PROVIDENCE WATER SUPPLY BOARD
WATER QUALITY PROTECTION PLAN
EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

Background and Purpose

The Scituate Reservoir serves over two-thirds of Rhode Islanders with drinking water. Providence Water (PW) continually adapts its management practices to provide the best available protection of the water supply and the raw water sources within the Scituate Reservoir Watershed. Toward this end, PW has established a watershed management and source water protection program. The program is described in this plan, entitled the *Providence Water - Water Quality Protection Plan*.

Rhode Island Water Quality Protection Act Public Drinking Water Supply System Protection Act (46-15.3) (hereinafter, the PDWSSPA) requires water suppliers to develop water quality protection plans (WQPPs) to protect water supplies and document their implementation. The PDWSSPA also enables a water-use surcharge, but restricts expenditure of collected monies to implementation of recommendations adopted under WQPPs. *Thus PW limits work funded through the PDWSSPA surcharge revenues to implementation of recommendations in the WQPP.*

PW's WQPP functions to provide clear structure as PW responds to changing watershed conditions and evolving federal, state and local policy. PW continually takes steps to address and eliminate conditions that may adversely affect source water quality. Moreover, PW works to foster relationships with the watershed communities and other entities (both public and private); educate the public on the need for source water protection; and encourage land management and best management practices in an effort to proactively protect surface and ground water resources.

PW prepared its first approved WQPP in June of 1989. The plan has been updated approximately once every five years since then—in 1995, 2001, 2008 and now 2017. This 2017 update thus represents the plan's fifth iteration. This plan update is consistent with the Water Quality Protection Act, the PDWSPA, the Rhode Island Comprehensive Planning and Land Use Act of 1988, and the Comprehensive Plans of watershed municipalities.

Structure of the Plan

This plan update is organized into 12 sections which are briefly described below.

- Section 1.0 - Introduces the updated plan with a statement of goals related to protection of source water quality and a brief description of the scope of the plan.

- Section 2.0 - Reviews revisions and amendments to the Water Quality Protection Act.

- Section 3.0 - Describes partnership efforts to protection water quality throughout the watershed.

- Section 4.0 - Addresses the importance of stormwater management throughout the Watershed.

- Section 5.0 Summarizes recent revenues and expenditures derived from surcharge fees as well as anticipated future surcharge revenues.

- Section 6.0 - Provides a general description of the watershed including subbasins and source water protection areas, geology and soils, hydrology, and surface water quality.

- Section 7.0 - Identifies protected properties within the watershed.

- Section 8.0 - Reviews and summarizes pertinent federal, state and local regulations as they relate to land use and protection of water resources, identifies deficiencies in these regulations and recommends measures to address these deficiencies.

- Section 9.0 - Identifies contaminants of concern regulated by state and federal agencies as presenting a threat to public health, and identifies potential sources of these contaminants within the watershed.

- Section 10.0 - Provides a description and summary of existing raw water quality monitoring programs within the watershed including a "Procedures Manual" for sampling activities.

- Section 11.0 - Identifies status of accomplishments under the current WQPP.

- Section 12.0 - Identifies key proposed actions and measures of protection from sources of contamination.

- Section 13.0 - References

Mapping prepared as part of this plan update includes the following and is provided in Appendix A:

- Watershed boundary map
- Identification of properties owned by PW
- Identification of current zoning within the watershed
- Identification of current land uses within the watershed
- Known pollution sources within the watershed

Summary of Accomplishments

PW continues to focus its efforts on improvement and proactive protection of the Scituate Reservoir and Watershed. PW accomplished much during the last WQPP planning period (i.e., 2008 – 2017). In summary of this work, PW:

- Completed hazardous building materials inspections and remediation work throughout the watershed.

- Completed sediment and water quality sampling to evaluate potential sources of contamination within the watershed to recommend remedial actions (e.g. the Scituate Landfill and Providence Police Firing Range sampling programs.)

- Continued water quality sampling and monitoring programs throughout the watershed (e.g. implemented stormwater BMP sampling, an IDDE survey, bacteria source tracking; developed of six subbasin sampling plans; developed and implemented a cyanobacteria sampling program; and completed a sodium source investigation.)

- Initiated development of a Watershed Plan through completion of a baseline assessment and technical stream assessments.

- Initiated development of a Climate Change Adaption Plan.

- Completed a municipal DPW training program to review the importance of water quality protection measures.

- Completed design, permitting and construction of the Rte. 6 and Rte. 116 stormwater best management practice to reduce discharge of sediment, bacteria and nutrients to the Regulating Reservoir.

- Completed a Ponaganset Reservoir build-out analysis, continued to assess property ownership, and reviewed opportunities for enhancement of buffering capacity around the Reservoir.

- Completed design, permitting and construction of the Rockland Stream Restoration project to reduce damaging erosion and scour potential and restore a degraded area downstream of a discharge outlet from the Peabody Dam.

- Continued to monitor and review potential sources of contamination within the watershed through an updated commercial and industrial facilities audit, a review of junkyard operations, a review of sand and gravel operations, developed a process to track OWTS violations and wetland violations, an updated CERCLA file review and an updated UST inventory.

- Continued to acquire properties critical to the protection of the water supply.

- Continued to update geographic information system software, hardware and coverages. Continued to develop ArcGIS tools and databases for the watershed to assist in tracking efforts. This included development of spill response model and georeferencing of historic imagery, bathymetry and other data. Developed a Mapbook documenting forest inventory within the watershed.

- Continued assessment of habitat and historic resources on PW property.

- Continued to assess and improve the watershed security and enforcement program to include proactive components.

- Continued to implement and update its forest management plan, including the invasive species management and deer management programs.

- Continued good forestry management practices on land owned by PW to optimize water production and develop additional revenues.

- Continued to assist in the implementation of agricultural and silvicultural best management practices.

- Continued to evaluate and provide financial assistance for a program to implement road de-icing alternatives.

- Continued to improve and expand its public education initiatives and public education partnerships.

- Continued its watershed mail survey program.

- Continued to perform aerial surveys of watershed.

- Continued its commercial and industrial facility environmental audit program and updated its watershed chemical inventory.

- Continued to improve and expand its raw water quality monitoring program.

- Continued initiatives to analyze water quality, land-use data and trends; model implications for present water quality; and predict future effects on water quality in the Scituate Reservoir.

- Continued water resource studies including limnologic studies, impaired water resource studies, and research on specific pollutants.

- Continued on-the-ground water quality improvement initiatives such as riparian buffer restoration, pollution control infrastructure improvement and stormwater management infrastructure implementation.

- Continued to provide recommendations on local, state and federal agency

regulations and enforcement.

- Continued to consult with watershed municipalities on modifications to planning and zoning ordinances.

- Continued to partner with NRICD and the municipalities to improve public education on watershed management and water quality management. Continued to provide residents with information on household hazardous waste storage and disposal options, fertilizer management, and pet waste management. Continued to coordinate with municipalities to promote alternative approaches to development and proper forest management that reduce potential water quality impacts.

- Pursued abandonment of unnecessary/unused Town roads.

- Continued to assess risks and alternative actions for, above ground and underground fuel storage tanks within the watershed.

- Continued participation in the Scituate Watershed Zoning Project to work with communities in developing land use controls that adequately protect source waters.

- Continued to participate in review of proposed development projects within the Watershed.

- Continued to encourage and support municipal efforts geared to investigate and establish voluntary individual sewage disposal system inspection program, wastewater management districts, and groundwater pollution management.

- Continued to enhance the emergency hazardous materials spill response plans.

- Continued to encourage access to household hazardous water collection programs within the watershed.

- Continued to support stormwater best management practice initiatives in partnership with the Rhode Island Department of Transportation and Watershed municipalities.

- Initiated maintenance project at the Providence Police Department's firing range located on Providence Water's watershed property. The maintenance project includes the reclamation of all lead projectiles and brass from the existing soil, excavation and neutralization of soil with detectable levels of lead, and restoration of the property within the existing firing range limits. In addition to the maintenance, reconfiguration of the firing lanes and new bullet trap systems will be implemented for safety reasons and to improve efficiency of future maintenance efforts in accordance with best management practices for firing ranges. Stormwater drainage improvements are being implemented to eliminate potential sources of heavy metals (lead) from entering the reservoir system.

Individual Task Summary Table

Watershed Planning/ Management	Climate Change Adaption Plan Watershed Management Plan (Moswansicut and Regulating Reservoirs) Habitat and Historical Surveys Endangered Species Habitat Review Ponaganset Property Ownership and Buffer Assessment Watershed-wide Plan Reviews Local, State and Federal Regulation and Land Use Planning Research Glocester Stormwater Utility BMP Assessment Limnological Research on Dissolved Iron Bound Phosphorus Foster Repayment and Debt for Nature Planning Potential Regulating Reservoir Drawdown Assessment Limnological Research on Total Organic Carbon
Water Quality Assessment and Monitoring	Subwatershed Sampling Plans Cyanobacteria Management Plan for Regulating Reservoir Cyanobacteria Monitoring Program Sodium Source Investigation Quanopaug Watershed Microbial Source Tracking Wet-weather Monitoring Program Moswansicut Stream IDDE Survey Stormwater and Water Quality Data Management Watershed Inspector Training Scituate Village Stormwater Detention Basin Wet Weather Monitoring USGS and PW Water Quality Data Review and Analysis
Stormwater, Restoration and Infrastructure Design/ Assessment	Regulating Reservoir Stormwater BMP Design, Permitting and Construction Rockland Stream Restoration Design, Permitting and Construction Stoke's Law Design Retrofit Rte. 6 and Rte. 116 Plunge Pool Construction Oversight Ponaganset Road Bridge Inspection and Assessment Peabody Dam Structural and Geotechnical Analysis Report Carpenter Road Stream Crossing Assessment Rte. 6 and Rte. 116 South Outfall BMP Concept Plan Scituate Fire Station Preliminary BMP Design

GIS Database Updates and Management	Emergency Spill Response Model Development of Water Quality Data Analysis Tools Photogrammetry and Aerial Photographs Parcel Updates On-Call GIS Training and Support Historical Photo Geodatabase Impervious Surface Tool Bathymetric Map Geodatabase Forest Inventory Mapbook Elevation Data Analysis to Locate Likely Vernal Pools Sand and Gravel Operation Watershed-Wide Review Betty Pond Sampling Data Layer Development
Hazardous Materials Management and Remediation	Hazardous Materials Inspection and Testing Phase I Environmental Site Assessment at Old Plainfield Pike Phase I Environmental Site Assessments at 1467 and 1495 Chopmist Hill Road Phase I Environmental Site Assessment at 510 Trimtown Road Phase II Environmental Site Assessment at 2837 Hartford Road D'Orio Property Environmental Remediation (Design, Permitting, and Construction) Green Acres Remediation Environmental Assessment of Junkyard at 40 Mill Road Targeted Site Assessment at Coastal Atlantic, LLC. Residential Abatement and Demolition Commercial and Industrial Facility Audits UST Inventory, Removal and Tracking OWTS and Wetland Violations Tracking Program Providence Police Firing Range Sediment and Water Quality Sampling (3 Rounds) Reservoir Sediment Background Sampling Providence Police Firing Range Management/ Relocation Assessment Sand and Gravel Operation Evaluation Junkyard Status and Operations Review CERCLA File Review Scituate Landfill Groundwater Sampling Sonoco Remediation File Review Tasca Field Recreational Improvement Review and Recommendations Assessment of Accidental Spill Frequency at Rte. 6 and Rte. 101 Trinity Episcopal Church Site Visit and Assessment
Municipal and Public Education	DPW Staff Watershed Management Training Scituate High School Erosion Control Design and Installation Class Project Assistance Public Education Program Enhancement Opportunities Research Municipal Ordinance Update Assistance

Summary of Findings

The Scituate Reservoir is the largest and highest capacity drinking water resource in the State of Rhode Island. In fact, it serves over two-thirds of Rhode Island citizens with potable water. Thankfully, water in the watershed remains of generally good quality. (Only one surface water resource—Moswansicut Stream—shows impairment due to pollution.) But water quality trends and modeling show early signs of changing conditions and a somewhat uncertain future for the Scituate Reservoir.

Land development and commercial uses—which are essential to the economic viability of the state as well as Watershed municipalities—continue to present significant pollution risk to the Scituate Reservoir. In fact, a review of residential building permits reveals a three to four fold increase over the last decade.

It is uncertain whether the risk will manifest in an untenable reality. Prevention remains the simplest and least expensive approach to managing water quality. To be efficient, PW must stay at least one step ahead and continue to protect this valuable drinking water resource.

Accomplishments under past iterations of PW's WQPP are impressive and prodigious. PW should continue to focus in these areas of success while growing its protection efforts to respond to changing policy and watershed conditions.

The development of this plan shed light on highlights a variety of challenges to watershed protection. The watershed includes parts of six towns, numerous land uses, and is populated by groups of individuals with varied interests and desires for the land. Some core issues include:

- Support from all communities is an integral part of water quality protection. Local, state and federal regulations affect activities within the watershed and the success of protection measures.

- Numerous groups of individuals have a variety of competing interests which must be satisfied while maintaining the protection of water quality. Economic growth and other interests in the area must be balanced with watershed protection.

- To help protect the water supply, PW must rely on the regulatory and enforcement process of local, state and federal agencies. PW will encourage the development of cooperative ventures between these agencies who have direct interests and work on common problems in order to coordinate work and reduce costs.

- Coordination of watershed protection activities are difficult due to the number of state agencies, local boards, commissions and groups involved in addition to PW.

- Successful watershed protection requires financial resources. The funds generated by the water quality surcharge are critical in providing this resource.

Balancing and juggling of scarce resources, competing interests, and governmental mandates will characterize management of the Scituate Reservoir for the foreseeable future. Because the environment responds in slow cycles, waiting accompanies the measurement

of success. To ensure the quality of the Scituate Reservoir will require PW to continue the use of adaptive environmental management in a patient and focused approach.

Key Proposed Actions

PW will continue to implement a majority of the protection measures identified in the 2008 Water Quality Protection Plan. Additional protection measures have been identified and will be addressed over the next five years.

The list below is a complete list of general recommendations. Parenthetical references refer to sections of the plans with detailed recommendations.

1. Land Acquisition and Ownership (Section 7.3.1)

Land acquisition is a key effort to acquire critical parcels of land and buffer zones within the watershed to ensure critical watershed resources are protected now and in the future. The recommendations in this plan address some specific issues related to land acquisition and ownership within the Watershed, but as a general recommendation, PW should continue existing efforts to acquire and protect property that is of strategic importance to raw water quality protection and explore efforts that will not only protect water quality, but assist in regenerating forest cover with native, sustainable tree species that may provide some economic value. PW should also explore ownership issues (e.g., on the Ponaganset Reservoir) and take necessary action to limit access as well as mitigate water quality threats and pollution problems.

2. Habitat and Historical Resources on PW Property (Section 7.3.1)

The Scituate Reservoir Watershed contains a rich diversity of habitat and history. Preservation of habitat and historical resources helps to ensure water quality and community appeal. PW has begun to inventory these resources on its own land holdings. PW should continue to inventory these resources and examine methods of habitat and historical resource preservation.

3. Updating GIS Database (Section 7.3.2)

A comprehensive database tracking pertinent data related to the watershed can be a valuable resource in identifying changing trends and areas of future concern as well as maximizing watershed protection efforts. PW utilizes a GIS database to track information such as land owned by PW, other protected properties, locations of existing and potential pollutant sources and water monitoring locations. The recommendations in this plan address some specific issues related to updating GIS databases, but as a general recommendation, PW should continue to update and expand this database in order to retain the value and accuracy of this resource.

4. Sampling, Trend Analysis, Modeling and Research (Section 10.6)

Sampling is the only direct method of measure the effects of potential pollutant sources to the Scituate Reservoir. As a general recommendation, PW should continue to explore methods to measure the effect of potential pollution sources. This may include sampling, trend analysis, modeling and research (e.g., limnological assessments and other water quality studies) on potential sources of water pollution as well as recommendations for water quality management. Specific recommendations are provided below.

5. State Regulations (Section 8.4.8)

State regulations are critical foundations for ensuring proper protection of drinking water supplies. The recommendations in this plan address some specific issues related to state regulations, but as a general recommendation, PW should continue to adapt, coordinate, and contribute inputs to various state regulatory agencies who draft and enforce rules and regulations, and regulations themselves, which help protect water quality.

6. Land Use, Land Development, and Construction (Section 9.2.4.4)

Water quality of the Scituate Reservoir relates closely to land use in the Watershed. Proper growth management including the use of innovative land-use management techniques (e.g., plays a key role in maintaining the quality of the Scituate Reservoir). The recommendations in this plan address some specific issues related land-use management within the Watershed and focus on cooperative efforts with Watershed municipalities, but as a general recommendation, PW should continue to participate in efforts to encourage and ensure the proper land use, land development, and construction.

7. Public Education and Outreach (Section 3.3)

Public education and outreach efforts promote water quality protection efforts throughout watershed towns. Throughout the United States, many public water supply systems attribute the success of their watershed management plans to public education and community support. The recommendations in this plan address some specific issues related to public education and outreach as well as partnership efforts to protect Watershed water quality. However, as a general recommendation, PW should continue existing education and outreach efforts as well as explore new programs, including efforts to work with partners in order to develop targeted watershed education for community leaders and Watershed residents.

8. Stormwater Management (Section 4.1 and 9.2.6.4)

Stormwater runoff has the potential to contribute loadings of nitrogen, phosphorous, bacteria, viruses, organic contaminants and metals to receiving waters. Runoff contaminants may be traced back to multiple sources including but not limited to OWTS, deicing practices, petroleum storage, improper waste disposal, land use, and lawn maintenance. The recommendations in this plan address some specific issues related to stormwater management within the Watershed, but as a general recommendation, PW should consider continuing ongoing efforts to enhance existing and future stormwater

management practices as well as partner with municipalities to ensure proper stormwater management.

9. Onsite Wastewater Treatment Systems (Section 9.2.1.4)

OWTSs may contribute pollutants such as pathogens and nutrients to nearby waters. Proper management of these systems is needed to maintain the quality of water in the Scituate Reservoir. The recommendations in this plan regarding OWTS are based on 2006 survey data results, but as a general recommendation, PW should continue to participate in efforts to encourage and ensure the proper design, installation, operation and maintenance of OWTSs.

10. Transportation (Section 9.2.6.4)

Studies around world have shown transportation infrastructure (e.g., roadways) to be a source of water pollutants including pathogens, metals, VOCs, as well as hydrologic alterations such increased stormwater volume and peak flow. The recommendations in this plan address some specific issues related transportation and roadway management within the Watershed, but as a general recommendation, PW should continue to participate in efforts to encourage and ensure the proper design, installation, operation, maintenance, and, as appropriate, closure of transportation infrastructure throughout the Watershed.

11. Silviculture (Section 9.2.5.4)

Potential impacts from forestry activities include erosion and sedimentation, increased water temperature and stream flow, as well as impacts from improper management of invasive and nuisance populations, organic debris deposition, and chemical applications. The recommendations in this plan address some specific issues related to silviculture within the Watershed, but as a general recommendation, PW should continue to participate in efforts to encourage and ensure the proper management of silvicultural operations and the forestlands that PW owns. This is intended to include approaches to ensure successful regeneration of forests postharvest.

12. Herbicides, Pesticides, and Fertilizer Usage (Section 9.2.2.4)

Improperly used herbicides, pesticides, and fertilizer represent significant sources of nutrients and toxics to nearby waters. Proper use, storage and management of these materials is needed to maintain the quality of water in the Scituate Reservoir. The recommendations in this plan address some specific issues related to fertilizer, pesticide, and herbicide use within the Watershed, but as a general recommendation, PW should continue to participate in efforts to encourage and ensure the proper use, storage, and management.

13. Animal Populations (Section 9.2.3.4)

Both wild and domesticated animals may present significant sources of pollutants such as pathogens and nutrients. Proper management of feeding operations and domestic animal waste as well as management of wild animals will help to prevent pollution of the Scituate Reservoir. The recommendations in this plan address some specific issues related

management of animal populations within the Watershed, but as a general recommendation, PW should continue to participate in efforts to encourage and ensure proper management of domestic and wild animals as this relates to water quality in the Watershed.

14. Uncontrolled Releases of Hazardous Materials (Section 9.2.11.4)

Uncontrolled releases of hazardous materials have potential to enter nearby wetlands, streams, and reservoirs, and can pollute drinking water supplies. It is important to control such releases through planning and response training. The recommendations in this plan address some specific issues related to uncontrolled releases of hazardous materials within the Watershed, but as a general recommendation, PW should continue efforts to promote proper handling of uncontrolled releases of hazardous materials and explore opportunities to enhance or develop new strategies which may control such releases.

15. Commercial and Industrial (Section 9.2.11.4)

Improperly managed commercial and industrial land uses present a significant threat to water quality because the type and intensity of their operations. The recommendations in this plan address a specific issue related to commercial and industrial operations within the Watershed, but as a general recommendation, PW should continue to participate in efforts to encourage and ensure the proper management of commercial and industrial land uses.

16. Gasoline and Petroleum Storage (Section 9.2.7.3)

Improper storage of petroleum products may lead to water contamination. The recommendations in this plan address some specific issues related petroleum product storage within the Watershed, but as a general recommendation, PW should continue to participate in efforts to encourage and ensure the proper management and storage of petroleum products.

17. Junk and Salvage Yard Operations (Section 9.2.9.4)

Improperly managed junk and salvage yard operations may contribute metals, VOCs and other toxic pollutants. The recommendations in this plan address some specific issues related to junk and salvage yard operations within the Watershed, but as a general recommendation, PW should continue to participate in efforts to encourage and ensure the proper management of junk and salvage yards, which in many cases may include prohibition. Recommendations regarding junkyards and salvage yards are listed below.

18. Unlined Dumps and Landfills (Section 9.2.10.4)

Unlined dumps and landfills can present a significant source of many pollutants such as VOCs, nutrients and pathogens. The recommendations in this plan address some specific issues related dumps and landfills within the Watershed, but as a general recommendation, PW should continue to participate in efforts to encourage and ensure the proper assessment, control and management of dumps and landfills.

19. Gravel and Sand Mining (Section 9.2.8.4)

Improperly managed gravel and sand mining operations may contribute pollutants such as sediment, metals and VOCs. Improperly closed operations may also increase the susceptibility of water resources. The recommendations in this plan address some specific issues related sand and gravel mining within the Watershed, but as a general recommendation, PW should continue to participate in efforts to encourage and ensure the proper siting, operation, and management of these operations, which in many cases may include prohibition.

20. Unauthorized Activities (Section 9.2.12.4)

Occasionally, unauthorized activities may occur that threaten or impair water quality. The recommendations in this plan address a specific instance within the Watershed, but as a general recommendation, PW should continue to participate in efforts to discourage and prevent unauthorized activities that may adversely affect water quality in the Watershed. This recommendation is intended to address issues beyond Watershed security and enforcement.

21. Impaired Waters (Section 9.2.13.4)

Impaired waters represent instances of lost water resource use typically as a result of pollution and mismanagement. Impairments in the Watershed should be viewed as clear bellwethers of potential impairment to the Scituate Reservoir. One water in the Watershed—the Moswansicut—has been listed as impaired. The recommendations in this plan address this impairment, but as a general recommendation, PW should continue to participate in efforts to encourage and ensure restoration of impaired waters in the Watershed. This work should include restoration of riparian buffers, where buffer deterioration may lead to adverse water quality effects.

Conclusion

Conditions continue to change in the watershed. Development intensifies and risk grows. PW must remain vigilant if it is to be the steward of clean drinking water in the Scituate Reservoir.

Through its WQPP, PW has established a model program of environmental management. This 2017 WQPP updates and enhances that model.

Prevention remains the most cost-effective and least intrusive form of water quality management. Prevention and thoughtful watching must, therefore, continue to compose the core of PW's adaptive management approach.