

Executive Summary

INTRODUCTION

The Warwick Water Division (WWD) presents this 2021 Water Supply System Management Plan (WSSMP) update as a comprehensive plan that addresses all of the elements in the “Rules and Procedures for Water Supply System Management Planning” dated October 2018, and includes the “Demand Management Strategy” information that the State has added by law in 2011 as included in the “Rules and Procedures Governing the Water use and Efficiency Act for Major Public Water Suppliers”.

This WSSMP update supersedes the 2015 plan (approved in April 2015), and all prior updates and WSSMPs.

BACKGROUND

The City of Warwick, RI is a coastal community bordered on the east by Narragansett Bay and on the south by Greenwich Bay, which is a sub-embayment of Narragansett Bay. The Potowomut section of the City is separated from other Warwick neighborhoods by Greenwich Bay and the Town of East Greenwich. There are thirty-nine (39) miles of shoreline in Warwick along Narragansett Bay, Greenwich Bay and their many coves and inlets. This geophysical characteristic has influenced the development of the City’s transportation network and its water distribution system, resulting in many dead ends along the shoreline.

The Warwick water supply/distribution system was chartered in 1927, when the community was still a town. Incorporation as a City occurred in 1931. Today, the City’s government is headed by a mayor, elected every 2 years, and a 9-member council selected from the City’s 9 wards also elected every 2 years. City management occurs through its departments and executive branch.

GENERAL SYSTEM DESCRIPTION

The WWD provides water to approximately 73,190 customers, i.e. ~90% of the City of Warwick’s population through 26,998 metered service connections (as of March 2021). Its water system includes approximately 333.7 miles of pipe (distribution and transmission), seven interconnections (emergency and everyday use), three storage tanks, one booster pump station.

The WWD currently obtains its finished water from sources outside of Warwick’s boundaries. Therefore, it does not own, operate or maintain water treatment facilities. The vast majority of Warwick’s water is supplied by two interconnections to the Providence Water Supply Board (PWSB) transmission main. A much smaller amount is supplied by one interconnection to the Kent County Water Authority (KCWA). From these interconnections, the supply is delivered to the City of Warwick’s water distribution system. The WWD also sells wholesale water to the KCWA through its interconnection at the Quaker Lane Meter Station.



WATER SUPPLY SYSTEM MANAGEMENT PLAN

The Bald Hill Tanks operate at an HGL of 205 ft MSL, and provide water to the Low Service area, which is the majority of the City. The Warwick Neck Tank operates at an HGL of 226 ft MSL, and provides water to the High Service Area, which consists of Warwick Neck from the State Street Pump Station south. The Forge Road Meter Station operates at an HGL of 132 MSL, and provides water to the Potowomut section of the City.

LEGAL AGREEMENTS

In accordance with the statutory authority invested in the WWD, the City entered into a series of agreements with the PWSB for the purchase of water from the Scituate Reservoir system. The first agreement commenced on October 10, 1928, was in effect for twenty years and was renewed on December 13, 1948 with the arrangement for Warwick to purchase a maximum of 150 gallons of water per capita per day (GPCD). The agreement was again renewed in 1968. The WWD is currently operating under a continuation of the 1968 agreement.

The City of Warwick has an agreement with the KCWA providing up to 7,000 gallons of metered water per minute to be delivered from the City's system at Bald Hill Road to the KCWA. This agreement went into effect on June 21, 2006 and was an update to the original agreement entered into between the City and the KCWA on September 15, 1971, which allowed for 3,200 gallons of metered water per minute to be delivered from the City's system at Bald Hill Road to the KCWA.

The WWD operates the Forge Road Meter Station through which the KCWA is required to supply water to the Potowomut section of Warwick according to Chapter 1278 of the Public Laws of Rhode Island. There is no formal agreement specifying the amount of water to be supplied.

The WWD and North Kingstown Water department (NKWD) have an agreement from 2000 whereby both communities paid for a 100-foot extension of 12-inch water main under the Forge Road Bridge No. 991 for emergency supply of water from the NKWD to the WWD's service area in Potowomut.

WATER SUPPLY SOURCES

The WWD is classified by the State as the third largest supplier in Rhode Island, although it produces no water. All of its water supply is purchased from either the PWSB or, to a much lesser extent, from the KCWA. It also obtains water from the NKWD for emergency supply to Potowomut

INFRASTRUCTURE COMPONENTS

Treatment Facilities

While the WWD receives finished water from the PWSB and the KCWA, it is responsible for protecting the quality of this water in its distribution system until it reaches the customer. The WWD thus routinely tests the water as required by the Safe Drinking Water Act (SDWA). The WWD also provides annual consumer confidence reports to its customers, as required by the United States Environmental Protection Agency (US EPA), so they can be updated on the quality of water distributed to them.



WATER SUPPLY SYSTEM MANAGEMENT PLAN

Storage Facilities

The Warwick Water Division owns and operates three water storage facilities. Two are located just west of Bald Hill Road near Summit Square (formerly Loehmann's Plaza), and the third is located on Warwick Neck. The Bald Hill Tanks on Bald Hill Road were constructed in 1969, inspected in 2014, and repaired/cleaned/repainted in 2015. The Warwick Neck Tank, located in the Warwick Neck section of the City, was constructed in 1964, inspected in 2007, and repaired/cleaned/repainted in 2008.

Pump Stations

The WWD has one pump station within the system that is located near the intersection of State Street and Oakside Street in the Warwick Neck section of the City. The pump station called the State Street pump Station boosts water pressures in the Warwick Neck area during periods of high demand when excessive head losses across the WWD's distribution system create inadequate pressure in that section of the City.

Transmission Mains

There are approximately 19.7 miles of water transmission mains in the WWD's water system ranging from 16-inch in diameter to 42-inch in diameter. Material for the transmission mains includes asbestos cement, cast iron, and ductile iron. The majority of the pipes were installed in the between 1950 and 1975.

Distribution Mains

The WWD's water distribution system consists of approximately 314 miles of piping, ranging from less than 6-inch in diameter to 14-inch in diameter. Pipe material within the distribution system includes asbestos cement, cast-iron, cast-iron (lined), ductile iron, and PVC. The majority of the pipes were installed in the mid-1940s to 1970s.

SCADA System

The WWD installed a Supervisory Control and Data Acquisition (SCADA) system in 1998 to improve the operation of its water system. The SCADA system allows WWD staff to monitor the tanks, pump station, and interconnections in real time, and make improvements to enhance efficiency. The SCADA system also delivers data on the tanks, pump station, and interconnections to WWD staff.

INTERCONNECTIONS

There are two active interconnections between the PWSB and the WWD's systems, and two active interconnections between the KCWA and the WWD's systems. The interconnections with the PWSB at Natick Avenue and Pettaconsett Avenue respectively deliver water from the PWSB to the City of Warwick. The interconnection with the KCWA at the Quaker Lane Meter Station delivers water from the WWD to the KCWA, and the interconnection with the KCWA at the Forge Road Meter Station delivers water from the KCWA to the WWD for supply in the Potowomut neighborhood of the City.



WATER SUPPLY SYSTEM MANAGEMENT PLAN

The WWD has one emergency interconnection with the PWSB at Northampton Street for water delivery from the PWSB to the City of Warwick. It has one emergency interconnection with the KCWA at the Quaker Lane Pump Station for delivery of water from the KCWA to the City of Warwick. The WWD's third emergency interconnection is with the NKWD at the Forge Road Bridge No. 991 for delivery of water from the NKWD to the Potowomut neighborhood of the City.

SERVICE AREA

The WWD's service area consists of the City of Warwick east northeast of a line drawn from Apponaug Cove, north along the eastern shore of Gorton's Pond, to Route 5 and then to the intersection of Route 5 and Route 113, thence westerly along Route 113 to Route 2, and then northerly to the intersection of the Pawtuxet River and I-95. The service area also includes Potowomut Neck. The KCWA serves the sections of the City west and south of Apponaug, including Cowesett, Apponaug, Natick, and a portion of Greenwood. The exceptions to these service area delineations, however, are system extensions by the WWD along Tollgate Road and Route 2 that provide fire protection to Kent County Hospital and water service to some of the commercial development along Route 2 south of Tollgate Road, including Bald Hill Commons and Summit Square.

Existing legal authorities and political boundaries limit the WWD's service area to the section currently serviced. There is no change anticipated that will alter the service area in the future. The service area is considered to be 100% served.

METERS

The WWD meters 100% of its service connections. In 2020, there were 25,267 residential meters, 1,701 commercial meters, 5 municipal meters, and 1 other meter. It instituted an aggressive meter replacement program in 1996, and has since continuously worked on replacing all of its residential and commercial meters to radio-read. Meter reading occurs on quarterly basis by district/neighborhood via remote read meters. In 2008, the WWD adopted a formal meter testing program, and purchased the equipment to manage it in-house.

SYSTEM PRODUCTION DATA

The WWD purchases all of its water supply from the PWSB and KCWA, It also purchases finished water from the NKWD only in case of emergency in Potowomut. Water from the PWSB comes the Scituate Reservoir Complex and is treated at the Philip J. Holton Water Purification Plant (PJHPP) prior to distribution. The KCWA receives the majority of its water through wholesale purchase from PWSB, and obtains the remaining amount from its own groundwater sources. The NKWD sources all of its water from its own groundwater sources.

WATER USE DATA

Average Daily Demand

The historical annual water usage for the years 2016 through 2020 is summarized in the following table.



WATER SUPPLY SYSTEM MANAGEMENT PLAN

Year	Volume (MGD)			
	Purchased	Sold and Billed	Non-Billed	Non-Account
2016	9.60	8.57	0.05	0.99
2017	9.18	7.97	0.04	1.17
2018	8.07	6.80	0.04	1.24
2020	7.17	6.11	0.04	1.02
AVERAGE	8.51	7.36	0.04	1.10

Firefighting

During a fire, water is used by the fire department and is not metered. Since there is no accurate way to measure the water used for firefighting, it must be estimated. In this report, firefighting water use was estimated as 0.5% of the total water within the WWD's service area.

Non-Account Water

Non-Account water is defined as the difference between the metered supply and the metered use for a specific period of time including an allowance for firefighting. Non-Account water can be from many sources, including the following:

- Leaks in the distribution system.
- Hydrant flushing, sampling, and other maintenance use.
- Unmetered water used for public parks and buildings.
- Other unmetered public uses (street sweeping, construction, etc.).
- Malfunctioning or old meters that do not accurately measure flow.
- Unread or misread meters.

Water Conservation Programs

The WWD promotes the conservation of water through the sale of conservation kits for residential users, leak detection and repair, meter replacement program, public education program, and through its cooperative effort with the Rhode Island Department of Environmental Management's Major User Technical Assistance Program (MUTAP). Approximately 9,400 kits have been provided to customers at no cost since the Residential Retrofit Program's launch in 1996.

In 1989, the City of Warwick Government launched its own plan to conserve water in addition to the WWD's specific actions. The plan, formulated by the City's Conservation Commission and Planning Department, aims to decrease domestic, non-domestic, and unaccounted water uses.

WATER SUPPLY SYSTEM DEFICIENCIES AND NEEDED IMPROVEMENTS

While much of the deficiency in transmission main carrying capacity has been corrected by the replacement of over 27,000 linear feet (~5.11 miles) of transmission main since 1988, the process is ongoing, and more than 47,000 linear feet (~8.91 miles) is scheduled for replacement in the future.



WATER SUPPLY SYSTEM MANAGEMENT PLAN

The initiative to aggressively replace small diameter water pipes, and looped dead-end water pipes as part of the Sewer Extension program in Warwick will remain on the WWD's action plan.

The current hydrant replacement program will continue to address the aging hydrant issue, and the Water System Master Plan will identify the specific distribution lines that need to be either replaced or clean-and-lined.

SOURCE WATER PROTECTION

The WWD does own or maintain any groundwater system, surface water system, and groundwater/surface water interface system. The sources for the water supplied to the WWD are owned by either the PWSB or KCWA. The WWD receives the vast majority of its water from the PWSB, which sources its water from the Scituate Reservoir. The PWSB's water rate to the WWD includes a surcharge for protection of the Scituate Reservoir as a source of drinking water. The Potowomut section of the WWD's service area receives its water from KCWA's East Greenwich well. In case of emergency, Potowomut may receive water from the NKWD's wells located in the Hunt Aquifer.

SUPPLY MANAGEMENT

The WWD continues to work with the PWSB, KCWA, and NKWD to protect the aquifers and watersheds on which the sources of water depend.

ANTICIPATED FUTURE DEMAND

Considering that the average population served by the WWD over the past 10 years have been approximately 90.6%, the projected service population is shown in the following table.

Year	Projected Population in		Percentage Served by
	Warwick	WWD Service Area	WWD
2026	79,704	72,182	90.6%
2030	79,090	71,626	90.6%
2035	78,322	70,931	90.6%
2040	77,555	70,236	90.6%
2041	77,401	70,097	90.6%
AVERAGE	78,414	71,014	90.6%

The average daily demand for all other water consumption categories for the planning period was estimated based on the relationship with the residential water use for the different years, and considering the overall percentage uses for the period of 2016 through 2020; a conservative estimate of an additional 5% water demands was incorporated into the average demands for the "Other" (includes governmental and commercial/industrial demands), and "KCWA" water use categories to account for unknown future development that would entail increased water demand. Additionally, Stantec assumed that non-account water will decrease to 9.9% due to the increased conservation effort by the WWD.



WATER SUPPLY SYSTEM MANAGEMENT PLAN

The projected average day demands are presented in the following table. The “Purchased” column depicts the amount of water bought by the WWD for supply to the different use categories.

Year	Residential	Other*	KCWA*	Non-Billed	Non-Account	Purchased
2026	4.79	0.376	2.18	0.0398	1.11	8.49
2030	4.76	0.373	2.16	0.0395	1.02	8.35
2035	4.71	0.370	2.14	0.0391	0.91	8.17
2040	4.68	0.367	2.13	0.0388	0.81	8.02
2041	4.65	0.365	2.12	0.0386	0.79	7.96
AVG	4.72	0.370	2.14	0.0392	0.93	8.20

*a conservative estimate of an additional 5% water demand was incorporated

AVAILABLE WATER

The WWD’s system is limited by its agreement with the PWSB, which sets the per capita consumption at 150 gallons per day. Accordingly, as the population of Warwick increases, the available water increases as well. In 2020, the estimated service area population of Warwick was 73,190. At 150 GPCD, this resulted in a legal entitlement of 11.0 MGD from the PWSB.

The 42-inch transmission system to the KCWA system can move 9.3 MGD at a flow rate of 1.5 feet per second. The limiting factor for available water is the 150 GPCD allowed as stated in the PWSB agreement. As the demand has been decreasing, there is not a concern for the amount of water available.

The WWD’s current WSSMP will assume available water at 150 GPCD as allowed by its agreement with the PWSB.

SAFE YIELD

The City of Warwick does not own or maintain its water sources, and has thus not performed a safe yield analysis. Information on safe yield for the water sources owned and maintained by the City of Warwick’s water suppliers, i.e. PWSB, KCWA and NKWD can be found in the Scituate Reservoir Source Water Assessment report , and the Kent County and North Kingstown Source Water Assessment report respectively.

ALTERNATIVE SUPPLY

There are no current alternative groundwater or surface water sources of supply for the WWD given existing conditions. The groundwater resources associated with the extensive aquifer that underlies the City are not considered suitable for potable water supply without treatment. The availability of this water and the treatment required have not been studied, but it is presumed that this is not a cost effective alternative given the existing capacity and developed infrastructure of current suppliers. There are no surface water impoundments other than the Scituate Reservoir that is of sufficient capacity to meet the WWD’s demand, and there is little likelihood that an adequate impoundment could be developed in Warwick due to the lack of suitable locations.



WATER SUPPLY SYSTEM MANAGEMENT PLAN

DEMAND MANAGEMENT

RESIDENTIAL RETROFIT PROGRAM

The WWD has had a water conservation program in effect since 1992. The program consists of making two separate kits available to consumers. While WWD has not mass distributed the kits, it has notified all its customers of the availability of these kits through a mailer to all accounts. The WWD is considering adjusting its meter reading and billing cycle as well as a new bill format that will allow for notification of all accounts as to the availability of retrofit and leak detection kits.

BUILDING CODE ENFORCEMENT

Future water use can be reduced by strict enforcement of the building code by the Building Department inspectors for use of low flow toilets in all new construction.

PUBLIC INFORMATION PROGRAM

A brochure entitled "Water Conservation at Home" continues to be furnished to water customers through "stuffers" inserted into the billing envelopes. It describes 20 easy ways to save water, and it educates the customer about the impact of careless water use and of leaking faucets, toilet tanks, and garden hoses. The WWD also participates in the annual "Water Week" public education program conducted by the State of Rhode Island at the Warwick Mall.

MAJOR USERS TECHNICAL ASSISTANCE PROGRAM (MUTAP)

A Major User is defined by the State of Rhode Island as "any public or private organization or entity using more than 3 million gallons of water per year". The WWD maintains a list of the major users, with water usage in millions of gallons per year. This data is used in conjunction with the Major Users Technical Assistance Program along with its high volume Meter Evaluation Program to develop individual information for each user complete with general suggestions and recommendations for reduction of water use.

WATER RATE MODIFICATION

The WWD operates as an independent enterprise fund. The revenues that it generates are used solely to cover the cost of operating the water system. Its current rate structure is a single block one, which includes a service charge based on the size of the meter and a consumption charge that is assessed at a flat rate. Other charges to customers are based upon the actual cost of providing service: e.g. private fire protection, service installations, etc.

OUTDOOR USES

The WWD educates the consumers and encourages efficient outdoor water use through bill mailings, the website, and the distribution of leak detection tablets for all customers. The WWD has adopted the Water Resources Board lawn watering guidelines.



WATER SUPPLY SYSTEM MANAGEMENT PLAN

SYSTEM MANAGEMENT

METER INSTALLATION, MAINTENANCE AND REPLACEMENT PLAN

The WWD has continued the comprehensive program that it had initiated to improve meters and meter reading systems, and ensure that the size for each meter is appropriate for its application. The WWD also tests its distribution meters when requested by customers, and replaces these at no more than a 15-year interval. It is in full compliance with the requirement that all accounts be metered, and all meters be read remotely. Customers are currently billed on the same schedule as the meter reading. Meters are read more frequently when there are customer complaints.

LEAK DETECTION AND REPAIR PROGRAM

The WWD performs leak detection of their system in conjunction with the Unidirectional Flushing Program. Due to the size of the system, the WWD typically only performs leak detection on a portion of the system. The water system consists of approximately 20 miles of transmission main and 314 miles of distribution main. A major area of concern is leaks in water mains under rivers and bays.

PREVENTATIVE MAINTENANCE PROGRAM

The WWD maintains approximately 2,004 hydrants, which it currently flushes during the warm weather months. The primary focus of its flushing program is on dead end lines. Hydrants that are malfunctioning are noted, and repaired/replaced within days in order to ensure fire protection. On average, 15% of the hydrants are replaced yearly. The WWD has a full time hydrant maintenance crew that maintains and replaces fire hydrants. Written records of hydrant flushing are kept on file at the WWD's office.

The WWD maintains approximately 4,407 valves. It conducts its Valve Exercising Program in conjunction with its Hydrant Flushing Program. Main line valves are exercised regularly, while smaller branch valves are exercised intermittently. The WWD has a valve exercising machine to increase the efficiency of its Valve Exercising Program. Written records of valve exercising are kept on file at the WWD's office.

EMERGENCY MANAGEMENT

An emergency management plan was submitted with the 2007 WSSMP. The plan has been updated to meet the requirements of America's Water Infrastructure Act (AWIA) of 2018, and complies with the requirements of the EPA. A risk assessment has also been completed as part of the AWIA and is attached to the Emergency Response Plan in Appendix J.

The vulnerability assessment describes the types of disaster/emergency events that could potentially affect the system, along with a general description of these effects. Upon identification of critical water system components, the goal of emergency management 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. Other portions of the



WATER SUPPLY SYSTEM MANAGEMENT PLAN

Emergency Management Plan consist of emergency preparedness planning, requirements for training, and guidelines for periodic updates of these documents.

Rhode Island Water/Wastewater Agency Response Network (RIWARN) is a Network that allows water and wastewater systems in Rhode Island to receive rapid mutual aid and assistance from other systems in RI to restore facilities damaged by natural or man-made incidents. Warwick Water Division joined RIWARN in November 2008.

DROUGHT MANAGEMENT

The WWD's drought management strategy is consistent with Rhode Island Water 2030, RI Drought Management Plan, and Section 2.8.9 of the RI Rules and Procedures for Water Supply Systems Management Planning. The WWD has the intent of responding promptly and effectively in anticipation of drought. It encourages efficient indoor and outdoor water use as the "normal" operating condition.

IMPLEMENTATION SCHEDULE, RESPONSIBLE ENTITIES, AND PROJECTED COSTS

Many of the components of the WWD's WSSMP have already been implemented. Sanitary device retrofitting, meter testing and calibration, distribution system facility replacements and inspection and pressure testing of new mains are programs that are in place and will be continued. Due to the age of the distribution system, leak detection will continue to be given high priority and leaks will be repaired as soon as they are discovered. Warwick's water saving device retrofit program will be continued.

Areas in which Warwick will increase its efforts include retrofitting promotion, public education through the schools, newspaper and direct mailings, outside leak detection surveys and technical assistance to major users. The WWD expects to increase its in-house activities in these areas as well as engaging outside professional assistance where appropriate.

The WWD's ongoing and future water supply management efforts are summarized in the five year implementation plan for water supply management included herein.

FINANCIAL MANAGEMENT

All operations of the WWD are financed from water revenues in the form of user fees. All residential, commercial, industrial and government water users are subject to the same fees and rates. User fees and charges levied and established by the WWD. The WWD has numerous options for financing projects, and will seek the most cost-effective manner of financing future capital needs. It is presently using a one-step (flat) water rate. It has investigated increasing rates through B&E Consulting's "Five Year Proforma Rate Study for the Warwick Water Division" report, and will again consider revising the current rate structure in the near future.

COORDINATION

The WWD's WSSMP is consistent with and has been coordinated with the City of Warwick's Comprehensive Plan. It has also coordinated with the most recent water supply system management



WATER SUPPLY SYSTEM MANAGEMENT PLAN

plans of the PWSB and KCWA which are the most important water supply systems to the Warwick Water Division. The WWD continues to improve the overall condition of its system through coordination of projects with the Warwick Sewer Authority. The WWD continues to coordinate with the Fire Department when there is a water main break or hydrant out of service as a result of an emergency, when a hydrant has mechanical issues which are deemed as “routine”, and when there is flushing going on, or a major catastrophe.

GENERAL POLICIES

The WWD takes pride in the high quality of the water delivered to its customers. It is constantly striving to operate the system to benefit the citizens and businesses of Warwick while maintaining efficiency such that the rates and charges are appropriate to operate, maintain and protect the integrity of the water system.

The WWD has adopted twenty-three (23) Water Supply Management Objectives (goals). These are consistent with state goals and policies, and reflect the basic principles established by State Guide Plan Element 721, Report 115, Water 2030 dated June 14, 2012. They are also consistent with the needs for water supply planning outlined in State Guide Plan Element 722, Water Supply Plan for Rhode Island, of December 1991.

