Town of Warren
Onsite Wastewater Management Plan
(Focusing on the Touisset Area)

Town of Warren

Warren, RI

January 2009

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Disciplines to Deliver

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1 Background and Purpose

Touisset Point and Touisset Highlands developed as summer cottage communities, but have evolved into year-round use over the last several decades. While the use of these homes has significantly increased—and in some cases expanded—the water and wastewater infrastructure supporting these properties has remained largely unchanged.

Most of the lots in these two areas are served by private wells and individual sewage disposal systems (ISDSs).[1] Given the small size of the lots (often 3,000 square feet or less), many properties are nonconforming and lack the space needed for ISDSs to meet setbacks from wells, property lines and other lot features. Add to this the fact that most of the ISDSs are relatively old—many are cesspools or otherwise outmoded—and significant concerns arise regarding potential for cumulative and chronic pollution problems.

Although, no violation of water quality standards has been directly linked to failed ISDSs, intensity of land use in the area presents an immediate risk and signs of water quality degradation are apparent in groundwater. This indicates that the Town should carefully consider developing a program focused on upgrading ISDSs.

Providing residents of Warren—especially the Touisset area—with assistance to better manage and, as needed, upgrade their ISDSs is the focus of this onsite wastewater management plan (OWMP). This follows the development of the *Touisset Point and Highlands Wastewater Management and Water Supply Impact Study* (November 2007) (hereinafter, Touisset Impact Study) and is intended as a first step in its implementation. Specifically, this OWMP is intended to assist the Town of Warren in the following:

- Establish townwide eligibility for the Community Septic System Loan Program (see Section 4.2.1 for more information on this program.
- Plan a sustainable ISDS upgrade program that helps system owners to comply with the Cesspool Phase-Out Act.
- Begin to consider the need for other forms of financial assistance.
- Begin to consider the need for ISDS owner technical assistance for repair/replacement as well as ongoing system maintenance.
- Consider an approach to evaluate the effectiveness of the proposed onsite wastewater management program.

[1] DEM has recently revised their septic system regulations. The term "individual sewage disposal systems" has been changed to "onsite wastewater treatment systems." As this report was first drafted prior to the change in terminology, we have kept with the older term.

2 Description of the Management Area

The Town of Warren, Rhode Island is mostly sewered. The Point and Highlands are the primary exceptions. Touisset is located on east side of the estuarine segment of the Kickemuit River and west of the Massachusetts line. The Point is approximately 2,200 feet south of the Highlands and the two are separated by conservation land owned by the Rhode Island Audubon Society.

Although this plan focuses on Touisset, some other small areas of Town are also unsewered and ISDSs in those areas may occasionally experience failure. Therefore, to make its program equitable, the Town of Warren intends to make its management program applicable to all ISDSs in Town. A map of the primary management area and additional non-sewered areas is provided in *Figure 1*.

2.1 Identification of the Number, Type and Locations of ISDSs

As of 2007, the Point had approximately 139 housing units and the Highlands had approximately 59 housing units. Lots of record in these areas total 258 and 126, respectively. Many homes are sited on yards made up of more than one lot. Wastewater systems in both the Highlands and the Point include conventional ISDS systems, cesspools, and some innovative & alternative (I&A) technologies. Our initial review of available information regarding these systems indicates that conventional systems and cesspools are the predominant types of ISDS used in both the Highlands and the Point**.** I&A technologies used in the area include bottomless sand filters (BSFs) preceded by pretreatment technologies as required in Rhode Island's ISDS regulations. Fixed activated sludge treatment (FAST) systems and the Advantex RX Denite System (RX-30),[2] two types of nitrogen-reduction systems, are also present.

An initial review of existing ISDS data was developed by reviewing RIDEM's online ISDS permit database. Despite providing valuable information, it should be noted that the online database contains records only from 1995 to the present and, therefore, provides only a representative sample of current wastewater systems in the Point and Highlands areas. Information was available for approximately 53 parcels in Touisset that were listed as permit applicants on the RIDEM online ISDS permit database. Of these 53 parcels, 21 are served by cesspools, 26 are served by conventional ISDS, and 6 are served by I&A technologies.

Approximately 40% of systems reviewed in the online database are cesspools, approximately 49% are conventional systems, and the remaining 11% of systems are I&A systems. If these numbers are extrapolated to the remainder of the study area, approximately 79 of the 198 systems would be expected to be cesspools. I&A systems were very uncommon prior to 1995. If the extrapolation includes only cesspools and conventional systems in the same proportion as they exist in the online database, then

[2] ISDS applications containing the Advantex RX Denite System (RX-30) are no longer processed. This I&A technology is being phased out and a new, equivalent technology is taking its place.

89 of the systems would be expected to be cesspools. Thus, we would expect to find 79-89 cesspools in the study area. Information provided by J & K Sanitation supports this breakdown of number and type of systems (see *Section 2.4.2*). Cesspools are substandard systems, which provide little if any wastewater treatment and should be upgraded for protection of public health and the environment.

2.2 Impacts of Failed Systems on Surface Groundwater

Improperly functioning ISDSs are known to contribute pollutants, such as pathogens and nutrients that can impact their surrounding environment. Improperly designed and installed sewage disposal systems can contaminate groundwater supply and can be particularly problematic in areas with shallow dug wells and substandard setbacks like the Point. For this reason, it is important and necessary to ensure that ISDS's in the Highlands and Point are appropriately designed and providing adequate treatment.

2.2.1 Private Wells in Touisset Highlands

Groundwater within the Point and Highlands is classified as GAA or GA, indicating that it is suitable for drinking without treatment. Proper setbacks between ISDSs and drinking water supplies, in addition to proper vertical distances to groundwater, should be established and maintained to minimize contamination of this groundwater supply throughout both the Point and Highlands. There are a number of parcels in the Point and Highlands where sewage disposal systems are less than 100 feet from wells.

The Touisset area uses primarily private groundwater wells as a water supply. Most of these private wells extend over 100 feet deep into bedrock. Representative well depth in the Highlands is 150 feet deep. Well data indicates water quality is very good in the Highlands area (LGB, 1999).

2.2.2 Touisset Point Water Trust Data

A community water system, which is owned and operated by the Touisset Point Water Trust (TPWT), serves approximately 69 of the 139 homes on the Point**.** The TPWT water system includes two wells situated in close proximity to each other in a park area surrounded by dense development. They are shallow (approximately 45 feet deep) gravel-packed dug wells. One well provides a yield of approximately 15 gallons per minute (gpm) and the other 65 gpm for a total cumulative capacity of 75 gpm.

Data for the two wells were reviewed to understand each well's raw water quality and assess whether ISDS could possibly be affecting the operation. Anecdotally, well water quality problems are minimal in the Point, with high iron content being the only reportable issue. However, a review of the annual Water Quality Reports filed with the Rhode Island Department of Health (RIDOH) for 2001 to 2006 reveal some emerging concerns.

Although there were no positive bacteria results for the wells, the presence of nitrates in the general range of 5 to 7 mg/l. Elevated nitrates could mean that discharge from adjacent ISDSs infiltrates the wellhead areas. Since most ISDSs in the area lack nitrogen treatment capability and since nitrogen tends to be persistent in groundwater this could result in elevation of nitrate levels.

Table 1, below, summarizes the levels of nitrogen and sodium detected in the two wells on Touisset Point.

Table 1
Touisset Point Water Trust
Consumer Confidence Report - Nitrate
2001-2006

Year	Nitrate (mg/L)	
	Well 1	Well 2
2001	6.8	5.4
2002	6.3	6.5
2003	6.5	6.5
2004	7.08	6.57
2005	6.6	6.6
2006	6.2	6.3

To put these numbers in perspective consider the following:

- Ambient nitrate levels in the Kickemuit Reservoir over the past 5 years are reported to be 0.8 mg/L. Levels in the TPWT wells are an order of magnitude greater.

- Although Rhode Island is not one of them, a number of states have established preventative action limits for nitrates to address potential for septic systems to create nitrate contamination in groundwater. Wisconsin has established a level of 2.0 mg/L for nitrate. Levels of nitrate greater than 10 mg/L are known to cause Blue Baby Syndrome.

- Nitrate is known to cause water quality degradation in saltwater systems. A number of recent studies (e.g., Buttermilk Bay on Cape Cod) have established ambient nitrate limits of less than 0.5 mg/L to protect estuarine ecology.

    - Generally, the levels of nitrate in the TWPT well water could be characterized as fairly strong bellwethers of an impending condition of impairment to groundwater and estuarine resources, which has improper treatment of wastewater as a likely root cause.

2.2.3 Water Quality in the Kickemuit River

Kickemuit River is an estuary with a water quality classification of SA, indicating that it is designated for shellfish harvesting for direct human consumption. Primary and secondary recreational uses are also allowed. However, the Kickemuit River is listed as impaired due to pathogens in the Rhode Island Section 303(d) list of impaired waters. The presence of pathogens signals potential contributions from inadequate sewage disposal, although no link has been found to the Point and Highlands areas. Improper or inadequate sewage disposal may also cause negative health and environmental effects.

2.3 Analysis of the Causes of Failure

Ground and surface waters are important natural and recreational resources that are vital to the economic, environmental, and public health of Warren. Many ISDSs in Touisset are prone to failure due to age, outmoded design, overuse, and improper installation, repair, and maintenance. Site factors such as poor soils or a shallow watertable can contribute to ISDS failure. Improperly treated effluent from failed and poorly functioning systems poses a risk to public health and is a source of contamination to surface and groundwater.

There have been few gross failures experienced in the Point and the Highland areas, given the number of substandard systems. However, as discussed in *Section 2.2.2,* the threat of treatment failure appears to have manifested in the TPWT wells and, unabated, this situation has the potential to adversely affect human health.

2.4 Type of System, Lot Size and Evolution of Use

As discussed in *Section 1.0,* the Point and Touisset Highlands developed as summer cottage communities, which have now evolved into year-round use. Use of many area homes has significantly increased, but water and wastewater infrastructure supporting these properties remains essentially in its original form.

Given the small size of the lots (often 3,000 square feet or less), many properties are nonconforming and lack the space needed for ISDSs to meet setbacks from wells, property lines and other lot features. Substandard systems, small lot size, and use of systems beyond their intended capacity predispose ISDSs in the Touisset area to failure. In some cases (e.g., overuse), failures may manifest as surface backups; but in other cases (e.g., inadequate setbacks in fast

soils), treatment failures may occur, which manifest as water quality problems such as high nutrient levels in well water.

2.4.1 Soils

Soils in the Highlands and on the Point tend to complicate ISDS design and installation, though for different reasons. The following is a brief description of the soil types found in the two study areas, as described in the *Soil Survey of Rhode Island* (1981). Refer to *Figure 2* for general location of soil-types in both the Point and the Highlands. The text below provides detailed descriptions of each soil group found in the Point and Highlands.

Touisset Highlands Soils

- **NeB – Newport silt loam, 3 to 8 percent slopes.** Permeability is moderate in the surface layer and subsoil and slow or very slow at greater depths. Onsite wastewater systems need to be specially designed in NeB soil.
- **NeC – Newport silt loam, 8 to 15 percent slopes.** Permeability is moderate in the surface layer and subsoil and slow or very slow at greater depths. Onsite wastewater systems in NeC soil need to be specially designed to prevent wastewater effluent from rising to the surface.

Touisset Point Soils

- **QoA – Quonset gravelly sandy loam, 0 to 3 percent slopes.** Permeability is moderately rapid to rapid at surface and subsoil layers and very rapid at greater depths. Onsite wastewater systems in QoA soil need to be carefully installed so as not to pollute groundwater.
- **QoC – Quonset gravelly sandy loam, rolling.** Permeability is moderately rapid to rapid at surface and subsoil layers and very rapid at greater depths. Onsite wastewater systems need to be carefully installed so as not to pollute groundwater in QoC.

NeB and NeC soils generally have moderate to slow permeability as vertical depth increases. Sewage disposal systems in these soils should be specially designed to prevent wastewater discharges from rising to the ground surface. QoA and QoC soils typically have moderately rapid to rapid permeability as vertical depth increases and so sewage disposal systems should be installed so as to not pollute groundwater.

2.4.2 Anecdotal Support for Causes of Failure

2.4.2.1 Telephone Interview with J & K Sanitation

In trying to characterize the wastewater systems in both the Point and the Highlands, a telephone interview was conducted with a septic hauler at J & K Sanitation, which is the primary septage hauler used by the residents of Warren.

This interview provided good anecdotal support for our analysis of causes of failure.

The following list summarizes key points by J & K Sanitation during an interview regarding ISDS-related issues in Warren:

- Cesspools are abundant on Bayview Road, Brownell, and Bradbury Street, and in the Point.
- The majority of systems are conventional ISDSs; however, the distribution of conventional systems to cesspools is close to equivalent.
- Few systems—roughly 20—appear to have "failed."[3]
- The most frequently observed problems seem to occur in the new alternative technology, particularly bottomless sand filters (BSF). The filter connected to the outflow pipe (i.e., effluent filter) in the septic tank clogs. Some may clog every six months and create backups.
- A main issue in the study area seems to be related to inappropriate siting. For example, some leach fields exist in very water-abundant areas (i.e., areas with high groundwater).
- J & K Sanitation do not often receive emergency calls concerning wastewater systems. When emergency calls are received, they are typically in reference to older systems.

2.4.2.1 Results of a Recent Site Visit

A site visit to both the Point and Highland areas was conducted on June 27, 2007 by Fuss & O'Neill, Jane Harrison and Adriane Bone, two Town residents, and John Massed, the Town's DPW Director.

Several observations of the site visit are described below:

- Homes are very densely packed, seemingly no more than one dwelling unit per 5,000 square feet.
- No odors or definitive evidence of surface sewage discharges were observed during the site visit. Although one terraced area in the Highlands, along the Kickemuit, appeared to be leaching flow (possibly leach field effluent), and green algal growth, often indicative of high water-borne nitrogen, was apparent.

[3] "Failed" in this case, probably refers to hydraulic failure (i.e., an inability to accept wastewater). This would not necessarily include treatment failure (i.e., the ability of a system to reduce pollutants to a level that is protective of public health and the environment).

- No illicit discharges were observed during the site visit.
- Adrian noted that in general, the community was very conscious of their water use. Car washing and lawn watering were frowned upon.
- An open field in the Highlands, reportedly owned by the Rhode Island Audubon Society was noted. This area appears to be well situated for construction of a community wastewater treatment system.

A complete summary of finding of the site visit is provided in *Appendix A*.

3 Alternatives Analysis Including Financial Issues

Warren examined wastewater management improvement options as part of its recent Touisset Impact Study. These were then presented at a public workshop in Touisset and at a meeting of the Town Council. Warren intends to continue to use ISDSs and upgrade them as needed. The following discussion has been adapted from the Touisset Impact Study and presents the factors that were considered in the decision making process.

3.1 Alternatives and Selection Factors

Three basic alternatives were examined in the Touisset Impact Study using a decision matrix. The alternatives included:

- Continued use of ISDS, including I&A systems.
- Community systems.
- Conventional sewering.

Potential to integrate a public water supply line with wastewater upgrade and realize some economy of scale was also considered as the TPWT wells are threatened by nitrate levels. *Sections 3.1.1 – 3.1.4* describe the alternatives in detail.

Neither "no action" nor pure reliance on conventional systems were included as viable options as environmental factors and strong anecdotal evidence demonstrate significant water quality threats and often insufficient disposal capacity where conventional technology is in use. Additionally, regulatory requirements for setbacks are expected to force many owners to upgrade their systems to I&A technology. Because of Touisset's proximity to the coast, we anticipate that many in the area will need to be upgraded to I&A technology.

Evaluation criteria include infrastructure cost, operation and maintenance cost, level of Town responsibility, land required, risk of increased development pressure, available funding options, need for water line extension, and likelihood of improved water quality. Relative opinions of cost were used to compare the alternatives. A somewhat

more refined opinion of cost is provided for ISDSs only in *Section 4.1;* however, this should still be considered and order-of-magnitude cost opinion.

3.1.1 Continued Use of ISDSs

Many ISDSs in the Point and Highlands will need to be upgraded. Based on information in the RIDEM online permit database, we estimate that 79 – 89 of the systems in the Point and Highlands are cesspools. In 2007, the State of Rhode Island passed the Cesspool Act of 2007 (see *Appendix B*). Under this legislation all cesspools in Rhode Island must be inspected, and if failed these systems must be replaced with an ISDS meeting regulatory standards. The new Cesspool Phaseout law will require upgrade of many of the cesspools in the study area within the next 4-5 years. Because of the proximity of sensitive receptors—drinking water wells and the Kickemuit River—RIDEM will probably require that homeowners replace most cesspools with I&A technology.

Given the proximity to coastal waters and the Touisset Point Water Trust wells, we anticipate that the State will require innovative and alternative technologies such as nitrogen reduction followed by a bottomless sand filter for many if not all of the system upgrades resulting from cesspool replacements. *Figure 3* shows the approximate location of the TPWT wells and the 400-foot setback[4] as well as the coastline and its required 200-foot setback.

RIDEM has approved a number of I&A technologies to be used for onsite wastewater disposal. The approval of these technologies is based on RIDEM procedures and regulations adopted in 1996. One I&A technology, the bottomless sand filter (BSF), has been used extensively in recent system upgrades. Other technologies, such as pressurized shallow narrow drainfields (PSND), may also be applicable to assist in relieving these constraints.

Appropriateness of these technologies would need to be assessed on a case-by-case basis. Rhode Island's regulations require that BSFs and PSNDs be preceded by pretreatment, equivalent to a recirculating sand filter, in order to reduce biological oxygen demand. Several such technologies are available. Typically, upgrades in the Touisset area have incorporated FAST systems for BOD pretreatment.

The appropriateness of this technology would need to be assessed on a case-by-case basis.

The University of Rhode Island—Onsite Wastewater Training (URI-OWT) Center has developed a system for the selection of I&A technology to address site constraints and protect sensitive receptors such as wellheads and estuaries (see *Appendix C)*. In the vicinity of these nitrogen sensitive resources, URI-OWT recommends systems such as recirculating sand filters, Advantex, RUCK, and FAST as treatment components and PSND and BSF for drainfields. This study concurs with these recommendations.

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[4] RIDEM requires that OWTSs be at least 400 feet away from public wells.

Given costs considerations, the Advantex and FAST are good examples of practical treatment to use in the study area.

Descriptions of the aforementioned technologies, in addition to technologies found on RIDEM's September 2008 list of *Alternative or Experimental Onsite Wastewater Treatment System (OWTS) Technologies*, are provided in *Appendix D*.

3.1.2 Community Wastewater Systems

The Town does not own any land in the Point or Highlands. While the Town could procure land or property rights, or take property through eminent domain, such approaches may not be practicable.

Possible locations for a community wastewater system (treatment plant and subsurface disposal facilities) include conservation land owned by the Rhode Island Audubon Society and privately owned farmland for which property rights would need to be secured.

Utilizing conservation land owned by the Rhode Island Audubon Society would be dependent on factors such as land availability, proximity of individual water supply wells to this location, and costs of piping wastewater effluent to the system. The use of private farmland as a potential site for a community wastewater system is not practicable to pursue at this time.

3.1.3 Conventional Sewering

Warren has existing conventional sewers and a treatment plant that serves the majority of the Town. The Point and Highlands could potentially be tied into the existing system. However, the closest sewer lines are approximately a mile from Touisset Highlands and approximately 1½ miles from the Point. This is a direct distance estimate. Actual pipe runs would be significantly longer as they would need to follow the road. To run sewers to the Highlands or Point will require traversing the entire peninsula.

Sewers would likely increase development pressures and hence pollution risks. Based on very rough opinions of cost, the cost to extend sewers to the study area would likely range from $11 million to $12 million. Furthermore the Town's wastewater treatment facility is at approximately 80% of its capacity, and costs for increasing the plant capacity would be significant.

3.1.4 Integration of Water Supply

Existing public wells appear to be somewhat stressed by the level of existing development in the Point. As water lines will require trenching that is segregated from sewer lines, we would not anticipate significant economies of scale to be realized by extending sewer and water service together. Not including the TPWT, the closest public water is approximate one to 1½ miles from the study area. We anticipate that

installing water lines from existing supplies will present similar costs as sanitary sewering. To develop a reliable opinion of cost to tap existing water supplies will require more thorough analysis than is within the scope of this report.

3.2 Results of Analysis in Summary

Table 2 provides our analysis of alternatives based on the selection factors discussed in *Section 3.3*. Our analysis shows that the community system option and convention sewering option to have relatively similar benefits and detractions. I&A systems, however, tend to present the lowest level detractions and reasonable likelihood of improving water quality. The following sections provide a more detailed discussion of our analysis of each factor.

Table 2
Touisset Wastewater Alternatives
Selection Factors

Alternative	Infrastructure Cost	Operation & Maintenance Cost	Town Responsibility	Land Required	Development Pressure	Funding Options	Water Line	Improve Water Quality
Continued ISDSs	L	L	L	No	L	CSSLP Local Bond Grants	Limited reduction in need for I&A systems	M
Community system	H	H	H	Yes	L	SRF Local Bond Grants	Unnecessary	H
Conventional Sewer	H	H	H	Limited (Pump stations)	H	SRF Local Bond	Unnecessary	H

Notes:
H – High
M – Medium
L – Low
CSSLP – Community Septic System Loan Program
SRF – State Revolving Fund

3.3 Discussion of Selection Factors

The following sections describe the factors taken into consideration to assess which wastewater disposal approach may be appropriate for the Point and Highlands.

3.3.1 Infrastructure Costs

We performed an order of magnitude cost analysis and developed annualized costs for a 10-year period assuming a 3% cost-of-business increase per year. The cost analysis showed that both a community system and conventional sewers would cost within an order of magnitude of each other—approximately $11 - $12 million with conventional sewering being the more expensive option. System upgrades, however, would only be needed at approximately 89 homes and would therefore be much less expensive—approximately $2.6 million.

We assumed that sewering or installation of a community system would occur over a 10-year period. We assumed that most ISDSs would be installed within five years (i.e., within the cesspool phase-out period required under state law), but that some systems—approximately two per year—would be repaired to address the statistically predicted failure rate.

For our analysis, we assumed that all residential units in both neighborhoods would tie-in to a sewer or community system and that no treatment plant upgrades would be needed. We have not included cost of land in our community system cost opinion. However, cost of land may add 100% to the community system cost as we anticipate needing approximately five acres to site the treatment works and soil absorption system.

Historically, the Town has financed sewer system upgrades through property taxes and individual homeowners have paid for their own ISDS repairs, alterations and upgrades. For the purposes of this plan, we anticipate that the Town would be responsible for financing the cost of sewer extension or community system and that ISDS repairs, alterations and upgrades will remain the responsibility of homeowners.

Table 3, below, shows the order-of-magnitude total cost over 10 years to the Town and directly to effected homeowners under the three proposed alternatives.

Table 3
Order-of-Magnitude
10-Year Total Direct Costs of
Wastewater Upgrade Alternatives
(in 2008 dollars)

Alternative	Town Cost	Aggregate Cost to Homeowners	Total Cost
Continued Use of ISDSs	$0	$2,582,000	$2,582,000
Community system	$11,104,000	$0	$11,104,000
Conventional Sewer[1]	$12,480,000	$0	$12,480,000

Notes:
1. A grant of up to $500,000 may be available from DEM to offset costs.

Table 4, below, shows the annualized cost for each alternative over a 10-year period.

Table 4
Order-of-Magnitude
10-Year Annualized Costs of
Wastewater Upgrade Alternatives
(in 1,000s of 2008 dollars)

Alternative	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Continued ISDSs	$543	$559	$576	$593	$48	$50	$51	$53	$54	$56	$2,582
Community System	$969	$998	$1,028	$1,058	$1,0900	$1,123	$1,157	$1,191	$1,227	$1,264	$11,104
Conventional System[1]	$1,089	$1,121	$1,155	$1,190	$1,225	$1,262	$1,300	$1,339	$1,379	$1,420	$12,480

Notes:
1. A grant of up to $500,000 may be available from DEM to offset costs.

3.3.2 Operation and Maintenance (O&M) Cost

While sewers are anticipated to be the most expensive alternative to operate and maintain (approximately 7% of infrastructure cost), community system O&M costs closely approach conventional sewering system O&M costs. It is anticipated that O&M for either conventional sewer or community systems would be the responsibility of the local sewer authority.

I&A systems will generally be less expensive to operate and maintain, but present the complexity of being decentralized (i.e., instead of one system to operate and maintain, the ISDS alternative presents over 100 little systems—many of which may be I&A systems). This can be overcome to an extent by leaving responsibility for system O&M in the hands of homeowners; however, we strongly recommend municipal tracking, if not stronger management, of O&M to ensure that that these systems achieve their anticipated value. We expect I&A system O&M to be greater than the cost of two pumpouts per year as currently subsidized by the Town for the Touisset area. We approximated O&M costs for I&A systems to be twice as much as the current disposal system costs. O&M expenses for these systems include regular inspections, chemicals, and energy for pumps and timers, in addition to regular pumpouts. RIDEM requires all I&A systems to have an operation and maintenance contract for the first two years after system installation. If the Town chooses to take an active role in O&M activities, an activity strongly encouraged by RIDEM, the Town responsibility for I&A systems may rise from a level of "Low" to a level of "Medium."

3.3.3 Town Responsibility

This study assumes that responsibility for design, construction and O&M for either the community system or conventional sewer alternatives would be the Town's. Since ownership of individual systems is currently decentralized, this study assumes that responsibility for upgrade and O&M would also be decentralized and borne by the individual property owners. To ensure effective implementation, the Town should establish a tracking system and provide financial assistance (e.g., loans through the community septic system loan program (CSSLP)).

3.3.4 Land Required

It is anticipated that there will be no land acquisition for installation of I&A systems and minimal land acquisition for conventional sewer pump stations. A community system would require land to install treatment works and a disposal field.

3.3.5 Development Pressure

It can reasonably be assumed that neither a community system sized for the Point and Highlands, or installation of I&A systems in the Touisset neighborhood will add to development pressure on the peninsula. Conventional sewering will probably add significantly to development pressure as it will simplify wastewater disposal for new homes. Typically, conventional sewers will increase development pressure. This often occurs irrespective of existing zoning regulations.

3.3.6 Funding Options

Towns typically fund conventional sewers through either locally issued general obligation bonds or the State Revolving Funding (SRF) or some combination of both.

Towns may also fund community systems and I&A systems in this manner—I&A systems enjoy a special set-aside under SRF, referred to as CSSLP. CSSLP allows towns to access 2% loans for residents. Towns act as a go-between for the State and homeowners; however, loans may be administered by Rhode Island Housing (RIHousing) to reduce this burden on behalf of towns.

Both community systems and I&A systems enjoy grant eligibility that is unlikely to be available for conventional sewering. Grants can be used to reduce the overall cost of implementation to the Town and its residents. Notwithstanding, sewering Touisset Point and Highlands potentially could qualify for an Interceptor Bond Fund grant (50% matching grant up to $500,000).

3.3.7 Water Line

If the Town opts to pursue conventional sewering, expansion of public water service should also be considered as the two will both require piping to be drawn from north of the peninsula and would be expected to achieve some limited economies of scale (primarily paving).

For the community system alternative, a treatment works and dispersal system would be installed nearby, but not within, the Highlands and Point. There is no apparent economic advantage to include public water service with wastewater service in Touisset. A community system would substantially reduce the risk of contamination to the Touisset Trust Well.

Adding public water to Touisset Point would reduce the number of I&A systems that would be needed from a regulatory perspective, thereby reducing wastewater infrastructure costs. The Touisset Trust wells are shallow gravel-packed wells and at significant risk for contamination. Drawing water from a source outside the peninsula would also remove the risk of potable water contamination by local wastewater. If the Town chooses the I&A system alternative, we recommend regular monitoring with serious consideration of adding public water service to the Point and Highlands areas.

3.3.8 Water Quality Improvement

At this time, there is no known evidence of violation of water quality standards due to wastewater contamination. That said, many homes in the Point and Highlands rely on substandard ISDSs. Any of the three alternatives discussed here will relieve this condition and will reduce the threat of wastewater contamination to nearby water resources. I&A systems can improve nitrogen and pathogen treatment. Conventional sewers and community systems allow for significantly enhanced nitrogen and pathogen treatment over I&A systems. I&A systems should be adequate for wastewater treatment in the study area as there are currently no known water quality violations; however, if the Town prefers a higher level of risk reduction, both community systems and conventional sewers offer it.

4 Community Assistance plan for Septic System Repair/Replacement

4.1 Nature and Extent of Assistance

The Town anticipates a total ISDS repair/replacement cost of approximately $2.6 million in the Point and Highlands areas. This is an order-of-magnitude cost based on a number of assumptions describe in the notes of *Table 5*. *Table 5* also shows the calculation of this cost.

Table 5
Approximate Cost of ISDS Repair/Replacement

Area	Number of ISDS	Estimated Existing Cesspools[1]	Estimated Failures in 10 Years[2]	Total ISDSs to Upgrade[3]	Approximate Cost[4] per System	ISDS Upgrade Cost	Time Adjusted ISDS Upgrade Cost
Coastal & Wellhead	86	39	5	44	$30,000	$1,320,000	
Other	112	50	7	57	$20,000	$1,140,000	
Total	198	89	12	101		$2,460,000	$2,582,000

Notes

1. Forty-five percent of ISDS in the study area are substandard (e.g., cesspools) and require upgrade per the Cesspool Phaseout Act.
2. Systems fail in the combined Point and Highlands area at a rate 1.1% annually. This is based on the number of conventional system repairs listed in the DEM ISDS database (1995 – 2007). Twenty-six such repairs were listed out of 198 systems total in the area over 12 years (0.011=26/[198*12]).
3. ISDSs that will need to be repaired/replaced equal required upgrades from cesspools plus anticipated failures in 10 years (i.e., term of CSSLP loan).
4. All systems repaired/replaced in the costal and wellhead will likely be upgraded to I&A technology. All systems repaired/replaced in other areas (i.e., non coastal, non well head areas) will be made conventional.

4.2 Sources of Assistance

The Town anticipates that CSSLP will become integral component of its onsite wastewater management strategy. It is worth noting, however, that additional sources of grant and loan money may be available to help system owners finance some of the costs of bringing substandard systems up to state and local standards. The Town intends to seek any and all available funding sources in order to assist its citizens and enhance the management of environmental resources.

4.2.1 Community Septic System Loan Program

The Rhode Island Clean Water Finance Agency (RICWFA), in cooperation with RIDEM, has developed CSSLP, a revolving loan fund exclusively for the upgrade and repair of onsite wastewater treatment systems. The state places no income restrictions on ISDS owners for use of CSSLP funds.

After a town has received approval of its OWMP (from RIDEM) and its loan agreement (from RICWFA), property owners may be eligible for loan money for the repair of failed ISDS. Program funds are available to single-family and multi-family residences up to four units. Septic systems that serve more than one lot are 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. Features of CSSLP include the following:

1. When a system is failed, but the repair also involves home improvements that increase design flow, the loan amount shall be limited to that required to repair or replace a system suitable for the home in its pre-improved form.

2. The municipality is obligated to repay only the outstanding principal balance in the event of a homeowner default.

3. CSSLP carries a two-percent interest rate to the community that is generally passed on to the system owner.

4. RIHousing is available as a financial intermediary to handle loan applications, fund balance reporting, collection procedures, etc., thus eliminating administrative burden to the community.

5. Communities may individualize CSSLP with features such as means testing, technical assistance or supplemental grants and loans.

4.3 Warren Eligibility Criteria for CSSLP Financing

4.3.1 General Eligibility

Warren's onsite wastewater management area focuses on the Point and Highlands, but encompasses the entire Town. The Town intends that any residential failed or substandard ISDS in Town that meets the CSSLP eligibility criteria for the state may qualify for the 2% loan funds. For determination of eligibility, this plan relies upon RIDEM's definition of "failed" and "substandard."

Currently, RIDEM defines a "failed" system as:

Any sewage disposal system that does not adequately treat and disperse wastewater so as to create a public or private nuisance or threat to public health or environmental quality, as evidenced by, but not limited to, one or more of the following conditions:

1. Failure to accept wastewater into the building sewer;
2. Discharge of wastewater to a basement; subsurface drain; stormwater collection, conveyance, or treatment device; or watercourse unless expressly permitted by the Department;
3. Wastewater rising to the surface of the ground over or near any part of ISDS or seeping from the absorption area at any change in grade, bank or road cut;
4. The invert of the inlet or the invert of the outlet for a septic tank, distribution box, or pump tank is submerged;
5. The liquid depth in a cesspool is less than six (6) inches from the inlet pipe invert;
6. Pumping of the cesspool or septic tank is required more than two (2) times per year;
7. ISDS is shown to have contaminated a drinking water well or watercourse;
8. If a septic tank, pump tank, distribution box, or cesspool is pumped and groundwater seeps into it; or
9. Any deterioration, damage, or malfunction relating to any ISDS that would preclude adequate treatment and dispersal of wastewater.
10. Excessive solids are evident in the distribution box or distribution lines.

"Substandard" refers to any ISDS that does not meet the current RIDEM standards for design and installation. This includes, but is not necessarily limited, to standards for design flow, vertical and horizontal setbacks, and treatment components.

4.3.2 Additional Eligibility Issues and Features

In addition to meeting the above criteria, the following will be considered by the Town when determining loan eligibility:

1. System design is an eligible expense.

2. Replacing a septic tank, even when no drain field repairs are necessary, is considered a legitimate expense of CSSLP funds.

3. I & A systems may be required in areas where site conditions warrant, such as a wetland buffer, high watertable soils, small lots, and lots with inadequate separation distance from a well, etc. Upgrading to I&A technology is eligible for loan funds.

4. Unless otherwise authorized the Town and RICWFA, maximum loan amounts for a single family shall be $20,000. Multifamily units will be evaluated on a case-by-case basis.

5. Generally speaking, loans will be made available on a first-come-first-served basis. If loan funds become limited, the Town may also consider hardship situations and emergency repairs when determining loan amounts and priority.

4.3.3 Application Procedure

The following list outlines the general procedure for loan making to CSSLP applicants:

1. A system owner wishing to access the funds must obtain a letter from the Town stating that the system is eligible.

2. The system owner hires the appropriate professional to design the system repair and then submits the application to RIDEM for design approval.

3. Once RIDEM permit approval has been received, the system owner applies for a CSSLP loan through RIHousing.

4. Following loan approval, RIHousing issues a two-party check to the contractor and system owner.

5. The system owner begins repayment of the loan within one month after the check is received.

4.4 Methods of Advertising

Warren anticipates using the following methods to advertise financial assistance for ISDS upgrades and repairs:

- Town and other web sites—Warren currently maintains a website where municipal documents, programs, and items of interest are discussed. As the Town continues to develop a wastewater management program, it will post information to its website. This may include planning documents, fact sheets, program descriptions, applications, pertinent web links, and other materials. At a minimum, the web site will provide information regarding eligibility criteria and how to apply for CSSLP.

- Public meetings—Warren has had two public meetings to discuss the Touisset Impact Study. The impact study was closely related to the development of this OWMP and the public meetings included discussion of CSSLP. The Town will also hold public to discuss this OWMP.

- Fact sheets and advertisements—During the development of the Touisset Impact Study, the Town developed a fact sheet that was distributed to residents (see *Appendix E*). The Town anticipates developing a similar fact sheet that will describe CSSLP and other features of the Town wastewater management program.

5 Method to Ensure or Encourage Regular ISDS Maintenance in the Management Area

Warren already practices methods of maintenance and management that should be adequate to meet the requirements of CSSLP. These methods include:

- Pumpout subsidies.
- Public participation and information-education campaign.

It is anticipated that as many as 89 existing systems may require upgrade to I&A technologies. Given the anticipated infrastructure upgrade needs in the Touisset area, Warren is currently considering enhancements to its management program that may include development of an inspection-based operation and maintenance program. This is especially important for management of I&A systems, which often require management beyond the knowledge and technical abilities of the typical homeowner.

This section of Warren's OWMP describes current management methods used by the Town, methods used in other areas of Rhode Island, and maintenance program enhancements that the Town is considering or has plans to implement.

5.1 Methods Currently Used by Warren

5.1.1 Pumpout Subsidies

Warren currently provides a subsidy to ISDS system owners for up to two septic tank pumpouts per year per ISDS. This program has been in existence for a number of years and is intended to offset the contribution of owners of unsewered properties to the cost of operating the Warren Wastewater Treatment Plant (WWTP), which is funded through general taxation. The Town plans to continue the program for the foreseeable future. The subsidy is administered by staff of the WWTP.

5.1.2 Public Participation

During development of the Touisset Impact Study, a technical advisory committee (TAC) was established to allow for stakeholder input into wastewater planning process and to help bring about a technically sound and practicable approach to improved wastewater management. The TAC includes local residents and Town representatives as well as technical experts. The intention is to use the TAC for review of the OWMP as well.

The TAC included the following members who are intended to provide technical support for the project and represent the Town as well as local area interest:

- Michelle Maher, Town Planner
- Jane Harrison, Resident of Touisset Highlands
- Rick Massie, Resident of Touisset Point
- John Massed, DPW Director
- Michael Abbruzzi, Town Manager
- Peter Grose, Fuss & O'Neill
- Jim Riordan, Fuss & O'Neill
- Amy Hunt, Fuss & O'Neill

TAC meetings were held to review progress and to address and document key decisions at important milestones. Three workshops have been held with the TAC to date. These meetings occurred on:

- June 27, 2007
- August 7, 2007
- October 29, 2007

5.2 Public Information Meetings

Two public information meetings were held to discuss the results of the Touisset Impact Study with the public and especially to help answer questions and address

concerns that residents of the study area as well as residents of the Town may have. These meetings were integral in the decision to move forward with the development of an OWMP. The meetings were held as follows:

- Touisset Point Fire Department (7:00 p.m., November 26, 2007)
- Warren Town Hall (January 3, 2008)

The meetings were advertised publicly. Invitations with a fact sheet providing the general objectives and results of the study were sent to residents of the study area (see *Appendix E* for a copy of the fact sheet). The meetings consisted of a brief PowerPoint presentation (see *Appendix F*) followed by an opportunity for comments, questions, and discussion.

In accordance with RIDEM's OWMP requirements, the Town held a third public meeting during which the OWMP was reviewed. This was the June 10, 2008 Town Council Meeting (see *Appendix G* for meeting materials and public notice.

5.3 Methods Used in Other Rhode Island Municipalities

Rhode Island municipalities enjoy significant state support for development of onsite wastewater management programs. In addition to CSSLP funding, the state has also offered grant funding for the development of municipal wastewater management programs as well as technical assistance in the form of several guidance documents. Two of these documents were developed to describe the onsite wastewater management implementation efforts of Rhode Island municipalities. They are:

- *Rhode Island Municipal Septic System Standards and Programs* (Riordan, 2001).
- *Summary of Rhode Island Municipal Onsite Wastewater Programs* (RIDEM, 2008).

Both documents are included in *Appendix I* of this report. A tabular summary of management approaches used by each municipality, adapted from the two aforementioned reports is been provided below.

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Table 6
Summary of Rhode Island Municipal
Onsite Wastewater Standards and Programs

Municipalities	Standards (Setbacks, etc.) Beyond State Regulations	Management (Inspection/Maintenance) Requirements	Required Use of Innovative and Alternative Technologies	Repair Replacement Programs
Burrillville	Yes	No	No	No
Charlestown	Yes	Yes	Yes	Yes(CSSLP)
Coventry	No	No	No	Yes (CDBG & CSSLP)
Cranston	No	Under consideration	No	In development (CSSLP)
Cumberland	No	Under consideration	No	In development (CSSLP)
East Greenwich	No	No	No	Yes (CDBG)[1]
Foster	Yes	In Development	No	Yes (WRIHRP) In development (CSSLP)
Glocester	Yes	Yes	Under Consideration	Yes (WRIHRP[2] & CSSLP)
Hopkinton	No	No	No	Yes (CDBG)
Johnston	No	Yes	No	Yes (CDBG & CSSLP)
Little Compton	No	No	No	No
Middletown	No	No	No	No
Narragansett	Yes	Yes	Based on staff recommendation	Yes (CSSLP)
New Shoreham	Yes	Yes	Yes	Yes (CSSLP)

Municipalities	Standards (Setbacks, etc.) Beyond State Regulations	Management (Inspection/Maintenance) Requirements	Required Use of Innovative and Alternative Technologies	Repair Replacement Programs
North Kingstown	Yes	Yes	Yes	Yes (CSSLP)
North Smithfield	No	No	No	No
Portsmouth	Yes	Under consideration	Yes	Yes (CDBG) In development (CSSLP)
Scituate	Yes	Under consideration	No	Yes (WRIHRP) In development (CSSLP)
South Kingstown	Yes	Proposed	May be required through negotiation	Yes (CSSLP)
Tiverton	Yes	Under consideration	No	Yes (CSSLP)
Warren	Yes	No	No	No
Warwick	No	No	No	Yes
West Greenwich	Yes	No	No	Yes (CDBG)
Westerly	No	Under Consideration	No	Under consideration

Notes

1. CDBG means Community Development Block Grant funds have been programmed for septic system repair/replacement.
2. WRIHRP refers to the Western Rhode Island Home Repair Program.

As shown in *Table 6* Warren has established standards that go beyond state regulations. Specifically, the Town has developed a special setback of 150 feet from surface waters and wetlands under section 32-89 of its Zoning Ordinance. This section states:

Sewage disposal facilities which are designed to leach fluid wastes into the soil shall be located not less than one hundred fifty (150) feet, or as specified by the Rhode Island Department of Health, from the edge of any wetland, water body or stream. On tidal water bodies, this measurement shall be made from the normal high tide mark.

5.4 Enhancements to Warren's Existing Maintenance Program

Warren has already taken a number of key steps in helping residents to manage their septic systems. These include:

- Establishing a special 150-foot setback for waterbodies and wetlands.
- Development of the Touisset Impact Study to assess existing conditions and establish direction for implementation.
- Engaging the public through workshops, outreach as well as establishment of a technical advisory committee.
- Development of this OWMP as a first step in establishing CSSLP financial assistance for septic system repair and upgrade for Town residents; and to determine next steps for OWM program implementation.
    - As shown in *Table 4,* above, a number of Rhode Island municipalities have developed inspection-based operation and maintenance programs. Warren is currently considering this as well. Such a program would likely involve:
- Development of a wastewater management district (WWMD) ordinance.
- Setting an inspection schedule (e.g., every 3 -5 years).
- Assignment of responsibilities for system owners, service providers, and the Town.

5.4.1 Wastewater Management District Ordinance

The State of Rhode Island developed and passed enabling legislation for WWMDs in 1987 under chapter 45-24.5 of the *Rhode Island General Laws*. In that same year, the Rhode Island Department of Administration published *Waste Water Management Districts…A Starting Point* (Millar, 1987), which provides a model WWMD ordinance and discusses its use. A copy of the report is provided in *Appendix I* of this plan.

5.4.2 Setting an Inspection Schedule

In 2000, RIDEM published *Septic System Checkup: The Rhode Island Handbook for Inspection* (Riordan) (see *Appendix J*). This handbook provides a state-approved method for inspection of conventional septic systems. For conventional systems, inspections are recommended on a 3 – 5 year basis, depending on system use, and can generally be completed by a service provide in few minutes. Inspections are recommended as the

basis for determining pumpout need, which helps avoid the unnecessary expense of overkill maintenance. Inspection-based programs also provide superior protection from system failure as they ensure that the system is functioning properly and that minor repair needs do not exacerbate.

An inspection-based program is essential for I&A systems, which generally include mechanical and electrical parts that are more likely to experience malfunction. I&A systems should be inspected annually. The University of Rhode Island's New England Onsite Wastewater Training URI-OWT Center has developed training and certification programs for service providers. These training programs include both conventional and I&A systems. A number of Rhode Island municipalities maintain lists of approved service providers and use satisfactory completion of the URI-OWT programs as the basis for service-provider registration.

5.4.3 Assignment of Program Responsibilities

Municipalities commonly divide the responsibility for septic system maintenance among three key parties—service providers, system owners, and themselves. Although many successful approaches exist, a typical approach might include the division of labor indicated below:

- *System Owners*

  System owners are responsible for scheduling for regular inspection and maintenance through an approved service provider. Inspection and maintenance service may be paid out of pocket by system owners or may be funded publicly through utility-fee revenues or general taxation.

- *Service Providers*

  Approved service providers provide general inspection and maintenance services on a scheduled basis. They are generally required to report inspection results and maintenance activities to the Town and system owner. *(Septic System Checkup: The Rhode Island Handbook for Inspection* provides routine-maintenance report form that would be appropriate for this purpose). Reporting allows the municipality to ensure that all systems receive appropriate service. It also allows the municipality to track the overall effectiveness of its program.

- *Municipality*

  The municipality is responsible for collecting program data and ensuring program effectiveness. This may involve computer tracking of inspection and maintenance information, environmental monitoring, and annual reporting. There are a number of computer applications currently on the market that are designed for septic system information tracking. Municipalities may provide additional services such as financial and technical assistance. Often these services are provided through an

intermediary. For example, financing may be coordinated through an agency like RIHousing; and technical assistance may be provided through an approved service provider.

6 Program Responsibilities and Administration

The Town Planner is expected to be responsible for overall implementation of the onsite wastewater management program. The Town Planner will also take the lead role on public education and development of a loan agreement with RICWFA as well as alternative financing such as grant seeking activities. Warren anticipates coordinating day-to-day loan administration activities with RIHousing through the Town Planner.

The pumpout and inspection program will be through the Warren Sewer Commission and will be the responsibility of David Komiega, Plant Manager of the Warren Wastewater Treatment Plant. The Sewer Commission will maintain pumpout and inspection records. Given the number of I&A systems likely to be needed in the Touisset area, the Town may opt to develop a more extensive operation and maintenance program. Responsibility for development and coordination of this program is yet to be determined.

7 Method of Septage Disposal

Based on the number of houses in the Point and Highland areas, we can assume 198 systems need to be pumped out and an average volume of 1,000 gallons per pumpout. Currently, the Town funds two pumpouts per year per ISDS to owners of ISDSs in Warren. This is intended to offset their contribution to the cost of operating the WWTP, which is funded through general taxation. The total volume of septage transported to the Warren Wastewater Treatment Plant (WWTP) per year would be approximately 400,000 gallons, if one were to assume that all ISDS owners in the Town pumped out their septic tanks twice per year (which is unlikely). The WWWTP does not currently experience capacity problems. Based in conversations with employees at the plant, it normally operates at significantly below the design capacity.

If the Town adopted an inspection-based system, pumpouts could probably be reduced to one per system every 3 to 5 years. Assuming an average pumpout rate of one pumpout per system every four years, total volume of septage transported to the WWWTP could be reduced to approximately 50,000 gallons per year.

8 Implementation Plan

8.1 Conceptual Description of Recommended Program

One important advantage of using I&A systems that is not addressed by the evaluation process discussed in *Section 3.0* is the flexibility of I&A system implementation. Treatment plants have limited capacity and so a treatment plant for the study area

would probably be sized large enough to accommodate tie-ins on an as-needed basis. This means the cost for a treatment works must be planned and paid up front. Not so for ISDSs. ISDSs can be converted to I&A systems on an as-needed basis without any implication for existing treatment systems. Significant present-day cost savings can be realized by as-needed installation of these systems on a prioritized basis.

This plan recommends an I&A system implementation program that takes advantage of phased installation on a prioritized basis. The steps recommend include the following:

- Develop a local assistance program to help phase out cesspools, substandard systems and distressed conventional systems, with upgrades to I&A technologies. Cesspools will need to be upgraded under the new Cesspool Phaseout Act. Cesspools along the coast will need to be upgraded. Conventional systems on undersized properties should also be upgraded. Given environmental and drinking water quality concerns in both the Highlands and Point, we recommend a program to facilitate upgrade of existing systems to denitrification where indicated. To ensure benefit at the earliest point possible, this study recommends development of a priority replacement and assistance strategy in the next phase of wastewater management planning.

- There are several financial assistance programs that communities may access to implement water supply and wastewater infrastructure enhancement programs. Some options have been discussed in this report. This study recommends continued exploration of financing mechanisms.

- To ensure the proper function of ISDSs—especially I&A systems—the Town should develop a wastewater management district. Such a program would be intended to foster regular inspection and maintenance of ISDSs in accordance with a given standard such as that describe in *Septic System Checkup* and as recommended by I&A treatment system vendors.

- Water quality in Touisset is showing signs of stress by development. This study recommends establishment of an integrated monitoring program that includes the public and private well and coastal water quality. This would be focused on baseline data and trends—during implementation and post-implementation. Over the long term, monitoring data could be used to determine the effectiveness of I&A system implementation. Such a program should be carefully thought out. This study recommends developing program components in the next phase of wastewater management planning.

- Capacity of the existing water supply system appears to be stressed and demand is likely to rise as private wells continue to be replaced by TPWT. This study recommends that the Town further examine adequacy of the public water supply and upgrade/add to supply wells as needed. This step should occur in the next phase of wastewater management planning as it has implications for

the number of systems that may need to be replaced and the order (i.e., priority) of their replacement.

- Carrying capacity of land in the Highlands and Point is already stressed. This study recommends that the Town prohibit unmerging of lots for the purpose of building new homes.

8.1 Anticipated Project Costs

Table 7 provides a suggested order-of-magnitude budget for onsite wastewater management program development, as described above in *Section 8.1,* for the Touisset study area.

Table 7
Touisset Onsite Wastewater Management
Program Development Cost

Program Item	Order-of-Magnitude Costs
Integrated monitoring program strategy	$8,000
Analysis of water supply improvement options	$13,000
Operation and maintenance program development	$8,000
Identify financing plan options	$5,000
Total	$34,000

8.2 Implementation Schedule

Table 8 provides a suggested schedule of next steps.

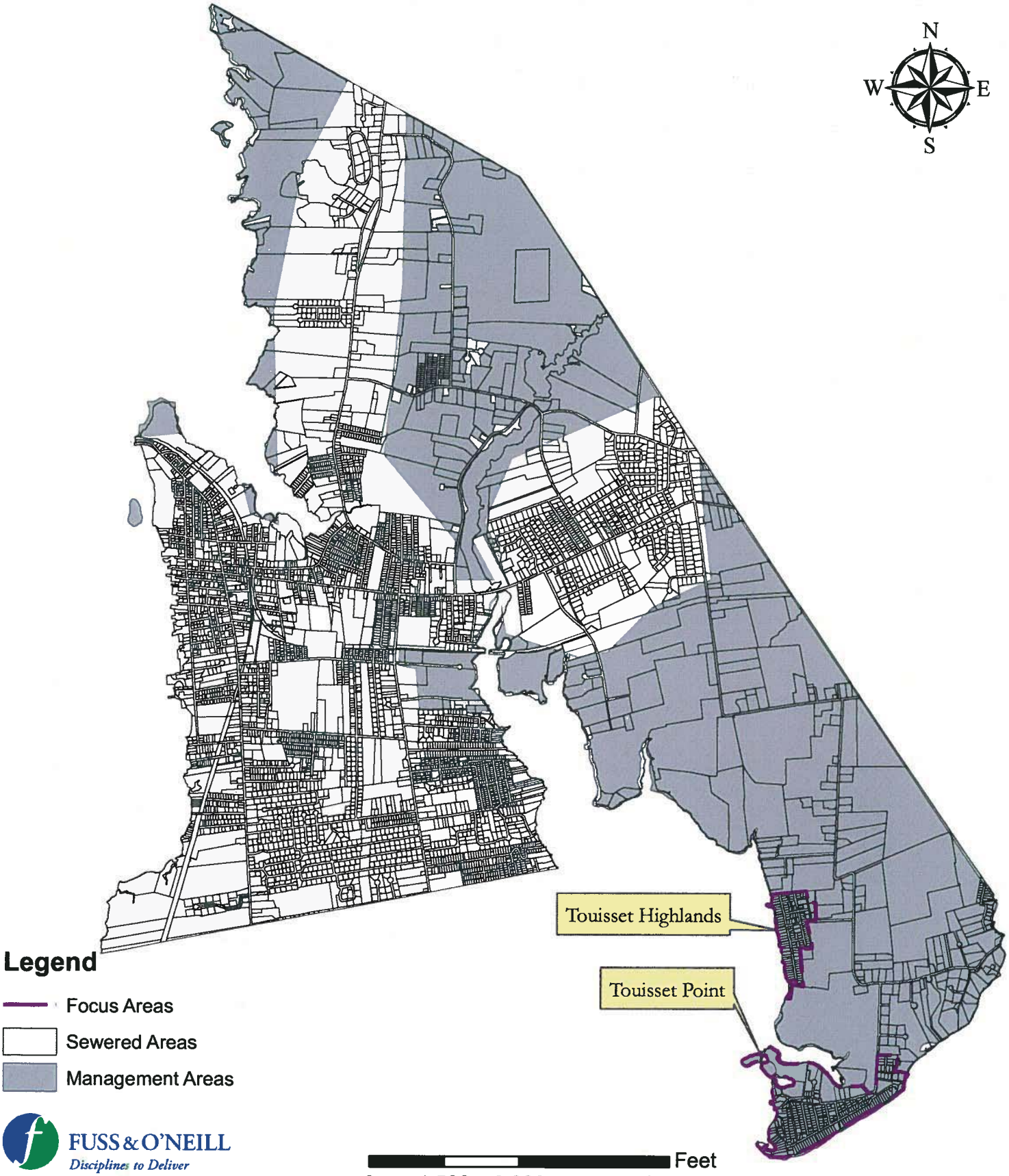
Table 8
Touisset Onsite Wastewater Management
Program Development Schedule

Program Item	Month Number
Seek funding for program development	Month 1
Develop integrated monitoring program plan	Month 3
Analyze water supply improvement options	Month 3
Develop ISDS assistance improvement program	Month 5
Draft zoning ordinance revision	Month 5
Develop operation and maintenance program	Month 7
Develop financing options	Month 7
CSSLP Plan approval[1]	Month 9
Establish CSSLP eligibility	Month 11

Notes:
[1] A plan is required to establish eligibility for the CSSLP program.

Figures

Figure 1 - Management Areas and Study Focus Areas in the Town of Warren



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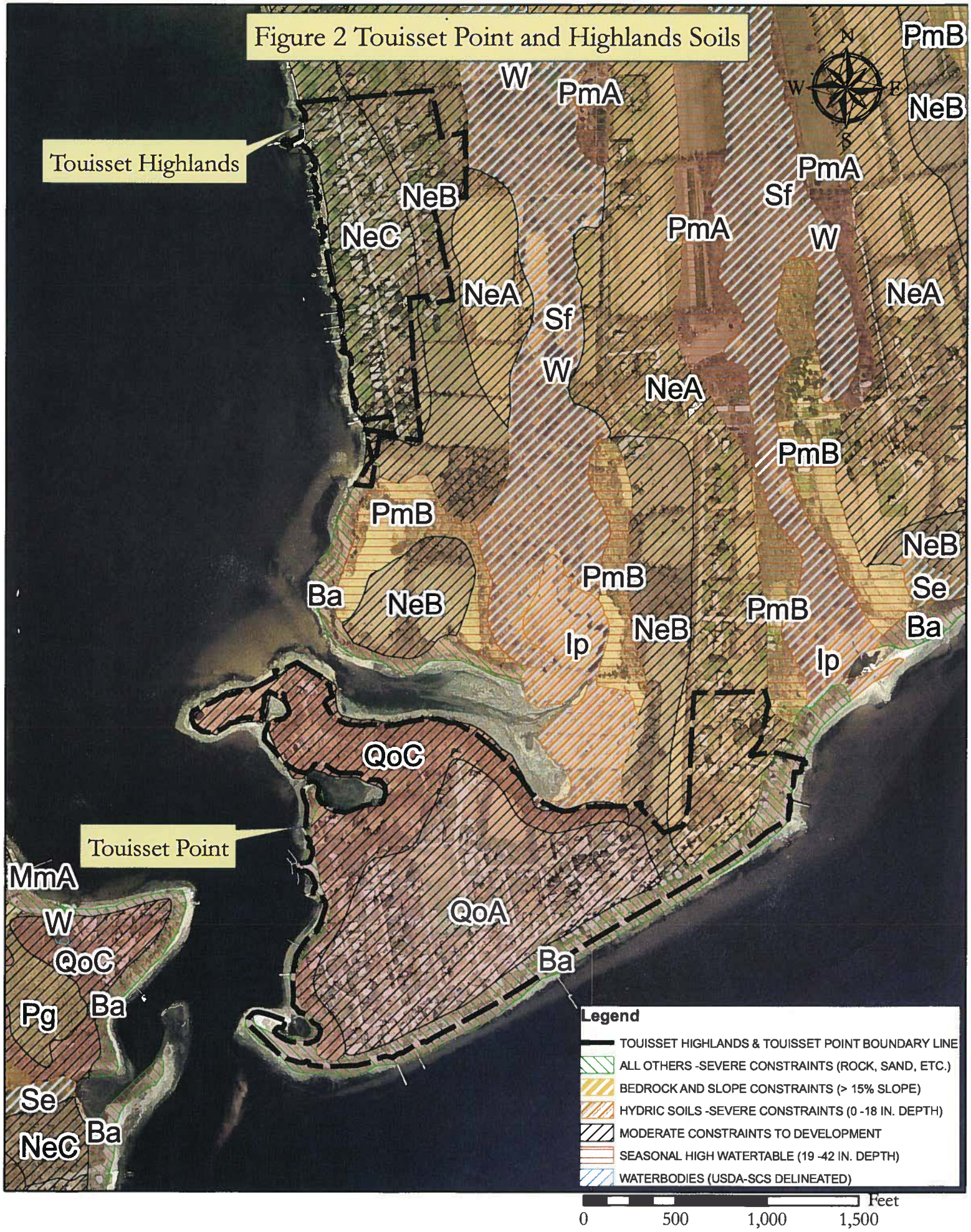
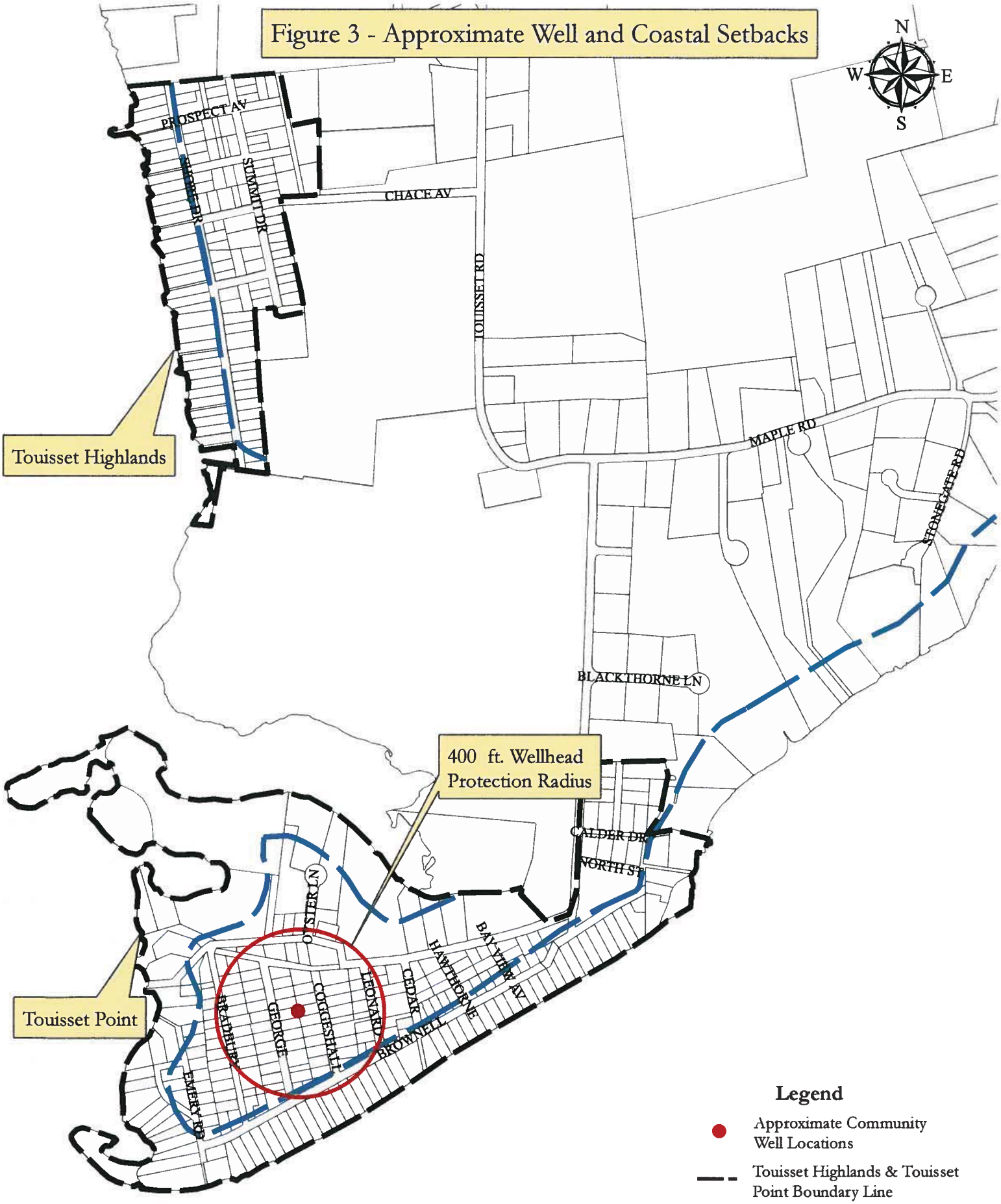


Figure 2 Touisset Point and Highlands Soils
Touisset Highlands
Touisset Point
N
W
E
S
W
PmA
PmB
NeB
NeC
NeA
Sf
W
PmA
Sf
PmA
W
NeA
NeA
PmB
PmB
NeB
Ba
NeB
PmB
NeB
PmB
Se
Ba
Ip
Ip
QoC
QoA
Ba
MmA
W
QoC
Pg
Ba
Se
NeC
Ba
Legend
TOUISSET HIGHLANDS & TOUISSET POINT BOUNDARY LINE
ALL OTHERS -SEVERE CONSTRAINTS (ROCK, SAND, ETC.)
BEDROCK AND SLOPE CONSTRAINTS (> 15% SLOPE)
HYDRIC SOILS -SEVERE CONSTRAINTS (0 -18 IN. DEPTH)
MODERATE CONSTRAINTS TO DEVELOPMENT
SEASONAL HIGH WATERTABLE (19 -42 IN. DEPTH)
WATERBODIES (USDA-SCS DELINEATED)
Feet
0
500
1,000
1,500

Figure 3 - Approximate Well and Coastal Setbacks



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