CITY OF EAST PROVIDENCE, RHODE ISLAND
WATER SUPPLY SYSTEM MANAGEMENT PLAN

EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

This Water Supply System Management Plan (WSSMP) Update has been prepared in accordance with the *Rules and Regulations for Water Supply System Management Planning* promulgated pursuant to the requirements and provisions of Chapter 46-15.3 of the Public Drinking Water Supply System Protection Act of 1997 RI General Laws, as amended. Other legislation that is applicable to the development of this plan includes the Federal Safe Drinking Water Act [42 U.S.C. § 300f et seq.], RI General Law Chapter 46-13 – Public Drinking Water Supply, RI General Law Chapter 46-14 – Contamination of Drinking Water, administered by the Department of Health, RI General Law 45-22.2 – RI Comprehensive Planning and Land Use Act and State Guide Plan Element 721 both administered by the RI Statewide Planning Program.

This updated Plan maintains consistency with the goals and policies of the City of East Providence Comprehensive Plan, State Guide Plan Element 721, Report 115 – *Rhode Island Water 2030,* State Guide Plan Element 121 – *Land Use 2025* and the RI Water Resources Board 2012 Strategic Plan.

This Executive Summary has been prepared to provide a general overview and comprehensive summary highlighting elements of the Plan's contents. The Executive Summary is organized as follows:

- Intent and Purpose of the WSSMP
- Organization of the WSSMP
- Summary of the WSSMP

Intent and Purpose

The WSSMP is prepared to serve the East Providence Water Utilities Division (EPWUD) as an important and necessary WSSMP document. Its purpose is to enable the EPWUD to continue to provide reliable high quality drinking water to the customers of the EPWUD water system as well as promote effective and efficient use of the State's water resources and to formalize the excellent operational and management practices currently utilized by the EPWUD.

Organization

The WSSMP addresses each of the elements listed within Section 8 of the *Rules and Regulations for Water Supply System Management Planning*. The WSSMP addresses each of the elements to the extent that the topic is relevant to the EPWUD water system.

Summary

This 2013 update of the EPWUD's WSSMP updates the information provided within the 2007 WSSMP which was prepared by Pare Corporation. This WSSMP also addresses the elements required by the *Rules and Regulations for Water Supply System Management Planning*.

Goals Statement

The goals statement sets the overall objectives and tone of the WSSMP. The purpose of setting the goals is not only to meet the regulatory requirements for preparation of the WSSMP, but also to promote responsible use of a public resource.

The general goals of this WSSMP are:

- To continue to provide reliable, high quality drinking water to the customers of the EPWUD water system.
- To promote effective and efficient use of the State's water resources.
- To formalize the excellent operational and proactive management practices currently utilized by the EPWUD.

The specific goals of this Plan are:

- To ensure the water quality for all water purchased, sold and wholesaled.
- To maximize the beneficial use of the current water allocation from Providence Water by reducing system losses and promoting conservation.
- To establish water supply reliability measures for primary and backup sources.
- To utilize this WSSMP as a reference document and planning tool for decision

making.

- To implement the elements of supply, demand and system management plans that are presented herein.

These goal statements are consistent with the 2010 – 2015 East Providence Comprehensive Plan, State Guide Plan Element 721, Report 115 – *Rhode Island Water 2030*, State Guide Plan Element 121 – *Land Use 2025* and the RI Water Resources Board 2012 Strategic Plan.

Water System Description

The EPWUD water system is wholly owned and operated by the City of East Providence. An organization chart of the EPWUD water system which shows all aspects of water system management and operation along with a description of key management personnel and general responsibilities is provided within the WSSMP.

The EPWUD purchases all of its water from Providence Water. As such, the EPWUD does not own or operate a water supply source or treatment facility. The EPWUD water system starts in Cranston on Budlong Road where a 42-inch transmission pipeline is connected to the Providence Water water system. From this connection, the 42-inch pipeline travels east through Cranston and Providence to the Providence River. Twin 30-inch pipelines carry the flow beneath the Providence River. On the East Providence side of the Providence River, the twin 30-inch pipelines meet at a metering pit on Veteran's Memorial Parkway. The flow is again combined and carried through a 42-inch pipeline which decreases to a 30-inch pipeline before entering the EPWUD's storage facilities.

The EPWUD water system is presently served by two storage facilities, each of which serves one of the EPWUD's two pressure zones. The pressure zones are known as the High Service and Low Service areas. The Low Service tank is an 8.0 million gallon standpipe constructed of welded steel and is approximately 48 years old. The High Service tank is a 1.0 million gallon spheroidal elevated tank constructed of welded steel. This High Service tank was constructed in 1998.

There is one pumping station within the water system. This station, located at the Kent Heights Storage Facilities Site, is used to boost water from the Low Service System to the High Service System and to the 1.0 million gallon elevated High Service tank. The station, which was upgraded in 1998 as part of the High Service tank construction, contains three (3) constant speed 1,000 gpm pumps. Emergency power is provided by a 250 kW diesel generator.

The EPWUD's transmission piping is defined as all piping within the water system that is 16-inches in diameter or greater. These pipelines include the 42-inch transmission pipeline, which runs through Cranston and Providence, the twin 30-inch pipelines beneath the Providence River and the 42-inch and 30-inch pipelines in East Providence.

The EPWUD has emergency interconnections with neighboring water suppliers in addition to the system's main interconnection with Providence Water. There are three points of interconnections with the Pawtucket Water Supply Board (Pawtucket) system. These interconnections are for the emergency delivery of water from Pawtucket to the EPWUD water system and were last used in 1995 during the catastrophic break of the 102-inch Providence Water transmission pipeline. Also, two interconnections were established in 1987 with the Bristol County Water Authority (BCWA) to supply water from the EPWUD system to the BCWA water system for emergency purposes only. As part of the cross-bay pipeline project, a pumping station was built in East Providence in 1998. The purpose of the pumping station was to provide the EPWUD with an emergency flow of water in the event that the EPWUD's main transmission pipeline from Providence Water fails. This pump station has remained unused for the past 16 years and is pending resolution regarding the ownership of the station. There are ongoing discussions with the BCWA regarding this pump station as it is unclear whether the BCWA maintains ownership of the pump station. As previously noted, the intent of the pump station and interconnection was to serve as a backup source to the existing 42-inch transmission main from Providence Water. At one time, there was another interconnection between the 42-inch line and the Providence Water distribution system at Allens Avenue near the Providence River which was used during construction of the 42-inch pipeline. The capability of reactivating this interconnection as an emergency supply is continuously being evaluated. A study is currently underway to determine

the feasibility of reactivating this interconnection. This study is expected to be completed by April of 2016.

The EPWUD water system is entirely bounded by the City limits of East Providence. In general, there is little undeveloped land in East Providence to which new water services could be connected. Due to the build-out of East Providence, there are no planned extensions to the water system.

Nearly all buildings in East Providence as well as some residences in Barrington are served by the EPWUD water system. In 2013, there were 14,942 service connections, which are broken down in Table 1. East Providence estimates its current population at 47,037 and the EPWUD estimates that it serves a population of 47,096.

TABLE 1
NUMBER OF ACCOUNTS

Category	2013
Residential	14,271
Commercial	535
Industrial	36
Governmental	100
TOTAL	**14,942**

The EPWUD's only master meter is at the connection with Providence Water at Budlong Road in Cranston as shown on the Water Supply System Map in Appendix A of Volume I of the WSSMP. This meter is owned by the EPWUD and is a 42-inch by 24-inch BIF Type M Venturi meter installed in 1968. The flow is read continuously and recorded on a circular chart recorder and on a totalizer. The meter is tested on an annual basis and calibrated as needed.

Major users are defined as those consumers who use more than 3 million gallons of water per year. Based on 2013 sales, there are 10 major users in the EPWUD water system. In general, all major users have meters that are 2-inches or larger. In the EPWUD system, all meters larger than 2-inches are owned by the customer who is responsible for testing, calibration and maintenance of their meters. The EPWUD has two meters to service the emergency interconnections with the

BCWA located on Richmond Street and Metropolitan Park Drive. These meters are owned by the EPWUD and are 6-inch by 3-inch Hersey meters that were installed in 1987. The meters are tested and calibrated before use. All temporary hydrant connections for bulk water sales are measured using hydrant meters.

Since October 30, 1970, the EPWUD has obtained all of its water from Providence Water. Over the past 11 years, (2003 – 2013), wholesale water purchases have ranged from 1,457.06 to 1,815.61 million gallons (MG) per year. The EPWUD purchased 1,457.06 MG in the year 2013 with an average day demand (ADD) of 3.99 million gallons per day (MGD). The average system per capita demand for total water purchased in 2013 was estimated to be 84.72 gallons per capita per day (gpcd) with a high of 105.32 gpcd in July and a low of 65.82 gpcd in November. It is noted that the limit of water to be supplied by Providence Water of 150 gpcd per month was not exceeded in 2013.

The EPWUD has not made any wholesale water sales to any other water supplier since 1998. Current water consumption for the year 2013 was determined to be 1,261.63 MG, which corresponds to an average day demand of 3.45 MGD. Residential water use was determined to be 977.75 MG, which corresponds to an average day demand of 2.68 MGD and a per capita demand for residential water usage of 56.91 gpcd. It should be noted that the residential per capita water usage is below the target of 65 gpcd established by the RI Water Resources Board. The relative percentages of current water consumption are presented in the following table.

TABLE 2
USER CATEGORY PERCENT CONSUMPTION

User Category	% Consumption	% of Service Connections
Residential	77.5	95.5
Commercial	14.2	3.6
Industrial	7.3	0.24
Governmental	0.97	0.67
TOTAL	**99.97**	**100.01**

The percentage of unaccounted water from 2003 to 2013 has ranged from 4.68% in 2009 to 16.59% in 2011 with an 11 year average of 9.47% and 13.41% for the current year, 2013. The

EPWUD is working continuously to maintain the goal of less than 15% non-account water as set forth in the State Guide Plan. Currently, the EPWUD is below the goal of 15% unaccounted water at 13.41% and the average for the past 11 years is also below the goal of 15% unaccounted water at 9.47%. The EPWUD is currently slightly above the goal of 10% leakage at 13.41% however, the average for the past 11 years is below the goal of 10% leakage at 9.47%. The EPWUD shall continue to strive to maintain the statewide goal of less than 10% leakage.

The EPWUD practices the following demand management measures: 100% metering and billing of its water users including governmental and public accounts, a combined uniform water and wastewater rate structure, a Major Users Technical Assistance Program (MUTAP), public education and water use restrictions and regulations.

The EPWUD's main deficiency is related to its sole source of supply from a single pipeline interconnection with Providence Water. The EPWUD is working towards activating the emergency interconnection with the BCWA at the Pawtucket Avenue Pump Station to facilitate an inspection of the EPWUD 42-inch pipeline connection to Providence Water. The EPWUD is also working to construct a permanent interconnection with Pawtucket to be utilized as an emergency supply and which would also allow for the inspection of the 42-inch pipeline connection to Providence Water. These efforts, along with additional efforts in the form of major system improvements, plans and studies that have been completed or are under consideration are listed below.

System Improvements

- Money has been budgeted to conduct an analysis of the structural integrity of the EPWUD's 42-inch pipeline from the master meter station on Budlong Road in Cranston to the Kent Heights Pump Station. This project can be completed once the BCWA emergency connection and Pawtucket Avenue Pump Station are operational.
- The EPWUD is working with Pawtucket to construct an interconnection with the Pawtucket water system to be utilized on an emergency basis. This new interconnection would provide the EPWUD with a redundant source of supply and may serve the EPWUD as a future permanent supply source. A new interconnection

with Pawtucket is necessary due to a lack of a reliable backup supply source within the EPWUD system. Completion of this project would also allow for inspection of the 42-inch pipeline that supplies water to the EPWUD from the master meter on Budlong Road in Cranston.

- Over the past several years, the EPWUD has improved over 17 miles of pipeline through either cleaning and lining or complete pipeline replacement. There are still 25 miles of pipeline throughout the EPWUD water system that still require improvements. The EPWUD shall continue to make these pipeline improvements throughout the coming months.
- In an effort to address water quality issues, the EPWUD identified several projects to improve water quality within the water system. These identified improvements consist of the installation of a new chlorination station at the Kent Heights Storage Facilities Site, the construction of a new 6.0 MG water storage tank at the Kent Heights Storage Facilities Site and the construction of a new 20-inch transmission main at the Kent Heights Storage Facilities Site.

Water Quality Protection

The EPWUD purchases treated water from Providence Water and directly supports their water quality protection efforts through a billing surcharge therefore, source water protection areas and potential contamination of sources is not included within this WSSMP. However, this section discusses the potential for contamination from within the distribution system. In the spring of 2005, the EPWUD was placed on a boil water advisory after water quality samples taken in East Providence tested positive for E-coli bacteria. An aggressive effort was made to identify possible sources of contamination, but none were found. Increased sampling efforts failed to find additional E-coli bacteria in the system and a review of operational procedures found no deficiencies that would increase the potential for contamination. The boil water advisory was lifted after approximately 3 weeks of bacteria free sample results. The EPWUD and City have since passed a backflow protection ordinance aimed at reducing the risk of water system contamination and the EPWUD is currently utilizing a unidirectional flushing program.

Prior to obtaining its water from Providence Water, the EPWUD derived its water supply from the Turner Reservoir. As part of the original contract with Providence Water, the EPWUD is prohibited from utilizing this source while being supplied by Providence Water. Therefore, this source has been abandoned since switching over to the Providence Water supply on October 30, 1970. The Turner Reservoir has been identified as a critical area of concern and is addressed in the City of East Providence Comprehensive Plan and was the subject of a 2001 study completed by the Army Corps of Engineers. The City of East Providence currently owns the Turner Reservoir and maintains the area as recreational land. Due to development upstream of the reservoir, the watershed has become vulnerable. The City of East Providence does not control land usage upstream of the Turner Reservoir and it would be cost prohibitive to do so. The study conducted by the Army Corps of Engineers indicated that the Turner Reservoir may be able to be used as a back-up water supply however, expensive treatment processes due to heavy aquatic plant growth, the potential for coliform bacteria and elevated levels of contaminants would need to be implemented which would also be cost prohibitive for the City of East Providence. Therefore, the EPWUD is not considering returning the Turner Reservoir to use as a water supply source.

Supply Management

This section presents the projections of the EPWUD's demands for water for the 5 year (2018) and 20 year (2033) planning horizons. These projections are made based on a review of current conditions, historical trends, the findings of the 2010 US Census, Rhode Island Statewide Planning (RISWP) figures and projections and the 2010 – 2015 East Providence Comprehensive Plan. The EPWUD does not have any future plans for wholesale water sales to the BCWA or Pawtucket. Therefore, future wholesale water sales are not included in either the 5 or 20 year projections. There are no system expansions planned for the future. At this time, there are no active legal contracts or obligations between East Providence and any of its customers to supply a certain quantity of water.

The following table details the ADD for the current year and the projected 5 and 20 year planning periods.

TABLE 3 PROJECTED WATER DEMANDS					
		5 Year Projections (2018)		20 Year Projections (2033)	
Category	**2013 ADD**	**Annual Use**	**ADD**	**Annual Use**	**ADD**
Residential	2.68 MG	953.31 MG	2.61 MG	896.60 MG	2.46 MG
Commercial	0.49 MG	174.45 MG	0.48 MG	164.07 MG	0.45 MG
Industrial	0.25 MG	92.70 MG	0.25 MG	92.70 MG	0.25 MG
Government	0.03 MG	12.26 MG	0.03 MG	12.26 MG	0.03 MG
Total	**3.45 MG**	**1232.72 MG**	**3.37 MG**	**1165.63 MG**	**3.19 MG**

These figures result in per capita demands for the 5 year planning period of 73.39 gpcd and for the 20 year planning period of 73.89 gpcd.

The EPWUD purchases treated water exclusively from Providence Water. The original legislation to supply the EPWUD with wholesale water purchases from Providence Water allowed the EPWUD to draw up to 150 gallons per capita per day of average daily flow from Providence Water calculated on a monthly basis. When compared with the per capita demands determined in the preceding sections, the EPWUD is not projected to have water supply shortages in the 5 or 20 year planning periods. The projection of no shortages is predicated on Providence Water not reducing the amount of water it supplies to the EPWUD.

The EPWUD had entered into an agreement with the US Army Corps of Engineers to perform a study of the Turner Reservoir and the Turner Reservoir Well Field area for potential reuse. The study was completed in 2001 and determined both sources “may be suitable for a back-up water supply”. However, the report also noted that both supplies would require thorough and expensive treatment processes due to heavy aquatic plant growth within Turner Reservoir, a potential for coliform bacteria and elevated levels of contaminants, particularly cadmium in sediments. Additionally, the City of East Providence owns the Turner Reservoir and maintains the area as recreational land. However, the City of East Providence does not control land usage and development upstream of the Turner Reservoir and doing so would be cost prohibitive. As such, the EPWUD is not considering the reuse of the Turner Reservoir as a supply source for the water system.

Demand Management

This section presents the measures used by the EPWUD in order to efficiently manage the demands for water by the users of the EPWUD water system. The two main tools that the EPWUD uses for demand management are the Major Users Technical Assistance Program and a uniform combined water and wastewater block rate.

The EPWUD has implemented the following demand management techniques to achieve permanent and long-term water savings:

- Enforcement of State plumbing code regulations.
- Close scrutiny of the water usage of newly proposed industrial developments.
- Encouragement of all major commercial and industrial users to adopt water recycling in their processes. When funding permits, the EPWUD will consult the RI State Guide Plan Element 721, Report 115 – *Rhode Island Water 2030* for water reuse and recycling programs that may be implemented within the EPWUD water system service territory.
- Public education on water conservation and general water system information.
- Combined water and wastewater rates that compel consumers to evaluate their water use and its effect on wastewater production thereby aiding in water conservation.
- Water use restrictions implemented when necessary.

System Management

This section of the WSSMP presents the measures that are and will be taken by the EPWUD in order to reliably and continuously deliver a clean supply of water to its customers and to minimize non-account water and leakage. Presently, the EPWUD practices many of the principles of sound system management. This section documents the success of the programs which have been implemented and the procedures used so that the programs continue to be implemented with consistency in the future. The section focuses on the main components of the EPWUD's system management practices which are as follows: meter management, leak detection and preventative maintenance.

The Kent Heights Low Service Storage Tank was taken out of service in May 2011 for cleaning. In addition to the cleaning, the floor seams were repaired and the vent screen was replaced. Because this tank is scheduled for replacement in 2015, it was determined that painting would not be required. Also in May 2011, the Kent Heights High Service Storage Tank was inspected and repairs were made to the vent screen. This tank is scheduled to be painted in 2017.

The EPWUD's meter installation and maintenance program was previously detailed under the Water System Description section. The EPWUD completed a formal city-wide Leak Detection and Repair (LDR) program in 2005. The survey showed the system to have a very low rate of leakage, and as such, it was determined that the leak detection and repair objectives had been achieved. Since completion of the LDR program in 2005, the EPWUD purchased leak correlation equipment and has recently completed an in-house, system-wide LDR survey in the spring of 2015. The EPWUD anticipates that an in-house, system-wide LDR survey will be completed every 3 to 5 years. As part of the meter replacement program, the EPWUD is planning to install a fixed network meter reading system which will include leak sensors on residential customer services that will provide real time leak detection. It is anticipated that the entire system-wide meter replacement program will take 6 to 7 years to complete. The EPWUD will continue to be aggressive in its efforts to minimize loss from leakage.

The EPWUD is currently utilizing a unidirectional flushing program. The program plan divides the EPWUD's water distribution system into 50 separate flushing zones. The EPWUD currently performs sound preventative maintenance practices in the operation of its storage and distribution system.

Emergency Management and Drought Management

The EPWUD has an emergency management plan that was developed in 2004 and updated in concert with this WSSMP. The East Providence Water Utilities Division utilizes this document for emergency procedures and is contained within Volume II of the WSSMP.

The EPWUD relies solely on Providence Water for water supply, and therefore, they are also

dependent on Providence Water for drought management. The EPWUD works in conjunction with Providence Water on preventive measures and maintenance to aid Providence Water in drought management. The EPWUD also provides response measures to emergency events, including drought, within the Emergency Response Plan, Volume II.

During a drought event, the EPWUD will work with State officials to institute stricter water conservation measures in accordance with the RI State Guide Plan Element 721, Report 115 – *Rhode Island Water 2030*. *Rhode Island Water 2030* identifies five (5) drought phases: normal conditions, drought advisory, drought watch, drought warning and drought emergency. Drought triggers based upon the supply capacity to the EPWUD system from Providence Water are utilized to determine the drought phase. Based upon the drought phase, the EPWUD will consider appropriate water conservation measures and notify the public of these measures. Such water conservation measures may include voluntary or mandatory water use restrictions, declarations of a local water emergency and the prohibition of nonessential uses of potable water. Any drought restrictions implemented by the EPWUD's supplier, Providence Water, in their system shall be adopted by the EPWUD water system.

The EPWUD's drought triggers and water reduction goals and responses for each stage of drought are consistent with RI State Guide Plan 721, Report 115 – *Rhode Island Water 2030* guidelines.

Implementation Schedule

An implementation plan was developed which lists each action item, the responsible person(s), department and/or organization, implementation time frame and the estimated costs for each action, if applicable, for the following programs:

- Residential Retrofit Program
- Major Users Technical Assistance Program
- Meter Installation, Maintenance and Replacement Program
- Leak Detection and Repair Program
- Preventative Maintenance Program

The implementation schedule of the EPWUD's significant Capital Improvement projects was previously detailed in the System Improvements section.

Financial Management

The system is operated as an enterprise fund. Basic financial principles are utilized to assure that the rates and charges imposed are sufficient to ensure that the organization can operate on a self-sustaining basis. The existing rate structure is a simple flat or uniform rate of $3.32 per 100 cubic feet of metered water. An annual fixed meter charge ranging from $80 to $6,000 depending upon meter size is also applied to all water system customers. The Water Utilities Division conducts meter readings. Residential, commercial and intermediate sized customers are billed on a quarterly basis. Major users are billed monthly. Payments are issued by the Water Utilities Division and collected by the Finance Department. The existing wastewater rate structure is a simple flat or uniform rate of $7.78 per 100 cubic feet of metered wastewater. When combined with the water rate this yields a total rate of $11.10 per 100 cubic feet for both water and wastewater use. The water rate combined with a uniform wastewater rate compels consumers to evaluate their water use and the effect on wastewater production which drives water usage down which in turn aides in water conservation. The EPWUD has recently conducted a rate study from which these current rates were developed and these rates are determined to be of the most appropriate structure and took into consideration necessary system funding, customer affordability and water conservation. During the recent rate study, an inclining block rate structure was not considered due to the fact that the current combined water and wastewater rates have had a significant impact on water usage within the EPWUD water system leading to considerable water conservation by consumers. The combined water and wastewater rates will be evaluated in the next rate study to determine if the current rate structure will continue to be the most appropriate rate structure to provide system funding, customer affordability and water conservation.

Coordination

The information contained within the WSSMP has been developed to be consistent with the East Providence Comprehensive Plan particularly as it relates to population growth, economic

development, land use planning and general water use policies. The EPWUD referred to the East Providence Comprehensive Plan during the preparation of this WSSMP update to ensure consistency with the Comprehensive Plan. The City Engineering and Water Utilities Division personnel shall strive to promote consistency between the contents of the WSSMP and the policies of the East Providence Comprehensive Plan. The EPWUD participates in the preparation of the Comprehensive Plan to update applicable sections.

The EPWUD maintains a close working relationship with both neighboring suppliers, the BCWA and Pawtucket, particularly as it relates to the use of emergency interconnections. The EPWUD also maintains a close working relationship with its main supplier, Providence Water. It should be noted that the EPWUD is cognizant of the water usage rates within their water system but has no control over the withdrawal rates of the Providence Water system. Should water conditions deem it necessary, the EPWUD shall attempt to institute watershed-based coordination with Providence Water.

The EPWUD routinely coordinates with and maintains a working relationship with East Providence's wastewater collection system. The City of East Providence's wastewater collection system is managed and operated by the East Providence Water Utilities Division therefore, all operations and data collection are handled within one Division. Additionally, East Providence maintains a sewer use fee such that the wastewater system may be operated as an enterprise fund similar to the water system. The sewer use fee is now billed with the water bills and is based on water consumption.