

STAFFORD POND SOURCE WATER PROTECTION PLAN



Developed for: Town of Tiverton Conservation Commission

Prepared by: Atlantic States Rural Water & Wastewater Association

This Plan was prepared by the Atlantic States Rural Water and Wastewater Association (ASRWWA) in cooperation with the Rhode Island Department of Environmental Management and Rhode Island Department of Health for the Town of Tiverton and Stone Bridge Fire District. Program funding was provided by the United States Department of Agriculture's (USDA) Source Water Protection Program.

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1. INTRODUCTION

1.1 Purpose of the Plan

This Source Water Protection Plan was prepared by Atlantic States Rural Water and Wastewater Association (ASRWVA) along with the Town of Tiverton Conservation Commission to protect Stafford Pond and its watershed. This Source Water Protection Plan includes **Protection and Restoration Actions** for water quality and aquatic habitat. Aquatic habitat includes all types of wetland systems, rivers, streams, lakes, and ponds in a watershed. The future “vision” this plan seeks to achieve is as follows:

Water quality and aquatic habitat in the Stafford Pond watershed will support the needs of current and future generations by supplying high-quality drinking water from surface water and groundwater and provide a crucial foundation for a healthy local ecosystem.

A watershed 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—in this case, source water protection.

Drinking water is sourced from groundwater, surface water, or a combination of the two—and it is important to note that groundwater and surface water are in many ways interconnected. Further, water resources are part of a larger Hydrologic Cycle through which water and its constituents move through the atmosphere, lithosphere, and hydrosphere and every

ecosystem and habitat on the planet. It is important to understand that, like all communities, Tiverton source water resources are part of this larger, interconnected, and globally vital network.

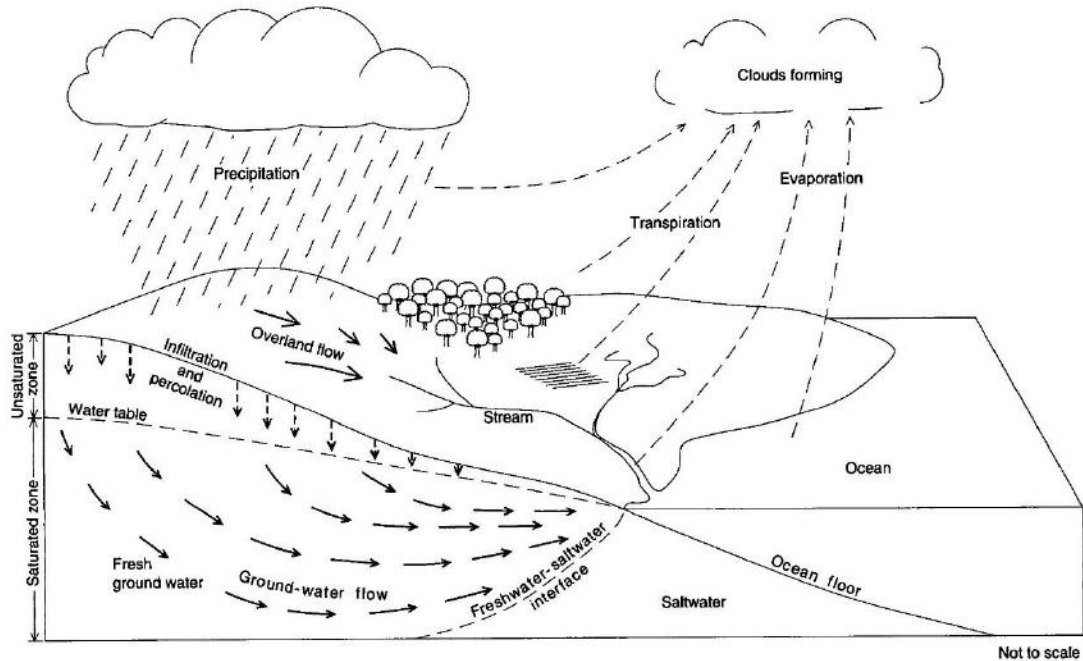


Figure 1: The hydrologic cycle.

1.2 Issues in the Watershed

Stafford Pond is the reservoir that supplies the Stone Bridge Fire District water system in Tiverton, RI. However, high levels of the nutrient phosphorus have resulted in Stafford Pond being designated by the Rhode Island Department of Environmental Management (RI DEM) as an “impaired waterbody.” This means that water quality does not meet its goal as a drinking water source without treatment. High levels of phosphorus present in Stafford Pond significantly increase the likelihood of hazardous algae blooms which can increase the cost of treatment.

In addition, a large proportion of the residents near the pond depend on onsite drinking water wells and onsite wastewater treatment systems (OWTS); therefore, strategies must be in place to protect groundwater in the watershed that supplies these drinking water sources as well. Stafford Pond is also an important recreational fishing area as it has one of the last few remaining populations of smallmouth bass in Rhode Island. Stafford Pond is stocked by the RI DEM Fish & Wildlife Division and is the site of several fishing tournaments each summer.

2. WATERSHED DESCRIPTION

2.1 Study Area

The Stafford Pond watershed is located in eastern Rhode Island in the northeast corner of the Town of Tiverton. The pond is drained by Sucker Brook which runs from the north end of the pond northward to Fall River, Massachusetts. The watershed, for purposes of this Plan, only encompasses the area upstream/south of the outfall to Sucker Brook.

Quick Facts:

- Stafford Pond covers 487 acres in area.
- The pond is roughly 1.9 miles at its longest point (north/south) and approximately 0.5 miles at its widest point (east/west).
- The Stafford Pond watershed covers 947 acres and is approximately 2.05 miles at its longest point (north/south) and 1 mile at its widest point (east/west).
- The watershed lies entirely within the Town of Tiverton, Rhode Island.

Map 1 provides an overview of the Stafford Pond watershed. The Pond is fed by an unnamed stream entering approximately midway along the western shore and a second unnamed stream entering at the northeast corner, as well as by stormwater runoff near the boat launch on the eastern shore. Sheet flow also contributes to the pond. Stafford Pond is drained by Sucker Brook, which runs north from the pond toward Fall River, Massachusetts.



Map 1: The Stafford Pond watershed.

Groundwater and surface water in the watershed 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.

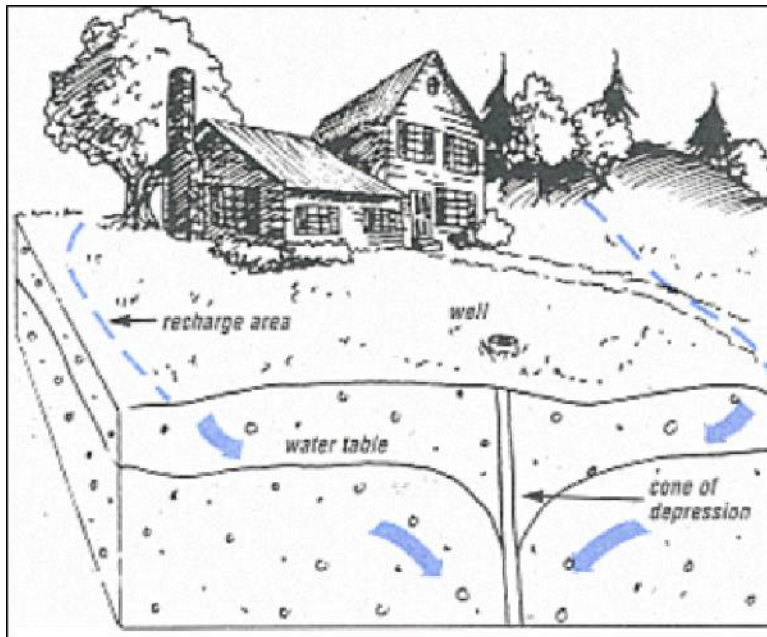


Figure 2: A schematic of a well typical of properties not serviced by a public water supply.

2.2 Land Use/Land Cover in the Watershed

Land use affects the function of watersheds in myriad direct and indirect ways. The mismanagement of wastes and alteration of land cover can greatly impact the biological, physical, and chemical integrity of water resources. Understanding patterns of land use/land cover in a watershed categorically, temporally, and spatially is integral to effective planning toward the amelioration of legacy and current impacts as well as future threats. **Figure 3** shows a breakdown of land cover in the Stafford Pond watershed by percent, while **Map 2** shows the same spatially.

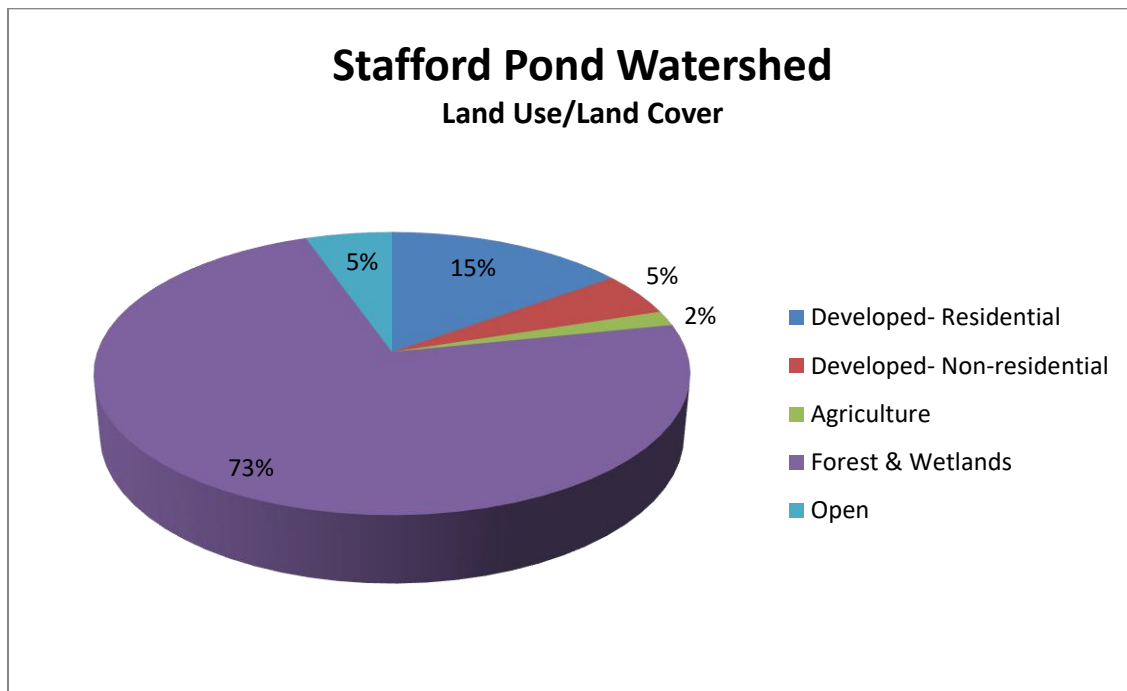
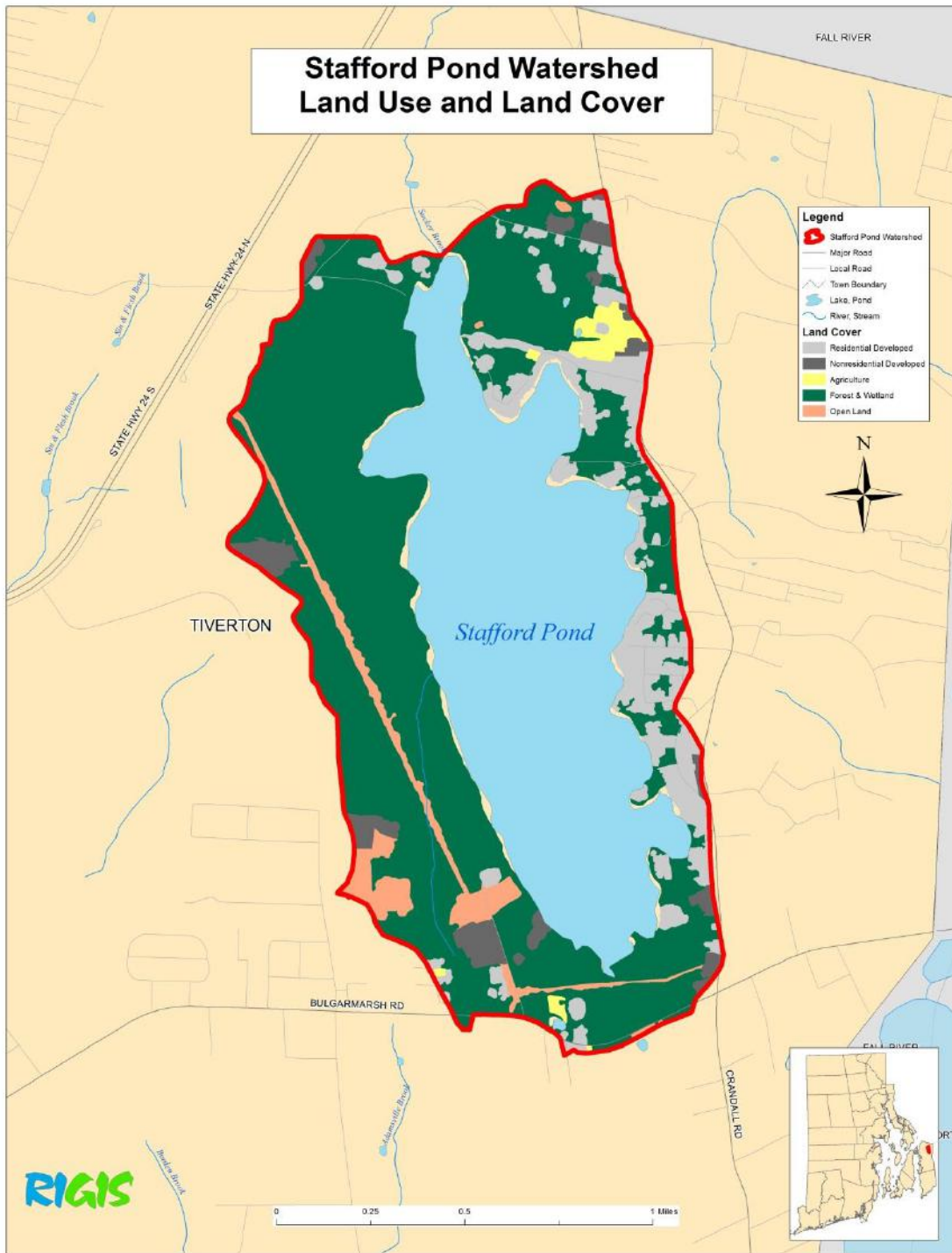


Figure 3: Land use/land cover in the Stafford Pond watershed.



Map 3 shows impervious surfaces within the Stafford Pond watershed. Impervious surfaces are buildings, streets, parking areas, etc. that do not allow precipitation to infiltrate into the soil. Serious adverse impacts can be seen when impervious surfaces in a watershed exceed 10%. The percent of impervious surface in the Stafford Pond watershed is 5.4% (2011 aerial photos). See more discussion on impervious surfaces and stormwater in Section 4.1. Relatively low percent impervious surface and mostly undeveloped land suggest Stafford Pond might have good water quality, but elevated nutrient levels persist. This may be due to poor stormwater management and loss of vegetated buffers to act as nutrient sinks along the riparian areas of the pond and its tributaries. In addition, nutrients from agriculture, lawn care, and septic systems may be a major contributing factor. These factors will be discussed more in Section 3 - Water Quality and Section 4 - Threats to Water Quality.



Map 3. Impervious surfaces in the Stafford Pond watershed.

2.3 Drinking Water Sources in the Watershed

Protecting surface water and groundwater resources is vital to public health and economic considerations as well as to ecological function, biodiversity, and environmental suitability in general. Further, protecting the source of a water supply is far less costly than treating the water to remove contaminants. Such benefits can be realized far into the future for communities whose water resources are sufficiently and effectively protected.

Homes, businesses, etc. that are not connected to a public water system depend on an onsite drinking water well for their water supply. In such cases property owners are responsible for maintaining and testing their own water supply. It is also private property owners' responsibility to protect their water supply from septic systems, lawn care, and other activities that may involve potential pollutants. Areas within the Stafford Pond watershed that are served by the Stone Bridge Fire District are shown on **Map 4** by a buffer of streets with public water lines.

The Stone Bridge Fire District is classified a "community" water system (≥ 15 connections serving ≥ 25 year-round residents) and provides public drinking water to 8,000 customers, including 3,400 residential connections. The District withdraws up to 750,000 gallons of water a day from Stafford Pond during peak demand. The District also sells treated water to the Town of Portsmouth, RI. Properties outside the highlighted service area on **Map 4** are served by onsite, private wells.



Map 4: Area serviced by public water in the Stafford Pond watershed.

2.4 Wastewater Management in the Watershed

All of the structures in the Stafford Pond watershed are served by onsite wastewater treatment systems. (See discussion in Section 3.4.)

2.5 Wetlands in the Watershed

Wetlands account for approximately 8.5% of the total area of the Stafford Pond watershed (see Map 1). Wetlands are an extremely valuable natural resource as they carry out a key role in the environment. Their hydrology initiates the cycling of nutrients and other biogeochemical processes that are crucial for water quality, and the fertile, complex habitat they provide is likewise important for biodiversity. While most wetlands have water year-round and are known as perennial wetlands, many do not and are wet only certain times of year—such are known as ephemeral wetlands. From a land use standpoint, it is important to accurately delineate and avoid wetlands so as to limit impacts on the local environment. All wetlands in the Rhode Island are protected by law, as are lands adjacent to wetlands which serve as buffers. Wetlands provide the following beneficial functions:

- Abate flooding by storing excess water during heavy periods of rain and/or snowmelt.
- Provide key links in the water cycle. Many help maintain stream flow through much of the year by releasing water from both surface and groundwater storage;
- Naturally filter polluted runoff;
- Important habitat for a great many flora and fauna.

- Supply large amounts of organic material that serves as a foundational energy base for local food chains.
- Support recreational activities including fishing, hunting, hiking, photography, bird watching, education, and nature studies.

3. WATER QUALITY

3.1 Overview

Most pollutants in water are invisible to the human eye, so water cannot be determined to be “clean” by simply looking at it. Various types of pollutants affect water quality—in Rhode Island, the most common are nutrients, bacteria, and metals. In the case of Stafford Pond, the primary pollutant is nutrients. Nutrients are present in waterbodies naturally, however, various human activities can cause nutrients to become elevated which can lead to major negative impacts to water quality. Elevated levels of nutrients often cause algae blooms that can take over an entire waterbody. When the large amounts of algae die, the decomposition by bacteria consumes the oxygen in the water. As a result, less oxygen is available for other lifeforms in the ecosystem, which causes the pond to shift into a low oxygen environment. This phenomenon is known as hypoxia and greatly harms aquatic life causing die-offs of fish and other plants and animals.

High levels of organic compounds from algal blooms are also a concern because during the typical public drinking water treatment process, organic matter can create potential carcinogens called Total Trihalomethanes (TTHMs). This occurs when chlorine additive—which is used as a disinfectant—reacts with the otherwise harmless organic matter to form TTHMs. To address this public health concern, the Stone Bridge Fire District upgraded its treatment

processes. However, this does not address the root of the problem. Protecting the source of the water is more cost-effective and comprehensive for protecting drinking water, the aquatic ecosystem, and the resource of Stafford Pond as a whole.

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 water resources from pollution. Each waterbody has a set of water quality standards applied to it based on its designated use. For example, drinking water reservoirs must be much cleaner than waterbodies that are used only for recreation. Both descriptive and numeric standards are used.

The Rhode Island Department of Environmental Management uses information from water monitoring to indicate whether or not a waterbody is acceptable for and supports its designated use. If monitoring indicates water quality meets standards, the waterbody can fully support its designated use(s). If, however, monitoring indicates water quality standards prescribed for certain uses are not met, the waterbody cannot support one or more of its designated uses and is deemed "impaired."

3.2 Conditions at Stafford Pond

Stafford Pond was added to the Rhode Island Department of Environmental Management List of Impaired Waters in 1998 due to hypoxia, nutrients, and excess algal growth. In response to the determination of Stafford Pond as an impaired water body, the Rhode Island Department of Environmental Management determined the degradation of water quality in Stafford Pond to be caused by high levels of phosphorus entering the watershed via runoff from local agricultural and residential land uses and stormwater discharges. The agency developed a Total Maximum

Daily Load for total phosphorus inputs to Stafford Pond. This Total Maximum Daily Load report includes a water quality restoration plan and documents the amount of phosphorus that must be removed in order to support the use of Stafford Pond as a drinking water source.

Recently, there have been documented blooms of a type of algae of particular concern known as cyanobacteria or blue-green algae. In addition to causing hypoxia, cyanobacteria blooms can produce toxins that are harmful to people, pets, and wildlife—such toxins have indeed been found in Stafford Pond. The presence of cyanobacteria/blue-green algae in Stafford Pond was confirmed by RI DEM in 2017 and multiple advisories have been issued since.

3.3 Stormwater Runoff

Surface runoff or overland flow is rain and/or snowmelt that flows over the land surface before it reaches and is incorporated into a waterbody or wetland. Where there has been development, areas of natural landscape cover have been replaced with nonporous or impervious surfaces in the form of buildings, streets, parking lots, compacted soils, and other paved or hardened surfaces. Impervious surfaces significantly impact both the quality and quantity of runoff. As water is unable to infiltrate into the soil, the volume of runoff increases greatly during precipitation events. Greater runoff often causes increased flooding, erosion, and sedimentation.

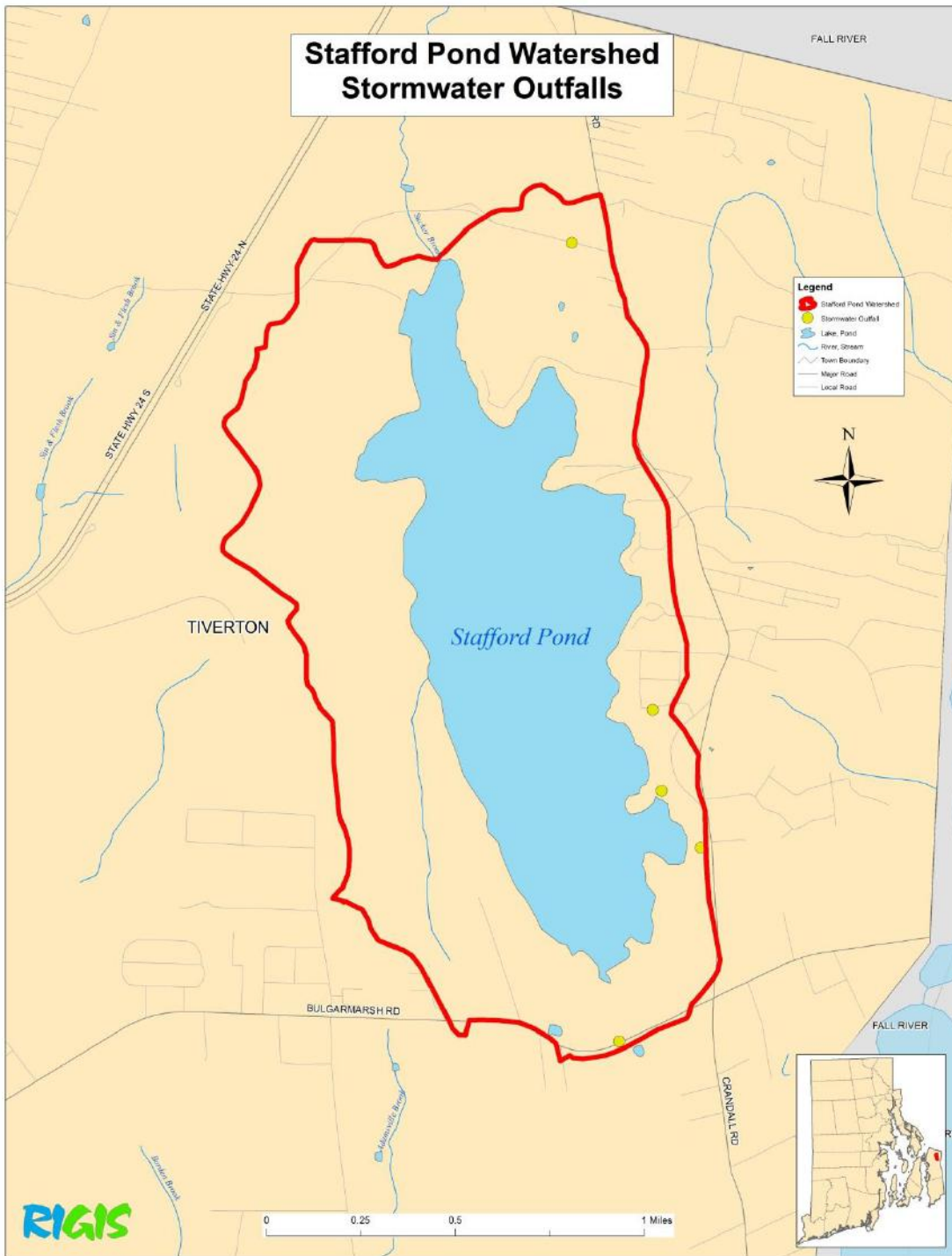
In addition to the aforementioned physical impacts, greater runoff due to increased impervious surfaces in a watershed allows for pollutants to be transported directly into waterbodies and causes further degradation of water quality. The pollutants typically carried by stormwater runoff come from various everyday sources, 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, nutrients and bacteria from failing septic systems and cesspools, nutrients and bacteria from wild animal waste, 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 waterbodies by stormwater drainage networks. Drainage outfalls in the Stafford Pond Watershed are shown on **Map 5**. Historically, these stormwater networks were designed to carry stormwater away from developed land as quickly as possible to prevent flooding with little to no treatment for pollutants.

As discussed earlier in Section 2.2 - Land Use in the Watershed, the proportion of impervious land cover in the Stafford Pond watershed is relatively low at 5.4%. This is well below the aforementioned 10% level; however, there are some potential problem areas. As can be seen in **Map 5**, there are at least five known stormwater outfalls in the Stafford Pond watershed; at least two of which are located directly on the shore of the pond. Also, there is a boat launch and parking area on the eastern shore of the pond off Stafford Road that appears to be heavily used and may be contributing significant stormwater runoff directly into the pond. These and other potential stormwater problem areas could be contributing to degradation of the resource and should be investigated and monitored.

Additionally, climate change stands to further complicate and exacerbate the issue of surface runoff. Changes in precipitation patterns have been observed and are predicted to continue. In general, precipitation is expected to come less moderately with more occurrences of deluge and drought. The impact climate change will have on the hydrology and ecology of the Stafford Pond watershed is not surely known nor are the implications concerning land use impacts and the protection of the resource.



Map 5: Stormwater outfalls in the Stafford Pond watershed.

3.4 Onsite Wastewater Treatment Systems

As noted earlier, all of the properties within the Stafford Pond watershed rely on onsite wastewater treatment systems (OWTS) (including cesspools) to collect, treat, and disperse wastewater into the soil. These systems represent potential sources of nitrates, phosphates, chlorides, bacteria, viruses, and other pollutants to groundwater, and failed systems may also discharge wastes directly to surface water. In addition, if improperly used for the disposal of hazardous wastes such as paints, solvents, petroleum products, etc. onsite wastewater treatment systems could be a source of dangerously toxic compounds.

3.5 Lawn and Turf Management

The care and maintenance of landscaped areas such as residential lawns and gardens, golf courses, cemeteries, athletic fields, parks, etc. 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. This can cause a host of negative impacts water resources including algae blooms, habitat degradation, and fish/wildlife die-off.

3.6 Agriculture

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. While it is possible for farms to operate with minimal negative effect on water resources, best management practices (BMPs) must be strictly maintained spatially and temporally.

As indicated in **Figure 3**, agricultural land use accounts for only 2% of the Stafford Pond watershed area. **Map 2** shows that the most sizable area of agricultural land is located in the northeasterly part of the watershed about 100 yards from Stafford Pond itself. There are also some smaller areas of agricultural land within the watershed just south of Stafford Pond. Buffering agricultural perimeters within the watershed with native landscaping materials and vegetation that provide slope stabilization and nutrient sinks could present opportunities to increase water quality and ecological function.

3.7 Roadways

Roadways present a significant threat to water quality. The possibility of an accident involving a truck transporting hazardous materials poses a risk. Roadways are also 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.

Numerous residential roads and driveways are located within the Stafford Pond watershed, especially along the easterly side of the pond. In addition, two major local thoroughfares are located in the watershed—Bulgarmarsh Road to the south and Stafford Road to the east. At places these roads come within 200 yards of the pond.

3.8 Pet Waste

Pet waste can be a significant contributor of bacteria, other pathogens, and nutrients to surface waters. Pet waste that is left on the sidewalk or on grass near the street can then be washed into stormwater drainage systems and cause 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 shell fishing (US EPA 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.

3.9 Recreational Uses

Recreational access has been conclusively shown to have negative impacts on drinking water sources. People entering the waters of Stafford Pond represent another way in which contaminants such as bacteria, viruses, and other pathogens can be introduced to the resource. Furthermore, heavy beach use can impact buffer areas when vegetation is trampled or removed and soils are compacted.

Perhaps the greatest threat to water quality in Stafford Pond from recreational uses is from boating. Motor fuel and oils that enter the water through spills, residue, or exhaust of unburnt materials can introduce hydrocarbons, tetraethyl lead, ethylene dibromide, ethylene dichloride, zinc, sulphur, and phosphorus to water and sediments. For example, concerning exhaust of unburnt materials, it has been observed that more than 500 g of unburnt hydrocarbons are released from a 70-horsepower outboard boat motor per hour. Further still, exhaust

contaminants can also include carbon, nitrogen oxide, and a number of oxidation products which are likewise directly introduced to the resource.

Currently, swimming is prohibited in Stafford Pond. However, use of motorized watercraft is permitted, and numerous fishing tournaments are held at Stafford Pond each year.

3.10 Residential Land Use

Threats to water quality from residential land use include several of the topics discussed above—onsite wastewater treatment systems, lawn management, and pet waste. Other potential sources of surface water and groundwater contamination include the following: household cleaning chemicals, automotive fluids (oil and gasoline), paints and solvents disposed of down the drain or onto the land surface; heating oil storage (above and below ground); 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 numerous potential contaminants stored, used, and disposed of around the home.

3.11 Commercial and Industrial Land Use

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. The Rhode Island Department of Environmental Management'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 Environmental Protection Agency and Rhode Island Department of Environmental Management. There are five registered hazardous material handlers in the Stafford Pond watershed. They are listed in the table below.

Hazardous Materials Handler	Location
R & A Auto Body	207 Stafford Rd.
George's Gas & Services	1215 Stafford Rd.
Speedway	1308 Stafford Rd.
Site Ready Materials	322 Eagleville Rd.
Northeast Millwork	500 Eagleville Rd.

Table 1: Registered hazardous material facilities in the Stafford Pond watershed.

There is one gravel operation in the Stafford Pond watershed. This operation poses 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 ground water itself may be impacted.



***Figure 4:** A gravel quarry within the Stafford Pond watershed. The Stafford Pond watershed boundary can be seen in orange.*

The quarry shown in **Figure 4** is bisected by the watershed boundary line for the Stafford Pond watershed. Route 24 and Eagleville Road complicate the hydrology in that area, so it is difficult to determine from contours if ground and surface water from the quarry pit flow into or away from the Stafford watershed.

3.12 Point Sources

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 Rhode Island Department of Environmental Management. The Stone Bridge Water Treatment Plant is the only RIPDES permit holder in the Stafford Pond watershed. The permit authorizes the Stone Bridge Fire District to discharge emergency overflows. Such discharges will only occur during emergency situations and are temporary in nature. Flow monitoring is required during emergency conditions and such discharges must only take place in accordance with the facility's approved Standard Operating Procedure. Accordingly, such potential discharges are not a significant threat to the Stafford Pond watershed.

4. 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, Rhode Island Department of Environmental Management, Rhode Island Department of Health, and the Stone Bridge Fire District to protecting this resource.

4.1 Tiverton Comprehensive Community Plan

Concerning Stafford Pond, the Natural Resources section of Tiverton's Comprehensive Community Plan states:

Stafford Pond is a primary source of the drinking water supply for Tiverton, Fall River and Portsmouth. Although it lies within the Safford Pond Watershed Overlay District, it is not fully protected because of ongoing recreational uses. The protection of Stafford Pond and its watershed is a unique planning challenge because of growing development along its shores, the complexities of its ownership, long standing recreation use and the lack of a single overall management authority.

...Steps to protect Stafford Pond include the adoption of a town ordinance requiring mandatory testing of individual septic disposal systems around the pond, the publication and dissemination of a pamphlet entitled "Your Guide to Protecting Stafford Pond" and the proposed creation of a Stafford Pond Watershed Committee. The Watershed Protection Overlay District also includes a requirement that all on-site (individual) sewage disposal systems within the watershed be improved to the prevailing state and local standards by 2005. Nevertheless, the quality of water is still threatened by the widespread use of gasoline motors, jet skis, seaplanes, swimming and other recreational uses not compatible with a drinking water supply.

Concerning groundwater resources, Tiverton's Comprehensive Community Plan states:

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.

The Comprehensive Community Plan also lays out goals, policies, and actions regarding natural resources including Stafford Pond. Toward the goal of preserving and protecting the natural features that contribute to the environmental quality of Tiverton, policies relevant to Stafford Pond include protecting "those natural features that sustain the basic functions of the town, including...surface and groundwater (and) wetlands" and protecting "the environment from potential sources of contamination." Actions prescribed by the Comprehensive Community Plan pertaining to Stafford Pond in particular include:

Action 13a: Establish a Stafford Pond Watershed Association that includes representatives of the water districts, town boards and commissions, residents, and business people which have an interest in the watershed.

Action 13b: Work together with RI DEM, RI DOH, RI DOT and the Stone Bridge Fire District to develop and implement a plan for recreational usage that protects and ensures Stafford Pond's long-term viability as a drinking water source.

Action 13c: The Tiverton Open Space Commission (TOSC) should investigate the legal and financial feasibility of acquiring developed parcels in the Stafford Pond watershed. The TOSC, working proactively with the Tiverton Land Trust and the R.I. Chapter of The Nature Conservancy, should develop policies that place a higher priority on the acquisition of land in the Stafford Pond watershed in order to protect the Pond's water quality.

Concerning Stafford Pond, the Comprehensive Community Plan goes on to state:

The protection of the Stafford Pond watershed is particularly urgent since the Pond is the town's principal supply of public drinking water. The establishment of a citizen watchdog group for that watershed area could be particularly effective in monitoring activities which would impact water quality and educate citizens about the need for watershed protection. This group could also guide the development of a management plan for the Stafford Pond watershed. In addition, while the pond benefits from the restrictions contained in the Watershed Protection Overlay District and the use of BMPs at an abutting dairy farm and the Stafford Road stormwater drain, the continued use of gasoline motors on the Pond is detrimental.

Some progress is being made to buy and preserve undeveloped parcels in Stafford Pond's watershed. However, developed parcels that abut the shoreline also contribute to water pollution. Unlike all other drinking water reservoirs in the state, Stafford Pond's east shore has numerous year-round and seasonal

residences that pose the threat of polluted stormwater runoff, pollution from failed septic systems, and pollution from human recreational uses. This threat could be gradually reduced over time by a concerted program of buying shoreline parcels; removing buildings, paved areas, and septic systems; and returning the land to a natural state.

4.2 Watershed Protection Overlay District

The Town of Tiverton has adopted as Article VIII of its Zoning Ordinance a Watershed Protection Overlay District. The purpose of the Watershed Protection Overlay district is stated as being:

- a. To protect, preserve and maintain the quality and quantity of surface water decreed by the town council to be of irreplaceable value as a public water supply upon which the residents of the Town of Tiverton and others depend.
- b. To protect the quality and quantity of drinking water supplies by regulating the use and development of land adjoining watercourses or primary water recharge areas, and to prevent uses of land within the watersheds of Stafford and Nonquit Ponds that would adversely affect the quality of water.
- c. To protect the health, safety and general welfare of the public.

The Watershed Protection Overlay District in part comprises the Stafford Pond watershed and prohibits within its boundaries the following:

- (1) Storage of petroleum or other refined petroleum products, except within buildings which it will heat or for normal household or agricultural use. This includes the parking for a period exceeding two hours in any 24-hour period of vehicles used for the storage and/or delivery of fuel.
- (2) The storage or disposal of hazardous wastes, as defined by G.L. 1956, § 24-19.1-1 et seq.
- (3) Disposal of solid wastes, other than brush and stumps native to site, except within a state department of environmental management approved solid waste facility.
- (4) The disposal of liquid, or leachable wastes, except for approved subsurface waste disposal systems.
- (5) Industrial, commercial and service uses which discharge process wastewater on-site, and discharging wastewater containing contaminants other than normal organic waste.
- (6) Storage of road salt or deicing chemicals unless stored in a publicly maintained roofed structure with an impervious floor, or used for the deicing of privately maintained roads and stored in a water tight container.
- (7) Automotive service and repair shops, junk and salvage yards.

(8) Incinerators and sanitary landfill sites.

In addition, the Watershed Protection Overlay District requires a variance for any and all proposed development within 200 feet for Stafford Pond and its direct tributaries.

4.3 Onsite Wastewater Treatment Systems

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

The design and installation of these systems must comply with RI DEM rules, but proper maintenance over the course of an OWTS lifespan is crucial for preventing environmental impacts and is difficult to ensure. Owners of OWTS 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 regulations. Municipalities 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 system repairs and replacement.

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

Table 2: Tiverton Onsite Wastewater Treatment System Checklist.

4.4 Municipal Separate Storm Sewer System Program

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 Stormwater Management Program Plan, which involves the following 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
- 6) Pollution Prevention/Good Housekeeping

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

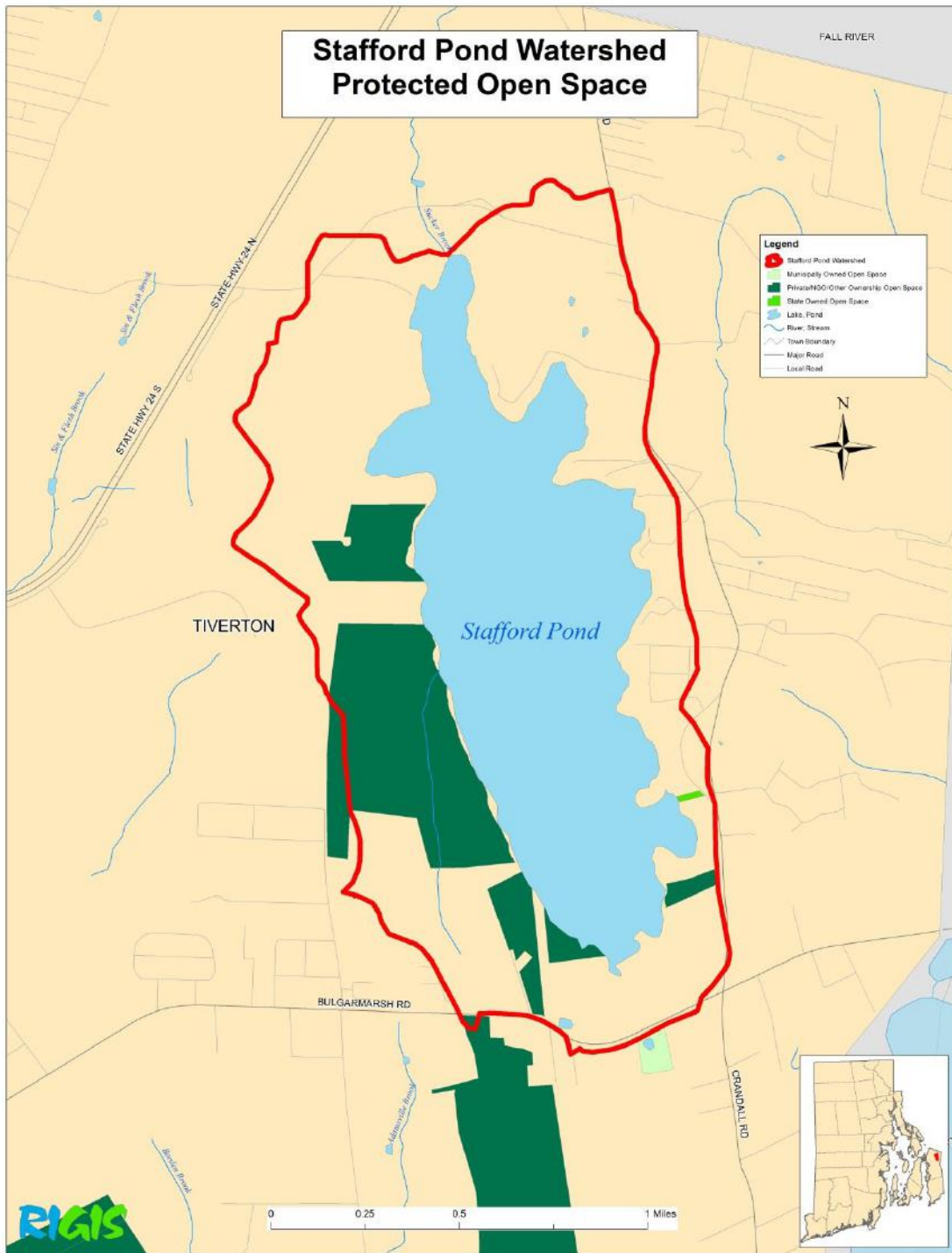
Tiverton has an ongoing and successful RIPDES Phase II MS4 Program. Despite its listing as an impaired waterbody, Stafford Pond is also identified by RI DEM as a Special Resource Protection Water because of its status as a drinking water source. This designation makes Stafford Pond subject to the Tiverton Stormwater Program. The Stormwater Program has worked with the Conservation Commission and other Town committees to provide outreach to residents of the Stafford Pond watershed regarding OWTS, stormwater, and waste management. Indeed, several stormwater BMPs have been initiated at various locations within the Stafford Pond watershed including the instillation of some rain gardens and bioswales at strategic locations. However, more can and should be done.

4.5 Open Space and Buffers

Protecting open space through land conservation practices is important to water quality and ecological function in a watershed. Natural landscapes remove pollutants through processes such as the infiltration of stormwater into the soil and the uptake of water and nutrients by vegetation. 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 Stafford Pond watershed controlled by state and local government and nonprofits are shown on **Map 7**. Areas within the Stafford Pond watershed that are protected as open space are concentrated to the south and west of the pond; there are no areas protected as open space to the north or east of Stafford Pond. 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 7: Protected open space in the Stafford Pond watershed.

4.6 Agricultural BMPs

The Stafford Pond TMDL estimated that the northern tributary—which runs through the Arruda Dairy Farm at 408 Stafford Rd.—was responsible for 50% of the phosphorus watershed load. Since then, some BMPs have been deployed at the farm including fencing and a drainage basin to control runoff. However, while subsequent monitoring has revealed these efforts have indeed decreased phosphorus load by more than 50%, the Arruda dairy Farm appears to still be a significant source of the nutrient.

BMPs are vital toward limiting impacts to water resources from agricultural land uses; however, such are typically voluntary and not required per regulation. Accordingly, farmers need to be educated, encouraged, and supported toward the implementation of BMPs. Governmental/nonprofit organizations such as the US Department of Agriculture Natural Resources Conservation Service can provide assistance in preparing farm management plans and for information on grants for installing BMPs to control water pollution.

5. IMPLEMENTATION

5.1 Public Information and Outreach

Public education/awareness is a key part of this Plan because everyone in the Stafford Pond watershed potentially 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 Stafford Pond watershed residents might be organized/overseen by a watershed association and executed through mailings, media, and/or public meetings with an aim to increase awareness of the link between land use and drinking water quality and to involve the public in watershed protection activities. Some of the most important areas to focus on should be 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, US EPA, Tiverton Wastewater Management, RI USDA/NRCS, and the Eastern RI 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: <http://www.easternriconservation.org//>

Recommended Action:

- Create a watershed association comprised of stakeholders as prescribed in the Tiverton Comprehensive Community Plan.
- Information and Outreach by means of mailings, media, public meetings, etc.

- The Stone Bridge Fire District, in cooperation with the Town of Tiverton and/or RI DOT, 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.

5.2 Water Quality Monitoring

Understanding the source and fate of pollutants and developing ways to limit them is crucial in the effort to improve water quality in Stafford Pond and its watershed. Monitoring of water quality in Stafford Pond—particularly for nutrients, algae blooms, and cyanotoxins—should continue and be intensified in any way possible.

Recommended Action:

- SBFD and other interested authorities continue to monitor water quality in the Stafford Pond watershed.
- Form a volunteer group of residents to augment monitoring.

5.3 Stormwater Management

Stormwater has been identified as a primary source of pollutants in the watershed and 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 Management Design and Installation Rules require the use of LID as the primary method for stormwater control.

To assist in incorporating LID into community planning processes, RI DEM, RI DOT, and the University of Rhode Island have developed “LID Site Planning and Design Techniques: A Municipal Self-Assessment.” The self-assessment contains questions covering a variety of topics related to LID. These topics range from open space and land disturbance to impervious surfaces and soil erosion control. Working through the assessment allows an in-depth review of the local regulations that shape development in the community and a comparison to LID benchmark techniques and practices. The intent is to identify which LID techniques are in place and which techniques could be improved or employed.

Recommended Action:

- Complete the LID Self-Assessment tool and revise local ordinances accordingly.

B. Stormwater Retrofits

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 Action:

- Develop and implement a strategy to promote installation of small-scale on-site stormwater BMPs (rain gardens, swales, dry wells, etc.) throughout the watershed at existing and proposed residential and commercial developments.
- Study the feasibility of installing structural stormwater BMPs where practical to treat stormwater from Town roadways.
- RI DOT complete and implement the Stafford Pond Stormwater Control Plan that is required pursuant to the EPA Consent Decree. RI DOT's timetable for this implementation is more than five years.

C. 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 on 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.

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 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 Stormwater Management and Utility District Act of 2002 authorizes municipalities to create stormwater management districts and empowers them to charge fees provided 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. 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 and develop options for billing within the service area.

Recommended Action:

- Conduct a stormwater utility feasibility study.

5.4 Onsite Wastewater Management

Recommended Action:

- Implement the Town's state-approved Onsite Wastewater Management Plan.

5.5 Agriculture

Recommended Action:

- Encourage farmers to apply for funding from NRCS to install BMPs to prevent impacts to water quality.
- Coordinate outreach to farmers—including small-scale and/or part-time farmers—on BMPs to protect water quality.
- Farmers install BMPs.

5.6 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 BMPs.

5.7 Watershed Boundary

Recommended Action:

- The Stone Bridge Fire District should consider more accurately delineating the Stafford Pond watershed, particularly in regards to the gravel quarry previously discussed.

5.8 Regulation of Uses

The Town of Tiverton currently has a watershed overlay district ordinance which applies primarily to residential development with only limited regulation of commercial, industrial, and other non-residential uses. The Stafford Pond watershed encompasses and borders zoning districts in which commercial, industrial, and other non-residential are allowed as-of-right or by special permit. The ordinance should be updated to include measures to address potential impacts from non-residential uses in the watershed.

In addition to impacts from land use/development, Stafford Pond is also impacted by recreational uses as described in Section 3.12. The Town of Tiverton Comprehensive Community Plan proposes the Town—in cooperation with the Stone Bridge Fire District, RI DEM, RI DOH, & RI DOT—develop and implement a plan for recreational uses that protects and ensures Stafford Pond’s long-term viability as a drinking water source.

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 Protection Overlay District and make changes that codify additional protections that are appropriate.

- Create and implement a plan for recreational uses at Stafford Pond.

5.9 Protection of Aquatic Habitat

This Plan addresses both protection and restoration of water quality and aquatic habitat, which includes all types of wetland systems, rivers, streams, lakes, and ponds.

A) 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 and therefore mitigate potential streambank erosion and flooding; and
- Moderate water temperature by providing shade.

Recent state law requires RI 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. One way to protect vital buffers from development is through the proliferation of open space. Areas of land important to watershed function might be strategically acquired outright or put under conservation easements by the Town of Tiverton and/or conservation groups.

Recommended Action:

- Work with local landowners to promote buffer protection and restoration where possible.
- Acquire open space strategically throughout the Stafford Pond watershed.

B) Landscape Connectivity

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

Substandard stream crossings at roadways and driveways on public and private land are much less obvious barriers on 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, RI DOT, and other interested 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 ecological connectivity, and/or to reduce 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 nonnative species that threatens (1) the diversity or abundance of native species, (2) the ecological stability of infested wetlands and waters, and/or (3) commercial, agricultural, aquacultural, or recreational activities dependent on such waters. This includes aquatic as well as semiaquatic and terrestrial species of flora and fauna. Impacts from aquatic invasive species generally include the following:

- 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 and cause other damage to infrastructure; therefore, the Stone Bridge Fire District would have an interest in monitoring the Stafford Pond watershed for the presence of invasive species.

Stone Bridge Fire District, the Town, and/or RI DEM could investigate the watershed—including the wetlands, tributaries, and shoreline of Stafford 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:

- The Stafford Pond watershed was last surveyed in 2010. At that time, the invasive plant species Mudmat and animal species Asian clam were found. Periodic monitoring for invasive species should continue.

5.10 Implementation Table

Action Item	Responsibility	Time Frame	Support and Resources	Cost	Priority
5.1 Public Information and Outreach					
<ul style="list-style-type: none"> Create watershed association 	TOT SBFD	1-2 years	NEMO	\$	L
<ul style="list-style-type: none"> Information and outreach by means of mailings, media, public meetings, etc. 	TOT SBFD	Ongoing	DEM DOH NEMO	\$	M
<ul style="list-style-type: none"> Installation of signs on roadways at the watershed boundaries. 	TOT DOT SBFD	1-2 years		\$	L
5.2 Water Quality Monitoring					
<ul style="list-style-type: none"> Continue existing water quality monitoring efforts. 	SBFD DEM	Ongoing	DEM	\$\$	H
<ul style="list-style-type: none"> Form volunteer group to augment monitoring. 	TOT	1-2 years	DEM	\$	M
5.3 Stormwater Management					
<ul style="list-style-type: none"> Complete LID Self-Assessment Tool and revise local ordinances accordingly. 	TOT	1-2 years	NEMO DEM	\$	M
<ul style="list-style-type: none"> Develop and implement a strategy to promote onsite stormwater BMPs at existing and proposed developments. 	TOT SBFD	1-2 years, ongoing	ERICD NEMO RIGIC	\$\$	M

<ul style="list-style-type: none"> Study the feasibility of structural stormwater BMPs for Town roadways. 	TOT	>5 years	DEM RIGIC	\$\$\$	H
<ul style="list-style-type: none"> Complete and implement the Stafford Pond Stormwater Control Plan that is required pursuant to the EPA Consent Decree. 	DOT	>5 years	EPA	\$\$\$	H
<ul style="list-style-type: none"> Conduct stormwater utility feasibility study. 	TOT	2-3 years	DEM RIGIC	\$\$	M
<ul style="list-style-type: none"> Comply with DEM Stormwater Program (MS4) requirements. 	TOT DOT	Ongoing	DEM	\$\$	H
5.4 Onsite wastewater Management					
<ul style="list-style-type: none"> Implement the Town Onsite Wastewater Management Plan. 	TOT	Ongoing	DEM	\$\$	M
5.5 Agriculture					
<ul style="list-style-type: none"> Encourage farmers to apply for funding from NRCS to install BMPs to prevent impacts to water quality. 	TOT NRCS	1-2 years, ongoing	ERICD	\$	M
<ul style="list-style-type: none"> Coordinate outreach to farmers (including small-scale/part-time farmers) on BMPs to protect water quality. 	TOT NRCS	Ongoing	ERICD	\$\$	M
<ul style="list-style-type: none"> Farmers install BMPs 	Farmers	As needed	NRCS ERICD	\$-\$\$\$	M
5.6 Quarry Operations					
<ul style="list-style-type: none"> Review and update town ordinances as necessary to mitigate potential impacts to water quality from quarry operations. 	TOT	3-5 years	DEM	\$	L
<ul style="list-style-type: none"> Provide outreach/education to quarry operators on appropriate BMPs. 	TOT	3-5 years	DEM	\$	L
5.7 Watershed Boundary					
<ul style="list-style-type: none"> Conduct a new watershed boundary delineation for further accuracy. 	SBFD	1-2 years	DEM	\$\$	L

5.8 Regulation of Uses					
<ul style="list-style-type: none"> Periodically review Watershed Protection Overlay District and revise accordingly. 	TOT	Ongoing	DEM	\$	L
<ul style="list-style-type: none"> Create plan for recreational uses. 	TOT SBFD	2 years	DEM DOH DOT	\$\$	M
5.9 Protection of Aquatic Habitat					
<ul style="list-style-type: none"> Support and promote protection and restoration of vegetated buffers. 	TOT SBFD	Ongoing	DEM ERICD NRCS	\$-\$\$\$	M
<ul style="list-style-type: none"> Inventory stream crossings in the watershed. 	TOT SBFD	3-5 years	NRCS ERICD DOT	\$	L
<ul style="list-style-type: none"> Continue periodic monitoring of Stafford Pond and watershed for invasive species and provide outreach. 	TOT SBFD	3-5 years	DEM RINHS	\$	L
<ul style="list-style-type: none"> Acquire strategic areas of open space 	TOT TLT NC	Ongoing	DEM	\$\$\$	M

DEM RI Department of Environmental Management

DOH RI Department of Health

DOT RI Department of Transportation

ERICD Eastern RI Conservation District

NEMO Nonpoint Source Education for Municipal Officials at URI

NRCS Natural Resources Conservation Service

SBFD Stone Bridge Fire District

TOT Town of Tiverton (Land use commission/boards, Town Council, and/or Stormwater/MS4 Program)

TLT Tiverton Land Trust

NC Nature Conservancy

RIGIC RI Green Infrastructure Coalition

RINHS RI Natural History Survey

- 1) Timeframe: ongoing, 1-2 years, 3-5 years, >10 years, as necessary.
- 2) Estimated Cost: Dollar figure or relative indication of cost. For example:
\$ = <\$25,000; \$\$ = \$25,000 -- \$100,000; and \$\$\$ = >\$100,000.
- 3) Priority: H – High, M – Medium, L – Low

6. 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.

6.1 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 EPA-approved Rhode Island Nonpoint Source Management Program Plan. These grants are made possible by federal funds provided to RI DEM by the EPA under Section 319 of the Clean Water Act.

Eligible applicants: Projects must be in a watershed with a watershed plan; municipal, state, or regional governments, quasi-state agencies, public schools and universities, and nonprofit watershed, environmental, or conservation organizations.

Contact: RI DEM Office of Water Resources, 235 Promenade St., Providence, RI 02908. (401) 222- 4700

6.2 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) brownfields remediation, and (6) estuary management. Through this program, the State of 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, and 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 Infrastructure Bank, 235 Promenade St., Suite 119, Providence, RI 02908. (401) 453-4430.

6.3 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 RIDEM 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: RIDEM Office of Water Resources, 235 Promenade St., Providence, RI 02908. (401) 222-4700; Rhode Island Infrastructure Bank, 235 Promenade St., Suite 119, Providence, RI 02908. (401) 453-4430

6.4 Narragansett Bay and Watershed Restoration Bond Fund

State funds are periodically available from the Narragansett Bay and Watershed Bond Fund to restore and protect the water quality and enhance the economic viability, environmental sustainability and resiliency of Narragansett Bay and its watershed. 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, and riparian buffer and aquatic habitat restoration projects.

Eligible applicants: Statewide; municipal, state, or regional governments; quasi-state agencies, public schools and universities; non-profit watershed, environmental, or conservation organizations; non-governmental for-profit businesses; and private schools.

Contact: RI DEM Office of Water Resources, 235 Promenade St., Providence, RI 02908. (401) 222- 4700

6.5 EPA Southeast New England Program

The EPA Southeast New England Program for Coastal Watershed Restoration brings together partnerships to protect and restore coastal watersheds of southeast New England from Westerly, RI to Cape Cod, MA. The Program seeks projects and partnerships that leverage multiple resources to generate collaboration to implement innovations and efficiencies in ecosystem management.

Eligible applicants: Municipalities, nonprofit organizations, and research/educational institutions.

Contact: US EPA Region 1, Southeast New England Program, mail code 06-1, 5 Post Office Sq., Suite 100, Boston, MA 02109

6.6 NRCS Grants

Environmental Quality Incentives Program

The Environmental Quality Incentives Program (EQIP) 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

The Wildlife Habitat Incentive Program (WHIP) 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 Rhode Island is on coastal habitats, freshwater wetlands, vernal pools, riparian habitats, upland habitats of 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.

6.7 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, and residents. These grants include water and sewer system improvements, and repair/replacement of private wells and onsite wastewater treatment systems.

Eligible applicants: Municipalities.

Contact: RI Office of Housing and Community Development, 1 Capitol Hill, 3rd Floor, Providence, RI 02908, 401-222-7901

6.8 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 & Development, 235 Promenade St., Providence, RI 02908. 401-222-4700

6.9 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

7. EVALUATION

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 a watershed. The most direct and straightforward indicators are water quality measurements, such as concentrations of bacteria, phosphorus, and nitrogen; dissolved oxygen (in particular, the periods of low oxygen that lead to fish kills); and suspended sediment. 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.

In addition to monitoring by the volunteer University of Rhode Island Watershed Watch Program, Stone Bridge Fire District is required to test the quality of the Stafford Pond and report to the RI Department of Health regularly pursuant to the Federal Safe Drinking Water Act. Therefore, testing of the pond is ongoing, and progress will be able to be measured as this Plan and the TMDL are implemented.

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

8. 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 Stafford 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 make updates as needed. The Plan should be considered the first step in an ongoing effort.

The Plan will satisfy the requirements for eligibility for EPA 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 Stafford Pond watershed.

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

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 !



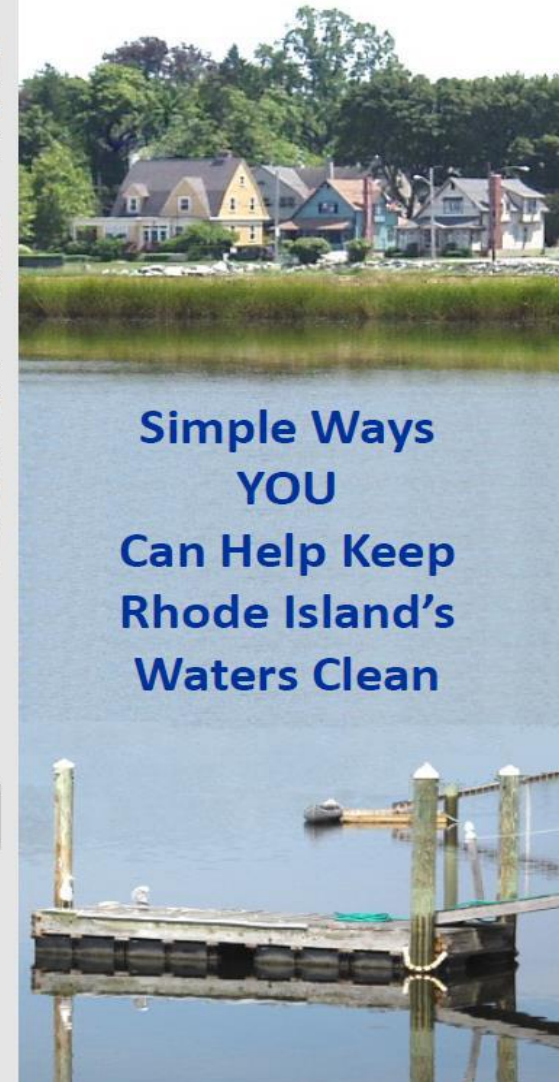
Swim, sail, surf, kayak, fish, boat, shellfish, go birding or walk along the shore. Explore Rhode Island's waters.

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



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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 RIDEEM 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.

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

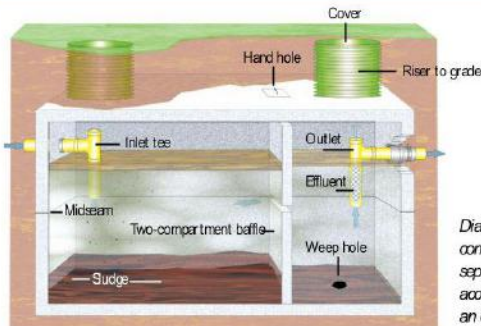


Diagram of a two-compartment septic tank with access risers and an effluent screen.



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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



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.

