipated Future Demands

Population and Economic Development

The following diagram shows the population trends since 1970 and projects a population of approximately 54,321 by 2020 and 56,141 by 2030. Historical and current population information was obtained from the Rhode Island Statewide Planning Program's website.



The BCWA contracted with Arthur Young to complete a Water Demand Analysis, which was completed in 1986 and was based primarily on a review of historical and projected population and household trends for the BCWA system, an analysis of historical patterns in service volumes and analysis of national water utility operating data. Interviews were also conducted with various local and state officials knowledgeable of economic development patterns within the BCWA system. Results from that study are shown in the table below:

Calendar Year	Projected Use (MGD)	Actual Use (MGD)
1990	4.3	4.3
1991	4.3	4.3
1992	4.4	4.3
1993	4.6	4.6
2000	5.5	3.6
2005	3.7	3.7
2010	5.8	n/a
2020	6.0	n/a

n/a – information not available as of the publishing of this Plan.

Per Capita Water Use

All inclusive average per capita water use for calendar year 2009 was approximately 57.4 gallons per capita per day (gpcd), with an average residential per capita water use of approximately 40.8 gpcd.. This amount was determined by dividing the total water produced by 365 days. This calculates the average day demand, which then is divided by the BCWA population in 2009 to determine the water use per person per day.

The calculated value of 57.4 gpcd is a very competitive figure. This low number is a result of the BCWA's aggressive leak detection programs, an effective public education programs for water conservation, and weather patterns during that year.

Non-Potable Water

The BCWA estimates that there are approximately 500 private wells within the service area that are used for the irrigation of residential lawns. The use of these wells for irrigation reduces the peak demand on the water system. Applications for new service are routinely reviewed to determine what the water will be used for and if it's feasible to use non-potable water.

Available Water

The safe yield of the BCWA system was originally determined to be approximately 4.1 million gallons per day, which at that time included approximately 3.4 mgd from surface water sources and 0.7 mgd from ground water sources. Since that time, the wells have been inactivated, leaving BCWA with an approximate safe yield of 3.4 mgd from its surface water reservoirs.

The Child Street Water Treatment Plant (CSWTP), which is used to treat the BCWA surface water supplies, with an original design capacity of 4.0 mgd, is limited in its capacity to treat these surface waters by the fact that the Plant is in dire need of upgrading. Although the safe yield of the surface water supplies is approximately 3.4 mgd, less than the Plant original design capacity, production is limited at this time to 1.3 - 1.5 mgd. Phase II upgrade of the CSWTP is in progress, in order to bring the CSWTP up to the 3.5 mgd or higher production rates and meet all regulatory requirements.

The East Bay Pipeline was activated in 1998. BCWA draws treated water through this pipeline on a daily basis. By agreement, a maximum amount of 7.5 mgd may be withdrawn from the East Bay Pipeline.

Demand Management

The BCWA seeks to manage average demand through efficient use and efficient delivery of water by the system, efficient and accurate measurement of water consumed, by encouraging the users to efficiently use water through education and pricing and support of institutional requirements for installation of efficient water using devices. Maximum demands usually occur in the summer months and the amounts are heavily dependent upon the amount of rainfall; the more rain in the summer, less the demand. Analysis by the BCWA indicates that peak demands are almost totally due to the watering of lawns and other outside uses.

High peak demand may potentially result in limiting the ability to water lawns and other outside uses. Before the activation of the East Bay Pipeline, the BCWA has been required to institute bans on outside watering. Reduction of high residential consumption is also encouraged by the BCWA's block pricing structure.

The BCWA's methods of assuring efficient transmission and use of water in its own facilities are addressed in the System Management section of this Plan. This Demand

Management portion of the Plan will be primarily concerned with the BCWA's current and planned efforts in what is commonly referred to as "conservation".

Fee and Rate Schedules

The BCWA's rate structure is shown below (Fiscal Year 2010). The rate structure includes a service charge, based upon the size of the meter, and a consumption charge. The service charge does not include any water use. A five-step increase/decreasing/increasing block rate is charged for consumption as follows:

- First 500 CF/mo — $2.325/Hundred Cubic Feet (HCF)
- Next 1000 CF/mo — $6.569/HCF
- Next 8500 CF/mo — $5.003/HCF
- Next 20000 CF/mo — $2.325/HCF
- All over 30000 CF/mo — $3.011/HCF

BCWA's water rates do not differentiate between residential, commercial, industrial or governmental billing rates. The rate structure is such that it encourages conservation, but does not deter industrial growth .

Residential Retrofit Program

BCWA has supplied customers with approximately 2,000 retrofit kits since 1993. These kits are available for free at the Administrative Office of BCWA and BCWA technicians have them available for delivery to homes during service calls. Because residents are actively conserving water already with a very low per capita consumption as compared to other communities, BCWA has not noticed a change in consumption.

System Management

The general functions of BCWA are to collect, store and protect the quality of raw water supplies; efficiently transmit the raw water to the treatment facilities; efficiently and effectively treat the raw water so that the water quality of the treated water, at a minimum, meets all of the regulatory requirements of the Safe Drinking Water Act; efficiently distribute the treated water to the consumers and fairly proportion the costs of operations to the users.

Source of Supply Operations

The BCWA reservoirs have a capacity of 356 million gallons when full. Based on system average demands, and the surface supply safe yield, this represents approximately 70% to 80% of the County water needs, once the Plant is upgraded.

Distribution and Storage System

The BCWA operates and maintains a distribution system consisting of approximately 220 miles of transmission and distribution mains and five distribution storage tanks with a total capacity of 3.9 million gallons. The distribution system has been significantly improved since the BCWA has commenced operations upon takeover of the system from the private American Water Works Company. To date, nearly 60 miles of water mains have been replaced or rehabilitated at a cost of $18 million. Unless limited by economies, every year, a leak detection survey is performed on 50% of the water system. Beginning in 2005 equipment was purchased to enable this work to be done by BCWA trained employees. Soundings are made along main lines at 10' to 15' intervals, and direct soundings are made on gate valve, hydrants and curb stops. When leaks are

discovered, they are promptly repaired. In 2009, 65.63 miles of pipe were leak surveyed; one (1) hydrant leak was detected and promptly repaired. In 2010, 143.81 miles of pipe were leak surveyed; one major leak was detected and immediately repaired.

The BCWA will continue to implement the Capital Improvement Program to improve the Distribution and Storage Systems. Projects are in five categories:

- Transmission Improvements
- Fire Flow Improvements
- Looping and Small Main Replacement
- Storage Improvements
- Emergency Interconnections Improvements

Metering

The BCWA meters 100% of its water users. At the end of fiscal year 2010 BCWA had an installed base of 16,820 active metered accounts, reading the consumption of its customers. The meters range in size from 5/8 inch to 6 inch and are all owned by the BCWA. The BCWA maintains an active replacement/calibration program for all large meters on an annual basis and for small meters on a ten-year cycle.

Leak Detection Repair Program

The BCWA has adopted the goals established in State Guide Plan 721, which includes the goal of 15% non-account water. In fact, the BCWA is committed to maintaining a level of non-account water below 15% which potentially will allow of an additional 5% bonus in any state grant due to non-account water below 15%.

Emergency Management

The Emergency Operations Procedure Manual is on file with RIWRB. The Emergency Response Action Plan, which is being updated, will be provided to RIWRB upon completion.

BCWA does a continuous inventory of critical spare parts and performs preventative maintenance/testing on all equipment at a minimum of twice yearly. BCWA has a 24 hour, 7 day a week emergency telephone number, 401-245-5071. BCWA Personnel are also on call 24 hours a day, 7 days a week for emergencies and are required to respond within 1 hour of receiving an emergency call-out.

BCWA is also a member of the Rhode Island Water/Wastewater Agency Response Network (RIWARN), which can provide emergency back-up if needed.

Implementation

The BCWA has planned various actions to upgrade the water system that are in concurrence with the requirements of the Water Supply Management Planning Act. These actions have been organized as Supply Augmentation, Demand Management and System Management.

Capital Improvement Program

BCWA's Capital Improvement Program budget is initially set at $500,000/year, provided funds are available. This budgeted amount is in addition to the major Capital

Improvements of the Shad Factory Pipeline and the Phase II rehabilitation of the Child Street Treatment Plant, which are funded by the State.

Financial Management

Operating income and expenses include the following parameters:

Revenue

- Annual Water Rate Revenue – includes all income received from customers as service charges, water consumption fees and fire protection charges.
- General Facility Charge Revenue – Not used
- Special Assessment Revenue – Not used
- Capital Funds – Contributions and/or Grants in aid of construction projects
- Reserve Fund Revenue – Not used
- Other Earned Revenue – Interest Income
- Other Unearned Revenue – Not used

Expenses

- Debt Service on Bonds – Revenue that has been used to pay the interest on outstanding bonds for previously completed capital improvements.
- Operation and maintenance expenses – Revenue that has been used to pay:
    - Salaries and benefits
    - Materials and supplies
    - Repair and maintenance
    - Miscellaneous expense
    - Utilities
    - Administrative expenses

- Depreciation

- Purchasing water from Providence, via the East Bay Pipeline: currently the water charge for purchasing water from Providence is $1,697 per million gallons.
- Other Expenses – Loss on abandonment of distribution mains and maintenance of the East Bay Pipeline.

Billing Frequency

Currently BCWA reads meters and bills customers as follows:

- Residential accounts – Quarterly
- Small Commercial accounts – Quarterly
- Large Commercial accounts – Monthly
- Public accounts (Governmental) – Monthly & Quarterly
- Industrial accounts – Monthly & Quarterly

Bills are due when rendered and collections of the bills are actively pursued.

Coordination

The BCWA is the legal organization that has been established to provide potable water to the service area of Bristol County, which includes the Towns of Barrington, Bristol and Warren. The BCWA has reviewed the appropriate sections of each of the Towns Comprehensive Plans and has provided information to the Towns as applicable.

Letters from each of the Towns, stating BCWA coordination with local comprehensive plans will be submitted after the Towns have indicated their review of the WSSMP.