JGA JOB NO. 19-008

WATER SUPPLY SYSTEM MANAGEMENT PLAN 5-YEAR UPDATE

PREPARED FOR:

KENT COUNTY WATER AUTHORITY
1072 Main Street, P.O. Box 192
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Approved by Water Resources Board: _____

VOLUME I

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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 Kent County Water District was formed in 1946 during the January session of the General Assembly of the State of Rhode Island and Providence Plantations, Chapter 1740. The KCWA, which operates the water district, was approved for formation on April 24, 1946, and officially organized shortly thereafter, on July 8, 1946. The Authority began functioning as a water distribution system when it acquired the assets of three privately owned water companies serving communities within Kent County, namely the Pawtuxet Valley Water Company, the Warwick and Coventry Water Company, and the East Greenwich Water Supply Company along with Good Earth, Inc., a real estate holding company and owner of Carr Pond in East Greenwich. The three water companies, each incorporated in the 1880's had been subsidiaries of New England Water, Light and Power Associates, a Massachusetts voluntary association, since 1928. The three water companies had been operated as a unit by a common staff with executive offices in Providence and operating headquarters in West Warwick. Over the years, as the towns they served grew, these small water companies expanded to service additional customers buying smaller water companies and mill lines on their way. At that time these three companies combined supplied approximately seven thousand customers on average at three million gallons a day from several surface reservoirs and well fields with a few storage tanks. Funding for these initial acquisitions was generated by the Authority's Water Revenue Bonds, issue of 1950, in the aggregate principal around of $2,050,000, all of which have been retired.

The 1956 General Laws (Section 39-16) empowered the KCWA to own, operate and maintain a water supply system (including all water supply sources, pump stations, transmission facilities and distribution piping) within Kent County and to make Rules & Regulations to serve the communities that comprise Kent County (i.e. Coventry, East Greenwich, West Greenwich, Warwick and West Warwick). Moreover, the Kent County Water Authority supplies water to outlying regions of Cranston, North Kingstown and Scituate that were either part of the original water system acquisitions or areas in need of public water that were within the serviceable limits of the system gradient. The KCWA currently supplies water regionally to central Rhode Island serving the majority of the commercial/industrial constituency and approximately 88,809 citizens through 27,392 service connections, including residential, commercial/industrial, and governmental users.

Originally, the KCWA Board consisted of five members. In 2017, Section 39-16-4 was amended to increase the Board to seven members, one each from East Greenwich, West Greenwich and Warwick, and two each from Coventry and West Warwick, each serving a 10-year term. The Board provides the leadership that establishes operating policy for the organization. Board meetings are held monthly unless issues arise that may require a special meeting to resolve. The Executive Director/Chief Engineer is responsible for daily management, operations, planning, budgeting, public relations, contracts and policy enforcement. The Executive Director/Chief Engineer is responsible for daily management, operations, planning, budgeting, public relations, contracts and policy enforcement. A management team made up of Director of Administration, Director of Engineering and Technology, Director of Finance and Human Relations, Director of Operations, and Treatment Manager/Water Project Engineer assists the Executive Director/Chief Engineer in the overall operation of the Authority. In total, thirty-seven (37) positions comprise the KCWA organizational structure to support administrative, infrastructure and customer related operations for the service area.

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 92% of system demand for the year 2019. The KCWA also owns three independent wellfields, two of which (Mishnock and East Greenwich) collectively supplied approximately 8% of the total system demand in the year 2018. For aesthetic water quality reasons, the third well is on standby for emergency supply.

The KCWA has placed the Mishnock Water Treatment Facility on line. Water is supplied to the treatment plant via any combination of the three wells which can provide a combined total feed input of 1,805 gallons per minute (GPM). The maximum treatment plant design flow is 2,000 GPM.

The well water is first treated through deep bubble aeration. The aeration equipment removes, or strips, radon and carbon dioxide from the water. Stripping carbon dioxide increases the pH of the feed water which enhances downstream treatment and reduces costs associated with chemical pH adjustment. Water discharged from the deep bubble aeration units enters rapid mix tanks where specialized treatment chemicals (Poly-Aluminum Chloride and Potassium Permanganate) are injected into the flow stream. The treatment additives quickly convert dissolved minerals (primarily iron and manganese) to a solid state and also simultaneously coagulate organics into larger particles that can be more easily filtered. The treated well water is then discharged to the membrane ultrafiltration

system. During the filtration cycle, well water flows into specialized tanks outfitted with thousands of suspended membrane fibers. The membrane fibers are like porous straws that only allow the passage of clean fresh water (permeate) via gentle suction action provided by a series of permeate pumps. The clean filtered water is discharged to a clear well and slightly chlorinated to achieve compliance constraints required under the EPA's Ground Water Rule for virus inactivation. During production, the filtered solidified minerals and organic matter become concentrated within the tanks. To rid the membrane tanks of these wastes, the filters go through a series of backwash/backpulse cycles to purge and reject the accumulated waste into a series of recycle tanks for solids settlement. After a settling period, the recycle system pumps the top clear portion of the water back to the head of the plant. This recycling of backwash water is accomplished to optimize water production and increase production efficiency (95% – 98% clean water recovery). The thickened mineral rich waste at the bottom of the recycle tanks is pumped to lagoons where the water either evaporates and/or percolates back into the ground recharging the aquifer while leaving iron and manganese solid residuals behind for accumulated disposal.

The transmission and distribution system consists of approximately 457 miles of water main, with sizes ranging from 2-inch diameter in older areas that serve domestic supply only, to 30-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 134 miles, or 30 percent of the total system piping.

The KCWA water distribution system is divided into seven distinct pressure zones operating at varying hydraulic pressure gradients at various locations. Three of the pressure gradients, or HGL (Hydraulic Grade Line) serve the majority of KCWA's customers. There are four 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 Spring Lake being in standby for emergency supply).

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 2019.

Type of Account	Number of Accounts
Residential	25,453
Commercial / Industrial	1,548
Governmental	273
Other (Dry – Non Metered Fire Lines)	118
Total	27,392

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]	2020 Population Served [2]	Percent Served
Coventry	35,014	26,971	77%
Cranston*	80,387	2,257	3%
East Greenwich	13,146	12,010	91%
North Kingstown*	26,486	28	0%
Scituate	10,329	1,364	0%
Warwick	82,672	15,504	19%
West Greenwich	6,135	1,728	28%
West Warwick	29,191	28,947	99%

* No projected increase [1] Taken from 2020 Census [2] Taken from Actual Census Track

The water supply and distribution system is 100% metered with the exception of some fire services. 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 non-metered fire services, yielding 99.4% metering. At this time, all of the residential and commercial water meters have been replaced with radio reading and billing style meters.

A review of production data totals for the past four years (2015 - 2018) reveals an average production rate of 7.88 million gallons per day (mgd); the maximum day demand for that period was 15.55 MGD. Based on the total production, the current Average Day Demand for FY 2018 computes to 7.55 mgd for the entire system. The current Average Day Demand for FY 2018 is based on the total volume of water metered at the point of sale (water purchased [i.e. residential, commercial, etc.]) for the entire system.

The KCWA supplied water to forty-five (45) major users in 2018. Kent County's major water user class varies greatly ranging from hospitals, to bio-manufacturing, 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 2018, major user water consumption totaled approximately 391.7 million gallons.

The KCWA has maintained an average of 8.5% non-account water over the past four years. 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 emergency 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 and encourages the installation of low-flow retrofit devices.

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.

- Distribution Storage Tank Hydraulic Evaluation (ongoing)
- Computer Model Upgrade (ongoing)
- Major Users Technical Assistance Program
- Infrastructure Rehabilitation Pipeline Database Update
- Emergency Response Plan
- Five-Year Capital Improvements Program Report

Risk Taking

East Greenwich WHPA: The final risk taking for the East Greenwich WHPA was determined to be **moderate**, which is consistent with the 2012 SWAP. In regard to the East Greenwich Well, KCWA has been working with the North Kingstown Department of Water Supply and the Quonset Development Corporation in regard to the Hunt River Aquifer.

Spring Lake WHPA: The final risk rating for the Spring Lake WHPA was determined to be **moderate**, which is consistent with the 2012 SWAP.

Mishnock WHPA: The final risk rating for the Mishnock WHPA was determined to be **moderate**, which is consistent with the 2012 SWAP.

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	PEAK HOURLY DEMAND
5-year	8.00	15.19	20.23
20-year	8.10	15.38	20.48

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

Theoretical Water Supply

	Present*	5-Year (2025)*	20-Year (2040)*
Clinton Avenue	25.00	25.00	25.00
Oaklawn Avenue	0.20	0.19	0.19
Quaker Lane	10.0	10.0	10.0
East Greenwich Well	2.0 (with treatment)	3.0	1.68**
Mishnock Wellfield	2.40	2.40	1.92**
Spring Lake Well	0.00	0.26	0.21**
Total	**39.60 MGD**	**40.85 MGD**	**39.00 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.

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 utilizes its website to inform their customers about elements of conserving water.

Outdoor water use during the summer months contributes to the increase in the average daily demand on most, if not all, water systems throughout the State. The Water Use & Efficiency Act requires water suppliers to 'manage demand to assure the long-term viability of water resources and water supply, to provide for strategic, prudent, reasonable and necessary use of water supplies, and to control and/or curtail water use during periods of diminished water supply availability including droughts;' The Act further states that State agencies need to become advocates for removing regulations and requirements that may hinder this objective.

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 the past 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.