# TIVERTON ONSITE WASTEWATER MANAGEMENT PLAN

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# I. INTRODUCTION

## What is an On-Site Wastewater Management Plan?

An On-Site Wastewater Management Plan (OWMP) is a toolbox of strategies designed to ensure the proper design, location, construction, function and maintenance of on-site sewage disposal systems. [1] When properly developed and implemented an OWMP can help preserve and improve the quality of valuable ground and surface water resources, and provide a cost-effective alternative to municipal sewers. The Tiverton OWMP contains the following principal components:

1. Public outreach, education and technical assistance.

2. A septic system inspection and maintenance program.

3. Zoning and subdivision provisions related to septic system setbacks and performance standards.

4. A financial incentive program for the repair and upgrade of failing and substandard systems.

## Why Develop an OWMP?

ISDSs are prone to failure with age, out-moded design, overuse, poor soil conditions, or improper installation, repair and maintenance. Failing systems jeopardize public health by contaminating the surface, ground, salt, and estuarine waters of Tiverton. The Town recognizes the importance of inspecting, managing and establishing performance standards for ISDSs in order to protect Tiverton's precious ground and surface water resources.

The objectives of the Tiverton OWMP are to:

1. Protect drinking water and other surface and groundwater resources through septic system management.
2. Ensure that all ISDSs in Tiverton are properly operated, regularly inspected, and routinely maintained to prevent system malfunction and insure maximum system longevity.
3. Outline the procedures for ISDS inspections, repairs, and maintenance.
4. Enable the Town to qualify for loan funds from the Community Septic System Loan Program (CSSLP).
5. Summarize Town ISDS issues, initiatives, goals, and regulations of local importance.

This OWMP also describes the nature of the problem, the impacts of failed ISDSs on ground and surface water and analyzes the causes of system failures. Furthermore, the Plan discusses the projected costs associated with the implementation of the OWMP and provides an environmental and economic perspective on the use of ISDSs. Development of the Tiverton Onsite Wastewater Management plan is supported by the Comprehensive Plan. Several goals and objectives in the Natural and Cultural Resources Element of the Comprehensive Plan that apply specifically to ISDSs include protecting public water supplies (Stafford and Nonquit Ponds), surface water, groundwater, coastal features, and the environment

[1] The terms on-site sewage disposal system, individual sewage disposal system (ISDS) and septic system are used interchangeably in this report. They are meant to include cesspools and any other means of on-site wastewater disposal and treatment.

from potential sources of contamination. Most importantly the Comprehensive Plan advocates implementing a long-range comprehensive wastewater management strategy with the goal of establishing Wastewater Management Districts. In addition to establishing Districts, other objectives include mandatory pump-outs of failing systems and reviewing and amending regulations concerning the construction and maintenance of septic systems.

Septic systems, when properly designed, installed and maintained provide an effective and efficient means for treating onsite wastewater. In rural areas of South Tiverton, they are more cost effective than sewers and will help preserve the Town's rural character. Conversely, improperly managed and maintained septic systems are a major cause of ground and surface water contamination. A program for the inventory, inspection and maintenance of septic systems provides an effective means for helping to maintain and where necessary improve the quality of ground and surface water.

There are additional reasons to develop an OWMP. Municipalities that develop an OWMP may help themselves qualify for the Community Septic System Loan Program (CSSLP). The RI Water Clean Water Finance Agency (CWFA) in cooperation with the RI Department of Environmental Management developed the CSSLP to provide low interest loan monies for the repair and replacement of failed ISDS. A municipality must first receive a Certificate of Approval from RIDEM for its Plan to qualify for the low interest monies.

## II. RIDEM PLAN CRITERIA

### What are RIDEM Criteria?

RIDEM established minimum criteria for OWMPs for those communities wishing to be approved for CSSLP financing.

These include:
1. A description of the management area
2. A description of the community assistance plan for septic system repair and replacement
3. Methods to encourage regular ISDS maintenance
4. Financial analysis
5. Description of program administration and implementation, including the method and location of septage disposal.

## A. DESCRIPTION OF THE MANAGEMENT AREA

The onsite wastewater management area includes all of Tiverton. Once the Onsite Wastewater Management Ordinance has been approved, all ISDSs within Tiverton must be inspected and maintained in accordance with the provisions of the ordinance. If not approved, the ordinance will be implemented on a voluntary basis.

Tiverton is 29.36 square miles and has a 2000 population of 15,260 or 520 people/square mile.[2] According to the 2000 census there are 6474 housing units, an increase of 799 units from 1990. The majority of these (4737) are single-family units. [3] The 1990 census includes 628 apartment units with 2 to 4 units, 98 with 5 to 9 units, and 110 with 10 or more units. In addition there were 350 mobile homes

[2] 2000 Census
[3] Tiverton tax assessor's data April 2002.

or trailers. The total number of built commercial units is 145 plus another 252 units that are a combination residential and commercial. There are 129 units classified as built industrial. [4]

According to the 1990 census, 5278 units or approximately 93 % of the 5675 housing units were serviced by onsite systems and 357 housing units were connected to the sewers. According to the Director, of the Town's Wastewater Commission, however, this number is inflated and 75 to 100 connections in 1990 is a more likely estimate. Currently there are an estimated 400 sewer connections. In the next few years most of the northwest section of Tiverton is due to be sewered (see Public Sewers section).

According to the 2000 Census there are 6474 housing units in Tiverton. Adding the 145 commercial units that are not classified as combination residential/commercial and the 129 built industrial units yields 6748 total units. If 12 additional units are added to account for schools, churches and other public buildings, the total estimated units is 6760. Subtracting the estimated number of sewer connections provides us with an estimated 6360 onsite wastewater treatment systems (94%). The vast majority of residents and businesses in Tiverton are still serviced by ISDSs, many of which are substandard or failing.

Housing units constructed prior to the enactment of the RI ISDS regulations in 1970 provide an indication of which homes are likely to have substandard or failing systems. According to the 1990 Census, approximately 3936 or 61% of existing housing units were constructed prior to 1970. From 1990 through April of 2002 there were approximately 502 ISDS repaired due to failure. During this same time period, approximately 61 ISDS were upgraded (alternations) due to residential renovations.[5] Allowing for some existing connections to the sewers of older units, there are still an estimated 3300 [6] housing units. This means cesspools or other substandard disposal units may service roughly 50 percent [7] of the homes in Tiverton. Many of these older systems, however, are in northwestern Tiverton within the sewer district.

## 1. NATURAL FEATURES

Interrelated features of the natural environment such as topography, geology, soils and hydrology affect the functioning, safe density, design and maintenance of ISDS.[8]

### a. Topography

Tiverton's topography consists of a gently rolling terrain that rises from the waterfront to low bluffs along the Sakonnet River. Low lying wetland areas along the coast and inland occupy large areas of the town. Higher elevations are 200 to 300 feet above sea level. Areas with slopes in excess of about 8% require special care in the construction and design of septic systems. The highest elevation is Pocasset Hill in North Tiverton at about 320 feet. This elevation forms part of a steep ridgeline that extends north along Main Road to Fall River roughly parallel to the Sakonnet River. This ridgeline is a divide between the upland till plains to the east and the Narragansett till plains to the west. The upland till is commonly loose and unconsolidated while the Narragansett till plains are generally compacted and of finer texture.[9] In North Tiverton, the bluffs overlooking the Sakonnet River rise quickly from the waterfront. Ledge

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[4] Unlike the census data Tiverton Tax assessor's data shows only 17 permitted trailers. Other numbers from Tiverton tax assessor's data April 2002.

[5] RIDEM repair records (excel spreadsheet) 1990 through April 2002

[6] Calculated using 1990 census #s for housing units built before 1970 minus the number of RIDEM repairs 1990 - 2000.

[7] Assumes that all repairs and alterations were on pre-1970 homes. Calculated by dividing 3300 by 6474 (2000 housing units) = 50.9% (estimates 70+- homes that were constructed prior to 1970 that have been subsequently hooked to the sewers.)

[8] Unless otherwise noted information on the natural features is from the Natural and Cultural Resource section of the Comprehensive Plan

[9] Wastewater Facilities Plan Update, Louis Berger Group, 2000.

formations near the surface present a constraint to development including septic system functioning. Further south they are separated from the shoreline by a coastal plain which is up to one mile in width.

Along the coastal plain are several important natural features, including ponds, wetlands, marshes and beaches. The 100-year floodplain forms part of the coastal plain and extends from a narrow strip along the northern shoreline to a broader area in the south. Seapowet Marsh and the Ruecker Wildlife Preserve form part of this floodplain.

**b. Soils and Wetlands**

Soils are a major factor in determining the suitability and performance of on-site wastewater disposal systems. According to the RI Soil Survey, large areas of the town are unsuitable for septic systems due to high water tables, steep slopes, low permeability and poor drainage. Dense, slowly permeability till soils are characterized by an underlying restrictive layer or "hardpan" and seasonal high water table. These have severe limitations for development due to the potential for septic system failure, horizontal movement of effluent along restrictive layers, high runoff and wet basements. In Jamestown, where soils are similar to those in Tiverton, researchers found higher-than estimated seasonal high water levels on highly compact lodgement till soils with a dense hardpan layer and restrictive permeability. In areas where the water table was expected to be between 18" to 3.5 ft, water levels actually rose near the surface following rainstorms and stayed high during winter months. Septic systems are therefore likely to have less than the required separation distance to groundwater during extended periods, increasing risk of malfunction and groundwater contamination. A soil mapped as having a seasonal high water of 3.5 feet actually had high water table at or near the surface following rainstorms. As a result, septic systems designed for the lower water table levels may be inundated with groundwater during at least a portion of the year.[10]

Dominant soil series in Tiverton include Newport (5525 acres), Canton (2290 acres), Mansfield (1585 acres), Pittstown (1480 acres), Stissing (1180 acres), and Broadbook (1055). The Newport, Pittstown and Broadbrook soils have severe constraints for septic system functioning due to very slow permeability in the substratum. The Canton series is characterized by steep slopes and boulders and has moderate septic system constraints. Mansfield and Stissing soils have severe constraints due to wetness.

Figure 1 depicts soil hydrology. Those soils classified as very wet on Figure 1 correspond with wetlands. Wetlands form a significant component of the land area of the town and are a major natural feature. Coastal wetlands comprise over 528 acres and include large areas at Seapowet and Fogland Marshes. Inland wetlands comprise nearly 4,500 acres throughout the town. Major areas include Great Swamp and Cedar Swamp in south Tiverton, and Basket Swamp and Pocasset Cedar Swamp in the northern section of town. Soils categorized as moist or moderately moist are likely to have high watertables that will adversely impact the functioning of a septic system. Depending on other factors such as housing density and location to critical resources or wells, septic systems capable of removing increased nitrates and/or pathogens may be warranted in some of these areas.

Overall, approximately 80% of the land within the town has severe or very severe limitations for the location of septic leaching fields based on water table elevation, permeability, bedrock depths, slopes, and degree of stoniness.[11]

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[10] Stolt, M.H., B.C. Lesinski, and W. Wright. 2001. Micromorphology of Seasonally Saturated Soils in Carboniferous Glacial Till. Soil Sci. 166:6 pp. 406-414.

[11] RI Soil Survey

**c. Drinking Water**

*Groundwater*

The groundwater of Tiverton is often overlooked. This precious natural resource is just as important as surface water because it also supplies major portions of the town with fresh water from private residential wells and public wellhead protection areas. Glacial till covers the bedrock of most of Tiverton and the uneven sized materials have various pore spaces that create an irregular flow of water. The composition of till provides a poor source of groundwater and poor percolation for septic systems. Most private wells in Tiverton are drilled into fractured bedrock beneath the till, which has higher yields of water.

Predicting the flow of groundwater and surface water is important when determining the impact of pollutants such as effluent from an ISDS. In Tiverton, however, predicting groundwater flow is difficult because the groundwater is contained in fractured bedrock and the overlying till.

According to the 1990 Census, approximately 40% of the housing units in the town rely on individual dug or drilled wells. Figure 2 depicts public wells in Tiverton. None of the town's groundwater resources are productive enough to be considered "aquifers", however a substantial portion of the Town relies on groundwater for its drinking water needs. The groundwater classification for Tiverton is primarily GA, which means the groundwater may be suitable for drinking without treatment. Aging underground oil tanks and failing septic systems threaten the quality of Tiverton's groundwater. A town ordinance requires residents to located underground tanks and prohibits any new tanks. Both problems must be addressed if Tiverton's citizens are to be assured of pure drinking water in the future.

*Surface water*

Tiverton relies exclusively on surface water and groundwater for its drinking water. Surface waterbodies include many small ponds plus Stafford and Nonquit Pond. Stafford Pond is a primary source of the drinking water supply for Tiverton. Soils on the pond's eastern shore and to the southwest of the pond in the vicinity of the middle school all have severe constraints for septic systems due either to slow percolation or a combination of wetness and slow percolation. In addition many lots, particularly on the eastern shore of the pond, have inadequate space for conventional leaching fields. The Town needs to develop on-site wastewater treatment standards and identify alternative systems capable of meeting these standards for this area.

The ongoing protection of Stafford Pond and its 947- acre watershed is a unique planning challenge because of existing and potential development along the northeast shore, the complexities of its ownership, long standing recreation use, and the lack of a single overall management authority. The Watershed Protection District for Stafford Pond was passed in 1986 and subsequently strengthened in 1994. In addition, there have been several recent initiatives aimed at better understanding and protecting Stafford Pond. These include the Limnological investigation by ENSR[12], the Total Maximum Daily Load (TMDL) Plan prepared by RIDEM and the Source Water Assessment Plan (SWAP), currently being prepared by URI Cooperative Extension.

The ENSR study concluded that nonpoint pollution to the pond is from a variety of sources including, agricultural runoff, storm drains and septic systems. The first two causes presented the largest pollution threat to the pond. Best management practices to reduce agricultural runoff to the pond are being implemented and retrofits to storm drains are complete.

[12] ENSR, August 1997. Limnological Investigation of Stafford Pond Tiverton, Rhode Island. Prepared for the Rhode Island Department of Environmental Management.

The study did not specifically address the contribution of failing septic systems to the pond. It noted that throughout much of the watershed groundwater movement is away from the pond and that relative to other identified pollutant sources, septic systems did not appear to be a major threat to Stafford Pond watershed. Annually, however, groundwater contributes 18 % to the pond's water replenishment. The study also states that older systems have the potential for failure, which can result in effluent running into the water supply. In addition the study estimates that 18% of the phosphorous and 32% of the nitrogen enters the pond via the groundwater and that onsite wastewater treatment systems are the primary source of these nutrients. It states that septic systems along the eastern side of the pond and the subsurface disposal from the school complex at the southwestern corner of the pond are the primary concerns. The ENSR report recommends a septic system maintenance and management program for the Stafford Pond area. According to preliminary Source Water Assessment Plan results for Stafford Pond (URI Cooperative Extension), septic systems contribute 73% of the nitrogen to the groundwater in the watershed.

Likewise, the RIDEM TMDL study determined that from 7 to 22% of the phosphorus loading to Stafford Pond is through ground water inputs. Phosphorous and chlorophyll levels in the pond indicate eutrophic conditions. The primary water quality criteria addressed by the TMDL are minimum standards for dissolved oxygen and total phosphorus. The TMDL seeks to reduce total phosphorous levels in the pond to 0.025mg/l and increase instantaneous dissolved oxygen to 5 mg/l. In all likelihood, the source of nutrients causing algal blooms and water quality problems in Stafford Pond is in part due to failing septic systems.

Despite these existing efforts, Stafford Pond suffers from a variety of water quality problems including hypoxia, nutrients, excess algae, and high coliform content in tributary streams. It is classified as a Group 2, Class A (E) waterbody by RIDEM.[13] In addition to water supply, the pond provides fish and wildlife habitat and is also used for boating, fishing, and other recreational uses.

Nonquit Pond is part of Newport's water system and provides a potential reserve source of water. A significant step in helping to protect the water quality of Nonquit Pond was taken with the purchase of Weetamoo Woods, which contains nearly 500 acres of Nonquit Pond watershed, including Cedar Swamp. Problematic, however, is the fact that Tiverton's landfill lies near the edge of this swamp. Preliminary Source Water Assessment results indicate that septic systems contribute over 22% of the nitrogen to the groundwater in the watershed.

**d. Water Quality**

The protection of groundwater and surface water in Tiverton is necessary to insure the quality of both private and public drinking water sources. Nutrients and pathogens from ISDSs will negatively impact ground and surface water quality.

The summary of water quality in the State of the State's Waters report indicates that the major freshwater bodies in Tiverton are classified as A but Adamsville Brook, Nonquit Pond, and Stafford Pond are impaired as evidenced by biological monitoring and due to elevated levels of turbidity, coliform bacteria, and nutrient loadings.

[13] Group 2 waters are those waters that do not meet RI Water Quality Standards and for which TMDL development is complete. Classification A means that the water body is classified for use as a drinking water supply, for primary and secondary contact recreation and for fish and wildlife habitat. The " E" represents the pond's eutrophic status. Currently Stafford Pond only partially sustains designated uses.

The majority of marine waters around Tiverton are classified as SA - including Nanaquaket Pond and the Sakonnet River, which means that the area is safe for both swimming and shellfishing. The RIDEM State of the State's waters report lists the Sakonnet River as impacted due to the high density of boats in the Stone Bridge area, non-point sources from road and agricultural runoff, and failed septic systems.

Most of the shellfishing in Tiverton occurs in Nanaquaket Pond. Mt. Hope Bay is closed to shellfishing from Stone Bridge north due to wastewater treatment plants upstream. South of Stone Bridge is approved for shellfishing except for a small channel area near Nanaquaket Pond.

## 2. THE HUMAN ENVIRONMENT[14]

### a. Growth

Several human factors such as growth, zoning, land use, water and sewer service area either directly or indirectly affect the number, location and functioning of on-site sewage disposal systems. Population increases will further stress the water quality of the drinking water reservoirs, wetlands, and coastal waters. Special care must be taken so that new septic systems are properly designed, located, and maintained.

Between 1990 and 2000, Tiverton's population increased by 948 people or 6.6 percent. A build-out analysis conducted in 1999, in association with proposed zoning changes, estimated that Tiverton's population at full build-out will be about 27,000 persons living in approximately 10,000 dwelling units, a 35% increase over the 6474 housing units from the 2000 census.[15] The buildout analysis also determined that 9,260 of the Town's 18,074 total acres or (45%) were undeveloped, yet potentially developable (Figure 3). The remaining 55% of the land is either wetland, already developed or otherwise protected. Most of the potentially developable land is located outside of proposed sewer growth areas, where ISDS management should be a priority.

In the decade between 1980 and 1990, the population of Tiverton grew by 4.3%, a figure slightly below that for the state as a whole. By contrast, Little Compton grew by 6.7% and Portsmouth grew by 16.2%. Most of the development has been in the form of small-scale (under 15 unit) subdivisions, or single unit developments. Commercial development has also been limited with small establishments along Main Road in North Tiverton, at Bliss Four Corners, Stafford Road, Fish Road, and small developments on East Road in South Tiverton.

The relatively moderate rate of growth is actually quite significant when the constraints to development are considered. With limited public wastewater treatment, and soil constraints throughout the town, the rate of growth highlights the popularity of the community. When constraints are removed by providing sewers and/or an expansion of the water system, accelerated growth follows. For example, sewer expansions in northern Tiverton will increase the growth in those areas. Indeed, a major factor in future land use, particularly in the less developed southern areas of town, will be the availability of public water and sewers. Sewers would open up extensive areas to development that are not currently accessible due to poor soils that prevent the use of individual septic systems. In addition this development would likely occur at a density that would destroy Tiverton's remaining rural character. Land use and utility extension decisions must conform to the Tiverton Comprehensive Plan.

[14] Unless otherwise noted information form the Tiverton Comprehensive Plan.
[15] Actual numbers may be slightly higher due to changes made in the proposed zoning at the time of the hearing.

**b. Land Use and Zoning**

*Land Use*

Figure 4 depicts existing land use. Land use concerns related to septic system functioning include housing density, location of commercial development, and limits of the sewer and water service area. The pattern of land use and development within this area includes four distinct sectors - North Tiverton, East Tiverton, Stone Bridge and South Tiverton. North Tiverton is an area of older residential and commercial development, extending north of Route 24. The area includes a neighborhood retail and service strip along Main Road; and residential development, primarily single family units, on the side streets. South of Judson Street within this area, along Main Road, strip commercial uses prevail. The east side of Fish Road is developing with general commercial and light industrial uses, while the west side remains essentially residential with some institutional uses.

South of Souza Road on Main Road is Stone Bridge, one of the historic areas of Tiverton. This area has active waterfront uses backed by older residences and several institutional uses. The residential upland is dominated by 19th Century homes, which give the area its historic character. Waterfront uses include the public Grinnell's Beach, several commercial establishments, the Tiverton Yacht Club and a boat launch under the Sakonnet Bridge. Homes along Riverside Drive capture the maritime flavor. Several are built on pilings along the shoreline. Other land uses include the Town Hall and Essex Library, the Stone Bridge Fire Station, Fort Barton Park with its Revolutionary War redoubt, and Fort Barton School.

There is an area of residential development east of Fish Road and north of Bulgarmarsh Road. A cluster of commercial uses is located at the intersection of Bulgarmarsh Road and Stafford Road in the area known as Bliss Four Corners. The Tiverton High School, Middle School, and Ranger Elementary School are located in this area, as is Stafford Pond, the principal source of the town's water supply. The east side of Stafford Pond is lined with residential uses.

South Tiverton remains rural and agricultural in character, with large estates along the shoreline, small residential developments on Crandall, King, Lake and East Roads, and many large parcels in agricultural use. The historic Tiverton Four Corners has developed into a charming commercial area, and a small commercial cluster has been located at the intersection of East and Lake Roads.

*Zoning*

Figure 5 depicts current zoning including the watershed overlay districts associated with Nonquit and Stafford Ponds. The watershed protection overlay district around Stafford (Article VIII) was created in 1986 and revised in 1994. The watershed protection overlay district around Nonquit Pond was added in 2001. The purpose of the district is to protect the quality and quantity of the drinking water supplies by regulating the use and development of land adjoining watercourses and within the watersheds of Stafford and Nonquit Ponds. The overlay district for Nonquit Pond is divided into two areas, a primary protection area and a secondary protection area. The primary area is the area south of Cedar Swamp, which is either within 2,000 feet of Nonquit Pond or within 500 feet from the pond's tributaries. The secondary area is the remaining portion of the watershed.

The district limits density of residential development to one unit per 3 acres, in the watershed of Stafford Pond and in the primary protection area of the watershed of Nonquit Pond and at a density of no greater than one unit per 100,000 square feet in the secondary protection area of the watershed of Nonquit Pond. No development may occur within 200-foot buffer of Stafford and Nonquit Ponds, and storage of petroleum, hazardous wastes and the disposal of solid and liquid wastes are prohibited. The district allows the Planning Board to impose restrictions and controls and requires an environmental review statement for all proposed development. The ordinance also requires that all ISDS within the Stafford Pond watershed be upgraded to prevailing State and local standards by the year 2005. In addition any

building improvements that could result in the addition of a bedroom also require that the septic system be upgraded to current standards.

*Enhanced Treatment Systems for Stafford Pond*: Replacing sub-standard systems with conventional systems may not be in the best interest of Stafford Pond or property owners within the watershed. This is particularly true on the pond's eastern shore where development is dense and the soils restrictive. In addition there are areas where groups of houses exist on leased land. Advanced wastewater treatment systems, although typically more costly than conventional systems in the short-term, provide higher quality wastewater treatment and with proper maintenance will last longer than conventional systems. Advanced cluster systems that serve more than one household should also be investigated as a cost-effective repair solution for certain areas of the watershed. Specific field investigations, however, are necessary to determine possible locations.

Article IX of the zoning ordinance addresses rural residential developments. These are alternative residential subdivisions designed to protect rural character through the use of flexible zoning, different engineering and design standards and/or decreased overall site density as compared to conventional subdivisions. Flexible zoning together with the alternative engineering and design standards may encourage enhanced community septic systems and community wells. Article VI, section 7 of the Zoning Ordinance requires that ISDSs be set back from water bodies: 125 feet for single family homes and 200 feet for all other uses. Applicants can apply for a special use permit from the zoning board if they cannot meet the setback requirements.

**c. Public Water**

Figure 6 shows Tiverton's water distribution system. Three water companies have historically served Tiverton - the Stone Bridge Fire District (SFD), the North Tiverton Fire District (NTFD), and the Tiverton Water Authority (TWA). The Town, however, is now in the process of selling the TWA to the NTFD. All of the water companies depend on water from Stafford Pond, the overflow rights to which are owned by the city of Fall River. Stone Bridge purchases water from the city of Fall River and NTFD purchases water from Stonebridge and the city of Fall River

Stone Bridge estimates the 2000 population in the District's distribution system at 2388 and the total number of service connections at 955. SFD used 97.5 million gallons in 2000 while providing 50 million gallons to NTFD and 37 million gallons to TWA.

The SFD serves an approximately 2.5 square mile L-shaped area extending from Stafford Pond west along Bulgarmarsh Road and north along Main Road to the connection with NTFD at Carey Lane. Stone Bridge Fire District recently negotiated an agreement to draw 1.9 million gallons of water per day from Stafford Pond. The district maintains a storage capacity of 1 million gallons per day. In turn, SFD sells a portion of its water to the other two districts. The Stone Bridge Fire District's water is stored in two tanks, one with the capacity of 1 million gallons and the second with a capacity of .5 million gallons.

The NTFD serves areas west of Fish Road and north of Route 24. It negotiates its own agreements with the City of Fall River to draw water from North Watuppa Pond and purchases water from the Stone Bridge District. It is therefore also dependent on Stafford Pond as a source of water. NTFD's water is stored in a 1.5 million-gallon underground reservoir utilizing pumps with back-up generators. A system-wide upgrade is scheduled to start in CY 2003 and will include construction of an elevated storage tank to remedy the low pressure of the existing distribution system.

The TWA was chartered to provide service for those remaining portions of town to be served by public water. It went on line, actually providing water in February 1989. It's service area included a southerly

loop running east on Bulgarmarsh Road, south on Crandall Road, west on East Road, north on Main Road, and back to Bulgarmarsh Road. The system, however, has not been extended south of Bulgarmarsh into the rural sections. At present rural South Tiverton draws water from on-site wells. There are three community wells that are shown in Figure 2 along with the hydrographically sensitive areas. Expansion of the public water supply systems could increase development pressures in South Tiverton. TWA's area also extends along Stafford Road north to Hancock Street and the system now extends to Hurst Lane.

The recent agreement between SFD and Fall River to draw water from Stafford Pond ensures adequate capacity to serve Tiverton well into the 21st century. There is concern, however, over improving the water quality of Stafford Pond. As opportunities arise and funds become available, the SFD will continue to purchase undeveloped land along Stafford Pond's western shore.

**d. Public Sewers**

Sewers are currently restricted to the dense areas in the northern sections of town (near the Fall River line) but are currently being expanded to areas east of Fish Road (for the 228 acre industrial park south of Route 24) and north along the old railroad tracks and the Sakonnet River to the Fall River Treatment Plant. See Figures 7 and 8.

Sewer connections are also increasing in those areas of town that are already sewered. The area northeast of Stafford Pond (Contract #6) along Hurst Lane currently has approximately 318 sewer connections, which include the Senior Center and Dialysis Center, and Hancock Estates with 51 apartments off Hancock Street. There are about 200 connections in Countryview Estates, which are individual condos for residents 55 and older, with about another 113 pending in the next year or two. The pump station off of Hurst Lane services all these connections. In addition, there is a potential development of an apartment complex with 192 apartments and 306 bedrooms west of Hurst Lane and William Canning Boulevard.

There are approximately 75 sewer connections along State Avenue, including Walnut Street, Clement Street, Rock Street, and several streets west of Main Road. The number of sewer connections will increase in this area with Contracts #3 and #5. The nearby Shove Street pump station services these connections.

Presently, only Sakonnet Bay Manor is connected to the Fall River Treatment Plant in the area along the train tracks and the Sakonnet River via a 4- inch force line that is not suitable for other connections. A new 24-inch gravity interceptor line is being installed to service the Village at Mount Hope Bay condominium complex, a mixed-use residential development adjoining the Sakonnet River west of Main Road at Carey Lane. This will add about 300 units to the newly installed sewer line and provide sewer access to numerous residences in the adjoining streets. This line will also absorb the Sakonnet Bay Manor 4-inch force line. According to the Wastewater Management Commission, much of northeastern Tiverton from Route 24 north will be sewered within the next few years, including Riverside Drive.

Currently, North Tiverton is responsible for 7% of the flow to the Fall River Wastewater Treatment Plant or 2 million gallons per day (mgd). There is a manhole connection in State Avenue at the State line that goes directly into the influent channel at the plant. This line will be metered in the near future. Tiverton and Fall River have a signed agreement regarding the Treatment of Tiverton's wastewater at the Fall River Treatment Plant. In addition, Fall River has an EPA directive to accept 2mgd from Tiverton. Additional negotiations between the two municipalities will be necessary should Tiverton identify a projected need for additional flows.

The existing capacity of the treatment facility is 31 mgd and the plant operates at about 70% of its capacity. The septage receiving capacity of the plant is 40,000 gallons per day. Currently the plant typically receives 25 to 30 thousand gallons per day. During a particularly wet spring the plant

sometimes reaches it septage capacity because people are inclined to pump at the same time. Tiverton's onsite wastewater management program can help alleviate this occasional problem by incorporating inspection and maintenance procedures that are designed to spread pumping throughout most of the year. There are still many on-site individual septic systems or cesspools in North Tiverton. The installation of these systems in areas of poor drainage, high water table or other site difficulties has resulted in a high incidence of septic failure, and the need for frequent pump-outs. Sewers will alleviate serious septic problems in many dense neighborhoods like Garden Heights off of Main Road.

Improperly treated effluent from ISDS failures and poorly functioning systems is a threat to the high quality waters in Tiverton. The Comprehensive Plan calls the drinking water supply the lifeblood of the community and Stafford Pond supplies water to much of the region. None of the areas around Stafford Pond are due to be sewered. Due to the poor soils and high density in certain portions of the watershed, innovative septic systems, including cluster systems, may well be part of the solution for improving the water quality of Stafford Pond. Residential education and maintenance of these systems will be key.

## 3. LOCATION, CAUSES AND IMPACTS OF ISDS FAILURE

Tiverton's ground and surface waters are important natural and recreation resources that are vital to the Town's economic, environmental, and public health. ISDSs are prone to failure due to high water tables, slowly percolating soils, age, out-moded design, overuse, and improper installation, repair, and maintenance. The RIDEM Inspector for Tiverton, Andy DeRiso, confirmed this assessment and explained that the major areas of ISDS failures are north of Souza Road and along Riverside Drive due to the age of the systems, limiting soils with slow percolation rates, ledge, and small lots. He stated that there are bad spots in South Tiverton as well, but the lots are larger so the problems are not as evident. An analysis of the RIDEM repair records confirms that the majority of the system failures are in North Tiverton. Hot spots include Crandall Road, Highland Road, Main Road, Riverside Drive, and Stafford Road. The surface breakouts of sewage that often accompany systems failures threaten public health and the quality of receiving waters.

From 1990 through April of 2002 there were approximately 502 ISDS repaired due to failure. During this same time period, approximately 61 ISDS were upgraded (alternations) due to residential renovations. Many of the failures are cesspools on small lots and there is no room to construct a conventional septic system. Some systems were initially designed for smaller homes that were subsequently expanded and converted to year round use, without the necessary improvements to the system. Many times innovative septic systems are the best solution for these problems but such systems can cost up to $20,000 dollars. An important part of the wastewater management program in Tiverton will be providing low interest loans to homeowners to help alleviate the hardship of this major expense.

Previous sections have discussed some of the potential impacts of septic system failure on Tiverton's natural resources. While it is often difficult to pinpoint specific impacts of failing septic systems on surface and groundwater, judicious inspection and maintenance can help to ensure the continued quality of Tiverton's water resources. Preliminary MANAGE study results from URI-Cooperative Extension indicate that the estimated contribution of Nitrate-nitrogen from septic systems to the groundwater of the watershed for Stafford Pond at 73.5% and 22.5% for Nonquit Pond. The study also concluded that in Stafford pond the developed nature of shoreline buffers along the eastern shore further exacerbates pollution risks. The MANAGE studies conclude that septic systems are a very real risk to these drinking water supplies and will prove to be more of a risk and contributor in the future.

Wastewater Management in Tiverton is about more than current impacts. It is about the future of the town and its residents. Onsite wastewater management is both prudent and necessary given the projected impacts of failed systems due to growth and restrictive soils.

## B. FINANCIAL ASSISTANCE PROGRAM

According to RIDEM plan criteria, communities must identify a source of funding for repair/replacement of failed septic systems.

### 1. COMMUNITY SEPTIC SYSTEM LOAN PROGRAM (CSSLP)

The RI Clean Water Finance Agency, (CWFA) in cooperation with RIDEM, has developed the Community Septic System Loan Program (CSSLP), a revolving loan fund exclusively for the upgrade and repair of onsite wastewater treatment systems. After the Town has received approval of its OWMP from RIDEM and the loan agreement and line of credit from RICWFA, property owners may be eligible for loan monies for the repair of failed ISDS. Program funds are available to single family and multi-family residences up to 4 units. A septic system that serves more than one lot (cluster system) is not eligible under CSSLP, but may be eligible under other CWFA programs, provided the Town has identified them on its annual project priority list submitted to RIDEM. Highlights of CSSLP include:

- A line of credit to the community with the obligation to repay only in the case of homeowner default.
- A 4 percent interest rate to the community that must be passed on to the homeowner.
- The use of a financial intermediary, RI Housing and Mortgage Finance Corporation (RI Housing), to handle homeowner loan applications, fund balance reporting, collection procedures, etc., thus eliminating a potential administrative burden to the community.
- The ability of the community to add its own features such as means testing, technical assistance or supplemental grants and loans.

#### a. Tiverton's Eligibility Criteria for CSSLP Financing

*Failed System*

The Onsite Wastewater Management Area encompasses all of Tiverton. Any failed residential ISDS that meets the CSSLP eligibility criteria may qualify for the 4% loan funds. This plan relies upon RIDEM's definition of "failed system" when determining a system failure. Currently, RIDEM defines a failed system as: "any sewage disposal system that does not adequately treat and dispose of sewage so as to create a public or private nuisance or threat to public health and/or environmental quality, as evidenced by, but not limited to, one or more of the following conditions:

- Failure to accept sanitary sewage into the building sewer.
- Discharge of sanitary sewage to a basement, subsurface drain, surface drain or surface water unless expressly permitted by the Department.
- Sanitary sewage rising to the surface of the ground over or near any part of an individual sewage disposal system or seeping down gradient from the absorption area at any change in grade, bank or road cut.
- Any deterioration or damage to any individual sewage disposal system that would preclude adequate treatment and disposal of wastewater. (For example, contact between the bottom of the ISDS and the water table.)

For purposes of a homeowner accessing the CSSLP funds the definition of failed system also includes:

- Any system which, in order to function has been pumped or is in need of pumping two or more time in a calendar year.

- Any substandard ISDS or cesspool, which the owner wishes to upgrade, even if that system has not been declared "failed" under the provisions of the ordinance (i.e. steel tanks, cesspools.).

*CSSLP Eligibility Criteria*
In addition to meeting the above definitions of "failed system", the following conditions also apply when determining loan eligibility.

- When a system is failed, but the repair also calls for an increase in the number of bedrooms, the loan amount shall be limited to that required to repair or replace a system suitable for the original number of bedrooms.

- Replacing a tank even when no drain field repairs are necessary is considered a legitimate expense of CSSLP funds. System design is also an eligible expense.

- Alternative systems may be required in areas where site conditions warrant, such as location in a wellhead protection area or drinking water watershed, coastal or freshwater wetland buffer, high water table soils, small lots, densely developed neighborhoods and inadequate separation distance from a well.

- Maximum loan amounts for a single family shall be $20,000. Multifamily units will be evaluated on a case-by-case basis. Loan periods may be up to ten years.

- All applications and proposed septic system plans must conform to any applicable zoning and subdivision regulations.

- When the available pool of money is $50,000 or less, hardship situations and emergency repairs will be given priority.

Persons submitting an application for loan funds must have an approved septic system plan from RIDEM. The Town has initially requested $300,000 for this project. This money is enough to repair 30 to 40 systems. Based on the number of homes built prior to 1970, there are over 3000 systems that may be substandard. When available funds have been reduced to $50,000, the Town will request additional loan money through an addendum to its loan agreement with RI Clean Water Finance Agency. The Town will publicize this program through the development of program fact sheets, and press releases and a letter to septic system owners. Special press releases will provide information about the CSSLP funds and application procedures. In addition the program will be publicized on the Town's website. A goal of this project is to establish a permanent mechanism for helping to fund the cost of system repairs.

Application Procedure: A Tiverton homeowner wishing to access the funds must obtain a letter from the Wastewater Management Commission stating that the system is eligible. The homeowner hires the appropriate professional to design the system repair and then submits the application to RIDEM for design approval on the repair. Once RIDEM permit approval has been received the homeowner applies for a CSSLP loan through RI Housing. Following loan approval, RI Housing issues a two-party check to the contractor and homeowner. The homeowner begins repayment of the loan one month after the check is received.

### 2. OTHER POTENTIAL SOURCES

The CSSLP is an integral component of the Town's on-site wastewater management strategy. It is worth noting, however, that additional sources of grant and loan monies may be needed to help homeowners finance some of the costs of bringing sub-standard on-site wastewater treatment systems up to state and local standards. Some communities, such as Warwick have passed local bond referendums that assist homeowners in offsetting the cost of septic system repair. Community Development Block Grant Funds and US Department of Agriculture's Rural Development Program could also provide a potential funding source for septic system repair for low and moderate-income households. The Town should continue to seek grant funds to help support program implementation, including a site assessment and feasibility study for the potential use of enhanced cluster systems on the eastern side of Stafford Pond.

## C. LOCAL ONSITE WASTEWATER MANAGEMENT INITIATIVES

Recognizing that a failure to protect Tiverton's water resources would be a true economic and environmental disaster, the Town has undertaken several ISDS management initiatives.

### 1. COMPREHENSIVE PLAN (1997)

The Comprehensive Plan (Services and Facilities) specifically mentions establishing a wastewater management district and adopting a wastewater management ordinance to prevent groundwater and surface water contamination. In addition, onsite wastewater management helps to support many related goals of the Comprehensive Plan, such as protecting the natural features including water supply, surface and groundwater, wetlands, and coastal features. Properly designed and maintained ISDS will help the Town to retain rural character, maintain property values, protect the Town's natural resources and contribute to the Town's financial well-being. Collectively managing ISDS town-wide enables the Town to work towards its Comprehensive Plan objectives and provides a necessary alternative to the extension of sewers.

### 2. ONSITE WASTEWATER MANAGEMENT ORDINANCE

In addition to the zoning ordinance provisions discussed on pages 8 and 9 of this document, the Town in an effort to implement the goals of its Comprehensive Plan has proposed an onsite wastewater management ordinance that would require the regular inspection and maintenance of ISDS. The Tiverton On-site Wastewater Management Ordinance provides a framework for the efficient inspection, repair and maintenance of ISDS throughout Tiverton. It requires that all on-site sewage treatment systems be periodically inspected and maintained based upon the results of the inspections. The purpose of ISDS inspections is to assess the condition of the ISDS to determine a) what maintenance is required, b) when the maintenance should be undertaken c) the date of the next inspection d) the need for system repair or replacement. Information from the inspections will be used to complete a town-wide ISDS inventory and to track system inspections, maintenance, and upgrades. Technical procedure follows that outlined in DEM's Septic System Check-up: The Rhode Island Handbook for Inspection.[16] In accordance with RIDEM regulations, failed systems must be repaired or replaced.

The Town will notify a homeowner when it is time to schedule an inspection. The owner then hires a private, town-approved ISDS inspector. After a system has been inspected, the owner and the Town will receive a report from the Inspector detailing maintenance requirements and the time frame for the next inspection. The owner is responsible ensuring that any maintenance or repair required by the inspection report is complete within the required time frame.

[16] Riordan, James. 2000. Septic System Check Up – The RI Handbook for Inspection

The ordinance requires the upgrade of cesspools within 12 months after the sale of a property. Cesspools within the Stafford Pond Watershed shall be brought into conformance as specified in the zoning ordinance. Houses that are scheduled to be connected to the sewers and have functioning cesspools, that do not present a public health hazard, should be exempted from this provision. All new tanks must be certified watertight before and after installation and shall be equipped with access risers to grade located at the inlet and outlet ends of the tank. Effluent filters are recommended at the outlet end of the tank. Any tank in good condition, installed prior to the Ordinance without an access riser to grade shall be retrofitted with riser(s) no later than 30 days following the First Maintenance Inspection. The ordinance also provides an administrative meeting as a first step for resolving differences of opinion and a hearing procedure in municipal court if the administrative meeting is unsuccessful.

Properties that have failed septic systems, but that are scheduled to be connected to sewers within a reasonable timeframe should be evaluated on a case by case basis in order to determine the most appropriate solution. The ultimate goal should be to eliminate any public health hazard in the most cost-effective means possible.

## 3. PROGRAM ADMINISTRATION

### a. General Administration

The Chair of the Wastewater Management Commission or the Commission's staff designee will manage and administer the OWMP. The Tax Collector shall be responsible for collecting all fees and fines associated with the ordinance. Septic system management and tracking software will be selected and refined as needed to build Town data base, schedule inspections and to track maintenance records and septic upgrades.

All septage or contents pumped from an ISDS shall be discharged at a State-approved septage receiving facility. The majority of the septage resulting from maintenance activities will most likely be hauled to the Fall River Treatment Plant.

### b. Education/Outreach

According to the proposed Wastewater Management Ordinance, the Wastewater Management Commission in cooperation with the Conservation Commission shall develop and oversee an annual education strategy to facilitate the implementation of the Onsite Wastewater Management Plan, Ordinance, and related zoning and subdivision regulations. The educational program may include:

1. Need, benefits and goals of onsite wastewater management
2. Proper inspection, operation and maintenance of OWTS.
3. Operation and management framework of the program.
4. Proper disposal of hazardous waste, including household hazardous waste.
5. Water conservation.
6. Protection of sensitive resources.
7. Use of environmentally sensitive cleaning products.
8. Use of alternative and innovative septic systems and associated technologies.
9. Costs of program and availability of financial assistance.
10. Informing designers, installers, and inspectors of specific Tiverton requirement.

The Wastewater Management Commission plans to distribute this information through letters to property owners, press releases, newspaper ads and letters to property owners. An annual targeted mailing to all property owners regarding ISDS operation and care, disposal of hazardous waste, water conservation and

instructions for submitting applications for CSSLP funding is planned. In addition any education program will build upon, not duplicate the efforts of the existing Stafford Pond Educational Outreach Program.

## D. FINANCIAL ANALYSIS

### 1. ESTIMATED COST OF REPAIRING FAILED ISDS

It is estimated that there are over 3000 cesspools in Tiverton that should be upgraded or if located in an area of proposed sewer expansion, connected to the sewers. The majority of these systems are located in northwestern Tiverton. Many of these older systems, however will not be replaced, but will be connected to the sewer system as it is expanded. If half of the substandard systems are located outside of the proposed sewer district and the average cost of system replacement is $10,000 the total costs would be 15 to 16 million.

### 2. ESTIMATED COST OF SEWER CONNECTIONS

The Wastewater Facilities Plan Update outlines alternatives for sewering North Tiverton and conveying flows to the Fall River WWTF. The total project cost for sewer lines and pumping stations is $21,810,550 in 1997 dollars. The total project costs including grants and interest payments, is over $30 million in 1997 dollars. These costs do not include the homeowner's costs of connecting to the sewer or any sewer use fees that may be assessed. The sewer system would service approximately 3,647 housing units and carry an average flow of 1,930,985 gallons per day.

### 3. ESTIMATED COSTS FOR WASTEWATER MANAGEMENT PROGRAM

#### a. Administrative Costs

The principal administrative costs for will be for the salary of an administrative person to work with the Wastewater Management Commission and the development of the septic system tracking software and database. It is estimated that a half time staff person will cost $20,000 per year, with an additional 25% factored in for partial benefits, workman's comp, etc. The initial costs for a commercial septic tracking program will be about $6000 to $7000. Annual maintenance fees, if any, will vary depending on the nature of the program and the amount of technical support desired by the Town. With some web-based programs the maintenance fees may run on the order of a 1 to 2 dollars per lot, but because the data on inspections is input electronically by the inspectors, the need for clerical support is reduced. Communities with the internal technical expertise such as South Kingstown have developed their own tracking programs. In addition to the costs mentioned above an estimated $8,000 would be needed in year one for a computer, office equipment, supplies, printing and mailing. Year one costs may be summarized as follows:

| | |
|---|---|
| Onsite wastewater specialist (half time) | $25,000 (including partial benefits) |
| Septic tracking program | $ 7,000 |
| Computer | $ 3,500 |
| Office equipment(desk, chair, file cabinet, misc.) | $ 1,500 |
| Printing and mailing | $ 2,000 |
| Supplies | $ 1,000 |
| Total | $40,000 |

There is $11,000 remaining in the existing grant that could help to offset these costs, leaving anticipated year 1 costs at 29,000.[17]

*Annual operating costs for year 2 are estimated as follows:*

| | |
|---|---|
| Onsite wastewater specialist (half time) | $27,000 (including partial benefits) |
| Supplies | $ 750 |
| Printing and mailing | $ 2,000 |
| Tracking Program Maintenance fee | $ 9,000 (may vary; program specific) |
| Total | $38,750 |

Program costs may either be part of the annual budget or may assessed on a per system basis. If a general estimate of 6,000 onsite systems is used the annual per system administrative fee would be about $6.50.

**b. Homeowner Costs**

*Inspection and Maintenance*
The homeowner costs are highest in the year of the First Maintenance (baseline) Inspection. The First Maintenance Inspection is more detailed than subsequent Routine Maintenance Inspections. This is because the septic tank component of a conventional septic system must be pumped to adequately assess the condition of the tank itself (i.e. is the tank watertight and structurally sound) and the inspection itself is more detailed. The maintenance and inspection schedules are determined based upon the results of the First Maintenance and subsequent Routine Maintenance Inspection(s). Below is a five year cost cycle for inspection and maintenance on a typical system.

**Conventional Systems: Five-Year Average Annual Cost for Inspection and Maintenance (2002 dollars)**

| | Year 1[18] | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|
| First Maintenance Inspection [19] | 125 | ----- | ----- | ------- | ------- |
| Pumping [20] | 150 | ------- | ------ | 150 | ------- |
| Routine Maintenance Inspection | ------ | ------- | ------ | 50 | ------- |

95$ = Five-year Average Annual Cost [21]

*Alternative Systems*
Alternative systems would have an annual maintenance contract with a cost of about $200 per year. This includes a spring and fall inspection, servicing and cleaning, but does not include pumping costs.

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[17] RIDEM grant for 35,000 to develop an onsite wastewater management plan and associated inspection and maintenance ordinance.
[18] Year 1 corresponds to the year of the First Maintenance Inspection not year 1 of the grant. Implementation of the program (i.e. the date of the First Maintenance Inspection) would be phased in over 3 to 5. Phasing plan to be detailed in the regulations.
[19] Assumes the system is accessible. If system is not accessible or its whereabouts is unknown this price will be more. Costs are dependent on how deep the system is and how long it takes to locate the system. If the system is more than a couple of feet down a backhoe may be necessary. In a case where the system is tough to find and a backhoe was needed for a few hours, the inspection could run about $525 ($125 finding system $300 excavating $100 inspecting.) If a system was difficult to access, it should be retrofitted with risers and filters at the time of the First Maintenance Inspection when everything is unearthed.
[20] This assumes a 4-year pumping cycle, could go 10-12 years.
[21] The RI Inspection Manual *Septic System Check-up* recommends no more than a 5 –year cycle.

Assuming one pumping every five years and $40 year increase in the electric bill. The five-year average annual fee for an alternative system would be $270.

*Retrofits and Repairs*

The cost to retrofit a tank with access risers and effluent filters is about $500. Access risers help facilitate inspection and maintenance. Effluent filters will help to extend the life of the drain field. The Town could develop financial incentives for homeowners to retrofit their tanks. This could include such things as buying equipment in bulk and passing on the cost savings to the consumers, or obtaining prices from contractors who agree to do the work for a set fee per system for Tiverton residents. In addition grant funds could be applied for to help offset the cost of tank retrofits. The proposed ordinance only requires that buried tanks with no surface access install risers to grade following the First Maintenance Inspection.

The cost to repair or replace a failed septic system varies widely depending on the nature of the failure and the size and location of the dwelling. Community Septic System Loan Program funds would be available for ISDS repair or replacement. Community Development Block Grant funds and USDA Rural Development funds may also be available for qualifying income brackets.

# III. GOALS AND IMPLEMENTATION

## A. GOALS

### 1. Townwide Goals

1. Safeguard public health and protect and improve ground and surface water resources by implementing the onsite wastewater management ordinance and ensuring the proper location, design, functioning and maintenance of all ISDS.

2. Recognize the interdependence of resource protection and economic development in Tiverton. Demonstrate that ISDS management is a tool that can foster prosperity and resource protection

3. Ensure that the Town has the resources to implement the Onsite Wastewater Management Plan and Ordinance

4. Invest in a software program for ISDS management and tracking which is capable of linking with GIS and the tax assessor's data and that reduces the administrative workload of the program. Build associated database

5. Phase the implementation of the Onsite Wastewater Management Ordinance shall occur over a period not to exceed 6 years as follows: a) Stafford Pond Watershed b) Nanaquaket Pond Watershed c) Nonquit Pond Watershed d) Sakonnet Waterfront e) Remainder of Town

6. Encourage the upgrade of all cesspools to current standards.

7. Prevent system failure, increase system longevity, reduce long-term repair costs and ensure that all ISDS adequately treat wastewater.

8. Provide financial assistance for the repair, retrofit and replacement of failing or substandard systems. Initiate CSLP; investigate other potential sources of funding.

9. Protect coastal waters and shellfishing areas from nutrient and pathogen contamination due to ISDS

**2. Water Supply Protection Goals**

1. Through the inspection and management of ISDS ensure the continued use of and quality of public water supplies.

2. Where necessary within the watershed or wellhead protection areas develop specific requirements for repairs, retrofits and new system installations that are necessary for meeting water quality protection goals.

3. Wherever possible, incorporate the recommendations of the Source Water Assessment Program (SWAP) into the implementation of the Onsite Wastewater Management Program.

**3. Education Goals**

1. Develop an annual education strategy by December 1 of each year for implementation the following fiscal year.

2. Through education and other incentives motivate Tiverton residents and visitors to assume responsibility for the adequate treatment of their own wastewater.

3. Provide needed information in a variety of formats including a web site, workshops, field tours, classroom activities, displays and various written media.

4. Provide education regarding program specifics with a focus on program compliance.

5. Through public education develop a program for water conservation.

6. Provide information and workshops on how to retrofit septic tanks with effluent filters and access risers and what to expect from an inspection.

7. Provide design guidance for recommended cesspool upgrades.

8. Provide workshops, technical assistance and demonstrations sites to help educate people about appropriate design options, including advanced treatment systems, for repairs and new installations.

**B. IMPLEMENTATION**

The proposed ordinance would be implemented in phases over a period of 6 years beginning first in the Stafford Pond Watershed. If the ordinance does not pass the program would be implemented on a voluntary basis. The Wastewater Management Commission will be responsible for implementation of the program. All septage will be taken to the Fall River treatment Plant or other state-approved septage receiving facility. From an administrative perspective, consideration must also be given to the time required to conduct public education, send notices, complete any required follow-up, attend administrative conferences, track repairs and retrofits, etc. In addition, establishing a data base and becoming familiar with the software will require a lot of time, at least during the first year.

First maintenance inspections will begin in the fall of 2003. In order to save money, persons needing to pump their system prior to the official implementation of the program may elect to have their system

inspected at the same time and provide proof of the inspection to the Wastewater Management Commission.

**1. FY 2003**

General

1. Pass Onsite Wastewater Management Ordinance
2. Hire a part-time onsite wastewater specialist.
3. Develop Associated Onsite Wastewater Management Regulations
4. Evaluate and purchase appropriate ISDS management software
5. Develop budget and implementation plan for FY 2003
6. Initiate Community Septic System Loan Program.

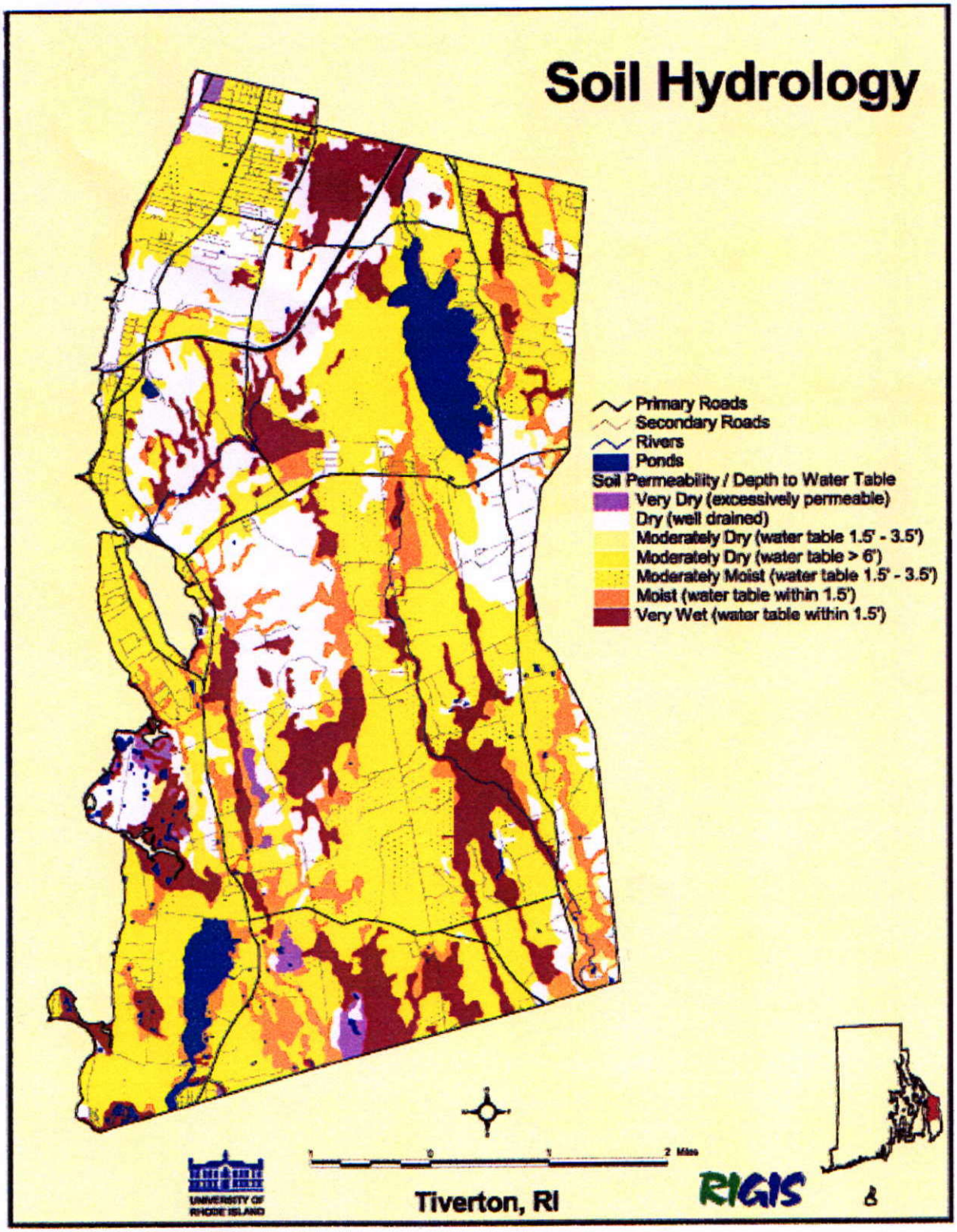
Education:

1. Develop Education Plan for FY 2003. Prioritize education and program publicity goals and begin implementation.
2. Prepare fact sheet and press release on cost and status of program and what a property owner must do to comply with the ordinance.
3. Prepare educational display for the library with videos, fact sheet, book, copies of the ordinance etc.
4. Conduct retrofit and inspection workshops in Stafford Pond Watershed. Obtain grant funding for two to three demonstration systems in the Stafford Pond Watershed.
5. Prepare fact sheet and other publicity related to the Town's loan and grant program for ISDS repair.
6. Begin development of website for information pertaining to the Tiverton Wastewater Management Program
7. Begin inspection program. Focus on critical resource areas or problem spots within the Stafford Pond Watershed and those systems that pre-date ISDS regulations.

**2. FY 2004**

Primary activities to occur during 2004 will include:

1. Hire a part-time onsite wastewater specialist.
2. Implement the onsite wastewater management ordinance beginning in the most critical areas of Stafford Pond Watershed.
3. Refine software and data entry as needed.
4. Amend zoning ordinance to include performance based standards for ISDS based on goals for the protection of critical resources and the results of any modeling studies or other scientific data.
5. Implementation of detailed education and program implementation plans developed in 2003




http://www.edc.uri.edu/riatlas/Town/Maps/small/ti_soilhydro.GIF

Figure 1 Soil Hydrology

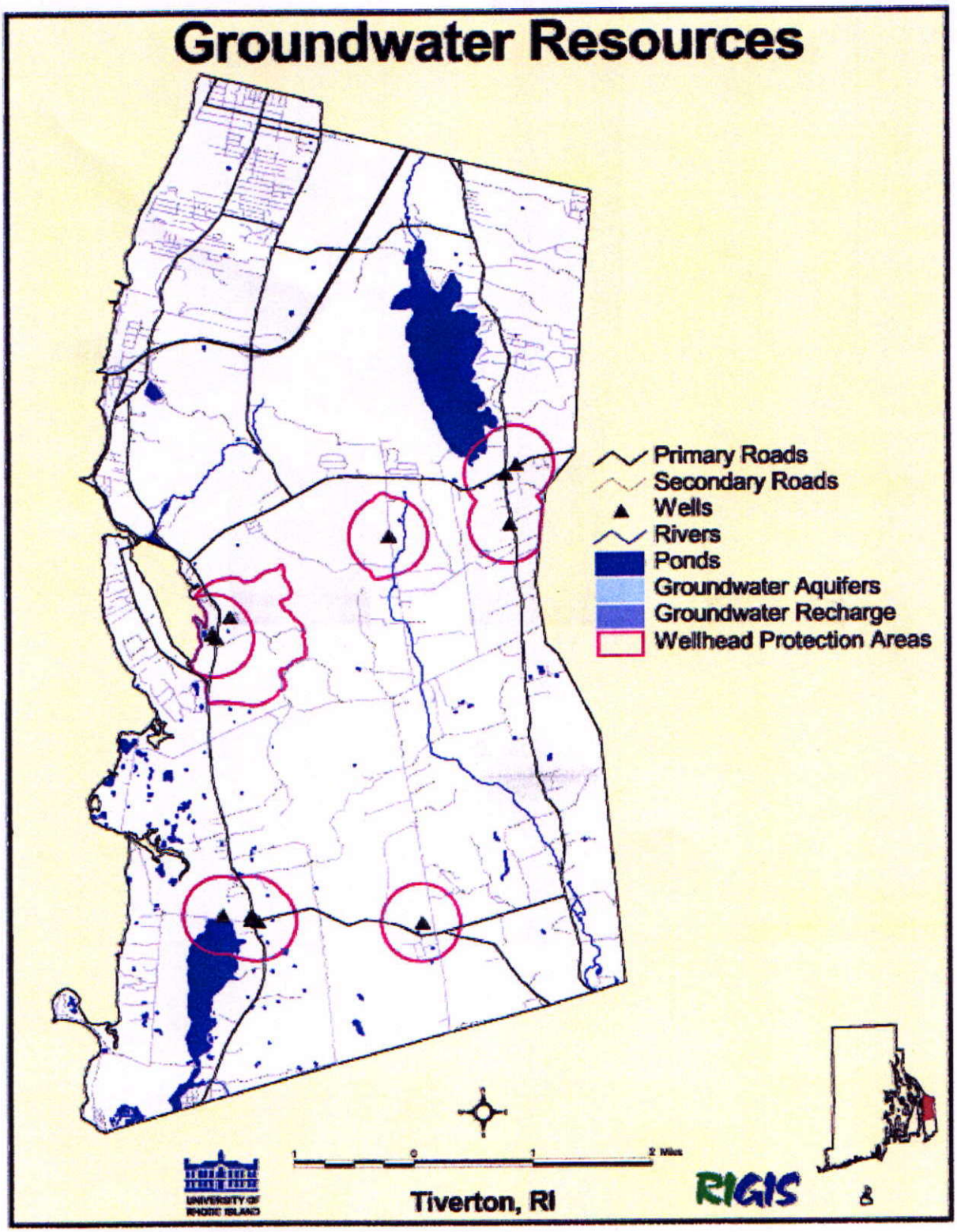
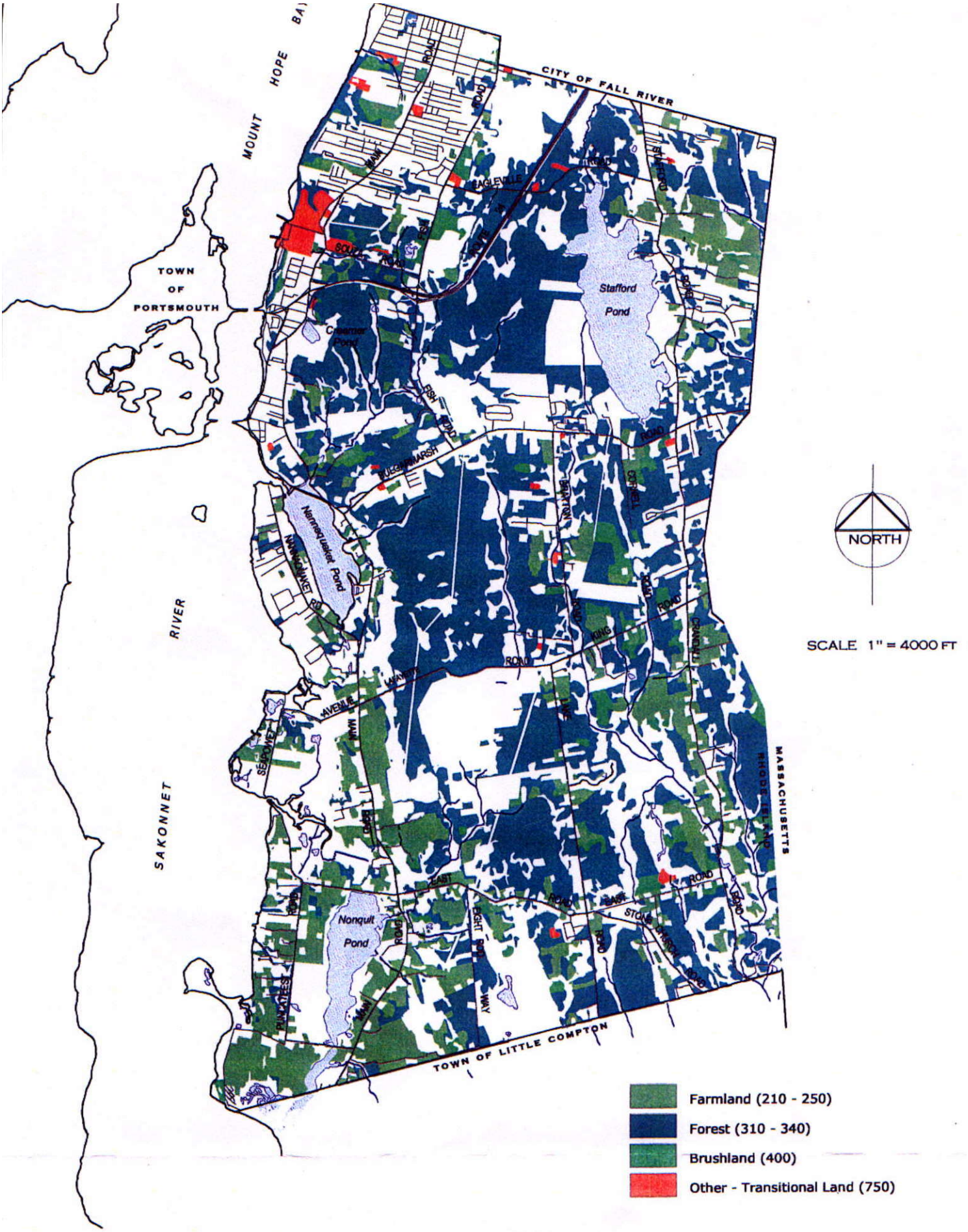
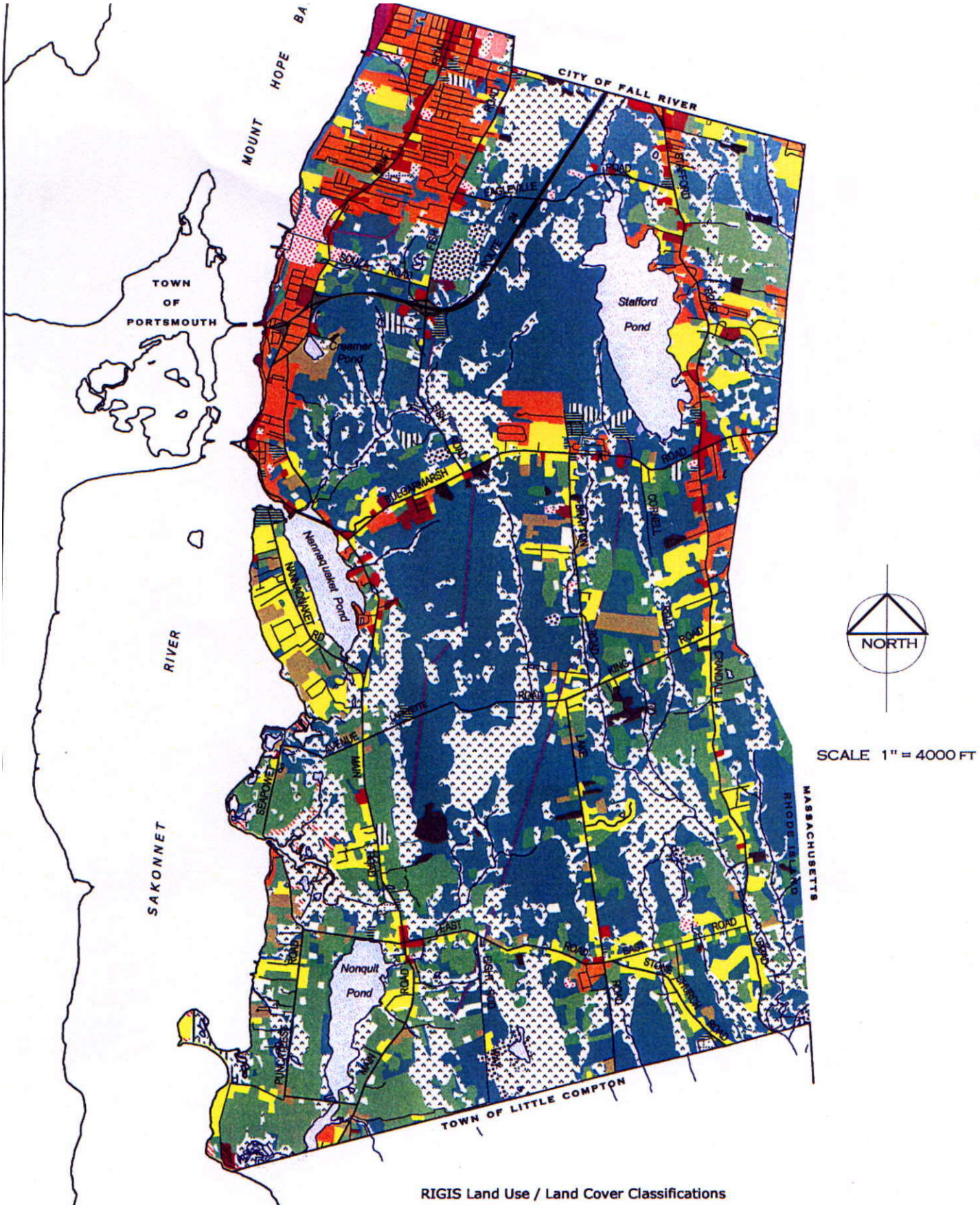



Figure 2 Groundwater Resources

http://www.edc.uri.edu/riatlas/Town/Maps/small/ti_gwater.GIF


MOUNT HOPE BAY
CITY OF FALL RIVER
TOWN OF PORTSMOUTH
SAKONNET RIVER
TOWN OF LITTLE COMPTON
MASSACHUSETTS
RHODE ISLAND
Stafford Pond
Nonquit Pond
Cranmer Pond
Nannaquaket Pond
NORTH
SCALE 1" = 4000 FT
Farmland (210 - 250)
Forest (310 - 340)
Brushland (400)
Other - Transitional Land (750)




RIGIS Land Use / Land Cover Classifications

- 111 - High Density Residential (< 1/8 acre lots)
- 112 - Med High Dens Residential (1/4 to 1/8 acre lots)
- 113 - Med Dens Residential (1 to 1/4 acre lots)
- 114 - Med Low Dens Residential (1 to 2 acre lots)
- 115 - Low Density Residential (>2 acre lots)
- 120 - Commercial (sale of products & services)
- 130 - Industrial (manufacturing, design, assembly, etc.)
- 141 - Roads (divided highways >200', plus related facilities)
- 144 - Water and Sewer Treatment
- 145 - Waste Disposal (landfills, junkyards, etc)
- 146 - Power Lines (100' or more width)
- 147 - Other Transportation (terminals, docks, etc.)
- 210 - Pasture
- 220 - Cropland
- 230 - Orchards, Nurseries
- 250 - Idle Agriculture (abandoned fields and orchards)
- 310 - Deciduous Forest
- 320 - Evergreen Forest
- 330 - Mixed Deciduous Forest
- 340 - Mixed Evergreen Forest
- 400 - Brushland
- 500 - Water
- 600 - Wetlands
- 710 - Beaches

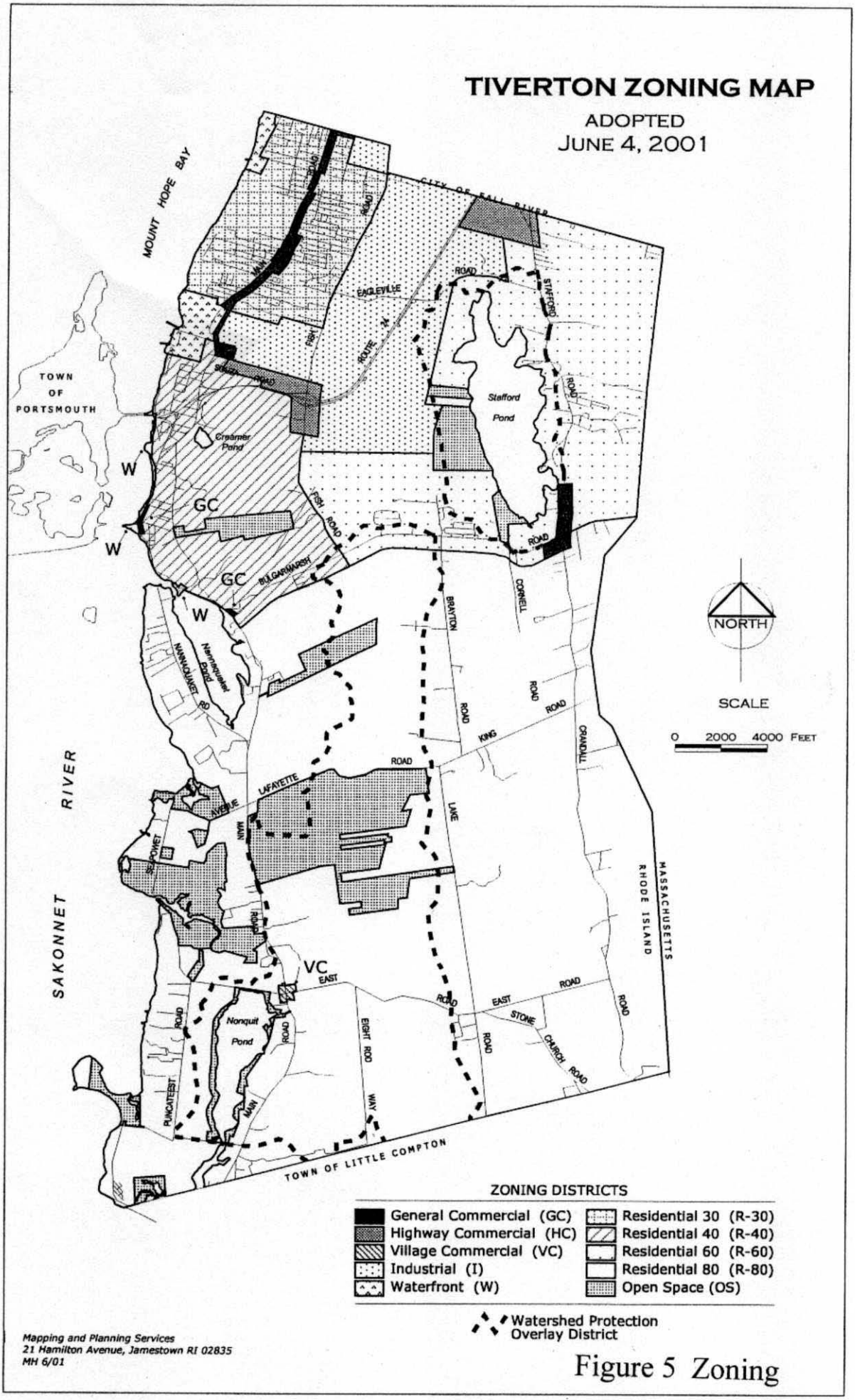



Figure 5 Zoning


Figure 6 Tiverton's Water Distribution System

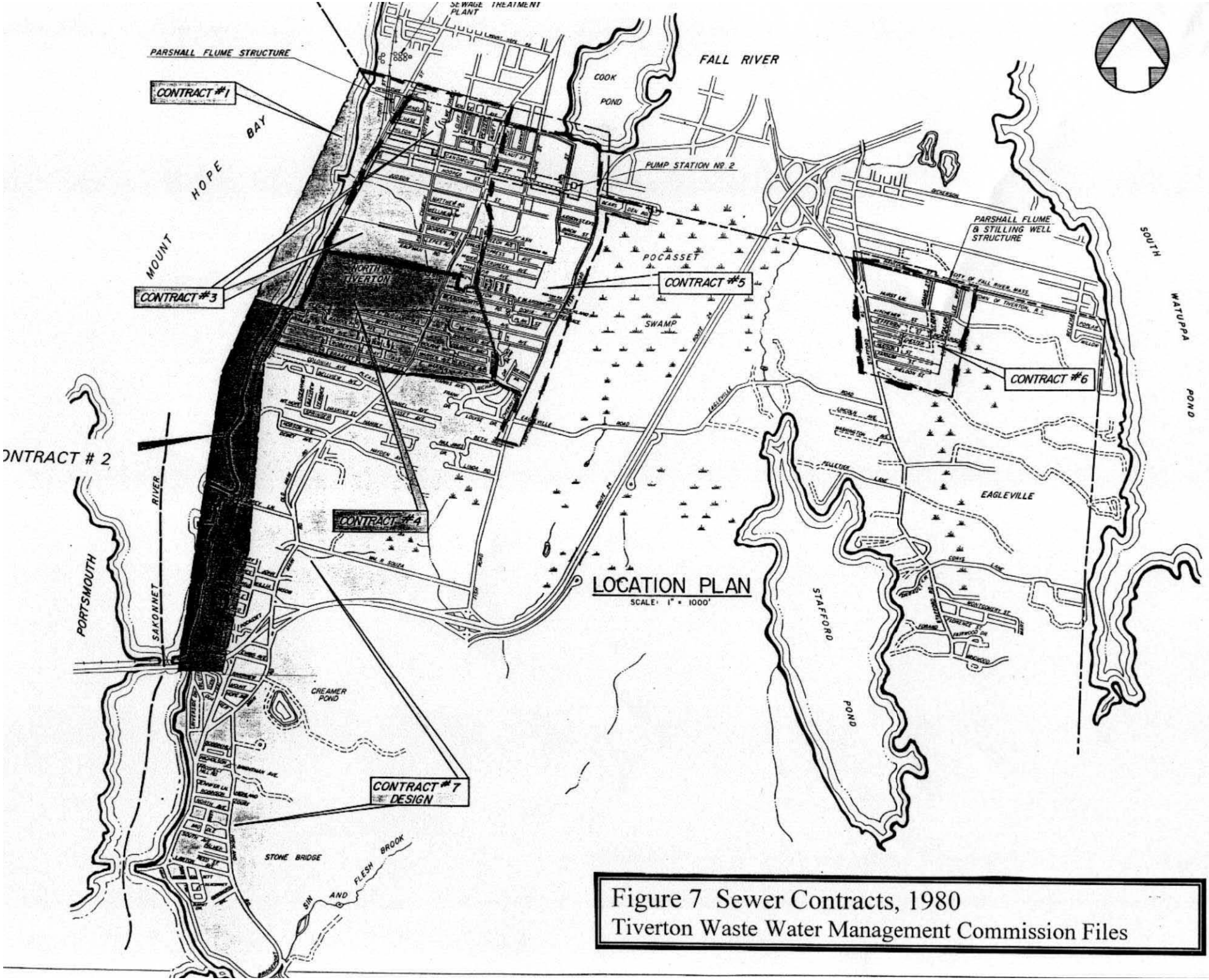



Figure 7 Sewer Contracts, 1980
Tiverton Waste Water Management Commission Files

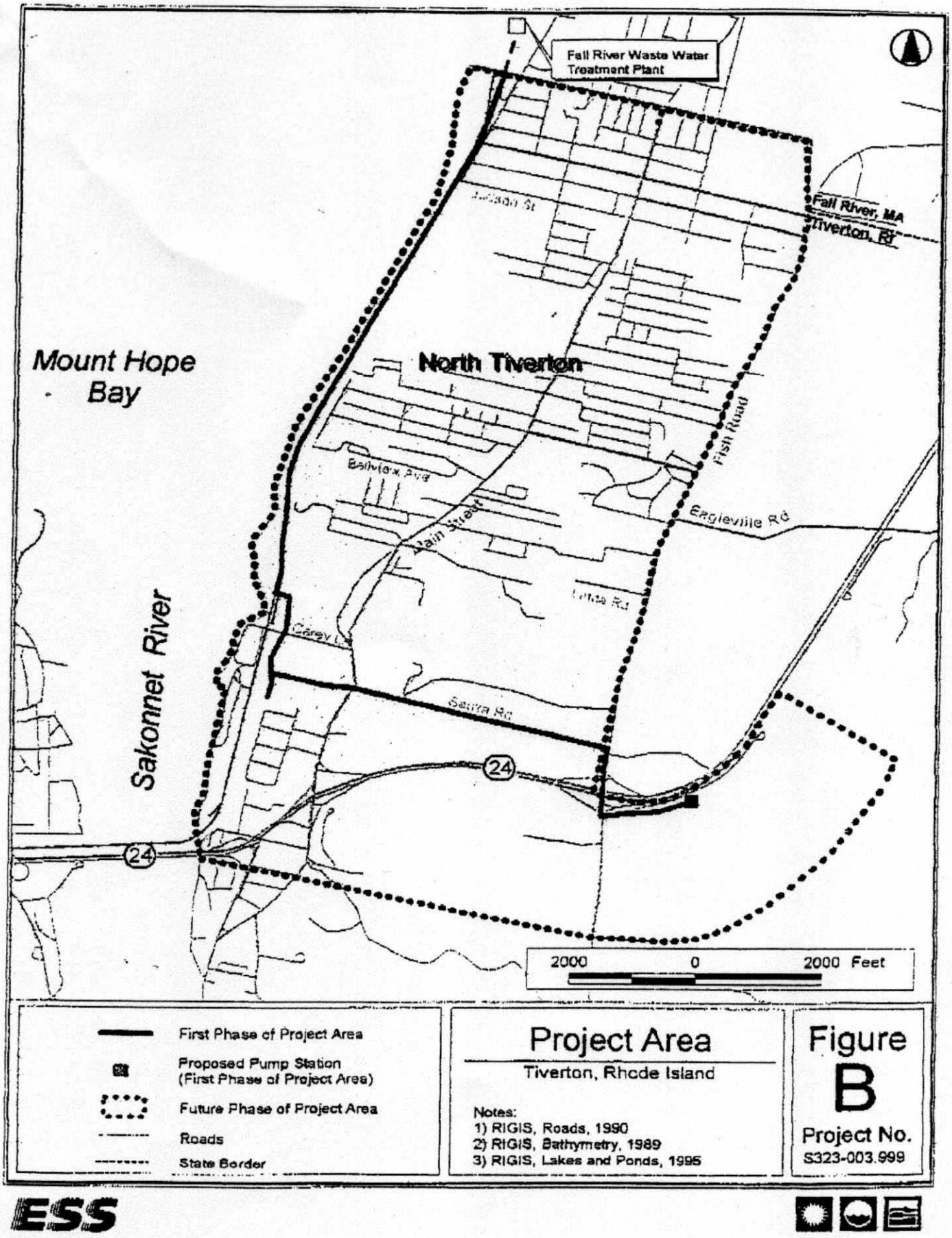



Figure 8 Sewer Project Area Map