PORTSMOUTH COMPREHENSIVE COMMUNITY PLAN

ELEMENT 9 – WATER SUPPLY

9.1 PORTSMOUTH'S WATER SUPPLY VISION

PORTSMOUTH WILL ENJOY A SAFE, RELIABLE LONG-TERM SUPPLY OF CLEAN DRINKING WATER FOR THE BENEFIT OF CURRENT AND FUTURE RESIDENTIAL, AGRICULTURAL, COMMERCIAL AND INDUSTRIAL USES.

This section addresses Portsmouth's water supply under the following categories:

- Existing conditions
- Portsmouth's water suppliers
- Potential impacts of natural hazards and climate change
- Portsmouth's role in water supply management
- Goals, policies and implementation

Those in Portsmouth not serviced by the few remaining private wells obtain their drinking water from one of three entities, the Portsmouth Water and Fire District, the Prudence Island Water District (both quasi municipal governmental agencies) and either directly or indirectly, the city-owned, Newport Water Department. Being legally separate from the municipal government, these entities have a critical responsibility to treat and distribute safe drinking water. But they have little to no control over land use activities that contribute not only to demand from their various transmission facilities but to source water quality in the drinking water reservoirs located in Portsmouth and the groundwater resources on Prudence Island. This is where the Town plays a critical role as an important partner with the water suppliers. It is not simply a matter of making sure the Town's land use planning is in alignment with the water suppliers' demand and supply management strategies, it is also a matter of using land use policy and regulatory controls to make sure the source water for these suppliers is as clean and pollutant-free as possible. This partnership between the water suppliers and the Town and the definition of our cooperative roles is the guiding principle of this Comprehensive Plan Element.

9.2 EXISTING CONDITIONS

9.2.1 WATER SUPPLY-RELATED NATURAL FEATURES & SENSITIVE AREAS

One or more maps showing Portsmouth's water supply-related natural features and sensitive water supply areas will accompany this element.

9.3 PORTSMOUTH'S WATER SUPPLIERS

The following section discusses Portsmouth's Water Supply, which is provided in combination by the Portsmouth Water and Fire District, Prudence Island Water District, Newport Water Division, and Hog Island Water Distribution.

9.3.1 PORTSMOUTH WATER AND FIRE DISTRICT

The Portsmouth Water and Fire District (PWFD) is a quasi-municipal, governmental agency created in 1952 by act of the Rhode Island General Assembly. The District was created to obtain and maintain a supply of water for the extinguishing of fire, and for distribution to the inhabitants of the district, for domestic use and for other purposes. (See Map XX.)

The District does not own or operate any water supply sources. All of the water the District supplies to its customers is purchased from the City of Newport, Newport Water Department. Water can be purchased from the Stone Bridge Fire District (Stone Bridge) in Tiverton as a backup supply, although it has not done so since the late 1990's.

Water purchased from the Newport Water Department comes from the Lawton Valley Reservoir, St. Mary Pond and Sisson Pond in Portsmouth, Watson Reservoir in Little Compton and Nonquit Pond in Tiverton. This water is treated before distribution by the newly-replaced (2014) Newport Water Lawton Valley Water Treatment Plant in Portsmouth. Water purchased from the Stone Bridge Fire District (during emergency situations only) comes from Stafford Pond in Tiverton and is treated at the Stone Bridge Fire District Water Treatment Plant, also in Tiverton. PWFD does not perform any additional treatment to the water purchases from either source.

PWFD's service area is established in its enabling legislation. In essence, the District's boundaries include all of Portsmouth on Aquidneck Island with the exception of most of the area in the southwest corner of Portsmouth bounded by Middletown, West Main Road and the northern boundary of the Melville Campgrounds. This area outside the District's boundaries, which specifically includes Redwood Farms,

Bay View Apartments and Condominiums, Raytheon, and the Melville marina area, is serviced by the Newport Water distribution system. The Raytheon Corporation is supplied by its own service line connected to the Newport Water 16-inch transmission main at the Lawton Valley treatment facility. The Navy Base and Melville Navy Housing are supplied with Newport Water through Naval Station Newport transmission facilities.

It is unlikely the PWFD's service area will extend beyond the current legislated boundaries as all surrounding areas are serviced by other public water systems. The entire Town of Portsmouth is serviced by the Portsmouth Water and Fire District, the Newport Water Department, Naval Station Newport (using water purchased from Newport Water and billed through wheeling accounts) or the Prudence Island Water Company. Although there are large tracts of undeveloped land in southern Portsmouth, most roads within the entire District are serviced with water mains so extensive infrastructure expansion to accommodate new development is not anticipated. As of March, 2011, the District population served and eligible to be served was 16,116 (approximately 94% of total) and 16,194, respectively.

Taken from PWFD's 2011 Water Supply System Management Plan (WSSMP), historic maximum day demand (MDD), estimated peak hour demand (PHD), and average day demand (ADD) based on a billing year basis in MGD, as well as the maximum day peaking factor, for the last five years is as follows:

Demand Factor	Calendar Year				
	2010	2009	2008	2007	2006
Maximum Daily Demand	2.193	2.580	2.532	2.025	2.488
Peak Hourly Demand	0.155	0.183	0.179	0.143	0.176
Average Daily Demand	1.134	1.249	1.289	1.164	1.280
Peaking Factor	1.93	2.07	1.96	1.74	1.94

The WSSMP identified no apparent significant system deficiencies limiting capacity to meet current (2010) demand. In projecting for future water demand, the 2010 base and future residential demand projections are based on the highest annual per capita consumption experienced by the District since 2003, which was fiscal year 2006, and the projected population for each year, taken from Portsmouth's Comprehensive Community Plan. Future non-residential projections are generally assumed to increase proportionally with the change in population, with the exception of agricultural demand, which is held constant using

the most recent high agricultural year of 2009. Updated population projection in this updated Comprehensive Plan indicate safe margins for water supply and demand well into the 20-year planning horizon. The average day demand and maximum day demand for the base year and the years 2015 and 2030 are shown in the summary table below.

Demand Factor	Year		
	2010 (Base Year)	2015 (5-Year)	2030 (20-Year)
Average Daily Demand	1.311	1.370	1.486
Maximum Daily Demand	2.557	2.645	2.867

PWFD purchases all of its water supply from other water suppliers; therefore, available water is defined by contract and/or the suppliers' ability to deliver water as may be prescribed by their WSSMP. The District's contract with the City of Newport to purchase 1.233 million gallons per day on an average day basis and 2.250 million gallons per day on a maximum day basis expired on December 31, 1995. The District and Newport Water continue to operate under the conditions of the expired contract, with the exception of water rates, which are determined by the Rhode Island Public Utilities Commission. In addition, in 1999, the District began to purchase all of its water from Newport Water with their concurrence. Prior to that time, the District purchased approximately one-half of its water from Stone Bridge. The District will continue to pursue a long-term agreement with Newport Water to include additional water availability to supply all of the District's future needs. The Newport Water WSSMP water projections for PWFD indicates that it has the water availability to meet its 2015 and 2030 demand.

Demand Factor	Year	
	2015 (5-Year)	2030 (20-Year)
Average Daily Demand	1.480	1.670
Maximum Daily Demand	2.664	3.006

Although the Portsmouth Water and Fire District is not affiliated legally or administratively with the Town of Portsmouth government, the District and Town work cooperatively to best serve their common constituents. The quality of potable water sources is of utmost concern to both the Town of Portsmouth and the PWFD. As the District purchases all of its water from the Newport Water Department and in emergency situations, from the Stone Bridge Fire District, PWFD does not own any sources of water or any watershed protection properties, and therefore does not have a Water Quality Protection Plan

(WQPP). However, while the District does not have any legal authority to implement or enforce watershed protection in Portsmouth, it has undertaken a number of initiatives to assist the Newport Water Department, which owns the reservoirs in Portsmouth, and the Town of Portsmouth with source protection in the town.

- The District has notified Newport Water and the Town of Portsmouth that Newport's Water Quality Protection Plan fairly and adequately addresses the need and methods for water quality protection and is supported by PEFD. As a result, the Newport Water Quality Protection Plan was subsequently included in the Portsmouth Comprehensive Community Plan (PCCP) by reference.
- PWFD has worked closely with the Town concerning implementation of zoning and land use regulatory recommendations of the Newport WQPP and the Portsmouth Public Works Department regarding best management practices. At the request of the town, the District participated in a review of the town's subdivision regulations prior to revision for conformance with the Town's Comprehensive Plan and the Water Quality Protection Plan.
- The District has supported the recommendations of the Town's Comprehensive Plan regarding watershed protection districts and other remedial water quality protection measures and has a continuing offer to provide technical assistance to the town to help achieve these recommendations. To that end, at the request of the town, the District reviewed and made recommendations on the draft regulations for the Watershed Protection Overlay District as part of Portsmouth's Zoning Ordinance.

9.3.2 PRUDENCE ISLAND WATER DISTRICT

The Prudence Island Water District (PIWD) Public Water System (PWS ID#1592023) provides water service to 355 active connections located in an approximate 1 square-mile area along the east side of Prudence Island. Another 19 service connections are provided to undeveloped lots within the service area. Recent improvements in the distribution system has allowed the District's historically-maintained waiting list for connection to drop to zero, with all new applications for service able to be accommodated for the time being.

The service area extends in a crescent shaped arc along the eastern edge of the island, from Roberta Avenue (Bristol Colony) at the southern end, to Warner Avenue and Dexter Road (Warnerville) at the northern end, immediately south of Nag Pond and Northeast Point. (See Map XX) The island population is seasonally variable with a winter population of 100 to 150 persons and a maximum summer population

of approximately 1200 persons. The peak seasonal population typically occurs on weekends during the summer with peak water demand occurring in July and August.

The system is presently served by three active drilled bedrock wells, Indian Springs Wells #1 and #4 and the Army Camp Well. As they are hydraulically connected, the two Indian Springs wells cannot be operated at the same time. The fourth well, Bristol Colony Well is presently offline and used strictly as a backup. The active bedrock wells provide makeup service to a single (1) atmospheric water storage tank; a nominal 100,000-gallon, aboveground storage tank installed on land leased from the Prudence Island Conservancy between Hillside Avenue and Prospect Terrace, approximately in the center of the service area. This storage tank was constructed in 2003 to replace the smaller (12,500 gallon) Greer Tank, now off-line and located adjacent to the new tank. The Greer Tank is now used as a water source tank by the Prudence Island Fire Department.

The three active water supply wells pump directly into the distribution system with the water distribution system operating on the static head provided by the 100,000-gallon water storage tank ("Big Blue"). This tank is installed in the upland area at the center of the distribution system. Because the majority of the users are located along the eastern coastline at elevations below the elevation of the tank, reasonable service pressures can be maintained at the service connections. A booster pump station (Broadway Pump House) was installed to help alleviate low pressure problems in the upland areas at the southern end of the system. No treatment of the water supply is presently provided, although the Indian Spring Wells demonstrate significant iron and manganese content. To assure adequate supply in times of drought or exceedingly high water demand, water use restrictions are occasionally enforced by the District to limit non-critical water use (irrigation, car washing, etc.) during the summer season.

As of December 2018, safe maximum yield of the PIWD system was approximately 64,800 gallons per day (45 gallons per minute). At first glance, this compares favorable against a daily average annual demand of 17,129 gallons per day. Maximum safe yield is, however accomplished with both the Indian Springs Well #4 and the Army Camp Well running at full capacity, which they cannot do for more than a few hours at a time. In addition, peak 3-month summer season demand is more nearly 39,000 gallons per day, with draw down of the storage tank proving difficult to recover in the overnight hours on occasions of high demand.

While capacity of the system to meet even peak season demand in the short term seems adequate, projections for future water demand point to the need to increase available supply and/or mitigate demand. PIWD has undertaken steps to develop projections future water demand using conservative predictions for annual increase in the number of active service connections and basing calculations on historic peak 3-month demands rather than average annual demands. Projected over a 30-year planning period (2042) the total annual system demand is expected to increase by approximately 25.7%, to an average annual water demand of 9,432,450 gallons. The Peak 3-Month average daily demand is calculated to be 40,088 gpd, and the peak 1-Day demand is calculated to be 100,927 gallons. To achieve even a modest margin of error of supply over demand, significant steps will need to be taken to maintain an adequate water supply in the 20-year planning horizon.

On the mitigation side, the District has implemented a successful leak repair program along with the promotion of water conservation measures, resulting in a substantial reduction in total water use. During the period from 2009 through 2012, the District demonstrated an 18.5% reduction in total water demand. Further improvements in the water distribution system are likely to continue this trend. To accommodate even modest growth however, the most significant near-term and long-term issue that must be addressed by the District is to increase the available supply of potable water to the system. Potential solutions include (1) increasing and optimizing withdrawals from the existing wells, (2) development of new groundwater wells, and (3) implementation of brackish/sea water wells and a desalination system. Option one has been optimized and further gains are not expected to be significant. With the development of desalination systems being prohibitively expensive, development of new groundwater wells seems the only answer.

While costs to develop new groundwater wells is modest and should not significantly impact rate payers, the search for the location of new wells becomes the critical factor. Based upon present understanding of the bedrock geology and soils of Prudence Island, it is believed there is potential for the development of new bedrock wells to augment the existing wells. A program of test well drilling and negotiations with landowners is underway and recently the PIWD has taken the significant step of exercising their taxing authority to extend financing debt and improvements to their water system to all property owners on the island not just to the ratepayers.

In October 2017, PIWD water sampling results of routine and recheck samples tested positive for the presence of fecal coliform bacteria and/or *E. coli.* A "Boil Water Order" was immediately issued. To resolve this problem, PIWD chlorinated their wells and the distribution system and public notification was posted or distributed to all concerned residents. Test results after 3 weeks demonstrated the water was contaminant-free and the boil water was lifted. In October 2018, water sampling results of routine and recheck samples again tested positive for the presence of fecal coliform bacteria and/or *E. coli.* A "Boil Water Order" was again immediately issued and again PIWD chlorinated their wells and the distribution system and public notification was posted or distributed to all concerned residents. The Town of Portsmouth purchased and provided bottled water to residents of the island on a temporary basis. Testing continued through 2018 with coliforms found in more samples than allowed. The Rhode Island Department of Health continues to work with PIWD to resolve the situation. As this contamination problem occurs regularly in the fall to varying degrees, current thinking is that the source of the contamination may be practices that homeowners use to drain the water pipes in their seasonal homes in as part of closing them up for the winter. As part of its on-going efforts to maintain quality service to its customers, PIWD is considering the mandatory installation of backflow preventer valves for all of its active connections as a prerequisite for connection to the system.

9.3.3 CITY OF NEWPORT, NEWPORT WATER DIVISION

Regulated by the Rhode Island Public Utilities Commission and a division of the City of Newport's Department of Utilities, the Newport Water Division (NWD) operates and maintains a drinking water treatment and distribution system which services Newport, Middletown, and a small section of Portsmouth. In addition, Newport Water provides water wholesale to the Portsmouth Water & Fire District and Naval Station Newport.

NWD draws its water supply from nine surface reservoirs, three of which are in Portsmouth under the land use protections of a Watershed Protection [overlay] District detailed in the Portsmouth Zoning Ordinance. Raw water is treated at one of the two water treatment facilities - Station 1 Plant in Newport or Lawton Valley Plant in Portsmouth.

Drinking water customers serviced directly by NWD, and therefore outside the district boundaries of the Portsmouth Water and Fire District, include residents in the Redwood Farms, Overlook Point and Bayview Apartments neighborhoods and the Raytheon campus. West Side drinking water customers serviced

indirectly through a Naval Station Newport-owned and operated distribution system include the marine-related businesses in the Melville area as well as Portsmouth's Melville School and the Portsmouth-owned Melville Campground. Customers provided NWD drinking water through the Navy distribution system are billed directly by NWD which in turn credits the Naval Station Newport on their wholesale water bills. In recent years, Naval Station Newport has expressed a strong desire to suspend its water supply responsibilities on the west side of Portsmouth as this function no longer supports its mission. Negotiations continue between Naval Station Newport, Portsmouth Water and Fire District and the Town of Portsmouth and other interested parties on how best to achieve this end result.

9.3.4 HOG ISLAND WATER DISTRIBUTION

The 250+ summer residents of Hog Island are serviced by private wells licensed and regulated by the Rhode Island Department of Health. The municipality of Portsmouth plays no role in water use on the island.

9.4 POTENTIAL IMPACTS OF NATURAL HAZARDS AND CLIMATE CHANGE

The 2018 Portsmouth Natural Hazard Mitigation Plan identifies multiple natural hazards that pose threats to the Town as a whole. Those posing significant threats to the drinking water supply include drought, sea level rise, coastal flooding, hurricanes/nor'easters and while not a natural hazard in and of itself, dam failure. While there may be a great deal of disagreement regarding the effects of these natural hazards, for planning purposes these potential effects cannot be ignored.

Drought – While climate models do not agree whether annual average rainfall will increase or decrease in the coming years due to climate change, the models do agree there will be greater extremes. Rainfall event will have a higher likelihood of being more extreme and periods of drought will have a likelihood of being longer. Both of these scenarios pose a threat to not only to Newport drinking water reservoirs but Prudence Island's groundwater resources as well. Excess rainfall can threaten water quality as runoff increases and dam safety in the extreme case. Longer periods of drought may critically effect Prudence Island's groundwater supply with PIWD already in need of drilling of new wells.

Sea Level Rise – While not a short-term danger to Portsmouth's water supply, future potential sea level rise may damage low-lying water distribution systems in Island Park (PWFD) and at Melville (NWD/Navy). Future salt water intrusion should certainly be a factor in the search for future locations of drinking water wells on Prudence Island.

Coastal Flooding – As with potential sea level rise, coastal flooding poses a threat to water distribution systems in areas of Portsmouth. In addition, one of Newport Water Division's water treatment plants is already at risk from coastal flooding, adding to supply worries for water supplied to Portsmouth from NWD's other treatment plants.

Hurricanes / Nor'easters – Climate models indicate increases in severity (wind speeds and storm surge) of hurricanes along with increases in occurrence in the coming years due to climate change. The largest threat to water supply from these coastal storms is damage to NWD's water treatment plants, and damage to infrastructure on Prudence Island preventing emergency travel and water pumping ability.

Dam Failure - Both the Rhode Island Department of Environmental Management (RIDEM) and Rhode Island Management Agency (RIEMA) list the dams for NWD's three drinking water reservoirs in Portsmouth (Lawton Valley Reservoir, Sisson Pond and St Mary's Pond) as high hazard dams where failure or mis-operation will result in probable loss of human life. Related to flooding, more intense rain events may stress structural integrity of these dams which could lead to failure which would certainly jeopardize water supply in Portsmouth. The 2018 Natural Hazard Mitigation Plan identifies the probability of a dam failure in these three dams as "possible" (1% - 1 chance in the next 100 years).

9.5 PORTSMOUTH'S ROLE IN WATER SUPPLY MANAGEMENT

Despite that the municipality of Portsmouth is legally separated from the entities responsible for supplying quality drinking water to our citizens, Portsmouth can and will participate in this critical function is several important ways.

Water Source Protections – Maintain up-to-date, effective land use controls as expressed in the Portsmouth Zoning Ordinance for the Watershed Protection [overlay] District protecting Newport Water's drinking water reservoirs and for the Water Resource Protection District protecting groundwater resources on Prudence Island.

Planning Coordination – Maintain close associations and coordinated planning efforts with the various drinking water suppliers.

West Side Water Supply – Work with all stakeholders to maintain the dual goals of ensuring an adequate water supply to Portsmouth's residents and businesses on the West Side all the while supporting the Navy's mission to discontinue its water supply responsibilities in the area.

New Sources of Drinking Water on Prudence Island – Provide assistance to the Prudence Island Water District and the residents of Prudence Island with land use negotiations and other issues associated with locating new drinking water wells on the island.

Stormwater Management – Maintain best practices in stormwater management in order to reduce pollution and nutrient loading of our drinking water sources.

Public Education - Coordinate and provide assistance to the various drinking water suppliers in the development and dissemination of public education materials related to drinking water quality and public health.

9.6 GOALS, POLICIES AND IMPLEMENTATION

GOAL WS - 1 - DELIVER A COST-EFFECTIVE SET OF PROGRAMS, POLICIES AND COOPERATIVE INITIATIVES THAT PROTECT AND PRESERVE BOTH THE QUALITY AND QUANTITY OF PORTSMOUTH'S DRINKING WATER SUPPLY.

Policy WS - 1.1

Protect Portsmouth's drinking water supply by minimizing the introduction of non-point source pollutants into our surface water reservoirs and groundwater resources.

Action WS - 1.1a –Review provisions in the Zoning Ordinance governing land development in the overlay Watershed Protection District and the Water Resource Protection District as needed for their applicability and effectiveness.

Action WS - 1.1b – Provide an annual report and recommendations to the Planning Board and the Town Council on any activities regarding water quality of the surface water reservoirs and groundwater resources located in Portsmouth.

Action WS - 1.1c – Continue the necessary actions to remain in compliance with federal and state mandates to manage storm water in accordance with Phase II storm water permit requirements.

Action WS - 1.1d – Identify all onsite wastewater treatment systems (OWTS) within the Watershed Protection District and the Water Resource Protection District and consider whether heightened inspection criteria are appropriate within the provisions of the Portsmouth Wastewater Management District.

Action WS - 1.1e – Continuously update and make available public education materials that describe steps individual landowners can take to reduce non-point source pollution and improve water quality.

Policy WS - 1.2

Maintain close coordination between Town land use planning and the various water suppliers' planning for future demand.

Action WS – 1.2a – Support Water Supply Management Plans of the Portsmouth Water and Fire District, the Prudence Island Water District and the City of Newport Water Division.

Action WS – 1.2b – Establish a program of annual (or more if necessary) workshops to bring the various water suppliers' staff, Town planning staff, members of the Planning and Zoning Boards, and the Director of Economic Development together to discuss land use, zoning controls and water supply and demand.

Action WS – 1.2c – Have a Town planning staff member attend all regular Board meetings of Portsmouth Water & Fire District and Prudence Island Water District.

Action WS – 1.2d – Continue to work with the Portsmouth Water & Fire District, Newport Water and Naval Station Newport regarding future water distribution in areas along the west side that are outside the PWFD District.

Action WS – 1.2e – Assist the Prudence Island Water District in its goal of establishing new drinking water wells on the island.

Action WS – 1.2f – Maintain up-to-date Emergency Action Plans for each high hazard dam in Portsmouth, per RIGL §46-19-9.