



## II. NARRATIVE

General Location of Aquifer. The subject of this petition is the aquifer located at Conanicut Island in the Town of Jamestown, Newport County, off the coast of Rhode Island. The Island is in Narragansett Bay. The Island is approximately 8.7 miles long in its entirety and varies from 1 to 1.6 miles in width. See *Comprehensive Community Plan*, p. 5 (**Exhibit A**). The north end of the Island is approximately 1.5 miles wide and 4.5 miles long, covering an area of approximately 5 square miles. See *Water Quality and Hydrology of Northern Conanicut Island, Rhode Island* by A.I Veeger, W. Abraham-Dematte, S. Michaud and J. Androf (Dept. of Geology, U.R.I., 9/22/97) (**Exhibit B**)

Groundwater Dependency in Location on the Aquifer for which Designation is Requested. The aquifer consists of a limited supply of fresh water replenished only by rainfall. Approximately 57% of Island residents rely solely on private water supply wells, living outside the area supplied by public water through the Jamestown Water District. These residents depend entirely on groundwater obtained through private wells typically screened at depth into fractured bedrock. The remaining 43% of residents on the island rely on municipal water provided by the Water District (a portion of which is also groundwater extracted from the Island's aquifer). In the areas not served by the Water District, 100% of residents rely on the aquifer for drinking water. See "*Protect Your Drinking Water: Safe and Healthy Lives in Safe and Healthy Communities*," (Rhode Island Department of Health) (**Exhibit C**) at p. 1.

As noted above, the Jamestown Water District also uses bedrock water supply wells to supplement its primary surface water supply. *Exhibit B* at p. 1. The Town estimates that it uses approximately 7 million gallons a year from the wells, which the Town estimates to be about 10-15% of their annual usage. The Water District is also, therefore, reliant on the aquifer to a significant extent.

Availability of Drinking Water Supplies Other than the Aquifer in Question. The portion of the population with access to public water is served by the Jamestown Water District. Public water comes from two surface reservoirs "North Pond" (also known as Carr Pond Reservoir) and "South Pond" (also known as South Reservoir), both part of the Jamestown Brook watershed; however, the North Pond is the primary supply of municipal drinking water. See *Exhibit C*. The Town has in the past rarely drawn from the South Reservoir due to high concentrations of organic matter in the water. For the last several years, water has been pumped from the South Reservoir up to the Carr Pond Reservoir where that high organic content water is mixed to make it useable for the municipal water supply. As noted above, the Water District utilizes bedrock water supply wells to supplement the surface water in the ponds and the Water District is reliant, at least partially, on the aquifer to meet its public water supply demand.

Private wells utilizing the aquifer (described above) are the only other source of drinking water.

Reasons for Interest in Sole Source Aquifer Designation. The NECC is petitioning the EPA for a Sole Source Aquifer designation to: (A) to secure the integrity of their water source on Conanicut Island, since each member of NECC is served exclusively by individual, private water supply wells and (B) to raise public consciousness about protecting ground water and preventing contamination of the Island aquifer.

The NECC is vitally interested in the sole source aquifer designation because its members rely solely on the aquifer for their drinking water. The continued supply of clean and plentiful drinking water depends on preventing contamination of the aquifer, including prevention of activities that present an unjustified risk to the aquifer.

Conanicut Island's subsurface hydrogeology is complex and could magnify detrimental effects. Several engineers and ground water specialists, including Drs. Rheinhard K. Frohlick and Patrick J. Barosh, made a presentation to the Town of Jamestown at which they explained that the Island's "geologic plumbing" is made up of faults and fractures that could transport pollutants in many directions for over two miles. The fractured bedrock environment makes it very difficult to predict where contaminants migrate or where the contaminants might end up. This uncertainty poses further risk to water supply wells. Town of Jamestown Board of Sewer Commissioners, Minutes (March 15, 2004)<sup>2</sup>; Jamestown Eagle (March 16, 2004).

Ultimately, the amount of fresh water available and its quality are directly related to land use activities in the watershed or recharge area because contaminated surface water eventually percolates down into the bedrock aquifer. Land management is especially important because the majority of households depend upon private wells, and alternative water supply systems are not feasible due to limited storage capacity and cost. *See Exhibit A*, p. 72. The use of bedrock aquifer supply wells to augment surface water bodies used for public water supply further increases the percentage dependency on aquifer water supplies.

NECC members are also very interested in raising public consciousness about protecting ground water on the Island through the sole source aquifer designation. Recognition by the EPA that the Island is a sole source aquifer will raise public awareness and better protect the aquifer.

### **III. SOLE OR PRINCIPLE SOURCE DATA**

The aquifer is the sole or principal source of drinking water for the aquifer service area. The petitioned aquifer is needed to supply more than 50% of the drinking water used in the aquifer service area. There are no reasonably available alternative sources to the aquifer.

Aquifer Service Area. The aquifer is best described as the entire Conanicut Island. The entire Island is served by private wells or a Water District that is at least

---

<sup>2</sup> See <http://www.jamestownri.net/pw/w&s/minutes04/3-15.pdf>.

partially reliant on bedrock water supply wells to meet demand. *Exhibit C* at p. 1 (map of area served by Jamestown Water District); and *Town of Jamestown Water Supply Distribution System*, Pare Engineering Corp. (June, 2002) (**Exhibit F**).

Population. In 2000, the population of Conanicut Island was 5,622. From 1960 to 1990 the Island’s population doubled. The R.I. Dept. of Administration predicts an 8.2% increase between 2000 and 2010. *See Exhibit A*, p. 37. Approximately 57% of residents rely on private wells that draw water from the aquifer. The remaining 43% are served by municipal water. *See Exhibit A*, p. 37. Those residents supplied by municipal water also rely on the aquifer because the municipal water supply is supplemented by bedrock water supply wells.

Current Drinking Water Sources For The Aquifer Service Area Matrix\*

Source/Use	Public Water Supply (Community & Non-Community)	Private and Other	Total
Petitioned Aquifer	----	57%	57%
Other Aquifers	----	----	----
Surface Water	43% <sup>3</sup>	----	43%
Transported from Outside	----	----	----
Total	43%	57%	100%

\* See Exhibit A

The Town has installed bedrock water supply wells to supplement the reservoir water supply. The map of the Town of Jamestown Water Supply Distribution System shows the locations of the 8 Jamestown community wells, JR1 - JR 8. *See Exhibit F*. The Town estimates that it uses approximately 7 million gallons per year from the wells, which is estimated to be about 10-15% of annual usage. Hence, public water supply – drawn from reservoirs – includes a significant portion of water drawn directly from the aquifer that is the subject of this petition. Without this groundwater supplement to the surface water supply in the two reservoirs, the public water supply system would be tapped beyond supply capacity even today (without the anticipated further population growth).

---

<sup>3</sup> The actual proportion of surface water use is lower (and use of the petitioned aquifer higher) given that the Public Water Supply’s reservoirs are supplemented by bedrock water supply wells.

Description of Sources Except Proposed Sole Source Aquifer. Uneven topography divides the Island into twenty small watersheds. Precipitation into these watersheds is absorbed into the ground, or drains into wetlands, ponds, streams or Narragansett Bay. The central watershed is one square mile, of which approximately one-third drains into North Pond, the only currently viable public surface water supply on the island. The rest of the watershed drains into Jamestown Brook and South Pond, a secondary public water supply. *See Exhibit A*, p. 50. “At capacity, South Reservoir represents a water system of approximately 10 days duration for the town.” *Jamestown Source Water Assessment Needs Analysis (Exhibit G)* (section entitled “South Reservoir as a Pretreatment Vessel”).

Calculating Water Use Percentages. The water use percentages are based on published reports. Exhibit A reports that 43% of residents rely on municipal water provided by the Jamestown Water District, while 57% of residents live outside the area and depend solely on private wells.

Currently, there is an average demand of 248,000 gallons per day (“gpd”) on the municipal water supply. This translates into 49.6 gpd for each resident of the Island who utilizes the municipal system. The water supply for those residents on the Northern end of the Island who employ private wells is, based on national averages, between 70-120 gallons per person per day depending on the season. *Report of the Jamestown Water Study Committee, April 2003*, p. 8-9 (**Exhibit H**).

Seasonal Variation. Water use is strongly seasonal. In the winter, Water District demand is about 5 million gal/month, but rises to over 9 million gal/month in the summer. *See Exhibit H*, pp. 4-5. In the summer months the population increases significantly. Additionally, the peak water demand in June, July, and August coincides with the peak evapotranspiration rate, when water loss from the surface of the catchment basin is high, and the recharge rate of the reservoir is at its lowest level. *See Exhibit H*, p. 5. The water system can sustain summer demand only if the reservoir is full to capacity at the beginning of the peak-demand summer period. Development will result in overdraft to the groundwater supply, especially during droughts or times of heavy seasonal water usage. *See Exhibit A*, p. 69. Water consumption data is derived from the pumping records of the water treatment plant. *See Exhibit H*, p. 4.

Actual Use v. Potential Capacity. Demand on the water source currently exceeds its capacity at the North Reservoir. The relatively constant consumption, 248,000 gallons/day (as of 2003) is excess of the capacity. *See Exhibit H*, p. 1. As the Rhode Island Department of Health as stated: “The Jamestown water system has limited safe yield; increasing capacity is not possible without affecting water quality. Due to naturally occurring organic solids and low flow, water supplies are highly vulnerable to any additional stress.” *See Exhibit C*, p. 1.

Other Potential Sources. When providing information about other potential sources of water, there are two different components to the discussion of that information. First, one needs to address alternative sources for those residents that rely

upon private water supply wells. In the event that residents' wells become contaminated, there are typically two reasonably available options: drill a new well or simply connect to the local public water supply system. In the circumstances of the fractured bedrock supply wells on Conanicut Island, it is highly likely that placement of a new well will not cure the situation. Option two, expansion of the public water supply system to supply replacement water, is not possible given that the system is currently overtaxed and there is no cost-effective method of expanding the available supply of water (as opposed to distribution capacity).

The second component in this discussion of "other potential sources" is to actually increase the available amount of water to the Island's public water supply system (and concomitantly increase the number of connections to the public water supply system to include those individuals currently on private wells) by importing water via pipeline from the mainland -- in particular, a pipeline connecting the Island to the North Kingstown water supply. North Kingstown, which lies west across Narragansett Bay, is connected to Jamestown by a mile long bridge. These two alternative sources are discussed below.

Alternative Drinking Water Sources

<b>SOURCE ESTIMATED</b>	<b>ESTIMATED DAILY SUPPLY</b>
(A) Public Water	No excess supply
(B) North Kingstown water supply system	No excess supply
Total	----

See Exhibit H.

Further expansion of the existing public water supply on the island is highly unlikely as it is already over capacity. The Town routinely issues water restrictions or bans for the municipal water supply during the summer.<sup>4</sup> Current demand exceeds capacity; "increasing capacity is not possible without affecting water quality." *Exhibit C* at p. 1. It has long been understood on the island that "there is little likelihood of the currently non-public service areas being serviced by public sewer and water in the future." *Planning Department Memorandum from Lisa W. Bryer, Town Planner for the Town of Jamestown* (June 6, 2002) (**Exhibit I**) at p. 1. Despite study, the Town has not to date identified any practical way to expand the existing public water supply on the Island.

With regard to alternative off-island sources, the Island has no natural access to the North Kingstown water supply. Access can only be achieved through use of pipelines. In 1993, as a result of a drought, the Town installed an emergency pipeline on

---

<sup>4</sup> Water ban information can be found on the Town of Jamestown's website, <http://www.jamestownri.net/> during the summer.

the old Jamestown Bridge. That pipeline has since been dismantled and NECC believes that a flexible, fold up line may be available on the new Jamestown Bridge for use in emergencies of a few days duration. North Kingstown itself not only depends entirely upon groundwater wells to meet its own needs, but its wells often reach maximum capacity in summer months. North Kingstown has also had water quality problems in past years, forcing its population to boil water and rely on bottled water.<sup>5</sup> There is no excess capacity in North Kingstown; hence, a pipeline is not a reliable source of additional water for the Island. The Jamestown Source Water Assessment and Wastewater Needs Analysis concluded that “[N]o feasible alternatives currently exist for permanent connections to other water supply systems.” *Exhibit G*, p. 3.

In addition, the Town of Jamestown has no legal authority to compel North Kingstown to allow access to its water supply. Any hypothetical access to North Kingstown water would be totally at the discretion of North Kingstown town officials.

These capacity problems create insurmountable technical, legal, and institutional constraints, leaving the residents without an alternative potential drinking water source.

A 2007 letter from the city manager of Newport, RI, (*Exhibit J*) - the community abutting the Newport Bridge to the east of Conanicut Island, and a 2007 letter from the Town Manager of North Kingstown, RI, (*Exhibit K*) - the community abutting the Pell Bridge to the west of Conanicut Island, both note they are either unable to supply water to the residents of Conanicut island or beyond a temporary emergency situation.

Additionally, a letter from Conanicut Island town administrator (*Exhibit L*) describes that a private water supply, United Water of RI, has a “limited level of excess supply” and “it is clear that a commitment to serve as an alternative source of supply to Jamestown is neither feasible nor practicable.”

### Economic Analysis

In the worse case scenario of water contamination rendering the water supply on Conanicut Island unusable for public and private demand during peak-flow period, an off-island source would have to provide 850,000 gallons per day to the residents of Conanicut Island. As an exercise in cost analysis, despite that an alternative water supply is not available to purchase for Conanicut Island, the expense to replace the water supply, using EPA criteria is as follows:

According to the latest 2000 census data for Jamestown, RI, the median household income is \$63,073. The number of households is 2,359. Therefore, the total household income is \$148,789,207. Multiplying the cost infeasibility criteria of

---

<sup>5</sup> See, e.g., Rhode Island Department of Health, Boil Water Advisory for North Kingstown Water System (Aug. 28, 2003) (<http://www.health.ri.gov/media/030828a.php>); Rhode Island Department of Health, Boil Water Advisory in Effect for the Town of North Kingstown Except the Saunterstown-Slocum Areas and RI Port Authority (July 24, 2005) (<http://www.health.ri.gov/media/050724a.php>)

0.4 to 0.6% of this income equals \$595,157 to \$892,735, respectively. The cost burden of providing replacement water to the households on Conanicut Island would far exceed the latter amount of \$892, 735, for it must include in part the capital expenses of pumping stations, construction of transmission systems connecting the alternative supplies to both the Jamestown water system and to all 3,204 private well users, land purchase, rights-of-way, storage, relocation of utilities, the operation and maintenance costs of labor, equipment, parts, administration, monitoring, in addition to architectural, engineering and legal fees.

*How Daily Supply is Calculated.* Water consumption data for the Jamestown municipal water system comes from the pumping record of the water treatment plant. This data is discussed in an April 2003 report of the *Jamestown Water Study Committee*. See *Exhibit H*, p. 4.

#### **IV. BOUNDARY INFORMATION**

The Island lies on a series of whaleback ridges that extend along the floor of Narragansett Bay. The Island was separated from the mainland during the Carboniferous period, when glaciers cut the East and West passages. The Island is essentially divided into three landmasses: North Island, Central Island, and Beavertail Peninsula. The largest is the northern half of the Island. It rises to an elevation of about 140 feet above sea level and is characterized by parallel ridges running north-south which create the Jamestown Brook Watershed. To the south, separated by Great Creek and extensive wetlands, is the Central Town area. During storm and extreme high tides, floodwaters may divide the north portion of the Island from the Central Island. The Central Island is comprised of gently rolling hills with rugged rock outcrops in the Dumplings and Fort Wetherill area. The highest elevation is about 100 feet. To the southwest is the Beavertail peninsula. Located on another ridge, it is connected to the rest of the Island by a sandy isthmus, Mackerel Cove Beach. Two hills comprise most of the peninsula with one rising to an elevation of 125 feet. See *Exhibit A*, p. 49.

The effects of Narragansett Bay and the Atlantic Ocean moderate the climate. Average annual precipitation for the period 1993-1996 was 42.8 inches. See *Exhibit B*.

Of the average annual precipitation of 42.8 inches, only a fraction percolates down into the aquifer (recharge).

The geology of Conanicut Island is largely responsible for determining the amount of groundwater available to the town. In general, Jamestown's geology yields the lowest quantity of groundwater in the State of Rhode Island. See *Exhibit A*, p. 66. The undulating topography of Jamestown is caused by the very irregular surface of the underlying bedrock. The rocks are over 200 million years old and classified as pre-Pennsylvania and Pennsylvanian Age. These consolidated rocks are evident at the cliffs and outcrops of Beavertail, the Dumplings, and Fort Wetherill. Unconsolidated deposits cover the bedrock of most of the Island. This is soil and rock carried from Northern New England by the glaciers and deposited when they melted and receded. The glacial



deposits range in depth from under one foot to over forty feet. Almost all of these deposits are unstratified drift called till. *See Exhibit A*, p. 50.

The glacial till that composes the surface geology of Conanicut Island is composed of uneven sized material with variable pore space and size that create an irregular flow of water. This composition makes it a poor source of groundwater. Most rural residences in Jamestown use wells drilled down to the rock beneath the till which has higher yields of water. *See Exhibit A*, p. 50.

The fractured bedrock beneath Conanicut Island forms a heterogeneous aquifer system. Ground water will flow along a fracture, but the rock between fractures is effectively impermeable. The rate at which water will flow along a fracture is a function of width of the fracture opening. Water is supplied to the fractures by infiltration of precipitation. Freshwater in the rocks that underlie Conanicut Island forms a lens-shaped body that “floats” on saltwater, because its density is less than that of the saltwater. The lens is thinnest near the perimeter and thickest near central parts of the Island. The depth to the bottom of the freshwater lens has not been determined by direct measurement. The thickness of the freshwater lens is estimated to range from a few tens of feet near the perimeter to more than 500 feet in the central part of the island under non-pumping conditions. *See Exhibit B*, p. 2.

The urban area of Jamestown relies on surface water reservoirs for its public water supply. Uneven topography divides the Island into twenty small watersheds. Precipitation into these watersheds infiltrates into the ground, or drains into wetlands, ponds, streams, or Narragansett Bay. The central watershed is one square mile, of which approximately one-third drains into North Pond, the primary public water supply. The rest of the watershed drains into Jamestown Brook and South Pond, a secondary public water supply. *See Exhibit A*, p. 50.

Several maps delineating the aquifer’s boundaries are attached. *See Exhibit F and Exhibit C* (containing various diagrams of hydrology and hydrogeology of the Island).

## **V. INFORMATION RELATED TO SIGNIFICANT PUBLIC HEALTH HAZARD**

The aquifer is highly vulnerable to contamination due to its geological characteristics. The aquifer is not a porous media, but a fractured bedrock media. Contaminants, once entering bedrock, do not readily attenuate.

Contaminants can be rapidly introduced into the aquifer system from a number of sources with minimal attenuation. These sources include chemical spills, storm water runoff (highway, urban and rural), septic systems, solid waste, leaking storage tanks, road salt applications on roads and parking lots, agricultural herbicides and pesticides and salt-water intrusion. The vulnerable bedrock aquifer has a limited yield and over pumping can

contaminate the wells and aquifer by drawing in salt water."

The Rhode Island Department of Health reached the following conclusions concerning threats to the Island's aquifer:

Groundwater is the only source of supply for most residents, however the island's bedrock wells have limited yield and are subject to saltwater intrusion with overpumping. Other threats include polluted runoff, loss of recharge with new construction, and substandard septic systems. Impacts are magnified in densely developed areas.

*Exhibit C* at p. 1. There is no doubt that contamination of the Island's sole source aquifer would endanger drinking water quality and public health.

## CONCLUSION

For the above reasons, the North End Concerned Citizens respectfully request that EPA designate the Conanicut Island aquifer as a sole source aquifer pursuant to Section 1424(e) of the Safe Drinking Water Act. In summary:

- A. The Conanicut Island aquifer is the sole source for drinking water for the majority of residents on the island, and the Water District relies on bedrock water supply wells from this aquifer to supplement the surface water supply serving the remaining Island residents;
- B. There exists no reasonably available alternative drinking water source or combination of sources of sufficient quantity to supply the Island;
- C. The petitioners have provided information sufficient to appropriately delineate the boundaries of the aquifer area, the aquifer recharge area, the review area, and the aquifer's service area; and
- D. A serious contamination incident could pose a significant public health hazard and place a severe financial burden on Island residents.

The NECC seeks sole source aquifer status for Conanicut Island to protect the Island's groundwater now and in the future, to protect the wells of its members and all residents of the Island, and to raise awareness of not only all who now live on the Island, but those who visit seasonally, and those who in the future choose to live, develop, and do business on this fragile aquifer.

The NECC also respectfully requests that the U.S. EPA contact Ellen Winsor (representative of NECC on this issue), the Town of Jamestown, RI-DEM and/or the Rhode Island Department of Health to request further information the Agency may deem necessary to approve this petition.

[SIGNATURE PAGE ATTACHED]

## LIST OF EXHIBITS

- Exhibit A: ‘Jamestown Rhode Island Comprehensive Community Plan’ (adopted by Jamestown Town Council, June 2002).
- Exhibit B: “Water Quality and Hydrogeology of Northern Conanicut Island, Rhode Island,” by A.I. Veeger, W. Abrahams-Dematte, S. Michaud and J. Sandorft, Department of Geology, University of Rhode Island (Sept. 22, 1997).
- Exhibit C: “Protect Your Drinking Water: Jamestown Drinking Water Assessment Results” Rhode Island Department of Health (undated).
- Exhibit E: Satellite Photograph of Conanicut Island, Jamestown, Rhode Island, June 2005.
- Exhibit F: “Town of Jamestown Water Supply Distribution System,” Map prepared by Pare Engineering Corporation (June 2002).
- Exhibit G: “Jamestown Source Water Assessment and Wastewater Needs Analysis,” University of Rhode Island Cooperative Extension in Cooperation with RI Health - Office of Drinking Water Quality and the Town of Jamestown (April 2003).
- Exhibit H: “Report of Jamestown Water Study Committee” (April 2003).
- Exhibit I: “Zoning Ordinance Amendment related to Section 709,” Planning Department Memorandum from Lisa W. Bryer (Town Planner) to Guy J. Settipane (President, Town Council) (June 6, 2002).
- Exhibit J: Letter, Edward Lavallee, City Manager, Newport, Rhode Island, May 10, 2007
- Exhibit K: Letter, Michael E. Embury, Town Manager, North Kingstown, RI, April 2, 2007.
- Exhibit L: Letter, Bruce R. Keiser, Town Administrator, Jamestown, Rhode Island, July 3, 2007.