Nonquit Pond Watershed Plan

Developed for: The Tiverton Conservation Commission
Prepared by: Atlantic States Rural Water and Wastewater Association
May 2018

NONQUIT POND WATERSHED PLAN

Tiverton, Rhode Island

May 2018
Prepared for:

Tiverton Conservation Commission

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Nonquit Pond Looking North from the Dam

Table of Contents

This plan was prepared by Atlantic States Rural Water and Wastewater Association in cooperation with the Town of Tiverton Conservation Commission and the Rhode Island Department of Environmental Management (RI DEM or DEM). Program funding was provided by the United States Department of Agriculture's (USDA) Source Water Protection Program. The purpose of the program is to provide technical assistance to rural and small communities for the development of Watershed Protection Plans.

1. INTRODUCTION

1.1 Purpose of the Plan

This Watershed Plan was prepared by Atlantic States Rural Water and Wastewater Association along with the Town of Tiverton Conservation Commission to protect Nonquit Pond and its watershed. This Watershed Plan includes **Protection and Restoration Actions** for water quality and aquatic habitat (**Section 6).** Aquatic habitat refers to all types of wetland systems, rivers, streams, lakes, and ponds in the watershed. The future "vision" that this plan seeks to achieve is:

Vision: Water quality and aquatic habitat in the Nonquit Watershed support the needs of current and future generations by supplying high quality drinking water from the Pond and from private wells, and provide for a healthy aquatic ecosystem.

A watershed (or drainage basin) is the land surface area that drains, or "sheds" water (and the pollutants in that water) to a single waterbody, such as a river, lake, coastal bay or ocean. Every body of water, no matter how large or small, has a watershed. Watershed boundaries are defined by topography and are often determined by a specific management objective, such as the "Nonquit Pond" watershed.

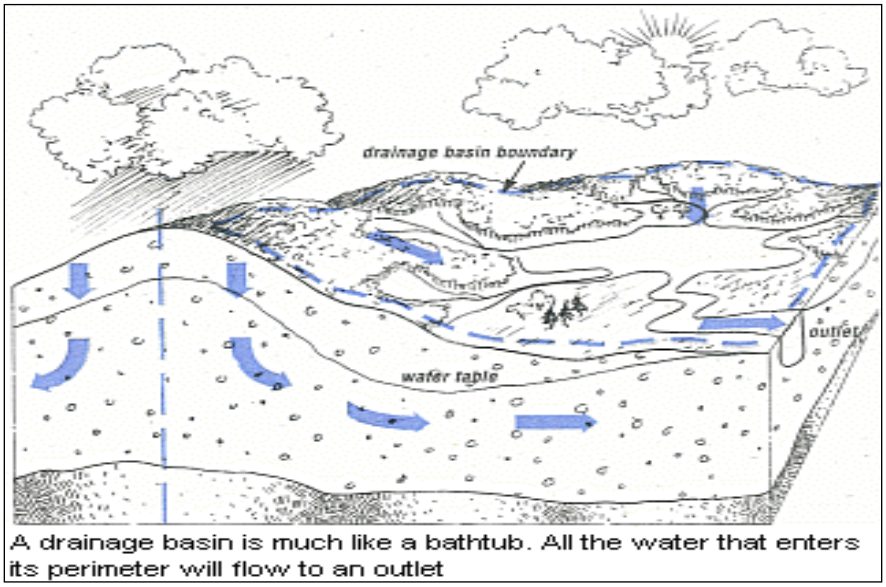


Figure 1: Watershed Diagram

To achieve the long-term vision for the Nonquit Pond watershed, the goal of this plan is to identify and take actions necessary to restore the Pond and its source waters to a condition that supports their designated uses and protects them from future degradation. These uses include serving as a public drinking water supply source, enabling primary and secondary contact recreational activities, and providing fish and wildlife habitat. Currently, the uses are impaired because of high nutrient loads – primarily phosphorus -- and algal abundance. The Rhode Island Department of Environmental Management (RI DEM or DEM) is in the process of finalizing a water quality restoration plan (TMDL) that will more specifically quantify the nutrient reductions needed to meet water quality standards, including identifying watershed and stormwater management actions needed to reduce phosphorus loads. In the interim, the plan proposes actions that can be taken immediately.

1.2 Compelling Issues in the Watershed

Nonquit Pond is one of nine reservoirs that supply the Newport Water drinking water supply system. However, high levels of nutrients (especially phosphorus) and total organic carbon have resulted in Nonquit Pond being designated by RI DEM as an "impaired waterbody," which means that water quality does not meet its goal as a drinking water source without treatment. These high levels of phosphorus and organic carbon significantly increase the cost of treatment. Currently, water from Nonquit Pond is combined with water from other Newport reservoirs to receive advanced treatment in facilities constructed by the Newport Water Division that went on-line in 2014. In addition to treatment costs, other considerations include concerns about the cumulative and residual effects over time of the available treatment approaches.

In addition, all residents and businesses in the watershed, except for those in the northern tip of the watershed along Bulgarmarsh Road, depend on on-site drinking water wells. Therefore, strategies must be in place to protect groundwater in the watershed that supplies these drinking water sources.

Nonquit Pond is formed by the dam on Almy Brook on Pond Bridge Road. Sea level rise will will eventually leave the dam vulnerable to storm surges.

Nonquit Pond is also one of the watershed's most important anadromous fish habitats, providing important spawning area for river herring. Young herring hatch and begin their lives in fresh water ponds and streams and migrate to the Atlantic Ocean to live during the summer, fall and winter. The adult herring return each spring using the fishway at the dam to reach the fresh waters of their birth to spawn. Numbers of river herring have varied significantly over the years, and currently are at a very low count (see Section 2.6)

2. WATERSHED DESCRIPTION

2.1 Overview of the Watershed

The Nonquit Pond watershed is located in eastern Rhode Island on the east shore of the Sakonnet River in the Town of Tiverton, RI. The watershed encompasses the area upstream of the dam on Pond Bridge Road that impounds the pond. Waters exit Nonquit Pond into Almy Brook and drain to the Sakonnet River through coastal wetlands.

Quick Facts:

- Nonquit Pond covers 201 acres (0.31 sq. mi.).
- It is roughly 1¼ miles long and ½ mile wide at its widest point.
- The Nonquit Pond watershed covers 6.93 sq. mi. and is about 5¾ miles long and 2½ miles wide at its widest point.
- The watershed lies almost entirely within the Town of Tiverton.
- There are 6.47 sq. mi. in Tiverton and 0.46 sq. mi. in Little Compton, RI.

Map 1. Nonquit Pond Watershed Surface Water Resources Overview

Map 1 provides an overview of the Nonquit Pond watershed. Borden Brook and its tributaries drain most of the watershed and empty into Nonquit Pond just south of the Tiverton Four Corners. Borden Brook also drains three large swamps: Basket Swamp at the northern end of the watershed, Cedar Swamp in the middle and an unnamed swamp in the southeast corner of the watershed. These large areas of wetlands are the likely source of tannins (responsible for a dark color) in Borden Brook and Nonquit Pond. A portion of the swamp associated with Quaket Creek to the west of Cedar Swamp also drains to Nonquit Pond, where it merges with Borden Brook just south of Puncatest Neck Road. An unnamed brook drains a smaller wetland area at the south end of the watershed and empties into Nonquit Pond south of where Borden Brook discharges.

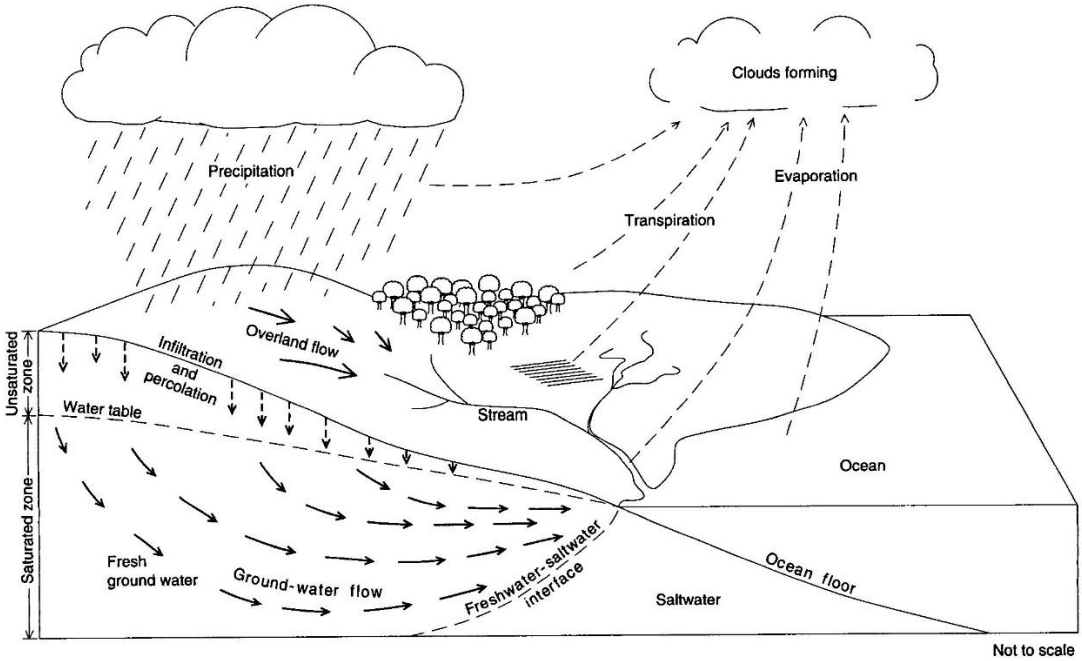
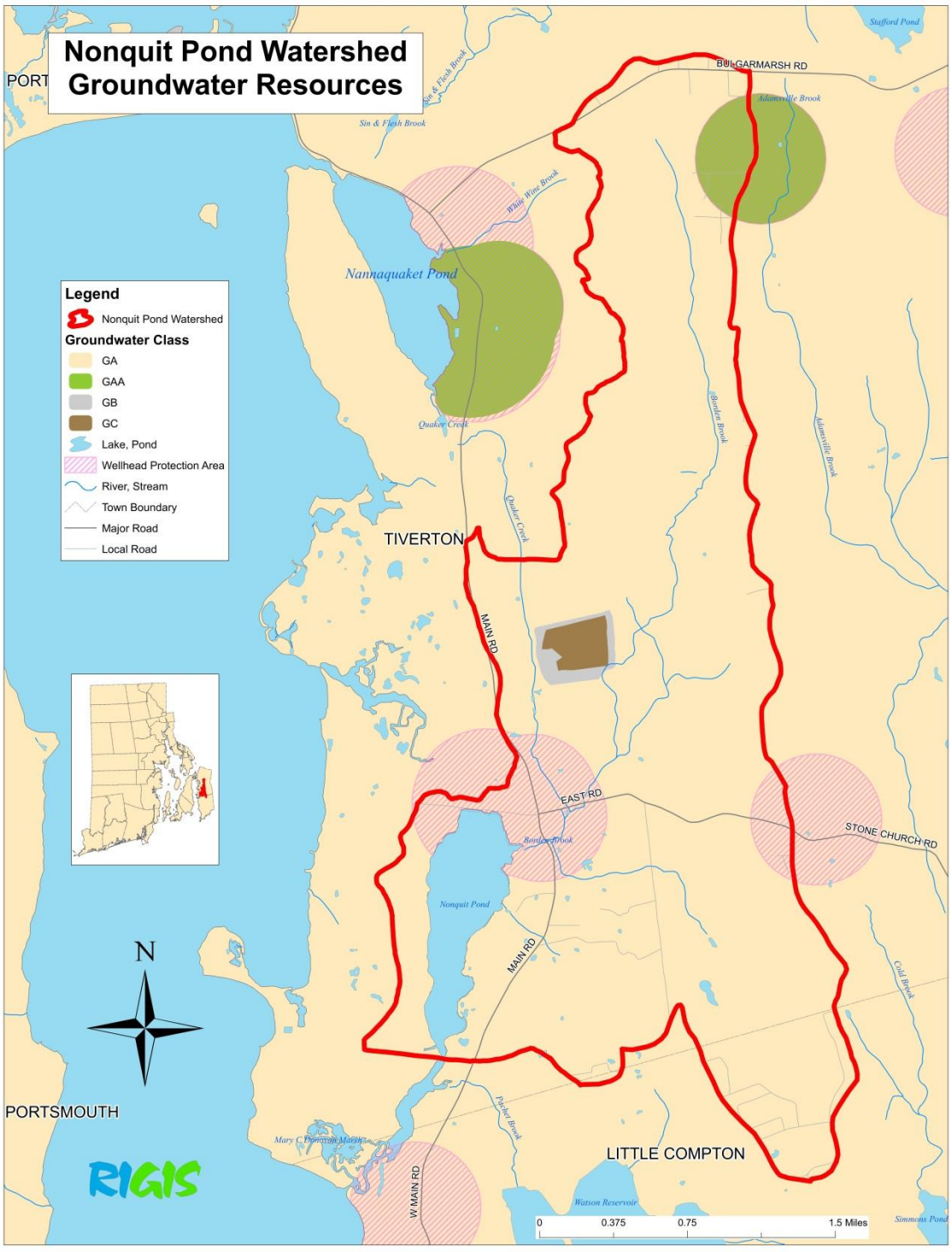


Figure 2: The Hydrologic Cycle. Arrows show the movement of water and water vapor.

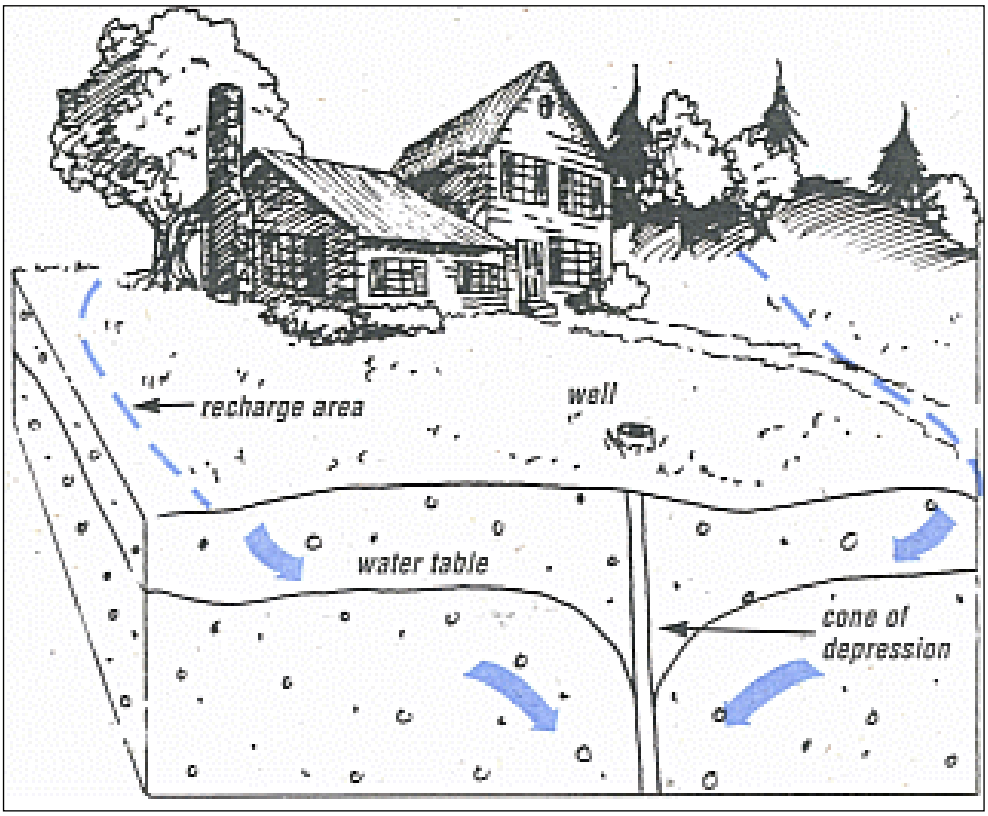
As illustrated in Figure 2., The Hydrologic Cycle, groundwater and surface water are closely interconnected. Groundwater is recharged by precipitation that filters down through the soils and then moves underground to lower places in the landscape. At some point the groundwater will discharge to a river, stream, pond or wetland. Any pollutants in the groundwater are thus delivered to the surface water. During periods of drought, it is the groundwater that makes up the flow in the streams.

Map 2 shows the groundwater resources within the Nonquit Pond watershed. The groundwater in the watershed is classified by RI DEM as GAA or GA, which means it is presumed by DEM to be suitable for use as a drinking water source, except for the area around the town landfill (see also Map 7) that is classified by DEM as GC and GB and not considered drinkable. There are 6 public water systems whose wellhead protection areas are at least partly within the watershed. Those systems will be discussed below in Section 2.3 Drinking Water.



Map 2. Nonquit Pond Watershed Groundwater Resources

Figure 3: *A wellhead protection area is a three-dimensional zone depicted on the map as the area surrounding a public well through which water moves toward that well and eventually is withdrawn by the well. It is also referred to a well's "contribution area" or "recharge area."*



2.2 Land Use in the Watershed

Activities on the land surface affect the quality of our waters, primarily from the disposal of our wastes and from precipitation that runs off the land surface carrying pollutants to our waters. The patchwork of land use in a watershed by type and location can lend insight into the potential for and source of water quality problems. The population density of the Nonquit Pond watershed is relatively low, approximately100 people per square mile, compared to 519 people per square mile for the entire Town of Tiverton.

Map 3 shows the land use/land cover for the Nonquit Pond watershed and the pie chart below details each land use as a percent of the watershed's land cover.

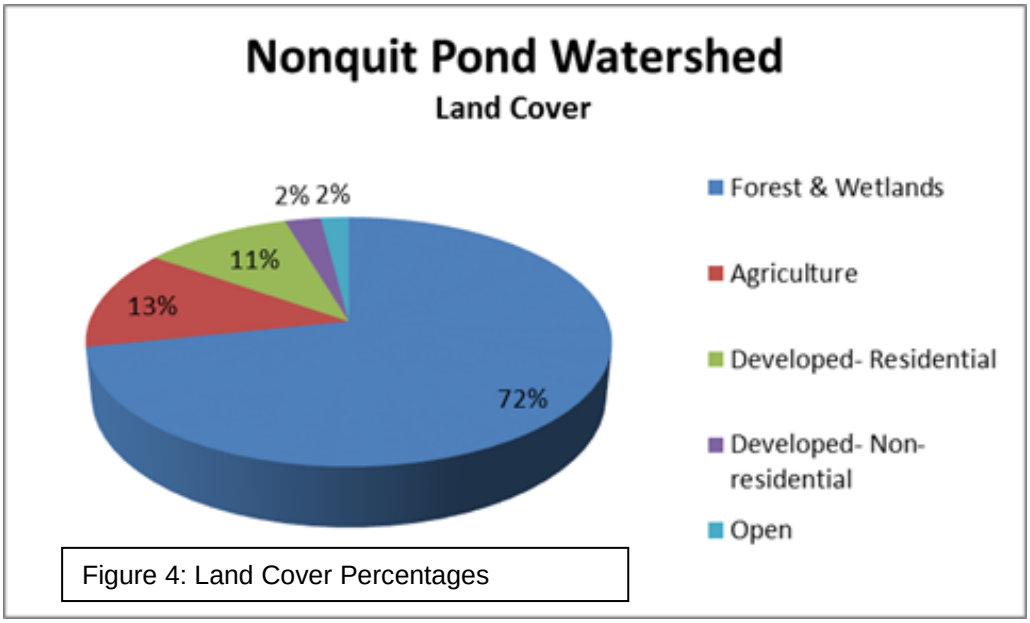
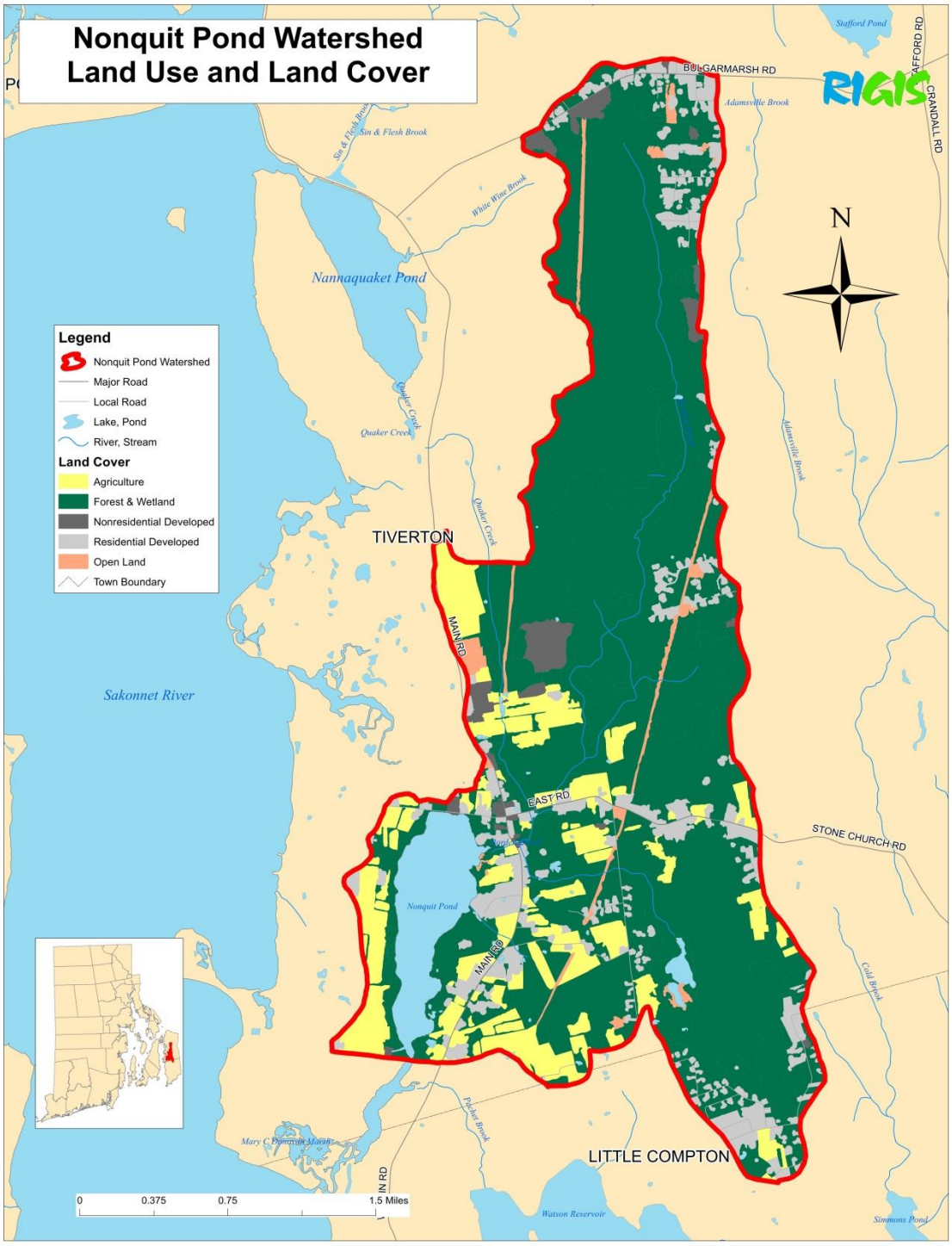


Figure 4: Land Cover Percentages

Map 4 shows the impervious surfaces within the Nonquit Pond watershed. Impervious surfaces are buildings, streets, parking areas, etc. that do not allow precipitation to infiltrate into the soil. When impervious surfaces are above 10% we start to see an impact on water quality in a watershed. The percent of impervious surface in the Nonquit watershed is 4.2% (using 2011 aerial photos). See more discussion on impervious surfaces and stormwater in Section 4.1.

Although land cover and land use would seem to indicate good water quality, high levels of nutrients and organic matter have been measured in Nonquit Pond. These problems may be due to stormwater flows, loss of vegetated buffers along streams and ponds, nutrients from agriculture, lawn care, and septic systems. This will be discussed more in Section 3 Water Quality and Section 4 Threats to Water Quality.



Map 3. Nonquit Pond Watershed Land Use and Land Cover

Map 4. Nonquit Pond Watershed Impervious Surface

2.3 Drinking Water Sources in the Watershed

Protecting surface drinking water reservoirs and groundwater resources is vital to the health of our citizens and to providing economic prosperity. Protecting the source of supply is far less expensive than treating polluted water to remove contaminants.

Your home, business, school, etc. is provided with water from either a public drinking water supply piped from a surface water source or groundwater (wellfield) source, or your drinking water comes from a private on-site drinking water well.

Public drinking water systems are classified into three categories;

Community Water Systems (CWS) serve at least 25 year-round residents, or have at least 15 service connections used by year-round residents. Examples include municipal systems (surface water and groundwater supplied) and wells serving nursing homes and mobile home parks.

Non-transient, Non-Community Systems (NTNC) serve at least 25 of the same persons (non-residents) over 6 months of the year. Examples include wells serving schools and places of employment.

Transient Non-Community Systems (TNC) serve at least 25 people for at least 60 days of the year. Examples include wells serving restaurants, campgrounds and hotels.

Homes and businesses that are not connected to a public water system depend on an on-site drinking water well for their water supply. Property owners are responsible for testing their water supply and taking actions on their property to protect it from septic systems, lawn care products and any homeowner activities that may involve potential pollutants.

As mentioned earlier, Nonquit Pond is one of the six sources of drinking water supply for Newport Water. There are also six (6) additional public water systems that are dependent on groundwater and whose wellhead protection areas are at least partly within the watershed. A table of those systems is shown below with information about known instances of coliform bacteria detection and of nitrate levels above the background level of 0.5 mg/L in the last five (5) years. Detection of these contaminants indicates that the wells are susceptible to pollution. These public water systems are required to test their well water quarterly and are licensed by and report to the RI Department of Health.

RI SYSTEM NO.	SYSTEM NAME	SYSTEM TYPE	COLIFORM BACTERIA (PRESENCE)	NITRATE (Above 0.5 mg/l)
2000048	FOUR CORNERS GRILLE	TNC	No	No
2051310	GRAY'S ICE CREAM, INC.	TNC	Yes	Yes
2980001	FOUR SEASONS MOBILE HOME COOP ASSN	CWS	No	Yes
2980103	PROVENDER FOODS	NC	Yes	No
2980138	SAKONNET EARLY LEARNING CENTER	NTNC	No	Yes
2980458	TIVERTON FOUR CORNERS	NTNC	Yes	No

Table 1. Public Well Water Systems

In addition to the six groundwater systems listed above, there is an additional area along Bulgarmarsh Road, at the very northern end of the watershed whose drinking water is supplied by the Stonebridge Water District (see **Map 5**). The water source for Stonebridge Water District is Stafford Pond which is outside of the Nonquit Pond watershed.

Map 5. Nonquit Pond Watershed Public Water Service Area

2.4 Wastewater Management in the Watershed

There are no sewered areas within the Nonquit Pond watershed; the entire area is served by onsite wastewater treatment systems. (See discussion in Section 4.2.)

2.5 Wetlands in the Watershed

Wetlands are one of our most valuable natural resources. They are transition zones between land and water where the flow of water and the cycling of nutrients meet to produce a unique ecosystem—making these areas very important features of a watershed. Although we think of wetlands as being "wet," a wetland might not be wet year-round. In fact, some of the most important wetlands are only seasonally wet.

Wetlands are the most biologically fertile and diverse landscapes in RI. All wetlands in RI are protected by law, as are the bordering lands adjacent to certain wetlands, which serve as buffers for water quality and important habitat. (Note: in RI, DEM and CRMC Freshwater Wetland Rules, surface waters, i.e., lakes, ponds, rivers and streams, are also considered "wetlands" for regulation purposes.)

Wetlands have many important functions. They:
- Help control floodwaters by storing excess water during heavy periods of rain and snowmelt;
- Provide key links in the water cycle. Many help maintain stream flow and water resources through much of the year by releasing water from both surface and ground water storage;
- Naturally filter polluted runoff;
- Serve as important habitat for many mammals, amphibians, reptiles, birds, and plants;
- Supply large amounts of plant material that serve as a base for food chains that support many animals and humans; and
- Support recreational activities including fishing, hunting, hiking, photography, bird watching, education, and nature studies.

Wetlands in the Nonquit Pond watershed are shown on **Map 1**. Approximately 30% of the watershed is wetlands. There are some wetland areas adjacent to Nonquit Pond, but most are within the low-lying areas of the watershed and drain to Nonquit Pond via Borden Brook and an unnamed stream to its south. These wetlands perform the positive environmental functions listed above, but are also the likely source of organic compounds such as tannins that contribute to making Nonquit Pond water expensive to treat for drinking water use.

2.6 River Herring

As mentioned earlier, the Nonquit Pond watershed is an important spawning area for river herring. River herring are a historically important forage species for commercial fish. According to NOAA National Marine Fisheries Service, river herring are listed as a 'species of concern' due to significant declines over most of their Atlanticrange. Data on fish counts from RI DEM Fish and Wildlife indicate the number of river herring has varied

significantly over the years. As shown in the table below, there was a very high count in 2008 (224,506), but the numbers have dropped significantly since then, particularly in 2016 and 2017 (9,664 and 8,647 respectively). The cause of the decrease is not clear but may be related to water quality, lack of spawning habitat, climate change, predation, and by-catch. In response to these declining numbers, Rhode Island placed a moratorium on the taking and possessing of river herring since 2006, which remains in place today. The Atlantic States Marine Fisheries Commission has developed a River Herring Conservation Plan (2015) to increase public awareness of, and to help restore river herring. Maintaining and improving the Nonquit Pond watershed as a spawning habitat for river herring is one important goal of this watershed plan.

Year	Herring Observed		Year	Herring Observed
1999	230,853		2009	49,841
2000	185,524		2010	38,516
2001	129,518		2011	30,126
2002	97,444		2012	60,132
2003	74,998		2013	52,563
2004	25,417		2014	71,501
2005	42,192		2015	32,330
2006	74,902		2016	9,664
2007	59,380		2017	8,647
2008	224,506			

Table 2: Annual Herring Counts for Nonquit Pond (source: Data from RI Division of Fish and Wildlife, courtesy of Phil Edwards.)

3. WATER QUALITY

Most pollutants in water are invisible to the human eye, so water can't be determined to be "clean" by simply looking at it. Various types of pollutants affect water quality. The most common pollutants in RI's waters are bacteria, metals and nutrients. The primary water quality concerns in Nonquit Pond are nutrients that cause algal blooms, including toxic blooms of cyanobacteria, and the high levels of organic compounds created both from those algal blooms, and from decaying organic matter from the streams that feed the pond.

Excess nutrients in a waterbody can upset the balance of the ecosystem by facilitating rapid and abundant algae growth. When the algae die, decomposition consumes the free oxygen in the water. Less oxygen is available for other life forms in the ecosystem harming aquatic life and sometimes causing fish kills.

High levels of organic compounds are a concern because during the typical public drinking water treatment process, organic matter can create potential carcinogens called total trihalomethanes (TTHMs). This happens when chlorine is added to the water as a disinfectant and it reacts with the otherwise harmless organic matter to form TTHMs. To address this public health concern, the Newport Water Division has invested $85 million in new drinking water treatment facilities with advanced treatment processes.

Both the United States Environmental Protection Agency and the state of Rhode Island have adopted water quality goals and standards that act as important tools that help protect Rhode Island's abundant and valuable water resources from pollution. Each waterbody has a set of water quality standards applied to it, based on its designated use. For example, standards for water quality in drinking water reservoirs must be much more strict than those for waterbodies that are used for recreation. Both descriptive and numeric standards are used.

RI DEM uses information from water monitoring to indicate whether or not a waterbody meets the standards for its designated use (it "supports" its intended use). If monitoring indicates that water quality in a waterbody meets its standards ("good" water quality) then the waterbody can fully support its designated use(s). If, however, the monitoring results indicate that it does not meet its standards (a finding of "unacceptable" or "impaired") the waterbody cannot support one (or more) of its designated uses.

Nonquit Pond was added to the RI DEM "List of Impaired Waters" in 2014 due to phosphorous and total organic carbon. According to RI DEM, Nonquit Pond is "not supporting" fish and wildlife habitat due to total phosphorous, and "not supporting" a public drinking water supply due to total organic carbon. This determination was prompted by the Department of Health in response to water quality data received from the City of Newport Water Division, which is required to perform regular testing in accordance with the Federal Safe Drinking Water Act and report the data to the Department of Health. (See discussion in Section 5 on efforts to restore water quality.)

Recently, toxins produced by certain types of algae, particularly blue-green algae, or cyanobacteria, have been detected in some of the nine reservoirs of the Newport drinking water district. To date, no algal toxins have been detected within Nonquit Pond, however there have been documented blooms in the Pond of the cyanobacteria that produce the toxins. Cyanobacteria are a concern because the toxin that can be produced is harmful to both humans and wildlife. Special monitoring for cyanobacteria within the Newport reservoirs began in 2014 (Refer to Newport Water District Consumer Confidence Reports). In 2014, the algal toxin (Microcystis) was detected in Watson Reservoir, which is located in Little Compton, not far to the south of Nonquit Pond.

In regard to groundwater, no groundwater monitoring network has been established in the watershed (nor anywhere else in RI). The best source of available information on overall groundwater quality in the Nonquit Pond Watershed is the Department of Health's data for the public drinking water wells that are regularly tested to ensure compliance with drinking water standards. (See previous discussion in Section 2.3 Drinking Water.)

4. THREATS TO WATER QUALITY

4.1 Stormwater

Stormwater runoff is rain and melted snow that washes over the land surface into nearby rivers and streams, ponds, wetlands and coastal waters. Where there has been development, natural landscape cover has been replaced with non-porous, or impervious surfaces (e.g., buildings, streets, and parking areas, even highly compacted soils from overuse or poor landscaping). Impervious surfaces significantly change both the quality and quantity of runoff. As water is unable to infiltrate into the soil, the volume of stormwater runoff increases (often causing flooding) and that water picks up pollutants and transports them to nearby lakes, streams, and bays. This greater volume of water also moves much faster, increasing soil erosion, especially where natural vegetation is no longer present. Vegetated buffers are very important for protecting water bodies from these pollutants and erosive forces.

The pollutants typically carried by stormwater come from all around us, including fertilizers and pesticides from residential and commercial lawns and agricultural land, nutrients and bacteria from pet waste left on the ground, petroleum products from automobiles and gas stations, metals from automobile brake dust, road salt, nutrients and bacteria from failing septic systems and cesspools, nutrients and bacteria from wild animal waste (in particular, resident Canada geese are a problem in RI), and soil and sediment from construction sites and eroding areas.

Stormwater runoff eventually reaches a stream, pond or wetland either by natural overland flow or it can be carried to these waterways by publicly owned drainage networks. Drainage outfalls in the Nonquit Watershed are shown on **Map 6.** Historically, these storm drain networks were designed to carry stormwater away from developed land as quickly as possible to prevent flooding with little or no treatment of pollutants.

As mentioned in Section 2.2 Land Use in the Watershed, the amount of impervious cover (or impervious surface) in the watershed is only 4.2% of the land area of the watershed. This relatively low number would normally indicate little water quality impact due to stormwater runoff, but it doesn't tell the whole story. While the overall amount of impervious surface in the watershed is low, there are some problem areas. One example is the Tiverton Four Corners where there is a relatively high percentage of impervious surface from which stormwater runoff drains into the Borden Brook just before it enters Nonquit Pond.

Map 6. Nonquit Pond Watershed Stormwater Outfalls

In addition to the increase of impervious surface and its effect of increasing stormwater runoff, rain events are becoming “flashier” -- they are often shorter in duration, but produce much more rain than in the past. This combination has created extreme runoff problems at the Tiverton Four Corners. East Street, which drops from an elevation of about 175 feet at the eastern edge of the watershed to about 20 feet at the Four Corners, collects a large amount of water. Most of the runoff on the higher (eastern) end of the road drains to wetlands to the south of the road. However, the last 2,500 feet of East Road (as it approaches the Four Corners) is very straight and drops about 50 feet. Stormwater collects in swales on each side of the road creating torrents of water that flow down both sides of East Street toward the Four Corners. Some of that stormwater empties into Borden Brook about 2,000 feet before it enters Nonquit Pond. In very large rain events the remainder of that stormwater sheet flows across the Four Corners intersection and down Puncatest Neck Road toward the north shore of Nonquit Pond. There is no opportunity for natural systems to attenuate the contaminants carried by these flows or reduce the speed and volume of the stormwater before it enters the pond.

4.2 Onsite Wastewater Treatment Systems

There are no sewered areas within the Nonquit Pond watershed. All residents and businesses rely on onsite wastewater treatment systems (OWTSs) (which includes cesspools) to collect, treat, and disperse wastewater into the soil. These systems represent potential sources of nitrates, phosphates, chlorides, bacteria, viruses and personal care products. In addition, if improperly used, such as for disposal of paints, solvents, petroleum products and other hazardous waste, they could be a source of toxic compounds.

4.3 Lawn and Turf Management

The care and maintenance of residential lawns and gardens, and other landscaped areas such as golf courses, cemeteries, athletic fields, and parks, can contribute to water quality degradation. Turf is a major feature of all but the highest density urban landscapes, and how it is managed affects water quality. Excessive amounts of fertilizer and pesticides, inappropriate formulations of fertilizer, and poor timing of fertilizer and pesticide applications can result in losses to the environment via stormwater runoff and/or leaching into groundwater.

4.4 Agriculture

The Land Use Pie Chart in Section 2.2 shows that agricultural land use accounts for only 13% of the Nonquit Pond watershed area. However, **Map 3** shows that most of that agricultural land is close to Nonquit Pond, with much of it just beyond the shoreline buffer owned by the City of Newport. There are also a number of farms adjacent to and running through the Quaket Creek swamp. Areas where the natural wetland or buffer has been removed present opportunities for wetland and buffer restoration.

The potential surface water and groundwater pollutants from agricultural operations include nutrients (nitrogen and phosphorus) from fertilizers and animal wastes; pathogens (bacteria and viruses), and organic materials primarily from animal wastes; sediment from field erosion; pesticides; and petroleum products. Well managed farms can operate with minimal negative effect on water resources.

4.5 Roadways

Roadways present a significant threat to water quality. Roadways are a potential source of contamination due to potential petroleum leaks from vehicles; the application of road salts, which could cause elevated levels of sodium and chlorides; and maintenance activity which may include herbicide and pesticide applications. The possibility of an accident involving a truck transporting hazardous materials poses a risk.

Of special concern is the proximity of Puncatest Neck Road, which runs along the north shore of Nonquit Pond.

Figure 5: Proximity of Puncatest Neck Road to Nonquit Pond

4.6 Pet Waste

Pet waste is a significant contributor of bacteria, pathogens, and nutrients to surface waters. Pet waste that is left on the sidewalk or on grass near the street is then washed into stormwater drainage systems and causes downstream water quality impairments. It has been estimated that for a small bay watershed (up to 20 square miles), 2 to 3 days of droppings from a population of 100 dogs contribute enough bacteria, nitrogen, and phosphorus to temporarily close a bay to swimming and shellfishing (USEPA website Water: CZA, Pollution Prevention Management Measures). Dog waste can harbor a host of different bacteria, parasites and viruses that can cause human illness and disease. One gram of dog waste contains 23 million fecal coliform bacteria, almost twice as much as human waste (RI DEM 2010).

4.7 Underground Home Heating Oil Tanks

Unlike underground storage tanks at auto fueling stations and commercial facilities, underground storage tanks for home heating oil are not regulated by RI DEM. These tanks are typically single wall steel tanks that will eventually corrode and leak. The leaking fuel can then cause groundwater and surface water contamination. Most homeowners do not realize that a leaking underground storage tank can contaminate their onsite drinking water well (and/or potentially their neighbor's well), cost tens of

thousands of dollars to clean up and that the costs of clean-up are not covered by homeowner's insurance. The potential problem can be eliminated by removing the underground storage tank and replacing it with an above ground tank in the basement or outside with a bermed collection area around it to contain any spills.

4.8 Residential Land Use

Threats to water quality from residential land use include several of the topics discussed above – onsite wastewater treatment systems, lawn management, pet waste, and underground storage tanks. Other potential sources of surface water and groundwater contamination include:

- Household cleaning chemicals, automotive fluids (oil and gasoline), paints and solvents, unused prescription drugs that are all disposed of down the drain or onto the land surface;
- Above ground heating oil storage tank spills; and
- Abandoned wells (can illegally be used as direct conduits for pollution into groundwater)

If taken on a case-by-case basis, the threat from residential land use is less than the threat from other land uses, but in the aggregate, it forms a significant source of contamination. Most citizens are unaware of the effects of the potential contaminants stored, used, and disposed of around their homes.

4.9 Commercial and Industrial Facilities

The degree of threat from fuel and chemical contamination at commercial and industrial facilities depends on how well these materials and generated waste are transported, stored, and handled. Accidents and leaks are, to some extent, unavoidable -- the challenge is to minimize the chances and the magnitude of any release. RI DEM's Office of Emergency Response is the first line of defense in protecting public health and safety and environmental quality in the event of an accidental release through implementation of actions outlined in the RI Emergency Response Plan.

Commercial facilities that handle hazardous material must be registered with the US EPA and RI DEM. There are five (5) registered hazardous material handlers in the Nonquit Pond watershed and they are all automotive related businesses. They are listed in the table below and shown on **Map 7**.

Table 3: Registered Hazardous Material Facilities in the Nonquit Pond Watershed

Hazardous Materials Handler	Location
Ryder Student Transportation Service	3624 Main Road
Sanford and Son, LTD	533 Bulgarmarsh Road
Smith's Auto, Inc.	3624 Main Road
South Shore Tiverton, LLC	413 Bulgarmarsh Road
Tiverton Auto Parts	541 Bulgarmarsh Road

4.10 Landfills

There are two former unlined, unregulated disposal areas in the Nonquit watershed: a former town landfill on Bulgarmarsh Road, and the Firestone landfill on Brayton Road. These landfills are noted as federal Superfund sites, but have not been listed on the National Priorities List (NPL) for remediation. It should be noted that although the sites are not currently prioritized for remediation, they still contain hazardous materials. The former town landfill on Bulgarmarsh Road is in the headwaters of the Borden Brook. The former Firestone landfill is immediately adjacent to the Borden Brook.

The current town landfill on Main Road is also unlined and is being phased out. Ongoing monitoring results of the groundwater around the landfill indicate the presence of lead, cadmium, arsenic and other contaminants, but in trace amounts well within regulatory limits. Stormwater runoff from this landfill enters Borden Brook, and Quaket Creek runs through the property. This runoff will be eliminated when the landfill is closed.

Landfill sites and registered hazardous material handlers are shown on **Map 7**.

Map 7. Nonquit Pond Watershed Registered Hazardous Materials Handlers

4.11 Point Sources (Other than Stormwater)

Point sources refer to discharges that enter surface waters through a pipe, ditch, or other well-defined point of discharge. (Note that for the purposes of this Plan, stormwater that may enter a waterbody via a "point" source is discussed separately.) The term applies to wastewater discharges from a variety of sources. Wastewater point source discharges are typically municipal and industrial wastewater treatment plants and small domestic wastewater treatment systems that may serve schools, commercial offices, residential subdivisions and individual homes.

Point source dischargers in Rhode Island must apply for and obtain a Rhode Island Pollutant Discharge Elimination System (RIPDES) permit from the RI DEM. There have been no RIPDES permits issued within the Nonquit Pond watershed.

4.12 Gravel Quarries

There are four (4) former or current gravel operations in the Nonquit Pond watershed. These operations pose a threat to groundwater due to spills from equipment and reduction of the depth to the water table, thereby reducing the capacity for remediation by the soil of contaminants carried by stormwater. In areas where the quarrying goes below the ground water level, contaminants can flow directly into groundwater and the groundwater flow itself may be impacted.

Two of the quarries are bisected by the watershed boundary line for the Nonquit watershed. Based on the contours in that area, it appears that ground and surface water might flow from the watershed on the east (right in photo) into the Nonquit watershed. Further study should be done to determine the actual watershed boundary and understand the surface and groundwater flow in these areas.

Figure 6: Aerial Image of two Quarries in Vicinity of Nonquit Pond Watershed Boundary

4.13 Sea Level Rise

With climate change and the projections for sea level rise, Nonquit Pond will become vulnerable to storm surges and eventually to normal tidal action. The Newport Water System, as owners of the dam that creates Nonquit Pond, is responsible for maintaining this structure, and will be responsible for determining how to protect the pond from sea level rise and to what degree it should be protected. The RI DEM Dam Safety Program has classified the dam as a "significant hazard" dam, which means it is a dam where failure or misoperation results in no probable loss of human life but can cause major economic loss, disruption of lifeline facilities or impact other concerns detrimental to the public's health, safety or welfare.

5. CURRENT WATERSHED PROTECTION MEASURES

This Section provides a brief description of water resources protection initiatives that are already in place or ongoing. It is meant to demonstrate the level of commitment by the Town of Tiverton, RI DEM, Rhode Island Department of Health and the Newport Water Division to protecting this resource.

5.1 Source Water Protection Initiative for Newport Water Supply Reservoirs

The "Source Water Protection Initiative for the Newport Water Supply Reservoirs" is an effort initiated by the RI DEM, in coordination with the RI Department of Health and the Newport Water Division, to restore and protect the quality of the Newport Water system's nine drinking water reservoirs, including Nonquit Pond.

As noted earlier (Section 3), based on data from the Newport Water Division, Nonquit Pond is listed as impaired, that is, not meeting its designated uses. Nonquit Pond is impaired due to total phosphorous and total organic carbon. The RI DEM is currently in the process of developing a water quality restoration plan (Total Maximum Daily Load (TMDL) analysis) to address these impairments in Nonquit Pond and the other Newport Water Supply reservoirs. Development of this plan includes water quality testing by the DEM of the two major tributaries of Nonquit Pond – Borden Brook and Quaket Creek. The restoration plan (called a 'TMDL Plan' or 'TMDL') will contain calculated reductions in the amount of phosphorus needed to meet the phosphorus standard for drinking water supply, along with important recommended mitigation measures to achieve the necessary water quality improvements. Although the recommendations from the TMDL will be included in this watershed plan, the TMDL will be a stand-alone document to be implemented in tandem with this watershed plan.

The primary objective of the Newport Water Supply Reservoirs TMDL is to restore the source waters to a condition that supports their designated uses and protects them from future degradation. RI's Water Quality Regulations classify all nine reservoirs as Class AA waters designated for use as a public drinking water supply source, primary and secondary contact recreational activities[1] and fish and wildlife habitat. The TMDL will

[1] RI's Water Quality Regulations require that the quality of Class AA waters be suitable for primary and secondary contact recreational activities, however notes that Class AA waters used for public drinking water supply are subject to restricted recreational use by State and local authorities

establish nutrient reduction targets to control algal over-abundance, which will benefit the reservoirs' use as public drinking water sources and their aquatic life. Improving the quality of the source waters will enhance protection of public health and is expected to lessen the Newport Water Division's use of the Advanced Treatment Processes, and thus, associated operational costs.

The data collected by RI DEM will be used to evaluate the relationships between nutrients and algal growth and total organic carbon, which, when chlorinated during treatment, results in formation of trihalomethane. The intended outcome of this evaluation is to establish a target phosphorus concentration for each of the reservoirs such that algal growth and total organic carbon concentrations are reduced to a level that supports drinking water and aquatic life uses.

RI DEM is currently applying this target phosphorus concentration to calculate an allowable phosphorus load to each reservoir. The existing phosphorus load to each reservoir will be estimated by means of models using available water quality data. Data collected from the reservoirs will be used to estimate the portion of the existing load which comes from the internal cycling of phosphorus from sediments. From these technical underpinnings, the necessary reductions in phosphorus loading to each reservoir can be calculated. The TMDL will identify watershed and stormwater management actions needed to reduce phosphorus loads.

5.2 Tiverton Comprehensive Community Plan

The Natural Resources section of Tiverton's Comprehensive Plan states:

"Nonquit Pond is part of the City of Newport's water system. As a public water supply it is Tiverton's responsibility to take measures, in cooperation with the Newport Water District, to protect this pond and its watershed. Since 1997, significant steps have been taken to protect approximately 1,320 acres of Nonquit Pond watershed through the purchase of development rights and the purchase and protection of fields, forests and wetlands, including Cedar Swamp in Weetamoo Woods and the Pardon Gray Preserve….

Easily overlooked because it is unseen, is the groundwater of Tiverton. This precious natural resource is just as important as surface water because it also supplies major portions of the town with fresh water from private residential wells. Protecting groundwater sources and maintaining drinking water is a major public concern."

See the Town of Tiverton's Comprehensive Plan for specific policies and objectives pertaining to, and supporting the protection of surface water, groundwater, and wetland resources.

5.3 Watershed Protection Overlay District

The Town of Tiverton has implemented a watershed overlay district ordinance. The purpose of the overlay district is, in part, *"To protect the quality and quantity of drinking water supplies by regulating the use and development of land adjoining the watercourses or primary water recharge areas, and to prevent the use of land within the*

watersheds of Stafford and Nonquit Ponds that would adversely affect the quality of water."

5.4 Tiverton Onsite Wastewater Treatment System (OWTS) Program

The level of treatment provided by onsite wastewater treatment systems (OWTSs) depends on many factors – system design and installation, system use and maintenance and the local soil and site characteristics. A properly sited, designed, installed and maintained OWTS will provide decades of use and provide treatment such that the system does not adversely impact public health or the environment.

The design and installation of these systems must comply with the RI DEM rules, but they must be properly maintained in order to protect public health and the quality of our environment. Owners of OWTSs are responsible for maintaining their systems, and each municipality has the opportunity to establish a management program to support property owners in these efforts.

Tiverton has an approved Onsite Wastewater Management Program to facilitate proper operation and management of OWTSs. Tiverton's efforts to manage OWTSs have been evaluated based on criteria established by RI DEM, which represents the preferred local management scenario. It should be noted that none of the elements below are required by state or federal rule or law. Municipalities voluntarily choose to develop OWTS programs to improve proper operation and maintenance of OWTS facilities in their jurisdictions and to access state-provided funding assistance for their citizens for system repairs and replacement.

Table 4: Tiverton OWTS Checklist	
Does the town have an approved Onsite Wastewater Management Plan?	Yes
Does the town participate in the Community Septic System Loan Program?	Yes
Has the town adopted an ordinance to address OWTS management?	Yes
Does the Onsite Wastewater Mgmt. Ordinance have mandatory inspections?	Yes
If so, has the town taken enforcement actions in cases of non-compliance?	No
Does the town have a web-based tracking system?	Yes
Does the town have a website for information and education on OWTS issues?	Yes
Does the town have staff whose primary responsibility is mgmt. of the OWMP?	Yes
Has the town adopted an ordinance more stringent than the DEM rules?	No

5.5 Municipal Separate Storm Sewer System (MS4) Program (RIPDES Phase II)

Under the Rhode Island Pollutant Discharge Elimination System (RIPDES) Phase II Stormwater Program, the Town of Tiverton contains regulated areas that are covered by a General Permit for discharging stormwater. This permit requires the development and implementation of a Storm Water Management Program Plan, which involves the following six 'minimum measures:'

1. Public Education and Outreach
2. Public Participation and Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
5. Post Construction Runoff Control, and

6. Pollution Prevention/Good Housekeeping

This permit also requires annual reporting to the RI DEM on the implementation activities and progress made towards achieving the requirements of the program.

Tiverton has an ongoing and successful RIPDES Phase II MS4 Program. Despite its listing as an impaired waterbody, Nonquit Pond is also identified by RI DEM as a Special Resource Protection Water because of its status as a drinking water source. This designation makes Nonquit Pond subject to the Tiverton Stormwater Program. The Stormwater Program has worked with the Tiverton Conservation Commission and other Town committees to provide outreach on the topics of OWTS, stormwater, and waste management to residents of the Nonquit Pond watershed in order to improve water quality.

5.6 Protected Open Space and Buffers

Protecting open space through land conservation practices is important to the water quality and aquatic habitat in a watershed. Natural landscapes remove pollutants through natural processes such as the infiltration of stormwater into the soil and the uptake of water and nutrients by plants. Protecting areas along the shoreline of a waterbody is particularly important as these natural buffers capture and reduce the amount of pollutants that enter the waterbody and provide important wildlife habitat for the many wetland dependent species.

In Rhode Island, natural landscapes are protected through conservation easements on private lands, municipal conservation efforts, the work of land trusts, and by local, state and federal parks. Areas of open space in the Nonquit watershed controlled by state and local government and nonprofits are shown on **Map 8** and constitute 35% of the watershed**.** Note that some land that is protected from development may remain in agricultural use. Therefore, it can still be a potential source of pollution.

Organizations involved in protecting open space can also have a role in restoring important buffers, whether on property that they control, or by working with land owners to promote and facilitate buffer and wetland restoration on private property.

Map 8. Nonquit Pond Watershed Land Protected from Development

6. IMPLEMENTATION -- PROTECTION AND RESTORATION ACTIONS

6.1 Public Information and Outreach – Encouraging Individual Action

Public education and awareness is a key part of this Watershed Plan because everyone in the Nonquit watershed poses a risk to groundwater and surface water. Most homeowners will work to protect their local water resources if they know how to minimize contamination risks. Individual actions in our own backyards may not have much of an effect by themselves, but the overall cumulative impact (positive or negative) on water quality in the watershed by individuals can be dramatic.

Outreach to Nonquit watershed residents will be done through mailings, media and/or public meetings to increase awareness of the link between land use and water quality and to involve the public in watershed protection activities. Some of the most important areas to focus on are stormwater management, septic system maintenance, lawn care, underground storage tanks, and information for private well owners. These efforts can be coordinated as part of the existing MS4 program.

Examples of outreach material are included as **Appendices A, B & C**. Other materials are available from the RI DOH, RI DEM, RI NEMO, U.S. EPA, Tiverton Wastewater Management, RI USDA/NRCS and the Conservation District. Some useful links are:

RI DOH: http://www.health.ri.gov/water/about/yourwater/
RI DEM: http://www.dem.ri.gov/programs/water/quality/
RI NEMO: http://web.uri.edu/nemo/
EPA: http://water.epa.gov/drink/ and http://cfpub.epa.gov/watertrain/
Tiverton Wastewater Management: http://twwd.org/septic/
RI NRCS: http://www.nrcs.usda.gov/wps/portal/nrcs/main/ri/soilshome/
Eastern RI Conservation District: www.easternriconservation.org/

Recommended Actions:

- Information and outreach by means of mailings, media, public meetings, etc.
- The Newport Water Division, in cooperation with the Town of Tiverton, should consider installing signs on road ways at the watershed boundary so residents and visitors are aware that their actions impact a public water supply.

6.2 Total Maximum Daily Loads (TMDLs) for Nonquit Pond

RI DEM and its partners in the study of Newport Water system's source waters will continue to develop the TMDL for phosphates and total organic carbon. Understanding the source and fate of these pollutants, and developing ways to limit them is very important in the effort to improve water quality in Nonquit Pond.

Recommended Action:

- DEM complete the TMDL, which will establish target phosphorus concentrations for Nonquit Pond and calculate the reductions in phosphorus inputs necessary to achieve those concentrations. The TMDL will include identification of specific watershed and stormwater management actions that need to be implemented.

6.3 Water, Wastewater, and Stormwater Management at Four Corners

There are several issues at the Four Corners that should be looked at in a holistic way because they are interrelated. They include providing safe and adequate drinking water for the development of that area, providing effective onsite wastewater treatment, and managing stormwater that originates or flows through that area. The high water table in the area makes it difficult to deal with wastewater on site and may limit the amount of stormwater that can be infiltrated

Recommended Action:

- The Town of Tiverton and partners should consider contracting for a study of the Four Corners area to develop an integrated plan for dealing with these three water issues (drinking water, wastewater, and stormwater).

6.4 Stormwater Management

Several action items above address stormwater management, including the TMDL study and improved stormwater management at the Four Corners. In addition, the following actions will improve stormwater management in the watershed:

A. Low Impact Development

For any new development or redevelopment of property, Low impact development (LID) regulations provide a comprehensive approach to project design that minimizes the impacts of development or re-development on our water resources by improving stormwater management. It is different from conventional stormwater management that was designed to quickly move water off of a site (i.e., “pipe-to-pond” management). In the past, the landscape was altered to fit the style of a development. When using the LID process, the development is shaped to fit into the landscape. The goal of LID is to design a site so that water moves over and through the site similarly to its movement under natural conditions. Stormwater treatment practices are placed throughout the site to decrease, infiltrate, manage, and treat runoff as close to the point where it is

generated as possible. The RI Stormwater Design and Installation Standards Manual (March 2015) requires the use of LID as the primary method for stormwater control.

Effective use of LID starts at the community planning level. The Rhode Island "Low Impact Development Site Planning and Design Guidance Manual" (March 2011) ("LID Manual") provides examples for local officials of how to amend their town's ordinances and development regulations to incorporate LID requirements. The LID Manual contains over 45 specific techniques that can be used by communities to avoid and reduce the negative impacts of stormwater on water quality. These techniques can also preserve community character, reduce flooding, and save money.

Recommended Action:

- Tiverton should review its existing planning and development ordinances and requirements to incorporate the use of LID techniques for proposed development and redevelopment.

B. Stormwater Retrofits and Green Infrastructure

Providing stormwater management features to improve water quality and reduce the amount of runoff from existing developed areas will help improve water quality in the watershed.

Recommended Actions:

- Tiverton should develop and implement a strategy to promote installation of small scale on-site (e.g., rain gardens, dry wells, etc.) stormwater best management practices throughout the watershed at existing individual residential and commercial properties.
- Tiverton should study the feasibility of installing stormwater best management practices where practical to treat stormwater from town and state roadways.

C. Stormwater Utility

A stormwater utility, operating much like an electric or water utility, may collect fees related to the control and treatment of stormwater. These fees are used to fund a municipal stormwater management program. The first step is to do a study that provides the community with enough information to decide if implementing a stormwater utility is sensible. A feasibility study will typically address preliminary revenue requirements (usually from current stormwater budgets) and develop options for billing within the service area.

Recommended Action:

- Tiverton should seek support to conduct a stormwater utility feasibility study.

Municipal Stormwater Utility

A stormwater utility is a public utility established to provide stormwater management services. It is to stormwater what a sewer utility is to sewage, and a water utility is to drinking water. Stormwater utilities generate revenue through user fees that are based upon the amount of stormwater generated on a property. An important distinction between stormwater utility fees and real estate taxes is that they are user-based and are tied to stormwater management services provided by the utility, whereas taxes are not tied to specific services. Stormwater utilities provide a dedicated, stable and predictable source of revenue to finance local stormwater management services. More specifically, this stable funding source can be used to ensure ongoing maintenance of stormwater infrastructure, conduct long-term strategic planning, incentivize water quality protection among landowners, and facilitate compliance with the state RIPDES Phase II (MS4) Stormwater Program (See Section 5.5).

This is appropriate since large rooftops and large parking lots generate high demands on town services in terms of the volume of stormwater that flows to municipal drainage systems, and catch basin cleaning and maintenance. Another key benefit of a stormwater utility is that it can assume responsibility for maintaining drainage infrastructure on private lands via easements. This prevents the scenario in which treatment structures (e.g., detention basins) are installed as a condition to planning board approval, but then are gradually forgotten, deteriorate, and cease to function as the development ages. Finally, a stormwater utility can respond to permit requirements and evolving regulations more efficiently and with greater expertise than individual land owners acting alone.

In Rhode Island, the Rhode Island Stormwater Management and Utility District Act of 2002 http://webserver.rilin.state.ri.us/Statutes/TITLE45/45-61/INDEX.HTM authorizes municipalities to create stormwater management districts, and empowers them to charge fees, provided that the fee system shall be reasonable and equitable so that each contributor of runoff to the system shall pay to the extent to which runoff is contributed. Stormwater utilities have focused on a variety of needs, including flood management, erosion control, stormwater treatment for water quantity and quality, and infrastructure maintenance.

Recently, the Rhode Island Department of Environmental Management has been working with selected towns to assess whether establishing a stormwater utility as a funding source might be a practical solution. With input from town professional staff, the Department has completed several stormwater utility district feasibility studies which are available online.

Many resources are available to assist communities in developing a stormwater utility.

6.5 Onsite Wastewater Management

Recommended Action:

- Implement the town's state approved Onsite Wastewater Management Plan described in Section 5.

6.6 Underground Home Heating Oil Tanks

Recommended Actions:

- Adopt a municipal ordinance prohibiting future underground storage tanks for home heating oil and requiring the removal and replacement of existing underground storage tanks by a specific future date to be determined.

6.7 Puncatest Neck Road

Recommended Actions:

- The Town of Tiverton, should develop plans to prevent vehicles from accidentally entering Nonquit Pond from Puncatest Neck Road. Barriers should be placed to prevent vehicles from veering off the road and entering the pond and procedures should be in place to mitigate spills from vehicles.
- An emergency response plan should be developed to respond to spills from accidents or other sources.
- The Town should consider designing a stormwater management system to intercept and treat runoff from the road before it enters the pond.

6.8 Landfills

Recommended Actions:

- The Town of Tiverton should consider developing a zoning ordinance that would prohibit drinking water wells near the landfill off Main Road. An example of the ordinance language used by the Town of Coventry, RI is included as **Appendix D**.
- Continue monitoring surface water and groundwater around the Town landfill and ensure proper closure to mitigate release of pollutants and to effectively manage stormwater.
- Ensure the former town landfill on Bulgarmarsh Rd. and the former Firestone landfill on Brayton Rd are not causing adverse impacts to surface water and groundwater.
-

6.9 Agriculture

Recommended Actions:

- Encourage farmers to apply for funding from NRCS to install BMPs on their properties to prevent adverse impacts to water quality.

- Coordinate outreach to farmers (including the very small part-time farmers) on best management practices to protect water quality.
- Farmers install BMPs.

6.10 Quarry Operations

Recommended Action:

- Tiverton should review and update town ordinances as necessary to mitigate potential impacts to water quality from quarry operations.
- Conduct outreach to quarry operators on appropriate best management practices.
- Consider more accurately delineating the Nonquit Pond watershed in the vicinity of the gravel quarries.

6.11 Sea Level Rise

Recommended Action:

- The Newport Water Division will adequately maintain the dam forming Nonquit Pond to mitigate the effects rising sea level may have on the dam.

6.12 Review and Revise Watershed Overlay District

The current watershed overlay district ordinance applies primarily to residential development with only limited regulation of commercial, industrial and other non-residential uses. The Nonquit Pond watershed includes a commercial zoning district and other portions, which allow non-residential uses by special permit. The ordinance should be updated to include measures to address potential impacts from nonresidential uses in the watershed.

Recommended Action:

- Based on the findings of this watershed plan, the RI DEM TMDL effort and other studies, the Town of Tiverton should review the zoning ordinance for the Watershed Overlay District and make changes that codify additional protections that are appropriate.

6.13 Protection of Aquatic Life

As noted earlier, this Watershed Plan addresses both protection and restoration of water quality and aquatic habita**t**, which includes wetland systems, rivers, streams, lakes, and ponds.

A) Vegetated Buffers

One of the primary means to protect water quality and aquatic habitat is to ensure the preservation of a vegetated buffer around that waterbody and habitat. This buffer will act to:

- Filter out sediments, nutrients, pesticides and other pollutants coming off the landscape;
- Provide valuable habitat for plants and animals;
- Absorb stormwater, helping to mitigate streambank erosion and flooding; and
- Moderate water temperature by providing shade.

Recent state law requires DEM and CRMC to revise its freshwater wetland regulations to establish new buffer distances and regulatory procedures for permitting new development. At the same time, the law prohibits local governments from establishing more stringent buffers and setbacks. Because buffers (and wetlands) perform so many important functions, it is just as important to restore buffers as it is to protect them from being removed or degraded.

Recommended Action:

- Encourage and help facilitate the protection and restoration of buffers and wetlands on public and private property.

B) Barriers to Stream Connectivity

Rivers and streams can be and have been physically altered by the construction of dams and sub–standard stream crossings. These barriers to stream connectivity prevent the free movement of aquatic life up and down a river system. The result is fragmented aquatic habitat, potential impacts on water quality, and an increased potential for flooding.

The only identified dam in the Nonquit watershed is the dam at the outlet of Nonquit Pond. The fish ladder there provides access for migratory species into the freshwaters of the watershed.

Sub-standard stream crossings at roadways and driveways on public and private land are much less obvious barriers to connectivity in our waterways. These are typically characterized by constricted or inadequate flow, perched culverts, blocked crossings or crossings in disrepair. There is no readily available information on the status of stream crossings in the watershed.

Recommended Action:

- The Town should work with NRCS, watershed groups, RIDOT, and other organizations to conduct an inventory of stream crossings in the watershed. This will help to evaluate the potential need for upgrades to culverts and bridges to maintain adequate flow, improve aquatic life passage, and/or to reduce potential impacts from flooding. (This activity could be coordinated with the Hazard Mitigation Plan, which recommends a drainage study.)

C) Invasive Species

An aquatic nuisance species or "invasive species" is defined as a non-native species that threatens: 1) the diversity or abundance of native species; 2) the ecological stability of infested wetlands and waters; or 3) commercial, agricultural, aquacultural, or recreational activities dependent on such waters. This includes in-water species as well as shoreline species (e.g. phragmites). Impacts from aquatic invasive species generally include:

- Reduced diversity of native plants and animals
- Impairment of recreational uses such as swimming, boating, and fishing
- Degradation of water quality
- Degradation of wetland function
- Degradation of wildlife habitat
- Increased threats to public health and safety
- Diminished property values
- Declines in finfish and shellfish populations
- Local and complete extinction of rare and endangered species
- Increased expenditures on prevention, eradication or control

In addition, aquatic invasive species can clog utility pipes, therefore, the Newport Water Division would have an interest in monitoring its surface reservoirs for the presence of invasive species.

The Nonquit Pond watershed has not been surveyed for the presence of invasive species. The Town could investigate the watershed, including the wetlands, tributaries, and shoreline of the Nonquit Pond for the presence of invasive species. The Rhode Island Natural History Survey is a key resource for outreach, education, identification, and management for invasive species. A link to their Invasive Species Portal webpage is here: http://rinhs.org/invasive-species-portal/ .

Recommended Action:

- Conduct an invasive species survey of the watershed.

IMPLEMENTATION TABLE

Recommended Action Item	Milestone (Initial Steps) (1)	Responsibility (2)	Time Frame (3)	Support	Cost (4)	Pri-ority
6.1 Information and Outreach						
A) Information and Outreach by means of mailings, media, public meetings, etc.	Distribute water quality brochure (see App A) to each house in the watershed	Town, NWD	On-going	DEM, DOH, NEMO	$	M
B) Installation of signs on roadways at the watershed boundaries.		Town, NWD	1-2 years		$	L
6.2 TMDL for Nonquit Pond						
A) Complete development of TMDL		DEM	1-2 years		$	H
B) Implement TMDL		DEM, Town, NWD	As necessary		$$$	H
6.3 Integrated plan for drinking water, wastewater and stormwater management at Four Corners.	Establish steering committee; hire a consultant; draft plan	Town	1-2 years	DEM DOH, DOT, NWD	$$	M
6.4 Stormwater Management:						
A) Review and update local ordinances to incorporate more effective use of LID strategies.	Planning Board workshop on LID	Town	1-2 years	NEMO, DEM	$	M
B) Develop and implement a strategy to promote the installation of small scale on-site (e.g., rain gardens, dry wells, etc.) stormwater management best	Host public workshop for private property owners	Town	1-2 years then on-going	ERICD, NEMO, RIGIC	$$	M

Recommended Action Item	Milestone (Initial Steps) (1)	Responsibility (2)	Time Frame (3)	Support	Cost (4)	Pri-ority
management practices throughout the watershed at existing individual residential and commercial properties.						
C) Tiverton should seek support to conduct a stormwater utility feasibility study.	Workshop for appropriate town officials	Town	3-5 years	DEM, NEMO, RIGIC	$$	M
D) Study feasibility of installing stormwater best management practices where practical to treat stormwater from town and state roadways.	Hire consultant to evaluate options	Town DOT	>5 years		$$$	M
E) Stormwater management system for Puncatest Neck Road	Hire consultant to evaluate options	Town, DOT	3-5 years		$$$	M
F) Comply with DEM Stormwater Program (MS4) requirements.		Town, DOT	On-going		$$	H
6.5 OWTS – Implement the town onsite wastewater management plan.		Town	On-going		$$	M
6.6 Underground home heating tanks -- Adopt a municipal ordinance prohibiting future home heating oil underground storage tanks and requiring the removal and replacement above ground of existing underground storage tanks by a specific future date.	Hold public meeting; draft ordinance	Town	3-5 years		$	L
6.7 Puncatest Neck Road -- vehicular barrier and emergency response plan.	Determine appropriate strategy	Town	3-5 years		$$	M
6.8 Landfills						
A) Zoning ordinance delineating buffer for placement of private drinking water wells near town landfill.	Hold public meeting; draft ordinance	Town	1-2 years		$	L

Recommended Action Item	Milestone (Initial Steps) (1)	Responsibility (2)	Time Frame (3)	Support	Cost (4)	Pri-ority
B) Continue monitoring surface water and groundwater around the town landfill and ensure proper closure to mitigate release of pollutants and to manage stormwater effectively.	Close landfill	Town	3-5 years for closure; on-going for monitoring	DEM	$$$	H
C) Ensure the former town landfill on Bulgarmarsh Rd and the former Firestone landfill on Brayton Rd are not causing adverse impacts to surface water and groundwater.	Assess potential adverse impacts	Town	5-10 years	DEM	$$$	M
6.9 Agriculture						
A) Encourage farmers to apply for funding from NRCS to install BMPs to prevent impacts to water quality.	Conduct meetings with farmers (groups or individuals)	Town NRCS	1-2 years, then on-going as appropriate	ERICD	$	M
B) Coordinate outreach to farmers (including the very small part-time farmers) on best management practices to protect water quality.	Conduct meetings with individual farmers	Town NRCS	On-going	ERICD	$	M
C) Farmers install BMPs	One or more BMPs installed	Farmers	As opportunity arises	NRCS, ERICD	$-$$$	M
6.10 Quarry Operations						
A) Provide outreach to quarry operators on appropriate BMPs.	Meet with quarry operators	Town	2-3 years		$	L
B) Review and update town ordinances as necessary to mitigate potential impacts to water quality from quarry operations.	Meeting of Town officials; public meeting	Town	3-5 years		$	L

Recommended Action Item	Milestone (Initial Steps) (1)	Responsibility (2)	Time Frame (3)	Support	Cost (4)	Pri-ority
6.11 Adequately maintain the dam forming Nonquit Pond to mitigate the effects rising sea level may have on the dam.		NWD	On-going		$$	H
6.12 Review and revise, as necessary, the Town watershed overlay district.	Planning Board advisory to Town Council; public meeting	Town	1-2 years		$	M
6.13 Protection of Aquatic Life						
A) Encourage and help facilitate the protection and restoration of buffers and wetlands on public and private property.	Information meeting for the public	Town	On-going	DEM, ERICD, NRCS, Land Trust	$-$$	M
B) Inventory stream crossings in the watershed	Desktop evaluation; fiels assessment of need for retrofit	Town	3-5 years	NRCS, ERICD, DOT	$	L
C) Conduct an invasive species survey of the watershed.	Start with survey of Nonquit Pond	NWD, Town	3-5 years	DEM, RINHS	$	L

1) Milestone shown is the initial step(s) towards completing the action. In some cases, a milestone is not provided when the action is self-explanatory.

2) Responsibility/Support

DEM RI Department of Environmental Management
DOH RI Department of Health
DOT RI Department of Transportation

ERICD Eastern RI Conservation District
NEMO Non-Point Source Education for Municipal Officials at URI
NRCS Natural Resources Conservation Service
NWD Newport Water Division
Town Town of Tiverton (Conservation Commission, Planning Board, Town Council, and/or Stormwater/MS4 Program)
RIGIC RI Green Infrastructure Coalition
RINHS RI Natural History Survey

3) Timeframe: ongoing, 1-2 years, 3-5 years, >10 years, as necessary.

4) Estimated Cost: Dollar figure or relative indication of cost. For example:
$ = <$25,000; $$ = $25,000 -- $100,000; and $$$ = >$100,000.

5) Priority:
H – High
M – Medium
L -- Low

7. FINANCIAL SUPPORT

Funding assistance for water quality and aquatic habitat protection and restoration actions is available from various government and private sources. This section provides an overview and contact information for financial assistance programs that may be used to implement some of the actions in this plan.

7.1 Federal Clean Water Act, Section 319 Nonpoint Source Implementation Grants

Section 319 Grants are available for projects to protect and restore water quality through reducing and managing nonpoint source pollution and for projects restoring aquatic habitat. Projects must be consistent with the goals and actions in the US EPA approved RI Nonpoint Source Management Program Plan. These grants are made possible by federal funds provided to RI DEM by the US EPA under Section 319 of the Clean Water Act.
Eligible applicants: Projects must be in watershed with an approved watershed plan; municipal, state, or regional governments, quasi-state agencies, public schools and universities, and non-profit watershed, environmental, or conservation organizations.
Contact: RI DEM's Office of Water Resources, 235 Promenade St., Providence, RI 02908. (401) 222- 4700

7.2 Clean Water Finance Agency, Clean Water State Revolving Fund Loans

The Clean Water State Revolving Fund is a federal/state partnership designed to finance the cost of infrastructure needed to achieve compliance with the Clean Water Act. The program is available to fund a wide variety of water quality projects including: 1) traditional municipal wastewater treatment projects; 2) contaminated runoff from urban and agricultural areas; 3) wetlands restoration; 4) groundwater protection; 5) brownfield remediation; and 6) estuary management. Through this program, Rhode Island maintains revolving loan funds to provide low-cost financing for a wide range of water quality infrastructure projects. Funds to establish or capitalize these programs are provided through federal government grants and state matching funds (equal to 20% of federal government grants). The interest rate charged to the Clean Water State Revolving Fund is one-third off the borrower's market rate.
Eligible applicants: Statewide, including municipal, state, or regional governments, quasi-state agencies. Funds are awarded to projects based on ranking of environmental benefits of the project, readiness to proceed, and availability of funds.
Contact: RI DEM Office of Water Resources, 235 Promenade St., Providence, RI 02908. (401) 222-4700; Rhode Island Clean Water Finance Agency, 235 Promenade St., Suite 119, Providence, RI 02908. (401) 222-4430

Community Septic System Loan Program

The Community Septic System Loan Program allows homeowners in participating communities to obtain low interest loans to repair or replace failed, failing, or substandard onsite wastewater treatment systems. These individual loans are funded from a Clean Water State Revolving Fund loan to a community and are administered

locally by Rhode Island Housing. Loans to homeowners are offered at 2% interest rate with a 10-year term.
Eligible applicants: Statewide. Municipal participation requires RI DEM approval of an onsite wastewater management plan. Funds are awarded to communities based on ranking of environmental benefits of the project, readiness to proceed, and availability of funds.
Contact: RI DEM Office of Water Resources, 235 Promenade St., Providence, RI 02908. (401) 222-4700; Rhode Island Clean Water Finance Agency, 235 Promenade St., Suite 119, Providence, RI 02908. (401) 222-4430

7.3 Narragansett Bay and Watershed Restoration Bond Fund

State funds approved by RI voters are periodically available from this Bond Fund to restore and protect the water quality, and enhance the economic viability, environmental sustainability and resiliency of Narragansett Bay and the state's watersheds. The fund is meant to provide funding assistance for the feasibility analysis, design, and construction of means to control nonpoint sources of pollution, stormwater pollution control projects, riparian buffer and aquatic habitat restoration projects.
Eligible applicants: Statewide; municipal, state, or regional governments; quasi-state agencies, public schools and universities, and non-profit watershed, environmental, or conservation organizations; and non-governmental for profit businesses, private schools.
Contact: RI DEM's Office of Water Resources, 235 Promenade St., Providence, RI 02908. (401) 222- 4700

7.4 EPA Southeast New England Program (SNEP)

The US EPA Southeast New England Program for Coastal Watershed Restoration brings together partnerships to protect and restore coastal watersheds of southeast New England from Westerly to Cape Cod. The Program seeks projects and partnerships that leverage multiple resources to generate collaboration to implement innovations and efficiencies in ecosystem management.
Eligible applicants: Municipalities, non-profit organizations, and research/educational institutions.
Contact Narragansett Bay Estuary Program, 235 Promenade St. Providence, RI 02908. (401) 633-0552.

7.5 U.S. Department of Agriculture Natural Resources Conservation Service Grants

Environmental Quality Incentives Program (EQIP)

This is a voluntary conservation grant program designed to promote and stimulate innovative approaches to environmental enhancement and protection, while improving agricultural production. Through EQIP, farmers and forestland managers may receive financial and technical help to install or implement structural and management conservation practices on eligible agricultural and forest land. Examples of eligible EQIP activities include practices for farm waste

storage, nutrient management, riparian buffers and stream bank improvements, wetland restrictions, and groundwater and surface water conservation activities. EQIP payment rates may cover up to 75 percent of the costs of installing certain conservation practices.
Eligible applicants: Any person engaged in livestock, agricultural production, aquaculture, shellfishing, or forestry on eligible land.
Contact: USDA NRCS – RI State Office/Service Center, 60 Quaker Lane, Suite 46, Warwick, RI 02886, (401) 828-1300.

Wildlife Habitat Incentives Program (WHIP)
This program is a voluntary program for landowners who want to develop and improve fish and wildlife habitat on private agricultural land, non-industrial private forest land, and tribal land. Through WHIP, farmers and forestland managers may receive financial and technical help to develop upland, wetland, aquatic, and other types of wildlife habitat on their property. The current focus of WHIP in RI is on coastal habitats, freshwater wetlands, vernal pools, riparian habitats, upland habitats of State significance (early successional habitats), and the restoration of native habitats impacted by invasive species.
Eligible applicants: Any person owning private agricultural land, non-industrial private forest land, or tribal land.
Contact: USDA NRCS – RI State Office/Service Center, 60 Quaker Lane, Suite 46, Warwick, RI 02886, (401) 828-1300.

Easement Programs
NRCS offers various easement programs to landowners who want to maintain or enhance their land in a way beneficial to agriculture and/or the environment. NRCS provides technical help and financial assistance to protect private lands through a variety of programs. These programs include the Farm and Ranch Land Protection Program, the Grasslands Reserve Program, the Healthy Forests Reserve Program, and the Wetlands Reserve Program.
Eligible applicants: Private landowners.
Contact: USDA NRCS – RI State Office/Service Center, 60 Quaker Lane, Suite 46, Warwick, RI 02886, (401) 828-1300.

7.6 Community Development Block Grants

Title 1 of the Housing and Community Development Act of 1974 authorized the Community Development Block Grant program. The program is sponsored by the US Department of Housing and Urban Development, and the Rhode Island program is administered through the State of Rhode Island Office of Housing and Community Development. There are income eligibility requirements for qualifying areas, businesses, or residents. These grants include water and sewer system improvements, and private well and OWTS repair or replacements.
Eligible applicants: Municipalities
Contact: Division of Planning, Office of Housing and Community Development, 1 Capitol Hill, 3rd Floor, Providence, RI 02908, (401) 222-7901

7.7 State Open Space Grants

RI DEM administers grant programs to facilitate land conservation relying on State bond funding and Federal program funds. Local Open Space Grants provide up to 50% matching funds to preserve valuable open space through ownership or easements
Eligible Applicants: Municipalities, land trusts, watershed councils, and non-profit organizations.
Contact: RI DEM Office of Planning and Development, 235 Promenade St., Providence, RI 02908. (401) 222-4700

7.8 Land Trusts

Land trusts seek to preserve open spaces, natural areas, scenic character, watersheds, drinking water sources, farmland, forests, historic sites, and shorelines that uniquely define communities. Land can be held by a land trust in outright ownership or by means of a conservation easement that permanently limits the use of the land in order to protect its conservation value.
Contact: Tiverton Land Trust, PO Box 167, Tiverton, RI 02878

8. EVALUATION – MONITORING AND MEASURING PROGRESS

There are several indicators of progress that can be used to measure and document improvements in water quality and aquatic habitat protection and restoration in the watershed. The most direct and straightforward indicators are water quality measurements, such as concentrations of bacteria, phosphorus, and nitrogen; dissolved oxygen; and suspended sediment loads. Monitoring can extend to biological indicators, such as aquatic macroinvertebrates and anadromous fish. Biological monitoring can look at species population levels, species composition, and/or contaminant levels in tissues.

There are currently no volunteer monitoring efforts in the Nonquit Pond Watershed. The Newport Water Division is required to test the quality of the Nonquit Pond reservoir and report to the RI Department of Health regularly pursuant to the Federal Safe Drinking Water Act. Therefore, testing of the pond is on-going and progress will be able to be measured as this watershed plan and the TMDL are implemented.

An additional way to measure progress is to systematically track the implementation of the actions and associated milestones in Section 6.

9. NEXT STEPS

This plan is being provided to the Town as a tool to use in the long-term protection and restoration of water quality and aquatic habitat in the Nonquit Pond watershed. Ideally, a local group (e.g., town entity or stakeholder group) will take ownership of this plan and lead efforts to implement strategies in the Plan and update the Plan as needed. The Plan should be considered the first step in an on-going effort.

The Plan will satisfy the requirements for eligibility for USEPA Section 319 funds that are administered by RI DEM. Projects requesting Section 319 funds must be either identified in the Plan's implementation section or at minimum consistent with the intent of the Plan, in addition to meeting the criteria of the 319 funding program. The Plan will also be useful in showing support for applications to other sources of funding for implementation.

As more is learned about the watershed or as additional strategies for protection and restoration are identified, the Plan should be amended accordingly.

This Plan should be continually evaluated and updated in order to guide appropriate actions to protect and restore water quality and aquatic habitat in the Nonquit Pond Watershed.

Appendix A: Simple Ways YOU Can Help Keep RI's Waters Clean

Available here for printing: http://www.dem.ri.gov/programs/benviron/water/quality/pdf/tenthing.pdf

REDUCE YOUR LAWN by creating "no-mow zones" of native wildflowers, grasses, shrubs, and trees, especially as buffers near ponds and streams. This reduces water, fertilizer, and pesticide use and provides a welcoming habitat for wildlife.

FERTILIZE SMART Have your soil tested before applying fertilizer to your lawn to see if it even needs it. Don't over-fertilize - more is not better. During rainstorms, nutrients from fertilizers can wash off lawns into local waters where the excess nutrients promote algae blooms, including some algae that are harmful to people and pets. Algae blooms cause a decrease in oxygen in the water which endangers aquatic life and can cause fish kills. Use phosphorus fertilizer for new lawns only, unless the soil test shows a need for phosphorus on an established lawn. Sweep up fertilizer that spills on hard surfaces. Leaving grass clippings on your lawn can reduce your fertilizer needs by up to 25%. For more information on soil testing see www.URIMasterGardeners.org

REDUCE USE OF LAWN AND GARDEN PESTICIDES Investigate use of biological controls and products with natural ingredients. Read the labels—apply the right amount at the right time and be aware of the toxicity warnings.

REDUCE RUNOFF Increase the amount of stormwater absorbed into the ground by directing downspouts onto your lawn, not onto paved surfaces where the runoff could pick up oil, yard waste, and other debris. Install a rain barrel— use the water for plantings. Install a rain garden to increase the amount of stormwater absorbed into the ground. For more information, see www.RIStormwaterSolutions.org

DON'T DRAIN YOUR SWIMMING POOL into storm drains, wetlands, rivers, or ponds. Instead drain it onto the ground away from your drinking water well. Drain your pool only when your test kit does not detect chlorine levels so that it won't harm vegetation.

PUMP IT, DON'T DUMP IT! If you own a boat, have your holding tank emptied at one of the local pumpout stations around Rhode Island. For a list of pumpout locations contact DEM.

VOLUNTEER with clean-up efforts or water quality monitoring. Participate in local activities that benefit the environment. Find out if there is a watershed council for your area. YOUR opinion counts! Attend public meetings. Your participation makes the statement that your community is concerned about local waterways. If you see a problem or want something done, say something! If you don't have time to attend meetings, call or contact a city or town official, a state representative, or DEM.

NOW...GET OUT AND ENJOY THE WATER !

Swim, sail, surf, kayak, fish, boat, shellfish, go birding or walk along the shore. Explore Rhode Island's waters.

If you need more information on any of these topics contact DEM Water Resources

RI Department of Environmental Management
Office of Water Resources
235 Promenade Street
Providence, RI 02908-5767
401-222-4700
www.dem.ri.gov

Rev 3/2015

Simple Ways YOU Can Help Keep Rhode Island's Waters Clean

YOU Can Make A Difference!

- **DO YOU EVER STOP AND WONDER** what you can do to make a difference in keeping our waters safe enough to swim in, fish from, or use for drinking? What you can do to protect the groundwater that supplies your drinking water well?
- **WHEN IT RAINS** water travels across our properties collecting pollutants such as animal feces, fertilizers, soil, oil, and chemicals. This runoff then flows untreated into local rivers, lakes, and streams; polluting water for human use as well as plant and animal life.

LEARN ABOUT YOUR LOCAL WATERS Everyone lives in a watershed, which is the area that drains to a nearby river, stream, lake, or pond. Think about washing everything in a sink then letting it go down the drain. The sink is your watershed and the drain is your local river or stream. Find out what waters are closest to you and where they flow.

TAKE CARE OF YOUR SEPTIC SYSTEM Faulty septic systems can pollute local waters. Systems should be inspected every three to five years and tanks pumped as recommended. Don't drive or park anywhere on your septic system. Plant only grass over and near the system. If you have a cesspool, consider replacing it with a septic system.

DON'T FEED THE DUCKS! Feeding geese, ducks, gulls, and other waterfowl can cause large populations of birds to become concentrated in areas that are incapable of supporting them. The waste they produce contributes bacteria to our waterways and results in beach closures and pollution of shellfishing areas.

SCOOP THE POOP Pet waste left on sidewalks, streets or yards can be washed away by rainwater and carried into storm drains and drainage ditches which flow untreated to nearby rivers, ponds and beaches. Pet waste contains bacteria that can cause human illness and contribute to the closing of beaches and shellfish beds. Always carry a baggie - scoop up waste, bag it, and put it in the trash.

DON'T FLUSH MEDICATIONS Old or unwanted prescription drugs and over the counter medications flushed down the toilet or drain can end up in our waters and harm organisms living there. Check to see if you can drop off medications at your police station. If not, properly dispose of them in the trash. Crush pills and tablets. Put the medicine into a sealable plastic bag. Place the sealed bag in the trash.

MINIMIZE THE USE OF HAZARDOUS PRODUCTS as much as possible. Cleaning and other household products contain many hazardous chemicals. Read labels and try to use the least harmful products available. Don't dispose of products down the toilet or drain. Dispose of household hazardous chemicals (e.g., oil based paint, pesticides, drain cleaner, oven cleaner, pool chemicals) using the RI Eco-Depot Program. See www.rirrc.org

DRIVEWAY CARE Driveway sealant can be either an asphalt or a coal tar mixture. Coal tar has much higher levels of chemicals harmful to human health and aquatic life. As sealants wear down, particles wash off in storm-water. If you must seal your driveway, use an asphalt sealant.

WASH VEHICLES ON YOUR LAWN (away from your drinking water well) or use a commercial car wash. Washing on your lawn minimizes the amount of dirty, soapy water flowing into the storm drains that run directly into our waterbodies. If you are unable to wash your car on your lawn, use only biodegradable, phosphate-free cleaners. If washing near a storm drain, temporarily divert the water towards grassy areas. Commercial car washes typically use far less water, recycle their wash water, and treat their water prior to releasing it into the sewer system.

RECYCLE USED MOTOR OIL AND ANTIFREEZE Don't dump automotive fluids down the storm drain or dispose of them in your trash. Contact your local Department of Public Works or see the RI Eco-Depot Program at www.rirrc.org

CONSERVE WATER Don't overwater your lawn. Lawns need only one inch of water per week (from either watering or rain). Excessive water use, especially in summer, can dramatically reduce flow in rivers and streams, harming aquatic life.

If your house is connected to a public sewer, conserving water will help reduce the discharge from your wastewater treatment facility into local waters AND save you money! If you use a septic system, water conservation helps prevent system failures.

Appendix B: Septic System Inspection

WHAT TO EXPECT DURING A

SEPTIC SYSTEM FIRST MAINTENANCE INSPECTION

Managing your septic system

Regular maintenance of your septic system will keep your system working efficiently and can prevent costly repairs. Inspections also can save you money by preventing unnecessary pump-outs, and a well-maintained system helps protect water quality.

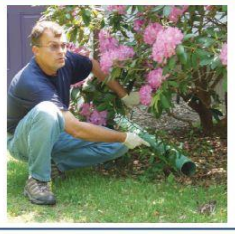
The first maintenance inspection provides baseline information about your system. You are encouraged to observe the inspection, using the checklist of standard RI DEM procedures below, so that you can have confidence in the results. If you believe the inspection was not completed properly, please contact your local wastewater management authority.

WHAT WILL THE INSPECTOR DO?

1. Determine Property Information

The inspector needs a copy of the permit or design plan, which you can provide, if you have one. The inspector also will ask about everyday water use practices in order to better understand how well your system is functioning.

- ❒ Determine the age of the system.
- ❒ Determine the type of system.
- ❒ Determine household appliances present.

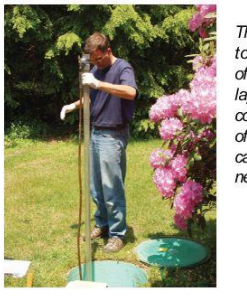


2. Evaluate the Site

- ❒ Check for impermeable surfaces, heavy objects, or large trees over the drainfield.
- ❒ Check for odors, ponding, or soggy areas.
- ❒ Check vegetation such as lush green grass or burnt-out grass.
- ❒ Check the landscape position for possible runoff.

3. Locate the System

- ❒ Locate and expose all access ports.
- ❒ Locate the approximate location of the drainfield.
- ❒ Sketch a diagram of components with measurements.



4. Evaluate the Tank

- ❒ Determine the size of the tank.
- ❒ Check the effluent level in the tank. Effluent levels can indicate potential problems with leaks or drainfields.
- ❒ Record solids accumulation.
- ❒ Check the condition of baffles.
  Baffles are critical because they control the flow of suspended solids within the tank and help prevent their exit to the drainfield.
- ❒ Check the overall structure of the tank.

The tool shown is used to measure the depth of sludge and scum layers. If those layers comprise at least 35% of the tank's storage capacity, your tank will need a pump-out.

5. Pump-Out

Pump-outs are highly recommended as part of a thorough first maintenance inspection. A pump-out performed during an inspection should include the following tasks. Check with your town hall for specific pump-out requirements.

- ❒ Check for drainback to the tank from the leachfield.
- ❒ Check the condition of the tank weep hole and midseam.
- ❒ Check the overall structure of the empty tank.

6. Check the Effluent Screen if Present

Effluent screens (also called outlet screens) are recommended as an inexpensive preventative measure.

- ❒ Check if the screen needs cleaning.
- ❒ Hose the screen off into the inlet side of the septic tank.
- ❒ Recommend a cleaning interval.

7. Provide Results and Recommendations

- ❒ Evaluate the overall system.
- ❒ Identify any needed repairs or upgrades.
- ❒ Complete recommendations and suggest a routine maintenance schedule.
- ❒ Submit required documentation to the homeowner and to the town.

Homeowners Tips for the Inspection

- Get multiple quotes from town-approved inspectors.
- Ask the inspector about discounts for inspecting and pumping at the same time.
- Ask the inspector about discounts if you locate and uncover the tank yourself.
- Prepare the information that the inspector will need (such as the system design plan and water bills) prior to his arrival.
- If possible, be home when the inspection occurs so that you can answer questions from the inspector and ask questions about the functioning of your system.
- Be sure that the inspector recommends a routine maintenance and pumping schedule. This will vary depending upon the type of system you have, the number of people in your household, and how much water you use.
- Be sure to get a copy of the inspection report from the inspector.

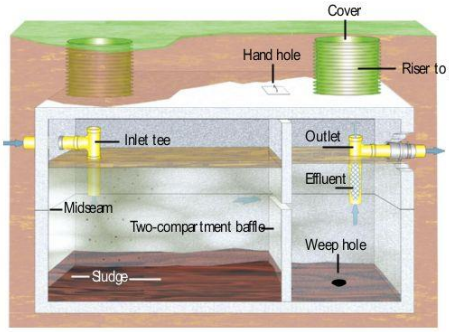


Diagram of a two-compartment septic tank with access risers and an effluent screen.

Additional Information Is Available

This series also includes fact sheets about routine maintenance, pump-outs, and recommended septic system upgrades such as effluent screens and access risers. Additional information is available at: www.uri.edu/ce/wq or call the URI Onsite Wastewater Training Center at 401-874-5950.

Septic System Checkup: The Rhode Island Handbook for Inspection. RI Department of Environmental Management. Available at www.state.RI.us/dem. Additional information is available at: www.uri.edu/ce/wq/owtc/html/owtc.html

Produced with funding by the Block Island and Green Hill Pond watershed, Rhode Island, EPA National Community Decentralized Wastewater Treatment Demonstration Project. Issued in furtherance of Cooperative Extension work, U.S Department of Agriculture.

Prepared by the University of Rhode Island Cooperative Extension Onsite Wastewater Training Center and Nonpoint Education for Municipal Officials Program. Cooperative Extension in Rhode Island provides equal opportunities in employment without regard to race, color, national origin, sex or preference, creed or disability. This is contribution #5004 of the College of the Environment and Life Sciences, University of Rhode Island.

University of Rhode Island
College of the Environment and Life Sciences
Department of Natural Resources Sciences
Cooperative Extension Onsite Wastewater Training Center and Nonpoint Education for Municipal Officials

Appendix C: Septic System Pump-Out

WHAT TO EXPECT DURING A

Managing your septic system

SEPTIC TANK PUMP-OUT

Septic tanks require pump-outs when the solids that accumulate in the tank begin to reach the tank's storage capacity. The tank should be pumped when total solid accumulation is between 30% and 50% of the total capacity. You are encouraged to observe the pump-out and to use the checklist below to ensure that all steps are completed.

WHAT WILL THE PUMPER DO?

Before Pumping

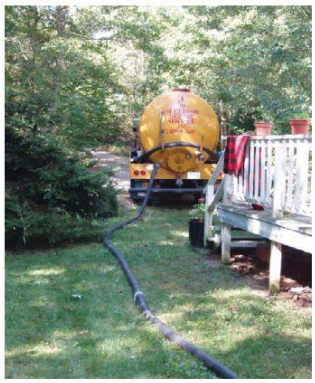
- ❒ Note the liquid level of the tank in relation to the tank's outlet pipe. A liquid level below the outlet pipe usually indicates a tank leak. A liquid level above the outlet pipe can indicate a problem with the pipe to the drainfield or the drainfield itself.

Pumping

- ❒ Pump the tank from the manhole. Pumping from inspection ports may damage tees and baffles. However, if pumping must occur from inspection ports, be sure to pump from both ports in order to pump all areas of the tank.
- ❒ Watch for backflow from the tank outlet pipe. Significant backflow indicates a drainfield system backup. A small amount of backflow can indicate a sag in the pipe to the drainfield.
- ❒ Pump the tank thoroughly. Use a septage spoon and backflush to loosen the sludge in the corners of the tank.
- ❒ Do not "seed" the tank by leaving septage in it.
- ❒ Do not scrub or power wash the tank's walls.

After Pumping

- ❒ Check the empty tank and note any signs of structural damage such as an open weep hole, leaking midseam, damaged baffles, or cracks.
- ❒ File report with the town. Check with your local town hall to find out whether you or the pumper need to provide the report of the completed pump-out.



How Can I Reduce the Number of Pump-outs Needed?

You can save time and money by taking a few daily precautions that reduce the frequency of pump-outs your system will need:

- **To flush or not to flush —** Aside from wastewater, toilet paper is the only other thing that should be flushed. Using the toilet to dispose of sanitary products, paper towels, disposable diapers, cigarette butts, and even tissues will harm your septic tank and cause you to need pump-outs more often.
- **Don't use a kitchen garbage disposal.** Septic systems are not intended to dispose of food waste, coffee grounds, grease, or fat, and, in fact, they will harm the septic tank. Try using a compost pile; it will reduce the number of pump-outs your system needs!
- **Reducing water usage** will protect your septic system. Repair leaky faucets and toilets; install low-flow water fixtures, and turn off the water while brushing your teeth or shaving. Water conservation reduces the load of wastewater your septic system has to handle.

Will System Additives Reduce the Number of Pump-outs Needed?

- Rhode Island law prohibits the use of acids and organic chemical solvents in septic systems. Acids will destroy a concrete septic tank, and they are ineffective in cleaning the tank. Most importantly, they can contaminate water supplies!

- While some manufacturers claim that biological additives enhance treatment and reduce the number of pump-outs your system will need, research indicates that biological enzymes and other "miracle" system additives do not improve septic system functioning. The amount of bacteria or enzyme in each does of additive is so small, that its effectiveness is virtually undetectable.

- Using additives to avoid pumping may cause even bigger problems. Without proper pump-outs, solids will flow into and clog the drainfield, resulting in an expensive repair process.

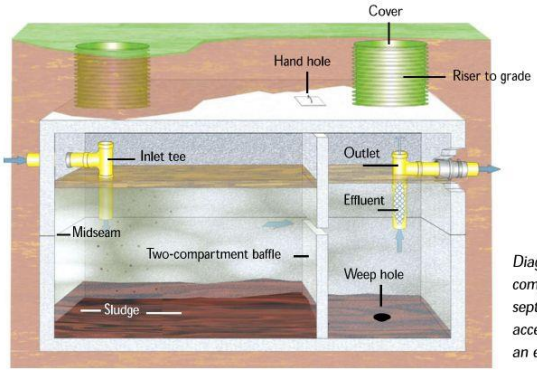


Diagram of a two-compartment septic tank with access risers and an effluent screen.

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Department of Natural Resources Sciences
Cooperative Extension Onsite Wastewater Training Center and Nonpoint Education for Municipal Officials

SEPTIC SYSTEM PUMP-OUT RECORD

Date	Service Provider	Cost	Notes

Appendix D: Coventry Groundwater Near Landfill Ordinance

Town of Coventry, RI
Thursday, April 7, 2016

Chapter 242. Wells

Article II. Groundwater Near Former Landfill

§ 242-14. Use of groundwater for potable purposes prohibited.

A. In connection with the remediation of the former Town Landfill located on the southern side of Arnold Road, the use for potable purposes of groundwater under certain real property (in whole or in part) located to the north and south of Arnold Road is hereby prohibited. For the purposes of this article, "potable purposes" is defined to mean use for drinking water or involving direct human contact (such as use in swimming pools) but does not include use for irrigation or other purposes.

B. The real property in whole or in part subject to this article is set forth on the list attached hereto as Exhibit A[1] and incorporated herein. A map showing the real property in whole or in part that is subject to this article is attached hereto as Exhibit B[2] and incorporated herein, and a copy of the map shall be maintained in the Office of the Town Building Official. Only that portion of a parcel of real property within the wellhead protection buffer boundary as shown on Exhibit B is subject to this article.
   [1] *Editor's Note: Said exhibit is on file in the Town offices.*
   [2] *Editor's Note: Said exhibit is on file in the Town offices.*

C. The placement and use of irrigation wells on the real property subject to this article shall be subject to the prior approval of the Town and the Rhode Island Department of Environmental Management to ensure that any such well is not located within the known contaminant plume.

D. Such prohibition shall remain in effect until the Rhode Island Department of Environmental Management or its successor department or agency shall determine that groundwater under such real property is suitable for use for potable purposes as defined herein. The Town Building Official shall give immediate written notice to the Director of the Rhode Island Department of Environmental Management upon repeal or modification of this article or any judicial decision that repeals or modifies this article.

§ 242-15. Enforcement.

The Town Building Official is authorized to enforce the provisions of this article and to institute such proceedings, including proceedings to enjoin the use of groundwater prohibited by § **242-14**, necessary to effectuate the requirements of this article. The Town Building Official shall also provide to the Director of the Rhode Island Department of Environmental Management an annual report by September 1 of the number and nature of any violations of this article in the prior fiscal year ending June 30.

§ 242-16. Exception for investigative monitoring.

This article shall not apply to the use of groundwater from any investigative monitoring well installed in connection with the investigation or remediation of the former Town Landfill or by any federal, state or local governmental authority.