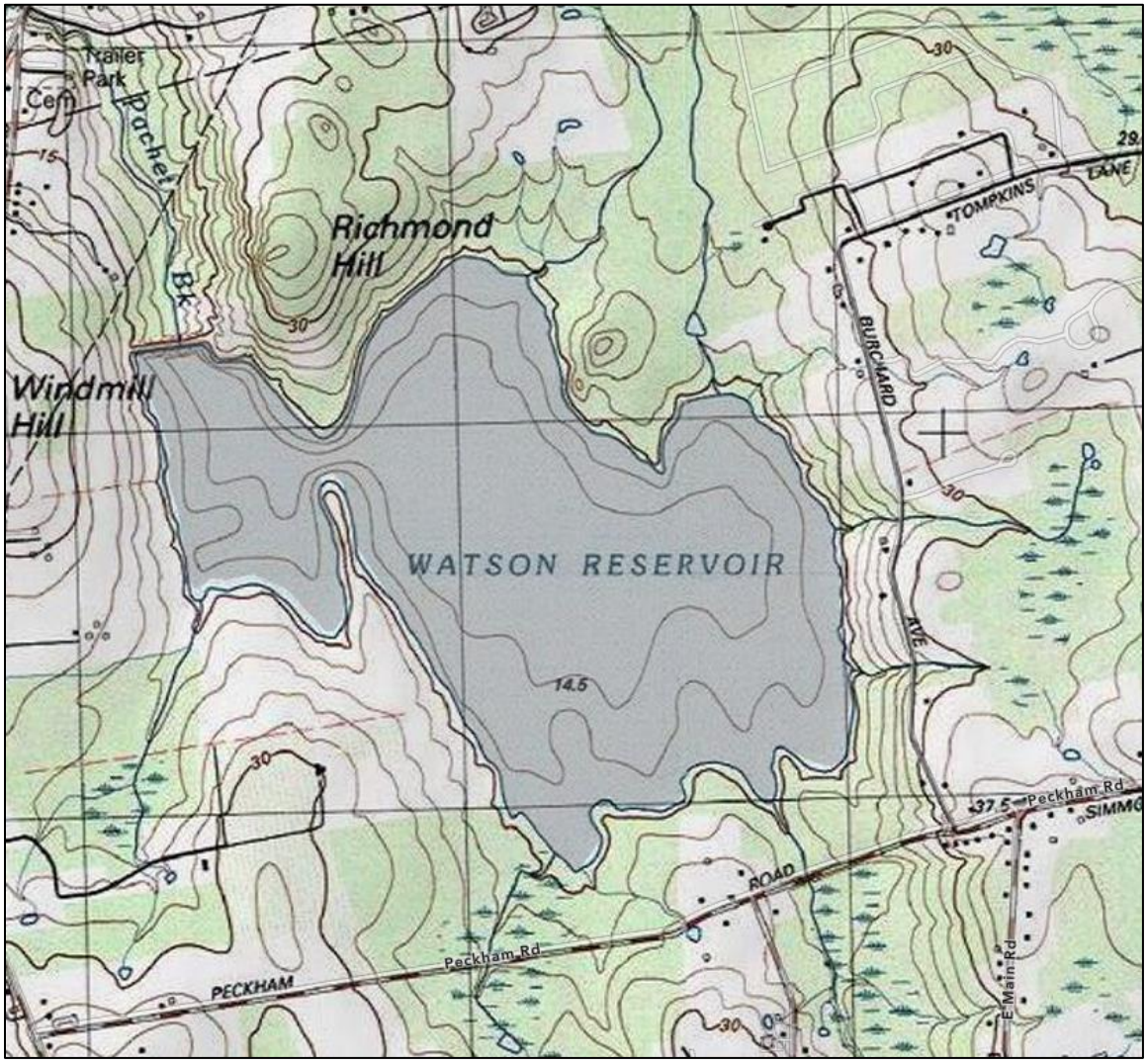
WATSON RESERVOIR WATERSHED PLAN

September 2021



Harold E. Watson Reservoir
Little Compton, Rhode Island

Prepared by: RI Department of Environmental Management, Office of Water Resources
Hayden McDermott, Seasonal Technical Support Intern
Jennifer Paquet, Senior Environmental Planner

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List of Acronyms

ACEP	NRCS Agricultural Conservation Easement Program
AIS	Aquatic Invasive Species
BMP	Best Management Practice
BWRF	Narragansett Bay and Watershed Restoration Bond Fund
CDBG	Community Development Block Grant
CERCLIS	USEPA Comprehensive Environmental Response, Compensation, and Liability Information System
CRMC	Rhode Island Coastal Resources Management Council
CSSLP	Community Septic System Loan Program
CWA	Clean Water Act
DBP	Disinfection Byproducts
DFW	RIDEM Division of Fish and Wildlife
EQIP	NRCS Environmental Quality Incentives Program
ERICD	Eastern RI Conservation District
GIS	Geographic Information System
HAB	Harmful Algal Bloom
HFRP	NRCS Healthy Forests Reserve Program
HWC	Healthy Watersheds Consortium
LCACT	Little Compton Agricultural Conservancy Trust
LID	Low Impact Development
MS4	Municipal Separate Storm Sewer Systems
NGO	Non-Government Organization
NPS	Non-Point Source (Pollution)
NRCS	USDA Natural Resources Conservation Service
OSPAR	Oil Spill Prevention Administration and Response Act
OWMP	Onsite Wastewater Management Plan
OWR	RIDEM Office of Water Resources
OWTS	Onsite Wastewater Treatment System
PDWS	Public Drinking Water Supply
PREP-RI	Coastal Resource Center's Providing Resilience Education for Planning in RI
RIDEM	Rhode Island Department of Environmental Management
RIDOH	Rhode Island Department of Health
RIDOT	Rhode Island Department of Transportation
RIPDES	Rhode Island Pollutant Discharge Elimination System
SLR	Sea Level Rise
SNEP	USEPA Southeast New England Program
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TP	Total Phosphorus
URI	University of Rhode Island
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank

1. INTRODUCTION

1.1 Purpose of the Plan

This plan is for the purpose of guiding actions to protect and restore the quality of the water resources and aquatic habitats in the Harold E. Watson Reservoir Watershed, located in Little Compton, Rhode Island. A description of the water resource conditions, and the pollutants and other stressors and threats to water resources are discussed, along with a history of key actions that have been taken to protect and improve the water resources in the watershed.

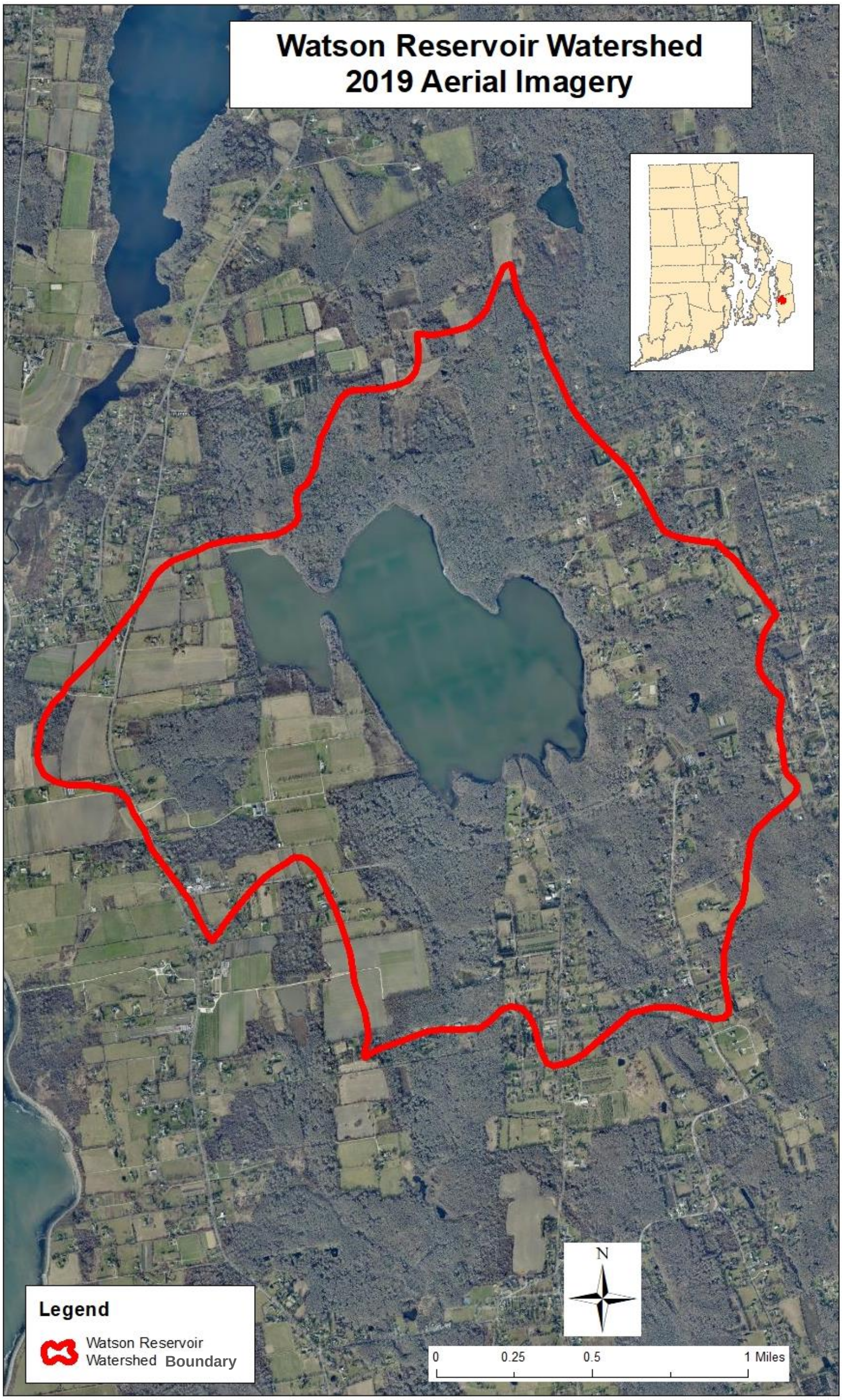
Watershed – is the total area of land where all the water that drains off it or is under it goes to the same waterbody. Topography is the key element to establishing watershed boundaries. See **Map 1.1** for Watson Reservoir watershed boundary.

Watershed-Based Plan – is a strategy and a work plan for achieving water resource goals in a watershed. It includes a description of the existing water quality conditions, identifies and prioritizes problems, and outlines what needs to be done to restore and protect the water resources and aquatic habitats of the watershed.

Figure 1.1 Watershed Diagram

Source: Lake County Stormwater Management Commission

Map 1.1


Watson Reservoir Watershed
2019 Aerial Imagery
Legend
Watson Reservoir Watershed Boundary
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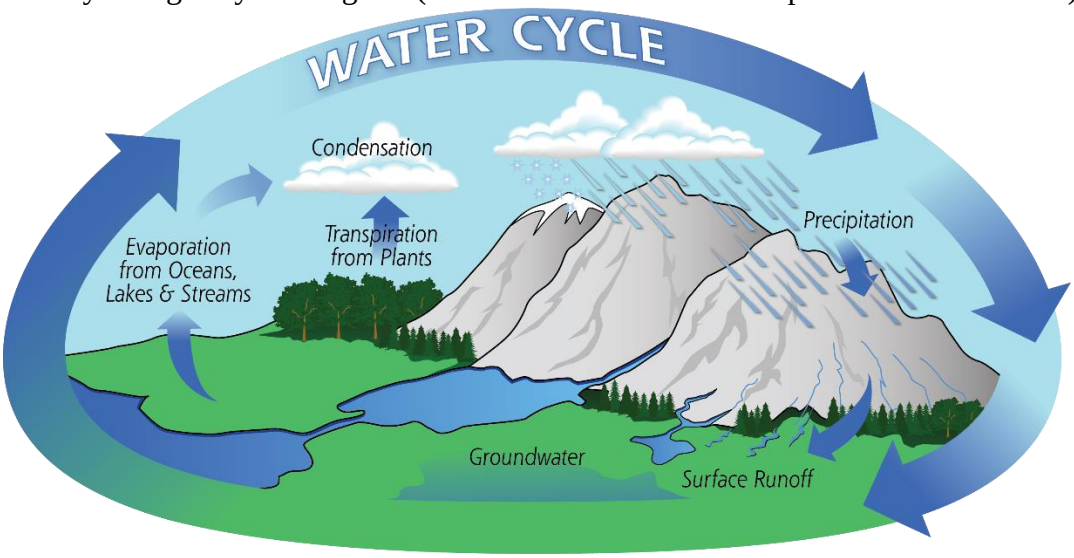
0.25
0.5
1 Miles

Figure 1.2 Hydrologic Cycle Diagram (Source: NASA Global Precipitation Measurement)



Watershed planning recognizes the geographical watershed as the appropriate unit for understanding and managing the water resources within it, and takes a comprehensive look at the land uses, water uses, and human activities within the watershed that influence the quality of its water resources. Aspects of the hydrologic system (see **Figure 1.2**), including precipitation, runoff, groundwater infiltration, evaporation, and transpiration are important considerations for understanding how best to manage and minimize impact to the watershed and its water quality and quantity, while taking best advantage of the resources it provides to us. Watershed plan development incorporates water quality monitoring information and input from stakeholders involved within the watershed in order to identify priority goals and action items to more effectively manage the water resources in the watershed.

1.2 Compelling Issues in the Watershed

Watson Reservoir is one of nine reservoirs that supply the Newport Water Department drinking water supply system. However, high levels of phosphorus and total organic carbon have resulted in Watson Reservoir being designated by RIDEM as an "impaired waterbody," which means that water quality does not meet its goals as an aquatic habitat, nor as a drinking water source without advanced and costly treatment. Four of the tributaries to the reservoir are also listed as being impaired by high levels of phosphorus.

Additionally, all residents, farms, and businesses in the watershed depend on private, on-site drinking water wells. Therefore, strategies must be in place to protect groundwater in the watershed.

The ultimate goal of actions recommended by this plan is to restore the water quality of the reservoir and its tributaries to a level acceptable for drinking water with conventional treatment and aquatic habitat uses, and to protect these natural resources within the watershed for current and future generations.

2. WATERSHED DESCRIPTION

Watson Watershed Quick Facts:

- Watson Reservoir was **created in 1960** by constructing a dam on Pachet Brook
- The Reservoir is approximately **378.9 acres**
- The watershed covers about **2,224.8 acres** (including the Reservoir)
- **9 mostly intermittent tributaries** feed the reservoir

2.1 Hydrology Overview

2.1.1 Surface Water

The Watson Reservoir is located in the Town of Little Compton, Rhode Island. This manmade reservoir was created with the construction of a dam on Pachet Brook in 1960 and occupies an area that was previously freshwater wetlands. The watershed of the reservoir covers 2,224.8 acres of primarily northern Little Compton, with 1.2% of its acreage crossing the town line into Tiverton. All overland runoff, groundwater infiltration, and flow from 9 intermittent tributaries within this watershed land area drain to Watson Reservoir. (See **Map 2.1**.) The reservoir outfalls to the Sakonnet River via Pachet Brook.

For all of the tributaries flowing into Watson Reservoir, either segments of the tributaries or entire streams are intermittent, meaning that the brooks are seasonal or rain-dependent (ephemeral) and may dry up at certain points of the year. For RIDEM water quality assessment purposes, four of Watson Reservoir's 9 tributaries share a waterbody identification number and have been given a designated use classification (these four RIDEM-identified streams are highlighted in bright blue on **Map 2.2**). DEM only assesses streams that appear as perennial streams on USGS topographic maps. For purposes of regulation, intermittent segments and ephemeral streams and tributaries are not given a use classification or assigned a waterbody identification number, and are otherwise considered under the jurisdiction of wetlands. Ephemeral streams are, however, important aspects of a watershed and are discussed as waterbodies for the purposes of this plan. Due to the streams' often changing appearance, depictions of these surface waters on the below maps vary, but can generally be associated with the locations of wetlands on the maps.

Descriptions of Tributaries

The tributaries described below are labeled counter-clockwise from #1 to # 9 on **Map 2.1** for reference, starting from the southernmost tip of the reservoir.

Tributary #1, which has a DEM assigned waterbody ID, begins in wetlands to the northwest of Simmons Hill and curves north through some intermittent ponds before crossing Peckham Road where it then flows into the reservoir at its southern tip.

Directly east, Tributary #2 is entirely ephemeral and starts in two branches south of Peckham Road with the first branch running north, parallel to Tributary #1. The second eastern branch originates in a pond by Willow Ave and travels northwest through an area with wet spots and soils with high water table, then under Peckham Road to a point where it meets with the first branch and connects to the reservoir at the same southern tip, just to the east of Tributary #1.

Tributary #3, locally known as Pachet Brook, has a waterbody ID and starts in two branches, the easterly source being ephemeral and originating from a wetland east of East Main Road. The branch meets with the brook within a wetland complex between Willow Ave and East Main Road, south of Peckham Rd. The brook then flows north under Peckham Road and into Watson Reservoir at one of its southeastern points.

Tributary #4 is entirely ephemeral and commences in a wetland to the south of Peckham Rd. The tributary crosses Peckham Rd, northwesterly into some ponds before continuing west into the reservoir at a southern location on its east side.

Tributary #5 originates in two branches in ponds within a wetland between Burchard Ave and Long Highway and after converging, runs almost parallel to Tributary #4, to the north, where it crosses Burchard Ave and continues west into the reservoir in the middle of its eastern side.

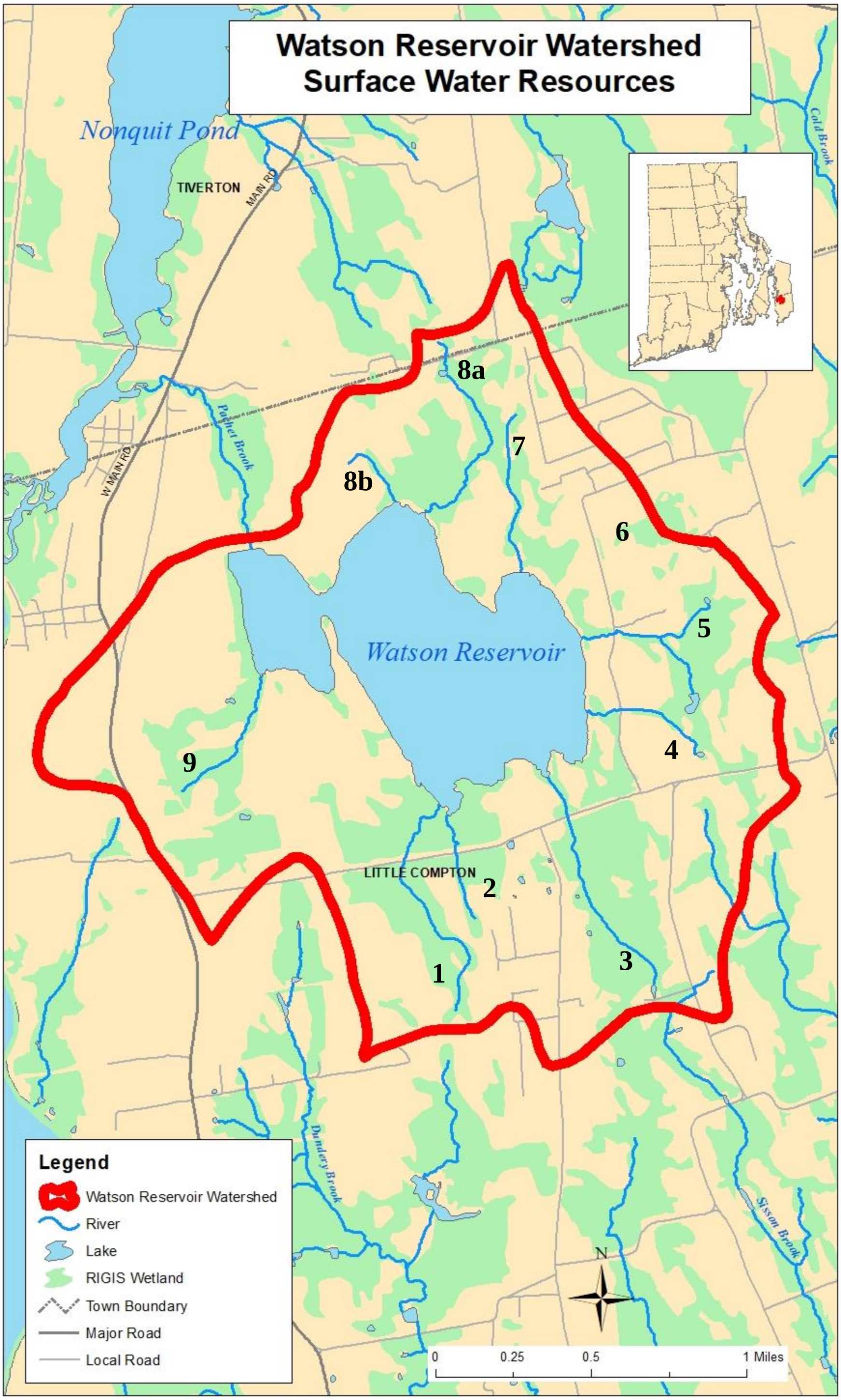
Tributary #6 is entirely ephemeral and derives from an area of soils with high water table and wet spots between Burchard Ave and Long Highway, seeming to meander west along High Meadow Road, then under Burchard Ave until it enters Watson Reservoir on its northeast curve. (Tributary #6 is visible on the topographic map, **Map 2.2**, but is not represented on **Map 2.1**.)

Tributary #7 begins just over the Tiverton border in soils with a seasonal high water table. The stream runs straight south through associated wetlands meeting a short tributary and a pond, and flows into the reservoir directly west of Tributary #6.

The three branches of Tributary #8 each start in wetland ponds in mucky soils with a seasonal high water table south of Eight Rod Way. The tributary flows south into to the reservoir on its northernmost curve. **Map 2.1** depicts two of the three Tributary #8 branches as separate streams, labelled #8a and #8b. The #8a. segment has been given a waterbody ID by RIDEM, while the other portions are ephemeral. **Map 2.2** shows all three branches leading into one stream before flowing into the reservoir.

Tributary #9, which does not have a waterbody ID number, begins east of the reservoir in mainly three branches tipped by ponds in wetlands and soils with seasonally high water tables northeast of the West Main Rd/Peckham Rd intersection. The branches meet and flow northeast into the reservoir's southwest tip of its northwestern lobe.

Map 2.1


Watson Reservoir Watershed
Surface Water Resources
Nonquit Pond
TIVERTON
MAIN RD
W MAIN RD
Cold Brook
Paquet Brook
Watson Reservoir
LITTLE COMPTON
Dundery Brook
Sisson Brook
8a
8b
7
6
5
4
3
2
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9
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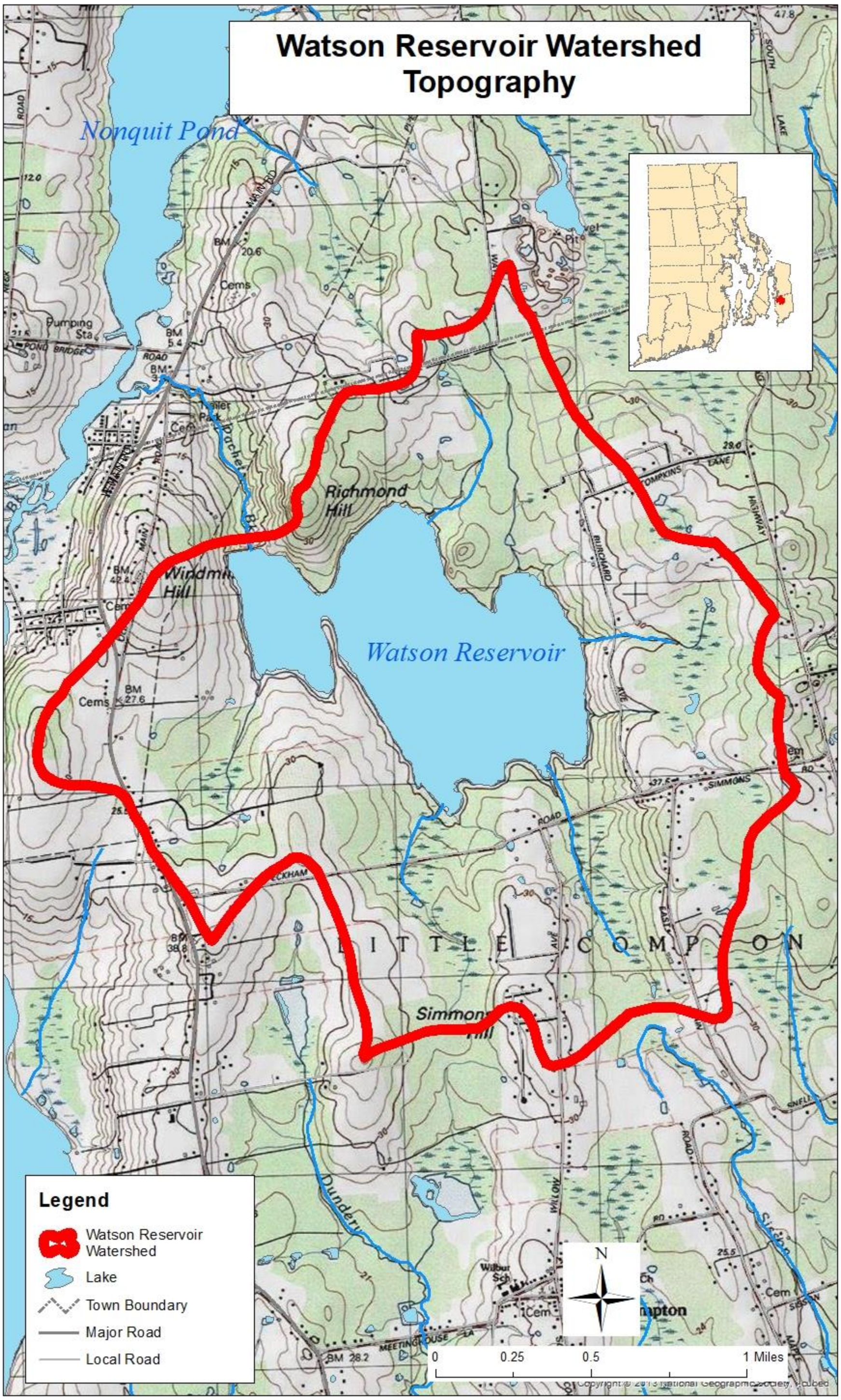
0.25
0.5
1 Miles
Legend
Watson Reservoir Watershed
River
Lake
RIGIS Wetland
Town Boundary
Major Road
Local Road

Map 2.2


Watson Reservoir Watershed Topography
Nonquit Pond
Richmond Hill
Windmill Hill
Watson Reservoir
Simmons Hill
LITTLE COMPTON
Legend
Watson Reservoir Watershed
Lake
Town Boundary
Major Road
Local Road
N
0
0.25
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1 Miles

2.1.2 Groundwater

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 stream, pond, or wetland. Any pollutants in the groundwater are thus delivered to the surface water. During dry periods, it is the groundwater that makes up the flow in the streams.

According to the RIDEM Groundwater Class Summary, groundwater classified GA or GAA are groundwater resources that are known or presumed to be suitable for drinking water use without treatment. Groundwater classified as GAA is used for aquifers (and their recharge areas) that are either potentially capable of serving as a significant source for public water or are the wellhead protection areas for a public community well. All groundwater within the watershed is classified as GA, as the amount of groundwater available is not likely capable of serving as a major public water supply source. Glacial till almost entirely underlays the Town of Little Compton, including the land within the watershed. The type of glacial sediment here yields the lowest amount of groundwater able to be easily extracted from the soil to make for a viable supply.

2.1.3 Wetlands

Wetlands provide key links in the water cycle between surface water and groundwater. Freshwater wetlands exist in areas where the groundwater table is close to the surface and often in proximity with other surface waters. Wetlands are the source of the headwaters for many of Watson Reservoir's intermittent tributaries. Vegetated wetlands support both aquatic and terrestrial species, many of which have specially adapted to the conditions present in wetlands and are among the most productive natural systems regionally and worldwide.

Wetlands perform specific functions and processes, also known as ecoservices, such as filtering stormwater pollutants, providing critical wildlife habitat, and mitigating climate change by sequestering carbon. These wetland ecoservices include:

- Wetland plants and soils can store, filter, and naturally treat nutrients and other stormwater pollutants
- Important habitats for aquatic, terrestrial, and avian species, particularly for endangered, threatened, and migratory species, including many of Rhode Island's rare species
- Store water during rainy periods and slowly release it, which controls flooding and keeps streams flowing during dry periods
- Create local microclimates through greater evapotranspiration rates, which has a cooling effect
- Protection from climate change through carbon sequestration.
- Educational, scenic, and historic resources
- Recreational resources such as hunting, fishing, and bird watching

The predominant wetland type in the watershed is 'deciduous forested wetland.' Wetlands cover 580 acres, or 31%, of the watershed (excluding the water area of the reservoir). See **Map 2.1** for extent of wetlands. These wetlands are a vital natural resource that must be protected.

2.2 Land Use in the Watershed

The types of land use in a watershed have a direct effect on water quality. Each type of land use tends to have a telltale mix of pollutants. Stormwater runoff carries these pollutants into nearby waterbodies.

In an undeveloped watershed, there is less human-generated waste. In these areas, this results in relatively unpolluted, lesser amounts of runoff, and more groundwater recharge compared to more developed watersheds. As watersheds become more developed with commercial, residential, agricultural, and industrial land uses, the amount of pollutant sources and stormwater runoff increases. There are simply more opportunities for pollutants to be deposited on the ground once land becomes developed or worked. The more intensive the land use or disruption of soils, the more opportunity for pollution to be generated and the easier it is to enter our waterbodies and wetlands.

Including the surface area of Watson Reservoir, the Watson Watershed comprises approximately 2224.8 acres, of which 46.7% is undeveloped forests and wetlands. Agricultural land uses (pastures, croplands, orchards, etc.) cover 24.1% of the watershed. Residential land uses, of mostly low density, cover 11.6% of the watershed. Developed non-residential land uses, such as commercial, industrial, and institutional uses, cover only 0.2% of the land. The 'open' land cover category, which consists of outdoor active recreation areas (not to be confused with 'protected open space' conservation lands), accounts for the remaining 0.2% of the watershed area. (See **Figure 2.1** and **Table 2.1**.)

Different land uses have different sources of pollutants. Residential areas tend to have pet waste, lawn fertilizers, and aging septic systems. Roads and driveways accumulate grime, particulate emissions, and tire and brake dust from cars, which are easily picked up by stormwater runoff. Agricultural land uses, such as growing crops or raising livestock, are sources of fertilizer, pesticides, manure, and sediments from worked fields. Pollutants from all of these land uses can enter nearby waterbodies or infiltrate groundwater. Refer to **Map 2.4** for the proximity of these land uses to the waterbodies.

Impervious cover comprises 3.5% of all land use in the watershed. This includes all hard surfaces such as roofs, roads, driveways, and parking lots that prevent water from infiltrating into the soil. Studies indicate that watersheds with an impervious cover under 10% generally have streams that experience little to no significant impact from development, whereas watersheds with impervious cover over 10% start to have greater and greater negative impacts to streams (CWP, 2003). Right now, the Watson Watershed has less than 10% impervious cover, and yet it is experiencing water quality impairments. Refer to **Map 2.5** for locations of impervious surfaces within the watershed.

Figure 2.1 Watson Watershed Major Land Uses Pie Chart

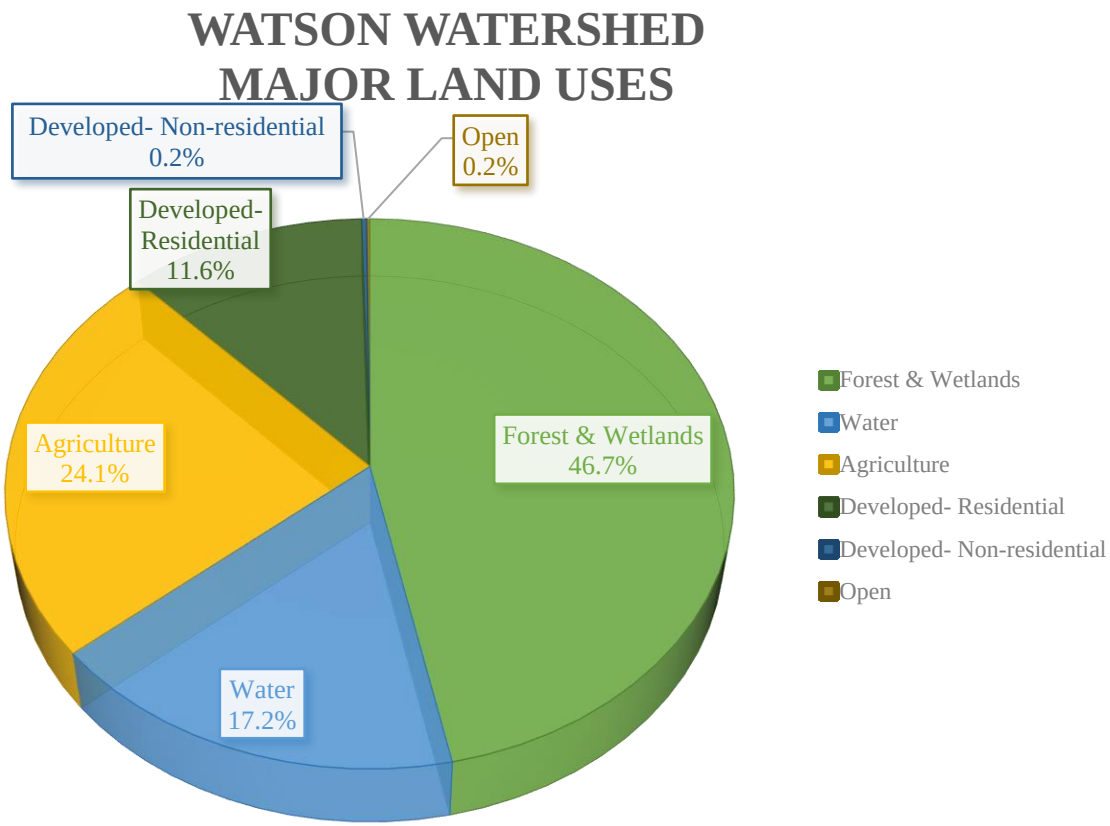
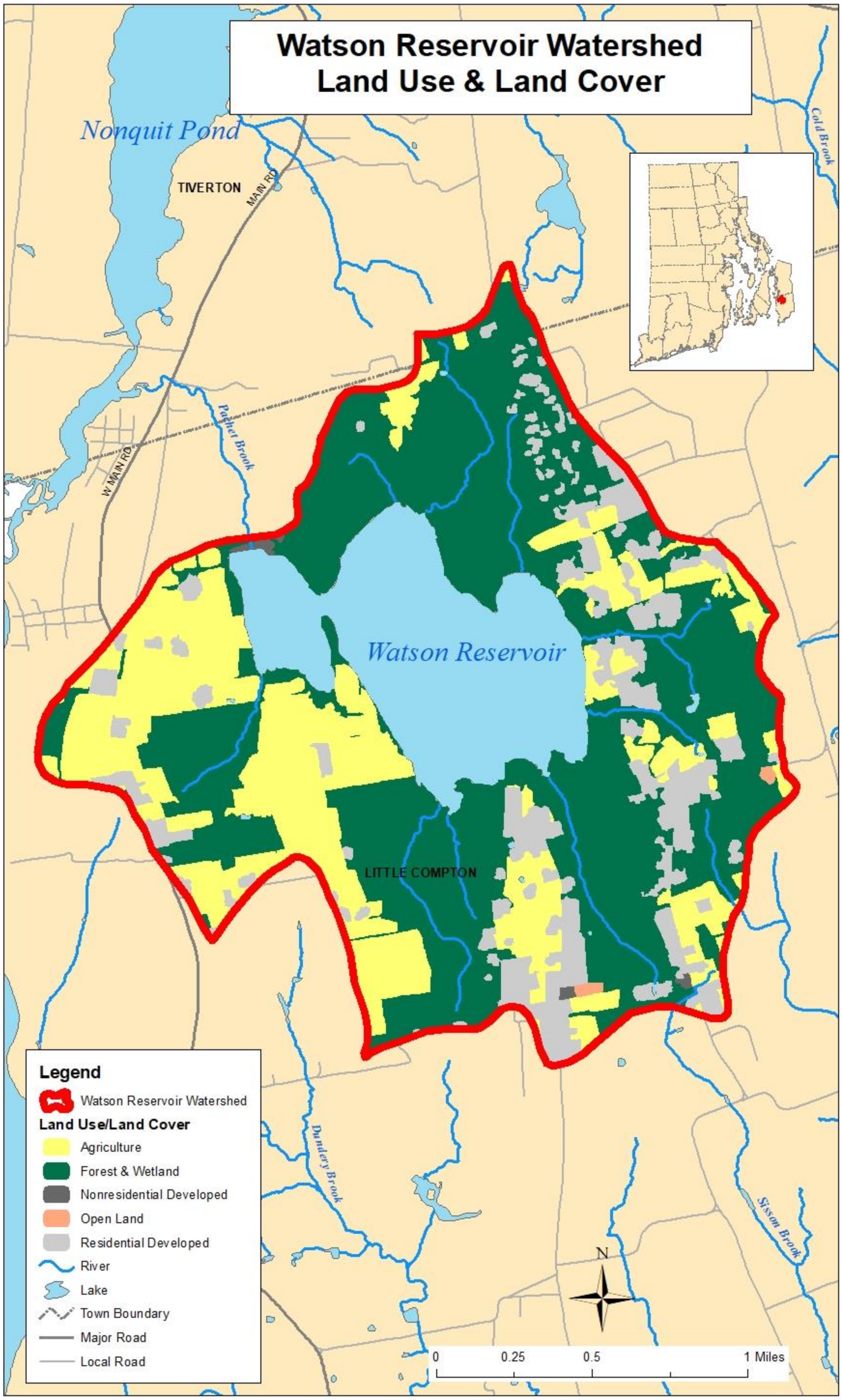


Table 2.1 Watson Watershed Land Use Acreage and Percentages

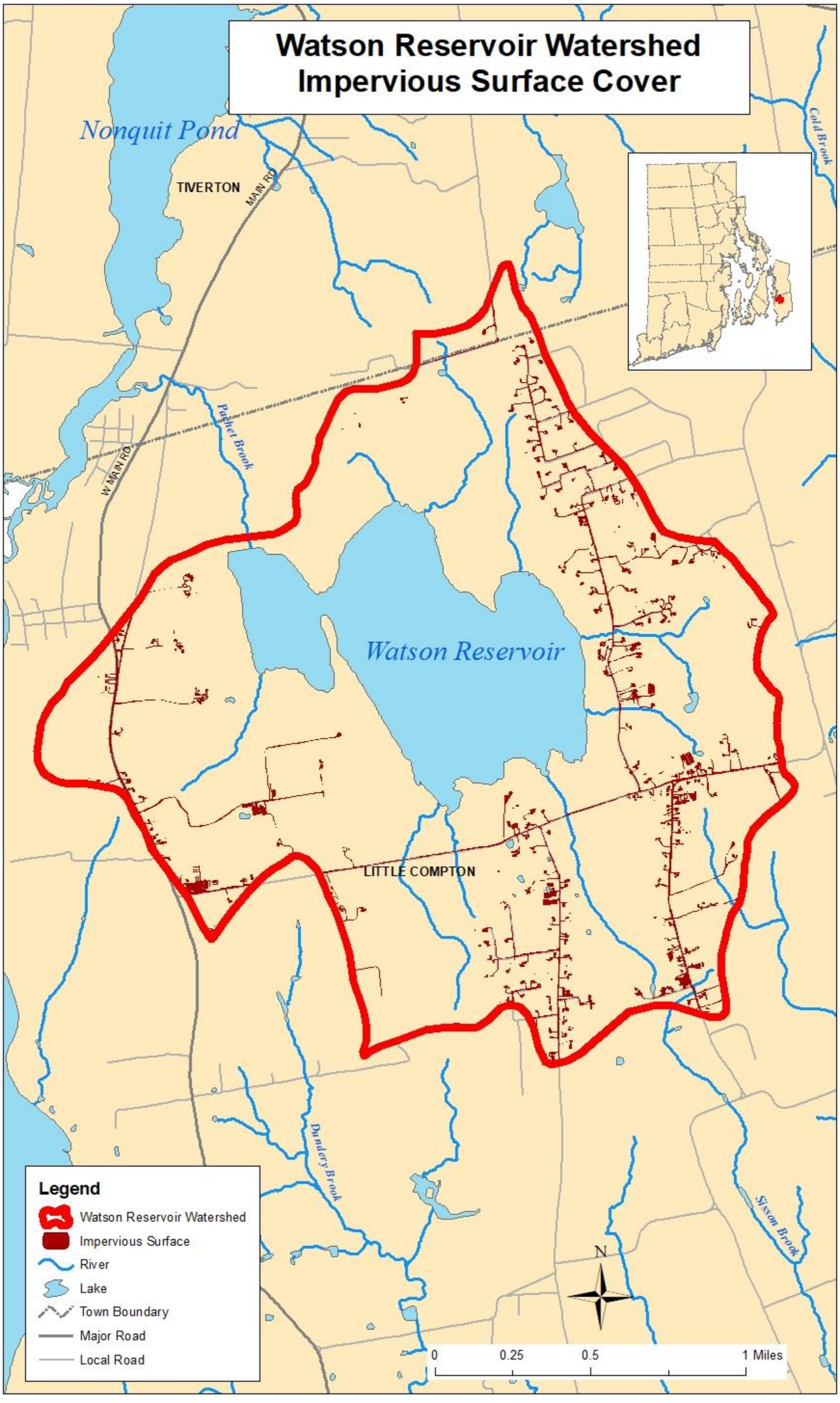
Land Use Type	**Acres**	**Percent (%)**
Forest & Wetlands	1039.4 acres	46.7%
Water	382.0 acres	17.2%
Agricultural	536.2 acres	24.1%
Developed - Residential	258.2 acres	11.6%
Developed – Non-Residential	5.4 acres	0.2%
Open (active recreation areas)	3.6 acres	0.2%
Total	**2224.8 acres**	**100%**
Impervious Cover	***78.6 acres***	***3.5%***

There are actions that municipalities can take to reduce the impact of impervious surfaces and land uses in a watershed, and actions that individuals can take to reduce the impact from human activities.

Map 2.3


Watson Reservoir Watershed
Land Use & Land Cover
Nonquit Pond
TIVERTON
MAIN RD
Cold Brook
W MAIN RD
Pachet Brook
Watson Reservoir
LITTLE COMPTON
Dundery Brook
Sisson Brook
Legend
Watson Reservoir Watershed
Land Use/Land Cover
Agriculture
Forest & Wetland
Nonresidential Developed
Open Land
Residential Developed
River
Lake
Town Boundary
Major Road
Local Road
N
0
0.25
0.5
1 Miles

Map 2.4


Watson Reservoir Watershed
Impervious Surface Cover
Nonquit Pond
TIVERTON
MAIN RD
Cold Brook
W MAIN RD
Pachet Brook
Watson Reservoir
LITTLE COMPTON
Dundery Brook
Sisson Brook
Legend
Watson Reservoir Watershed
Impervious Surface
River
Lake
Town Boundary
Major Road
Local Road
N
0
0.25
0.5
1 Miles

2.3 Drinking Water Sources

Protecting surface drinking water reservoirs and groundwater resources is vital to the health of our communities. Watson Reservoir serves Aquidneck Island and individual private groundwater wells serve the residents of Little Compton.

2.3.1 Public Surface Water Supply

"Public" water suppliers are those systems that are monitored by the RI Department of Health (RIDOH) to ensure they provide safe drinking water, and which have at least 15 service connections or regularly serves an average of at least 25 individuals daily at least sixty days out of the year. As part of the Newport Water Division's interconnected reservoir system, Watson Reservoir is considered a public water supply.

Watson Reservoir is the largest of the Newport Water's nine drinking water reservoirs, providing a back-up potable water source to the towns of Newport, Middletown, and Portsmouth. Although the reservoir is located in Little Compton, it currently serves only as drinking water supply storage for Aquidneck Island via Newport Water's Sakonnet Pumping Station (Newport Water TMDL, 2021).

2.3.2 Ground Water Supply

All residents of the Town of Little Compton rely on groundwater for their drinking water. There are no public groundwater supply wells, as residents use private wells for all domestic water purposes (Little Compton Comprehensive Plan, 2018). A private well is a well that has less than 15 service connections or regularly serves an average of at less than 25 individuals daily. Individual homeowners are responsible for maintaining and monitoring their own private wells.

Strategies to protect groundwater dependent areas include:

- zoning provisions (such as a groundwater overlay district) to ensure high risk land uses do not pose a threat,
- implementing an Onsite Wastewater Management Plan (OWMP),
- prohibition of underground storage tanks (USTs),
- adoption of Low Impact Development (LID) site planning and design requirements in local development regulations, and
- public education on proper yard and farm management (fertilizers, animal waste, etc.), proper household hazardous waste disposal, and private well owner education.

2.4 Wastewater Management

There are no sewered areas within the Watson Reservoir watershed; the entire area is served by individual onsite wastewater treatment systems (OWTS).

3. WATER QUALITY

A 'pollutant' is any substance, material, or heat which will likely alter the physical, chemical, biological or radiological characteristics and/or integrity of water. The primary water quality pollutants of concern within Watson Watershed are excess nutrients, specifically excess phosphorus and excess organic carbon. Excess phosphorus causes associated appearances of algae blooms and cyanobacteria blooms, both of which negatively affect the drinking water and the aquatic habitats in the watershed. The algae blooms spurred by the excess phosphorus are the primary source of the excess organic carbon. Excess nutrients can be reduced through municipal and individual actions.

The State of Rhode Island Water Quality Rules specify the criteria each waterbody in the State shall meet based on its designated use. Each waterbody or segment of a waterbody has been given an identification number and a use classification. Watson Reservoir and its tributaries have a freshwater designated use classification of 'AA,' which means that 'these waters are designated as a source of public drinking water supply (PDWS) or as tributary waters within a public drinking water supply watershed, for primary and secondary contact recreational activities and for fish and wildlife habitat. These waters shall have excellent aesthetic value.'

However, both Watson Reservoir and its tributaries do not meet these water quality standards for their designated uses (see **Map 3.1**). When a waterbody does not meet the criteria for a designated use, it is considered "impaired" for that use, and the cause of the impairment is identified. Watson Reservoir does not meet its criteria as a source of public drinking water due to its levels of total organic carbon. Both the reservoir and its assessed streams are impaired for their use as fish and wildlife habitat due to excess phosphorus. (Refer to **Table 3.1**)

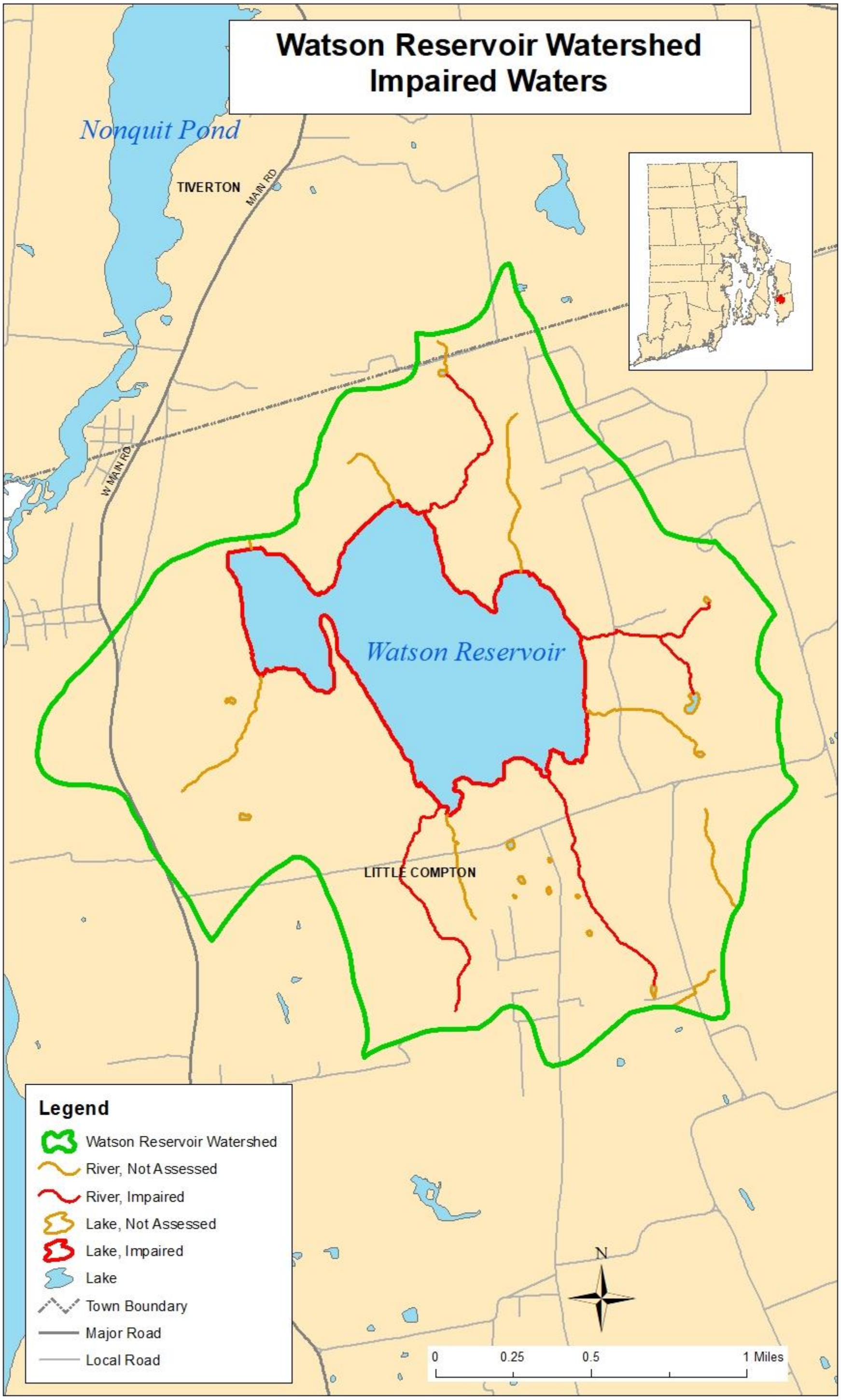
When a waterbody is determined to be impaired by RIDEM and listed on the State of RI's 'Impaired Waterbody List,' a Water Quality Restoration Plan, also called a Total Maximum Daily Load (or, 'TMDL') analysis, is scheduled to be developed for that waterbody for its specific pollutant and impairment (see **Table 3.1**). Key elements of a TMDL include identifying the pollutant sources and the degree of pollutant reduction necessary to attain the applicable water quality standard. Additionally, TMDL's include important recommended mitigation actions to achieve the necessary water quality improvements. Watson Reservoir is included in the 'TMDL for Phosphorus for the City of Newport Drinking Water Reservoirs,' which was completed this year. See **Section 7** for further discussion of recommended actions from the Newport Water TMDL.

Table 3.1 Watson Watershed Water Quality Use Assessment Status (Source: 2018-2020 Impaired Waters Report, finalized February 2021)

Name of Water Body (Segment ID) and *Classification*	**Cause of Impairment(s)**	**Use Not Supported due to impairment**	**Year First Listed**	**RIDEM TMDL Date**
Watson Reservoir (RI0007035L-07) *Class AA*	Total Phosphorus, Total Organic Carbon	Fish and Wildlife Habitat, Public Drinking Water Supply	2014 list	2021 - completed
Tribs to Watson Reservoir* (RI0010031R-21) *Class AA*	Total Phosphorus	Fish and Wildlife Habitat	2018-2020 list	2023

*ID number has grouped together the 4 tributaries, which are shown as impaired on Map 3.1 and individually labeled on Map 2.1 for reference as numbers 1, 3, 5, & 8.

Map 3.1


Watson Reservoir Watershed
Impaired Waters
Nonquit Pond
TIVERTON
MAIN RD
W MAIN RD
Watson Reservoir
LITTLE COMPTON
Legend
Watson Reservoir Watershed
River, Not Assessed
River, Impaired
Lake, Not Assessed
Lake, Impaired
Lake
Town Boundary
Major Road
Local Road
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0
0.25
0.5
1 Miles

3.1 Phosphorus

Phosphorus is found naturally in freshwater in very low amounts and is measured as total phosphorus (TP). The accumulation of nutrients, such as phosphorus, in freshwater lakes and ponds is a natural process called eutrophication, which is accelerated by human activities in the watershed. Excess phosphorus can rapidly lead to eutrophic conditions that promote algae growth, including harmful algae (also known as cyanobacteria) blooms. The excess phosphorus found in Watson Reservoir is the direct result of human activities, often transported by stormwater.

The largest external sources of phosphorus to a waterbody include fertilizer from agricultural land uses and application on residential, commercial, and recreational lawns and turf grounds; construction site and agricultural field erosion (phosphorus binds to soil particles and is transported along with them); animal waste (livestock, pets, waterfowl, and wildlife); failing septic systems, and illicit connections of wastewater to storm drains. Some other sources of phosphorus include stockpiled leaf and yard waste, vehicle exhaust particulate deposits on streets, parking lots, and driveways; and atmospheric deposition from wind-blown plant and soil particles.

Once phosphorus accumulates in the reservoir from these external sources, it can be released from bottom sediments and "recycled" in the waterbody. This release of old phosphorus is referred to as 'internal cycling' or 'internal loading.' Internal loading can be a significant source of phosphorus in reservoir waters, recirculating the phosphorus and continuing to cause algae blooms. The ultimate source of most of the sediment-bound phosphorus is external, so it is important to manage external phosphorus sources before addressing internal accumulation (Newport Water TMDL, 2021).

Newport Water TMDL for Phosphorus and Load Reduction Needed

As aforementioned, RIDEM has completed the TMDL for phosphorus for the Newport Water Reservoirs, which includes Watson Reservoir. This TMDL contains calculated existing TP loads as well as TP reductions needed to meet drinking water and wildlife habitat water quality standards. **Table 3.2** is a copied summary table of Watson Reservoir's existing and allocated annual TP loads from the Newport Water TMDL. Based on the TMDL existing TP load calculations, RIDEM has calculated the goal of reducing anthropogenic sources of phosphorus by 25%, or 40 lbs. of phosphorus annually. See **Section 4** for further discussion of phosphorus loading from each anthropogenic land use type and **Section 7** for a summary of recommended restoration actions.

Previous Phosphorus Reduction Study for Watson Reservoir

A precursor to the TMDL, in 2015, Newport Water Department received a grant from EPA's Southern New England Program to hire a consultant to conduct a phosphorus reduction feasibility study for the Watson Reservoir and the St. Mary's Reservoir watersheds, which

resulted in the development of the June 2016 *Source Water Phosphorus Reduction Feasibility Plan* by Fuss & O'Neill. The modelling methods and recommendations for conceptual stormwater best management practices (BMPs) from this study were considered and incorporated into the Newport Water TMDL.

Table 3.2 Watson Reservoir – Annual Total Phosphorus Loads (from Newport Water TMDL)

Table 5.13. Existing and Allocated Annual Total Phosphorus Loads- Watson Reservoir.

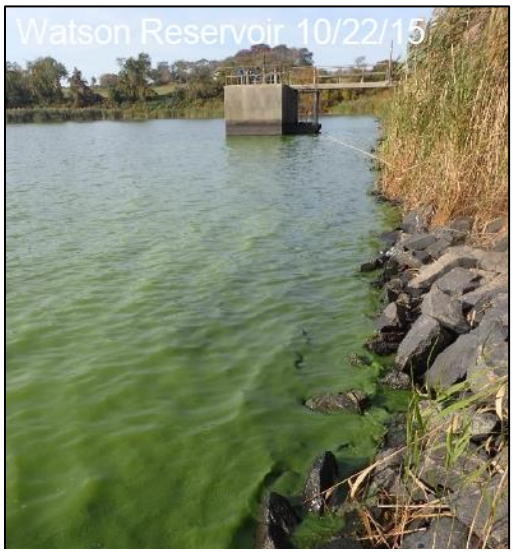
Existing total phosphorus load to Watson Reservoir				195 lbs
Natural Background (Forest + Atmospheric) Load				35 lbs
Anthropogenic phosphorus load (Existing Load – Natural Background)- (195 lbs - 35 lbs)				161 lbs
Allowable Total Phosphorus Load				156 lbs
Allowable Total Phosphorus Load – Natural Background Load- (156 lbs – 35 lbs)				121 lbs
Required Reduction from Anthropogenic Sources- (161 lbs – 121 lbs)				40 lbs
Expressed as a Percent[1]				**25%**
A 25 % reduction is required between all anthropogenic source categories				
Land Use Category	**Existing Annual TP Load (lbs)**	**Allowable Annual TP Load (lbs)**	**WLA**	**LA**
Urban	101	76	100%	
Agriculture	57	43		100%
OWTS failure to surface water	2	0		-
Forest/Wetland/Atmospheric	35	35		Natural Background

[1]The allowable load for OWTS surface failure is zero (0). The percent reduction is inclusive of this.

3.1.1 Cyanobacteria (aka Harmful Algal Blooms)

Certain types of algal blooms, consisting of cyanobacteria (also called 'blue-green' algae), may result in the release of natural toxins that can be harmful to humans, pets, marine mammals, fish, and shellfish. These blooms are deemed Harmful Algal Blooms (HABs). Human contact with cyanobacteria can cause skin, eye, and nose irritation. If swallowed, humans may experience diarrhea, vomiting, or neurotoxicity. Pets, livestock and waterfowl that ingest water with blue-green algae toxins can also experience sickness, paralysis or even death. (RIDEM Fact Sheet, 2016).

Figure 3.1 HAB in Watson Reservoir, 2015



Source: RIDEM Staff, Newport Water TMDL Presentation

The Rhode Island Department of Health (RIDOH) and the Rhode Island Department of Environmental Management (RIDEM) work cooperatively to detect/respond to the presence of cyanobacteria blooms, evaluate the potential risks to the public, and, when necessary, jointly issue health/recreational advisories when conditions indicate a cyanobacteria

bloom poses a risk to public health. Six (6) such advisories have been issued for Watson Reservoir in the past 10 years, with the most recent HAB advisory being in November 2019 (RIDEM Current & Past Cyanobacteria Advisories, accessed 7/29/21).

3.2 Organic Carbon

Total organic carbon (TOC) is the term used for the amount of carbon that is derived from decaying vegetation, bacterial growth, and the metabolic activities of living organisms or chemicals. The sources of organic carbon in the drinking water reservoir can be linked primarily to increased phytoplankton growth and cyanobacteria as well as excessive algal growth, which are spurred by the excessive phosphorus coming from the watershed.

Organic carbon is considered a pollutant impairing the raw water of the Watson Reservoir for its use as a drinking water supply because it necessitates additional treatment beyond conventional drinking water treatment. Organic carbon reacts with drinking water disinfectants to create byproducts (DBPs) that are known to be carcinogenic, called 'trihalomethanes,' and have resulted in the need for additional, more expensive, drinking water treatment before it can be delivered to service areas. As noted in the Newport Water Supply Reservoirs TMDL, the amount of excess carbon can be mitigated by addressing the excess phosphorus. Therefore, the goal of restoring the water quality of the reservoir and its tributaries to meet the drinking water quality standard will also achieve the goal of improving the aquatic habitat.

4. THREATS TO WATER QUALITY

4.1 Stormwater Runoff

Stormwater runoff is a major conveyor of pollutants into the waters within Watson Watershed. Runoff is rain and melted snow that washes over the land surface and various developed land uses into nearby rivers, streams, lakes, ponds, drinking water reservoirs, coastal waters, and freshwater and coastal wetlands. Stormwater washes over these various surfaces, accumulating pollutants, and flows directly into nearby waterbodies if it hasn't been properly managed or otherwise been able to infiltrate into the soils or be filtered.

Stormwater pollutant sources include fertilizers and pesticides from residential lawns and agricultural fields, bacteria and nutrients from pet, livestock, and wildlife waste (particularly from resident Canada geese), nutrients and bacteria from failing septic systems and cesspools, residue from automobile products, road salt, and sediments from roadways and erosion of unstabilized construction sites and farms. Sediment binds with phosphorus and is a significant contributor of phosphorus transported in stormwater. Leaf and yard waste also leach out phosphorus 'tea' when they get soaked in a storm, and if this tea, or any yard debris, can flow to a stream or storm drain, it can be a significant source of seasonal influxes of phosphorus to a waterbody.

Any pollutants that make their way onto impervious surfaces (such as parking lots, driveways, sidewalks, and streets) can be washed very easily into storm drains which often discharge directly into a waterbody without any treatment. (This is why street sweeping and catch basin cleaning are important maintenance activities for protecting water quality.) Additionally, the lack of opportunity for stormwater to infiltrate into the ground where impervious cover has been created results in greater volumes of runoff that move much faster. This leads to increased soil erosion, especially where there is a loss of natural vegetated buffers; increased stream channel erosion; and less groundwater recharge. These physical changes not only affect aquatic habitat, but can also lead to flooding issues.

There are 7 stormwater discharge points, called stormwater outfalls, within the Watson Watershed identified in the Newport Water TMDL that discharge to the reservoir via its tributaries. Two outfalls are owned by the RI Department of Transportation (RIDOT) and are located by Tributary 9 headwaters, along West Main Road. Two outfalls owned by the Town of Little Compton discharge to wetlands between Tributaries 3 and 4 at Peckham Road, and the other three municipally-owned outfalls are located along Pachet Brook Rd, by Tributary 7 (see **Map 4.1)**.

The RIDOT-owned outfalls are regulated under the RI Pollutant Discharge Elimination System (RIPDES) Municipal Separate Storm Sewer Systems (MS4) General Permit. Upon notification by RIDEM of the US Environmental Protection Agency's approval of the TMDL, RIDOT will have 180 days to amend their SWMPP consistent with Part IV.D of the General Permit. The TMDL has determined that the General Permit's six minimum measures alone are insufficient to

restore water quality and that structural BMPs are necessary. Therefore, RIDOT will be required to revise their TMDL implementation program to address pollutants entering the reservoir via their two priority outfalls. According to the TMDL, RIDOT must design and construct BMPs within priority catchments that reduce the pollutants of concern and stormwater volumes to the *maximum extent feasible*. Prior to the development of the Newport Water Supply Reservoir TMDL, a stormwater control plan (SCP) had been developed by RIDOT for Watson Reservoir, which indicated that no SCP was required because the watershed is less than 10% impervious. However, according to the Consent Decree between RIDOT and EPA, now that a TMDL has determined that structural controls are needed, RIDOT must implement structural stormwater controls consistent with the TMDL.

Due to small population size and density, the stormwater sewer systems and outfalls in the Town of Little Compton are not currently regulated under the RIPDES MS4 General Permit. With the approval of the TMDL, however, the Town may be required to formally identify any MS4 discharges to the Reservoir and the contributing drainage area.

In areas that are already developed, installing stormwater structural controls and implementing best management practices are important means of reducing pollution and other impacts to the reservoir and its tributaries, whether they are required by regulatory means or conducted voluntarily to protect and improve water quality in the watershed.

As new development will continue, it must do its part to not contribute further pollution to the watershed. Land development is governed by local zoning ordinances and land development regulations, which can require low impact development (LID) site planning and design techniques for any new or redevelopment projects subject to local review. In the past, stormwater runoff was considered a nuisance and was designed to leave a site quickly, without any treatment or consideration for groundwater recharge. LID is a site planning and design strategy to reduce runoff, mimic predevelopment hydrology, and take advantage of natural treatment processes in soil and vegetation. LID is far more effective in protecting water quality than engineered stormwater structures alone. The State does not implement LID site planning and design techniques because these are elements of local zoning and development ordinances.

Additionally, Little Compton can require modern stormwater management and erosion controls on projects that are smaller than those that trigger a state permit, because every development within the watershed cumulatively contributes to water pollution. A list of resources is provided in Section 8.2.

<u>Recommended Stormwater Management Actions:</u>

Despite not being regulated, the Town can still take action to protect water quality from stormwater runoff. Stormwater best management practices (BMPs) specifically recommended for this watershed include:

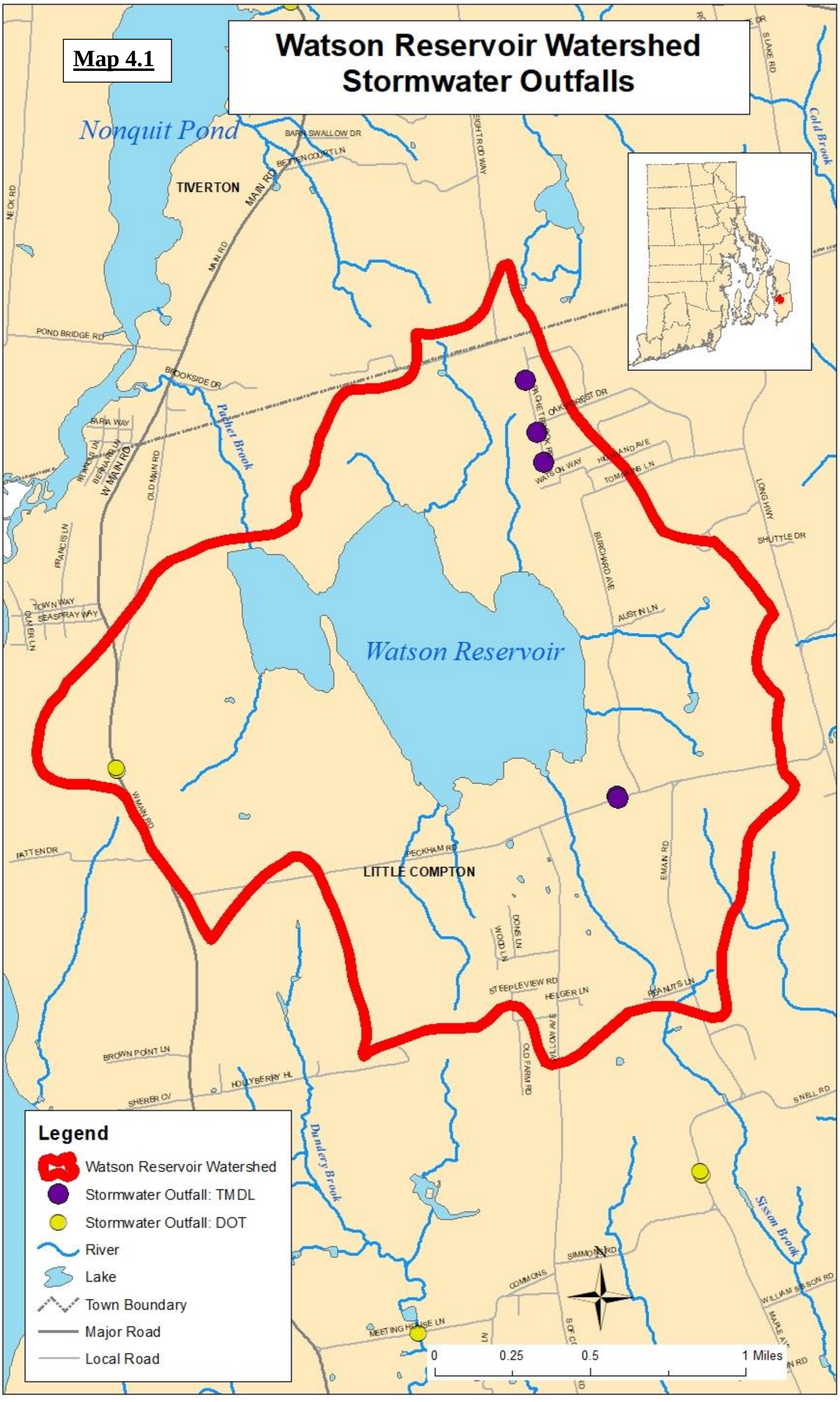
- Public education: addressing the sources that contribute pollutants to stormwater from residential and agricultural properties

- Adopt local LID requirements and require the design and installation of stormwater treatment systems as property is developed or redeveloped;
- protecting and restoring riparian buffers (see **Section 4.6**);
- street sweeping;
- identify any stormwater outfall discharges to the reservoir and the contributing drainage area
- install structural stormwater BMPs as outlined in the Source Water Phosphorus Reduction Feasibility Plan (Fuss & O'Neill 2016), and to address the outfalls in the watershed.

See the Implementation Table in **Section 7** for more action items pertaining to improving stormwater management in the watershed.

Map 4.1

Watson Reservoir Watershed Stormwater Outfalls



4.2 Wastewater

4.2.1 Onsite Wastewater Treatment Systems

As there are no sewered areas within the Watson Watershed; all residents and businesses rely on onsite wastewater treatment systems (OWTSs). A properly sited, designed, installed, and maintained OWTS will provide decades of use and treatment of wastewater such that the system does not adversely impact public health or the environment. OWTS can fail if they are improperly sited, designed, installed and/or maintained, causing health and water quality concerns as wastewater backs up onto the land surface and flows directly into surface waters or stormwater collection systems, or moves untreated into groundwater. Failing OWTSs and materials improperly disposed of through OWTSs can be sources of nitrates, phosphates, chlorides, bacteria, viruses, personal care products, paints, and other hazardous materials. Lack of maintenance is considered to be a primary cause of system failure. Operation and maintenance of existing systems is the responsibility of the property owner.

The Newport Water TMDL cites OWTS failure to surface water as responsible for 2 lbs. of annual TP loading (see **Table 3.2**). This is the only anthropogenic source of phosphorus that is expected to be reduced by 100%, because failing OWTSs are unacceptable per the RIDEM "Rules Establishing Minimum Standards Relating to Location, Design, Construction and Maintenance of Onsite Wastewater Treatment Systems," and must be rectified.

All OWTS are regulated and permitted by the RIDEM OWTS Rules. The OWTS Rules have more stringent setback standards for OWTSs near a Drinking Water Supply Watershed, such as those in within the Watson Watershed boundary, but RIDEM does not inspect these systems after they are installed.

The Town of Little Compton can play a major role in ensuring OWTS maintenance. In Rhode Island, municipalities can establish an OWTS management program to support property owners in maintenance efforts. When a town has an **Onsite Wastewater Management Plan (OWMP)** approved by RIDEM, this qualifies the municipality for the State's **Community Septic System Loan Program (CSSLP)**. The CSSLP is part of the State Clean Water Revolving Loan Fund program that provides low-interest loans to municipalities so that they may in turn issue low interest loans to homeowners to repair or replace failed, failing, or substandard OWTSs. The Town of Little Compton does not yet have an approved OWMP, but stated that establishing such a plan is a priority in their 2018 Comprehensive Plan.

4.2.2 Cesspools

Cesspools are a substandard means of onsite wastewater disposal that should be eliminated in the watershed. They are essentially a hole in the ground which does not provide any treatment. Failed cesspools anywhere in RI are required to be replaced under the State's OWTS rules. The Rhode Island Cesspool Act of 2007 requires the replacement of cesspools located within 200 feet of a waterbody with an intake for a drinking water supply, such as Watson Reservoir.

Amendments to the Cesspool Act in 2015 requires any property sold or transferred that uses a cesspool to have that cesspool replaced within one year of the sale or transfer, whether or not it is within 200 feet of a waterbody. Cesspools are common in residences built before 1970.

Recommended Wastewater Management Actions:

- Create and implement a local OWMP
- With an approved OWMP, apply for the State CSSLP

See the Implementation Table in **Section 7** for more action items pertaining to improving wastewater management in the watershed.

4.3 Residential Land Use

As noted in **Section 2.2**, residential land use comprises 11.6% of land area in the watershed. In addition to the above-mentioned water quality pollutant threats from OWTSs, residential areas pose such threats as:

- Pesticides and fertilizers from lawn and yard maintenance, and lawn/yard debris
- Household cleaning chemicals, automotive fluids (oil and gasoline), paints and solvents disposed of down the drain or onto the land surface (aka, Household Hazardous Waste)
- Heating oil storage (above and below ground tanks, further discussed below), and spills
- Abandoned wells (can illegally be used as direct conduits for pollution into groundwater)
- Pet waste

If taken on an individual basis, the threat from a single residence is normally less than the threat from other land uses, but when factoring them all together, they form a significant source of contamination. The Newport Water TMDL reports that 'urban land uses' (which encompasses non-agricultural developed land, including low density 'rural' residential uses) are responsible for 101 lbs. out of 195 lbs. total of annual TP loading in Watson Reservoir (see **Table 3.2**). Usually, urban land use means not only residential areas but commercial and institutional land uses, such as schools, hospitals, stores, offices, parks, churches, etc. In the case of land use within the Watson Reservoir Watershed, there are only two small plots of land that are neither residential nor agricultural: an auto body shop on Willow Ave and the area that the dam occupies in the reservoir's northwest corner (see **Map 2.3**). This lack of non-residential urban land uses indicates that residential land use, which represents only 11.6% of the land use in the watershed, is responsible for nearly all of the 101 lbs. of annual urban phosphorus loading to the reservoir, which is over half of the total TP loading.

Most citizens are unaware of the effects of the potential contaminants stored, used, and disposed of around the home. Education and outreach to the public is important in reducing this source of water pollution. See **Sections 6.5 & 7** for ways individuals and municipalities can reduce pollution from residential activities.

4.3.1 Lawn Management

Like impervious surfaces, lawns are another high-impact artifact of development. As all residential land area within the watershed is medium or low density and the Town Zoning Code requires a minimum residential lot area of two acres for all new single-family homes and subdivisions, large lawns are a common occurrence (ZO §14-4.1). The maintenance of residential lawns and gardens contributes to water quality degradation when people are not aware of the water quality impacts of their actions. Excessive amounts of fertilizer (nutrients) and pesticides, and poor timing of applications, release off the targeted area into the environment via runoff (whether from stormwater or lawn watering) and leaching to groundwater. Problems can also originate from storage and disposal practices for fertilizers and pesticides.

Most homeowners over-fertilize and are not aware of the appropriate best management practices to reduce the impacts to water quality in managing their lawns. Landscape contracting businesses can also over-apply fertilizers. Many states, including five in the New England/New York region have enacted state laws to minimize pollution from the overuse and misuse of fertilizer on turf grass. RI has no state law to address fertilizer use. Since laws regarding lawn management are difficult to enforce, strategies for managing fertilizer and pesticide use on lawns in Rhode Island are focused on education and training. Education of homeowners and landscape contractors on proper lawn and yard management continues to be the primary strategy used in Rhode Island to minimize water quality impacts. Unfortunately, stronger management of these chemicals is needed, as the impact to the environment, such as phosphorus loading, has serious implications.

4.3.2 Underground Home Heating Oil Tanks

Unlike underground storage tanks at gas stations and commercial facilities, underground storage tanks for home heating oil are not regulated by the RIDEM. 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 and that the tens of thousands of dollars in clean-up costs are not covered by homeowner's insurance. The best practice is to remove the underground storage tank and replace it with an above ground tank in the basement or outside with a spill collection barrier.

RI General Laws §46-12.1 enables municipalities to adopt ordinances to regulate and control underground tanks and to establish procedures for the registration, testing, and removal of such tanks. RIDEM has encouraged municipalities to use this authority to prohibit USTs in sensitive areas and focus their efforts on encouraging removal of home heating oil tanks. The Town of Little Compton could adopt such an ordinance.

4.3.3 Pet Waste

As there are no parks, sidewalks, or shared public areas within the watershed, all waste from dogs and other domestic animals occurs in residential areas. Pet waste is a significant contributor

of bacteria, pathogens, and nutrients (including phosphorus) to surface waters. Pet waste residue left on lawns and roadsides is easily carried by runoff into stormwater drains and nearby waterbodies. There is a need to strengthen education on the water quality impacts of not picking up of pet waste and of not properly disposing of pet waste in the trash. Tossing plastic bags or even biodegradable bags of pet waste under a bush or into a road ditch is not only littering, it allows the waste to pollute our waterbodies.

Recommended Residential Actions:

- Provide education to homeowners on proper lawn management
- Consider participating in RIDEM's Green Certification / Sustainable Turf Management for Landscaping Certification program
- Consider implementing a local voluntary program for landscapers to commit to pollution prevention, such as the Town of Charlestown's Recommended Landscaper Process.
- The town can adopt limits on residential lawn areas in new developments to minimize this source of pollution and promote infiltration of stormwater. (This is a LID strategy.)
- Educate homeowners on the threat to water quality from above-ground and underground home heating oil tanks and the potential financial consequences.
- The town may adopt ordinances prohibiting new heating oil USTs, and for phasing out and replacing existing underground home heating oil USTs.
- Educate the public about the impact of pet waste on water quality. Strategies include:
    - Municipalities could hand out or mail a pet waste or water quality brochure along with the license/tags.
    - Provide veterinarians and other pet services with water quality information (for dissemination to clients).

4.4 Agriculture

Agricultural land uses account for 24.1% of land cover in the watershed, including cropland, livestock pasture, and orchards, groves, and nurseries (see **Table 2.1**), and is responsible for 35% of the excess phosphorus load to the reservoir. Several of the agricultural sites within the watershed are held in interest by the Town's Little Compton Agricultural Conservancy Trust (LCACT). The Newport Water TMDL reports that agricultural areas are responsible for 57 lbs. out of 161 lbs. of total annual anthropogenic phosphorus loading to the reservoir (see **Table 3.2**).

The types of surface water and groundwater pollutants that can come from agricultural operations include nutrients (such as phosphorus) from fertilizers and animal wastes; pathogens and organic materials primarily from animal wastes; sediment from field erosion and soil disturbing activities; pesticides; and petroleum products. Agricultural land is directly adjacent to Watson Reservoir and many of its tributaries, and/or hydrologically connected wetlands. Well managed farms can operate with minimal negative effect on water resources.

Implementing conservation measures on farms is one of the most cost-effective ways to reduce pollution to local waterbodies. These practices include:

- Implementing nutrient management and conservation plans
- Installing and maintaining grassed or forested buffer strips along farm fields
- Planting cover crops and managing drainage patterns in a way that retains soil in the field
- Fencing animals out of streams and wetlands
- Covering manure and compost piles and locating them over 200 feet away from waterbodies, wetlands, and stormwater drainage features.

Farmers should utilize the BMPs consistent with the USDA Natural Resources Conservation Service (NRCS) Conservation Practice Standards (https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/cp/ncps/) to the maximum extent practicable. All programs to employ or improve conservation practices on farms are usually voluntary. Financial incentive programs are provided through the NRCS. See **Section 8.1.5** for further information about NRCS's programs.

4.5 Waterfowl and Wildlife

Waterfowl and wildlife are a natural part of our environment and are enjoyable to watch. However, when they congregate in excessive numbers due to human encouragement, they contribute pathogens and excess nutrients to water pollution. There is an important distinction between native and migrating waterfowl, which tend not to be a pollution problem, and nuisance waterfowl—such as resident Canada geese—which do not migrate and congregate for longer periods of time, resulting in excess waste contributing to bacteria and nutrient pollution problems. Feeding of waterfowl, and large lawns near waterbodies that allow waterfowl to land and congregate, can result in unnaturally high concentrations of waterfowl in these locations. Whether by direct excretion of waste into waterbodies, or via stormwater runoff which transports the waste deposited on lawns and parking lots into waterbodies, the bacteria and nutrients in their waste end up negatively affecting the water quality.

Figure 4.1 Canada Goose

Source: RIDEM DFW Staff

Recent concern has focused on the large numbers of resident Canada geese, whose populations have increased greatly over the last 50 years in southern New England. As reported by the RIDEM Division of Fish and Wildlife (DFW), a single Canada goose produces a pound of fecal waste a day. Although most people find a few geese acceptable, problems develop as local flocks grow and their droppings become excessive where they regularly feed and congregate. The

Newport Water TMDL noted high magnitudes of geese and goose waste along the reservoir. The TMDL estimates a mean annual Canada goose population of 412 geese at Watson reservoir, whose droppings are responsible for 10-19% of annual TP loading.

Geese are attracted to open lawn areas of lush green grass and nearby easy access to water. There are ways to modify the landscapes that geese are attracted to so that they do not flock to these areas. For example, allowing grass to grow tall to eliminate grazing area on the shore, planting some strategic shrubs and trees in a large expanse of lawn, or installing a fence to block access between the water and the grazing area. More techniques to deter geese can be found here: http://www.dem.ri.gov/programs/bnatres/fishwild/pdf/cangeese.pdf.

In 2016, EPA's Eastern RI Conservation District (ERICD) modeled best goose abatement practices in their project "Resident Canada Goose Education and Mitigation in East Bay Watersheds and Aquidneck Island." ERICD held educational workshops in Newport and Bristol Counties, including for Little Compton residents, and conducted the GeesePeace method of egg-oiling for population control in goose nest study sites. Although Newport Water had previously partnered with ERICD, they declined to allow the study to be conducted at any of their reservoirs, including Watson. Since woody plants are not feasible to plant on reservoir berms, other options to deter geese in these areas are recommended in the Newport Water TMDL and include installing reflective streamers or other shiny moving objects, and/or selective mowing schedules. See the TMDL for additional discussion and methods to control geese around the reservoir and at congregation areas throughout the watershed.

4.6 Loss of Vegetated Buffers

A vegetated buffer is an area of natural trees, shrubs, and other vegetation located adjacent to rivers, streams, lakes, ponds, and wetlands. These areas provide the important functions below:

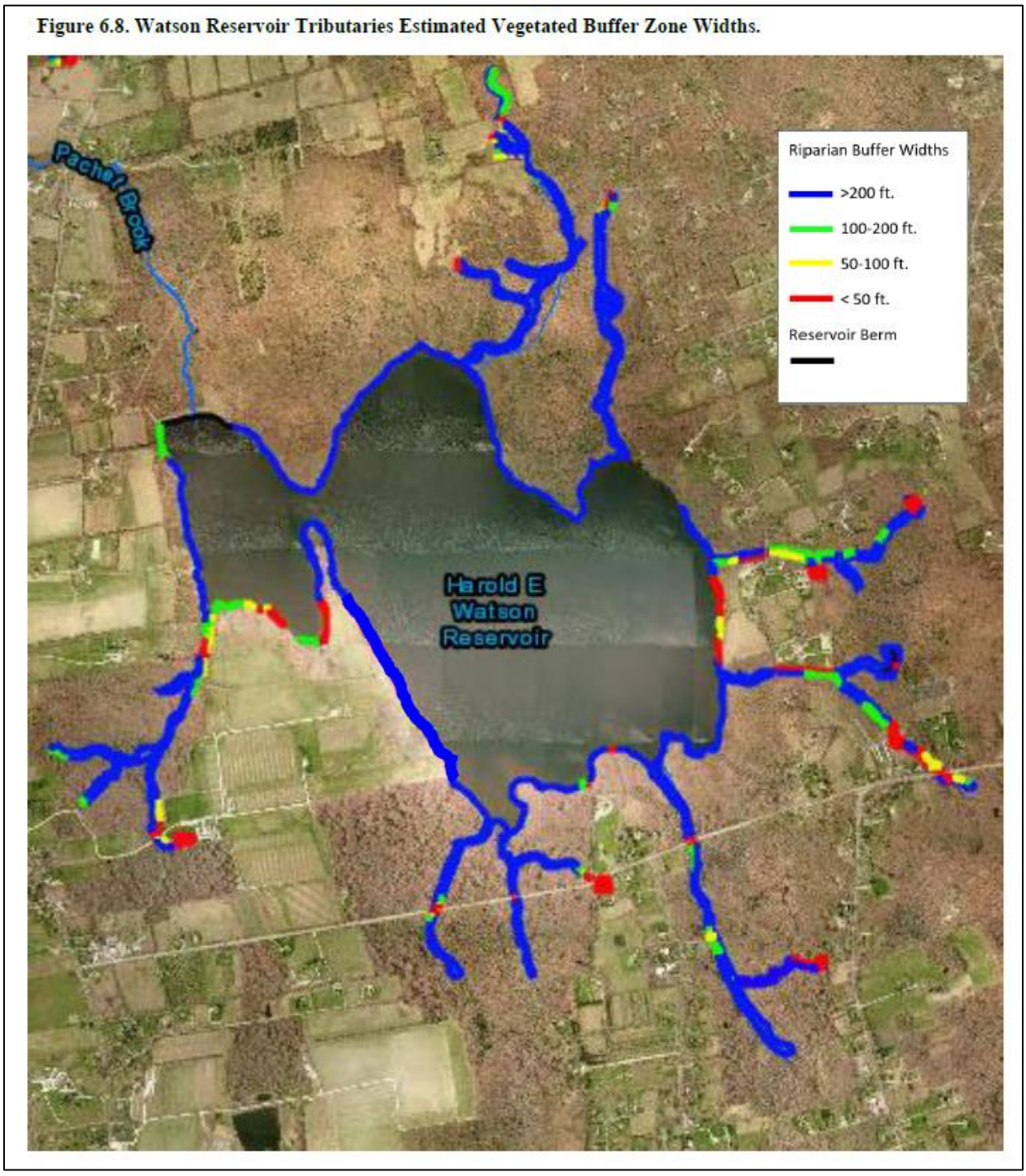
- Protects waterbodies from those nonpoint pollutant sources discussed above, and other stressors by performing natural functions
- Filters and slows down runoff and allows it to soak into the ground to recharge groundwater
- Traps sediment before it can reach the waterbody
- Treats nutrients in stormwater by uptake in vegetation or trapping in the soils, including functioning as a sink for phosphorus
- Transforms nitrate in the groundwater, thereby reducing the amount of nitrogen entering the waterbody
- Stabilizes and protects stream banks from erosion
- Moderates temperature and provides shading around the waterbody, helping to maintain conditions for the aquatic habitat
- Provides areas for flooding, protecting downstream properties
- Provides important habitat for connecting wildlife to the waterbody corridor system and is also often a special transition area hosting a diversity of wildlife between the aquatic and the upland habitats

- Makes habitat less appealing to Canada geese

Vegetated buffers are lost when land is cleared for development, yards and lawn areas, agricultural use, or views to the waterbody.

The RIDEM recommends a minimum 100-foot buffer to control both sediment and phosphorus, although in many cases long-term management of phosphorus may require effective on-site management of its sources. The following **Map 4.2** of vegetated buffer widths of waterbodies within Watson Watershed is from the Newport Water TMDL and should be utilized to plan and prioritize where buffer re-establishment or buffer augmentation should occur through voluntary or conservation efforts. Compared to that of the other Newport Water Reservoirs, the riparian buffers of Watson Reservoir are relatively intact, and yet the reservoir is still impaired by phosphorus. Efforts to restore the lengths of disturbed riparian buffer zones indicated in the below map should be made to further mitigate pollution from excess nutrients.

Map 4.2 Watson Reservoir & Tributaries Estimated Vegetated Buffer Zone Widths



Source: Newport Drinking Water Reservoirs TMDL, RIDEM, 2021

Recommended Buffer Restoration Actions:

- Inspect all land under Newport Water ownership and protective easement and identify areas to install plants or supplement to provide an adequate buffer. Enforce provisions of protective easements.
- Further evaluate the extent and condition of riparian buffers in the watershed (including invasive species).
- Work with landowners to promote buffer protection and restoration where possible.
- Develop a watershed wide Buffer Protection and Restoration Plan
  The restoration work that the Aquidneck Land Trust is doing in the Maidford River watershed can be a model to look to for how to go about this. (For more information: https://snepnetwork.org/maidford/)
- Pair buffer restoration on prioritized properties along with methods for pollution prevention to control any originating sources of excess phosphorus.

4.7 Road Salt & Sand

Road salt and sand are important elements of maintaining safe roadways in winter, however, there is a water quality cost. Salt and sand wash into surface waters impacting aquatic life. Salt can enter groundwater and contaminate drinking water wells. Not only is the water not suitable for drinking, but the salt corrodes the pipes, and can cause harmful metals, such as lead, to leach out into the water. The sand that is applied on the roads during winter can become a major contributor to stormwater BMP failure by clogging the systems. RIDOT estimates that only about five to ten percent of the sand applied to the road is recovered as street sweepings (RIDOA, 2014).

Minimizing impacts to water resources from road salt and sand application while at the same time maintaining public safety presents a unique challenge. Improved technology and best management practices can be utilized to reduce the amount of salt and sand applied to roads without compromising winter travel safety. In addition, the sand and salt must be stored in a manner to reduce impacts to water quality, primarily by the covering of the salt pile in a structure and containing runoff from the site. RIDEM rules require that all stockpiles of road salt (state, town, and private) in the watershed be covered with, at minimum, a durable cover. There are no public salt piles in the watershed.

Another issue that Rhode Island has been experiencing is mild conditions and rain events interspersed between winter storms. This has the ability to accelerate the washing of winter sand and salt into our waterways prior to the typical time when street sweeping is conducted in the Spring. Increasing the frequency of street sweeping, particularly on mild winter days, can help prevent more of this sand and salt from entering waterbodies.

Recommended Actions:

- Upgrade equipment for more efficient application of road salt and sand.
- Ensure any private stockpiles of road salt are covered. – *may not be relevant*

- Consider feasibility of reducing the amount of salt added to the roads.
- Promptly remove winter sand (street sweeping).
- Consider increasing frequency of street sweeping between winter storms.

4.8 Climate Change

Climate change-associated temperature increases and more frequent droughts pose the biggest threat to the water resources in this watershed. Increased droughts and evaporation can affect the amount of drinking water supply available in the Watson Reservoir. Surface water reservoirs are more vulnerable to evaporation than groundwater supplies. Heat and evaporation of surface water reservoirs can increase growth of algae and bacteria and concentrate pollutants, potentially making treatment more difficult. Drought can also impact private wells and irrigation supplies for agriculture. Private wells may need deeper drawdown due to drought. Drought also increases risk for wildfires which can have a significant impact on water quality and associated costs to drinking water treatment.

Climate change can pose other threats to the watershed, such as to the functioning of the storm water pollution infrastructure that we rely on to help keep our waters clean. An increased frequency of intense storms can overwhelm the existing storm flow drainage infrastructure (such as culverts, bridges, and catch basins), which may not have the capacity to freely pass the increased amounts of water and can cause blow-outs or back-ups, thereby contributing to additional damage, erosion, and increased flooding risks to the public and the environment. The only area within the watershed currently in a Special Flood Hazard Area identified on the National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM) is just around the immediate perimeter of the reservoir within that area owned by the City of Newport.

Watson Reservoir is far enough away from the coast that climate change-associated sea level rise (SLR) is not anticipated to impact the reservoir. The RI Coastal Resources Management Council (CRMC) and the University of Rhode Island's (URI) STORMTOOLS is an interactive map that aids Rhode Island residents and municipalities in determining what houses, buildings, and infrastructure are at risk of coastal inundation under different scenarios of storm surges and SLR. The CRMC currently predicts local SLR of 3-5 feet or more within 100 years. Even under the extreme scenarios of 12 feet of SLR and a 100-year storm under SLR mapped on STORMTOOLS, coastal surge is not anticipated to breach the reservoir. As several of Newport Water's other reservoirs are predicted to be affected by coastal flooding, Watson Reservoir may become a more important water supply in the future.

The RIDEM recommends that municipalities educate themselves on the impacts of stormwater, flooding, and sea level rise so that they can prepare. It is recommended that all municipal board and commission members complete the PREP-RI on-line module series, available here: https://prep-ri.org/.

5. STRESSORS TO AQUATIC HABITAT

Healthy aquatic ecosystems need to have clean water, but they also need to be free of other stressors that result in physical changes to aquatic habitats. Stressors are associated with human activities, climate change, and spread of invasive species. Promoting a healthy watershed includes restoration of critical components of the ecosystem that have been physically changed. However, there are challenges associated with ecosystem restoration. While it is always better to protect aquatic habitats and their buffers from alteration, restoration can have an important role in watershed management because of the valuable functions that can be returned.

5.1 Wetland Disturbance

As discussed in **Section 2.1.3**, wetlands provide many environmental and ecological benefits for us. They are important habitats for aquatic, terrestrial, and avian species, particularly for many of Rhode Island's endangered, threatened, and migratory species. When wetlands or their vegetated buffers are altered, these benefits are diminished or lost.

Direct disturbance to wetlands includes activities such as cutting of vegetation, filling, illegal dumping, excavating, water diversion, road crossings, and livestock access. Prior to regulation initiated in the 1970s, many wetlands were filled, ditched or drained. Much of the area that is now Watson Reservoir was wetland before the dam on Pachet Brook was constructed in 1960. Wetlands can also be directly altered by an influx of sediment transported in stormwater from farther away construction sites; winter road sand; and eroding stream banks, dirt roads, and dirt driveways.

The ecosystem of each wetland has adapted to certain water conditions. In addition to the disturbances noted above, hydrologic alterations in a watershed can also be caused from manmade withdrawals of water for watering lawns, irrigation, or drinking water, and have been identified as a concern in Rhode Island. Resulting impacts to the aquatic habitat occur due to loss of riverbed area covered by water, receding wetlands, loss of vernal pools, and inadequate baseflow of streams for a healthy, reproducing natural fish population.

While direct impacts to wetlands are regulated by the Freshwater Wetlands Rules, the contributing drainage area to a wetland is not protected by these current regulations. This stresses the importance of watershed planning in order to protect wetlands, not as isolated systems, but as an interconnected part of the watershed. Throughout a watershed, land use planning, stormwater management, erosion controls, land conservation, public water supply demand management, and other techniques can be employed in order to avoid indirect impacts to wetlands.

Wetlands are the source of the headwaters for many of Watson Reservoir's intermittent tributaries. Wetlands that were dug out to make private ponds or watering holes, or have otherwise been encroached upon, can be direct conduits of nutrient and/or bacteria pollution from residential and agricultural properties into intermittent streams.

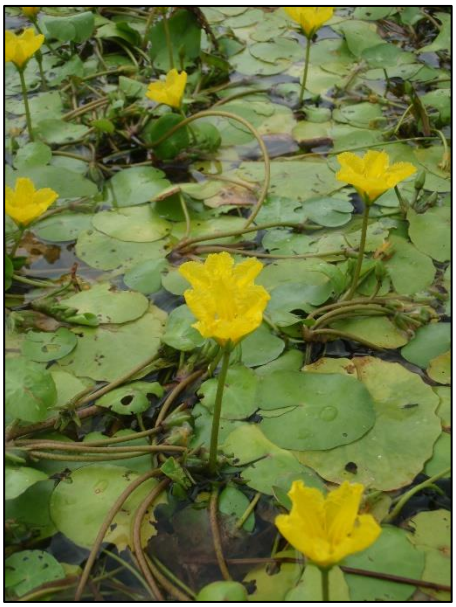
Opportunities to restore damaged wetlands and riparian buffers can help improve water quality and aquatic habitat. This often involves working with private landowners and farmers.

5.2 Aquatic Invasive Species

Aquatic invasive species (AIS, or non-native aquatic plants) can create dense vegetative growth that disrupts aquatic habitat and interferes with recreational activities. AIS can be difficult and expensive to treat. AIS can live in freshwater lakes and ponds, or on the shorelines of waterbodies and in freshwater and marine wetlands. Excess nutrients may exacerbate the AIS problem, but do not cause it.

One AIS has been documented within Watson Watershed--Yellow Floating Heart (*Nymphoides peltata*). First noted in 2010, this invasive species lives in an unnamed pond off of Peckham Road, in the headwaters of Tributary 2. Yellow Floating Heart can form dense, floating mats over large areas of water. These mats limit the amount of light available to other aquatic plants, allowing it to quickly displace and out-compete native species. When the plants die off, the subsequent decomposition of the large biomass can recycle phosphorus levels in lakes, decrease oxygen levels, and produce algae blooms or fish kills. It reproduces easily via fragmentation and can spread quickly to other waterbodies (RIDEM Fact Sheet, 2017).

Figure 5.1 Yellow Floating Heart



Source: RIDEM Staff

Presently, Yellow Floating Heart is only within the beginning of the eastern branch of this tributary and has not yet spread further down the stream nor into Watson Reservoir. Early prevention via education, monitoring, and boat/equipment hygiene is key. Hand pulling may be effective to completely remove small patches, however because this plant reproduces by fragmentation, physical control activities may unintentionally promote the spread of the plant if care is not taken to be sure that all plant fragments are caught and removed. Chemical control may be effective for large populations but has not yet been used for Yellow Floating Heart in Rhode Island (RIDEM Fact Sheet, 2017).

5.3 Barriers to Stream Connectivity

Rivers and streams provide “highways” for aquatic species, allowing them access to a variety of food resources, places to lay eggs and rear their young, and hide from predators. For some species, such as American eel and River herring, the ability to move freely up and downstream in a river is a critical part of their life cycle.

Dams and other obstacles, such as road culverts (pipes or box openings under roads allowing water to pass), prevent the free passage of fish and wildlife, and therefore limit access to riverine habitat. If not properly designed and constructed, wetland crossings can fragment linear habitat corridors, disturb or block fish and wildlife passage, alter ecosystem processes and aquatic communities, flood roads and property, and compromise water quality. Actions to address stream connectivity in Rhode Island include physical removal of barriers, construction of fish ladders, or replacement of undersized and perched culverts with larger structures designed for wildlife passage. Due to the co-benefits of stream connectivity projects, another opportunity to consider fish and wildlife passage is when culverts and other road crossings need upgrading due to flooding problems, which may be identified in local Hazard Mitigation Plans. In these cases, when the new design is being created to address flooding, wildlife friendly design should also be incorporated.

Watson Reservoir Dam

Since Rhode Island's earliest settlement, dams of varying size were constructed on all of its larger rivers and many of its smaller streams. As discussed above, Watson Reservoir was created by constructing a dam on Pachet Brook. This dam may obstruct wildlife that previously migrated

Figure 5.2 Watson Reservoir Dam

Source: RIDEM Environmental Resource Map, Aerial Photo (Fall 2020) GIS layer

and spawned in the freshwater wetlands around or that are now the reservoir. The Strategic Plan for the Restoration of Anadromous Fishes to RI Coastal Streams identifies Watson Reservoir as an attractive alternative habitat for River herring, a species of concern with steeply declining populations. Although no populations of Alewife or Blueblack herring currently live in or migrate to Watson Reservoir, this habitat could be made available to them with the construction of the specific fish passage recommended for this dam, an Alaska Steeppass Fishway (RIDEM DFW, 2002).

Since old dams can pose a safety hazard, they are given a hazard potential rating, and are visually inspected by engineers hired by RIDEM on a schedule determined by the hazard rating, with higher hazard potential dams being inspected more frequently. Watson Reservoir Dam is rated as a High Hazard potential dam. A dam rated as a High Hazard means that failure or mis-operation of this dam will result in a probable loss of human life (Pare, 2013). The hazard potential rating is not related to the actual condition of the dam. An inspection report dated 2013 for Watson's dam detailed vegetation overgrowth, maintenance, and safety issues. Failure of this dam would result in loss of life in the residential area of West Main Road, south of Nonquit Pond, and cause damage to the Almy Brook saltmarshes. The City of Newport was issued a Notice of Violation from RIDEM in 2016 for all of the reservoir dams that they own which are both High Hazard and deemed unsafe due to vegetation growth and other maintenance and stability issues. The City has been working on correcting these issues. In 2020, the work needed for the Watson Reservoir Dam was completed to address the unsafe conditions (RIDEM OC&I, 2020).

5.4 Climate Change

Climate change is recognized as a threat to all aquatic habitats in the watershed, especially to freshwater marshes and vernal pools. Freshwater wetlands are vulnerable due to changes in hydrology. Predicted changes in precipitation patterns and more frequent droughts may change spring seasonal flows and floods, and produce drier summers that change groundwater levels and soil moisture. The hydroperiod of seasonal pools may shorten, affecting the breeding success of species dependent on this habitat, such as amphibians.

Changing water regimes and temperatures can result in loss of wetlands and their valuable services to society; and can result in changes to species, resulting in loss of native habitat, while opening the door to invasive species. Warming air and water temperatures can affect fish habitat and water chemistry dynamics. Warmer water also encourages algae growth and holds less dissolved oxygen, exacerbating eutrophication of lakes and ponds.

More extreme weather events of droughts and storms are expected due to climate change. Hurricanes and tropical storms can destroy established vegetation and their stabilizing roots, resulting in increased erosion of fertile soils and stream banks, and sedimentation of stream beds.

Maintaining or restoring vegetated buffers is the best defense to help retain moisture and microclimates in these ecosystems, whereas loss of buffers will accelerate the negative effects of a changing climate to these sensitive resources.

6. CURRENT WATERSHED PROTECTION MEASURES

This Section provides a brief description of water resources protection initiatives that are already in place or are ongoing.

6.1 Revised Freshwater Wetlands Rules

The 1971 RI Freshwater Wetlands Act authorized the RIDEM to preserve and regulate the freshwater wetlands of the state for the public benefits that they provide. Current regulated areas include 200 feet around rivers 10 feet or greater in width (referred to as large rivers), 100 feet around narrower rivers and streams, 50 feet around lakes and ponds greater than ¼ acre, and 50 feet around larger wetlands.

On January 15, 2022, the revised Freshwater Wetlands Rules will go into effect. This revision expands the regulated areas to 'freshwater wetlands, buffers, floodplains, areas subject to storm flowage, areas subject to flooding, and contiguous areas that extend outward two hundred feet (200') from the edge of a river or stream, two hundred feet (200') from the edge of a drinking water supply reservoir, and one hundred feet (100') from the edge of all other freshwater wetlands. Persons planning new projects or regulated activities within the riparian buffer zones will need to obtain a permit unless otherwise exempt.'

The new rules increase the protected area around Watson Reservoir from 50 feet to 200 feet, as it is a drinking supply reservoir, and the regulated area around Watson's narrow tributaries from 100 feet to 200 feet. Freshwater wetlands of all sizes now have a protected buffer zone and regulated perimeter. State law specifies that farmers will remain subject to current rules and not subject to the 2022 Rules for buffers.

6.2 Source Water Protection Initiative for Newport Water Supply Reservoirs

The 2015 Source Water Protection Initiative for Newport Water Supply Reservoirs is an effort initiated by the RIDEM, in coordination with the RIDOH, to restore the quality of the Newport Water System's nine source reservoirs, including Watson Reservoir. The primary objective of the Source Water Protection Initiative is that the water quality in each of the nine reservoirs is suitable for drinking water use with conventional treatment, and supports aquatic life uses. As part of this initiative, the RIDEM committed to developing a water quality restoration plan in the form of the recently published Total Maximum Daily Loads (TMDL) for Phosphorus for the City of Newport Drinking Water Reservoirs. The RIDEM conducted bi-weekly monitoring of the nine reservoirs from May through October 2015 to gain a better understanding of the source reservoirs' water quality.

During this time, the RIDEM also partnered with the Natural Resources Conservation Service (NRCS) to focus National Water Quality Initiative (NWQI) water quality investigations in several tributaries within the Newport reservoir watersheds, including the Maidford River and

Paradise Brook. This data was then used to determine acceptable phosphorus levels in the reservoirs to support a healthy aquatic ecosystem and water quality that is suitable for drinking water use with conventional treatment alone. Based on this data analysis, the RIDEM determined the necessary reductions in phosphorus discharged to the reservoirs. The TMDL also identified pollution sources, and watershed and stormwater management actions. The NRCS NWQI program has also prioritized funding for agricultural best management practices within the watersheds of the Newport Water Supply Reservoirs.

6.3 Little Compton Comprehensive Plan

Rhode Island has a reciprocal system of land use planning whereby the State sets broad goals and policies through the State Guide Plan and municipalities express local desires and conditions through the development of community comprehensive plans. These local comprehensive plans serve as the basis for land use regulation and establish an implementation program for achieving each community's stated goals. The Little Compton Comprehensive Plan establishes important local goals, policies, and action items to protect and improve water quality.

Natural resource goals from the Little Compton Comprehensive Plan include:

- Goal NR1. Protect water quality by reducing or eliminating existing and potential groundwater and surface water contaminants.
- Goal NR2. Ensure that onsite wastewater treatment systems (OWTS) in the community work properly and do not threaten public health, local water resources, or the environment.

See the 2018 Comprehensive Plan for specific policies and action items supporting the protection of surface water, groundwater, and wetland resources.

Additionally, the low density residential zoning district which encompasses the watershed excludes those commercial or industrial uses which may pose a high risk to groundwater quality.

6.4 Protected Open Space and Buffers

Preserving land in the watershed in its natural state is an important tool in protecting water quality and aquatic habitat. 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 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, purchases in fee simple, and through conservation development (or 'cluster') zoning provisions. Conservation easements, which permanently limit the use of the land in order to protect its conservation value, are the most common tool for conserving private lands, and for adding an additional layer of legal protection to publicly owned open space land. Conservation

of land is undertaken by all levels of government (local, state, federal) and non-governmental entities, including land trusts and conservation organizations.

Active land stewards and land preservation groups in the Watson Watershed include:

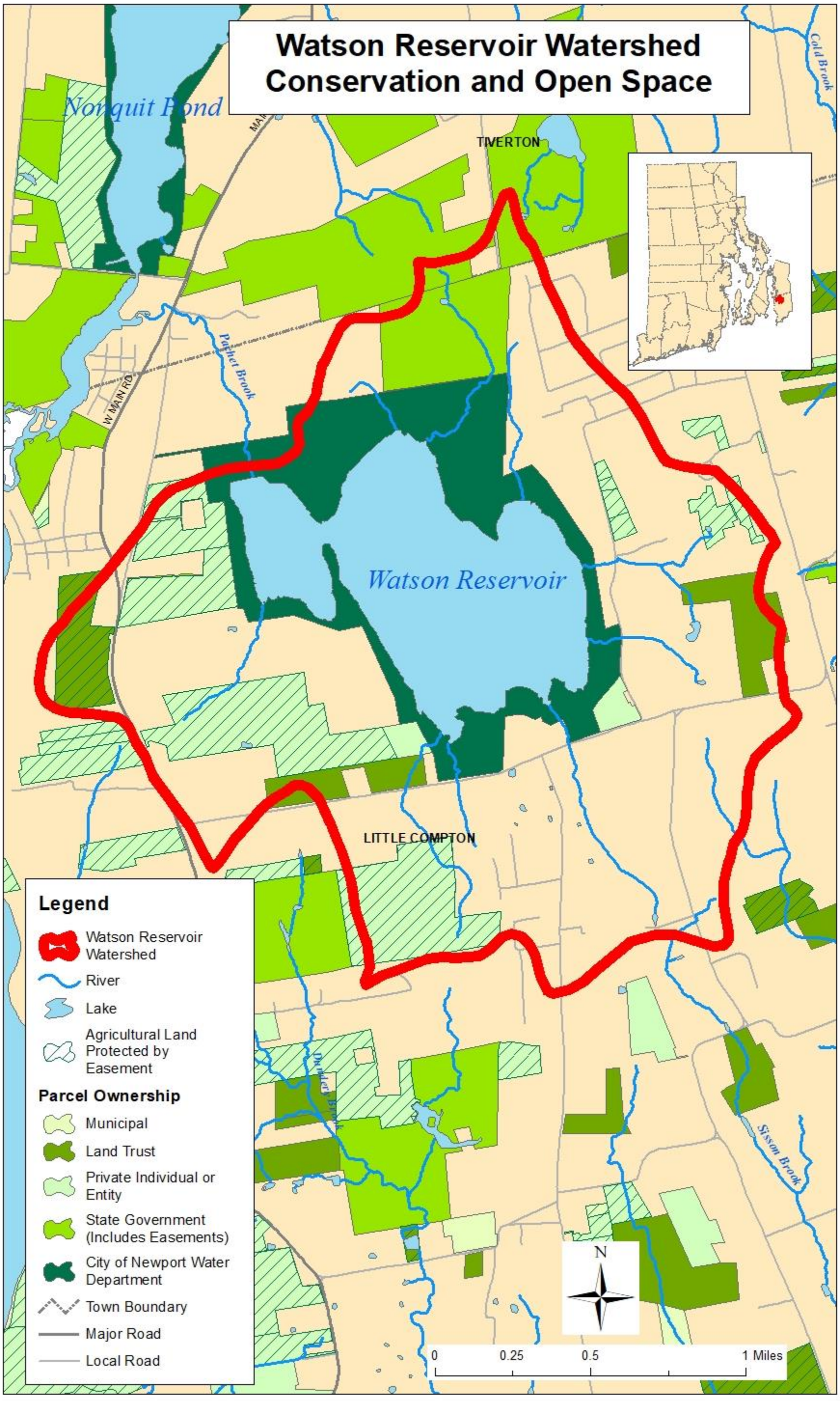
- City of Newport (municipal)
- Little Compton Agricultural Conservancy Trust (municipal)
- Sakonnet Preservation Association (private)
- Natural Resource Conservation Service (federal)
- State of Rhode Island (state, RIDEM)

Map 6.1 depicts the land parcels of protected open space within the watershed, which totals over 1,031 acres (56% of the watershed land area). Note that some land that is protected from development may remain in agricultural use, which is the case for 28% of the open space land in the watershed. Therefore, it can still be a potential source of pollution if sustainable conservation practices and water quality protections are not effectively employed. The City of Newport has protected over 14% of the land in the watershed, mostly directly adjacent to the reservoir, in addition to owning the 379 acres of the reservoir itself.

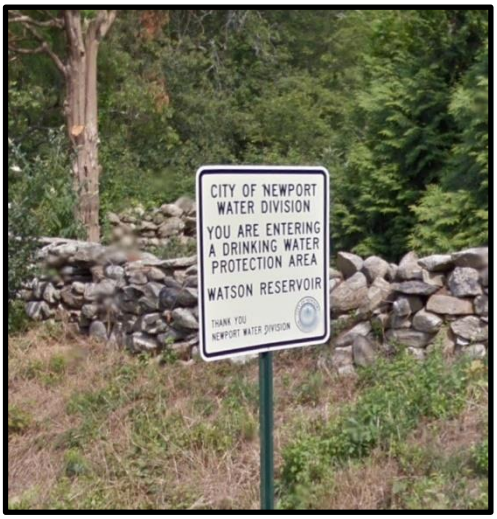
Table 6.1 Open Space Land in the Watershed

	Total Acres	Adjusted for reservoir water area	Percent of land area	Percent of Open Space
Total Acres in Watershed Planning Area	2224.847	1845.8471	100.00%	N/A
Agriculture Land Protected by Easement	292.3889	292.388895	15.84%	28.36%
State Owned Fee Title (not easements)	99.79274	99.792737	5.41%	9.68%
Municipal (Newport) (total includes 379 acres of the reservoir)	650.839	271.8390223	14.73%	26.36%
Land Trust	91.8933	91.89330322	4.98%	8.91%
Private/NGO/Other	275.1933	275.1932853	14.91%	26.69%
Total	1410.107	1031.107243	55.86%	100.00%

Map 6.1


Watson Reservoir Watershed Conservation and Open Space
Nonquit Pond
TIVERTON
Cold Brook
Paquet Brook
W MAIN RD
Watson Reservoir
LITTLE COMPTON
Sisson Brook
Legend
Watson Reservoir Watershed
River
Lake
Agricultural Land Protected by Easement
Parcel Ownership
Municipal
Land Trust
Private Individual or Entity
State Government (Includes Easements)
City of Newport Water Department
Town Boundary
Major Road
Local Road
N
0
0.25
0.5
1 Miles

6.5 Public Outreach & Individual Actions



Public education and awareness is a key part of this watershed plan because everyone in the Watson Reservoir Watershed poses a risk to surface water, groundwater, and aquatic habitats. Though many actions to improve water quality are the responsibility of government agencies, other actions taken by residents and non-governmental groups have the potential to make a large difference in local water quality. Most homeowners will work to protect their local water resources if they know how to minimize contamination risks. The challenge has always been how best to inform the public and how to interest the public enough to take actions to make a difference.

Some of the most important areas to focus on for pollution prevention are pet waste responsibility; lawn care; avoiding dumping yard waste in or near wetlands, streams, or other waterbodies; the importance of vegetated buffers; discouraging nuisance waterfowl; septic system maintenance; information for private well owners; proper disposal of household hazardous wastes, trash, and recycling; and ways to reduce stormwater runoff. Outreach to the public should also include education on the values and importance of wetlands, riparian corridors, and vegetated buffers to waterbodies; open space protection, and green stormwater infrastructure. Outreach to hobby farms should include topics for keeping livestock out of wetlands and streams, manure and compost management, erosion prevention, and other agricultural best management practices.

Examples of public outreach programs and materials include:

- RIDEM OWR's Simple Ways YOU Can Help Keep RI's Waters Clean pamphlet – http://www.dem.ri.gov/programs/benviron/water/quality/pdf/tenthing.pdf
- URI Onsite Wastewater Training Program's Factsheets – https://web.uri.edu/owt/onsite-wastewater-factsheets/
- RI Stormwater Solutions, developed by URI NEMO with funding from RIDOT is hosted on DEM's website here: http://dem.ri.gov/ri-stormwater-solutions/
- ERICD's Residential Guide to Stormwater Management – https://drive.google.com/file/d/1LqCznLVq6D8M4bceWuJbQJLpcTUQVGmE/view
- Sakonnet Preservation Association's ongoing conservation speaker series – https://sakonnetpreservation.org/educational-programs/
- Encourage residents to learn about taking care of their well. A local resource is the URI Home*A* Syst Private Well Water Workshops (https://web.uri.edu/safewater/workshops/)
- URI HOME*A*SYST Water Quality Program: Small Acreage Livestock Factsheets https://web.uri.edu/safewater/protecting-water-quality-at-home/animal-waste/small-acreage-livestock/livestock-factsheets-and-self-assessment-worksheets/

7. IMPLEMENTATION TABLE

Table 7 identifies the actions for addressing the goals noted at the beginning of this watershed plan. The action items are derived from the discussions in the plan, and also include actions derived or modified from implementation of TMDL's, local, state, and regional plans, and other best management practices. Each action item is prioritized to reflect items of high importance that should be addressed first. Some items are requirements and are not given a priority, as they must be done. Implementation action items were prioritized based on the goal priorities, professional judgement of the direct applicability of the action to address the concern, and relative ease of implementing the measure.

The Implementation Table is divided by management topic, and includes the following information:

1) Action Item
2) Responsible Party: primary responsible parties listed include municipality, state agency, non-governmental organizations, private companies, landowners, etc. Supporting parties are indicated in parentheses.
3) Timeframe: on-going, 1-2 years, 3-5 years, 5-10 years. When target completion dates are known, these are included.
4) Cost Estimate: Relative indication of estimated cost as follows:
   $ = <$25,000; $$ = $25,000 -- $100,000; and $$$ = >$100,000
5) Priority, as follows:
   Required
   H – High
   M – Medium
   L – Low

Responsible Party/ Support Abbreviations:

Town = Town of Little Compton
NWD=Newport Water Division
RIDEM= RI Department of Environmental Management
RIDOT= RI Department of Transportation
USFWS= US Fish and Wildlife Service
SRICD= Southern RI Conservation District
ERICD=Eastern RI Conservation District
GIC= Green Infrastructure Coalition
NRCS= RI Natural Resources Conservation Service
WRB= RI Water Resources Board
NGO's= Non-governmental organization, as applicable
ALT= Aquidneck Land Trust
RIRRC=RI Resource Recovery Corporation
URI= University of Rhode Island (Cooperative Extension)

Table 7. Implementation Actions

Action Item **(Listed by Management Topic)**	**Responsible Party** (Support)	**Timeframe (years)**	**Cost Estimate**	**Priority**
Stormwater Management				
Identify any stormwater outfall MS4 discharges to the Reservoir and the contributing drainage area. (*required if RIDEM notifies the Town)	Town*, RIDOT	1-2	$	Required
Implement stormwater mitigation to treat runoff from outfalls identified in the TMDL.	Town, RIDOT	3-5	$$	High
RIDOT to amend and implement Stormwater Control Plan (SCP) for discharges to impaired waterbodies in the watershed, as applicable under the Consent Decree with EPA. (SCP required within 2 years of EPA approval of the TMDL)	RIDOT	3-5	$$	Required
Implement the structural stormwater BMPs outlined in the Newport Water/ Fuss & O'Neill 2016 Source Water Phosphorus Reduction Feasibility Study (p. 5-14). This includes the proposed concepts for: Peckham Rd Linear Bioretention, East Main Rd Linear Bioretention, Burchard Ave Bioretention, West Main Rd Linear Bioretention. Install other BMPs as opportunities arise.	Town, RIDOT	On-going	$$$	High
Consider adopting local stormwater requirements and soil erosion controls, for development projects smaller than one acre (i.e., smaller than the state minimum requirement) for all new and redevelopment applications.	Town	1-2	$	High
Review existing zoning and land development ordinances to evaluate what LID techniques are included, decide what LID techniques would be appropriate for the community to incorporate, and adopt the use of the selected LID techniques into local development regulations for use in proposed development and redevelopment projects.	Town	1-2	$	High
Ensure adequate resources to properly maintain BMPs.	Town	On-going	$	High

Action Item **(Listed by Management Topic)**	**Responsible Party** (Support)	**Timeframe (years)**	**Cost Estimate**	**Priority**
Stormwater Management, cont.				
Provide public education on 'good housekeeping' efforts that residents in the watershed can do to reduce pollutants and stormwater runoff (restoring vegetated buffers around streams and wetlands, discouraging geese, maintaining septic systems, properly disposing of pet wastes and yard wastes, minimizing fertilizer use, ways of reducing stormwater runoff, proper disposal of household hazardous wastes, and prevention of illegal dumping).	Town (ERICD)	On-going	$	High
Conduct a stormwater utility feasibility study. Investigate the feasibility of establishing a stormwater utility district as a stable source of funding for stormwater management needs.	Town	3-5	$$	Medium
Reduce stormwater runoff by encouraging construction of rain gardens, native landscaping, lawn reduction, permeable driveways, excess pavement removal, and dry wells which facilitate groundwater infiltration on private and public properties.	Town (ERICD)	1-2	$	Medium
Require erosion and sediment control training for contractors to work in Town.	Town	1-2	$	Medium
Consider ordinances to require all new development to reuse stormwater runoff as a method for reducing the need for watering landscaped areas with potable water	Town	1-2	$	Low
Street sweeping	Town, RIDOT	On-going	$$	High
Catch Basin Cleaning	Town	On-going	$	High
Investigate and eliminate illicit sanitary and gray-water connections to storm drains (Illicit Discharge Detection and Elimination). Screen for suspicious inflow pipes during catch basin cleaning and manhole inspections, and for suspicious dry weather flows from outfalls when it hasn't been raining.	Town	3-5	$	Medium

Action Item (Listed by Management Topic)	Responsible Party (Support)	Timeframe (years)	Cost Estimate	Priority
Wastewater Management				
Develop and implement an Onsite Wastewater Management Plan (OWMP).	Town	3-5	$$	High
Apply for the Community Septic System Loan Program (CSSLP) to provide low-interest loans to homeowners to cover costs associated with septic system repairs or upgrades (requires completed OWMP).	Town	3-5	$	High
Develop or enhance a local educational program for OWTS maintenance.	Town	1-2	$	Low
Lawn Management				
Educate landowners on best management practices for lawn care and landscaping. Include: why and how to limit application of fertilizers and pesticides to gardens and lawns to recommended doses and avoid application prior to rain events. Consider offering 'free' assessments and/or demonstrations.	Town	1-2 (then On-going)	$	High
Adopt requirements for LID landscaping (native landscaping, xeriscaping, minimum undisturbed areas, etc.) for new residential and commercial development.	Town	1-2	$	Medium
Adopt limits on residential lawn areas in new developments to minimize this source of pollution.	Town	1-2	$	Medium
Implement a local voluntary program for landscapers to commit to pollution prevention, such as the Town of Charlestown's Recommended Landscaper Process.	Town	3-5	$	Low
Consider participating in RIDEM's Green Certification / Sustainable Turf Management for Landscaping Certification program.	Town	3-5	$	Low

Action Item (Listed by Management Topic)	Responsible Party (Support)	Timeframe (years)	Cost Estimate	Priority
Underground Home Heating Oil Tanks (USTs)				
Prohibit new heating oil USTs.	Town	3-5	$	Low
Educate homeowners on the threat to water quality from existing above-ground and underground home heating oil tanks and the potential financial consequences.	Town	1-2	$	Low
Pet Waste Management				
Adopt a local ordinance and strategies requiring owners to pick up after their pets on all property, and to properly dispose of such waste.	Town	1-2	$	High
Educate the public about the impact of pet waste on water quality.	Town	1-2	$	Medium
Waterfowl/Wildlife Waste				
Devise and implement a sustainable strategy to address waterfowl/wildlife management at the reservoir and in the watershed. Enlist the help of a local group.	NWD, Town	1-2	$	High
Encourage property owners to discontinue mowing and to grow tall, coarse vegetation along the segments of reservoir edges or install commercially available fencing to restrict waterfowl access to the water. (Consider a demonstration project to educate and spur interest.)	NWD, Town	1-2	$	High
Provide public education on the negative impacts of feeding waterfowl.	Town, NWD (ERICD, RIDEM)	1-2	$	Medium
Implement and enforce effective ordinances and signage to prevent the public from feeding waterfowl.	Town	1-2	$	Medium

Action Item (Listed by Management Topic)	Responsible Party (Support)	Timeframe (years)	Cost Estimate	Priority
Agriculture				
Work with partners to provide guidance and tools for farmers (including small part-time farmers) regarding identification of non-point source pollution, BMPs (nutrient management plans, fencing livestock out of streams and wetlands, planting cover crops, etc.), and resources available.	Town, NRCS	3-5	$	Medium
Encourage farmers to apply for funding from NRCS to install BMPs on their properties to prevent adverse impacts to water quality.	Town, NRCS, RIDEM Ag	3-5	$	Medium
Farms should develop and implement a Farm Conservation Plan tailored to their specific operations that identifies the BMPs needed to minimize adverse impacts on water quality.	Individual Farmers (NRCS)	3-5	$	Medium
Implement agricultural BMPs on Little Compton Agricultural Conservancy Trust (LCACT) land holdings. Include practicing agricultural BMPs or implementing Farm Conservation Plans in the legal terms of any future LCACT easements or outright purchases.	Town, Farmers, (NRCS) (LCACT)	3-5	$	High
Adopt municipal ordinances with BMP's for backyard livestock owners to properly control animal wastes.	Town	3-5	$	High
Wetland Protection and Restoration				
Target wetlands and ample buffers for open space protection strategies, including purchases, easements, and through alternative zoning techniques that require open space. Focus on assemblage of large areas of protected land in order to provide better protection for wetlands.	Town, NGOs	On-going	$$$	High
Incorporate public education on the importance of wetlands, riparian corridors, vegetated buffers to waterbodies, open space protection, and green infrastructure in outreach media and activities.	Town	1-2	$	Medium

Action Item (Listed by Management Topic)	Responsible Party (Support)	Timeframe (years)	Cost Estimate	Priority
Buffer Protection				
Work with landowners to: • protect and maintain existing riparian buffers around the drinking water reservoir and its tributaries • re-establish lost vegetative buffers to drinking water reservoir and its tributaries, especially in areas where the current buffer width is less than 100 feet.	Town, NWD, Property owners, NGO's (ALT)	On-going 3-5	$ $$	High High
Invasive Species (AIS & Terrestrial)				
As opportunities arise, take actions to control and manage aquatic invasive species in the watershed.	Town, RIDEM, NGOs	On-going	$$	Medium
Monitor and control the population of Yellow Floating Heart in the Peckham Rd Pond.	Town, property owner	1-2	$	Medium
Survey the reservoir and ponds in the watershed for the presence of AIS.	RIDEM	3-5	$$	Medium
Promote or require the use of native species for landscaping and erosion control seed mixes (especially near wetlands) in all development and redevelopment projects.	Town	1-2	$	Low
Promote the use of native and sustainable plants to homeowners and provide public education on the harms of invasive species.	Town, NGOs	3-5	$	Low
Survey the watershed for the presence and extent of terrestrial and wetland invasive species, with a focus on wetland areas, riparian buffers, and stream banks.	Town	3-5	$$	Low

Action Item (Listed by Management Topic)	Responsible Party (Support)	Timeframe (years)	Cost Estimate	Priority
Stream Habitat Connectivity				
Conduct an inventory and assessment of stream crossings in the watershed for wildlife/fish passage and capacity for increased storm intensity. Coordinate with partners.	Town, RIDOT, NRCS, NGO's	3-5	$$	Low
Climate Change Resiliency				
Municipal Boards and commissions educate themselves on the impacts of flooding and climate change. Recommended for all Board members to complete the PREP-RI on-line module series.	Town	1-2 (then On-going)	$	High
Open Space/Conservation				
Continue to pursue open space conservation, with a priority on areas that contribute to the protection and restoration of water quality and aquatic habitats, including wetlands and buffers. Also focus on the connectivity of these areas.	Town, NGOs	On-going	$$$	High
Source Water and Groundwater/Drinking Water Protection				
Coordinate the Water Supply Systems Management Plan with the Town's comprehensive community plan.	NWD, Town	3-5	$	High
Install signs on roadways at the watershed recharge boundary so residents and visitors are aware that their actions impact a public water supply.	NWD (Town, RIDOT)	On-going	$	Low
Road Salt and Sand				
Promptly remove winter sand (street sweeping).	Town, RIDOT	1-2	$$	Medium
Upgrade equipment for more efficient application of road salt and sand.	Town, RIDOT	6-10	$$$	Medium
Consider increasing frequency of street sweeping between winter storms.	Town, RIDOT	3-5	$$	Low

Action Item **(Listed by Management Topic)**	**Responsible Party** (Support)	**Timeframe (years)**	**Cost Estimate**	**Priority**
Public Education				
Distribute educational materials relating to steps residents can take individually to prevent stormwater, surface water, and groundwater pollution.	Town	0-2	$	High
Host education events and encourage residents to participate in: • EcoDepot Household Hazardous Waste collection days with RIRRC • Private Well Water /Residential Pollution Prevention workshops with URI Home*A*Syst Program • Stormwater pollution and prevention with URI NEMO (Non-point Education for Municipal Officials)	Town	On-going	$	Medium
Plan Implementation, Coordination, and Follow-up				
Foster regular dialogue among the Town Council, Town Conservation Commission, Agricultural Conservancy Trust, Planning Board, and Newport Water District to implement this plan, and monitor and evaluate progress and water quality improvements.	Town, NWD	Ongoing	$	High

8. IMPLEMENTATION RESOURCES

8.1 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.

8.1.1 DEM Nonpoint Source Grant Program using federal Clean Water Act Section 319 funds

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 USEPA approved RI Nonpoint Source Management Program Plan. These grants are made possible by federal funds provided to RIDEM by the USEPA under Section 319 of the Clean Water Act (CWA).
Eligible applicants: Projects must be in watershed with a watershed plan; municipal, state, or regional governments, quasi-state agencies, public schools and universities, and non-profit watershed, environmental, or conservation organizations.
Contact: RIDEM's Office of Water Resources, 235 Promenade St., Providence, RI 02908. (401) 222- 4700

8.1.2 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 CWA. 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, 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. Interested participants must apply to the Department of Environmental Management to be placed on the Project Priority List and receive a Certificate of Approval. Prospective borrowers can then apply for financing through Rhode Island Infrastructure Bank.
Contact: RIDEM Office of Water Resources, 235 Promenade St., Providence, RI 02908. (401) 222-4700; Rhode Island Infrastructure Bank (formerly known as RI Clean Water Finance Agency), 235 Promenade St., Suite 119, Providence, RI 02908. (401) 453-4430 info@riib.org
Program website: http://www.dem.ri.gov/programs/water/finance/state-revolving-fund.php

8.1.2.1 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) 222-4430

8.1.3 Narragansett Bay and Watershed Restoration Bond Fund (BWRF Grants)

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; non-profit watershed, environmental, or conservation organizations; and non-governmental for-profit businesses and private schools.
BWRF Contact: RIDEM's Office of Water Resources, 235 Promenade St., Providence, RI 02908. (401) 222- 4700
Program webpage: http://www.dem.ri.gov/programs/water/finance/

8.1.4 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.
Program webpage: https://www.epa.gov/snecwrp

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

8.1.5.1 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.
Program webpage:
https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/

8.1.5.2 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. All NRCS easement programs are voluntary. Local landowners and organizations are needed to make NRCS easement programs successful. NRCS provides technical help and financial assistance to protect private lands through a variety of programs. These programs include:

- The **Agricultural Conservation Easement Program** (ACEP) provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits. Under the **Agricultural Land Easements component**, NRCS helps Indian tribes, state and local governments and non-governmental organizations protect working agricultural lands and limit non-agricultural uses of the land. Under the **Wetlands Reserve Easements component**, NRCS helps to restore, protect and enhance enrolled wetlands.
- The **Healthy Forests Reserve Program** (HFRP) helps landowners restore, enhance and protect forestland resources on private lands through easements and financial assistance. Through HRFP, landowners promote the recovery of endangered or threatened species, improve plant and animal biodiversity and enhance carbon sequestration.

Eligible applicants: Private landowners.
Contact: USDA NRCS – RI State Office/Service Center, 60 Quaker Lane, Suite 46, Warwick, RI 02886, (401) 828-1300.
Program Webpage:
https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/

8.1.6 Community Development Block Grants

Title 1 of the Housing and Community Development Act of 1974 authorized the Community Development Block Grant (CDBG) 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
Program website: http://ohcd.ri.gov/community-development/cdbg/

8.1.7 State Open Space Grants

RIDEM 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: RIDEM Office of Planning and Development, 235 Promenade St., Providence, RI 02908. (401) 222-4700
Program webpage: http://www.dem.ri.gov/programs/planning/grants/

8.1.8 Healthy Watersheds Consortium Grant Program

The Healthy Watersheds Consortium (HWC) was launched in summer 2015 and is a partnership between the U.S. Endowment for Forestry and Communities, the U.S. Environmental Protection Agency, and the USDA Natural Resources Conservation Service. The goal of the HWC Grant Program is to accelerate strategic protection of healthy, freshwater ecosystems and their watersheds, with a primary focus on prevention of land deterioration in the watershed by:

- Developing funding mechanisms, plans, or other strategies to implement large-scale watershed protection, source water protection, green infrastructure, or related landscape conservation objectives;
- Building the sustainable organizational infrastructure, social support, and long-term funding commitments necessary to implement large-scale protection of healthy watersheds; and
- Supporting innovative or catalytic projects that may accelerate funding for or implementation of watershed protection efforts, or broadly advance this field of practice.

Eligible Applicants: Not-for-profit 501(c)(3) organizations, for-profit companies, tribes, intertribal consortia, interstates, state, and local government agencies including water utilities and wastewater facilities, and colleges and universities.

Contact: U.S. Endowment for Forestry & Communities, Inc., 908 E. North Street, Greenville, SC 29601 Phone: 864.233.7646 Fax: 864.235.3842
Program webpage: https://www.epa.gov/hwp/healthy-watersheds-consortium-grant
Consortium webpage: http://www.usendowment.org/healthywatersheds.html

8.1.9 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.

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.

In Rhode Island, some of the communities that are looking into this funding mechanism and have conducted feasibility studies include Bristol, Middletown, West Warwick, and the City of Providence. In 2017, the State BWRF grant round included projects that support development of a dedicated sustainable funding mechanism for stormwater management in its list of eligible applications.

8.2 Technical Resources

8.2.1 Low Impact Development Regulations

- ***LID Self-Assessment for RI Municipalities*** to evaluate local regulations available here: http://www.dem.ri.gov/programs/benviron/water/permits/ripdes/stwater/t4guide/lid-checklist-primer.pdf
- additional resources (including LID Fact Sheets and ***LID Guidance Manual***): http://www.dem.ri.gov/programs/water/permits/ripdes/stormwater/stormwater-manual.php scroll down to 'Low Impact Development (LID) Guidance Documents.'

- The Code & Ordinance Worksheet: A Tool for Evaluating the Development Rules in Your Community,' by the Center for Watershed Protection (CWP), 2017, available here: https://www.cwp.org/updated-code-ordinance-worksheet-improving-local-development-regulations/ .) (as an alternative to the RI Self-assessment)

8.2.2 Lawn/Turf Management:

- RIDEM's voluntary 'Sustainable Turf Management for Landscaping Certification' program

  Contact: Ann Battersby, Senior Environmental Scientist
  RIDEM Office of Customer and Technical Assistance
  Phone: (401) 222-6822 ext. 2777284
- Town of Charlestown Recommended Landscaper Process https://www.charlestownri.org/index.asp?SEC=57BE787A-1F23-406A-906B-4FBC5BCACF34&DE=5CA3025C-C8D4-4182-BABE-9B19B7A55024

8.2.3 Wetland Resources

For more information on Wetland Restoration see RIDEM's webpage, "Freshwater Wetland Restoration Kit for Landowners," available here: http://www.dem.ri.gov/programs/water/wetlands/restkit.php

For more information on wetlands, see the Center for Watershed Protection, Article series on 'Wetlands & Watersheds,' available here: https://owl.cwp.org/mdocs-posts/wetland-and-watershed-article-series_-article-1/

8.2.4 Buffer Resources

For calculating estimated pollutant removal rates for constructed buffers:

- Pollutant Removal Credits for Restored or Constructed Buffers in MS4 Permits: Technical Memorandum, June 2019 available here: See 'Credit for Going Green' on UNH's Stormwater Center website. https://www.unh.edu/unhsc/news/credit-going-green

EPA's Southeast New England Program, SNEP Network:
The Maidford River Pilot Project, Buffer Restoration Resources
http://snepnetwork.org/buffer/

8.2.5 Invasive Species Resources

A Lake Management Plan designed specifically to target an invasive plant should be developed by a certified lake manager or licensed herbicide applicator who is knowledgeable about the species. For more information,
see http://www.dem.ri.gov/programs/water/quality/surface-water/aisplant.php

For information on Aquatic Invasive Plants, see RIDEM's webpage on AIS here:
http://www.dem.ri.gov/programs/water/quality/surface-water/aisplant.php

RI Save the Lakes
For creation of a lake association and educational opportunities, see RI Save the Lakes
http://stlri.org/

The RI Aquatic Invasive Species Management Plan, 2007
http://www.crmc.ri.gov/invasives/RIAIS_Plan.pdf

CRMC's Invasive plants website: http://www.crmc.ri.gov/invasives.html

RI Natural History Survey
The RINHS keeps track of the terrestrial invasive species that are widespread and those that are emerging in locations throughout Rhode Island. They also hold workshops on invasive species for the general public. For more about their programs: http://rinhs.org/invasive-species-portal/invasive-species-lists/

For resources to create a Lake Management Plan:
The Practical Guide to Lake Management in Massachusetts
https://www.mass.gov/files/documents/2016/08/te/practical-guide.pdf

RIDEM GREAT Boaters Program:
http://www.dem.ri.gov/programs/water/quality/surface-water/aisresp.php

8.2.6 Stream Connectivity Resources

North Atlantic Aquatic Connectivity Collaborative
The University of Massachusetts Extension hosts the North Atlantic Aquatic Connectivity Collaborative, which is a participatory network of practitioners united in their efforts to enhance aquatic connectivity. The NAACC has developed unified protocols for road-stream crossing assessments that can help identify bridges and culverts that are problematic from an aquatic connectivity perspective. Their website includes resources such as field forms, training webinars, an on-line database, and local contact persons. For more information, their website is here: https://streamcontinuity.org/index.htm

RI Wetland BMP Manual
http://www.dem.ri.gov/programs/benviron/water/permits/fresh/pdfs/wetbmp.pdf

8.2.7 Creating a Lake Management Plan

- Website for the North American Lake Management Society: https://www.nalms.org/home/lake-management-planning/
- Practical Guide to Lake Management in Massachusetts: https://www.mass.gov/files/documents/2016/08/uk/practical-guide-no-pics.pdf

8.2.8 Creating a Stormwater Utility

Some resources available to assist communities in developing a stormwater utility include:

USEPA Funding Stormwater Programs Fact Sheet
This document includes information on various stormwater funding mechanisms and types of stormwater utilities. It also describes how to create a stormwater utility and provides a list of resources.
Online at: http://www3.epa.gov/region1/npdes/stormwater/assets/pdfs/FundingStormwater.pdf

New Hampshire Department of Environmental Services Stormwater Utilities Webpage
This webpage provides information about creating stormwater utilities, provides examples, and a list of resources.
Online at: http://des.nh.gov/organization/divisions/water/stormwater/utilities.htm
https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/stormwater-utilities.pdf

8.2.9 URI Watershed Watch Contacts

To get involved in a local volunteer water quality monitoring program, contact:

Elizabeth Herron, Program Director
Phone: (401) 874-4552
Fax: (401) 874-4561
Email: emh@uri.edu

Kelly Addy, Program Coordinator
Phone: (401) 874-7532
Email: kaddy@uri.edu

For information on the URI Watershed Watch program: https://web.uri.edu/watershedwatch/

9. 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. For the Watson Reservoir Watershed, the most direct and most applicable indicators are water quality measurements such as concentrations of phosphorus, organic carbon, and chlorophyll-a. Frequency of algal blooms and cyanobacteria blooms in the reservoir is also a meaningful indicator for tracking progress over time.

Other parameters often measured in a water quality monitoring program include bacteria, nitrogen, dissolved oxygen, and suspended sediment loads. Monitoring can extend to biological indicators, such as aquatic macroinvertebrates and anadromous fish, depending on the goals of various actions that may be taken.

There are currently no volunteer monitoring efforts in the Watson Watershed. The Newport Water Division is required to test the quality of Watson 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.

A community volunteer effort can be undertaken to monitor water quality in the tributaries. URI's Watershed Watch Program. Led by trained scientists, URI Watershed Watch helps local governments, watershed, tribal and other organizations recruit and train volunteers to become citizen scientists gathering detailed, quality assured monitoring data. This comprehensive watershed-based program focuses on long-term environmental monitoring of RI's fresh and salt water resources including lakes, ponds, streams and coastal waters. The program provides training, equipment, supplies and analytical services tailored to organizational needs, while meeting strict quality assurance and quality control guidelines in the field and in a state-certified water testing laboratory. (see Technical Resources **Section 8.2.9** for contacts.)

An additional way to measure progress is to systematically track the implementation of the actions in the **Section 7 Implementation Table**.

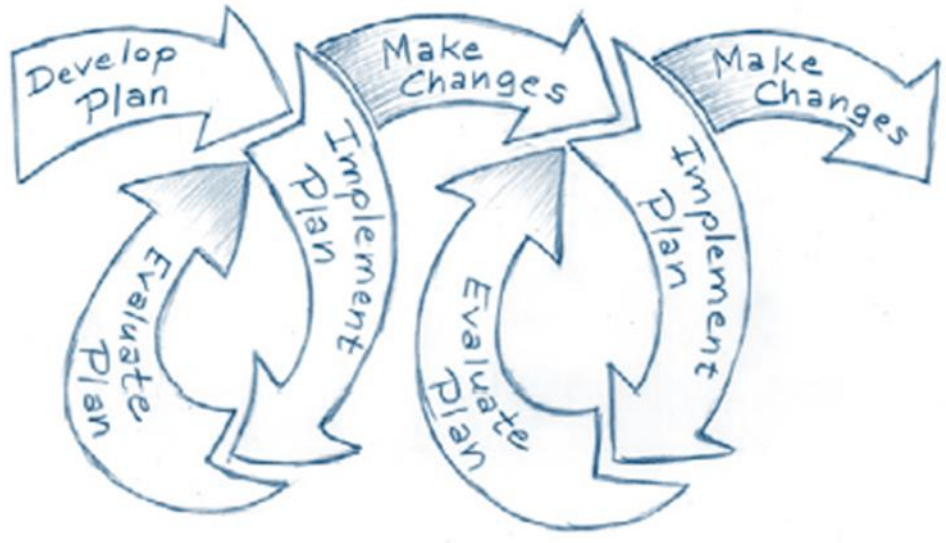
10. NEXT STEPS

This plan is being provided to the Town of Little Compton as a tool to use in the long-term protection and restoration of water quality and aquatic habitat in the Watson Reservoir Watershed. Ideally, local stakeholders, such as town entities and non-government organizations, will assume leadership of this plan and lead efforts to implement the strategies in the plan. This watershed 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 the RIDEM. 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.

Figure 10.1 The Adaptive Management Process



Source: EPA Handbook for Developing Watershed Plans to Restore and Protect Our Waters

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PDF of Simple Ways pamphlet: 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 stormwater. 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.