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**North Kingstown  
Water System Supply Management Plan - Executive Summary**

Prepared by North Kingstown Water Department

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# **NORTH KINGSTOWN WATER SUPPLY SYSTEM MANAGEMENT PLAN EXECUTIVE SUMMARY**

## ***Introduction and Background***

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

Under this regulation, the Town of North Kingstown – North Kingstown Department of Water Supply (NKWD), 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 Town update this WSSMP periodically, as significant changes warrant, and every five years, or as otherwise stipulated in the Regulations.

Water Supply System Management Plans are prepared in order to provide the proper framework to promote the effective and efficient conservation, development, utilization and protection of the natural water resources of the State as utilized by the water purveyor. Further, the overall goals shall be consistent with the State Guide Plan Element 721, *Water 2030*. The purpose of this WSSMP is to outline the objectives of the Water Supply System Management Planning process for the Town of North Kingstown Water Supply System, and to serve as a guide to employ the proper decision-making processes toward meeting that goal.

The WSSMP contains a description of the water system and includes the policies and procedures related to the general operation and management. The Emergency Management section relates to the vulnerability assessment of the water system for use in emergency planning. It shall be incumbent upon the NKWD 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 Town of North Kingstown Water Supply Department, which is wholly owned by the Town of North Kingstown, was established by legislation of the General Assembly of the State of Rhode Island circa the late 1930s. The majority of the water system infrastructure was installed in the 1940s and **1950s**. Since that time, the system has expanded to meet the needs of the Town's growing population. It is presently operated as a self-supporting enterprise fund where all operations are financed from revenues derived from various user fees.

### ***Water Supply Sources, Pumping Stations and Water Storage Tanks***

The primary source of raw water supply for the North Kingstown water system is groundwater. Water is pumped directly into the distribution system for consumption, or serves to provide storage capacity in the storage facilities. The water supply, at present, consists of 11 water supply wells and pumping stations that serve the Saunderstown High, Slocum High and Low service areas. The Water Department installed a new gravel packed well (Well #11) and received new source approval from the RI Department of Health in April 2005. This well helps to meet peak demands associated with development that has occurred within the Town over the past twenty (20) years and provide system flexibility and redundancy. In addition to the proposed new well, a satellite well (well #5a) was constructed to replace existing well #5. The new satellite well went into service in the summer of 2005. It is anticipated that Well #10, which has been out of service since 2013, will be reactivated (a new well developed to replace it) in 2022.

The NKWD does not own or operate any water treatment facilities. Historically, source water has been treated with sodium hydroxide for pH adjustment and a corrosion inhibitor is added for lead and copper control. As a result of acute violations of the Total Coliform Rule in 2001, 2002, and 2003 a disinfection pilot study, was initiated in the low service area of the distribution system (wells #1, 2, 6, 9, & 10) in the summer of 2005. The purpose of the pilot study was to evaluate the effectiveness of using sodium hypochlorite to control bacterial regrowth in the distribution system. Following successful piloting of sodium hydroxide disinfection (no additional total coliform-positive samples), the process

was implemented on a permanent basis and remains in-use. All chemical treatments take place at each well station facility, except for Well 2, for which sodium hydroxide and sodium hypochlorite treatment equipment is located at Pump Station (Well) 1 and Wells 7 and 8 for which sodium hydroxide and the proprietary polyphosphate (corrosion control) are dosed by equipment at Well 3.

### ***Water Distribution***

The transmission and distribution system consists of approximately 177 miles of water main, constructed mainly in the 1940s and 1950s. The majority of the system consists of asbestos cement (AC) pipeline ranging in size from 6 to 16 inches. New and replacement mains consist of polyvinyl chloride (PVC) and cement-lined ductile iron pipe.

The service area is typically operated as three (3) independent systems, operating at different hydraulic grades. The service areas are isolated by several gate valves, which remain in the “closed” position and a pressure reducing valve (PRV). The North Kingstown Water System owns three (3) booster pumping stations in addition to the eleven (11) well pumping stations. Only two of these booster pumping stations are operational. In the event of an emergency, water could be supplied to the high service system from the low service by boosting the hydraulic grade through one of these facilities and opening a gate valve. If the shortfall occurred in the Low Service Area, water could be supplied from the high service area by opening one of the gate valves that isolate the pressure zones. Sharing water between the pressure zones is complicated to some extent by the Low Service Area disinfection. The NKWD has recently constructed a PRV/Booster pumping facility that will allow us to share water between pressure zones without compromising disinfectant residuals in the Low Service Area.

The Slocum service zone is controlled by the overflow elevation of the Slocum elevated water storage tank, with an overflow elevation of 348 feet mean sea level (MSL) and a total storage capacity of 500,000 gallons, and the Saunderstown service zone is controlled by the overflow elevation of the Saunderstown Standpipe (overflow elevation is 298 feet MSL) and a total storage capacity of 528,000 gallons. It should be noted that prior to

1996 the Slocum tank overflow elevation was equal to 298 feet MSL. In order to increase domestic service pressures in the vicinity, the original standpipe was replaced with an elevated storage tank that afforded an additional fifty (50) feet of storage height and an additional pressure zone was subsequently created.

Water storage in the low service zone is provided by three (3) facilities. The Bow Hunters Water Storage Tank (overflow = 215 feet MSL), North End Standpipe (overflow = 210 feet MSL), and the Wickford Elevated Tank (overflow = 210 feet MSL) each provide regional storage capacity within the low service area. Total low service area storage capacity is 4,375,000 gallons.

### ***Interconnections***

The NKWD maintains five interconnections to neighboring water purveyors. They include the Town of Narragansett Water System (wholesale connection), and emergency connections to Warwick Water, the Quonset Development Corporation (Quonset Point Industrial Park), the Kent County Water Authority (KCWA) and an emergency-only interconnection, which requires the deployment of a temporary line on the Jamestown/Verrazano Bridge, with the Jamestown Water District. North Kingstown and Jamestown negotiated an emergency interconnection agreement. The two towns' staff are coordinating to fulfill completion of Department of Health-directed sampling to assess corrosivity of the North Kingstown water that would be transmitted to Jamestown.

### ***Legal Agreements***

North Kingstown has approved written agreements with the Kent County Water Authority and the City of Warwick for use of the interconnections to supply water during emergencies. North Kingstown has also entered into written agreements with the Town of Jamestown periodically for emergency water supply. An attempt to enter into a new agreement with the Town of Narragansett failed to gain the support of the North Kingstown Town Council. The Water Department is unaware of any former agreement with the Quonset Development Corporation. The Water Department will commit to

initiating discussion with all interconnected communities and the North Kingstown Town Council about the establishment of updated legal agreements.

### ***Metering and Non Account Water***

The source and distribution system is 100% metered. Master meters located at each individual well/pump station meter 100% of the water produced from the North Kingstown well field supply system. Every domestic service connection within the North Kingstown Water System is metered at the point of sale, thus providing 100% distribution metering. In recent years the NKWD has made the changeover to automatic reading and billing (ARB) remote distribution metering, and more recently to radio read meters, with the intent of recovering operating and capital costs of system operations, reducing unaccounted-for water volumes and collecting more accurate water use data. Additionally, all master meters at the well stations were re-calibrated in the spring of 2021.

Recently, non-account water percentages have been increasing. However, the most recent estimate for non-account water is reported in the Fiscal Year 2022 Annual Report to the Water Resources Board is 13.1 percent. This is a decrease from the Fiscal Year 2020 and 2021 Annual Reports which reported non-account water as 16.4 percent and 16.7 percent respectively. Since the percent non-account water exceeded the state goal of less than 15% in two successive fiscal years (FY 20 and 21), investigation began with the evaluation of the master meters' accuracy. This investigation indicated that master meters at the 11 well stations were not accurately measuring production. All master meters were recalibrated in Spring 2021. The Water Department will continue to repair leaks as quickly as practicable. Leak Detection survey was put out for bid twice during 2020 and in 2021. No acceptable bids were received either time. This was put out to bid again in 2022 and leak detection survey utilizing satellite data began July 11, 2022.

The Department will continue to implement programs to improve the efficiency of water use and measurement.

### ***Population Served***

The service population is comprised mainly of residential, commercial, and government customers of which there are approximately 9,972 metered accounts. The total current service population has been estimated at approximately 27,911 people according to US Census population estimate for July 1, 2021. The remaining residents not served by the public water system are served via private individual wells. Average day demand based on pumping data for the past five (5) years is approximately 2.6 million gallons with a maximum day demand of approximately 6.239 million gallons (July 2017).

The Town of North Kingstown has grown steadily over the past twenty (20) years. It has become evident that the more recent large lot subdivision developments use a significantly greater amount of water during the summer months than older smaller lot developments. New subdivision development in the southwest region of Town and the related prevalence of in-ground lawn and landscape irrigation systems have been the major contributors to seasonal high water demands.

This reality, that water usage in this largely residential community which is driven primarily by lawn size and the preponderance of in ground irrigation systems has caused us to rethink the format of our Major Users Technical Assistance Program (MUTAP). Rather than base this important demand management component around the traditional concepts of modification of commercial & industrial water usage, NKWD has decided to focus its MUTAP on the high usage irrigation accounts as well. Details of the program are included within the body of this WSSMP.

### ***Demand Management***

Pursuant to R.I. General Laws 46-15-8, as well as 46-15.3-5.1, 46-15.7-3, 46-15.8-5 the Water Resources Board has promulgated the Water Use and Efficiency Rule for Major Public Water Suppliers. The rule establishes targets and methods for efficient water use and requires that each major supplier prepare a Water Efficiency and Demand Management Strategy (DMS) to achieve the identified targets. Water use efficiency targets are to be reached through the application of required methods identified in section

4.1 of the rule and through the application of selected optional methods listed in section 4.2 and/or any other methods as appropriate.

The Water Department is very cognizant of the fact that the maximum day demand is encroaching on the available safe yield of its sources. A demand management program including revisions to the water service area, twice a week lawn irrigation restrictions and customer education programs have been implemented. Recent concerns regarding the Hunt River and the impact of water withdrawal on the availability of streamflow have resulted in a more focused effort to reduce seasonal demand increases and wasteful use of water. North Kingstown continues to employ proper system management procedures aimed at increasing the overall operating efficiency of its water supply distribution system with the underlying theme of water conservation. Continued effort toward water quality protection includes public education material emphasizing the importance of septic system maintenance, the merit of leaving grass clippings on lawns, not mowing grass too short, application of fertilizers according to package instructions and ideally avoiding the use of pesticides and herbicides.

Per capita water use for Fiscal Year 2022 is estimated as 101 gallons per person per day, which exceeds the state goal of 65 gallons per capita per day by 36 gallons. This estimate was prepared using the averaged monthly ADD, excluding water sold to Narragansett, because electronic reporting of exclusively residential use is not available. However, we expect that a more accurate estimate would be influenced by summer drought conditions and North Kingstown being a large lot municipality. We continue to implement and enforce the summer irrigation program. This program allows irrigation twice weekly, Monday and Thursday in Zone 1 (East of Post Road) and Tuesday and Friday in Zone 2 (West of Post Road), outside the hours of 10:00 AM and 2:00 PM. In 2021 we implemented use of the WaterSmart billing and customer interface platform. This internet-based platform makes customized notifications available to customers of consumption and conditions suggesting a leak; it is anticipated that this will have a positive effect on water conservation and that this effect will increase with time as more customers opt-in for customized notifications.



### *Capital Improvements*

Although the Water Department uses an “as-needed” meter replacement program, a full-scale upgrade to radio read meters was initiated as part of the Water Department Capital Improvement Program in July of 2010. All new meters and replacement meters are now radio read capable. As of January 2021, 9,685 of the system meters, or 98.6%, are capable of being read via radio. The North Kingstown Water Department will continue with this effort until the switchover is complete and will continue to replace meters in accordance with AWWA guidance.

At Well 1 the sodium hydroxide system was replaced with double-walled storage tanks in 2017; this system serves both Wells 1 and 2.

More recently (FY 2020) soft start switch gear and variable speed drives were installed at Wells 1, 2, 5, 9 and 11 to minimize water hammer on startup and potential associated leaks and main breaks.

Design, engineering, and activities to identify location for new Well 10 have been completed. Well development and equipment rebuilding activities continue.

Water main replacement has been completed in conjunction with sewer main installation and State Road drainage project and is planned for Saunderstown Village.

Short-term future capital improvements include installation of mixing equipment in water storage standpipes.

Long-term improvements include:

- The purchase of an appropriately sized portable generator to run the Bowhunter booster station, which was constructed with a plug-in location for a generator.
- Replacement of all sodium hydroxide bulk & day tanks and installation of liner to all sodium hydroxide containment areas.
- Water main replacement will continue as a long-term improvement.
- Construction of a replacement well for Well #6.

### *System Management*

System-wide leak detection every 10 years – In addition to 10-year leak detection requirements, North Kingstown continues developing a proactive, ongoing leak detection program. Noise loggers purchased were not as effective as anticipated due to poor sound transmission of AC pipe and insufficient level of staffing. Leak detection survey was put out for bid twice during 2020-2021. No acceptable bids were received either time. This was to be rebid during calendar year 2022 and satellite leak detection began in July 2022.

Leakage less than 10 percent – For the fiscal year 2022 leakage is calculated as 21 percent. During FY22 there were two significant main breaks, both at stream crossings, that contributed to this statistic. Water Department leak repairs are prioritized according to apparent severity and repaired as quickly as practicable. Customers are encouraged to repair leaks as quickly as they are able to arrange for the necessary contractors.

Non-account water less than 15 percent - In addition to pipe leakage, meter inaccuracies, water system operations and maintenance, firefighting, and public works operations also fall under non-account water. The Water Department continues to attempt tracking and quantifying more realistic estimates of such uses. For the fiscal year 2022 non-account water has been calculated to be at 13.1% (greater than the state target of 10 percent system wide leakage). Master meters at production wells were recalibrated based on the results of the Weston & Sampson report, in April/May of 2021 by Edward Altieri of Harbor Controls.

#### Preventative maintenance -

The Water Department's preventive maintenance program consists of the following components:

- **Annual well inspection and maintenance** – Each year all municipal supply wells are inspected by a qualified independent company. Annual maintenance includes draining and replacing motor oil, greasing bearings and repacking stuffing box as necessary and performing a meg-Ohm test on motor leads to assess the condition of the insulation.
- **Well redevelopment** – Results of the above-mentioned annual well inspection and maintenance reports are utilized to assess and prioritize the need for pump repairs and well redevelopment to maintain flow rates over time.

- **Storage Tank Inspection and Cleaning** – Tanks are inspected and cleaned on a rotating basis in accordance with AWWA standards.
- **Infrastructure Replacement Plan** – The Town’s approved Clean Water Infrastructure Replacement Plan is reviewed and used in the development of the Water Department annual budget submittals, which directly affect infrastructure maintenance planning.
- **Distribution System Flushing** – System-wide hydrant flushing is conducted twice per year in the early spring and late fall. In the future we hope to develop a unidirectional flushing program; however, current workload and staffing levels do not permit this at the present time.
- **Hydrant Maintenance** – Late in 2020, the Water Department added the position of Fire Hydrant Technician to the technical staff. Although this position’s responsibilities include distribution system maintenance, having one individual charged with implementation of the hydrant maintenance program will enable more efficient hydrant maintenance and better interaction with the NK Fire Department.
- **Operator Training** – Water Department personnel are encouraged to attend the various operator training programs offered by the New England Water Works Association and Atlantic States Rural Water and Wastewater Association.

### *Available Water and Safe Yield*

North Kingstown’s total pumping capacity in the Hunt, Annaquatucket, Pettaquamscutt Aquifer System is approximately 8.9 MGD but in reality the flow would be less given that individual well yield is less when other wells nearby are pumping at the same time. Previous Water Supply Management Plans used available water estimates published in the USGS water supply papers. These plans failed to acknowledge that the USGS reports did acknowledge the streamflow implications of pumping at these levels during dry periods or under drought conditions.

The recent estimates developed by the Water Resources Board applying the RIDEM developed Streamflow Depletion Methodology indicate that the low flow allowable depletion in the Hunt, Annaquatucket, Pettaquamscutt Aquifer System is approximately

4.8 MGD. The fact that seasonal high water demand associated with North Kingstown's current customer base occasionally exceeds 4.8 MG, demonstrates the need for continued management of our current supply sources and the need to look for sustainable future sources of water supply.

### ***Anticipated Future Demands***

In 2012 the North Kingstown Town Council approved an amendment to the North Kingstown Comprehensive Plan that included revisions to the North Kingstown Water Service Area. This revision is meant to aid in meeting the goals of the Water Use Efficiency Act, to support state and local efforts to direct growth to appropriate areas, and to promote protection of outlying land areas, which in North Kingstown includes our sensitive groundwater protection zones. As part of this effort, the Horsley Witten Group (HW) was tasked with preparing a buildout analysis of the revised Water Service Area. Looking at a 20-year horizon, HW developed estimates for the number of potential residential units and commercial and industrial acres that could be served and estimated the demand in gallons per day under the revised Water Service Area Map based on existing zoning designations. The analysis also took into consideration parcels outside of the revised Water Service Area that have frontage on existing water mains. The results of their analysis estimated an average day increase of 1.7 MG and a peak day increase of close to 4 MG<sup>1</sup>.

### ***Rate Structure and Financial Management***

The North Kingstown Town Council did adopt a Water Rate schedule that includes inclining block rates for all water customers and a "fourth tier" for residential customers to discourage excessively high water use. The rate schedule includes a base rate set at the average cost of producing and distributing water. There was consensus among the Town Council members that all or a portion of the funds generated by the fourth tier could be used to finance education and incentive programs.

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<sup>1</sup> Multiplier used for peak based on 2005 water pumping data

Recently, the fixed costs (flat fee) were adjusted to more truly reflect costs associated with metering and billing; the infrastructure replacement fee was increased to a number based upon the costs identified in the CWIRP. The actual per gallon rate was not increased.

### ***Emergency Management***

The Emergency Management section of the Plan establishes the responsibilities and authority within the NKWD 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 are consistent with the goals of the State Emergency Water Supply System Management Plan. It is also intended that this document provide guidance to ensure that the primary aspects of recovery from an emergency are addressed in an organized manner to aid in an efficient response and in maintaining drinking water quality and quantity. This Emergency Management section was updated in the spring of 2020 and again in summer 2022, to operate as a “stand alone” document capable of being utilized in all emergency situations. This was done in conjunction with the federally mandated vulnerability assessment. In addition to updating contact information, which included adding websites and email address, epidemic/pandemic and cyber-security sections were added.

Water quality protection has always been of the highest priority to the North Kingstown Water Department, and in spite of the continuing source water protection assessment which indicates that the water supply has a low susceptibility for contamination, it is understood that any supply can become contaminated. Ongoing diligent protection efforts are critical to continue to protect this critical asset.

### **Drought Management**

Current safe yield analyses of the supply aquifer systems report a safe yield greater than the Tier 1 water quantity condition (2.8 MGD). Therefore, it is doubtful that even during a severe drought, the system would need to curtail basic service. However, during drought conditions, Department monitoring of various environmental conditions and system parameters will be performed. When Department monitoring indicates the initial

trigger condition, voluntary conservation actions will be encouraged. If drought condition continues and Department monitoring observations indicate increased severity, mandatory conservation measures will be enacted with penalties for non-compliance. During drought condition, the Department will monitor the state emerging drought conditions and phases and actions will be coordinated with the RI Drought Steering Committee.