



Background

This Water Supply System Management Plan (WSSMP), as amended, has been prepared as required under the Rhode Island General Laws (RIGL) 46-15.3, as amended and titled, "The Water Supply System Management Planning Act" (Act). The legislative authority to effectuate the goals and policies 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 2002, as amended to implement the provisions of this Act.

Under this regulation, the Kent County Water Authority (KCWA), as a water purveyor supplying over 50 million gallons of water per year, is responsible for the preparation and adoption of a WSSMP. It also requires that the KCWA update this WSSMP periodically, as significant changes warrant but at a minimum of every five years, or as otherwise stipulated in the Regulations.

WSSMP's are prepared in order to provide the proper framework that will facilitate the effective and efficient conservation, development, utilization and protection of the natural water resources of the State as utilized by the water purveyor. Further, the overall goals incorporate the applicable policies and recommendations of the Rhode Island Water 2030, State Guide Plan Element 721. The purpose of this WSSMP is to outline the objectives of the Water Supply System Management Planning process for the KCWA water supply system, and to serve as a guide to employ the proper decision-making processes toward meeting that goal.

This WSSMP contains a detailed description of the water system and includes the policies and procedures related to the general function, operation, and management of the water system. The water quality protection component of the plan is contained, separately, under Volume II. The Emergency Management section, Volume III, relates to the vulnerability assessment of the water system for use in emergency planning. It shall be incumbent upon the KCWA to implement the recommendations and procedures outlined in this WSSMP in order to comply with the overall requirements of the Act.

Water System Description

The KCWA was established by legislation of the General Assembly of the State of Rhode Island and Providence Plantations in 1946. Formation of the KCWA entailed the consolidation of three water companies: the Warwick and Coventry Water Company, the Pawtuxet Valley Water Company, and the East Greenwich Water Supply Company. The 1956 General Laws empowered the KCWA to own, operate, and maintain a water supply system (including all water supply sources, pumping stations, transmission facilities and distribution piping) in Kent County, and to serve the communities that comprise Kent County (i.e., Coventry, East Greenwich, West Greenwich, Warwick, and West Warwick). Moreover, since 1956, the KCWA has supplied water to localized outlying regions of Cranston, North Kingstown and Scituate. The service population is comprised mainly of residential, commercial, and government customers of which there are over 26,560 metered accounts. The total service population has been estimated at 88,781 persons.

The primary source of water supply for the KCWA water system is wholesale water purchased from the PWSB and City of Warwick which accounts for approximately 93% of system demand for the year 2011. The KCWA also owns three independent wellfields (Mishnock, Spring Lake, and East Greenwich) that collectively supplied approximately 12% of the total system demand in the year 2011. Currently, the East Greenwich Well is the only operating and active well source.

The KCWA will be placing the Mishnock Water Treatment Facility on line in 2013. At this time, groundwater is disinfected at each of the production wells via injection of a diluted 15% hypochlorite solution. In addition to disinfection, potassium hydroxide is added for pH adjustment and corrosion control.

The transmission and distribution system consists of approximately 402 miles of water main, with sizes ranging from 2-inch diameter in older areas that serve domestic supply only, to 24-inch diameter transmission mains, which transport water from the supply sources and storage tanks to the distribution system. Transmission mains, which are defined as water mains 12 inches or greater in diameter, total approximately 38.4 miles, or 9.7 percent of the total system piping.

The service area is operated as eight (8) distinct service areas (pressure gradients), each operating at varying hydraulic grades. Three of the pressure gradients serve the majority of KCWA's customers.

There are ten water storage facilities that are operated by the KCWA and maintain the pressure gradients. The KCWA owns and operates three (3) booster pumping stations (Setian Lane, J.P. Murphy Boulevard and Johnson Boulevard Pump Stations) and two (2) transmission pumping stations (Clinton Avenue and Quaker Lane Pump Stations), in addition to the four (4) well pump stations (with only the East Greenwich Well active).

The KCWA maintains four interconnections to neighboring water purveyors – two each with Providence Water and the City of Warwick. Three of the four interconnections supply the KCWA with finished water on a daily basis, while one of the interconnections to the City of Warwick (Potowomut) conveys finished water to the City of Warwick. The KCWA also has four emergency interconnections, one with the Quonset Development Corporation, one with the Town of North Kingstown, one is offline in the City of Warwick and one is with the Providence Water Emergency Interconnection on Hoover Street in West Warwick.

Kent County service area comprises five communities in central Rhode Island (Coventry, East Greenwich, West Greenwich, Warwick, and West Warwick). The general laws of Rhode Island permit the KCWA to own, operate and maintain a water supply coterminous the county's political boundaries. In addition to serving all or parts of those communities, KCWA service has been extended outside of its legislative boundaries to contiguous bordering areas in need of public water supply. Currently, its service area also incorporates parts of Oaklawn in Cranston, Western Cranston, southeastern Scituate, and the extreme northeast corner of North Kingstown.

The following table indicates the breakdown of KCWA customer account distribution for the year 2011.

Type of Account	Number of Accounts
Residential	24,912
Commercial / Industrial	1,351
Governmental	297
Other (Dry – Non Metered Fire Lines)	144
Total	26,704

The KCWA does not have the ability to accurately record actual population served for each water use classification (i.e., residential, commercial, industrial, government). Census information represents an

average population for residential occupancy. A reasonable estimate of total residential population served within the service district can be derived using statewide planning standards and utilizing various sources of data including the number of residential services, population figures, number of households (actual and projected), and persons per household.

Population Per Community versus Population Served by KCWA

Community	2010 ¹	2011 Population Served ²	Percent Served
Coventry	35,014	26,971	77%
Cranston*	81,131	2,257	3%
East Greenwich	13,146	12,010	91%
North Kingstown*	26,486	28	0%
Scituate*	10,325	1,364	13%
Warwick	85,620	15,504	18%
West Greenwich	6,135	1,728	28%
West Warwick	29,191	28,947	99%
* No projected Increase	¹ Taken from 2010 Census	² Taken from Actual Census Track	

The water supply and distribution system is 100% metered. Master meters located at each individual well station and interconnection to neighboring purveyors, meter 100% of the water produced and purchased via wholesale interconnections. Every service connection within the water distribution system is metered at the point of sale, with the exception of a small amount of dry non-metered fire services, yielding 99.4% metering. Since 2010, the KCWA has begun the process of replacing the water meters with radio frequency reading systems. Commercial meters and large meters over 2 inches are not being replaced as part of this program. The large meter replacement and/or testing program has been implemented. Some customers have been resistant to comply with the Public Utilities Commission's regulations requiring the testing of large meters on an annual basis. It is anticipated that the large meter replacement/calibration program will continue to fall short of the prescribed 100% testing goals due to customer resistance to comply with PUC requirements. Legislative reform and/or amendment to PUC regulations are necessary to assist water purveyors in compelling customer compliance (i.e. violation with fine).

A review of production data totals for the past ten (10) years (2002 - 2011) reveals an average production rate of 3,348 million gallons per year (mgy), with a high of 3,874 mgy occurring in 2005, and a low of 2,860 mgy occurring in 2009. Based on the total production, the current Average Day Demand for calendar year 2011 computes to 8.02 million gallons per day (mgd) for the entire system. The

current Average Day Demand for calendar year 2011 based on total system production is 8.02 mgd. The current Average Day Demand for calendar year 2011 based on the total volume of water metered at the point of sale (water purchased ie. residential, commercial, etc.) computes to 6.78 mgd for the entire system. The volume of water sold to residential customers in 2011 totaled 1,869.05 million gallons, which averages to a daily residential consumption of 5.1 mgd. Based on the estimated residential service population of 88,781 persons, the current per capita system demand for residential users is approximately 57.67 gpcpd.

The KCWA supplied water to forty-eight (48) major users in 2011. Kent County's major water user class varies greatly ranging from hospitals, to a yacht club, to laundromats and private multi residential properties. The majority of the major users, however, are either residential entities (i.e. mobile home parks, condominium associations, etc.) or large industrial enterprises. In 2011, major user water consumption totaled approximately 495.7 million gallons.

The KCWA has maintained an average of 7.62% non-account water since 2002, and 8.2% for the year 2011. This rate is below the goal of 10% set forth in 2011 Water Use and Efficiency Act, RI General Laws §46-15.3-22(b). The success KCWA has achieved is largely due to the large meter testing program, residential retrofit program, the meter replacement program, and the aggressive leak detection and repair program that it maintains.

No specific legal obligations or contract agreements exist between any city or town regarding the KCWA's provision to supply water to undeveloped territory. Agreements do exist for wholesale supply from the PWSB and the City of Warwick to obtain supply. KCWA also has an interconnection agreement with the North Kingstown Water Department the Quonset Development Corporation and the City of Warwick to provide water under emergency circumstances.

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 KCWA uses seasonal press releases to encourage efficient outdoor watering techniques, provide tips on how to check your home for leaks, encourages the installation of low-flow retrofit devices, and recently developed a Water Conservation Action Plan.

Recent System Improvements

The KCWA maintains an ongoing, aggressive Capital Improvement Program (CIP) in order to provide its customers with a safe and reliable supply of potable water. What follows is a list of major system improvements that are planned for the future or have taken place in recent years.

- Quaker Lane pump station rehabilitation study Feb 2007
- Mishnock Wells Water Treatment Facility under construction
- Water Conservation Action Plan Jan 2007
- Evaluation of the Clinton Avenue Pump Station 2008
- Distribution Storage Tank Hydraulic Evaluation (ongoing) Dec 2006
- Computer Model Upgrade Feb 2006
- Major Users Technical Assistance Program Jan 2006
- Distribution system computerized model update 2005
- Infrastructure Rehabilitation pipeline database update 2009
- Emergency Response Plan 2012
- Five-Year Capital Improvements Program Report Jan 2012
- East Greenwich Well sequestering study 2004
- East Greenwich Well Treatment Study 2012

Water Quality Protection

Volume II of the WSSMP fulfills the requirements of the water quality protection component of the plan. An update of the 2011 Kent Count and North Kingstown Source Water Assessment Plan (SWAP) for the KCWA was developed in accordance with the Guide to Updating Source Water Assessments and Protection Plans, final draft October 2011. The final risk ratings for the East Greenwich, Spring Lake, and Mishnock Wellhead Protection Areas were determined to be consistent with the 2006 ratings.

Current and Future Demands

Kent County has grown moderately over the past ten years and over this same span, however, the average day demand has remained fairly constant, indicating the effective employment of water

conservation measures. Anticipated future demands for the 5- and 20-year planning periods were developed utilizing population projections for each service community as well as information from hydraulic modeling reports. The following table shows the estimated ADD and MDD for 5- and 20-year planning periods.

	ADD	MDD
5-year	11.6	22.4
20-year	13.4	25.6

Theoretical Water Supply values were developed for the current year and 5-and 20-year planning periods.

Theoretical Water Supply

	Present*	5-Year (2010)*	20-Year (2020)*
Clinton Avenue	25.00	25.00	25.00
Oaklawn Avenue	0.19	0.19	0.19
Quaker Lane	4.60	10.10	10.10
East Greenwich Well	2.00	2.00	1.60**
Mishnock Wellfield	0.00	2.4	1.92**
Spring Lake Well	0.00	0.26	0.21**
Total	31.79 mgd	39.95 mgd	39.02 mgd

***Pump station values are based on the maximum capacity (both high and low service gradient pumps operating) of the facility and may not be achieved over extended periods due to operational system constraints. Over time, all wells will see a reduction in capacity due to aging of the well through general use. Values are used for planning purposes only and should not be construed as actual available water supply.**

****20% reduction in well capacity due to aging of well.**

Comparison of the anticipated future demands verse the theoretical water supplies revealed that the KCWA will be able to meet demands for both the 5- and 20-year planning periods.

Conservation and Education

The Hunt River Wellhead Protection Area Planning Committee was comprised of members from the KCWA, Rhode Island Economic Development Corporation, and the Towns of East Greenwich, North Kingstown, and the City of Warwick. It was intended that this Committee's first task be the update of the Hunt Aquifer WHPP. This did not occur and the sunset imposed by the Town of East Greenwich regarding this committee action plan ran out. KCWA has met with the other two water suppliers, North Kingstown and QDC, who use this aquifer as their source of supply to develop a coordinated management plan for this source. This plan was presented to the RIWRB in April 2007. The plan was accepted by the RIWRB and is now being actively implemented.

Demand and System Management

The KCWA had periodically distributed educational flyers to service area businesses and residents. Funding for periodic newsletters was denied by public utilities commission effectively cutting off one method of communicating these types of concerns to the customers. The KCWA has implemented an "E" News letter on its website as an alternative communication mechanism to offset the debilitating affect cancellation of the printed version has on customer communications. The KCWA published a Conservation brochure and Water Audit mailer focused on education and assisting its customers with the elements of conserving water. One flyer, entitled "Lake Mishnock," is a foldout pamphlet that educates readers on water quality issues, protective measures, volunteer efforts, and regional hydrology.

The KCWA implemented a residential retrofit program in 1999 and remains active. The KCWA also developed a Water Conservation Action Plan in January 2007. KCWA started its Major Users Technical Assistance Program (MUTAP) in July 2004 and identified sixty-four (64) customers, at the time, as major users. Major Users are defined as customers that use approximately 3 million gallons of water or more each year (KCWA expanded this at the time to include customers under but close to the 3 million gallons per year threshold).

Outdoor water use contributes to double the average daily demand on most, if not all, water systems throughout the State. With the passage of the Water Use & Efficiency Act, the State has adopted

cohesive statewide conservation regulations to demonstrate a firm commitment to conservation that can be equitably implemented across all local, state and municipal boundaries.

The KCWA employs a Meter Installation, Maintenance and Replacement (MIMR) Plan as well as an aggressive Leak Detection and Repair program. As previously mentioned, with the exception of some fire services, the KCWA meters 100 percent of the water supplied to its customers. Other exceptions of water used include municipal, fire fighting, and water system maintenance. The KCWA maintains an aggressive Leak Detection and Repair (LDR) program. For over fifteen years, the KCWA has been performing in-house leak detection and repair services on a routine basis by trained personnel using electronic leak detection equipment.

The KCWA performs preventive maintenance on its water system, the extent of which is limited by the workforce currently available to accomplish this work. Preventive maintenance practices are largely limited to aboveground activities such as exercising emergency power at the pump stations, changing oil, checking gauges, and semi-annual flushing of water mains. The KCWA is looking to expand and formalize its preventive maintenance program.

The KCWA is not contemplating any planned extensions of the water system infrastructure in or outside of the water service district. Any desired expansion of the water system must be applied for, approved by the KCWA, and financed independently.

The KCWA has demonstrated full compliance with all of the water quality provisions of the Safe Drinking Water Act and its subsequent amendments and RIDOH regulations.

Emergency and Drought Management

The Emergency Management section, Volume III, of the Plan establishes the responsibilities and authority within the KCWA 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 generally consistent with the goals of the Rhode Island Water Emergency Response 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.

The KCWA developed a Demand/Drought Management Policy that was approved in April 16, 2003 and revised February 15, 2006. This policy provides the KCWA the ability to proactively prepare and manage potential drought occurrences. The use and development of this policy demonstrates KCWA's commitment to drought management.

Implementation, Financial Management, and Coordination

The KCWA has developed a 20 year Implementation Schedule for system improvements. A detailed schedule outlining the individuals or entity responsible, timing, and costs associated with recommendations of this plan has been developed and is presented within the WSSMP. Where work can be accomplished by the KCWA, the responsibility has been designated "In-House." It is intended that where outside consultants and/or contractors are required, the KCWA shall take the necessary steps to advertise for and contract with such resources. The costs developed for each recommendation include an estimate of the capital, operating and maintenance costs associated with each implementation.

It is evident from review of these documents that KCWA's continued revenue stream and control of expenses has provided a solid foundation for the Authority to continue to provide the quality service to its customers, as well as provide repayment of the debt issuance. PUC authorized rates have failed to realize the full funding needs of all programs and operational cost. KCWA will continue to file for increases as necessary to compensate for budget shortfalls associated with reduction in sales due to variation in consumer water use patterns.

KCWA water rate charges consist of a combination of a *Consumption Charge* (Rate varies according to meter size), a *Service Charge* (Flat Rate), and a State imposed *Water Quality Protection Charge*. The Consumption Charge is of a uniform block rate structure, whereby customers are charged a constant rate per 100 cubic feet of water metered. Service charges are based on size and use.

The WSSMP is intended to be reasonably consistent with the goals and policies of the Comprehensive Community plans for the communities serviced by the KCWA. Naturally, these communities must also take into consideration the ability of the KCWA to extend water service in an area zoned for development without adversely impacting existing customer service or rates for the constituents of the communities served.