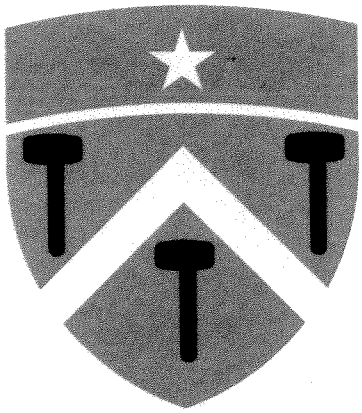
TOWN OF NORTH SMITHFIELD

WASTEWATER MANAGEMENT FACILITIES PLAN

FOR THE

NORTH SMITHFIELD SEWER COMMISSION



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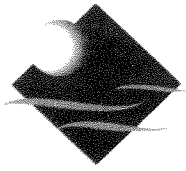
APRIL 2007
(Revised August 2007)
(Final Revision - October 25, 2007)



JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
272 West. Exchange St., Suite 201, Providence, RI 02903-1061
Phone: 401-454-7000 • Fax: 401-454-7415

RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
235 Promenade Street, Providence, RI 02908-5767 TDD 401-222-4462

December 14, 2007

CERTIFIED MAIL

Robert B. Lowe, Town Administrator
1 Main Street
Slatersville, RI 02876

RE: Approval of Wastewater Facilities Plan and Finding of No Significant Impact
(DEM file # 07-B)
North Smithfield, Rhode Island

Dear Mr. Lowe:

This letter is in regard to the Town of North Smithfield's request to approve the above-referenced Wastewater Facilities Plan (FP) and the FP's associated environmental review findings.

North Smithfield submitted the FP approval request based on "Town of North Smithfield Wastewater Management Facilities Plan for the North Smithfield Sewer Commission" prepared by James J. Geremia & Associates, Inc., dated April 2007 (Revised August and October 2007). The proposed projects involve the design and construction of wastewater collection system expansion to unsewered areas, and implementation of a wastewater management district for areas of Town to remain unsewered. These projects are intended to mitigate adverse water quality impacts to water bodies including, but not limited to, Slatersville Reservoir, Forestdale Pond, Andrews Pond, and the Blackstone River.

Based on our review, RIDEM hereby approves this document as the Town-wide FP.

The FP sufficiently addresses the statutory intent of the environmental review requirements of the Federal Water Pollution Control Act (commonly known as the Clean Water Act) and **RIDEM is hereby issuing a Finding of No Significant Impact (FONSI)** for the proposed projects identified in the FP. Please note that unless reaffirmed, this environmental review approval expires five (5) years from the date of issuance.

This approval maintains eligibility for construction assistance programs administered by RIDEM that contain funds allotted to the state under provisions of the Clean Water Act.

A copy of the approved FP will be forwarded to your office under separate cover. If you have any questions, please call our office at 222-4700.

Sincerely,

Angelo S. Liberti, P.E., Chief
Surface Water Protection Section
Office of Water Resources

ASL/AGZ/agz

Enclosure: Finding of No Significant Impact

pc: Jay Manning, OWR/SRF
Jim Geremia, JG & A
Manuel Alvarez, N. Smithfield Water Official

R.I. DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Office of Water Resources

FINDING OF NO SIGNIFICANT IMPACT

The Office of Water Resources has reviewed "Town of North Smithfield Wastewater Management Facilities Plan for the North Smithfield Sewer Commission" prepared by James J. Geremia & Associates, Inc. dated April 2007 (Revised August 2007 and October 25, 2007) for the Town of North Smithfield, in conjunction with a request for approval of this Wastewater Management Facilities Plan (FP) and the water pollution abatement projects proposed therein, and

Pursuant to the requirements and authority set forth in Chapter 46-12.2 of the General Laws of Rhode Island, 1956, as amended, and the "Rules and Regulations for the State Revolving Fund (SRF) Program", DEM has determined that the projects identified in the above FP will not cause significant detrimental effects, the quality of the environment will be improved by the proposed projects, and an Environmental Impact Statement will not be required. The environmental information provided has met the statutory intent of the Federal Clean Water Act environmental review requirements.

DEM is hereby issuing a formal FINDING OF NO SIGNIFICANT IMPACT for the above FP.

The approval of the projects identified and contained in the study areas of this FP are recommended for immediate implementation and will not foreclose alternatives to the Town of North Smithfield in other areas.

The proposed project involves the design and construction of wastewater collection systems to the Great Road East, Greene Street, Lamoureux Boulevard, North Smithfield Industrial Park, Park View, Providence Pike, St. Paul, Victory Highway/Dawley Brook, Warren Avenue/Park Drive, Waterford, and Willerval/Tangelwood areas; and implementing a Wastewater Management District for areas of Town to remain unsewered. These projects are intended to mitigate adverse water quality impacts to water bodies including, but not limited to, Slatersville Reservoir, Forestdale Pond, Andrews Pond, and the Blackstone River.

Project Name: North Smithfield FP

Project Location: Town of North Smithfield

Project Description: Design and construction of wastewater collection systems to the Great Road East, Greene Street, Lamoureux Boulevard, North Smithfield Industrial Park, Park View, Providence Pike, St. Paul, Victory Highway/Dawley Brook, Warren Avenue/Park Drive, Waterford, and Willerval/Tangelwood areas; and implementing a Wastewater Management District for areas of Town to remain unsewered.

Anticipated Environmental Impacts:

Long Term: No detrimental impacts.

Short Term: Construction-related impacts only.

Required Mitigation Measures:

Sedimentation, erosion, noise and dust control during construction; and any other measures required by federal, state or local permitting and/or approval authorities;

Angelo S. Liberti, P.E., Chief
Surface Water Protection
Office of Water Resources, DEM

DATE: 12/14/07

TOWN OF NORTH SMITHFIELD

WASTEWATER MANAGEMENT FACILITIES PLAN

FOR THE

NORTH SMITHFIELD SEWER COMMISSION

December 13, 2007
Angelo S. Tekula
DEM File #07-3

APRIL 2007
(Revised August 2007)
(Final Revision - October 25, 2007)

JAMES J. GEREMIA & ASSOCIATES, INC.
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1.0 EXECUTIVE SUMMARY

1.1 PLAN OVERVIEW

This Facilities Plan, prepared for the Town of North Smithfield, is a comprehensive study addressing both present and future needs of the Town's wastewater collection system. The Facilities Plan is an investigation into the present and future adequacies in the collection system. The study area includes the entire Town of North Smithfield. The study was completed according to the requirements of the State Revolving Loan Program established and managed by the R.I. Department of Environmental Management.

Wastewater generated by the Town is serviced by the Woonsocket Regional Wastewater Treatment Facility. The Town of North Smithfield entered into an agreement with the City of Woonsocket on 7 December 1977 for the treatment and disposal of wastewater generated by the Town. The agreement indicates that the cost disbursement for capital expenses are proportioned based on percentages of total design flow. Operating costs for the Town of North Smithfield, including maintenance, repairs, supplies, and administration are based upon the actual metered flow from either the Alice Avenue Metering Station or the Elizabeth Avenue Metering Station, and water usage records for units that do not pass through the metering station, and are then proportioned based on the total flow treated by the Facility.

1.2 EXISTING CONDITIONS

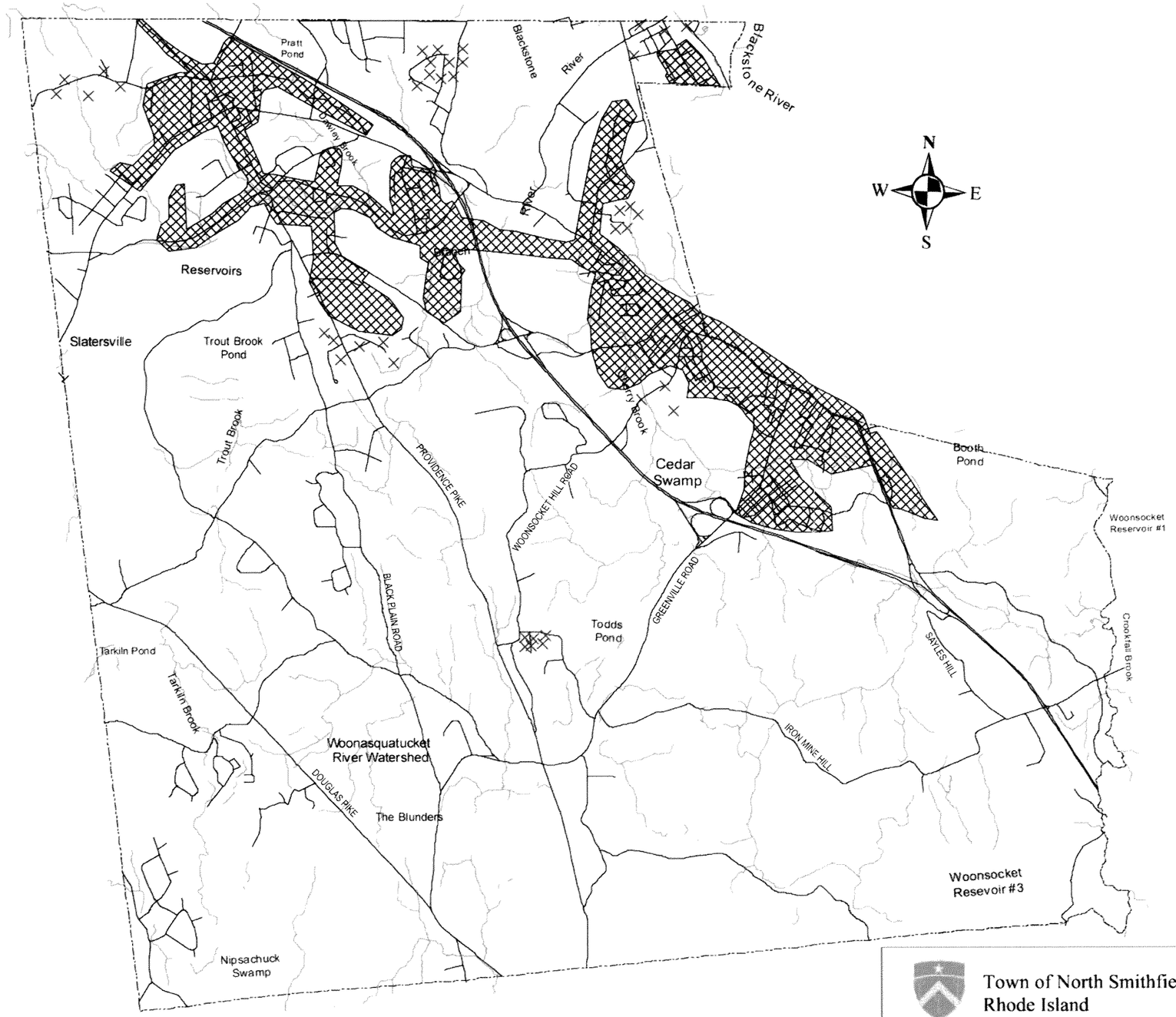
Fifty-one percent (51%) of the residents of the Town are serviced by individual sewage disposal systems, while the remaining forty-nine percent (49%) are serviced by the municipal wastewater collection system. The North Smithfield Sewer System discharges directly to the Woonsocket Regional Wastewater Collection System located in the vicinity of Edward Street at the Blackstone River in the City of Woonsocket. The eastern section of Town is serviced by the Union Village Interceptor and the western section of Town is serviced by the Branch River Interceptor. The North Smithfield Interceptor conveys the majority of the wastewater generated by the North Smithfield users to the Woonsocket system. The confluence of the three major interceptors occurs in the vicinity of Brookside Drive and Cherry Brook.

Figure 1-1 shows the existing sewered areas within the Town of North Smithfield and Figure 1-2 depicts the interceptors and lateral sewers. The system consists of 13 miles of lateral and intercepting sewers. The collection system does not have bypasses or overflows installed, and the system does not have combined sewer overflows. The lateral system contains 5.5 miles of 8-inch diameter clay pipes, 3.5 miles of 8-inch diameter polyvinyl chloride pipes, 0.5 miles of low pressure sewers, and 0.2 miles of 4-inch ductile iron force main and one pumping station. The interceptor sewers consist of 4.4 miles of 10-inch through 24-inch diameter clay pipes, 1.6 miles of 30-inch diameter reinforced concrete pipe, and 0.3 miles of 10-inch and 20-inch diameter ductile iron force mains, nine (9) pump stations and two flow metering stations.

There are 2,122 on-site disposal systems in the Town of North Smithfield, and the majority of these systems are located in the Slatersville Reservoir groundwater recharge area and the watershed area for the Woonsocket Reservoirs (Figure 1-3). Many systems are substandard, beyond their intended life expectancy, and most are not maintained on a periodic basis. A Wastewater Management District is proposed for implementation that will call for the inspection, repair and replacement of individual sewage disposal systems to prevent non-source pollution of the groundwater.

The construction, alteration and repair of ISDS systems are regulated by RIDEM's Division of Water Resources in the Rules and Regulations Establishing Minimum Standards Relating to Location, Design, Construction and Maintenance of Individual Sewage Disposal Systems. These rules state that all installations, alterations and repairs must be approved, in writing, by the Division. In this manner, the Division can inspect and keep track of all ISDS installations and repairs. The review of the ISDS records revealed that 102 system failures were reported between 2000 - 2005, and that the individual owners made the necessary repairs to be in compliance with State and local regulations. Figure 1-4 illustrates the location of these failures and repairs.

They are generally considered to be two ways in which an ISDS system can fail. In the first circumstance, the leaching field does not operate, meaning that water cannot pass through the system. The system eventually surcharges, or backs up into the house. In the second instance, the system drains too freely, causing untreated sewage to percolate to the groundwater. In each case of failure, there may be several factors which contribute to the system not operating properly. For example, soils that drain poorly cannot pass large volumes of water. Conversely, soils which drain excessively may result in poor wastewater treatment and short-circuit to the surface or groundwater table. Population density is another factor. Areas which have a high



Legend

- Existing Sewer Service Area *
- On site ISDS Problem Area Identified From Comprehensive Plan

** Map shows approximate limits of existing, approved, and proposed sewer services. Some streets and sections within the delineated areas may not be on sewers.*

This map was prepared for the inventory of real property within the Town of North Smithfield. Users of this tax map are hereby notified that the public primary information sources, including record deeds and plats, should be consulted for the verification of the information contained on this map. The Town of North Smithfield and its mapping contractors assume no legal responsibility for the information contained herein.

Base map and hydrographic features were provided by Rhode Island GIS as 1":400' features derived from the 1997 National Grid USA/RIDOT Orthophoto Project.

Updated September 2003

APPLIED GEOGRAPHICS, INC.
Empowering People with Spatial Solutions

Town of North Smithfield
Rhode Island

Figure 1-1

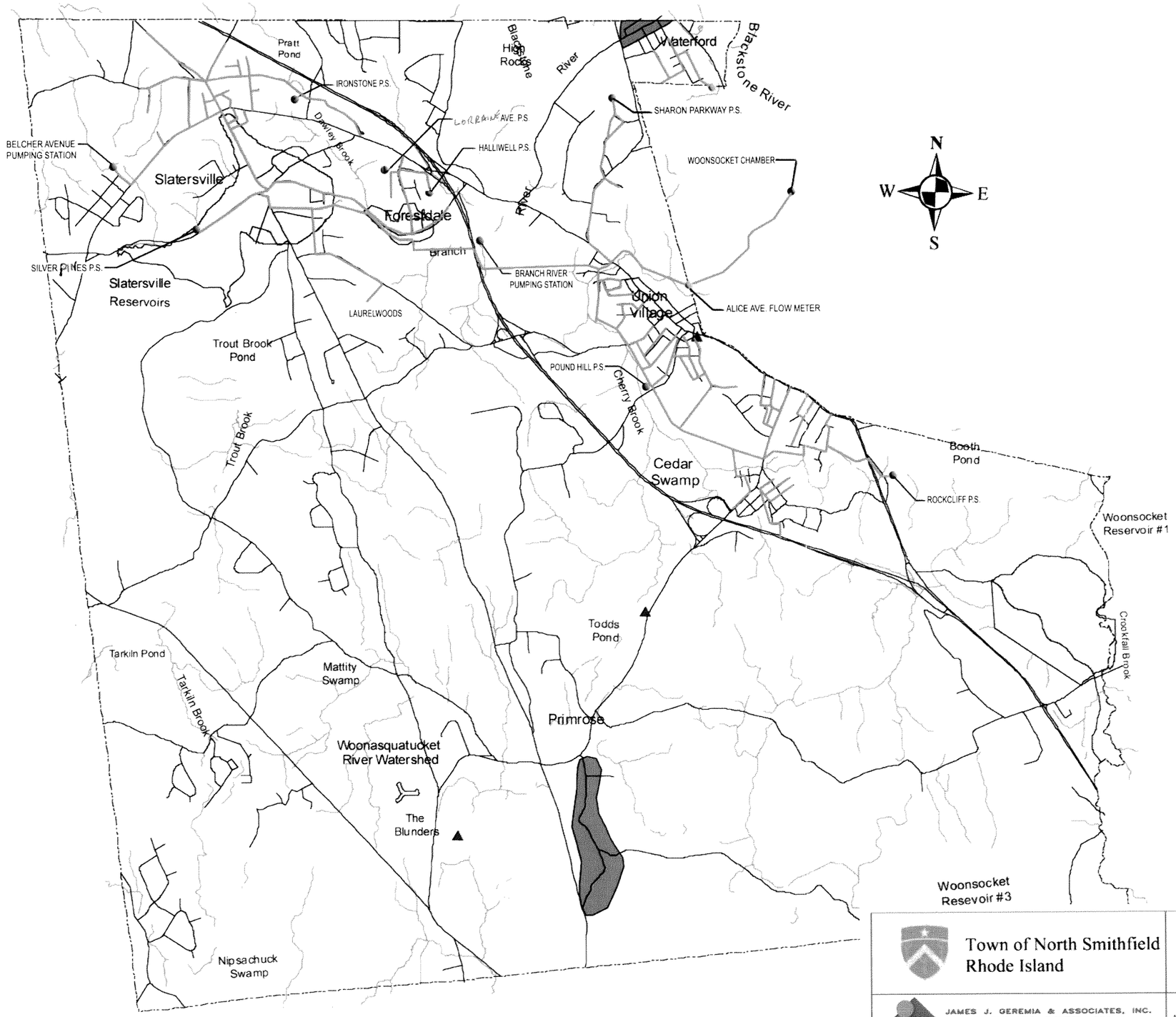
EXISTING SEWER AREA

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
272 W. Exchange Street Suite 201 Providence,RI 02903-1025
Phone: 401-454-7000 Fax: 401-454-7415

Source: Town of North Smithfield

Date: 2006

Scale: No Scale



Legend

- Town Historic District and Listed on State and National Registers of Historic Places
- Historic District Listed on State and National Registers of Historic Places
- Historic District Nominated for State and National Registers of Historic Places
- Historic Structure on State and National Registers of Historic Places
- Lakes & Ponds
- Streams
- Roads
- Town Boundary
- Flow Meter
- Pumping Stations
- Existing Sewer

0 1,500 3,000 6,000 9,000 Feet

1 inch equals 3,042 feet

Town of North Smithfield
Rhode Island

Figure 1-2

Existing Sewer Collection System

JAMES J. GEREMIA & ASSOCIATES, INC.
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272 S. Exchange Street Suite 201 Providence,RI 02903-1025
Phone: 401-454-7000 Fax: 401-454-7415

Source: Town of North Smithfield

Date: 2006

Scale: No Scale

Legend

- Community Wells
- Non-Community Wells
- Groundwater Reservoir
- Groundwater Recharge Area
- Water Supply Basin Boundary
- flood
- EPA - CERCLIS Site
- EPA - CERCLIS Superfund Site
- Town Boundary
- Streets
- Lakes & Ponds
- Streams

Town of North Smithfield
Rhode Island

Figure 1-3

WATER RESOURCES

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
272 W. Exchange Street Suite 201 Providence,RI 02903-1025
Phone: 401-454-7000 Fax: 401-454-7415

Source: Town of North Smithfield

Date: 2006

Scale: No Scale

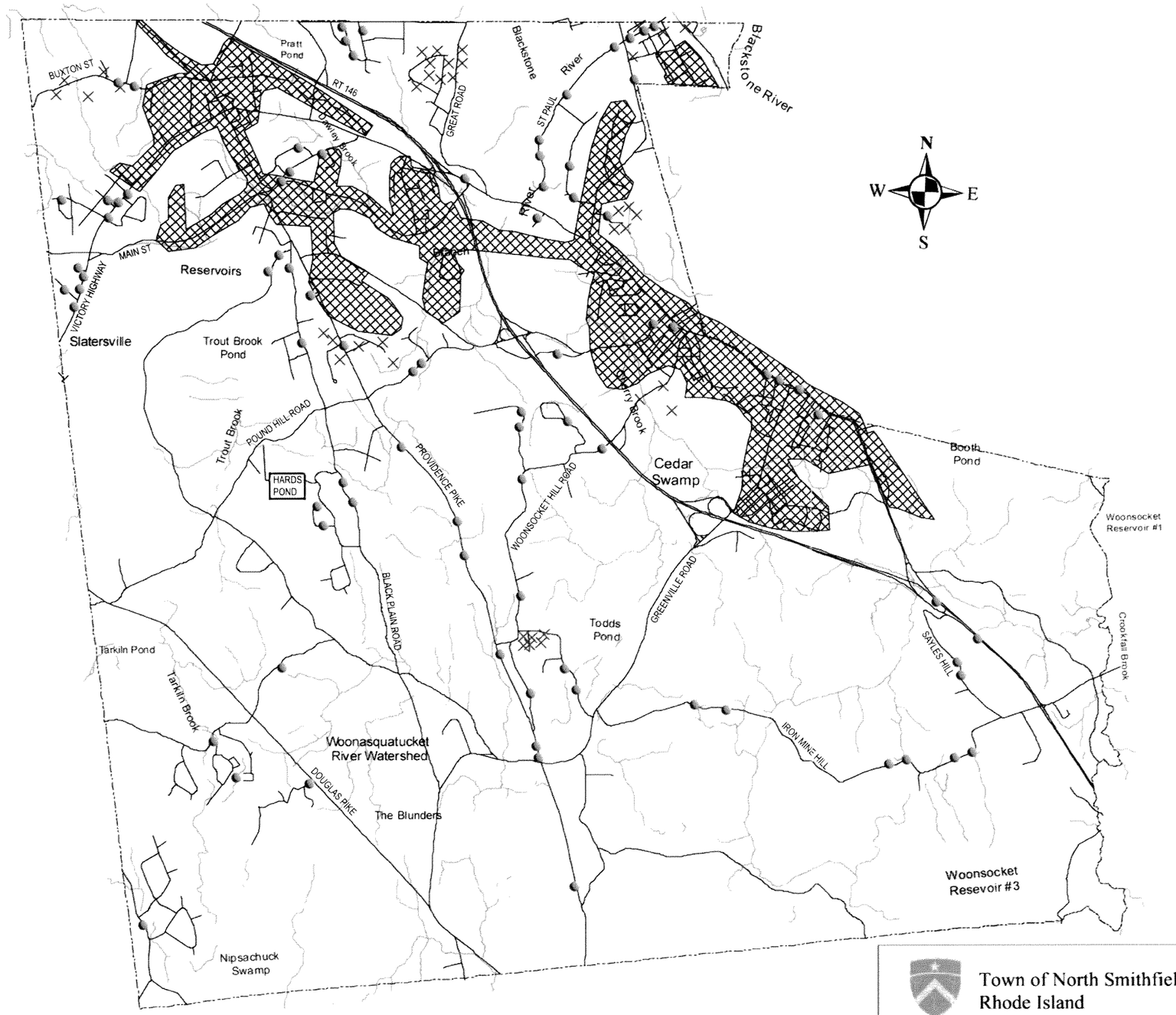
concentration of residences over a small land area may experience oversaturation of ISDS effluent in the soil, particularly in wetland areas. High groundwater will also restrict a soil's ability to disperse and treat wastewater.

An examination of the soils where the failures have occurred finds they are very permeable soils. These soils have the potential to cause groundwater pollution, slowly permeable soils having a potential for ISDS failures, soils with a seasonally high water table located within 1.5 to 3.5 feet from the surface, and soils consisting of topography with slopes greater than 15 percent and shallow bedrock. The major areas of failure within the Slatersville Reservoir groundwater recharge area (as presented in Figure 1-4) are as follows: Buxton Street, Victory Highway, Greene St. Area, Tanglewood, Waterford area, St. Paul area, Great Road, and Providence Pike area from the Slatersville Reservoir to Pound Hill Road, Route 146 and Sayles Road. There were also areas of on-site disposal failures along Iron Mine Hill Road, Sayles Hill Road and south of Pound Hill Road, which are located within the watershed area of Woonsocket Reservoir.

The continuation of sewering the Slatersville Reservoir groundwater recharge area will improve the quality of the reservoir, groundwater, and adjacent wetlands with the elimination of leaching field effluent containing pathogenic bacteria and viruses, nitrates, phostates and synthetic organic chemicals from septic tank additives and household chemicals. There were 102 ISDS reported to have failed in accordance with DEM records and 64 of these systems are within the Slatersville Reservoir groundwater recharge area. The individual sewage disposal systems predate state-enforced siting and design standards, and have approached their expected life span. In addition, the majority of dwelling with ISDS failures are served by individual wells as a source of portable water supply.

Zoning, along with land use and planning, are important factors in ISDS wastewater management. Zoning, however, establishes the concentration of domestic dwellings in local areas. In areas of concern, this concentration may contribute to soil saturation of groundwater and water quality. Proper planning of zoning regulations can prevent potential ISDS problems.

Residential areas can be generally described as our basic lot sizes: 10,000 square feet, 20,000 square feet, 40,000 square feet and 80,000 square feet.



Legend

- Existing Sewer Service Area *
- On site ISDS Problem Area Identified From Comprehensive Plan
- Onsite ISDS Problem Area March 19, 2006

** Map shows approximate limits of existing, approved, and proposed sewer services. Some streets and sections within the delineated areas may not be on sewers.*

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Updated: September 2003

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Town of North Smithfield
Rhode Island

Figure 1-4

ISDS FAILURES

JAMES J. GEREMIA & ASSOCIATES, INC.
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272 W. Exchange Street Suite 201 Providence,RI 02903-1025
Phone: 401-454-7000 Fax: 401-454-7415

Source: Town of North Smithfield

Date: 2006

Scale: No Scale

The zoning map is utilized as a tool to evaluate dense concentrations of residential development. Areas designated R-10 and R-20 reflect small lot sizes.

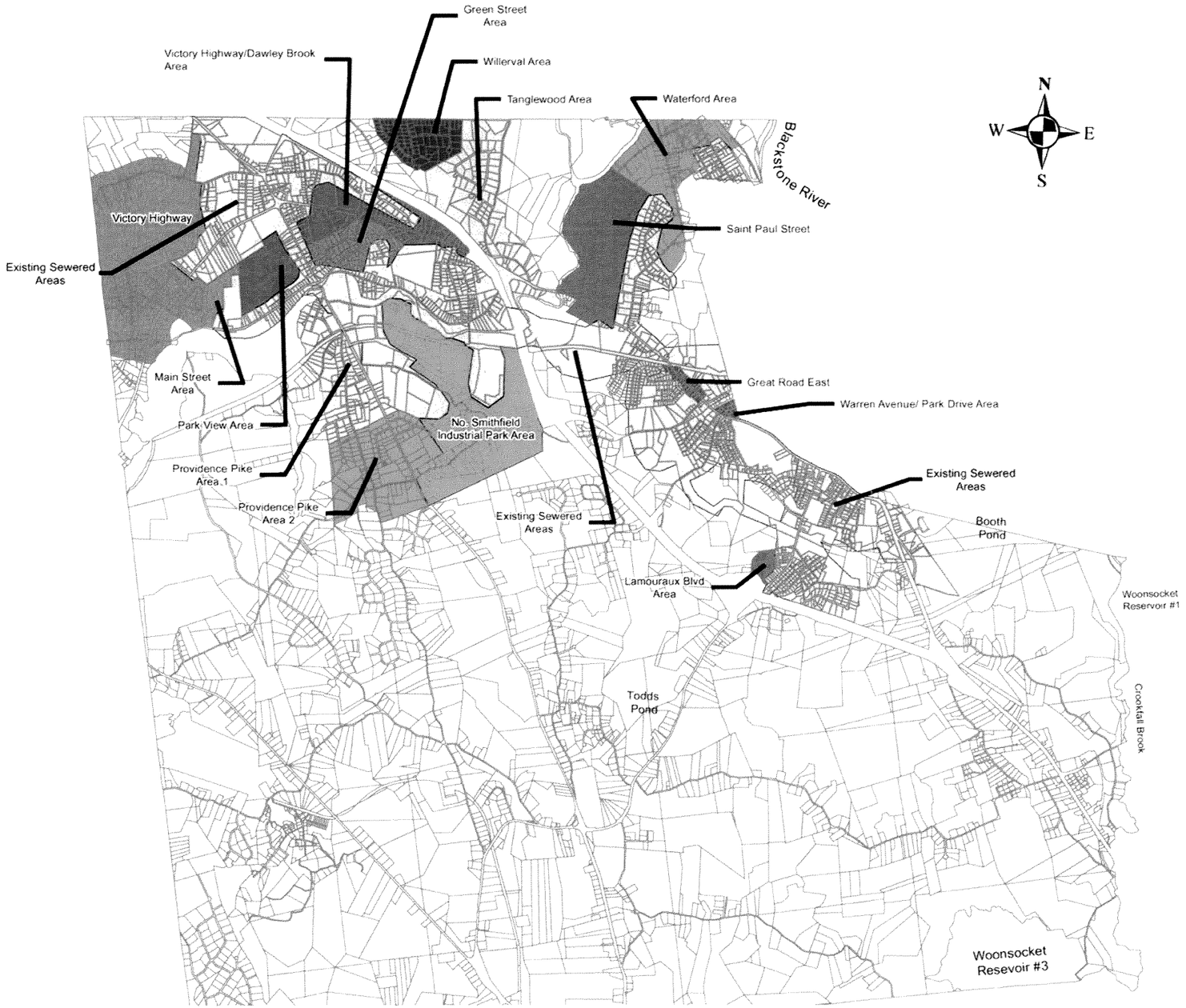
Alternatively, newer developments currently being planned which may potentially experience septic system difficulties can be zoned to help prevent such failures. In those newly developed areas that have been restricted by zoning regulations which classify the area as R-80 (one dwelling unit at 80,000 square feet), such requirements, along with the current State ISDS requirements, greatly reduce the potential of septic system failure. The zoning requirement practically assures ample soil area for leach field distribution systems, and therefore, lessens the chances of soil saturation with ISDS effluent. It is clear, then, that proper and careful zoning of undeveloped land areas can help prevent future septic system failures in such areas.

For those areas where there is less dense development, it is more cost effective to establish a Wastewater Management District to ensure that the groundwater quality is maintained. In Section 6 of this Facilities Plan, the mechanism necessary for the Town to adopt and implement a Wastewater Management Program will be provided.

The Facilities Plan will identify those areas that are to be added to the Sewer District and those areas that are to remain on Individual Sewage Disposal Systems.

1.3 FUTURE SEWERED AREA

The Town of North Smithfield will continue to increase in sewer service population over the next twenty years. Areas that have been defined as future service areas are depicted in Figure 1-5 The future service area is adjacent to the existing areas with sewers and is within the groundwater recharge area of the Slatersville Reservoir. Reviews of the Department of Environmental Management's records for Individual Sewer Disposal Systems for the past five years and discussions with Town officials revealed that there have been failures of Individual Sewer Disposal Systems in the future areas, as depicted in Figure 1-4. The remaining areas without sewers were evaluated and based on the sparsely located dwellings, it was determined that a Wastewater Management District be established to prevent Individual Sewer Disposal System problems and to preserve the water quality of groundwater and surface waters within the Town of North Smithfield. The Wastewater Management District will control the repair, replacement and maintenance of Individual Sewer Disposal Systems within the newly formed District.



1 inch equals 3,208 feet

Town of North Smithfield
Rhode Island

Figure 1-5

FUNCTIONAL SEWER SERVICE AREA

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
272 W. Exchange Street Suite 201 Providence,RI 02903-1025
Phone: 401-454-7000 Fax: 401-454-7415

Source: Town of North Smithfield

Date: 2006

Scale: No Scale

It is assumed that 100 percent of a future service area will have sewer lines at build-out. Table 1-1 indicates that the population with sewers will reach 10,148 in the year 2025.

TABLE 1-1
EXISTING AND FUTURE POPULATIONS WITH SEWERS

	2005	2010	2015	2020	2025
Population	5,168	6,961	8,023	9,085	10,148
Dwelling Units	1,980	2,668	3,074	3,481	3,888

The future service area consists of soils that have constraints such as:

- Slow permeability in excess of 40 minutes per inch.
- Seasonally high water table located between 1.5 to 3.0 feet from the surface.
- Shallow bedrock between 1 to 3.0 feet from the surface.

In accordance with the Department of Environmental Management's regulations these soils are not considered suitable for Individual Sewer Disposal Systems.

In accordance with the recommendations of the Comprehensive Plan and the soil characteristics, the areas of the Town listed below in Table 1-2 will constitute the future sewer areas. The Town should monitor growth patterns, environmental conditions, development proposals, and availability of construction funding when evaluating sewer line extensions for these areas.

TABLE 1-2
PROJECTED FUTURE AREAS FOR SEWER EXTENSION

Great Road East	St. Paul
Greene Street	Victory Highway
Lamoureux Boulevard	Victory Highway/Dawley Brook
North Smithfield Industrial Park	Warren Avenue/Park Drive
Park View	Waterford
Providence Pike No. 1	Willerval/Tanglewood
Providence Pike No. 2	

1.4 FUTURE WASTEWATER FLOWS

In order to compute the future wastewater flows, the following assumptions are made based on a realistic, but conservative approach:

- Present residential per dwelling unit wastewater flow selected for the computation is equal to 180 GPD per dwelling unit, based on the sewer flows obtained from the North Smithfield Sewer Department.
- Based on the existing plumbing code that promotes water conservation methods, it will continue to result in the stabilization of water consumption.
- Future residential per dwelling unit wastewater flow will be based on 300 GPD.
- Wastewater flows for Silver Pines, Rockcliff Farm, Laurel Woods, Graves and Slatersville Mill Developments are based on design flow data from each entity.
- Future infiltration will be increased by 65 GPD (25 GPD x 2.61 persons per dwelling unit) for the future dwellings.
- Future inflow will remain at the current level.
- Peak flow factor for future residential, industrial and commercial flows is based on flow records from TR-16.
- Future industrial and commercial flow is based on 1,000 GPD per acre.

The summary of the present and estimated future flows are presented in Table 1-3.

TABLE 1-3
SUMMARY OF ANTICIPATED FUTURE WASTEWATER FLOWS
FOR THE TOWN OF NORTH SMITHFIELD

	2005		2025	
	Average Daily Flow (MGD)	Peak Hourly Flow (MGD)	Average Daily Flow (MGD)	Peak Hourly Flow (MGD)
Residential/Commercial	0.431	1.078	0.995	2.488
Industrial	0.046	0.115	0.218	0.575
Infiltration	0.287	0.287	0.360	0.360
Inflow	0.000	0.575	0.000	0.575
Totals	**0.764**	**2.055**	**1.573**	**3.998**

The increase in flow over the next 20 years (shown in Table 1-3) is from 0.764 MGD to 1.573 MGD. Currently, the average daily flow into the Woonsocket wastewater treatment facility from all sources is 8.35 MGD, that is less than the plant's design flow of 16.05 MGD. Therefore, the average increase of 0.809 MGD is not anticipated to have an adverse impact on the proper operation of the Woonsocket wastewater treatment facility. Furthermore, of the 16.05 MGD design flow, 3.0 MGD is allotted to North Smithfield based on the Intermunicipal Agreement. The total flow from the Town of North Smithfield in the year 2025 is anticipated to be 1.573 MGD, or slightly more than one-half of the design flow allotment to North Smithfield.

1.5 FUTURE WASTEWATER LOADINGS

The residential and commercial waste load contributions for the year 2025 was computed by first making the assumption that per capita waste loads of suspended solids and BOD_5 in the regional system are essentially equal to the nationwide average per capita loadings of these constituents. These average concentrations for the residential and commercial sources are 0.17 pounds of BOD_5 per capita per day and 0.20 pounds of suspended solids per capita per day. These averages, along with previously computed connected population figures, were then compared to minimum design standards for influent BOD5 and TSS. These computer values were less than the minimum design standard of 250 mg/l of BOD and TSS. Therefore, the results presented in Table 1-4 reflect an influent concentration of 250 mg/l.

TABLE 1-4
AVERAGE FUTURE WASTE LOADS AND CONCENTRATIONS
(Residential, Commercial and Industrial)

Year	BOD_5 Load (lb/d)	TSS Load (lb/d)	BOD_5 Conc. (mg/l)	TSS Conc. (mg/l)
2005 [1]	1,592	1,592	250	250
2025 [2 3]	6,255	6,255	250	250

1 Based upon actual flow conditions and concentrations of 250 mg/l.
2 Based upon 250 mg/l influent concentration of BOD_5 and TSS.
3 Based upon the contractual flow of 3.0 MGD with the City of Woonsocket.

1.6 COLLECTION SYSTEM

Current capacities of the interceptor segments were examined with regards to their ability to meet the present and future wastewater flows through the 2025 planning period. Table 1-5 presents these findings.

1.7 FINANCIAL IMPACTS OF THE FUTURE SEWER AREAS

As part of this Wastewater Facilities Plan, financial impacts for the wastewater collection system have been considered. This review includes larger capitalization projects, and conforms to financial managements expressed in the Community
Comprehensive Plan.

Operational and Maintenance Improvements

Operational and Maintenance improvements are typically smaller scale, maintenance related projects which are performed during the course of the fiscal year. The Town identifies various projects and improvements to complete for the period July 1 through June 30 of each year during the budget preparation process.

Since these smaller projects do not require the sale of municipal bonds, funding (revenue) is provided through yearly user fees. Each user will be responsible for its proportional share of these cost improvements.

The Town user charge system is structured such that the revenue is equal to the expenses. At this time, the annual sewer charge per dwelling unit is $319 per year.

For those projects where all users will benefit, the system improvement cost will be distributed throughout the entire system through the annual sewer charge.

Capitalized Improvements

As defined by the Town Finance Department, capitalized improvement shall be those projects of a larger magnitude which typically require the sale of municipal bonds to fund the related improvements. Funding of the

TABLE 1-5 FUTURE INTERCEPTOR SEGMENT ADEQUACY ANALYSIS			
INTERCEPTORS	**MIN. CAPACITY (MGD)**	**PEAK DISCHARGE (MGD)**	**COMMENTS**
North Smithfield	14.52	3.968	Adequate
Union Village			
Segment 1	0.62	0.076	Adequate
Segment 2	0.90	0.101	Adequate
Segment 3	1.26	0.247	Adequate
Segment 4	2.29	0.366	Adequate
Segment 5	3.72	0.603	Adequate
Branch River			
Segment 1	8.01	2.196	Adequate
Segment 2	5.61	2.196	Adequate
Segment 3	2.54	0.606	Adequate
Segment 4	1.78	0.606	Adequate
South Union Village	2.29	0.113	Adequate
Great Road	2.82	0.170	Adequate
Mendon Road	2.99	0.170	Adequate
PUMP STATIONS	**MIN. CAPACITY (MGD)**	**PEAK DISCHARGE (MGD)**	**COMMENTS**
Branch River	2.74	2.146	Adequate
Pound Hill	1.58	0.603	Adequate
Sharon Parkway	0.22	0.020	Adequate
Lorraine	0.058	0.030	Adequate
Halliwell	0.062	0.031	Adequate
Ironstone	0.158	0.067	Adequate
Belcher Avenue	0.266	0.182	Adequate
Silver Pines	0.288	0.134	Adequate
Rockcliff Farms	0.259	0.071	Adequate

Town of North Smithfield improvements to the wastewater collection system are paid through sewer bonds. Yearly service for the original infrastructure has, and will continue to be paid via the user charge system.

It is anticipated that the yearly debt service for future capitalized improvement to the collection system will be via third party specific benefit assessments. For example, property owners in the Victory Highway Area will be required to pay for those wastewater improvements which specifically provides them a benefit.

The new sewer users would be responsible for the cost directly related to their service area. The anticipated cost and dwellings to be serviced are summarized in Tables 1-6 and 1-7. Table 1-8 summarizes the implementation schedule and rankings of the sewer collection system improvements.

1.8 FUTURE WASTEWATER MANAGEMENT DISTRICT

On-Site Systems

Individual disposal systems will continue to play an important role in the Town's overall Wastewater Management Plan. The adoption of this *Facilities Plan for Wastewater Management* will essentially provide a long-range (i.e., twenty (20) year) "Master Plan" for sanitary sewer conveyance and treatment systems. The Facilities Plan supported the premise that a WWMD is an appropriate alternative for addressing individual sewage disposal systems (ISDS) problems in certain parts of the Town. While the "ideal" solution to ISDS problems may be the installation of conventional public sanitary sewers, the WWFP included evaluations as to the economic and physical factors related to sewering existing neighborhoods. These factors included the "cost per affected resident" (typically paid through an assessment program wherein the benefitting property owners pay the entire cost) and the cost to the overall Enterprise Fund for infrastructure improvements necessary to handle the increased flows (i.e., increasing the physical capacity of a pump station, or the treatment facilities). The capital costs associated with system-wide infrastructure improvements would typically be distributed equally to all units throughout the Town that are connected to the sewer system.

Given the absence of Federal and/or State grant monies, the aspect of defined WWMD's will be a viable alternative when compared to upgrading either wastewater collection system or the treatment facility. Even

TABLE 1-6 SUMMARY OF THE TOTAL PROBABLE PROJECT COSTS FOR THE RECOMMENDED IMPROVEMENTS TO THE WASTEWATER COLLECTION SYSTEM	
SERVICE AREA	TOTAL COST
Great Road East	$ 1,696,200
Greene Street	1,520,900
Lamoureux Boulevard	98,600
North Smithfield Industrial Park	3,097,600
Park View	908,600
Providence Pike No. 1	4,216,700
Providence Pike No. 2	2,248,500
St. Paul	6,179,700
Victory Highway	5,439,300
Victory Highway/Dawley Brook	2,711,200
Warren Avenue/Park Drive	857,400
Waterford	2,151,800
Willerval/Tanglewood	5,588,000
TOTALS	**$ 36,714,500**

All costs presented in 2006 dollars.

TABLE 1-7 SUMMARY OF THE ANTICIPATED COST PER DWELLING FOR THE IMPROVEMENTS TO THE WASTEWATER COLLECTION SYSTEM				
	TOTAL COST [1]	20 YEAR BOND 3% INTEREST	EQUIVALENT DWELLING UNITS	ANNUAL COST / DWELLING UNIT
Great Road East	$ 1,696,200	$ 2,257,700	31	$ 3,641
Greene Street	$ 1,520,900	$ 2,024,370	60	$ 1,687
Lamoureux Boulevard	$ 98,600	$ 131,240	3	$ 2,187
North Smithfield Industrial Park	$ 3,097,600	$ 4,123,011	N/A	$ N/A [2]
Park View	$ 908,600	$ 1,209,327	33	$ 1,832
Providence Pike No. 1	$ 4,216,700	$ 5,612,572	160	$ 1,754
Providence Pike No. 2	$ 2,248,500	$ 2,992,830	99	$ 1,512
St. Paul	$ 6,179,700	$ 8,225,392	209	$ 1,968
Victory Highway	$ 5,439,300	$ 7,239,894	180	$ 2,011
Victory Highway/Dawley Brook	$ 2,711,200	$ 3,608,700	49	$ 3,682
Warren Avenue/Park Drive	$ 857,400	$ 1,141,229	18	$ 3,170
Waterford	$ 2,151,800	$ 2,864,120	86	$ 1,665
Willerval/Tanglewood	$ 5,588,000	$ 7,437,820	376	$ 989

[1] All costs presented in 2006 dollars.
[2] Industrial Lands

TABLE 1-8
SUMMARY OF THE IMPLEMENTATION SCHEDULE
FOR THE IMPROVEMENTS TO THE
NORTH SMITHFIELD WASTEWATER COLLECTION SYSTEM

	Implementation Year	Priority	Failed ISDS	Water Quality Benefits	Growth Area
Great Road East	2009	High	X	X	
Greene Street	2009	High	X	X	
Lamoureux Boulevard	2019	Low		X	
North Smithfield Industrial Park	2009	High		X	X
Park View	2014	Medium	X	X	
Providence Pike No. 1	2014	Medium	X	X	
Providence Pike No. 2	2019	Low	X	X	
St. Paul	2009	High	X	X	X
Victory Highway	2019	Low	X	X	X
Victory Highway/Dawley Brook	2014	Medium	X	X	
Warren Avenue/Park Drive	2009	High	X	X	
Waterford	2014	Medium	X	X	
Willverval/Tanglewood	2019	Low	X	X	

with the recent increase in sewered neighborhoods, the Town does not have a large enough user base to comfortably support a significant increase in the debt service related to the Wastewater Enterprise Fund. As a true Enterprise Fund, there are no property tax contributions to this fund, and actual sewer customers only are billed.

Unfortunately, neglect or improper operation on the part of the property owner, along with unsatisfactory site conditions, can lead to early failure of the on-site system. Failing septic systems can threaten the health of the residents and adversely impact the environment.

The Town must first adopt rules and regulations establishing a Wastewater Management District for all systems outside of the sewered areas. As part of the Ordinance, a Wastewater Management Commission must be formed to administrate the rules and regulations of the Wastewater Management District.

Information Management

Once the Town adopts an ISDS Wastewater Management Plan, provisions are to be made to manage the information in an effective way. Currently, the Town has no data on the existing ISDS system. Information such as plat, lot, owner, address, owner's address, date of pumping and hauler's name should be collected.

The data collection can begin by identifying each non-sewer user, which can provide the basic data. This data can be cross-referenced into the tax records to aid in the information database. As inspection reports are returned to the Planning Department, the additional data, such as system type, system condition, date of pumping and hauler's name, can be added.

As part of the Plan, over the next five year period each of the septic systems will need to be inspected to determine the operating condition of the system. From the inspection results, the homeowner will then be required to take the appropriate action. All cesspools are to be considered to be malfunctioning systems and will be required to be replaced with an on-site wastewater system that conforms with current state and local standards within twelve (12) months after the sale of a property, or within five (5) years of the date of the first maintenance inspection (whichever comes first).

Inspections

ISDS inspections should be conducted in accordance with Septic System Check-Up: The Rhode Island Handbook for Inspection, as published by the Rhode Island Department of Environmental Management. This guidance document provides a complete review of all ISDS concerns, including installation, maintenance and proper operation.

New installations, repairs and alterations are inspected by Rhode Island Department of Environmental Management, or the licensed designer. As such, for these items, it would be redundant for the Town to participate in the inspection process.

The purpose of inspections is to assess the current condition of the ISDS in order to determine:

a) what maintenance is required;
b) when the maintenance should be undertaken;
c) the date of the next inspection; and
d) the need for system upgrade or replacement.

Maintenance requirements shall be based upon inspection results. Information from the inspections will also be used to complete a town-wide ISDS inventory and to track system inspections, maintenance, and upgrades.

The inspections shall be conducted by a private, town-approved ISDS inspector. Town approved septic system inspector(s) shall determine the maintenance and pumping requirements for each ISDS based upon criteria outlined in RIDEM's handbook. In order for an inspector to be approved by the Town, he/she must satisfactorily complete a training course in inspecting methodology consistent with the use of the handbook. The Planning Department shall maintain a list of town-approved inspectors and make such list available to property owners for the purpose of arranging the inspection of their own ISDS.

Once inspected, the property owner will have an inspection report that details the ISDS condition, components, inspection schedule and maintenance requirements. The property owner shall assume all responsibility for hiring a septage hauler or maintenance contractor to complete the maintenance and inspection requirements contained in the ISDS inspection report within the time frame required. As proof of compliance, the property

owner shall submit a receipt for pumping and other documented system maintenance to the Town Planner within thirty (30) days of the date stipulated in the ISDS inspection report.

Education

The Town, through its Planning Department, shall establish a public education program to inform people about the findings, benefits, and goals of the on-site wastewater management. The education program shall include, at a minimum:

- Proper inspection, operation and maintenance of ISDS.
- Operation and management framework of the program.
- Proper disposal of hazardous waste, including household hazardous waste.
- Water conservation.
- Protection of sensitive resources.
- Use of environmentally sensitive cleaning products.
- Use of alternative and innovative septic systems and associated technologies.
- Availability of financial assistance.
- Costs to homeowners to ensure compliance with a good operating system.

LIST OF FIGURES

2.0 PURPOSE OF STUDY

2.1 INTRODUCTION

The purpose of this Facilities Plan is to determine the future needs for the upgrading and expansion of the North Smithfield Wastewater Collection System, which contributes to the Woonsocket Regional Wastewater Treatment Facility.

The Facility Plan has been developed to be consistent with the goals and policies of the North Smithfield Community Comprehensive Plan.

The study demonstrates the most cost-effective and environmentally sound solution for achieving groundwater quality objectives and receiving water quality objectives.

This study is formatted and presented based on parameters established for the Development of a Wastewater Management Facilities Plan and the On-Site Wastewater Management Plan to allow for funding under the State Revolving Loan Program for any sewer expansion or ISDS improvement.

This study has been prepared utilizing the 2006 Update to the Town's Community Comprehensive Plan originally prepared by Burk Ketcham and Associates, 1992.

This study focuses on the North Smithfield Wastewater Collection System with respect to its ability to meet objectives for the present and future flow rates and waste loads. Alternative proposals for upgrading the collection system were developed and evaluated. The most environmentally sound and cost-effective proposal shall be proposed. Preliminary plans and cost estimates shall be prepared for the proposed collection system improvements.

2.2 NORTH SMITHFIELD WASTEWATER COLLECTION SYSTEM

The North Smithfield Wastewater Collection System discharges directly to the Woonsocket Regional Wastewater Treatment Facility, which is located in the vicinity of Edward Street at the Blackstone River in the City of Woonsocket. The eastern section of Town is serviced by the Union Village Interceptor. The North Smithfield Interceptor conveys the majority of the wastewater generated by the North Smithfield users to the Woonsocket system. The confluence of the three major interceptors occurs in the vicinity of Brookside Drive and Cherry Brook.

The Town of North Smithfield discharges its wastewater to the Woonsocket Regional Wastewater Treatment Facility in accordance with the requirements stated in its intermunicipal agreement with the City of Woonsocket. This agreement is presented in Appendix A. This agreement became effective on 7 December 1977 and provides the legal means for the Town of North Smithfield to become a partner in the Woonsocket Regional System. The agreement also specifies that the Town's contribution to the Woonsocket system cannot exceed an average daily flow of 3.0 million gallons per day (MGD). Presently, the Town is discharging approximately twenty-five percent of this amount into the Woonsocket system. This information shall be utilized along with an assortment of varying factors in order to determine the Town's needs and appropriate alternatives over the next twenty years.

2.3 SCOPE OF STUDY

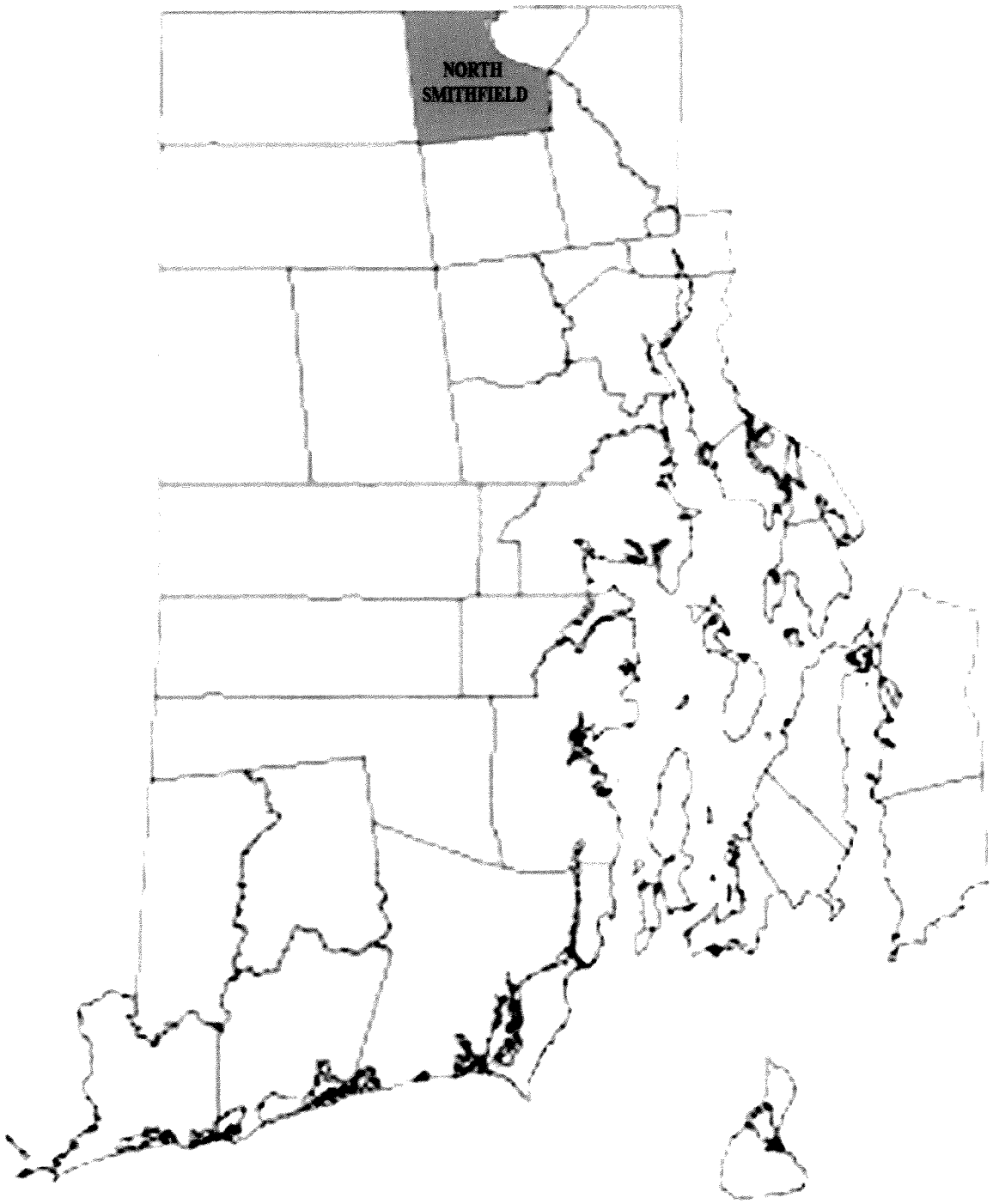
The study scope is concentrated as follows:

The interceptor sewers will be analyzed and evaluated for the purpose of determining their capacity. The adequacy of the interceptor system for conveying wastewater flows from planned system expansions and population increases throughout a twenty (20) year planning period will also be evaluated. In those areas where it is determined that the capacity of the existing system is inadequate, a program will be developed for renovation of the trunk line system. The interceptor renovation program will be based on a forty (40) year planning period.

All future proposed improvements shall consider the improvement and protection of groundwater quality. Located within the Town's boundaries are several public water supply aquifers and watersheds, and the preservation of the integrity of these supplies will most likely impact future actions.

2.4 FACILITY PLAN STUDY AREA

The geographical location of the Facility Plan Study Area for the Town of North Smithfield is presented in Figure 2-1.



Town of North Smithfield
Rhode Island

Figure 2-1
STUDY AREA GEOGRAPHICAL LOCATION

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
272 W. Exchange Street Suite 201 Providence,RI 02903-1025
Phone: 401-454-7000 Fax: 401-454-7415

Date: 2006

Scale: No Scale

LIST OF TABLES

3.0 WATER QUALITY

3.1 SURFACE WATER QUALITY STANDARDS

All wastewater discharges into the nation's surface waters must meet the minimum effluent water quality standards established in the Federal water quality regulations.

The North Smithfield Sewage Collection System serves mainly the Slatersville and Union Village portion of Town, and conveys all of the flow to the Woonsocket Regional Wastewater Treatment Facility. The Regional Facility services the City of Woonsocket and the Town of North Smithfield, Rhode Island, and the Towns of Blackstone and Bellingham, Massachusetts. The Facility discharges the treated effluent into the Blackstone River in the vicinity of the intersections of Hamlet Avenue, Cumberland Street, and Cumberland Hill Road (Route 122) in the City of Woonsocket. This is approximately one and one-half miles downstream of the South Main Street Dam in Woonsocket.

The effluent must comply with standards established in Water Quality Regulations dated July 2006 by the State of Rhode Island. The freshwater water quality classifications for the State of Rhode Island are summarized in Table 3-1. Appendix A of the Regulations, entitled Water Quality Classification Descriptions, establishes the following water quality for the stretch of the Blackstone River, which receives the discharge from the Woonsocket Facility, as presented in Table 3-2.

3.1.1 RIPDES PERMIT

The Federal Environmental Protection Agency has delegated to the State of Rhode Island the responsibility for establishing and enforcing effluent discharge limitations which shall ensure the respective water quality standards of all receiving waters. The State's authority to exercise this responsibility was established with the adoption of the Rhode Island Pollution Discharge Elimination System (RIPDES) Regulations on June 26, 1984. Therefore, the administration of all water quality management is the responsibility of the Rhode Island Department of Environmental Management, which controls wastewater treatment plant discharges by the issuance of RIPDES permits to all discharges which affect the quality of fresh and salty receiving waters in the

TABLE 3-1
SUMMARY OF RHODE ISLAND
WATER QUALITY CRITERIA FOR FRESHWATER

ITEM	CLASS A Drinking Water Supply	CLASS B Public Water Supply with Appropriate Treatment	CLASS C Bathing, Other Primary Contact Recreational Activities
1 Dissolved Oxygen	75% saturation, 16 hrs/day, but not less than 5 mg/l at any place or time, except as naturally occurs.	75% saturation, 16 hrs/day, but not less than 5 mg/l at any place or time, except as naturally occurs.	Minimum 5 mg/l any place, time, except as naturally occurs. Normal seasonal and diurnal variations above 5 mg/l will be maintained.
2 Sludge Deposits	None allowable	None allowable	None except that amount that may result from the discharge from the discharge from a waste treatment facility providing appropriate treatment.
3 Color and turbidity	None other than of natural origin. Not to exceed 5 NTU over background when the background is 50 NTU or less or have more than a 10% increase in turbidity when the background is more than 50 NTU.	None in such concentrations that would impair any usages specifically assigned this class. Not to exceed 10 NTU over background when background is 50 NTU or less, or have more than a 10% increase in turbidity when the background is more than 50 NTU.	None in such concentrations that would impair any usages specifically assigned to this Class. Not to exceed 10 NTU over background when the background is 50 NTU or less, or have more than 20% increase in turbidity when the background is more than 50 NTU.
4 Coliform bacteria	Not to exceed a median value of 100 and not more than 10% of the samples shall exceed a value of 2,400.	Not to exceed a median value of 1,000 and not more than 20% of the samples shall exceed a value of 2,400.	
5 Fecal Coliform	Not to exceed a median value of 20 and not more than 10% of the samples shall exceed a value of 200.	Not to exceed a median value of 200 and not more than 20% of the samples shall exceed a value of 500.	
6 Taste and Odor	None other than of natural origin.	None in such concentrations that would impair any usages specifically assigned to this Class and none that would cause taste and odor in edible portions of fish.	None in such concentrations that would impair any usages specifically assigned to this Class and none that would cause taste and odor in edible portions of fish.

TABLE 3-1
SUMMARY OF RHODE ISLAND
WATER QUALITY CRITERIA FOR FRESHWATER

	ITEM	CLASS A Drinking Water Supply	CLASS B Public Water Supply with Appropriate Treatment	CLASS C Bathing, Other Primary Contact Recreational Activities
7	pH	As naturally occurs.	6.5 - 8.0 as naturally occurs.	6.0 - 8.5 as naturally occurs.
8	Allowable temperature	None other than of temperature natural origin.	Only such increases that will not impair any usages specifically assigned to this Class.	Only such increases that will not impair any usages specifically assigned to this Class.
9	a.	Waters shall be free from chemical constituents in concentrations or combinations which could be h armful to human, animal, or aquatic life for the appropriate most sensitive and governing water class use or unfavorably alter the biota.		
	b.	If an aquatic toxicity value has not been established in the R.I. DEM Ambient Water Quality Guidelines, then the level of any "priority pollutant" shall not exceed the "detection limits" in the ambient water unless the discharger demonstrates to the satisfaction of the Director that a higher concentration will not adversely affect the most sensitive use of the water body.		
	c.	The ambient concentration of a pollutant in a water body designated as suitable for fish and/or wildlife habitat shall not exceed the Ambient Quality Guidelines for the protection of aquatic organisms from chronic effects, unless the chronic guidelines are modified by the Director, based on results of bioassay tests.		
	d.	The limits prescribed by the United States Environmental Protection Agency will be used where not superseded by more stringent State requirements.		
Phosphorous		None in such concentration that would impair any usages specifically assigned to said Class. New discharges of wastes containing phosphates will not be permitted into or immediately upstream of lakes or ponds. Phosphates shall be removed from existing discharges to the extent that such removal is or may become technically and reasonably feasible.		

TABLE 3-2 RECEIVING WATER CLASSIFICATION WOONSOCKET REGIONAL WASTEWATER TREATMENT FACILITY		
RIVER SECTION	**PRESENT WATER QUALITY CONDITIONS**	**CLASSIFICATIONS**
Blackstone River from Massachusetts - Rhode Island state line to Main Street Dam - Pawtucket	C	C

State. The Woonsocket Regional Wastewater Treatment Facility has been issued a RIPDES Permit (No. RI0100111) under which it is authorized to discharge its effluent into the Blackstone River. The permit expired in July 2005. The permit is still in effect, and is presently being revised by the Department of Environmental Management.

Table 3-3 summarizes the major effluent limitations contained in the permit.

TABLE 3-3 PRESENT MAJOR EFFLUENT LIMITATIONS		
PARAMETER		**AVERAGE MONTHLY LIMITATION**
Flow		16 MGD
$CBOD_5$	June 1 - October 31	10 mg/l
BOD_5	November 1 - May 31	30 mg/l
TSS	November 1 - May 31	15 mg/l
Ammonia	June 1 - October 31	2 mg/l
	November 1 - April 30	15 mg/l
	May 1 - 31	12 mg/l
Phosphorous	April 1 - October 31	1.0 mg/l
	November 1 - March 31	Not Applicable
Total Nitrogen	April 1 - October 31	10 mg/l
	November 1 - March 31	Not Applicable
Settleable Solids		Monitor Only
Fecal Coliform		200 / 400 ml
Chlorine Residual		56 µg/l

3.2 GROUNDWATER QUALITY

The Rhode Island Department of Environmental Management has adopted Rules and Regulations for Groundwater Quality. The proposed regulations have been prepared in order to fulfill the requirements of the Rhode Island Groundwater Protection Act, Chapter 46-13.1 of the Rhode Island General Laws.

Approximately 24% of the State's population depends on groundwater for their water supply, and approximately two-thirds of the cities and towns in Rhode Island depend on groundwater in whole or in part for their drinking water supply. The purpose of the regulations is to protect the quality of the State's groundwater for use as drinking water sources and other beneficial uses and to promote restoration of groundwater to drinking water quality where feasible.

The regulations apply to all of the groundwaters of the State. Unless otherwise noted, they apply to any facility owner or operator that has a discharge to the subsurface and any facility owner or operator or property owner where the groundwater has been contaminated and it exceeds the groundwater quality standards. Individual sewage disposal systems (ISDS) with a design flow of less than 10,000 gallons per day are exempt from the regulations, provided they are used solely for sanitary sewage and they are designed, installed and operating in compliance with the DEM ISDS regulations.

The key prohibitions established by the regulations are summarized below:

- Groundwater shall be maintained at a quality consistent with its classification. No person shall take action that violates the standards in the regulations;
- No person shall cause or allow a discharge of pollutants to groundwater without the approval of the Department;
- No person shall discharge hazardous materials to the groundwaters of the state;
- Solid waste landfills and facilities for the disposal of hazardous waste are prohibited in areas where the groundwater is classified GAA;
- No person shall install underground storage tanks within the wellhead protection area of community water supply wells.

A central element of the regulations is the classification of the State's groundwater resources using the four classes (GAA, GA, GB, and GC) described herein. Groundwater classified GAA and GA is to be protected to maintain drinking water quality, whereas groundwater classified GB and GC is known or presumed to be unsuitable for drinking water use without treatment. The DEM has determined that suitability for use without treatment will generally mean that there are no pollutants in the groundwater resulting from human activity that will require the groundwater to be treated.

Class GAA

Groundwater classified GAA are those groundwater resources that are known or presumed to be suitable for drinking water use without treatment and which are located in one of the three areas described below. Groundwater classified GAA underlies approximately 19% of the state (108 square miles). Of this area classified GAA, about 1.5 square miles is designated as non-attainment. Groundwater classified GAA includes the following:

- The state's major stratified drift aquifers that are capable of serving as a significant source for a public water supply ("groundwater reservoirs") and the critical portion of their recharge area as delineated by DEM.

- A 2,000 foot radius circle around each community public supply system well[1] or within the delineation of a well head protection area for such wells delineated by DEM or another delineation accepted by DEM done in accordance with the RI Wellhead Protection Program. DEM plans to have well head protection areas delineated for these wells using hydrogeologic data and mathematical modeling by the fall of 1992, which will then supersede the 2,000 foot radius circle.

- Groundwater dependent areas that are physically isolated from reasonable alternative water supplies and where the existing groundwater warrants the highest level of protection. At present, only Block Island has been designated as meeting this criterion.

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[1] Community water supply systems serve year-round residents and include municipal systems, trailer parks, nursing homes, etc. Public water systems also include other wells serving non-community systems such as schools, industries, hotels, restaurants, etc.

Class GA

Groundwater classified GA are those groundwaters, which like GAA, are known or presumed to be suitable for drinking water use without treatment. However, groundwater classified GA does not fall within any of the three priority areas described above under GAA. Most of the state, approximately 72% (774 square miles), overlies groundwater classified GA. Of the large area classified GA, only 2.4 square miles is designated non-attainment. It is worth noting that greater than 90% of the State's groundwater resources are classified as suitable for drinking water use (i.e. class GAA and GA).

Class GB

Groundwater classified GB is that groundwater which may not be suitable for drinking water use without treatment due to known or presumed degradation. The DEM Groundwater Section relied on data from known sources of contamination and land use information for the GB delineation. Using this information, portions of the delineation for class GB are based on "presumed degradation," as is provided for in the Groundwater Protection Act. Groundwater classified GB lies under approximately 9% of the state (95 square miles). In general, all of the areas where the groundwater is classified GB are served by public water systems. There is no goal to restore groundwater classified GB to drinking water quality, however, groundwater remediation may be required to protect public health and the environment. Groundwater classified GB is located primarily beneath the following:

- Highly urbanized areas of the state, primarily those areas with dense concentrations of industrial and commercial activity, that have been identified from land use information; and
- The waste disposal area at inactive landfills and disposal sites for solid waste, hazardous waste, and sewage sludge.

Class GC

Groundwater classified GC is or may be unsuitable for drinking water use due to certain waste disposal practices. The areas where the groundwater is classified GC are limited to the DEM permitted waste disposal areas at licensed solid waste landfills and areas surrounding these landfills that are determined by DEM to be

suitable for solid waste disposal. The groundwater that is not drinkable beyond the area classified GC is classified GB or designated GAA Non-attainment or GA Non-attainment. Groundwater classified GC is beneath .04% of the state (0.4 square miles).

Non-attainment Areas

As mentioned earlier, groundwater designated non-attainment is known or presumed to be out of compliance with the standards for the assigned classification. The goal for this groundwater is restoration to a quality consistent with the classification. The areas designated non-attainment are site-specific locations of activities that include, but are not limited to, subsurface disposal of commercial and industrial wastes, salt storage areas, leaking underground storage tanks, locations of chemical and oil spills (where significant volumes are known or presumed to have reached groundwater), and landfills (beyond the waste disposal area). The Groundwater Protection Act requires groundwater quality standards to be established for each class. In addition, the Act establishes preventive action limits, which are to be a percentage of the groundwater quality standard.

Class GAA and GA

Because GAA and GA are suitable for drinking water use without treatment, both classes are subject to the same groundwater quality standards and preventive action limits. The GAA and GA standards are numerical and narrative in form. The numerical standards are the state drinking water standards, plus five additional standards for substances frequently encountered in RI groundwater for which state maximum contaminant levels (MCLs) have not yet been adopted[2]. Preventive action limits have been set at 50% of the numerical groundwater quality standard.

DEM has established a narrative standard for those pollutants that do not have a numerical standard. All such pollutants are not to be in groundwater classified GAA or GA in any concentration which will impair these

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2 The RI Department of Health establishes drinking water standards in compliance with the federal Safe Drinking Water Act. When a standard is established by the federal government, the Department of Health must adopt the standard, or a more stringent standard, within a specified period. Similarly, as the Department of Health adopts new or revised numerical standards (MCLs), these new standards will be adopted by DEM for GAA and GA.

groundwaters as a source of drinking water or which will adversely affect other beneficial uses of groundwater. Federal guidelines and health advisories will be used to determine appropriate concentrations.

Class GB and GC

There are no numerical standards for groundwater classified GB or GC because of the varying degrees of degradation beyond the point where groundwater is unsuitable for drinking water use without treatment. Therefore, narrative standards have been established. Since there are no numerical standards, preventive action limits have been established. On a site-specific basis, concentrations of pollutants will be set for the purpose of reviewing discharges to groundwater and administering groundwater remediation activities in groundwater classified GB and GC. Groundwater classified GB and GC will be set for the purpose of reviewing discharges to groundwater and administering groundwater remediation activities in groundwater classified GB and GC. Groundwater classified GB and GC shall be of a quality that does not:

- Threaten public health or the environment;
- Adversely impact current or future uses of property, groundwater, or surface water; or
- Violate any groundwater or surface water quality standards.

Portions of North Smithfield have been proposed to be classified as classification GAA. The area includes the Slatersville Reservoir groundwater surcharge area, and Woonsocket Reservoir 1 and 3 drainage area. In general, the remainder of North Smithfield is classified GA.

A significant portion of land within North Smithfield is classified GAA, with the remainder being GA. As such, the regulations deem the Town's groundwater a "significant source for a public water supply".

This fact shall be utilized along with an evaluation of failed ISDS systems in order to determine future sewer needs.

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4.0 EXISTING CONDITIONS

4.1 CONDITIONS IN THE PROPOSED PLANNING AREA

4.1.1 PLANNING AREA DESCRIPTION

Boundaries and Political Jurisdictions

Planning area boundaries for the Town of North Smithfield have been illustrated in Figure 2-1 and have been briefly discussed in Chapter 2. The Town of North Smithfield is situated in Providence County, Rhode Island.

The North Smithfield facility planning area is located in the north central portion of Providence County. Its land area of approximately 25 square miles is bounded on the north by the Towns of Uxbridge, Millville, and Blackstone, Massachusetts, on the east by Woonsocket and Lincoln, on the south by Smithfield, and on the west by the Town of Burrillville.

4.1.2 ORGANIZATIONAL CONTEXT

The North Smithfield sewer system is managed by an appointed five member Sewer Commission. The Commission oversees the overall operation, while the Sewer and Water Superintendent oversees both daily and overall operation of the system.

Commission members are appointed by the Town Council for a term of five years. It is the job of the Commission to provide sewer services within the Town of North Smithfield to be responsible for the construction, alteration, repair, maintenance and operation relating to the functions and services within its jurisdiction as defined in the Public Laws of Rhode Island of 1973, Chapter 84 as amended.

The budget and user rates are established by the Sewer Commission on a yearly basis. The charges assessed by the North Smithfield Sewer Department are set up as follows:

- User Fee: The user fee is a yearly fee charged to every sewer user. This fee covers yearly operation and maintenance fees relating to the Town's Wastewater Collection System and their portion of the cost related to the operation of the Woonsocket Treatment Plant serviced by North Smithfield. These costs are assessed to the total number of units.

- Sewer Assessment: The sewer assessment is the cost recovery method for capital expansions. The charge is spread over a 20 year term and is assessed only to the people who directly benefit from the improvement. This cost recovery system is discussed further in Chapter 4.3.6. The Sewer Commission is also responsible for the future planning of the sewer system. This is done in conjunction with the Sewer and Water Superintendent, Public Works Director, and the Planning Department.

4.1.3 EXISTING DEMOGRAPHIC AND LAND USE DATA

Introduction

This section of the Facility Plan has been taken directly from the Town's revised Comprehensive Plan (adopted in 2006). The following provides a brief history of the Town of North Smithfield is presented as a background to the demographic, economic, and land use discussion. Following this historical review, a population trend analysis of the facilities planning study area is provided. Land use patterns of the Town are discussed. Information regarding population composition is presented in the land use discussion. It is important to note that much of the information presented in this section (Chapter 4.1), has been provided by the North Smithfield Comprehensive Plan Five-Year Update, September 2005 (recently adopted in 2006).

Twentieth Century History

Over the past twenty-five years, the Town of North Smithfield has received considerable land use planning assistance from State agencies; this has been included in comprehensive plan studies and technical assistance on special projects.

In 1969, the first Comprehensive Plan for the Town was prepared with the assistance of the Planning Division of the Department of Community Affairs. In the mid 1980's a second Comprehensive Plan was initiated by the North Smithfield Planning Board with guidance from the Division of Planning and the Rhode Island Department of Administration. The 2006 Comprehensive Plan represents a continuation and completion of the earlier studies. Background data and information developed by the Division of Planning was helpful in the 2006 update of the North Smithfield Comprehensive Plan.

The 1969 Comprehensive Plan established the framework for present land use regulations. Zoning controls and zoning districts were enacted based on that plan. With some exceptions, the development that has taken place during the past twenty years has followed the general outline of the 1969 Comprehensive Plan.

History is another important land use determinant. First settled in 1666, what ultimately became the Town of North Smithfield in 1871 has experienced a gradual transition. First, from a farming community to an industrial community in the nineteenth century, and then from both farming and industry to the present day combination of industry, business, suburban and rural housing.

Union Village initially flourished as a stage coach stop along Great Road (146A). Subsequent small-lot residential growth within areas to the north and south of Union Village represented an early outward sub-urbanization of Woonsocket that spilled into North Smithfield.

Slatersville is one of the nation's first planned mill villages and was established in conjunction with the Slatersville Mill along the Branch River. Forestdale, Branch Village and Waterford were all Branch River Valley communities near water powered mill complexes.

These early influences are very apparent in North Smithfield today. Industry is still clustered along or near the Branch River. Small-lot housing, predominantly single-family with scattered two-family units, tends to be concentrated in and around the old mill villages and adjacent to the Woonsocket line. In contrast, the westerly and southerly sections of Town, that is broadly defined as Primrose, retain a rural and rural-residential character furthered by larger lot zoning requirements. There is an industrial zone along North Smithfield Industrial Drive and commercial development along Route 146 in the Sayles Hill Road area. Virtually the entire

land area to the south of the Providence and Worcester Railroad and to the west of Route 146 is zoned for residential development.

The villages had a few stores and shops to serve the mill workers, but North Smithfield never developed what might be considered a downtown. Woonsocket served this function and at one time trolley cars extended out to North Smithfield from downtown Woonsocket. Today there are about five clusters of commercial/retail activity in North Smithfield as follows:

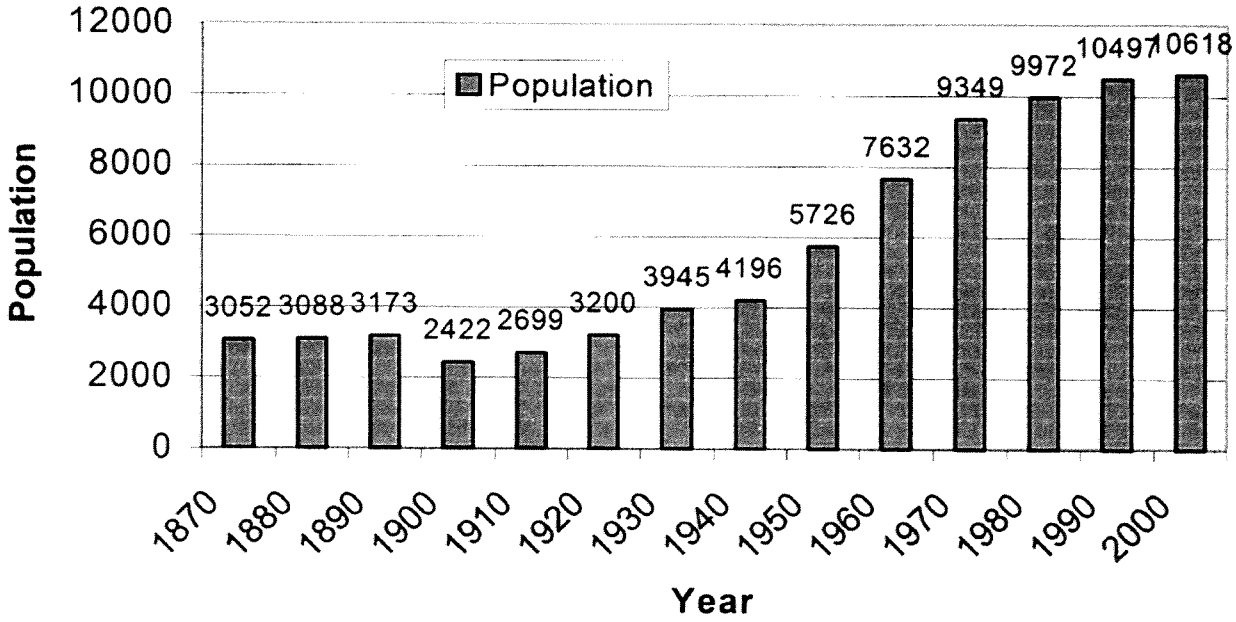
- Highway-oriented businesses along the non-limited access section of Route 146 between the146A merge and the Lincoln Town line;
- Park Square area of Eddie Dowling Highway (Route 146A), a retail district straddling the North Smithfield/Woonsocket municipal lines;
- Branch Village area along Route 146A near St. Paul Street serving both local residents and transients;
- Carpenter's Corner (North Main Street and Route 146A) the locus of a shopping center anchored by a supermarket and;
- The Route 102/South Main Street intersection with highway-oriented business activities.

Population Trends

Since 1950, North Smithfield's population has climbed from 5,726 to 10,618 (based on final count data from the 2000 U.S. Census). Whereas, the numerical growth of the population between 1980 and 1990 was only 525 persons, the number of housing units increased from 3,526 in 1980 to 3,835 in 1990 - a net increase of 309 units and a percentage growth of 8.0 percent. North Smithfield's population has increased 1.15% (121 people) during the most recent census period of 1990-2000, while housing units increased 6.1% (235) town wide for that same time frame. Growth in North Smithfield has historically been occurring at a decreasing rate from a high of 36.5% in the 1940-1950 decade, to 6.6% between 1970 and 1980, to 5.0% between 1980 and 1990 and 1.15% between 1990 and 2000 (see Figure 4-1).

Between 1990 and 2000, average household size continued its decline from 2.7 to approximately 2.6. This compares with 2.9 for 1980 and 3.3 for 1970.

FIGURE 4-1
POPULATION BETWEEN 1870 AND 2000



According to US Census Bureau figures, North Smithfield presently ranks 12th in the State of Rhode Island for low population density with approximately 442 people per square mile. Within the Northern Rhode Island Region, only Burrillville and Gloucester have lower population densities with approximately 284 and 181 people per square mile respectively. Cumberland and Lincoln both have population densities of just over 1,000 people per square mile, Smithfield has a density of 775, and nearby Woonsocket has a whopping 5,606 people per square mile.

Population Projections

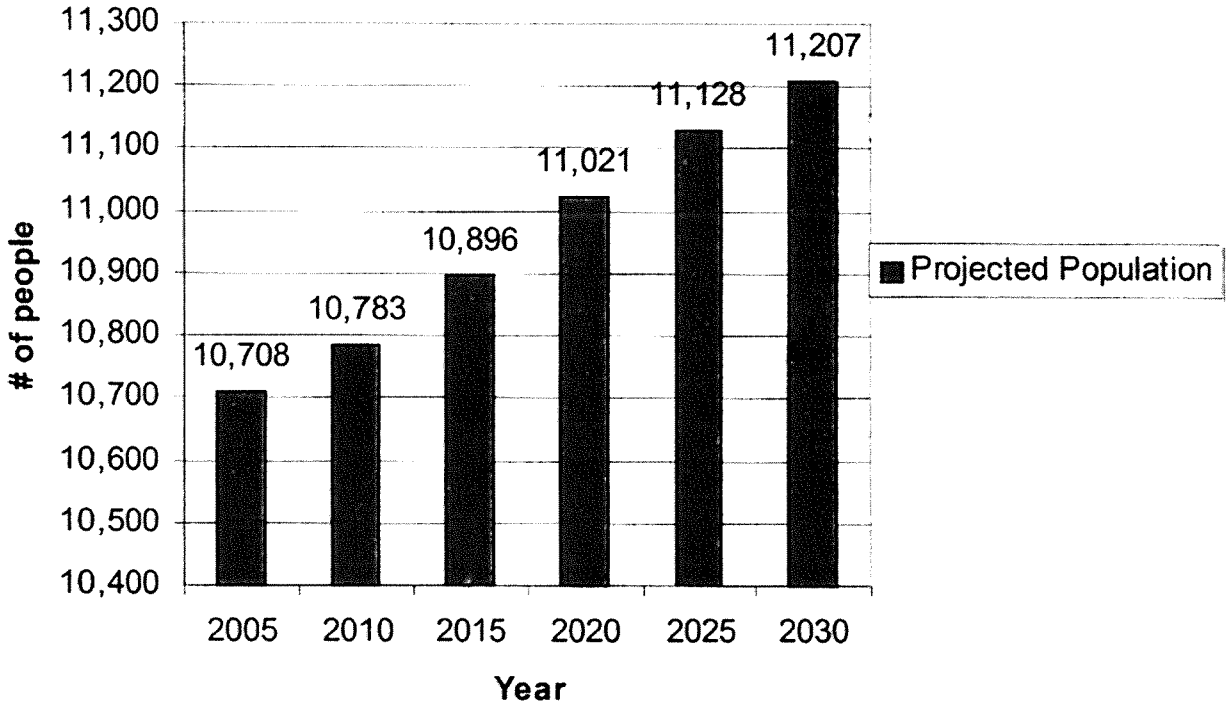
In 1989 the Rhode Island Division of Planning estimated that an average natural increase (births minus deaths) of 15 per year along with an average of 40 new dwelling units per year would produce an average annual population increase of 175. This led to a 1990 estimate of 11,120 which was 623 higher than the actual 1990 U.S. Census figure of 10,497.

The overall negative natural increase during the most recent census period, the shrinking household size and factoring in the actual number of new dwellings built during the 90's resulted in Statewide Planning's

overestimating the 2000 population by approximately 900 people. According to the U.S. Census, North Smithfield's population in the year 2000 totaled 10,618.

Preliminary population projections from the Statewide Planning Program show a continued slow growth rate for North Smithfield with a 1.6 percent increase projected between 2000 and 2010. These projections are based entirely on past trends and may prove quite inaccurate if compared with current market trends. Additionally, in light of the need to re-zone certain areas to encourage affordable housing production, there may be land development opportunities that may also result in higher population figures. Figure 4-2 presents the population projections through 2030.

FIGURE 4-2
POPULATION PROJECTIONS 2005-2030



The 1992 Comprehensive Plan suggested that the current and proposed land use regulations, the Lack of sewers serving undeveloped residential areas, the constraints imposed by extensive ledge and high groundwater conditions, the declining out-migration from Woonsocket, and other considerations such as a death rate in excess of the birth rate and decreasing family size pointed to a continued slow rate of growth

through the 2000's. However, the build-out of 509 approved market rate condominiums, age-restricted units and elderly units is expected by 2007. Another 348 units in three other projects are expected to be constructed by 2011, which will drastically increase the Town's population.

TABLE 4-1
BUILDING BY YEAR OF MAJOR PERMITTED OR PROPOSED DEVELOPMENT

Project Name	2005	2006	2007	2008	2009	2010	2011	Total Units
Rockcliff	12	30	29					71
Mixed use, near Landmark				40	36			76
Silver Pines	54	35	39					128
Laurelwood	36	43	43	40				162
High Rocks		39	39	42				120
Slatersville Mills			30	38	60	60	40	228
County Meadows		40	40					80
Total Units by Year	**102**	**187**	**220**	**160**	**96**	**60**	**40**	865

Source: 2006 Comprehensive Plan

The existing population along with the projected future population over the next twenty years is presented in Table 4-2.

TABLE 4-2
TOTAL POPULATION SEWERED AND NON-SEWERED PROJECTS FOR THE TOWN OF NORTH SMITHFIELD THROUGH THE YEAR 2025

YEAR	2005	2010	2015	2020	2025
Sewered	5,168	6,961	8,023	9,085	10,148
Unsewered	5,540	3,822	2,873	1,936	980
TOTAL	**10,708**	**10,783**	**10,896**	**11,021**	**11,128**

Source: 2000 Census data. All other data provided by the State of Rhode Island, Division of Planning

Land Use

Land Use describes the desirable pattern and location of development, both public and private. The Land Use Map, Figure 4-3 is relied upon as the vehicle that drives changes, namely the transformation of policy into land

Legend

- Lakes & Ponds
- Town Boundary
- Streams
- Superfund Sites
- Parcels
- Open Space
- Rural Residential Conservation - Low Density
- Rural Residential - Medium Low Density
- Suburban Resdential - Medium Density
- Urban Residential - Medium High Density
- Village Residential
- Agricultural Business
- Mill Rehabilitation
- Mixed Use - Office Commercial
- Mixed Use - Office Commercial/146A
- Professional Service
- Limited Commercial
- Business Neighborhood
- Business Highway
- Manufacturing

Town of North Smithfield
Rhode Island

Figure 4-3

LAND USE PLAN

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CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
272 W. Exchange Street Suite 201 Providence,RI 02903-1025
Phone: 401-454-7000 Fax: 401-454-7415

Source: Town of North Smithfield

Date: 2006

Scale: No Scale

use law (zoning and subdivision amendment). The link between general plans and zoning is quite apparent. That is, the plan identifies a pattern of desired land use development, and zoning ordinances specify the range and condition of use that can occur on parcels of land. Based on the Handbook of the North Smithfield Comprehensive Plan Five-Year Update, September 2005 (recently adopted in 2006):

The future use of land in North Smithfield is influenced by many considerations:

- The nature of the existing distribution of uses.
- Current zoning controls that were developed as the result of previous comprehensive planning studies.
- Physical constraints imposed by topography and soils.
- The location of aquifers and their recharge areas with existing and potential surface water supply reservoirs and their watersheds.
- Drainage and flooding systems along wetlands, streams and rivers.
- The need to set aside areas for conservation, recreation, open space, schools and public buildings and facilities.
- The present or proposed availability of sewer and water services.

Land use and traffic circulation determine the nature and density of land uses and influences on the volumes of traffic that may be anticipated along given sections of the roadway system. The availability of roadways with excess capacity and convenient links to a broader region influences the location of commercial and industrial development.

North Smithfield's major expressway system that connects the Providence, Worcester and Boston metropolitan areas is strategic and is a significant land use determinant. Adjoining communities, that have better access to Interstate 295, may have an advantage to attract economic development, however, the consequences of excessive traffic-generating activities can detract from the quality of the living environment.

One of the most basic components of a land use plan is a summary of existing land uses by classification and acreage. This presents a simple picture of the Town at a particular point in time. Insight also can be gained

by comparing current data with similar historical information that allows for a more in-depth analysis of change. This comparison can help focus attention on such important policy issues as loss of open space or recent commercial and industrial trends.

Existing land use information for 1995 was provided by the Rhode Island Geographic Information System (RIGIS) and is presented in Table 4-3.

TABLE 4-3
EXISTING LAND USE

1995 RI GEOGRAPHIC INFORMATION SYSTEMS	Percent of Total
Residential	18%
Commercial	1%
Industrial	1%
Transport/Utilities	4%
Recreation	1%
Urban Open Land & Cemeteries	0%
Institutional	1%
Agriculture	5%
Forest	45%
Brush	1%
Water	3%
Wetlands	18%
Barren	2%
Other	0%
TOTAL	**100.0**

Source: North Smithfield Comprehensive Plan Five-Year Update, September 2005

For planning purposes, the following classifications of land use have been made. They are meant to be overall guidelines for future land use on a Town-wide basis only and are not intended to supersede the zoning ordinance map or other site-specific land use ordinances. These areas are shown on the Land Use Map, (Figure 4-3). Reference to specific land parcels have been avoided on this map. Except for certain major land parcels with fixed, permanent boundaries (such as public parks), the Land Use Plan Map is not intended to follow specific lot lines. Within the classification shown on the map, environmental and site planning considerations are not to be disregarded and may affect individual project density or land use.

The Land Use Map is generally true to the land use pattern that is established by historical development trends and zoning regulations.

Residential Land Use

As part of the 1969 Comprehensive Plan, North Smithfield was divided into four (4) residential land use areas of varying density. These were subsequently translated into residential zoning districts which continue to apply today.

The 2006 Comprehensive Plan Five-Year Update recommends greater flexibility in developing residential areas to further the provision of affordable housing and encourage a better relationship between the natural and man-made landscape. The work of the 2006 Comprehensive Plan Five-Year Update was done in line with contemporary thinking, the overwhelming endorsement of the Citizens Advisory Committee in 1992, the participants of the 2001 survey and charette, other forums of public input, and discussions with the Planning Board. Specific proposals for implementation are contained in the Comprehensive Plan.

In general, the Land Use element perpetuates the use and density patterns that have been historically established. The 2001 Community Survey results support maintaining the existing pattern based on their response to certain "quality of life" issues. Eighty-eight percent of the respondents thought that protection of the water supply was of greatest importance; 73% thought protection of open space was critical and the third highest group of respondents (69%) thought it was important to maintain the small town character.

Urban Residential - Medium High Density - Areas for Urban Residential are currently served by water and/or public sewer services. These areas are now included within the RU-20 zoning district that allows the following types of residential development:

- Single-family homes on lots of 20,000 sq. ft.;
- Two-family homes on lots of 30,000 sq. ft. and;
- Multifamily dwellings by Special Use Permit from the Zoning Board of Review, with a maximum of 100 bedrooms at a density of 4,000 sq. ft. for each bedroom, providing the units are served by municipal

sewers and water. Depending on the number of bedrooms per housing unit, the density could be as high as ten units per acre.

Additions to the RU-20 zoning district should be considered in villages that are served by sewers and in areas that are already substantially developed with lots of approximately one-half acre in size. The purpose of expanding the RU-20 district in these areas is to promote in-fill development and provide opportunities for the development of multi-unit and affordable housing.

Suburban Residential - Medium Density - Suburban Residential development at a density of one dwelling unit per acre for single or two family homes is continued for non-sewered sections of the Slatersville neighborhood, areas to the south of Slatersville along sections of the Providence Pike, Pound Hill Road and Woonsocket Hill Road. Portions of this area to the north of Victory Highway in Slatersville and to the south of Slatersville along and near Providence Pike have experienced problems with Individual Sewer Disposal Systems.

Approximately two-thirds of the Suburban Residential land has been subdivided and developed. Most of the area proposed for Suburban Residential use is now located within the RS-40 zoning district that allows the following:

- Single-family homes on lots of 40,000 sq. ft.;
- Two family homes on lots of 80,000 sq. ft. and;
- Multifamily dwellings by Special Use Permit, with a maximum of 100 bedrooms at a density of 6,000 sq. ft. for each bedroom, provided the units are served by municipal water. For multifamily, depending on the number of bedrooms per dwelling unit and the adequacy of water supply availability, this could mean a density of up to 7 dwelling units per acre.

Rural Residential - Medium Low Density - Rural Residential areas were originally designated under the assumption that public sewer and water services will not be provided. The intent is to perpetuate a rural atmosphere in the southern, western and northern sections of the Town. As has been discovered in other communities, large-lot zoning does not necessarily create a rural environment, particularly where new houses are lined up at 200 foot intervals along country roads and the vacant lots between older homes are built upon. Because of this development trend, the Town will consider revising the Zoning Ordinance and Subdivision and Land Development Regulations to allow for Conservation Development. Conservation Development would

encourage better design of subdivisions and other projects to be more suited for the lower density zones in Town. Under the RA-65 zoning district, which corresponds to the Rural Residential use area, single family homes are allowed with lot sizes of 65,000 sq. ft. and two-family homes may be built providing the lot has a minimum of 130,000 sq. ft. Multi-family is allowed by Special Use Permit with up to 100 bedroom units allowed at a density of 20,000 sq. ft. per bedroom, however, approval is contingent upon the availability of municipal water services. Depending upon the number of bedrooms per dwelling unit, a multi-family density of up to 2 dwelling units per acre would be allowed. Although less than one-third of the Rural Residential area is presently developed, substantial sections are not suitable for development due to wetness, ledge or excessive slopes.

Rural Residential Conservation - Low Density - The Rural Residential Conservation area covers land and water requiring conservation action. All are sensitive areas where utilities should not be provided to preserve open space. Development proposals must take into account the constraints associated with the existence of the Environmental Protection Agency Superfund sites and the need to protect the Slatersville Aquifer and Reservoirs. The REA-120 District allows for Single-family housing as the principal allowed residential use; the minimum lot frontage is 300 feet and the lot size requirement is 120,000 sq. ft.

Business and Commercial Land Use

As previously noted, North Smithfield does not have a downtown area. Retail and business uses serving local shopping needs are found along Route 146A. The stores and supermarket at Carpenter's Corner (Slatersville Plaza) provides convenience shopping for the Town's northern neighborhoods as well as sections of Burrillville and adjoining communities in Massachusetts.

Most commercial and retail development, other than the shopping centers at Carpenter's Corner and Park Square has been small scale and generally related to local needs and the service of transient traffic. A regional shopping center was recently proposed in the Booth Pond area off of Route 146A. Development of this center will provide residents with a greater array of choices for comparison shopping and reduce the need to travel to nearby communities for larger ticket items.

Neighborhood Business - Neighborhood Business, as currently embodied in the BN zoning district, is designed primarily to serve local needs for convenience shopping, personal services and small business offices. Post offices, as in Slatersville and Forestdale, provide both functional and social benefits to neighborhood residents. Efforts to consolidate and relocate postal facilities to an impersonal highway location should be resisted.

Business Highway - Business Highway use areas are designed to serve specialized retail and commercial uses requiring high volumes of passing traffic. All areas are located along four-lane highways (Eddie Dowling Highway and the non-limited access section of Route 146 near Sayles Hill Road) and are within the existing Business Highway (BH) District.

Professional Services - Professional Service uses are on the west side of Eddie Dowling Highway in the vicinity of Hanton Road. Allowed uses include single family detached dwellings with professional office space, hospitals and clinics, and office buildings. A large area on the east side of Eddie Dowling Highway currently located within the PS District has been designated for Mixed Use in the Comprehensive Plan and will be discussed shortly within the context of a new mixed-use area.

Manufacturing

Manufacturing uses, generally in accordance with the provisions of the present Manufacturing (M) District and studies completed by the North Smithfield Industrial Development Commission allow for manufacturing to promote jobs and economic development. Within the (M) District are uses that may move to the Mixed Use category discussed below.

Limited Commercial - Portions of the land between St. Paul Street and the Branch River now located within the Manufacturing (M) District are designated as Limited Commercial (LC). This use change acknowledges the limited industrial use. Limited usable sites and nearby housing emphasize the need to preclude most types of heavy manufacturing. Allowed uses include light industry and certain types of retail and commercial development.

Mixed Use

A number of different types of mixed use districts are under consideration in order to facilitate redevelopment of under utilized mill complexes, encourage development in and adjacent to existing villages, take advantage of highway access and infrastructure, and encourage commercial and industrial activities. Other specific objectives of mixed-use districts include:

- Allow compatible mixed uses on a site, that are ordinarily not permitted together through conventional zoning.
- Coordinate architectural styles, building forms, and structural/visual relationships in an innovative, aesthetic, and functionally efficient manner.
- Provide flexibility of zoning in exchange for creative design and added amenities.
- Encourage land development and redevelopment with mixed-use within Village areas that preserve their natural and/or historical features.
- Encourage the redevelopment and rehabilitation of deteriorated and/or underutilized historic or nonconforming structures and areas.
- Promote pedestrian friendly environments that provide both a safe walking atmosphere and a logical connection of destinations within and adjacent to existing village centers.
- Enhance the quality of life for the inhabitants, users, and/or workers who will be utilizing or otherwise benefitting from the provided amenities.

Mill Rehabilitation - With the diminishing number of tenants willing to occupy older mill buildings, mill owners are forced to explore mixed-use conversions in order to maintain historic mills. The Slatersville Mill site and Blackstone-Smithfield Industrial Park are both attractive sites for conversion with residential occupancy being the primary use. Other compatible uses such as commercial, recreation, light industry, or municipal uses should be allowed along with a public open space or river access component. Present zoning is Manufacturing (M).

Village Residential - A village residential district should be created to accommodate residential development in areas served by public infrastructure. This predominantly residential district may also include limited commercial, public uses, recreational uses, and/or open space. The purpose of the Village Residential zone is to allow housing with limited impacts on Town services in areas immediately adjacent to village areas. Mixed

residential developments might include age-restricted housing (e.g. retirement communities) with a clubhouse or other recreation facility or other appropriate service, light commercial or retail use and useable open space, assisted living facility with a health clinic and clustered multi-unit housing accompanied by light commercial or retail use.

Mixed Office/Commercial - To take advantage of North Smithfield's access to Route 146, a mixed office/commercial district should be established to provide opportunities to develop campus-style executive office complexes. There are a limited number of large acreage sites that can take advantage of highway access along 146 and the North Smithfield Industrial Highway for the development of corporate offices, offices with light manufacturing and/or research and development, health care facilities, banking, restaurants, daycare facilities, and other uses that may be considered amenities to the main employment use.

Mixed Use/Retail - Plans to construct a large scale retail, office and residential complex off of Route 146A near Landmark Medical/Fogarty Unit have been submitted to North Smithfield and Woonsocket. Already identified in the 1992 Comprehensive Plan as a site with development potential, the municipalities of Woonsocket and North Smithfield are currently reviewing plans that call for retail activities in several detached buildings, restaurants, office space and residential condominiums.

The property abuts Woonsocket and would be connected to Woonsocket's public water system. The Woonsocket portion of the development could be accessed through the main project entrance at Landmark Medical/Fogarty Unit and would consist of various retail activities. Given the project's location in an important drinking water watershed and the existing traffic pattern and volumes, special attention is needed for the project's design.

Build-Out Analysis

In June 2001, the Blackstone River Valley National Heritage Corridor Commission completed a build-out analysis of the 27 communities in the Blackstone River Watershed. A build-out analysis helps reveal a community's future layout if all undeveloped land were developed in accordance with existing zoning. Build-out is a tool for projecting and planning for a community's future population, households, commercial growth and

demands for services such as water, garbage pickup and other municipal services. The build-out analysis was based on GIS mapping and community input. The maps used illustrated existing zoning, developed areas, and permanently protected and un-buildable lands. Assumptions were made based on the existence of natural constraints and land needed for new infrastructure.

Based on less sophisticated data and techniques for conducting a build-out, the 1992 Plan suggested that another 2,100 dwelling units could be accommodated in Town. The 2001 study suggests this number should be much higher. Given current engineering practices and the zoning that was in place in 2001, more land is available for construction than was thought in 1992. The 2001 study found that the Town of North Smithfield can accommodate another 5,110 dwelling units, or 4,525 residential lots.

However, it is clear that the 2001 study is also undercounting. The 2001 study took only a small portion of the potential mill conversion projects and other land development projects into account (totaling approximately 865 units as of 2005). Nor does it account for the re-zoning proposed in the updated Comprehensive Plan (approximately 200 units), or the possible density bonuses that may be granted in order to encourage the creation of additional affordable housing (estimated at 160 units). A more accurate build-out, consistent with the proposed zone changes, the Housing Element, Natural Resources, Economic Development and Services and Facilities Element would result in approximately another 6,320 additional dwelling units. Assuming the average number of people per household holds steady at 2.61, the additional dwelling units could support another 16,495 people in North Smithfield.

Between 1990 and 1999, new housing units were created in North Smithfield at an average annual rate of about 46 units per year including elderly and other multi-family units. Between 2000 and 2004, an average of 29 building permits were issued annually. However, given the large number of approved and soon to be approved proposals and based on the previously discussed population estimates, it is anticipated that the rate could average around 200 new housing units per year over the next five years. New housing construction, at the growth rate estimated for the years 2000 to 2010, could utilize approximately 15% of the build-out potential.

4.1.4 CULTURAL RESOURCES

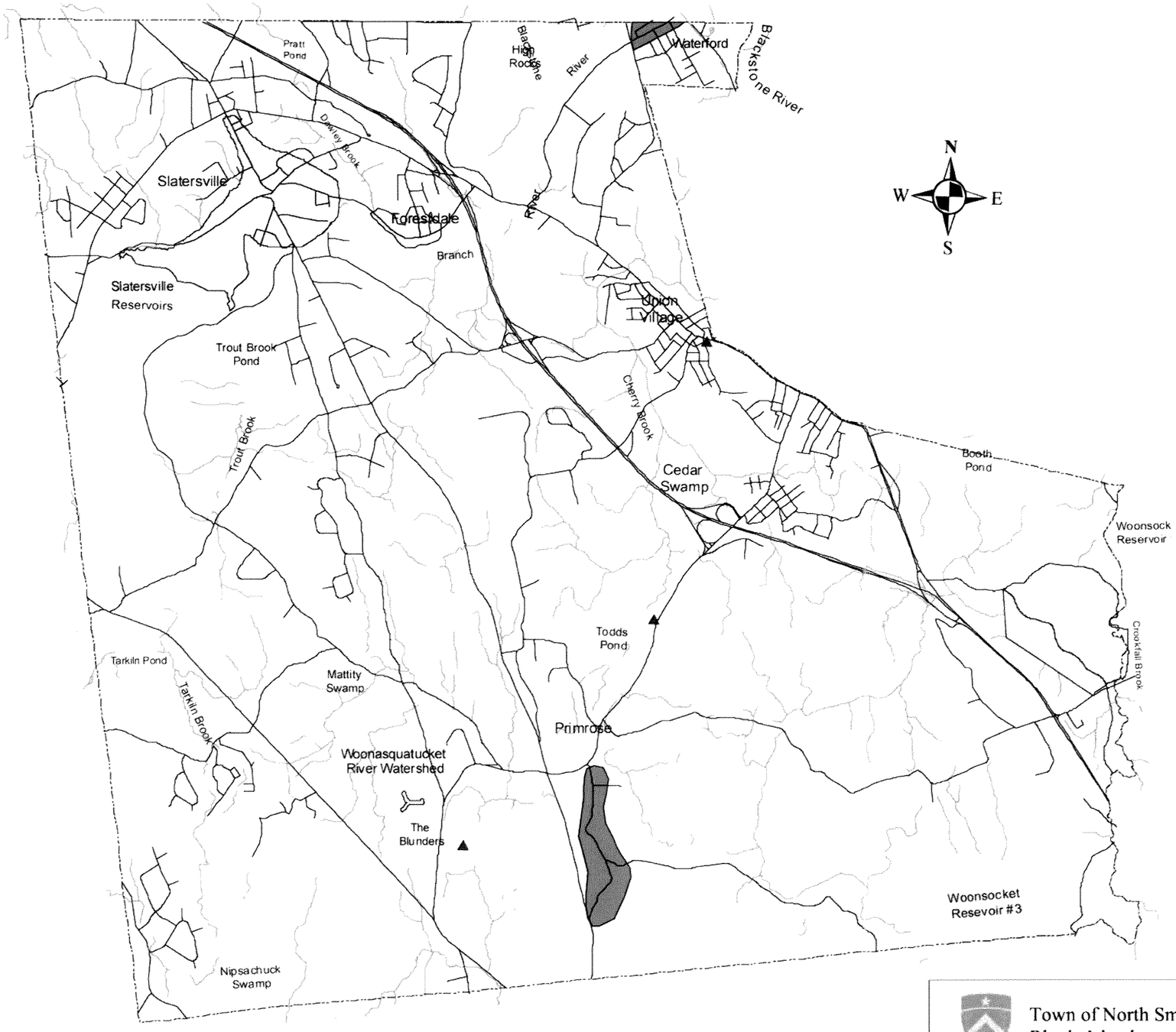
Inventory of Historic Resources

North Smithfield's significant historic resources consist of districts, structures and archaeological resources that represent patterns of community settlement and growth from pre-European settlement through the twentieth century. Most of the resources are fully documented and described in Historic and Architectural Resources of North Smithfield: A Preliminary Report, prepared by the RI Historic Preservation Commission in 1980. One subsequent inventory of historic resources was undertaken by the Blackstone River Valley National Heritage Corridor Commission for their 1989 Cultural Heritage and Land Management Plan. However, this document was based on the earlier 1980 inventory, which remains the most comprehensive record of North Smithfield's historic resources prepared to date. Due to the presence of these documents, this section is not intended to provide a detailed history but rather to give an overview for resource protection.

Cultural History

The Town of North Smithfield's cultural history is evident today in the Town's pattern of development and architecture, much of which dates to the 18th and 19th centuries. Agriculture, once the basis of the region's economy, is now a minor occupation. Nevertheless, the legacy of the Town's agricultural past is still apparent in the historic farmhouses, stone walls, and open fields once devoted to agriculture. In a similar way, the manufacturing settlements that sprang up in the latter part of the 18th century have left a rich legacy in the mill villages, characterized by an urban design and architecture of another age. In 1666, what is now North Smithfield was settled by European colonists from Providence. Prior to that time, the area was inhabited by Native Americans. North Smithfield remained largely agrarian during the early years of the 18th century. During the latter part of the 18th century, small, decentralized milling operations sprang up wherever waterpower was available. The simplicity of 18th century life is reflected in the buildings that survive. Along Farnum Pike, Iron Mine Hill Road and Louisquisset Pike are several surviving 18th century houses. They are also found in the Grange Road District, in Union Village, on Grange Road, and Pound Hill Road.

A major route in the pre-Revolutionary period is today's Smithfield Road (146A), (see Figure 4-4), formerly the Great Road and today marked by milestones indicating the distance from Providence. Several mills, serving



Legend

- Town Historic District and Listed on State and National Registers of Historic Places
- Historic District Listed on State and National Registers of Historic Places
- Historic District Nominated for State and National Registers of Historic Places
- ▲ Historic Structure on State and National Registers of Historic Places
- Lakes & Ponds
- Streams
- Roads
- Town Boundary

Town of North Smithfield
Rhode Island

Figure 4-4

CULTURAL AND HISTORIC RESOURCES

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Source: Town of North Smithfield

Date: 2006 | Scale: No Scale

the farmers, were located at various waterpower sites in North Smithfield. By the end of the century, these most likely included a gristmill, sawmills and a mill manufacturing iron farm tools. During the 19th century, what had been small settlements began to expand. In Union Village, several large houses, a tavern, bank (the first in northern R.I.), and academy were built shortly after 1800. Later, several substantial dwellings were constructed. After 1851, Union Village was bypassed by the completion of the Providence and Worcester Railroad through Woonsocket. Whereas Union Village grew as a result of its highway location, the other villages grew as mill villages dependent on the waterpower of the Branch and Blackstone Rivers. The industrial transformation of the area contributed to the decline of agriculture as the basis for the Town's economy.

Of the several textile mill villages that developed during the 19th century, Slatersville was the first. In 1806, Samuel Slater, who had earlier set up America's first successful textile mill in Pawtucket, formed a partnership that was the basis for "Slatersville" which began operations a year later, as one of the first factory villages in the U.S. The present mill was erected in 1826. The village was designed to be self-contained and included additional factories, mill houses, a Congregational Church and a pair of commercial blocks. Much of the village remains today, including not only the buildings cited, but later 19th century additions, such as St. John's Roman Catholic Church (1872) built for the French-Canadian mill workers.

Other extant mill villages include: Forestdale, inaugurated in 1825 with a scythe factory along the Branch River. By the end of the century, the Forestdale settlement included a commercial block, a cotton mill, a row of Greek Revival houses, and a one-room schoolhouse. Waterford developed as a village in the early 1800's to serve several mills including Mammoth Mill along Canal Street. The mill's name was derived from its size as the largest mill building in the United States at the time. The mill's ruins are still in evidence.

Transportation improvements during the 19th century stimulated industrial development. This included highways, a canal and rail and streetcar service. By 1875, agriculture had experienced a gradual decline at which time the census recorded 191 farms, with farmland beginning to revert to forest. By 1900 the Town's population had dipped to 2,400 from its 19th century peak of 3,200 in 1875. During the first half of the 20th century, the textile industry of New England underwent a serious decline that adversely affected North Smithfield firms. Tupperware's purchase of two North Smithfield factories helped stabilize the local economy

in the 1950's. During the same decade, Slatersville village properties, once owned by one company, were sold piecemeal.

The advent of car ownership facilitated North Smithfield's gradual conversion from a self contained group of settlements to a community functioning increasingly as a suburb. As a result, the villages declined and the countryside became dotted with homes. North Smithfield's access to employment stimulated residential development. This development continued along public ways, as it had historically. However, with the advent of zoning, the development was sited on uniform-sized lots rather than in conjunction with farms. A significant departure from the traditional settlement patterns is represented by the subdivision of tracts of land into lots of like area and dimensions, also introduced by the Town's Zoning Ordinance. These recent land development patterns represent a significant departure from the traditional dispersed agricultural pattern on one hand and the compact mill village settlement, on the other. In terms of "change-factors" affecting cultural resources, subdivision and zoning are among the most important.

Historic Districts and Areas

North Smithfield contains several concentrations of historic structures, industrial systems and other historic resources that represent a cohesive development pattern and retain many of their original qualities of design and environment. Several of these areas, recorded on the local inventory, are protected by entry on the National Register of Historic Places and one is designated as a local historic district. The historic districts are shown on Figure 4-4, Historic Resources. Placement on the National Register - the official inventory of the nation's cultural and historic resources which are worthy of preservation - affords limited protection from potentially intrusive federally funded or licensed projects through review procedures. Under certain circumstances, it also may provide tax benefits for rehabilitated income-producing properties, and more limited funds for matching grants for restoration of key properties.

The establishment of local historic districts provides, through enactment of historic district zoning, more stringent controls on the exterior appearances of structures located within district boundaries. A local Historic District Commission rules on the appropriateness of alterations and new construction within districts. The following listings are current as of February 2005.

National Register Districts

Slatersville Historic District: The district includes the Slatersville reservoir, dams and water-power systems, and 19th century mill, commercial blocks, mill houses, churches, and other buildings along Main Street, Green Street, School Street, Railroad Street and several side streets.

Forestdale Historic District: Lies at the intersection of Main Street and Maple Avenue, near the Branch River/Mill Pond dam and mill. The mill housing runs along both streets. As with other mill villages, the value of Slatersville and Forestdale lies not only in individual structures but also in its historic street plan and development pattern, which evolved to service a self-contained community.

Old Smithfield Road Historic District: This historic area consists of a seven-tenths mile section of Smithfield Road (originally Great Road) north of the Manville Road. There are six noteworthy houses, two cemeteries, stone walls, an apple orchard, fields, woods and two brooks. Laid out in the 17th century, the original Great Road joined Providence to Worcester. In this part of North Smithfield, the highway's course was altered in about 1741 to follow what is now Smithfield Road. Except for an 18th century tavern, the district's features are 19th century. Smithfield Road itself is important as it retains the narrow, winding roadway, lined by stone walls and passing through open fields, woods, and houses.

Union Village Historic District: This district is a half-mile long section of Great Road (Route 146A), from Woonsocket Hill Road to a point just beyond Westwood Road. Union Village includes fifteen 18th and early 19th century structures as well as twelve late 19th and 20th century buildings.

National Register Eligible Districts

The following districts in North Smithfield have been determined eligible, but are not yet listed on the National Register of Historic Places:

- *St. Paul Street (Waterford) Historic District:* Includes a series of structures built from 1845 to 1927, located on the street and dominated by the 1852 Gothic Revival - St. Paul's Roman Catholic Church possibly designed by Richard Upjohn. Also includes the Mammoth Mill and Saranac Mill sites that are the

subject of an archeological study funded by a Rhode Island Department of Transportation Enhancement Grant. Funds will also be used to design and develop interpretive features at site.

- *Grange Road Historic District:* Includes a section of Grange Road (approximately seven tenths of a mile long) lying north of Providence Pike, and a short section of Rocky Hill Road where the two roads meet. This is a very good 18th century example of Rhode Island's rural agrarian landscape. The district contains four 18th century farm complexes, and other historic structures including: a schoolhouse, grange hall, four cemeteries, fields bounded by stone walls, and 2 narrow early roadways.

Another potential district is on Great Road at the Branch River in the north-central part of Town. This district would contain two industrial areas, several mill houses, a fire station and a variety of commercial establishments. It is well known as the location of the Tupperware complex.

Also recommended for further study and possible nomination to the National Register is Wright's Dairy Farm on Woonsocket Hill Road. This working farm complex contains several historic buildings and is listed in the RI Historical Preservation and Heritage Commission's 2001 publication titled Historic Landscapes of Rhode Island.

Local Historic Districts

To date, Union Village and the Blunders are the only Town designated historic districts, and only Union Village is listed simultaneously on the National Register. Other areas worthy of protection are the following "Historic Areas" that were included in the 1980 report on Historic and Architectural Resources in North Smithfield:

- *Blackstone River/High Rocks Natural and Historic Area:* Located along the northern border of Town where the Blackstone River enters Rhode Island is a rugged, and mainly undeveloped section of the River. This area includes High Rocks and continues south to just below Branch River.

- *Cedar Swamp Natural and Historic Area:* This is a relatively large swamp of historic importance for trapping of animals and hunting along Cherry Brook in the north-central part of Town.

- *Mattity or Mattetokomitt Meadow Natural and Historic Area:* An extensive swamp in the southwestern part of Town at the headwaters of the Woonasquatucket River used initially for animal grazing but is now of greater botanical importance.

- *Nipsachuck Natural and Historic Area:* Located in the extreme southwestern corner of North Smithfield, south of lake Belair and west of Nipsachuck Hill, this area was of historic importance during the King Phillip's War in the late 1600s, but is still of geologic interest due to its swamp, irregular "kame and kettle" topography and esker (a long, narrow and steep ridge).

- *Woonsocket Reservoir No. 3 Natural and Historic Area:* Of critical importance as a modern watershed, this area north of Rocky Hill Road and west of Woonsocket Reservoir No. 3 in the southeastern corner of North Smithfield, contains a rich mixture of cultural features and was of historic importance for its farmsteads.

Historic Structures

Structures - consisting of buildings, roadways, cemeteries, and engineering structures - both within and located independently of districts. They are recorded in the local inventory, Historic and Architectural Resources of North Smithfield: A Preliminary Report. Those that have been individually listed on the National Register are given below. (Numbers refer to Local Inventory Number.) These structures are shown on Figure 4-4, Historic Resources, within this Plan. A longer list of structures that are potentially eligible for listing is also excerpted from the inventory. Since this list was compiled over two decades ago, it is necessary to update determination of eligibility for these resources, to assure that the qualities that made them Register-eligible have not been lost. However, this 1980 Report is still the most comprehensive inventory as of February 2005.

Individual Structures on the National Register

Peleg Arnold Tavern, 4 Woonsocket Hill Road (1690, c. 1790)
Smith-Andrews-Taft-Todd Farm, 670 Farnum Pike ©. 1740 et seq.)
William Mowry House, Farnum Pike ©. 1802-1805)
Tyler Mowry House, 112 Sayles Hill Road ©. 1825)
Individual Structures Potentially Eligible for National Register Listing
Aldrich Farm, Comstock Road (#20) (1775, 1815, 1825)
Mowry-Connolly House, Iron Mine Hill Road (#44) ©. 1800)
A. Aldrich Farm, Iron Mine Hill Road (#45)
Ananias Mowry II House, Iron Mine Hill Road (#47) ©. 1764)
West Acres, Louisquisett Pike (#55) ©. 1730 et seq.)
Metcalf Marsh House, Mechanic Street (#62) ©. 1820)
Andrews Tavern, Old Great Road (#72) (1825)
Old Sayles Hill Historic Roadway (#73) (17th century)
#485 Pound Hill Road (#79) ©. 1810)
Nathan Staples Farm (#88) (Late 18th century and 1810)
Blackmar Wing Farm, 2338 Providence Pike (#91) ©. 1690 et seq.)
Cyrus Arnold Farm, Woonsocket Hill Road (#109) (1815, c. 1890)

Archaeological Resources

Mapped information provided to the Town under the RIGIS program shows 17 areas in North Smithfield where the Rhode Island Historical Preservation Commission has identified prehistoric and historic archaeological resources. The RIGIS map showing these archaeological resources is on file at the North Smithfield Planning Department offices.

One location, the Three Dog Site (Blunders), near Route 5 and 104 on the Smithfield Town Line, is the only prehistoric archaeological site presently listed on the National Register of Historic Places. A 17-lot subdivision proposed for this 76.5 acre site received Master Plan approval in 2004. The Master Plan includes a proposed dedication of 30 acres of open space. The historic district and sensitive habitat area are included in the open space areas. Tables 4-4 and 4-5 summarize archaeological resources presently on file at the RI Historic Preservation Commission, status of documentation/protection, and potential threats.

As noted in Historic and Architectural Resources of North Smithfield, there is limited professional archaeological knowledge of the earliest inhabitants of what is now North Smithfield. The Narragansett Indian Tribe has advised the Town of an interest in protecting its Tribal and historic and cultural resources located in North Smithfield. There may be other similarly valuable periods of resources not yet recorded. Lack of knowledge of other existing sites is a threat that can be counteracted by continued surveying and use of predictive land use models in areas deemed archaeologically sensitive. Further study is also recommended for those sites which have been identified by the State survey and which may potentially be eligible for National Register listing. Since any land development project - gravel excavation, road construction, public works projects or building development - can potentially disrupt these sites, coordination of mapped data with state and local agencies (Rhode Island Department of Transportation and local planning board, for example) can help pinpoint archaeological resources before they are disturbed.

Climate

North Smithfield is located in the north eastern portion of the State of Rhode Island. A major waterway, the Blackstone River traverses across North Smithfield on its way to Narragansett Bay. Narragansett Bay and the

TABLE 4-4 NORTH SMITHFIELD HISTORIC ARCHAEOLOGICAL RESOURCES			
SITE	**GENERAL LOCATION**	**STATUS**	**THREATS**
Cider Mill Foundation	Route 104, near Todd's Pond	Potentially National Register eligible	Road improvements; scattered housing
Whetstone Quarry	Near Todd's Pond Potentially National	Register eligible	Road improvements; scattered housing, logging, potential gravel
Saw Mill, Dam, Ice House	Route 104, Southern end of Primrose Pond	Potentially National Register eligible	Private development
Schoolhouse Foundation	Near intersection of Routes 104 and 7	Potentially National Register eligible	Housing development; gas pipeline maintenance
Abandoned Farnum Pike	Route 7, between Route 104 and 5/104	Potentially National Register eligible	Road improvements; scattered housing
Electric Street Car Line	Near Route 146 on Lincoln Town Line	Potentially National Register eligible	Road improvements; water pipeline construction
Morris Mill	Near Route 146 on Lincoln Town Line	Potentially National Register eligible	Road improvements
Crookfall Dam	Near Route 146 on Lincoln Town Line	Potentially National Register eligible	Road improvements

In addition to these sites, there are several others considered "low priority" including sections of dirt roads, a railroad station foundation, and stone walls where little information is available.

TABLE 4-5 NORTH SMITHFIELD PREHISTORIC ARCHAEOLOGICAL RESOURCES			
SITE	**GENERAL LOCATION**	**STATUS**	**THREATS**
Three Dog Site/Blunders	Route 5 and 104, near Smithfield Town Line	National Register	Road improvements; construction
Twin Indian Cemetery	Route 5 near High School	Further Study Recommended	Active farm; encroaching gravel operation
Vegetable Garden Site	Woonsocket Hill Road, Union Village	Further Study Recommended	High tension power line maintenance; housing development
Crookfall Brook Rock Shelter	Crookfall Brook near Route 146 and Lincoln Town Line	Further Study Recommended	City of Woonsocket in ownership of large "undevelopable" tract - (Reasonably well protected)

There are five other mapped prehistoric sites which contain single artifacts and are therefore considered as "low priority."

Atlantic Ocean play a role in the climate of the State of Rhode Island. Extreme temperatures are infrequent in Rhode Island because of the marine influence. Temperatures exceeding 90°F occur approximately nine days each year. Temperatures below zero occur two to three days per year, but winters are generally cold with freezing temperatures occurring 120 days per year.

The Town of North Smithfield lies in a belt of the prevailing westerlies. The movement of air masses in the regions is derived principally from the west and originates as a result of the following: Cold damp air moving onshore from the Atlantic Ocean; Cold air moving south from the Arctic, and; warm air derived from the Gulf of Mexico funneled north-northeast along the Appalachian trough.

The bulk of normal precipitation comes from northeasterly winds that bring either rain or snow from the coast. According to a forty year climatological summary for the State, mean annual precipitation is 41.20" including mean annual snow fall of 39.2". The mean annual temperature is 50.5°F and the mean wind speed and direction is Southwest at 10.7 mph. The average growing season is 160 to 180 days.

Topography

The Town of North Smithfield has many varied resources. Several locations are greater than five hundred feet in elevation above sea level. Directly in contrast is the presence of several large lowland swamps, wetlands, rivers and brooks. Listed below are North Smithfield's most notable and valuable topographical features:

- Slatersville Reservoir
- Branch River
- Tarklin Reservoir
- Woonsocket Reservoir No. 3
- Cedar Swamp
- Todd's Pond
- Primrose Pond
- Blackstone River Gorge
- Woonsocket Hill
- Black Plain Hill
- Nipsachuck Hill

Grange Road is one of the State's significant scenic resources.[1] Grange Road has excellent views, distinct forest and land patterns and has been nominated for inclusion on the National Register of Historic Places.

[1] The Rhode Island Landscape Inventory, Department of Environmental Management 1989

There are many man-made and natural landscapes that add to the attractiveness of the community. Many of the natural resources such as Todd's Pond or the Blackstone River Gorge are obscured from public view due to private ownership or land of access. Others that are not are the view of the farms and bans on Woonsocket Hill Road, the Audubon property off Providence Pike with its slow streams, ponds and woods that epitomize the New England look.

Drainage

North Smithfield is located within the drainage system of three major Rhode Island rivers. The northern portions of the Town drain into the Branch River which in turn joins the Blackstone River in the northeastern section of Town. In the southwest corner several streams, including those flowing through Primrose Pond, combine to form the headwaters of the Woonasquatucket River. In the eastern section of the community both the Cherry Brook and Crookfall Brook systems flow to the east and into the Blackstone River in Woonsocket.

This Wastewater Facilities Plan Update reconfirms where sewers are essential and where a Wastewater Management District is a viable water resource protection device. A Wastewater Management District should be formed for those areas outside of the sewer district to develop a management plan for the repair, replacement and maintenance of all Individual Sewer Disposal Systems in the management district. Elements of the Wastewater Management Plan should address the following:

- Identification and location of Individual Sewer Disposal Systems in the Town.
- Identification of the number and impacts of failed or failing Individual Sewer Disposal Systems on surface and groundwater.
- Analysis of the cause of failure.
- Description of community assistance for finance, technical and data collection.
- Information and Education initiatives to improve operation and maintenance of Individual Sewer Disposal Systems.
- Data tracking for inspection and maintenance requirements of the District.

Geology and Soils

North Smithfield's soil environment is complex and sometimes difficult to manage. Although 42% of the soils have only moderate limitations for development, 58% have severe constraints due to high water tables, steep slopes, shallow bedrock or wetland conditions. As new development is proposed, the constraints to development are increasing. Over 3,000 acres have agricultural soils rated as prime or of statewide importance, yet only approximately 500 acres are in actual use for agriculture. Figure 4-5 Agricultural Soils, illustrates the prime agricultural soils and the State important soils. The sections which follow explain the derivation of the above-cited statistics.

Soils Suitability

The United States Department of Agriculture, Soil Conservation Service in collaboration with the Rhode Island Division of Planning, has classified Rhode Island soils into five general groupings in terms of their suitability for residential development. As shown on Figure 4-6, Soils Suitability for Development, identifies the general location of Groups A through D. Although the soils have been rated in terms of suitability for residential development, the applicable constraints generally apply to the common types of public, commercial and industrial uses which might be developed in North Smithfield. Consequently, they serve as a good community-wide planning guide.

Group A - Moderate Constraints: Soils in this group generally have few or moderate development constraints. The moderate constraints include: very permeable soils with a potential for groundwater pollution; slowly permeable soils with potential for septic system failures; and stony soils which are expensive to excavate and grade. The Soil Conservation Service cautions that development in soils with moderate constraints needs to be evaluated on a case by case basis. Approximately 6,600 acres or about 42% of North Smithfield is covered by Group A.

Group B - High Water Table Constraints: This group includes soils with a seasonally high water table located within 1.5 to 3.5 feet from the surface for significant periods of the year. In most cases, the soils are characterized by very slow permeability. The Department of Environmental Management's regulations for

Legend

- Prime Agricultural Soils
- State Improtant Soils
- Town Boundary
- Lakes & Ponds

Town of North Smithfield
Rhode Island

Figure 4-5

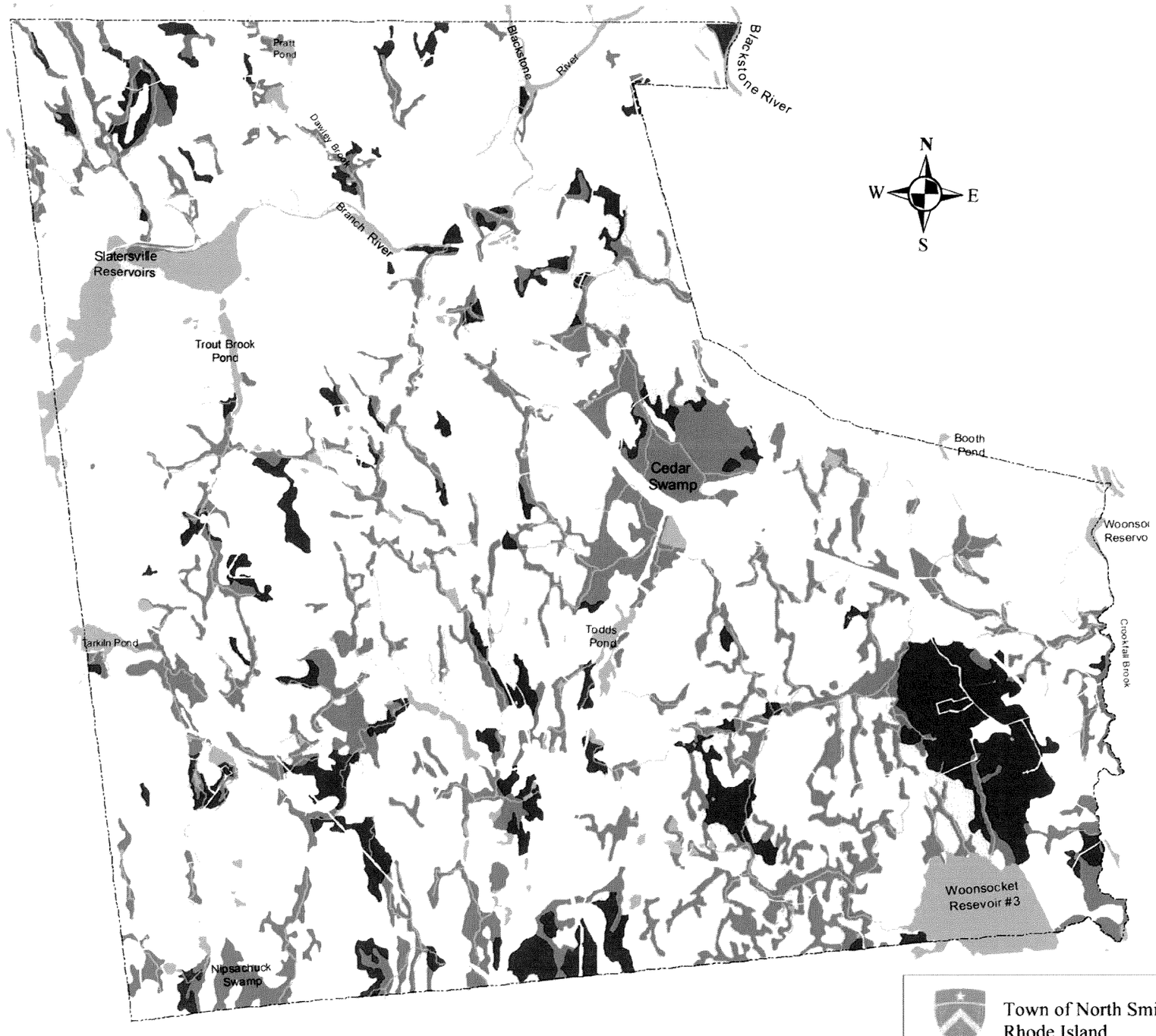
AGRICULTURAL SOIL

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
272 W. Exchange Street Suite 201 Providence,RI 02903-1029
Phone: 401-454-7000 Fax: 401-454-7415

Source: Town of North Smithfield

Date: 2006

Scale: No Scale



Legend

- Group A - *Moderate Constraints*
- Group B - *High Water Table Contraints*
- Group C - *Slopes Over 15% and/ or Shallow Bedrock*
- Group D - *Hydric Soils Constraints*
- Lakes & Ponds
- Streams
- Town Boundary

Town of North Smithfield
Rhode Island

Figure 4-6

SOILS SUITABILITY FOR DEVELOPMENT

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Source: Town of North Smithfield

Date: 2006

Scale: No Scale

Individual Sewer Disposal Systems generally require a minimum of 3 feet between the bottom of the leaching field and the seasonally high water table. Where the seasonally high groundwater is located between 2 feet and 4 feet from the natural surface of the land, mounding to elevate the bottom of the leaching field is allowed when certain additional state requirements are met. In general, development in Group B soils would be better served by sewers than septic systems. Comprehensive Plan studies show that 1,100 acres or about 7% of the Town's land area is in Group B.

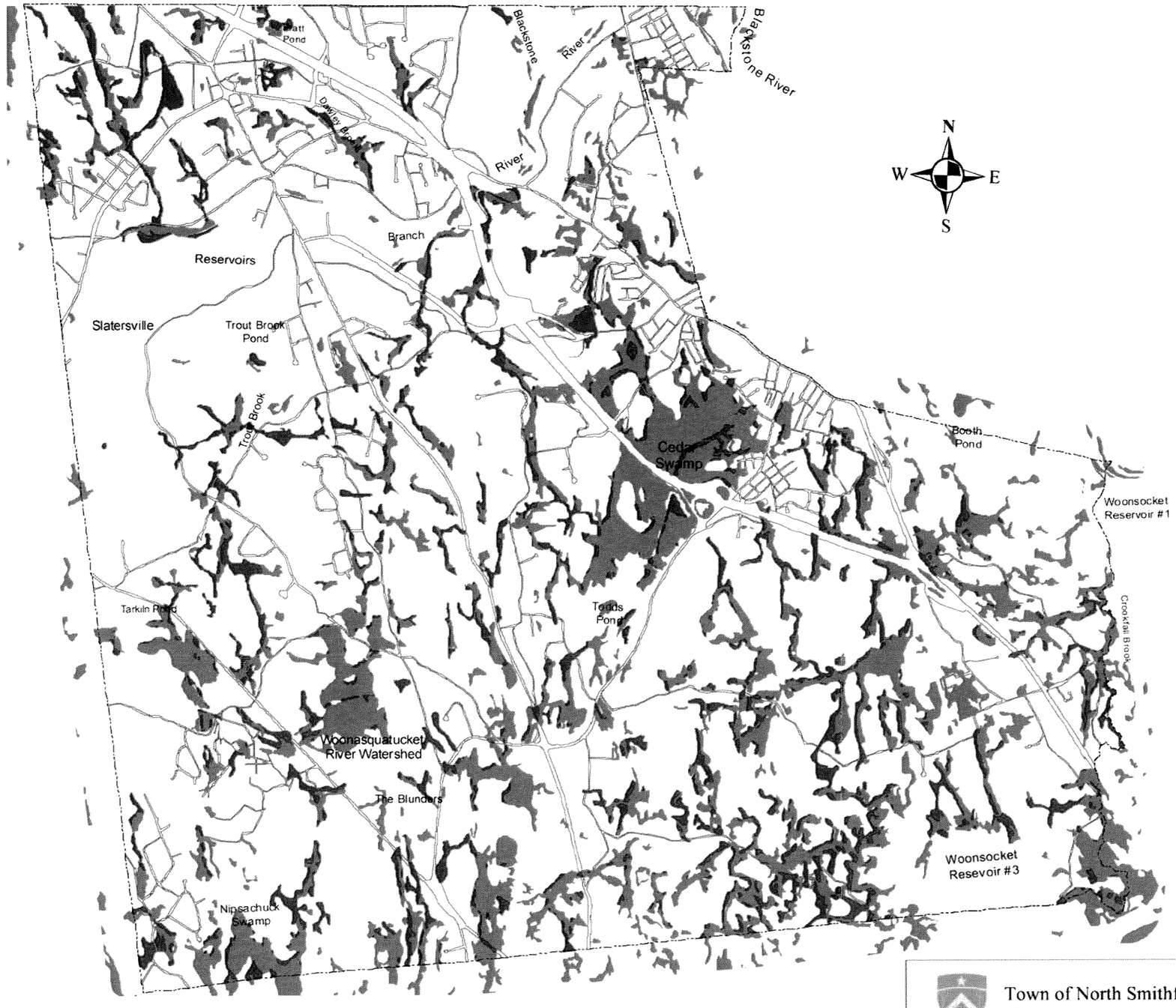
Group C - Slopes Over 15% and/or Shallow Bedrock: The steep slopes in Group C render these soils difficult for on-site septic systems and are easily eroded during construction. Shallow bedrock increases road construction costs and often precludes the underground installation of utilities or septic systems. The Department of Environmental Management's regulations for Individual Septic Disposal Systems generally require a minimum of 5 feet between the bottom of the leaching field and ledge (impervious formations).

Systems may be permitted to be mounded where ledge is encountered between 4 to 6 below the original ground surface when certain additional State requirements are met. There are about 5,800 acres in Group C representing approximately 37% of the land area of North Smithfield. The hilly nature of much of the Town accounts for this rather high percentage.

Group D - Hydric Soils: Hydric soils have water at or near the surface for significant periods of the year. A hydric soil is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper layers. Many areas with hydric soils are classified as wetlands. Development in areas with hydric soils usually is not feasible nor allowed by local, State or Federal wetland regulations (Department of Environmental Management, Division of Groundwater and Freshwater Wetlands, U. S. Army Corps of Engineers) without a specific permit granted by the Department of Environmental Management based on engineered plans. Hydric soils cover about 2,250 acres or approximately 14% of North Smithfield.

Wetlands

Figure 4-7 delineates areas of freshwater wetlands and hydric soils. Wetlands, as defined by the Army Corps of Engineers, are lands where saturation with water is the main factor determining the nature of soil development



Legend

- Freshwater Wetlands
- Additional Areas with Hydric Soils
- Town Boundary
- Lakes & Ponds

Source: Wetlands --
National Wetlands Inventory
United States Dept. of the Interior

Hydric Soils –
Soil Conservation Service
United States Dept. of the Interior and
Hydric Soils Map Units of Rhode Island

Town of North Smithfield
Rhode Island

Figure 4-7

WETLAND & HYDRIC SOILS

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Source: Town of North Smithfield

Date: 2006

Scale: No Scale

(hydric soils) and vegetation types (hydrophytes). It should be noted that not all areas of hydric soils are wetlands, such as the case of drained hydric soils not capable of supporting hydrophytes without restoration of favorable conditions. Wetlands serve a variety of valuable functions for man and the natural ecology of the area. Alteration of wetlands and their associated buffers are strictly regulated by the Department of Environmental Management. Also, the U.S. Army Corps of Engineers regulates activities within federal wetlands. Cedar Swamp is by far the largest wetland in North Smithfield. The swamp was severely altered to construct Route 146 and is increasingly impacted from upstream paving, construction and siltation. The wetlands/hydric soils map is suitable for community planning purposes only; the National Wetlands Inventory, the basis for identifying the wetlands, is derived from the interpretation of high altitude aerial photographs. Wetlands are considered a severe constraint to land development. Virtually all significant wetland areas should be considered as prime candidates for conservation and preservation.

Group E - Landfill: Group E soils are not identified on the Soil Suitability for Development Map because the only area is the Landfill & Resource Recovery landfill covering about 28 acres.

4.1.5 WATER QUALITY AND SUPPLY

The North Smithfield aquifers are classified by the Department of Environmental Management as GAA. This means that the aquifer is presumed to be suitable for drinking water without treatment. Water currently being withdrawn from the aquifer for public water supplies is not treated. It has been estimated that there is a potential safe yield of approximately 5 million gallons per day from the Slatersville Aquifer.[2]

Portions of the Blackstone River and the Branch River in North Smithfield are classified by the Department of Environmental Management a B waters. This means the water is suitable for public water supply with appropriate treatment, agricultural uses, bathing, primary contact recreation activities and fish and wildlife habitat.

[2] Report on Water System Master Plan for North Smithfield, Weston and Sampson, May 1990

Rivers and Streams

North Smithfield is located within the drainage system of three major Rhode Island rivers. The northern portions of the Town drain into the Branch River which in turn joins the Blackstone River in the northeastern section of Town. In the southwest corner several streams, including those flowing through Primrose Pond, combine to form the headwaters of the Woonasquatucket River. In the eastern section of the community both the Cherry Brook and Crookfall Brook systems flow to the east and into the Blackstone River in Woonsocket.

All of the rivers and streams serve the obvious function of carrying off drainage from the adjoining lands. As a greater percentages of the drainage area is developed and covered by impervious surfaces (e.g. buildings, roadways and parking lots), the streams and rivers are challenged to handle increasing flows and storm water following major storms. A good example is the considerable paving which is located in and around Park Square. This commercial area drains into the Cherry Brook system where there are present examples of downstream residential area flooding.

There are four major dams in North Smithfield. Three, located along the Branch River, were developed to provide water power for the mills. The fourth dams Crookfall Brook to create Woonsocket Reservoir #3. The maintenance of existing dams is important for water quality purposes. The dams, particularly those along the Branch River, have served to trap contaminated sediments; a breach could have adverse environmental consequences of statewide significance. RIDEM's Dam Division is concerned with dam safety issues in Rhode Island. Rivers and streams which were the basis for the mills which attracted people to North Smithfield are no longer looked upon as workhorses. They are being rediscovered as educational and recreational resources in our own back yard. Other sections of this Plan Update discuss programs to bring the rivers and brooks of North Smithfield back into the "mainstream" of community life.

4.1.6 FLOODPLAINS

Figure 4-8 shows the limits of the 100 year floodplain adjacent to major streams and rivers in North Smithfield as delineated by the Federal Emergency Management Agency Flood Insurance Study of 1993. Generally, these floodplains coincide with the wetland and hydric soils areas delineated on Figure 4-7. Flooding in North Smithfield is primarily the result of heavy rainfall from spring storms.

Legend

- Community Wells
- Non-Community Wells
- Groundwater Reservoir
- Groundwater Recharge Area
- Water Supply Basin Boundary
- flood
- EPA - CERCLIS Site
- EPA - CERCLIS Superfund Site
- Town Boundary
- Streets
- Lakes & Ponds
- Streams

Town of North Smithfield
Rhode Island

Figure 4-8

WATER RESOURCES

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Source: Town of North Smithfield

Date: 2006

Scale: No Scale

The Branch River, with steep side slopes, has a minimal floodplain. Cherry Brook, with headwaters formed by the confluence of two small streams near Follett Street and Greenville Road, has a more extensive floodplain as it passes along Todd's Pond and Cedar Swamp and ultimately into Woonsocket. Several subdivision streets close to Cherry Brook in the Union Village area are subjected to frequent flooding. An undersized culvert under the nearby railroad contributes to this problem. Other floodplains tend to be in more rural and less developed sections of the community.

North Smithfield has adopted zoning regulations applying to development in Flood Hazard Areas. The 1993 FEMA report warns that "Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacities, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself." Generally, the regulations prohibit any land alteration which will result in the decrease in the flood storage capacity of the watercourse. It should be noted that FEMA is currently updating its floodplain and floodway boundaries and maps. Once updated, these maps should be included in this Comprehensive Plan.

4.1.7 EXISTING NOISE AND AIR QUALITY

The major sources of noise in North Smithfield are traffic related. Of prime concern is from the Smithfield Expressway (Route 146) and the Louisquisett Pike (Route 146A). There is noise from industrial activities, but these are isolated and minimal. Noise is closely associated with the density of population and traffic volumes, so the greatest ambient noise levels are in the portion of Town located in the vicinity of Routes 146 and 146A. Vegetation is used extensively to screen noise throughout the Town.

Ambient air quality in Rhode Island has been monitored since 1968 by a network of stations by the Department of Environmental Management's Office of Air Resources. Amendments to the Air Toxics requirements in Air Pollution Control Regulation No. 9, Air Pollution Control Permits. and No. 22, Air Toxics. were adopted on April 27, 2004. Below is a summary of the major changes:

1. Expand the list of toxic air contaminants in the regulations to include all of EPA.s Hazardous Air Pollutants as well as 47 other substances for that the Environmental Protection Agency has derived inhalation health benchmarks and 17 substances that RIDEM evaluated in air permit reviews in the past several years.

2. Update Acceptable Ambient Levels that are ambient air impact standards, to reflect current toxicological data compiled by the Environmental Protection Agency.

3. Update Minimum Quantity applicability thresholds. These thresholds were calculated by using air dispersion models to determine the amount of a listed air toxic that, if emitted under poor dispersion conditions, could cause an exceedance of an AAL for that substance.

4. Change the Minimum Quantity thresholds from the amount of the substance used or generated to the amount emitted by a facility. This change eliminates the unintended regulation of facilities that use but do not emit air toxics.

5. Remove requirements for perchloroethylene dry cleaning facilities. Remove the exemption for small organic solvent degreasing sources. Exempt sodium hydroxide emissions from caustic scrubbers. Add exemptions for asbestos abatement projects subject to Department of Health rules and for lead paint hazard reduction and removal projects.

4.1.8 VEGETATION AND WILDLIFE

The residents of North Smithfield are the caretakers of 15,600 acres or about 2% of the land and inland water area of Rhode Island. Visual observation of recent aerial photography indicates that somewhere in excess of 50 percent of the land area in North Smithfield is wooded. The Town's rolling and forested terrain, interspersed with streams, ponds and wetlands, creates habitats for a variety of plant and animal species, both common and rare. These same features help to break up the development pattern and provide varied living environments for man as well. Unique natural areas such as the Blackstone River Gorge or the Blunders are of statewide importance.

Woodlands serve major ecological, hydrological, climatological and aesthetic functions in North Smithfield. They also provide a local source of firewood for those with small woodlots. Where there has been unsympathetic clear-cutting, the community bears the scar for many years. Consulting foresters are available to advise landowners of the proper management techniques of their woodlands. Certification of Farm, Forest and Open Space can reduce the tax liability for 15 years, but the landowners must follow the management recommendations. Under Rhode Island Intent to Cut regulations, state permits are required for cutting of 5 acres or more, 35 cords or in excess of 8,000 board feet. The Department of Environmental Management's Division of Forest Environment can provide technical assistance with harvesting operations.

According to Fisheries Investigations and Management in Rhode Island Lakes and Ponds, the Department of Environmental Management's Division of Fish and Wildlife, 1987, the most prominent habitats for freshwater fish are the Upper and Lower Slatersville Reservoirs. These man-made basins that have an average depth of 8 to 9 feet, support a wide variety of freshwater fish such as; bluegill, sunfish, golden shiner, pumpkinseed sunfish, largemouth ass, chain pickerel, black crappies, yellow perch, brown bullhead and white perch. The report also states that the population growth rates for black, yellow perch, brown bullhead and white and yellow perch exceed state averages for these species.

Aquifer Protection

The following approaches are suggested for the protection of the Slatersville and Branch River Aquifers. These same considerations can be made for other lesser groundwater reservoirs and recharge areas that have potentials for public water supply.

Groundwater Overlay Zoning

The Town responded to the 1992 Comprehensive Plan's call for groundwater protection by adopting Section 6-19 of the Zoning Ordinance titled "Regulation of Groundwater Aquifer Zones, Groundwater Recharge Areas, Wellhead Protection Areas and Water Supply Basin". The regulations dictate uses over these resources with more stringent guidelines than in the underlying districts. The Town is going to consider whether to prohibit excessive water drawdown for non-municipal uses. The bedrock aquifers and those areas sensitive to brittle fracture zones need to be mapped and baseline data collected for the purpose of monitoring ground water quality.

Wastewater Management Districts

Individual sewage disposal systems in Rhode Island fail at a rate of 13% per year. North Smithfield is not immune to this problem and will have a severe impact on the Town's water resources. There are a number of properties within contributing recharge areas of the aquifers or with direct drainage to surface water reservoirs that have experienced problems with failing Individual Sewer Disposal Systems. Bringing public

sewers to these areas may be the solution in some critical areas, but sewers generally are not recommended where growth at higher densities over the aquifers or within the watersheds could be encouraged. The cost to bring public sewers to a large area of large lot development is very expensive.

This Wastewater Facilities Plan Update will reconfirm where sewers are essential and where Wastewater Management Districts are a viable water resource protection device. Wastewater Management Districts, based on legislation passed in the 1987 General Assembly, may be established by individual municipalities. Essentially, they provide a system for inspections, pumping and maintenance of Individual Sewer Disposal Systems in designated areas. The Rhode Island Division of Planning, in collaboration with the Department of Environmental Management, is developing a regional management approach to assisting individual towns and cities with the administration of Wastewater Management Districts.

Individual Sewage Disposal Systems

A critical area generally associated with groundwater reservoirs is the highly permeable soils which transmit wastewater too quickly, allowing little time for waste constituents to be attenuated. This condition may apply over the Slatersville Aquifer. While the Town does have slightly more stringent regulations than the Department of Environmental Management in regards to Individual Sewer Disposal System setbacks to water bodies, more must be done to protect aquifers and groundwater recharge areas.

Two solutions are possible. The most effective would be to have Department of Environmental Management make an amendment to the December 1989 "Rules and Regulations Establishing Minimum Standards Relating to Location, Design, Construction and Maintenance of Individual Sewage Disposal Systems "to include designated aquifer and recharge areas as "Critical Resource Areas" as in the "Scituate Reservoir Critical Resource Area" to protect the quality of water supplies. Secondly, the Town is working with the Department of Environmental Management to establish a Wastewater Management District. Properties in a Wastewater Management District are subject to regular inspections of their Individual Sewer Disposal System as well as requirements to address deficiencies found during inspections.

4.2 EXISTING SEWAGE COLLECTION SYSTEM

4.2.1 EXISTING ON-SITE DISPOSAL PROBLEMS

Individual Sewer Disposal Systems serve approximately 51% of the homes in North Smithfield. Many systems are substandard, beyond their intended life expectancy and most are not maintained on a periodic basis. A Wastewater Management District is proposed for implementation that will call for the inspection, repair and replacement of Individual Sewer Disposal Systems to prevent non-source pollution of the groundwater. Concurrently, the District requirements can be applied to the groundwater recharge for the Slatersville Reservoirs and watershed area for the Woonsocket Reservoirs.

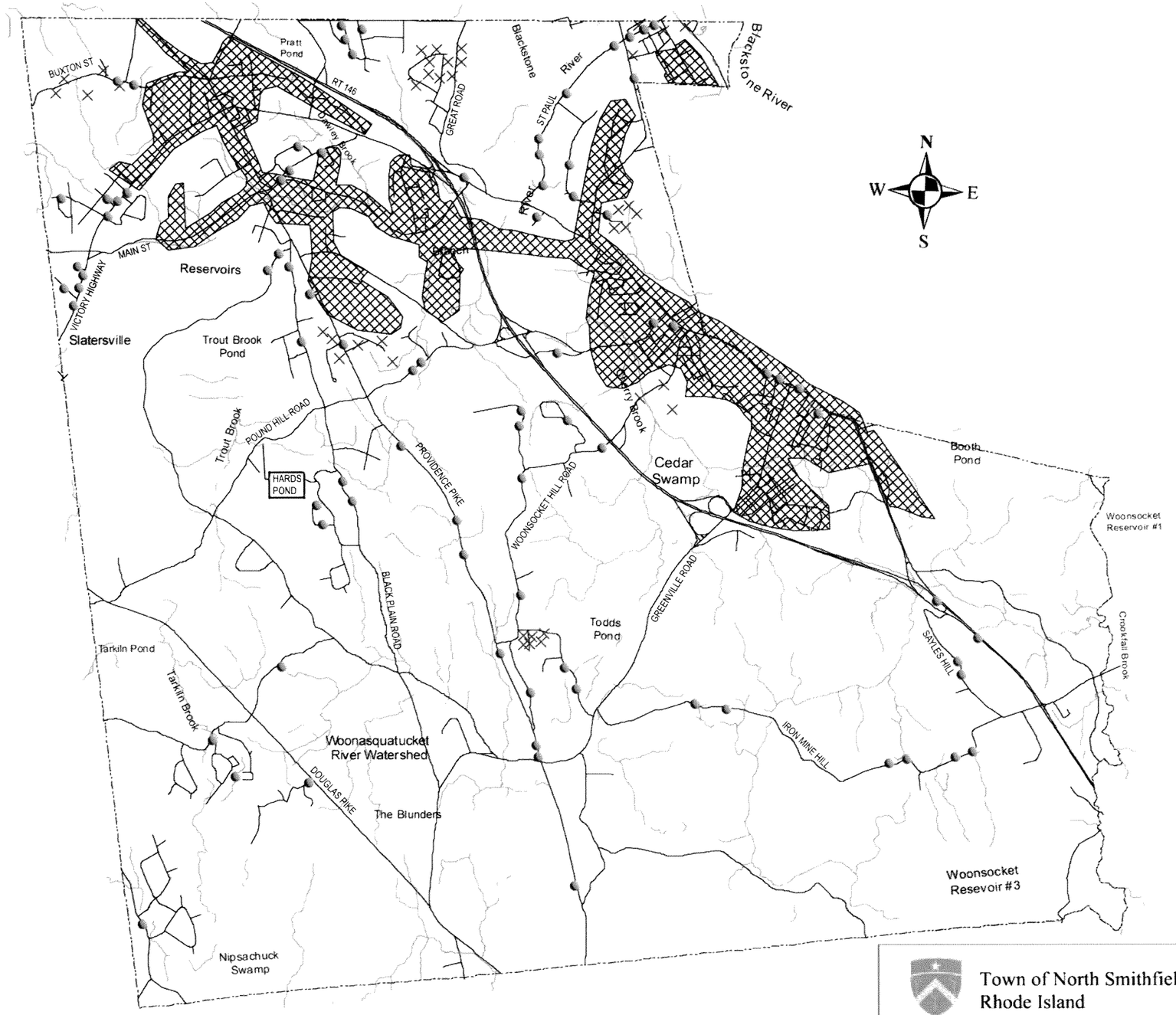
There are 2,122 on-site disposal systems in the Town of North Smithfield, and the majority of these systems are located in the Slatersville Reservoir groundwater recharge area. The Rhode Island Department of Environmental Management Water Resources records were examined and tabulated in Table 4-6 for failures of Individual Sewage Disposal Systems (ISDS).

The construction, alteration and repair of ISDS systems are regulated by RIDEM's Division of Water Resources in the Rules and Regulations Establishing Minimum Standards Relating to Location, Design, Construction and Maintenance of Individual Sewage Disposal Systems. These rules state that all installations, alterations and repairs must be approved, in writing, by the Division. In this manner, the Division can inspect and keep track of all ISDS installations and repairs. The review of the ISDS records revealed that 102 system failures were reported between 2000 - 2005, and that the individual owners made the necessary repairs to be in compliance with State and local officials. Figure 4-9 illustrates the location of these failures and repairs.

They are generally considered to be two ways in which an ISDS system can fail. In the first circumstance, the leaching field does not operate, meaning that water cannot pass through the system. The system eventually surcharges, or backs up into the house. In the second instance, the system drains too freely, causing untreated sewage to percolate to the groundwater. In each case of failure, there may be several factors which contribute to the system not operating properly. For example, soils that drain poorly cannot pass large volumes of water. Conversely, soils which drain excessively may result in poor wastewater treatment and short-circuit to the surface or groundwater table. Population density is another factor. Areas which have a high

TABLE 4-6
ISDS FAILURES
YEARS 2000 TO 2005

HSE #	STREET NAME	DATE OF REPAIR	HSE #	STREET NAME	DATE OF REPAIR
7	Antaya Ave.	2000	8	Patricia Ave.	2003
36	Black Plain Rd.	2002	22	Pine Ct.	2002
608	Black Plain Rd.	2003	141	Pond House Rd.	2003
501	Black Plain Rd.	2004	809	Pound Hill Rd.	2001
244	Black Plain Rd.	2004	811	Pound Hill Rd.	2001
17	Branch Ave.	2003	31	Pound Hill Rd.	2003
83	Brentwood Dr.	2002	1937	Providence Pike	2003
118	Brentwood Dr.	2005	1040	Providence Pike	2004
21	Brian Ave.	2004	650	Providence Pike	2002
19	Brian Ave.	2003	1925	Providence Pike	2004
6	Brian Ave.	2004	1422	Providence Pike	2004
27	Brookside Dr.	2001	1165	Providence Pike	2002
250	Buxton St.	2000	328	Providence Pike	2004
289	Buxton St.	2004	2206	Providence Pike	2000
12	Canal St.	2003	35	Railroad St.	2002
29	Colerick Ave.	2003	8	Rainbow Ln.	2004
11	Country Way	2005	22	Rainville Ave.	2003
15	Eaton St.	2005	20	Rankin Path	2000
395	Eddie Dowling Hwy.	2004	117	Sayles Hill Rd.	2001
464	Eddie Dowling Hwy.	2004	122	Sayles Hill Rd.	2003
82	Follet St.	2001	634	Smithfield Rd.	2001
109	Follet St.	2005	760	Smithfield Rd.	2002
8	Glenn Ave.	2005	680	Smithfield Rd.	2002
903	Grat Rd.	2003	519	Smithfield Rd.	2000
94	Great Rd.	2005	72	St. Paul St.	2005
159	Green St.	2002	475	St. Paul St.	2000
40	Green St.	2001	321	St. Paul St.	2005
8	Green St.	2001	93	St. Paul St.	2004
46	Greenville Rd.	2002	462 & 466	St. Paul St.	2003
4	Greenwood Ln.	2003	113	St. Paul St.	2006
165	Iron Mine Hill Rd.	2000	80	St. Paul St.	2003
Kielhorn	Iron Mine Hill Rd.	2005	584	St. Paul St.	2003
401	Iron Mine Hill Rd.	2006	16	Tanklin Pond Rd.	2005
428	Iron Mine Hill Rd.	2003	54	54 Taylor Dr.	2004
1105	Iron Mine Hill Rd.	2004	24	Tift Rd.	2002
215	Iron Mine Hill Rd.	2003	41	Tift Rd.	2000
1000	Iron Mine Hill Rd.	2004	1190	Victory Highway	2002
3	Julie Ave.	2005	1558	Victory Highway	2005
335	Keogh St.	2003	1239	Victory Highway	2002
10	Knowlridge Rd.	2003	Morris	Victory Highway	2002
16	Lincoln Dr.	2003	1501	Victory Highway	2002
4	Lincoln Dr.	2000	305	Victory Highway	2002
90	Log Rd.	2000	445	Victory Highway	2004
Pole #59	Main St.	2002	489	Victory Highway	2003
351	Mattity Rd.	2005	1565	Victory Highway	2002
171	Mattity Rd.	2003	1290	Victory Highway	2003
97	Middle Rd.	2004	3	Willerval Ave.	2005
1455	Old Iron Mill Rd.	2003	980	Woonsocket Hill Rd.	2002
39	Old Pound Hill Rd.	2005	409	Woonsocket Hill Rd.	2005
68	Overlea Rd.	2002	794	Woonsocket Hill Rd.	2005
8	Park View Dr.	2002	1356	Woonsocket Hill Rd.	2003



Legend

- Existing Sewer Service Area *
- On site ISDS Problem Area Identified From Comprehensive Plan
- Onsite ISDS Problem Area March 19, 2006

** Map shows approximate limits of existing, approved, and proposed sewer services. Some streets and sections within the delineated areas may not be on sewers.*

This map was prepared for the inventory of real property within the Town of North Smithfield. Users of this tax map are hereby notified that the public primary information sources, including record deeds and plats, should be consulted for the verification of the information contained on this map. The Town of North Smithfield and its mapping contractors assume no legal responsibility for the information contained herein.

Base map and hydrographic features were provided by Rhode Island GIS as 1":400' features derived from the 1997 National Grid USA/RIDOT Orthophoto Project.

Updated September 2003

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Town of North Smithfield
Rhode Island

Figure 4-9

ISDS FAILURES

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
272 W. Exchange Street Suite 201 Providence,RI 02903-1025
Phone: 401-454-7000 Fax: 401-454-7415

Source: Town of North Smithfield

Date: 2006

Scale: No Scale

concentration of residences over a small land area may experience oversaturation of ISDS effluent in the soil, particularly in wetland areas. High groundwater will also restrict a soil's ability to disperse and treat wastewater.

The soils where the failures occur are very permeable soils having a potential for groundwater pollution, slowly permeable soils having a potential for ISDS failures, soils with a seasonally high water table located within 1.5 to 3.5 feet from the surface, and soils consisting of topography with slopes greater than 15 percent and shallow bedrock. The major areas of failure within the Slatersville Reservoir groundwater recharge area (as defined in Figure 4-8) are as follows: Buxton Street, Victory Highway, Greene St. Area, Tanglewood, Waterford area, St. Paul area, Great Road, and Providence Pike area from the Slatersville Reservoir to Pound Hill Road, Route 146 and Sayles Road. There were also areas of on-site disposal failures along Iron Mine Hill Road, Sayles Hill Road and south of Pound Hill Road, which are located within the watershed area of Woonsocket Reservoir.

The continuation of sewering the Slatersville Reservoir groundwater recharge area will improve the quality of the reservoir, groundwater, and adjacent wetlands with the elimination of leaching field effluent containing pathogenic bacteria and viruses, nitrates, phostates and synthetic organic chemicals from septic tank additives and household chemicals. There were 102 ISDS reported to have failed in accordance with DEM records and 64 of these systems are within the Slatersville Reservoir groundwater recharge area. The individual sewage disposal systems predate state-enforced siting and design standards, and have approached their expected life span. In addition, the majority of dwelling with ISDS failures are served by individual wells as a source of portable water supply.

Zoning, along with land use and planning, are important factors in ISDS wastewater management. Zoning, however, establishes the concentration of domestic dwellings in local areas. In areas of concern, this concentration may contribute to soil saturation of groundwater and water quality. Proper planning of zoning regulations can prevent potential ISDS problems in the future.

Figure 4-10 illustrates the current zoning classifications in Town. Residential areas can be generally described as our basic lot sizes: 10,000 square feet, 20,000 square feet, 40,000 square feet and 80,000 square feet.

Legend

	Property Lines	
	Historic District Overlay	
BH		BUSINESS HIGHWAY
BN		BUSINESS NEIGHBORHOOD
LC		LIMITED COMMERCIAL
M		MANUFACTURING
PS		PROFESSIONAL SERVICES
RA-65		RURAL AGRICULTURAL
REA-120		RURAL ESTATE AGRICULTURAL
RS-40		RESIDENTIAL
RU-20		URBAN RESIDENTIAL

Town of North Smithfield
Rhode Island

Figure 4-10

ZONING PLAN

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Source: Town of North Smithfield

Date: 2006

Scale: No Scale

The zoning map is utilized as a tool to evaluate dense concentrations of residential development. Areas designated R-10 and R-20 reflect small lot sizes.

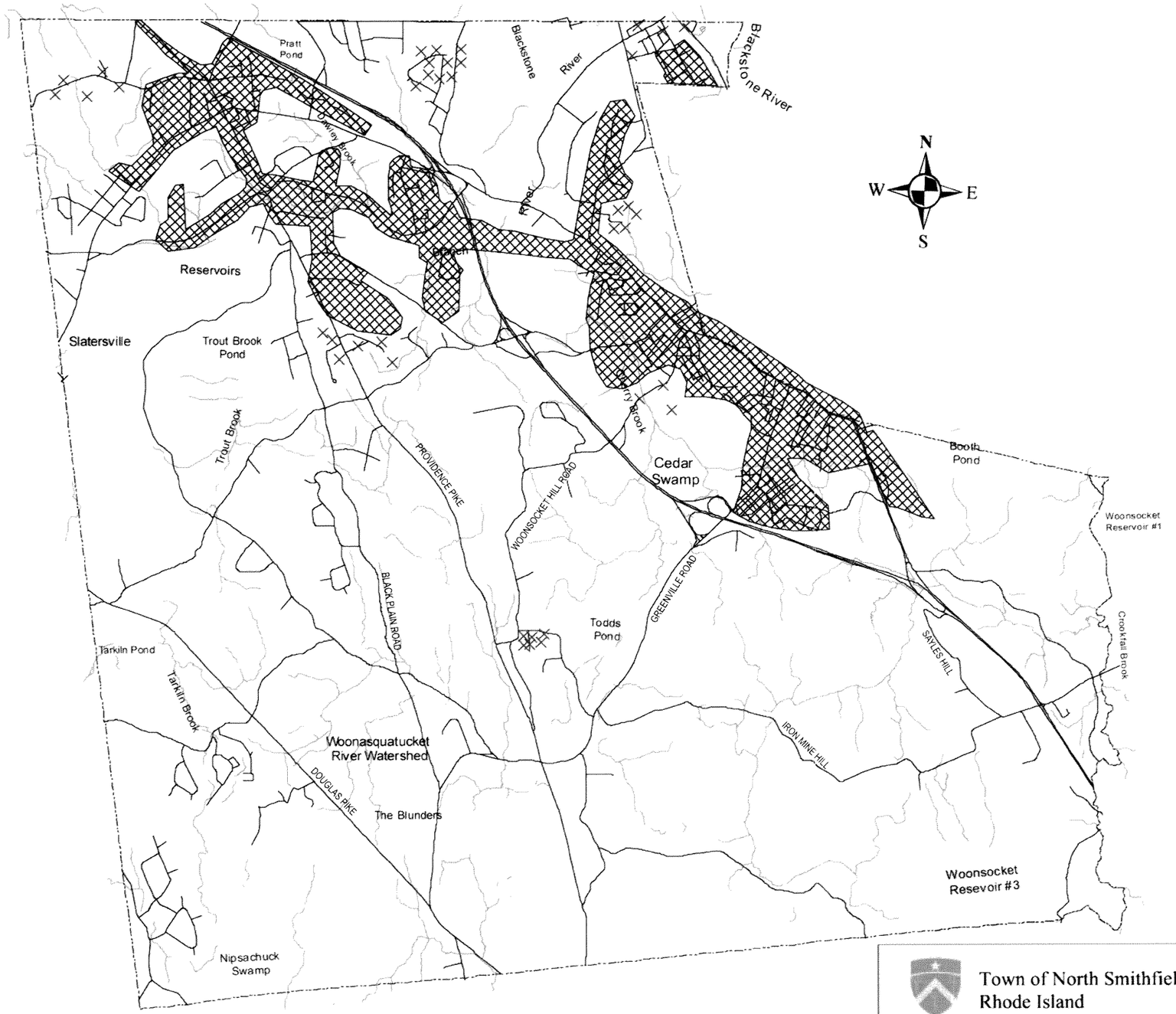
Alternatively, newer developments currently being planned which may potentially experience septic system difficulties can be zoned to help prevent such failures. In those newly developed areas that have been restricted by zoning regulations which classify the area as R-80 (one dwelling unit at 80,000 square feet), such requirements, along with the current State ISDS requirements, greatly reduce the potential of septic system failure. The zoning requirement practically assures ample soil area for leach field distribution systems, and therefore, lessens the chances of soil saturation with ISDS effluent. It is clear, then, that proper and careful zoning of undeveloped land areas can help prevent future septic system failures in such areas.

For those areas where there is less dense development, it is more cost effective to establish a Wastewater Management District to ensure that the groundwater quality is maintained. In Section 6 of this Facilities Plan, the mechanism necessary for the Town to adopt and implement a Wastewater Management Program will be provided.

4.2.2 MAJOR SERVICE AREAS AND INTERCEPTORS

The Facilities Planning Study Area encompasses the Town of North Smithfield. The North Smithfield Sewer System discharges directly to the Woonsocket Regional Wastewater Collection System located in the vicinity of Edward Street at the Blackstone River in the City of Woonsocket. The eastern section of Town is serviced by the Union Village Interceptor and the western section of Town is serviced by the Branch River Interceptor. The North Smithfield Interceptor conveys the majority of the wastewater generated by the North Smithfield users to the Woonsocket system. The confluence of the three major interceptors occurs in the vicinity of Brookside Drive and Cherry Brook.

Figure 4-11 shows the existing sewered areas within the Town of North Smithfield and Figure 4-12 depicts the interceptors and lateral sewers. The system consists of 13 miles of lateral and intercepting sewers. The collection system does not have bypasses or overflows installed, and the system does not have combined sewer overflows. The lateral system contains 5.5 miles of 8-inch diameter clay pipes, 3.5 miles of 8-inch diameter polyvinyl chloride pipes, 0.5 miles of low pressure sewers, and 0.2 miles of 4-inch ductile iron force



Legend

- Existing Sewer Service Area *
- On site ISDS Problem Area Identified From Comprehensive Plan

** Map shows approximate limits of existing, approved, and proposed sewer services. Some streets and sections within the delineated areas may not be on sewers.*

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Updated: September 2003

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Town of North Smithfield
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Figure 4-11

EXISTING SEWER AREA

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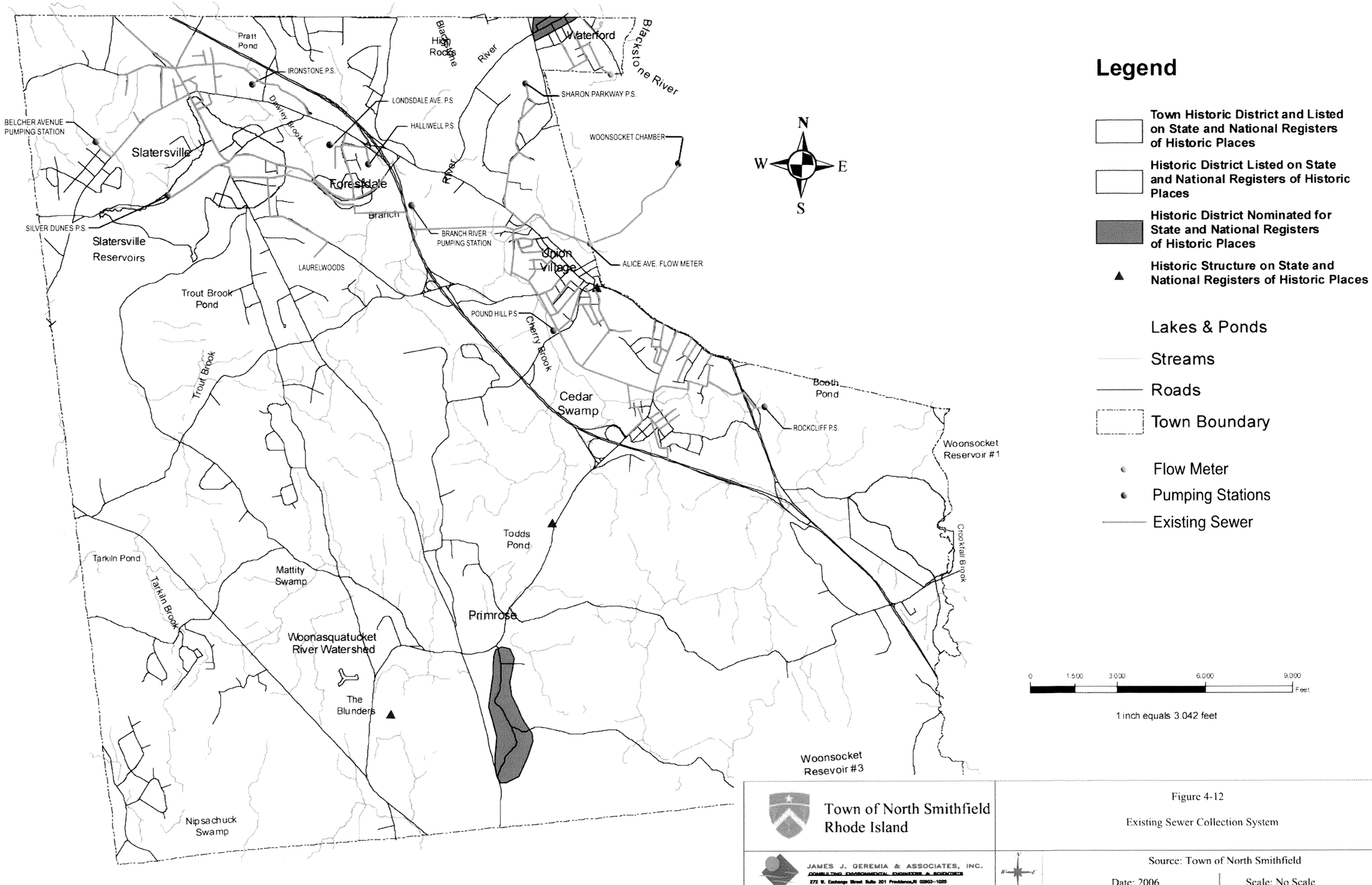
Source: Town of North Smithfield

Date: 2006

Scale: No Scale



Town of North Smithfield
Rhode Island

Figure 4-12

Existing Sewer Collection System

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Source: Town of North Smithfield

Date: 2006

Scale: No Scale

main and one pumping station. The interceptor sewers consist of 4.4 miles of 10-inch through 24-inch diameter clay pipes, 1.6 miles of 30-inch diameter reinforced concrete pipe, and 0.3 miles of 10-inch and 20-inch diameter ductile iron force mains, eight (8) pump stations and two flow metering stations. For the purpose of this report, an interceptor is defined as the main sewer within the service area which collects sewage from branch sewers and submains, and transports it to a treatment facility or to another interceptor. The interceptors are generally limited to a minimum diameter of 10 inches.

The Sewer Commission has received seven (7) sewer applications from residential dwelling units requesting to receive authorization to connect to the collection system at the time of publication of this document. The Commission has given approval to the seven (7) requests. The seven (7) connections have been installed by the owners of the dwelling units.

Interceptors

Branch River Interceptor: The Branch River Interceptor serves the western section of North Smithfield which includes the Industrial Park and the Victory Highway area. The interceptor is approximately 11,400 feet long. The Branch River Interceptor consists of 1,200 feet of 12-inch diameter vitrified clay pipe, 1,300 feet of 15-inch diameter vitrified clay pipe, 80 foot, 18-inch diameter ductile iron double barrel siphon, 1,300 feet of 20-inch diameter ductile-iron force main, and 2,700 feet of 21-inch diameter vitrified clay pipe. The interceptor commences at the confluence of the three main interceptors; the Union Village Interceptor, the North Smithfield Interceptor, and the Branch River Interceptor. The confluence is located 100 feet from the Cherry Brook culvert crossing on Brookside Avenue. The interceptor follows the railroad tracks in a westerly direction for 2,400 feet. At this point, the first interval of the gravity portion ends, and the pressure system begins. The 20-inch diameter force main follows the railroad tracks for 700 feet westerly and then proceeds through a right-of-way for 600 feet to its point of termination at the Branch River Pumping Station.

The second interval begins at the pumping station which is located in the vicinity of Route 146 and the Branch River. The pipeline crosses Route 146 and proceeds westerly along the southern banks of the Branch River for 1,900 feet. At this point, the interceptor crosses the Branch River and proceeds along the northern bank of the river for 300 feet. The interceptor then parallels the river and School Street along the river bank for 2,400 feet in a westerly direction. The interceptor then follows the river southwest for 660 feet at which point

the industrial park connects to the system. The interceptor then continues in a right-of-way to its point of termination on Main Street in the vicinity of the Town Memorial Building.

Union Village Interceptor: The Union Village Interceptor is 3,000 feet long and serves the eastern section of the Town. The interceptor commences at the confluence of the three main interceptors and terminates on Raymond Street west of Route 146A. The Union Village Interceptor consists of 630 feet of 8-inch diameter vitrified clay pipe, 2,000 feet of 10-inch diameter vitrified clay pipe, 330 feet of 10-inch diameter ductile iron force main, 1,800 feet of 12-inch diameter vitrified clay pipe, 650 feet of 15-inch diameter vitrified clay pipe and 7,590 feet of 18-inch vitrified clay pipe. The Union Village Interceptor begins at the three-way intersection and proceeds southerly for 450 feet to Lapre Road. The pipeline proceeds along the roadway in an easterly directions to Woodlawn Road. On Woodlawn Road, the interceptor follows the roadway southerly to Cherry Brook. At this point, the pipeline follows the northern bank of the brook to the Pound Hill Pumping Station located 300 feet west of Gilfillan Road. The gravity section terminates approximately 300 feet from the pumping station, at which point the 10-inch force main discharges.

The second section of the interceptor begins at the wet well and proceeds to Pound Hill Road. From this location, the interceptor follows the roadway for 300 feet to a right-of-way along the northern bank of Cherry Brook, which parallels Gilfillan Road. The pipeline crosses Homestead Avenue and enters a right-of-way southerly to Woonsocket Hill Road. At this point, the interceptor crosses the roadway and follows the eastern bank of Cherry Brook southerly to the Narragansett Electric easement. The pipeline follows the easement easterly to Greenville Road. At Greenville Road, the interceptor enters a right-of-way and proceeds to Glen Avenue and onto Valley Street. On Valley Street, the sewer main follows the roadway easterly to Chester Street and then follows Chester Street northerly for 300 feet. At this point, the interceptor enters a right-of-way along Cherry Brook in an easterly direction for 600 feet, and then proceeds southerly along the brook to Raymond Street. The interceptor then follows the roadway to its point of termination in the vicinity of Route 146A.

North Smithfield Interceptor: The North Smithfield Interceptor conveys all of the metered flows generated by the users of the North Smithfield Wastewater Collection System. The interceptor is approximately 8,400 feet long. The North Smithfield Interceptor consists of 85 feet of 42-inch diameter reinforced concrete pipe and 8,315 feet of 30-inch diameter reinforced concrete pipe. The interceptor commences at the Woonsocket

Regional Wastewater Collection System's inlet siphon chamber located in the vicinity of Edwards Street in the City of Woonsocket, and proceeds westerly along the bank of the Blackstone River to Old Street. At Old Street, the interceptor crosses Cherry Brook and follows the west bank of the brook southerly to Mason Street. The interceptor then proceeds within a right-of-way in a westerly direction to North Ballou Street. From North Ballou Street, the interceptor proceeds onto Roberta Avenue for approximately 1,000 feet to Alice Avenue. The sewer main follows Alice Avenue 300 feet to a right-of-way and continues along the right-of-way for 250 feet to the Alice Avenue metering station. Upon leaving the metering station, the interceptor proceeds westerly along the northern bank of Cherry Brook for 1,100 feet. At this location, the sewer main crosses the bank of the brook, and then crosses Great Road to its point of termination, which is at the confluence of the Union Village and Branch River Interceptors.

South Union Village Interceptor: The South Union Village Interceptor is located in the extreme northeast section of Town and serves 60 dwellings. The interceptor is 2,800 feet long, and consists of 15-inch diameter clay pipe. The South Union Village Interceptor commences at the Union Village Interceptor located 500 feet north of Annette Avenue. The interceptor follows a right-of-way for 500 feet to the south to Annette Avenue, and then follows the roadway to Lamoureux Boulevard. On Lamoureux Boulevard, the sewer main traverses to John Avenue and proceeds southerly to John Avenue for 200 feet to a right-of-way. At the right-of-way, the interceptor proceeds east to Greenville Road. From this point, the interceptor follows Greenville Road southerly to its point of termination in the vicinity of Robert Street.

Great Road Interceptor: The Great Road Interceptor presently serves 70 dwellings. The interceptor commences in the vicinity of Brook Avenue at the North Smithfield Interceptor and proceeds along Great Road for 1,100 feet to its point of termination at Mendon Road. The interceptor was installed in the 1970's, and consists of 1,100 feet of 12-inch diameter clay pipe.

Mendon Road Interceptor: The Mendon Road Interceptor was installed in 1990, and consisting of 12-inch diameter polyvinyl chloride pipe serving 70 dwellings. The total length of the interceptor is 1,800 feet. The interceptor begins at the terminus of the Great Road Interceptor and proceeds along Mendon Road to its point of termination at the intersection of Cynthia Drive and Oberline Drive.

Pump Stations

Branch River Pump Station: The Branch River Pump Station is located in close proximity to the Route 146 crossing of the Branch River, and serves the wastewater collection system within the western section of Town. The station was constructed in the mid-1970's and conveys the sewer flows via a 20-inch force main, approximately 1,300 feet in length, to the second segment of the gravity portion of the Branch River Interceptor. Wastewater enters the pump station through the 24-inch diameter Branch River Interceptor gravity segment, which is located west of the station.

The Branch River Pump Station consists of a concrete building with brick facing for the pump chamber and a separate concrete wetwell. The pump chamber consists of: three constant speed vertical sewage pumps (with extended shafts to the motors located in the second level); manual hoist with a trolley; flow recorder and totalizer; sump pump; Data Acquisition System; heating and ventilation; dehumidifiers; emergency generator (on the upper level); and a flood door providing 5 feet of flooding protection.

The wetwell consists of a comminutor and a bar rack and an ultrasonic level system that measures the liquid level in the wetwell.

Potable water is provided from a well located on site. An exterior wall hydrant is provided on the pump chamber. Hose bibs are provided in the wet well and each level of the pump chamber without any provisions for contamination.

In a separate chamber adjacent to the pump chamber, a venture flow tube is located which monitors the flow discharged by the pump station.

Pound Hill Pump Station: The Pound Hill Pump Station is located on Pound Hill Road, 300 feet west of Gilfillan Road. The pump station serves the Union Village Interceptor service area east of Pound Hill Road. The 10-inch force main from the pump station traverses 400 feet northerly within the right-of-way, to the second section of the gravity portion of the Union Village Interceptor.

The Pound Hill Pump Station consists of a wetwell and drywell. Located in the drywell are the following: the emergency generator; two centrifugal non-clogging vertical mounted sewage pumps; Data Acquisition System; heating and ventilating. The wetwell consists of an ultrasonic level system for the control of the sewage pumps as well as for the high level and low level alarms; bar rack as a standby for the comminutor; and ventilation.

Sharon Parkway Pump Station: The Sharon Parkway Pump Station is a below-ground submersible lift station constructed in 1990. The pump station is located on the cul-de-sac on Sharon Parkway. The pump station serves 23 residential homes on Sharon Parkway and Cynthia Drive and the Deerfield Commons Apartments (an 80-unit elderly complex). The 4-inch force main traverses 600 feet southerly along Sharon Parkway to an existing sanitary manhole. When there is a loss of power, the exterior gas powered emergency generator provides the required power. An alarm is activated for high water level.

Lorraine Avenue Pump Station: The Lorraine Avenue Pump Station is located at the end of Lorraine Avenue and it was constructed in 1992. The pump station serves 35 residential dwelling units. The Lorraine Avenue Pump Station is a below-ground lift station. The 2-inch PVC force main is 2,000 feet in length. The force main traverses along Lorraine Avenue to Litizen Road. On Litizen Road, the force main travels in a northerly direction to Maple Avenue and terminates at the gravity sewer manhole located at 12 Maple Avenue.

In the wetwell, there are: two submersible grinder sewage pumps; lifting rails and a float system. The valves are located in an adjacent chamber. The station has a generator plug so that a portable generator can be connected during power failures. The alarm system is connected to the Data Acquisition System.

Halliwell Pump Station: The Halliwell Pump Station is located at the rear of Halliwell Elementary School near Pole #156. The pump station serves 15 residential dwelling units and it was constructed in 1997. The pump station is identical to the Lorraine Avenue Pump Station.

Ironstone Pump Station: The Ironstone Pump Station is located on Mechanic Street, opposite of house number 246. The pump station was constructed in 1998 and serves 72 residential dwellings. The 4-inch PVC force main traverses along Mechanic Street in a westerly direction to its point of termination at the intersection of North Main Street, Central Street and Mechanic Street. The force main is 2,100 feet in length. The station consists of a pump chamber and a separate valve chamber, and an emergency generator in an exterior housing.

In the wetwell, there are: two submersible Flygt pumps with an automatic flush valve, and an ultrasonic level controller. The alarm system is connected to the Data Acquisition System.

Rockcliff Farm Pump Station: The Rockcliff Farm Pump Station is located on Old Louisquisset Pike, approximately 300 feet south of the entrance to Rockcliff Farm. The pump station was installed in 2005 by the developer. The pump station was designed to handle flows from 71 condominiums, 4 residential dwellings, and 2 office buildings along Old Louisquisset Pike. The 4-inch ductile iron force main proceeds along Old Louisquisset Pike in a northerly direction to its point of termination at an existing gravity sewer manhole located near Route 146A. The force main is 700 feet in length. The Rockcliff Farm Pump Station is the same as the Ironstone Pump Station.

Belcher Avenue Pump Station: The Belcher Avenue Pump Station was installed in 1996 and is located at the end of Belcher Avenue. The 4-inch PVC force main is 2,100 feet in length. The force main traverses along Belcher Avenue to Victory Highway. On Victory Highway, the force main proceeds easterly to its point of termination at the gravity sewer manhole located at 951 Victory Highway. The station consists of a pump chamber and a separate valve chamber, and an emergency generator in an exterior housing. The Belcher Avenue Pump Station is the same as the Ironstone Pump Station.

Silver Pines Pump Station: The Silver Pines Pump Station was installed in 2004 by the developer of the Silver Pines Condominiums. The station is designed to handle flows from 128 condominiums within the Silver Pines development and 14 residential units along Main Street at the entrance to Silver Pines. The force main traverses along Main Street in an easterly direction for 1,400 linear feet and connects to a gravity sewer manhole located at 95 Main Street. The pump station is the same as the Ironstone Pump Station.

Conclusions

Generally, the interceptors and pump stations are in fair to good condition. The interceptors and pump stations have been constructed at various phases, ranging from the 1970's to 2005. Based on the Town's sewer accounts, 49 percent of the dwelling units (1,980) within the Town are sewered.

4.2.3 INTERCEPTOR ADEQUACY ANALYSIS

General Description

The interceptors that were analyzed are listed in the previous section and depicted in Figure 4-11. The North Smithfield Interceptor, Branch River Interceptor, Union Village Interceptor, South Union Village Interceptor, Great Road Interceptor, and the Mendon Road Interceptor are tributary to the Woonsocket Regional Wastewater Facility, and based on the Town's records, the connected population is approximately 5,168 residents.

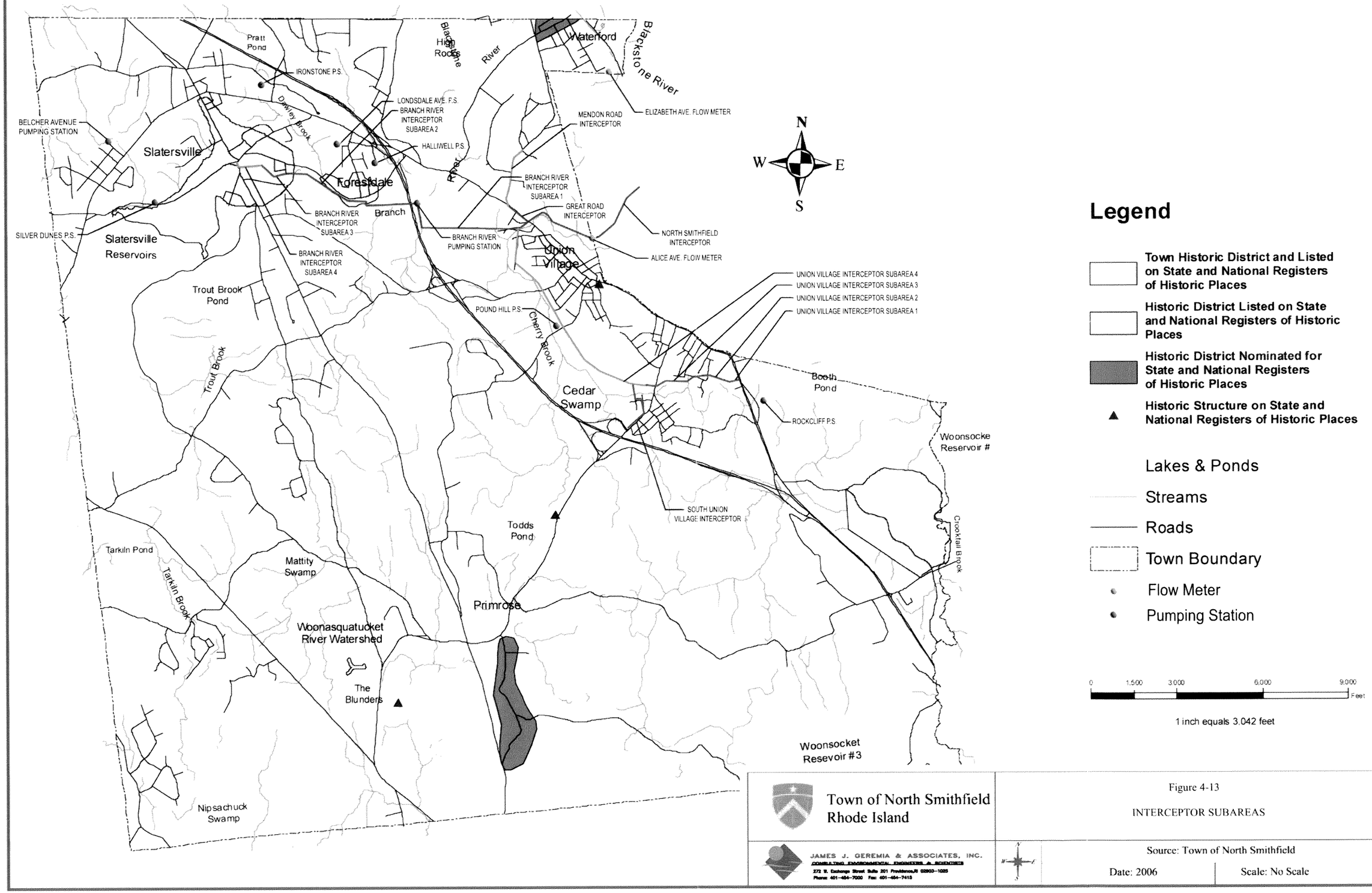
Figure 4-13 also shows sub-areas of each interceptor's service area. Hydraulically, it is not necessary for the upper portion of the interceptors to carry the entire flow from the interceptor service area. For this reason, sub-areas were established on the basis of a reasonable estimate of incremental capacity requirements. In the following analyses, the sub-areas are examined, and conclusions are formulated on the adequacy of the interceptor segment capacities within these sub-areas. In analyzing the sub-areas, several factors were considered. On the following pages, these factors are explained and evaluated in order to provide for an overall view of the adequacy of the interceptor segments.

Wastewater Flow

In analyzing the adequacy of each sewer, it was necessary to determine sewage flow based upon the Town's flow records for each contributing pumping station, and upon the current population. In the areas where the pumping stations were not the sole contributors, the zoning maps and existing sewer maps were utilized to determine the number of dwelling units. Based upon the U.S. census figure, an occupancy rate assumed at 2.61 persons per unit. The per dwelling flow rate used was 180 gallons per day per unit, and was determined from sewer flow data obtained from the Town of North Smithfield.

Peaking Factors for Wastewater Flow

It is sound engineering practice in the design or evaluation of sewers, to include an allowance for peak rates of flow. Peak rates of flow are obtained by increasing the average daily flow by a percentage. The larger the



Town of North Smithfield
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Figure 4-13

INTERCEPTOR SUBAREAS

JAMES J. GEREMIA & ASSOCIATES, INC.
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Phone: 401-454-7000 Fax: 401-454-7415

Source: Town of North Smithfield

Date: 2006

Scale: No Scale

population serviced, the lower the peaking factor. The reason for the variation in peaking factors is that peak discharges from small areas tend to reach a common point in the sewer at the same time. Conversely, in a large area, nearby peak discharges pass a specific point sooner than peak discharges from a more remote area. This is due to storage and travel time in the sewer. Peaking factors used in this analysis were obtained from "Design and Construction of Sanitary and Town Sewers", Water Pollution Control Federation (WPCF) Manual of Practice No. 9, and from available flow records. The average daily domestic flow for a given sub-area was multiplied by the appropriate peaking factor to obtain peak daily flow.

Interceptor Capacities

To determine the adequacy of each sewer segment, it was necessary to compare existing capacities with the present wastewater flows. The capacity of the pipe sections was computed using Manning's equation for circular pipes flowing full and was used in the form:

where; $Q = (1.49A/n)R2/3\ S1/2$

Q = discharge (cfs)

A = cross section area (ft2)

n = Manning roughness coefficient (dimensionless)

R - hydraulic radius (ft), pipe diameter/4 for pipes flowing full

S = slope of the pipe (ft/ft), assumed parallel to the hydraulic grade line

The roughness coefficient used in this analysis for the interceptors was 0.013, and is a standard design value. All pipe diameters and slopes were obtained from "as-built" drawings.

The capacity of each pump station was determined from the Town's Wastewater Collection System records.

Pump Station Adequacy

Branch River Pump Station: The Branch River Pump Station processes flow from the entire sewer system west of Route 146. The station consists of three 1,900 GPM constant speed pumps. Based on the Operations & Maintenance Manual, the capacity of the station is 3.97 MGD (2,757 GPM). The pump station was designed

for one pump running, one as standby, and one as an emergency in accordance with the Operation and Maintenance Manual for the station. The average daily flow is 226,400 GPD (157 GPM) and the peak daily flow is 679,200 GPD (470 GPM). Therefore, the Branch River Pump Station is adequate for existing flows.

Pound Hill Pumping Station: The present capacity of the Pound Hill Pump Station is 1,584,000 GPD (1,100 GPM). The pump station processes flows from the Union Village Interceptor located east of Pound Hill Road. The average daily flow is 184,000 GPD (128 GPM) and the peak daily flow is 332,000 (383 GPM). The station consists of two vertical centrifugal sewage pumps rated at 1,100 GPM each. The pump station is adequate for the existing sewage flows.

Sharon Parkway Pump Station: The Sharon Parkway Pump Station contains two submersible sewage pumps each rated at 150 GPM. In accordance with TR-16 published standards of the New England Interstate Water Pollution Control Commission, the capacity of the station is 150 GPM, the capacity of the station with one pump in service while the other pump is on standby.

The station receives an average flow of 6,500 GPD (5 GPM) and a peak flow of 19,500 GPD (14 GPM). Based on the existing flows, the present system is adequate.

Lorraine Avenue Pump Station: The Lorraine Avenue Pump Station contains two ABS Piranha grinder sewage pumps, each rated at 40 GPM. The capacity of the station is 57,600 GPD (40 GPM). The present average daily flow entering the station is 9,900 GPD (7 GPM) and the peak rate of flow is 29,700 GPD (20 GPM). The pump station is adequate to handle the existing sewage flows.

Halliwell Pump Station: The present capacity of the Halliwell Pump Station is 61,900 MGD (43 GPM). The station has two ABS Piranha grinder sewage pumps. The present average daily flow entering the station is 6,900 GPD (5 GPM) and the peak daily rate of flow is 20,700 GPD (14 GPM). The pump station has the capacity to handle the existing sewage flows.

Ironstone Pump Station: The present average daily flow entering the station is 22,400 GPD (16 GPM) and the peak daily rate of flow is 67,200 GPD (47 GPM). The present capacity of the Ironstone Pump Station is 110 GPM (158,400 GPD). Therefore, the pump station is adequate to handle the existing sewage flows.

Belcher Avenue Pump Station: The Belcher Avenue Pump Station has a capacity of 266,400 GPD (185 GPM). The present average daily flow is 9,400 GPD (7 GPM) with an associated peak daily flow of 28,200 GPD (20 GPM). The pump station is adequate to handle the existing flows.

Silver Pines Pump Station: The Silver Pines Pump Station has a capacity of 288,000 GPD (200 GPM). The present average daily flow is 3,000 GPD with an associated peak daily flow of 9,000 GPD. The pump station is adequate to handle the existing flows.

Rockcliff Farm Pump Station: The Rockcliff Farm Pump Station has a capacity of 259,200 GPD (180 GPM). The present average daily flow is 2,000 GPD with an associated peak daily flow of 6,000 GPD. The pump station is adequate to handle the existing flows.

Interceptor Adequacy

Table 4-7 compares the estimated peak flows to the present capacities for each interceptor segment. Each interceptor segment consists of various sizes and slopes, resulting in a variation in capacities within each segment. The capacities shown in Table 4-7 represent the lowest capacity of an interceptor segment. Estimated peak flows will be compared to the "weakest link" (section) within the segment.

It can be concluded from the tabulations in Table 4-7 that the existing interceptors and pumping stations are adequate for the existing peak sewage flows.

4.2.4 INFILTRATION/INFLOW

Infiltration is groundwater entering a collection system primarily through defective sewer pipes, pipe joints, other connections and manhole walls. Inflow is the water discharge into a collection system from such sources as roof leaders, sump pumps, foundation drains, manhole covers and cross connections, among others. Infiltration is a physical factor. It is the result of groundwater levels and improperly installed materials and methods of construction, pipe joints, manholes and chamber structures and connections. Some of the major causes of infiltration are: improperly constructed sewer pipe joints, unstable pipe bedding, improper methods of backfilling, defective plugs used on stubs and sewer connections, inadequate testing and inspection of sewer

TABLE 4-7 ADEQUACY ANALYSIS EXISTING PEAK FLOWS			
INTERCEPTOR	**MINIMUM CAPACITY (MGD)**	**PEAK DISCHARGE (MGD)**	**COMMENTS**
North Smithfield	14.52	1.91	Adequate
Union Village			
Segment 1	0.62	0.005	Adequate
Segment 2	0.90	0.030	Adequate
Segment 3	1.26	0.176	Adequate
Segment 4	2.29	0.292	Adequate
Segment 5	3.72	0.552	Adequate
Branch River			
Segment 1	8.01	0.679	Adequate
Segment 2	5.61	0.679	Adequate
Segment 3	2.64	0.160	Adequate
Segment 4	1.78	0.160	Adequate
South Union Village	2.29	0.110	Adequate
Great Road	2.82	0.195	Adequate
Mendon Road	2.99	0.120	Adequate
Branch River P.S.	3.97	0.226	Adequate
Pound Hill P.S.	1.58	0.552	Adequate
Sharon Parkway P.S.	0.22	0.020	Adequate
Lorraine Ave. P.S.	0.058	0.030	Adequate
Halliwell P.S.	0.062	0.021	Adequate
Ironstone P.S.	0.158	0.067	Adequate
Belcher Ave. P.S.	0.266	0.028	Adequate
Silver Pines P.S.	0.288	0.003	Adequate
Rockcliff Farm P.S.	0.259	0.002	Adequate

construction (as well as service connections), improper construction of manholes (such as pipe connections and horizontal joints), pipe deterioration due to age, and pipe damage at points where service connections cross from shallow trenches to deep structure tunnels.

Inflow is the result of connections of sources of water into the sewage collection system. These connections are made as a method to dispose of unwanted sources of stormwater or other drainage water into a sewer conduit. Inflow can be a result of draining low areas through manhole covers, cross connections of drainage systems, discharges from roof leaders, foundation drains and basement drains or sump pumps. Flow from such sewers is a result of operational conditions and can be corrected by rigorous regulations and inspections.

An Infiltration/Inflow Analysis is an engineering analysis for the purpose of demonstrating the possible existence, or non-existence, of excessive infiltration/inflow in each sewage collection sub-system discharging to the treatment works. This analysis identifies the presence of extraneous flows and characterizes flows as being either infiltration, inflow or both. A "desk top" investigation was performed to examine the extent of infiltration/inflow (I/I) that enters the North Smithfield collection system. The total town-wide I/I entering the collection system during the wet season was determined to be 0.862 MGD.

Infiltration

The rate of infiltration was calculated utilizing the actual flow figures during the wet season (months of March and April). The infiltration rates for the system were determined by subcontracting the average dry weather flows from the average daily flows during high water conditions (excluding flows during rainfalls). The dry weather flows were determined from examining the wastewater flow during the months of July, August and September (when there is very little rainfall and groundwater was at its lowest).

Table 4-8 presents the development of the average infiltration rate of 0.287 MGD.

TABLE 4-8 DETERMINATION OF INFILTRATION	
	SEWER SYSTEM [1] (MGD)
Average Flow (March - April)	0.764
Dry Weather Flow	0.473
Infiltration	0.287
Connected Population	5,168
Per Capita (GPCD)[1] - Residential	139
Infiltration Per Equivalent Dwelling Unit (GPD)[2]	145

1 Infiltration and residential flow during periods of high groundwater of 139 GPCD was determined by subtracting the existing non-domestic flow of 0.046 MGD from the average flow of .764 MGD (0.764 - 0.046) and dividing it by the sewered population of 5,168.

2 Infiltration per Equivalent Dwelling Unit = 287,000 divided by 1,980 units.

Inflow

The wet weather flows during the latter part of March and the month of April were used to determine the average wet weather flow based on four (4) rain events ranging from intensities of 2.4 inches to 6.21 inches. The rainfall intensities were based on the National Oceanic and Atmospheric Administration (NOAA) recorded data for the area.

The flows in these months were utilized because the Rhode Island Department of Environmental Management, as discussed previously, has determined this period to be during the wet season. The wet season is defined as the period of time when the groundwater is at its highest. The dry weather flow and infiltration determined previously was subtracted from the total flow. The result is the wet weather inflow to the collection system.

Table 4-9 presents the results of the inflow analysis.

TABLE 4-9 DETERMINATION OF INFLOW	
	SEWER SYSTEM[1] (MGD)
Wet Weather Flow	1.339
Dry Weather and Infiltration	0.764
Inflow	0.575
Connected Population	5,168
Per Capita (GPCD)	250

[1] The per capita flow was determined by dividing the connected population by the wet weather flow.

The domestic wastewater plus non-excessive infiltration of 139 gallons per capita per day (GPCD) is slightly over the recommendation of 130 GPCD in accordance with the EPA Handbook, Sewer System Infrastructure Analysis and Rehabilitation. The total daily flow during a storm is 250 GPDC which does not exceed 275 GPCD based on the EPA Handbook. Therefore, it is not recommended that the Town undertake an Infiltration/Inflow analysis.

The system's Infiltration/Inflow is 0.862 MGD as summarized in Table 4-10.

TABLE 4-10 SUMMARY OF INFILTRATION/INFLOW	
	SEWER SYSTEM (MGD)
Infiltration	0.287
Inflow	0.575
Infiltration/Inflow	0.862
TOTAL INFILTRATION/INFLOW = 0.287 + 0.575 = 0.862 MGD	

4.3. EXISTING FLOWS AND WASTELOADS

4.3.1 FLOWS

Sources of existing wastewater flows in the Town of North Smithfield includes single and multiple family residential units, commercial establishments, public buildings, industries, infiltration into the sewer system from groundwater and inflow from storm water run-off.

The Woonsocket Regional Wastewater Treatment Facility serves the North Smithfield Wastewater Collection System.

The North Smithfield residential, commercial, and industrial flow component was determined by applying a per capita flow allowance to an estimate of the present connected population. The average per dwelling flow allowance is 180 gallons per dwelling unit (gpdu) based upon an examination of the current sewer records. The present connected population was determined by comparisons of dwelling unit counts within the service area to data on connected population from the Sewer and Water Department. The total estimated population served by the North Smith field Wastewater Collection System is approximately 5,168 persons (1,980 dwelling units). The existing average daily sewage flow based on the Town of North Smithfield is 764,000. The peak rate of flow (PF = 2.75) is 2,104,500 GPD.

The total industrial component of the wastewater flow is estimated to be 46,000 gallons per day. A summary of the industrial facilities connected to the wastewater collection system are summarized in Table 4-11.

TABLE 4-11
INDUSTRIAL DISCHARGERS

Stamina Mills*
Philip Components*
Stone Systems
SAE-BC Enterprises
National Marker

* Groundwater remediation

Current infiltration/inflow (I/I) user quantities were calculated to be 287,000 gallons per day and 575,000 gallons per day, respectively. Table 4-12 indicates flow components of the present daily flows.

TABLE 4-12
PRESENT FLOW COMPONENTS
NORTH SMITHFIELD

	AVERAGE DAILY (GPD)	FLOW DISTRIBUTION (%)	PEAK HOURLY (GPD)
Residential & Commercial	431,000	56.41	1,127,500
Industrial	46,000	6.02	115,000
Infiltration	287,000	37.57	287,000
Inflow	0		575,000
TOTAL	**764,000**	**100.00%**	**2,104,500**

4.3.2 WASTELOADS

Wasteloads were determined from actual wastewater flow analysis at the Woonsocket Regional Wastewater Treatment Facility from January - December 2005. Results of the analysis from the regional flow can be found in Table 4-13.

TABLE 4-13
EXISTING INFLUENT FLOWS AND WASTELOADS (2005)
AT THE WOONSOCKET REGIONAL WASTEWATER TREATMENT FACILITY

MONTH	FLOW (MGD)	BOD (LB/DAY)	TSS (LB/DAY)
January	8.7736	10,941	9,013
February	7.7272	11,117	7,296
March	7.2956	11,875	7,506
April	8.2849	9,600	9,549
May	8.9964	13,238	12,009
June	7.9125	14,660	14,886
July	7.3651	12,353	13,233
August	6.6261	15,069	12,312
September	6.3531	11,278	11,303
October	11.402	13,821	14,419
November	9.989	11,957	9,528
December	9.5017	12,018	9,141
AVERAGES	**8.35**	**12,327**	**10,850**

4.3.3 SEPTAGE LOADS

Industrial septage volumes and characteristics will not be discussed in this report because the industrial establishments within the Town of North Smithfield are connected to the collection system.

Domestic septage may be defined as a partially digested mixture of liquid and solid material that originates as waterborne domestic wastes. Septage accumulates in a septic tank or cesspool over a period of several months or years. Normally, household wastes are derived from facilities such as toilets, baths or showers, sinks, garbage disposals, dishwashers, and washing machines. Septage may also include the pumpings from the septic tanks of schools, motels, restaurants, and similar establishments. Septage is frequently discharged into municipal wastewater systems, however, careful design and operation is required to handle it adequately.

The amount of septage generated from any project area is directly related to the non-sewered population and the frequency of individual septic tank pump-outs. The calculations were based on a conservative value of 150 gallons per capita per year. The results are summarized in Table 4-14. All septage collected within Town by licensed haulers is transported to various out of town wastewater facilities for proper treatment.

TABLE 4-14
EXISTING SEPTAGE QUANTITIES

	TOTAL NON-SEWERED POPULATION	TOTAL SEPTAGE VOLUME (GAL/YR)	EQUIVALENT PER CAPITA SEPTAGE (GPC/YR)
North Smithfield	5,450	817,500	150

4.3.4 STAFFING

The efficiency of the operation and maintenance of the wastewater collection system is highly dependent on the skill of the employees. The collection system is designed to provide a dependable public utility to its users. A preventive maintenance program for the collection system will prevent a public health hazard and inconveniences through needless interruptions of services, prevent unnecessary damage to the existing

system, and to prevent lawsuits against the municipality by property owners who have had damage caused to their property caused by blockages in the sewer mains.

The present staffing for the North Smithfield Wastewater Collection system consists of one individual who is not only responsible for the maintenance of the wastewater collection system, but also of the water distribution system.

The present staffing that the Town has is not sufficient to conduct a preventive maintenance program for the collection system. A minimum of two persons should be employed for safety purposes and to conduct routine maintenance of the wastewater collection system. A third, part-time, person (possibly a floater between the Public Works, Wastewater Division and Water Division) should be considered when confined space entry is required by the Wastewater personnel. As more pumping stations and sewer laterals are brought on line, the Town must consider establishing a road crew dedicated to the pumping stations.

4.3.5 INDUSTRIAL PRETREATMENT

The administering and enforcing of industrial pretreatment requirements for those significant industrial users which are located within the Town of North Smithfield, is the responsibility of the City of Woonsocket. This responsibility is stated in Section 10, "Domestic, Industrial, and other Wastes" of the Wastewater Disposal Service Contract between the City of Woonsocket and the Town of North Smithfield.

The Industrial Pretreatment Program is administered by the Pretreatment Coordinator of the City of Woonsocket.

Currently, there are eleven (11) Significant Industrial Users located within the Town of North Smithfield, which are regulated by the Program. Of these eleven industries, only one falls under the classification of an EPA Categorical Industry. The majority of these Significant Industrial Users are located in the North Smithfield Industrial Park area, and are therefore serviced by the Branch River Interceptor.

Table 4-15 lists the dischargers located within the Town of North Smithfield which are regulated by the City of Woonsocket's Industrial Pretreatment Program.

TABLE 4-15
PERMITTED INDUSTRIAL DISCHARGERS
TOWN OF NORTH SMITHFIELD

Stamina Mills*
Philip Components*
Stone Systems
SAE-BC Enterprises
National Marker

* Indicates Groundwater Remediation

The total average daily industrial flow attributed to the North Smithfield users listed in Table 4-15 is 46,000 gpd.

4.3.6 SEWER USE CHARGES

Sewer User Charges

The Town's sewer use charges recover from each user the Town's share of the annual cost of operation and maintenance of the Woonsocket Regional Wastewater Treatment Facility and the annual cost of operation, maintenance, and minor capital improvements associated with replacement and repair of the Town's wastewater collection system.

The Town's share of the operation and maintenance of the Woonsocket Facility is based on the sewage flows monitored by the Alice Avenue and Elizabeth Avenue Flow Metering Stations and by water consumption for those which are not part of the flow monitoring. The operation and maintenance cost disbursement is then proportioned based on percentages of the total flow which is treated by the Woonsocket Wastewater Treatment Facility.

The cost disbursement for capital expenses to the WWTF are proportioned based on percentages of total flow, which have been designed into the WWTF. The percentages are as follows:

Woonsocket	68.5%	11.00 MGD
North Smithfield	18.7%	3.00 MGD
Blackstone	4.7%	0.75 MGD
Bellingham	8.1%	1.30 MGD

Each sewer user is charged on a per unit assessment to cover the capital cost and operational/maintenance cost for the Woonsocket WWTF and the operation and maintenance of the North Smithfield Wastewater Collection System on a yearly basis. The cost per unit is adjusted on a yearly basis; therefore, there are no deficits.

The sewer assessments are based on assessed value of land and buildings; a number of feet by which the estate abuts the street; and a flat fee per unit. The cost is spread over a 20-year term and is assessed only to the individuals who directly benefit from the improvement. The establishment of each district is done by Ordinance at the time the bonds are issued.

The total cost recovery system for the Town has, as a whole, been well formulated such that the cost to the Town for providing sewer services has always been covered by the funds the recovery system provides.

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5.0 FUTURE CONDITIONS

5.1 FUTURE SEWERED POPULATION AND SERVICE AREA

It is prudent to explore the various impacts associated with the expansion of sewer service before the delineation of future service areas and subsequent increased populations are presented. Typically, these evaluations include political impacts, legal/institutional impacts and secondary impacts.

The legal/institutional arrangements required to maintain and regulate a sewer system expansion are already in place within the communities of North Smithfield and Woonsocket. As discussed in Chapter 2.0, an Intermunicipal Agreement was executed between the Town of North Smithfield and the City of Woonsocket.

There are Individual Sewer Disposal System problems in areas without public sewers. There are development pressures on land parcels adjacent to the existing sewer service areas and soil constraints for Individual Sewer Disposal Systems making development more difficult. Through construction of sewer lines growth will be stimulated. Additionally, based on existing zoning allowances and demands for building permits, increases in the number single and multi-family units will likely occur within the study areas whether or not there are extensions of sewer lines.

As sewer lines are expanded, the Town may seek to mitigate the impact of the residential and open space area's character by either zoning changes to smaller lots or petitions for zoning variances that are carefully controlled by the local Planning and Zoning Boards.

It must be recognized that although the collection system is based on a certain development assumption, once the collection system is provided, development may proceed in many different ways and at differing rates, unless the Town makes a conscientious effort to control development through zoning or other planning techniques.

Development can be effectively controlled and managed. The Comprehensive Plan for North Smithfield should provide the needed directions and legal infrastructure to control these expected pressures.

It is anticipated that North Smithfield will continue to increase in sewer service population throughout the planning period of this document. Areas that have been defined as future service areas are depicted in Figure 5-1. The future service area is adjacent to the existing areas with sewers and is within the groundwater recharge area of the Slatersville Reservoir. Reviews of the Department of Environmental Management's records for Individual Sewer Disposal Systems for the past five years and discussions with Town officials revealed that there have been failures of Individual Sewer Disposal Systems in the future areas, as depicted in Figure 5-1. The remaining areas without sewers were evaluated and based on the sparsely located dwellings, it was determined that a Wastewater Management District be established to prevent Individual Sewer Disposal System problems and to preserve the water quality of groundwater and surface waters within the Town of North Smithfield. The Wastewater Management District will control the repair, replacement and maintenance of Individual Sewer Disposal Systems within the newly formed District.

For purposes of this study, it is assumed that 100 percent of a future service area will have sewer lines at build-out. Table 5-1 indicates that the population with sewers will reach 10,148 in the year 2025.

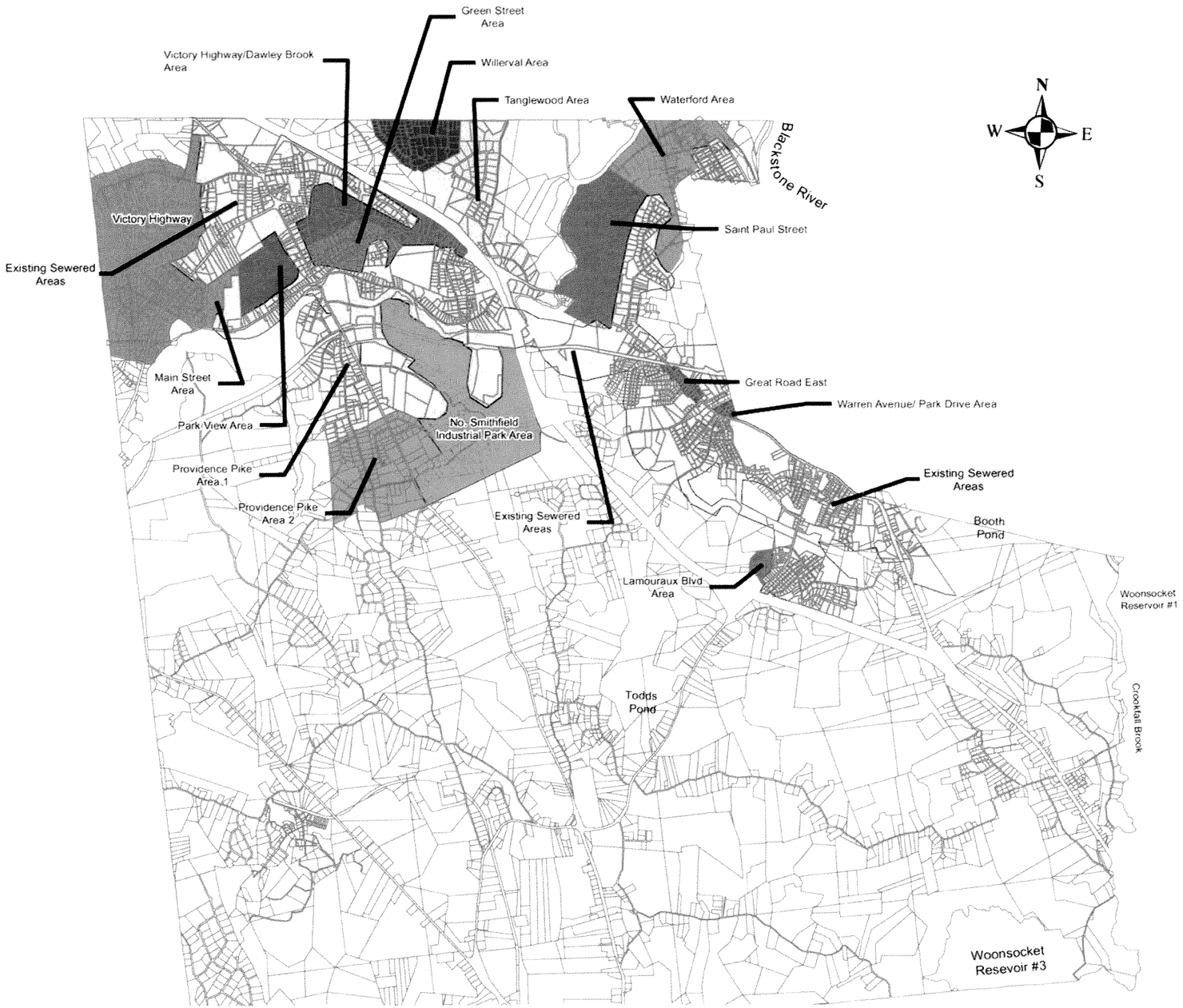
TABLE 5-1
EXISTING AND FUTURE POPULATIONS WITH SEWERS

	2005	2010	2015	2020	2025
Population	5,168	6,961	8,023	9,085	10,148
Dwelling Units	1,980	2,668	3,074	3,481	3,888

The future service area consists of soils that have constraints such as:

- Slow permeability in excess of 40 minutes per inch.
- Seasonally high water table located between 1.5 to 3.0 feet from the surface.
- Shallow bedrock between 1 to 3.0 feet from the surface.

In accordance with the Department of Environmental Management's regulations these soils are not considered suitable for Individual Sewer Disposal Systems.



1 inch equals 3,208 feet

Town of North Smithfield
Rhode Island

Figure 5-1

FUTURE SEWER SERVICE AREA

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Source: Town of North Smithfield

Date: 2006

Scale: No Scale

In accordance with the recommendations of the Comprehensive Plan and the soil characteristics, the areas of the Town listed below in Table 5-2 will constitute the future sewer areas. The Town should monitor growth patterns, environmental conditions, development proposals, and availability of construction funding when evaluating sewer line extensions for these areas.

TABLE 5-2
PROJECTED FUTURE AREAS FOR SEWER EXTENSION

Great Road East	St. Paul
Greene Street	Victory Highway
Lamoureux Boulevard	Victory Highway/Dawley Brook
North Smithfield Industrial Park	Warren Avenue/Park Drive
Park View	Waterford
Providence Pike No. 1	Willerval/Tanglewood
Providence Pike No. 2	

5.2 FUTURE LAND USE

The future use of land in North Smithfield was discussed in Section 4 to highlight the factors that zoning has as well as the following factors affecting future use of land:

- The nature of the existing distribution of uses.
- Current zoning controls that were developed as the result of previous comprehensive planning studies.
- Physical constraints imposed by topography and soils.
- The location of aquifers and their recharge areas with existing and potential surface water supply reservoirs and their watersheds.
- Drainage and flooding systems along wetlands, streams and rivers.
- The need to set aside areas for conservation, recreation, open space, schools and public buildings and facilities.
- The present or proposed availability of sewer and water services.

In the Build-Out Analysis discussed in Section 4, assumptions were made based on the existence of natural constraints and land needed for new infrastructure. The 1992 Comprehensive Plan suggested that 2,100 dwelling units could be accommodated in Town. Yet the potential mill conversion projects, re-zoning proposed in the updated 2005 Comprehensive Plan, possible density bonuses granted in order to encourage additional affordable housing and other land development projects could lead to a more accurate build-out of approximately another 6,320 additional dwelling units. Assuming the average number of people per household holds steady at 2.61, the additional dwelling units could support another 16,495 people in North Smithfield.

5.3 FUTURE INFILTRATION AND INFLOW

The existing infiltration/inflow values are incorporated for the North Smithfield sewer collection system in Table 5-3 under the heading Present (2005). For those areas currently not served by sewers, a per dwelling unit rate of 65 GPD (2.61 persons per dwelling unit x 25 gallons per person per day) for infiltration/inflow was used. Table 5-3 illustrates the amount of infiltration/inflow that will be generated by sewer service to future service areas.

TABLE 5-3
SUMMARY OF
INFILTRATION/INFLOW COMPONENTS

Present (2005)	
Infiltration	0.287 MGD
Inflow	0.575 MGD
Future (2025)	
Infiltration/Inflow	0.073 MGD
TOTAL	**0.935 MGD**

5.4 FUTURE FLOWS AND WASTE LOADS

5.4.1 FUTURE FLOWS

In order to compute the future wastewater flows, the following assumptions are made based on a realistic, but conservative approach:

- Present residential per dwelling unit wastewater flow selected for the computation is equal to 180 GPD per dwelling unit, based on the sewer flows obtained from the North Smithfield Sewer Department.
- Based on the existing plumbing code that promotes water conservation methods, it will continue to result in the stabilization of water consumption.
- Future residential per dwelling unit wastewater flow will be based on 300 GPD.
- Wastewater flows for Silver Pines, Rockcliff Farm, Laurel Woods, Graves and Slatersville Mill Developments are based on design flow data from each entity.
- Future infiltration will be increased by 65 GPD (25 GPD x 2.61 persons per dwelling unit) for the future dwellings.
- Future inflow will remain at the current level.
- Peak flow factor for future residential, industrial and commercial flows is based on flow records from TR-16.
- Future industrial and commercial flow is based on 1,000 GPD per acre.

Utilizing previously presented population projections, flows, infiltration/inflow rates, the industrial - commercial flows and Comprehensive Plan, the information for Table 5-4 was calculated.

The increase in flow over the next 20 years (shown in Table 5-4) is from 0.764 MGD to 1.573 MGD. Currently, the average daily flow into the Woonsocket wastewater treatment facility from all sources is 8.35 MGD, that is less than the design flow of 16.05 MGD. Therefore, the average increase of 0.809 MGD is not anticipated to have an adverse impact on the proper operation of the Woonsocket wastewater treatment facility. Furthermore, of the 16.05 MGD design flow, 3.0 MGD is allotted to North Smithfield based on the Intermunicipal Agreement. The total flow from the Town of North Smithfield in the year 2025 is anticipated to be 1.573 MGD, or slightly more than one-half of the design flow allotment to North Smithfield.

TABLE 5-4 SUMMARY OF ANTICIPATED FUTURE WASTEWATER FLOW FOR THE TOWN OF NORTH SMITHFIELD				
	2005		2025	
	Average Daily Flow (MGD)	Peak Hourly Flow (MGD)	Average Daily Flow (MGD)	Peak Hourly Flow (MGD)
Residential/Commercial	0.431	1.078	0.995	2.488
Industrial	0.046	0.115	0.218	0.575
Infiltration	0.287	0.287	0.360	0.360
Inflow	0.000	0.575	0.000	0.575
Totals	**0.764**	**2.055**	**1.573**	**3.998**

5.4.2 FUTURE WASTE LOADS

The residential and commercial waste load contributions for the year 2025 was computed by first making the assumption that per capita waste loads of suspended solids and BOD_5 in the regional system are essentially equal to the nationwide average per capita loadings of these constituents. These average concentrations for the residential and commercial sources are 0.17 pounds of BOD_5 per capita per day and 0.20 pounds of suspended solids per capita per day. These averages, along with previously computed connected population figures, were then compared to minimum design standards for influent BOD5 and TSS. These computer values were less than the minimum design standard of 250 mg/l of BOD and TSS. Therefore, the results presented in Table 5-5 reflect an influent concentration of 250 mg/l.

TABLE 5-5 AVERAGE FUTURE WASTE LOADS AND CONCENTRATIONS (Residential, Commercial and Industrial)				
Year	BOD_5 Load (lb/d)	TSS Load (lb/d)	BOD_5 Conc. (mg/l)	TSS Conc. (mg/l)
2005 [1]	1,592	1,592	250	250
2025 [2 3]	6,255	6,255	250	250

1 Based upon actual flow conditions and concentrations of 250 mg/l.
2 Based upon 250 mg/l influent concentration of BOD_5 and TSS.
3 Based upon the contractual flow of 3.0 MGD with the City of Woonsocket.

5.4.3 FUTURE SEPTAGE VOLUME AND LOADS

The future quantities of septage were computed for the North Smithfield project area based on the projected future non-sewered populations and the rate of per capita septage generation. For calculating future septage quantities, a conservative value of 150 gallons per capita per year was used.

The summary of the non-sewered population projections and future septage volumes is presented in Table 5-6.The loading associated with the future septage increases were calculated based on the average characteristics of domestic septage recommended for design purposes in EPA publications. These characteristics are listed in Table 5-7.

TABLE 5-6
PROJECTED FUTURE SEPTAGE QUANTITIES

	2005 Non-Sewered Septage			2025 Non-Sewered Septage		
Town	**Population**	**gal/yr**	**gal/day**	**Population**	**gal/yr**	**gal/day**
North Smithfield	5,450 [1]	817,500	2,240	980	147,000	403

[1] Derived from the following: 1,980 units sewered x 2.71 persons per unit = 5,168 sewered population.
10,168 current population - 5,168 = 5,450 unsewered population.

TABLE 5-7
PHYSICAL AND CHEMICAL CHARACTERISTICS OF SEPTAGE

PARAMETER	SUGGESTED[1] DESIGN VALUE	PARAMETER	SUGGESTED[2] DESIGN VALUE
TS	40,000 mg/l	Iron	205 mg/l
TVS	25,000 mg/l	Zinc	49 mg/l
TSS	15,000 mg/l	Aluminum	48 mg/l
VSS	10,000 mg/l	Lead	8.4 mg/l
BOD_5	7,000 mg/l	Copper	6.4 mg/l
COD	15,000 mg/l	Manganese	5.02 mg/l
TKN	700 mg/l	Chromium	1.07 mg/l
NH3-N	150 mg/l	Nickel	0.90 mg/l
Total P	250 mg/l	Cadmium	0.71 mg/l
Alkalinity	1,000 mg/l	Mercury	0.28 mg/l
Grease	8,000 mg/l	Arsenic	0.16 mg/l
pH	6.0	Selenium	0.076 mg/l

1 Handbook for Septage Treatment and Disposal, EPA, October 1984
2 Process Design Manual. Sludge Treatment and Disposal, EPA, September, 1979

5.5 FUTURE ADEQUACY OF THE INTERCEPTOR SYSTEM AND PUMP STATIONS

Current capacities of the interceptor segments are presented in Section 4.2.3. This information is used in this Section for comparison with forecasted wastewater flows in the year 2025.

Pound Hill Pump Station

The Pound Hill Pump Station will be receiving flows from residential neighborhoods bounded on the north by Pound Hill Road, south by Louisquisett Pike, east by Great Road and on the west by the North Smithfield Expressway (Route 146). The capacity of the station is 1,584,000 GPD (1,100 GPM) and the future peak daily flow is 603,100 GPD (420 GPM). The pump station is adequate for future flows.

Branch River Pump Station

Branch River Pump Station receives the wastewater generated by the service area located west of the North Smithfield Expressway (Route 146). The capacity of the Branch River Pump Station is 2,736,000 GPD (1,900 GPM) and the future peak daily flow is 2,146,900 GPD (1,490 GPM). Therefore, the pump station is adequate for future flows.

Sharon Parkway Pump Station

The Sharon Parkway Pump Station will be receiving residential flows of 6,500 GPD on the average with a peak daily flow of 19,500 GPD. The capacity of the pump station is 216,000 GPD, therefore, the pump station is adequate for future flows.

Lorraine Pump Station

The Lorraine Pump Station will be receiving residential flows of 9,900 GPD on the average with a peak daily flow of 29,700 GPD. The capacity of the pump station is 58,000 GPD, therefore, the pump station is adequate for future flows.

Halliwell Pump Station

The Halliwell Pump Station will be receiving flows from the Halliwell Elementary School and from residential dwellings. The average daily flow will be 10,400 GPD with a peak flow of 31,200 GPD. The pump station is adequate for future flows because the capacity of the pump station is 62,000 GPD.

Ironstone Pump Station

The Ironstone Pump Station will be receiving average daily residential flow of 37,100 GPD with an associated peak daily flow of 111,300 GPD. The capacity of the pump station is 158,000 GPD, therefore, the pump station is adequate for future flows.

Belcher Avenue Pump Station

The Belcher Avenue Pump Station will be receiving flows from the Victory Highway (Route 102) future service area as well as the existing flows. The future average daily flow will be 67,900 GPD and the future peak daily flow will be 181,000 GPD. The capacity of the pump station is 266,000 GPD, therefore, the pump station is adequate for future flows.

Silver Pines Pump Station

The Silver Pines Pump Station will convey flows from the Silver Pines Condominium Association as well as residential dwellings along Main Street. The average daily flow to the pump station will be 49,700 GPD and the peak daily flow will be 134,100 GPD, which is less than the capacity of 288,000 GPD, making the station adequate for future flows.

Rockcliff Farm Pump Station

The Rockcliff Farm Pump Station will be receiving flows from the Rockcliff Farm Condominiums, from residential dwellings and from two office buildings that will contribute an average daily flow of 23,600 GPD and

a peak daily flow of 134,000 GPD. The design capacity of the pump station is 259,000 GPD, therefore, the pump station is adequate for future flows.

Table 5-8 presents the lowest capacities in each interceptor segment and the forecasted wastewater flows. From this comparison it is evident that the existing interceptors are adequate in the year 2025.

TABLE 5-8
FUTURE INTERCEPTOR SEGMENT ADEQUACY ANALYSIS

INTERCEPTORS	MIN. CAPACITY (MGD)	PEAK DISCHARGE (MGD)	COMMENTS
North Smithfield	14.52	3.998	Adequate
Union Village			
Segment 1	0.62	0.076	Adequate
Segment 2	0.90	0.101	Adequate
Segment 3	1.26	0.247	Adequate
Segment 4	2.29	0.366	Adequate
Segment 5	3.72	0.603	Adequate
Branch River			
Segment 1	8.01	2.196	Adequate
Segment 2	5.61	2.196	Adequate
Segment 3	2.54	0.606	Adequate
Segment 4	1.78	0.606	Adequate
South Union Village	2.29	0.113	Adequate
Great Road	2.82	0.170	Adequate
Mendon Road	2.99	0.170	Adequate
PUMP STATIONS	**MIN. CAPACITY (MGD)**	**PEAK DISCHARGE (MGD)**	**COMMENTS**
Branch River	2.74	2.146	Adequate
Pound Hill	1.58	0.603	Adequate
Sharon Parkway	0.22	0.020	Adequate
Lorraine	0.058	0.030	Adequate
Halliwell	0.062	0.031	Adequate
Ironstone	0.158	0.067	Adequate
Belcher Avenue	0.266	0.182	Adequate
Silver Pines	0.288	0.134	Adequate
Rockcliff Farms	0.259	0.071	Adequate

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6.0 ALTERNATIVES AND PLAN SELECTION

6.1 TRANSPORTATION

6.1.1 WASTEWATER COLLECTION SYSTEM ALTERNATIVES

There are several different types of wastewater collection systems which could be used, such as a conventional gravity system and a grinder pump system.

Conventional Wastewater Collection System

The conventional wastewater collection system consists of gravity lateral sewers and pump stations with gravity house service connections. The advantages of this system are that a gravity system requires a minimal amount of maintenance, low operation and maintenance costs, and are typically operational during loss of power. The disadvantage to this system is the construction cost associated with depth of excavation.

Grinder Pump Sewer Systems

Grinder pump sewer systems permit shallow excavations and small diameter pipelines to be provided with individual grinder pump units located at every property. This system is feasible and cost effective in areas with undulating roadways, shallow bedrock, and for dwellings at lower elevations than the roadways. The disadvantages of the grinder pump sewer system are the high operation and maintenance requirements, inability to function during loss of power, requirement of a properly conceived and implemented management arrangements, individual home electrical requirements, and provisions for portable standby power. Grinder pump sewer systems are used in combination with gravity sewers to ensure that the gravity sewers are cost effective.

Cost-Effective Analysis

The capital cost was developed for each alternate system, assuming a service area consisting of 65 dwelling units and 6,000 linear feet in length. Table 6-1 summarizes the capital cost of each alternate.

TABLE 6-1 SUMMARY OF CAPITAL COST FOR ALTERNATE WASTEWATER COLLECTION SYSTEMS		
	CONVENTIONAL GRAVITY SYSTEM	GRINDER PUMP SYSTEM
8-inch PVC Pipe	$ 420,000	$ 0
6-inch PVC Pipe	81,300	0
3-inch PVC Pipe	0	210,000
1½-inch PVC Pipe	0	52,000
Pumping System	0	487,500
Sewer Wyes	6,500	0
Precast Concrete Manholes	50,000	0
Rock Excavation and Gravel Refill	66,000	30,000
Dewatering	60,000	30,000
Pavement Replacement	70,000	70,000
Traffic Control	25,000	25,000
Sub-Total	$ 778,800	$ 904,500
Construction Contingencies (25%)	194,700	226,100
TOTAL	**$ 973,500**	**$ 1,130,600**
Cost per Unit	$ 15,000	$ 17,400

Recommendation

Based on the cost-effective analysis and the comparison of the advantages versus disadvantages, it is recommended that the wastewater collection systems consist of a combination of gravity sewers and grinder pump pressure sewers. The pressure sewers will be utilized in areas that have undulating terrain; thereby, a cost-effective system will be provided.

At the facilities planning phase, the location of the grinder pump pressure sewers are determined by the available topography provided by USGS maps. During the design phase, detailed topographic mapping and subsurface investigations will dictate the location of the grinder pump pressure sewers.

The Town has adopted a set of guidelines titled "Standard Sanitary Sewer Requirements" which consists of a set of specifications and details governing gravity sewers, low pressure sewers, force mains, and pump stations that

are based on state-of-the-art technology and RIDEM guidelines. These standards may be revised by the Town as required based on technology improvements or revised RIDEM guidelines.

For Town-sponsored sewer projects, the Town provides a grinder pump unit to each dwelling owner that is located within a low pressure sewer system or a dwelling that is located in a low lying area along a gravity system provided by the Town at no cost to the dwelling owner.

NO-BUILD ALTERNATIVE

The "no-build" alternative will be for the Town of North Smithfield not to provide new wastewater collection systems in the future service areas. The "no build" alternative is inconsistent with the goals and policies of the Comprehensive Plan, State Guide Plan, and the Plans of adjoining communities. The majority of the future service areas are within the Slatersville Reservoir groundwater recharge area classified as GAA (as discussed in Chapter 5.1). The groundwater is presumed to be suitable for drinking water use without treatment. The Slatersville Reservoir is part of the state's major stratified drift aquifer that is capable of serving as a significant source of public water supply and the critical portion of the recharge area.

The no-build alternative will continue to degrade the groundwater and surface water qualities and would not be in conformance with the Comprehensive Plan and the Rhode Island Groundwater Protection Act. The existing development in the future service areas are at densities less than 2 acres, which is considered land that is developed beyond its carrying capacity. These densities have been found by the Coastal Resource Management Council to exceed the natural ability of the soils and other environmental factors to attenuate the effects of development. Most of the on-site individual sewage disposal systems in the future service areas predate state enforced citing and design standards, and are approaching or have approached their expected life span. The soils within the future service area consists of characteristics such as: slow permeability in excess of 40 minutes per inch, seasonally high water table located between 1.5 to 3.0 feet from the surface and shallow bedrock located between 1.5 to 2.0 feet from the surface in accordance with the Soil Survey of Rhode Island prepared by the U.S. Department of Agriculture. The Department of Environmental Management considers these soils as unsuitable for on-site disposal systems and the Comprehensive Plan recommends that these areas with the above constraints be serviced by the sewer system.

Alternate Routes

All of the solutions for facilities improvements in the planning area, except for a no action alternate, involve the conveyance of sewage through lateral sewers and pump stations. The future service areas are adjacent to the existing wastewater collection system, therefore, the points of connection have been established.

6.1.2 WASTEWATER COLLECTION SYSTEM

General

In the determination of the future adequacy of the interceptor systems and pump stations, it was determined that the interceptors and pump stations are adequate for future flows. The future service area will require seven (7) new pump stations and lateral sewers consisting of the conventional gravity system and low pressure system to convey the sewage flows generated by this area.

Table 6-2 summarizes the dwelling units and estimated projected future flows for the future sewered areas described herein.

Great Road East Wastewater Collection System

The Great Road East Wastewater Collection System service area is located along Great Road from Morse Avenue to Lapre Drive, including Highview Avenue. This area consists of approximately 31 residential dwelling units. The low pressure sewer collection system will traverse along Great Road and tie into existing sewer manhole on Lapre Drive. The average wastewater generated by Great Road East Wastewater Collection System is 11,300 GPD with an associated peak flow of 29,900 GPD.

TABLE 6-2 ESTIMATED FUTURE SEWERED AREA FLOWS				
AREA	DWELLING UNITS	RESIDENTIAL FLOW (GPD)	COMMERCIAL INDUSTRIAL FLOW (GPD)	I/I Flow (GPD)
Great Road East	31	9,300	0	2,015
Greene Street	60	18,000	0	3,900
Lamoureux	3	900	0	195
North Smithfield Ind. Park	61	18,300	139,000	3,965
Park View	33	9,900	0	2,145
Providence Pike No. 1	160	48,000	0	10,400
Providence Pike No. 2	99	29,700	0	6,435
St. Paul	101	30,300	36,000	6,565
Victory Highway	159	47,700	7,000	10,335
Victory Highway/Dawley Brook	49	14,700	0	3,185
Warren Avenue/Park Drive	20	6,000	0	1,300
Waterford	86	25,800	0	5,590
Willerval/Tanglewood	256	76,800	40,000	16,640
Laurel Woods*	162	48,600	0	**
Silver Pines*	142	44,700	0	**
Rockcliff Farm*	71	23,700	0	**
Graves*	40	12,000	0	**
Slatersville*	375	50,000	0	**
TOTAL	**1,908**	**514,300**	**222,000**	**72,670**

* Ongoing private developments. Associated flows are based on design flow data approved from each development.

** I/I flows are part of each development's residential flow.

Greene Street Wastewater Collection System

The Greene Street Wastewater Collection System will serve approximately 60 dwellings located on Greene Street, Ridge Road, Country Way, and Pacheco Drive. A pump station with a capacity of 60 GPM will be required to convey the wastewater from the Victory Highway area and from the Greene Street area. The 3-inch force main will traverse along Greene Street to a sanitary manhole located at the apex of the roadway. The gravity system will then traverse along Greene Street to the Branch River Interceptor.

Lamoureux Boulevard Wastewater Collection System

The Lamoureux Boulevard Wastewater Collection System service area is adjacent to the existing sewered area called Birch Hill. The future service area consists of 3 residential dwellings. The gravity lateral system will connect to the South Village Interceptor.

North Smithfield Industrial Park Wastewater Collection System

The North Smithfield Industrial Park Wastewater Collection System is comprised of 139 acres of industrial zoned property and 61 residential dwelling units. The service area is bound on the north by the Branch River, on the south by Pound Hill Road, on the east by the Smithfield Expressway (Route 146), and on the west by Providence Pike. The majority of the gravity lateral system and the low pressure sewer system will flow to a pump station located in the vicinity of the entrance to the CVS Warehouse. The design capacity of the Industrial Park Pump Station is 200 GPM, and the Pump Station will serve 61 residential dwelling units and73 acres of industrially zoned properties. The sewage will be conveyed through an 4-inch force main traversing along North Smithfield Industrial Drive in a northerly direction, to its point of termination approximately 1,000 feet south of Steel Street.

Park View Wastewater Collection System

The future service will convey the wastewater flows generated by 33 dwelling units to the existing sewer system on North Main Street. The Park View Wastewater Collection System consists of Edward Avenue, Park

View Drive, and Northwood Lane. The Park View Pump Station will be located in the vicinity of Edward Avenue and Park View Drive with a capacity of 30 GPM. The 2-inch force main from the station will traverse along Park View Drive to its point of termination at the existing sewer manhole on Park View Drive.

Providence Pike No. 1 Wastewater Collection System

The Providence Pike No. 1 Wastewater Collection System is located within the Slatersville Reservoir recharge area, serving a total of 259 dwellings (160 dwellings - Providence Pike No. 1 area plus 99 dwellings - Providence Pike No. 2 area). The service area is bound on the north by Slatersville Reservoir, on the west by Trout Brook Pond, on the south by Pound Hill Road, and on the west by Providence Pike. The sewer system will discharge to the Branch River Interceptor via the existing river crossing at Steel Street. The average flow generated by the Providence Pike No. 1 area is 58,400 GPD and a peak flow of 154,400 GPD. The collection system will also transport wastewater generated by the Providence Pike No. 2 Wastewater Collection System.

Providence Pike No. 2 Wastewater Collection System

The Providence Pike No. 2 Wastewater Collection System, serving 99 dwelling units, is bound on the north by Slatersville Reservoir, on the south by Pound Hill Road, on the west by Trout Brook, and on the east by the Providence Pike. The collection system will consist of a low pressure sewer system conveying flows to the Providence Pike No. 1 Wastewater Collection System. The domestic sewage to be generated by this service area is 36,100 GPD as the average, with an associated peak daily flow of 95,500 GPD.

St. Paul Wastewater Collection System

The St. Paul Wastewater Collection System is located in the northeast section of Town, serving 101 dwelling units and 36 acres of commercial properties. The St. Paul service area is bound on the west by Blackstone River, on the east by Mendon Road, on the south by Great Road, and on the north by Franklin Avenue, including Andrews Terrace and Branch Avenue. The wastewater collection system will consist of gravity lateral sewers and low pressure sewers with a pump station located in the vicinity of the North Smithfield Fire

Department. The sewage to be generated by this area is 72,900 GPD as the average flow, with an associated peak daily flow of 205,500 GPD. The design capacity of the St. Paul Pump Station is 572,500 GPD (400 GPM), serving the St. Paul service area consisting of the Willerval/Tanglewood Wastewater Collection System consisting of 256 dwelling units and 33 acres of land zoned manufacturing and 7 acres of land zoned neighborhood business. The wastewater will be discharged via a force main along Great Road in an easterly direction to the existing sewer manhole located at the intersection of Mendon Road and Great Road.

Victory Highway Wastewater Collection System

The proposed Victory Highway Wastewater Collection System will serve an area that is bounded on the south by Victory Highway, on the east by Slatersville Reservoir, on the west by Burrillville, and on the north by wetlands, including Main Street. The collection system will consist of a conventional gravity system, low pressure sewer system and with a pump station to convey the flow generated by this area to the existing Belcher Avenue Pump Station. The collection system will serve 159 dwelling units and 7 acres of highway business property. The Victory Highway Pump Station (below-grade), will have a design capacity of 80 GPM with a 3-inch force main traversing along Victory Highway in a southerly direction to Suncrest Avenue.

Victory Highway/Dawley Brook Wastewater Collection System

The Victory Highway/Dawley Brook Wastewater Collection System will serve 49 dwelling units. The Victory Highway/Dawley Brook service area is bound on the north by Route 146 and Mechanic Street, on the south by Victory Highway, on the west by Highview Avenue, and on the east by Route 146. The wastewater collection system will consist of a gravity lateral system, a low pressure sewer system, and a pump station with a capacity of 20 GPM, in the vicinity of Connector Road on Victory Highway. The Victory Highway/Dawley Brook Pump Station will discharge via a 2-inch force main along Great Road in an easterly direction to its point of termination approximately on Greene Street.

Warren Avenue/Park Drive Collection System

The Warren Avenue/Park Drive Collection System will serve 20 existing residential dwelling units located on Warren Avenue, Park Drive and on Great Road between Warren Avenue and Park Drive. The low pressure sewer system will convey flows to the existing sewer manhole located on Milton Avenue.

Waterford Wastewater Collection System

The Waterford Wastewater Collection System is located in the northeasterly corner of Town, bounded by the Blackstone River on the north, east, and west, and on the south by Franklin Way. The service area consists of 86 dwelling units. The wastewater collection system will consist of low pressure sewers connecting to the existing sewer manhole on Elizabeth Avenue. The sewage generated by the Waterford service area is 31,400 GPD as the average flow, and an associated peak daily flow of 83,300 GPD.

Willerval/Tanglewood Wastewater Collection System

The Willerval/Tanglewood Wastewater Collection System will consist of 8-inch gravity sewers along Great Road, grinder pumps and low pressure sewers within the Tanglewood and Willerval areas, and a below-grade pump station to convey flows to the St. Paul Wastewater Collection System. The average sewage flow generated by this area is 133,400 GPD with an associated peak flow of 367,040 GPD, serving 256 dwelling units, 37 acres of manufacturing zoned land, and 7 acres of land zoned neighborhood business.

The Great Road Pump Station will have a capacity of 255 GPM and be located in the vicinity of the Blackstone River crossing on Great Road. The 4-inch force main will cross the river via a new pipe utility. The force main will then proceed in the roadway on Great Road to the sewer manhole located at St. Paul Street which is part of the St. Paul Wastewater Collection System.

6.2 WASTEWATER MANAGEMENT PLAN

6.2.1 INTRODUCTION

Basic Operations of an Individual Sewage Disposal System (ISDS)

A conventional ISDS consists of a septic tank, distribution box and a drainfield feed by gravity. Wastewater goes through the building's sewer before it reaches the tank. Effluent from the tanks is channeled by the distribution box (D-box) to the drainfield lines allowing the wastewater to percolate through soil where pathogens are trapped and nitrification may occur. In order to operate properly, the septic tank has two primary functions. First, it acts as a holding tank allowing solids to settle out. The heavier solids will sink to the bottom forming the sludge layer, while the lighter solids, such as fats, grease, oils, etc., rise to the surface forming the scum layer. The layer between the scum layer and sludge layer is referred to as clear zone. Secondly, due to detention time within the tank, naturally occurring anaerobic bacteria begin breaking down the solids resulting in the partial digestion of solids. This digestion process can reduce solids by 80%. However, septic tanks must be pumped out occasionally throughout the life of the system to remove the solids that have collected within the tank. The septic tank is usually constructed of reinforced concrete and in order to properly operate, it must be watertight. Water cannot be allowed to either enter the tank due to high groundwater, or leave the tank and infiltrate into the soil without proper treatment. Septic tanks also vary in size. This is determined by the number of bedrooms in the dwelling unit. The minimum tank size is 1,000 gallons.

After the initial treatment process within the septic tank, the effluent enters the soil treatment phase, commonly called the drainfield. Current standards require the drainfield to be comprised of a perforated plastic pipe (i.e., SDR-35) surrounded with approximately one (1) foot of crushed stone with a filter fabric laid on top of the stone-filled trench. The trench is then backfilled with acceptable gravel. As the effluent leaves the septic tank, it is channeled by the distribution box to the drainfield. The effluent, prior to leaving the tank, passes through a series of baffles. The baffle prevents larger floatable solids from entering the drainfield and eventually short circuiting the system in time.

Once the effluent passes the baffle, it percolates through the stone bed. During this process, additional pathogens within the effluent are destroyed due to oxygen that may be present in the voids. These voids are created by the irregular shapes within the stone bedding. The effluent then enters the natural soil completing the treatment process.

Site Testing and Design Criteria:

The size of the drainfields is a function of the following criteria: number of bedrooms of the individual dwelling unit, depth to groundwater, depth to impervious material (i.e., ledge) and the soil behavior. The soil behavior is determined by a percolation test and test pits. A percolation test identifies the soil's capability to absorb water, while test pits are a visual inspection of the soil. During test pits, the various soil strata is recorded noting the texture, grain size and color. Test pits also serve as a means to determine the depth to ledge and groundwater.

The limits of the ISDS within a certain piece of property are governed by various setbacks regulated by the Rhode Island Department of Environmental Management (setbacks such as: distance from private wells, property line, watercourses and the dwelling unit itself). These setbacks are considered minimum values and should be maintained in the design and construction stages. Table 6-3 lists the setbacks.

Conventional Systems

The drainfield (or leaching trench), as stated previously, consists of a perforated pipe surrounded with crushed stone. However, if there are restrictions within the site (such as, small lot area), there are precast structures that can be used in lieu of the trench called leaching chambers. The leaching chambers have the advantage in that they increase the effective leaching area, while reducing the size of the system. The effective leaching area increases since there is a greater capacity to store the effluent in the chamber. However, the leaching chambers are more expensive than the traditional leaching field. The leaching chambers can be broken down into two (2) categories: 1) Shallow leaching chambers, which are also called diffusers; and 2) Deep leaching chambers, which are referred to as galleys.

Shallow leaching chambers, or diffusers are significantly wider than they are deep. The diffusers are precast perforated concrete. The deep leaching chambers, or galleys, are approximately equal in width and depth.

TABLE 6-3 MINIMUM DISTANCES					
	Distribution Box Dosing Tank Septic Tank (ft)	Disposal Trench, Bed or Chambers (ft)	Seepage Pit (ft)	Building Sewer (ft)	Privy (ft)
1. Private well	75	100	200	50	50
2. Water Supply Line (pressure)	10	25	25	10	25
3. Water Supply Line (suction)	30	40	40	25	40
4. Property Line	10	10	10	10	30
5. Dwelling	5	15	20	3	30
6. Surface drinking water supplies or tributaries, including storm and sub-surface drains, that discharges thereto	200	200	200	200	200
7. Watercourse	50	50	50	25	50
8. Subsurface drains, Foundation drains, Storm drains	25	25	50	25	25
9. Edge of any land at a level lower than the invert of the distribution line	10	25	25	25	10
10. Public Drinking Water Supply Well	400	400	400	400	400

Source: Rules and Regulations Establishing Minimum Standards Relating to Location, Design, Construction and Maintenance of Individual Sewage Disposal Systems, RIDEM, September 1998.

Traditional Alternative Systems

The Department of Environmental Management does accept alternatives as a means of on-site sewage disposal only for special cases. Special cases include areas where conventional ISDS's is neither practical nor feasible such as areas where a septic tank and leaching trenches cannot be installed due to site conditions. The following are considered conventional alternatives accepted by DEM:

1. Humus toilets
2. Large capacity composting toilets
3. Heat assisted composting toilets

Even though these are accepted alternatives discussed in the Rhode Island Regulations. DEM deters their use as sewage disposal means for residential/commercial use. Cesspools are considered a substandard method of on-site disposal. In fact, if a cesspool system has failed or needs to be repaired, DEM requires construction of a new system meeting the current rules and regulations for on-site disposal systems.

Innovative/Alternative technologies have become available within the past few years to replace the conventional alternative systems that have failed or are in need of repair.

Innovative/Alternative ISDS Technologies

An Innovative/Alternative system or technology (I/A) is an Individual Sewage Disposal System that does not meet the typical standards (location, design, construction, etc.) of a conventional system. However, I/A technologies provide the same degree, if not better, of environmental and public health protection. This is accomplished through field testing, calculations, and other engineering evaluations. Innovative/Alternative technologies are divided into three (3) categories:

1. Alternative Systems
2. System Components
3. Experimental Systems

Alternative systems and system components both have three (3) classes of certification.

Alternative Systems:

Class I shall meet the following criteria:

A. Has at least five (5) consecutive years of quality performance data, clearly demonstrating all applicable standards have been met.

B. System has been approved for at least five (5) consecutive years in Rhode Island, or at least three (3) other jurisdictions.

Class II shall meet the following criteria:

A. Has at least two (2) years of performance data.

B. Has demonstrated a theory or applied research.

C. System has been approved for at least two (2) consecutive years in Rhode Island or other jurisdictions.

System Components:

Class I shall meet the following criteria:

A. Has at least two (2) consecutive years of performance data.

B. Has been approved for at least two (2) consecutive years in Rhode Island or at least three (3) other jurisdictions.

Class II shall meet the following criteria:

A. Provide one (1) to two (2) years of performance data.

B. Demonstrate a theory or applied research.

C. Has been approved for use in at least one (1) other jurisdiction.

D. Has performed successfully for a minimum of one (1) year.

Innovative/Alternative technologies can provide more economical and effective treatment of wastewaters than conventional systems. This is accomplished by implementing one or a combination of innovative designs, patented products, alternative materials, filtration processes, recirculation systems, pumps, etc. I/A technologies primarily apply to existing homes on substandard lots that have failed or are failing due to poor site conditions. I/A technologies do require special design by a professional engineer, therefore, these types of systems may require additional operational/maintenance costs, higher maintenance frequency, and may be more expensive than conventional systems.

The University of Rhode Island's Department of Natural Resources developed the Rhode Island On-Site Wastewater Training (OWT) Program. This program includes both classroom and hands-on field training covering the design, operation and maintenance of septic systems. The On-Site Wastewater Training Program's goal is to instruct regulatory agencies, local officials and user groups of the available technologies and effectiveness of those technologies, and thereby help safeguard water quality.

The program has implemented various I/A technologies throughout Rhode Island for research purposes that will provide performance data on the technologies. The systems used for research purposes include those in which RIDEM allows, or those with a potential of being implemented in its regulations.

Innovative/Alternative technologies can be divided into four (4) categories:

1. Leachfield Alternatives
2. Effluent
3. Aerobic Treatment Systems
4. Nitrogen Reduction System

Leachfield Alternatives can be used to replace the conventional drainfield system. There are currently three (3) systems approved by RIDEM, which include:

1. Eljen In-Drain, Type B
2. Double-Wide Standard Infiltrator Chambers
3. Double-Wide High Capacity Infiltrator Chambers

Eljen In-Drains are manufactured by Eljen Corporation and replace the conventional gravel/stone drainfield. In-Drains are constructed of a plastic core with a geotextile fabric folded accordion style over and under the core. The folded fabric creates an excellent environment for biological growth and provides effluent pretreatment in both the module and sand layer. As a result, the Long Term Acceptance Rate (LTAR) of the native soil is increased and the drainfield can be reduced in size compared to the conventional trench system. Other advantages include uniform soil loading in very porous soils; enhanced evapotranspiration, biodegradation and nutrient uptake; allows greater separation distance from groundwater than traditional deep trench systems; allows additional natural soil filtration to occur; and more flexibility in system placement meeting setback requirements.

The *Infiltrator Chambers* are manufactured by Infiltrator Systems and serve as an alternative to drainfield systems. They are arc-shaped injection molded high density polyethylene chambers. They have a hollow interior for storing influent and the sides are slotted that allow maximum infiltration. The chambers are available for H-20 loading. Other advantages include lightweight units (25 lbs.) for easy installation, reduction in labor costs by almost 50% (when compared to conventional systems), chamber construction of strong, durable material, and open chamber bottoms that allow additional infiltrative area. The primary disadvantage is that material costs are approximately 20% more when compared to conventional systems. However, there is an overall lower cost if infiltration chambers are used for on-site sewage disposal. The chambers may pose problems if a high groundwater table is present for separation requirements to be met.

Effluent Filters enhance primary treatment by keeping solids in the septic tank. The major goal is to protect the drainfield from solids load, maximizing the drainfield life span. The use of effluent filters can be used on any system, but are extremely important to use in slow "perc" soils.

The *Zabel Effluent Filters* are made of PVC and are installed at the effluent pipe in the septic tank. The filter's purpose is to prevent large particles from entering and clogging the drainfield. Installation is easy and takes minimal time; cleaning of filters is only necessary at time of pumping septic tank; an alarm is available indicating when maintenance is needed; and most importantly, the filter improves effluent quality (Total Suspended Solids <30 ppm) extending the life of the drainfield.

Aerobic Digestion is the biological oxidation of organic sludges and requires the presence of oxygen. This process typically occurs in trickling filters where microorganisms are present to break down the sewage waste. The RIDEM accepts the following alternatives as aerobic wastewater treatment systems:

1. Bioclere
2. Biocycle 525
3. Single Home and Modular FAST
4. Norweld Singular

The *Bioclere* is installed between the primary tank and distribution box. The wastewater is distributed through filter media where the organic material is degraded by aerobic microorganisms that grow on the filter. This process of pumping effluent through the filter media continues, detaching and washing the biomass from the media. Sludge is also pumped back into the primary tank facilitating denitrification. These processes reduce BOD, TSS and nitrification. Therefore, RIDEM allows a reduction in leachfield size. The system can be used with the following site characteristics: seasonally perched water tables, sandy/gravelly soil, and both slow and rapid "perc" rates.

The Bioclere does not interrupt or impact the flow of a traditional system since the process occurs above gravity flow. Other advantages include: the clarifier increases settling and detention time; reduction in leachfield size; landscaping can be done to minimize exposure; is relatively maintenance free; and due to the trickling filter, the system is stable and able to absorb shock loadings comparatively well. Disadvantages associated with this alternative technology are the following: power outages pose problems; the system may have to be anchored due to high groundwater table; and most importantly, the system must maintain biological activity.

Construction cost vary depending on specific site conditions. However, a retrofit for a single family home may cost between $1,500 and $2,000 with operation and maintenance costs ranging from $250 to $300 per year. It may be possible in significantly reducing costs if the Bioclere system is used in residential clusters.

The *Biocycle 525* is a compact aerated wastewater treatment system that utilizes aerobic digestion, anaerobic digestion and primary clarification. It is a four (4) chamber, fully self-contained system which does not need

a septic tank. It is designed to treat flows up to 525 GPD. The system can be placed in series to utilize cluster capacities. The Biocycle system incorporates disinfection by utilizing chlorine or a germicidal ultraviolet light. Other advantages include: reduction in BOD, TSS and fecal coliform; elimination of septic tank; the treated effluent may be pumped out and used for irrigation purposes, thus conserving water; alarm systems are available to inform the homeowner of potential problems; and leachfield size may be reduced. One of the major disadvantages is operation and maintenance costs. The system utilizes air and effluent pumps which may require frequent maintenance. The system must also be inspected and maintained by a technician quarterly. Also, power failures may pose problems even though the system has reserve capacities and alarm backups.

The *Single Home and Modular FAST* is an aerobic wastewater treatment system utilizing a trickling filter and an activated sludge process. The system is installed in a two compartment tank along with a septic tank in series. Oxygen is supplied to the system by a blower. The blower is the only mechanical part that needs maintenance and is easily accessible. The system is capable of reducing BOD and TSS, therefore RIDEM has allowed for leachfield reduction. The system relies on electricity, therefore this may pose a problem during power failures.

The *Norweco Singular System* is a three (3) chambered precast concrete tank. The treatment relies on extended aeration in four (4) stages: primary settling; aeration; clarification; filtration. An optional chlorination/dechlorination unit can be installed for pathogen removal. An aerator continuously operates, providing oxygen to the system. Both the aerator and filter can easily be removed for maintenance. The Singular is installed in the same manner as a septic tank with accessible risers to grade.

Other advantages include: BOD and TSS removal of 85% and 90% respectively; the system is capable of removing pathogens; and the aerator is monitored electronically making homeowners aware of any problems. The major disadvantage is the system requires electricity. Without power, the unit functions as a septic tank, treatment efficiency is reduced, and the filter will eventually clog.

The cost of the unit is $3,250 and is dependent on site conditions. Operating and maintenance costs include electricity and standard servicing of the system.

Nitrogen Removal: There is currently only one approved nitrogen removal system, the RUCK system. In order for the system to work, however, a building's blackwater (toilet and kitchen sink wastewater) must be plumbed separately from the greywater (shower, laundry and bathroom sink).

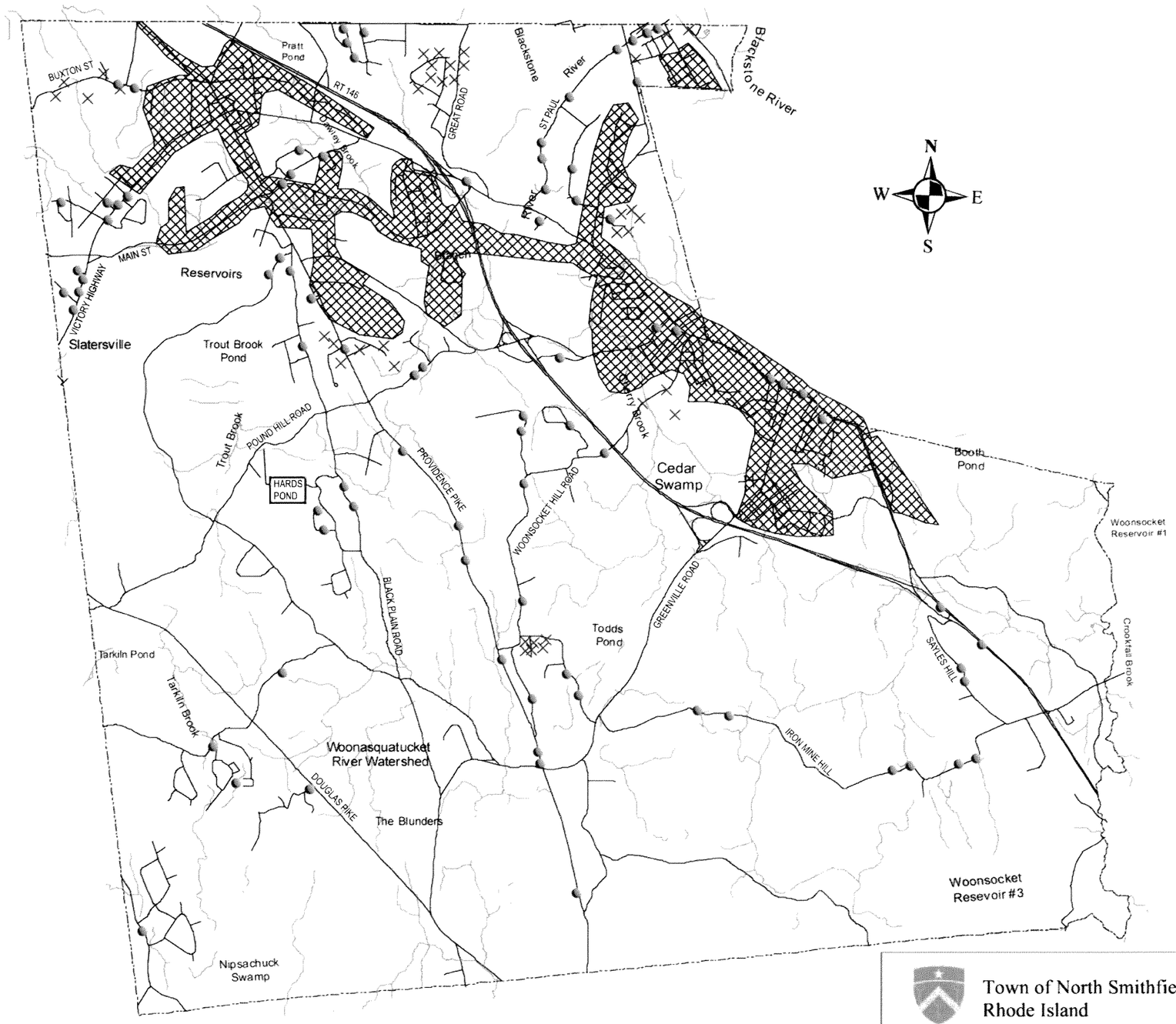
The blackwater enters a blackwater septic tank followed by a buried, aerobic sand filter. The greywater is plumbed to a greywater septic tank. The nitrified blackwater from the sand filter either is pumped or flows into the greywater septic tank for the denitrification process which occurs under anaerobic conditions with the greywater serving as a carbon source. This system is a single pass-through system. The system is capable of significantly reducing biological oxygen demand, total suspended solids, and total nitrogen in the influent. Based on these reductions, DEM has allowed for a reduction in leach field size.

The goal of a Wastewater Management Plan is to reduce the existing pollutant loadings from on-site disposal systems to the greatest extent possible, and at the same time, to prevent future increased loadings from developing within areas that are not part of the future sewer. There are approximately 2,580 on-site disposal systems that are not within the sewered area of Town. Some of these septic systems are within the Slatersville Reservoir groundwater recharge area and the Woonsocket Reservoir 1 and 3 drainage areas, as presented in Figure 6-1. The majority of the unsewered areas depend on groundwater as a source of drinking water supply.

6.2.2 WASTEWATER MANAGEMENT APPROACHES

On-Site Systems

Individual disposal systems will continue to play an important role in the Town's overall Wastewater Management Plan. The adoption of this *Facilities Plan for Wastewater Management* will essentially provide a long-range (i.e., twenty (20) year) "Master Plan" for sanitary sewer conveyance and treatment systems. The Facilities Plan supported the premise that a WWMD is an appropriate alternative for addressing individual sewage disposal systems (ISDS) problems in certain parts of the Town. While the "ideal" solution to ISDS problems may be the installation of conventional public sanitary sewers, the WWFP included evaluations as to the economic and physical factors related to sewering existing neighborhoods. These factors included the "cost per affected resident" (typically paid through an assessment program wherein the benefitting property owners pay the entire cost) and the cost to the overall Enterprise Fund for infrastructure improvements



Legend

- Existing Sewer Service Area *
- On site ISDS Problem Area Identified From Comprehensive Plan
- Onsite ISDS Problem Area March 19, 2006

** Map shows approximate limits of existing, approved, and proposed sewer services. Some streets and sections within the delineated areas may not be on sewers.*

This map was prepared for the inventory of real property within the Town of North Smithfield. Users of this tax map are hereby notified that the public primary information sources including record deeds and plats, should be consulted for the verification of the information contained on this map. The Town of North Smithfield and its mapping contractors assume no legal responsibility for the information contained herein.

Base map and hydrographic features were provided by Rhode Island GIS as 1"=400' features derived from the 1997 National Grid USA/RIDOT Orthophoto Project.

Updated September 2003

APPLIED GEOGRAPHICS, INC.

Town of North Smithfield
Rhode Island

Figure 6-1

ISDS FAILURES

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
272 W. Exchange Street Suite 201 Providence,RI 02903-1085
Phone: 401-454-7000 Fax: 401-454-7418

Source: Town of North Smithfield

Date: 2006

Scale: No Scale

necessary to handle the increased flows (i.e., increasing the physical capacity of a pump station, or the treatment facilities). The capital costs associated with system-wide infrastructure improvements would typically be distributed equally to all units throughout the Town that are connected to the sewer system.

Given the absence of Federal and/or State grant monies, the aspect of defined WWMD's will be a viable alternative when compared to upgrading either wastewater collection system or the treatment facility. Even with the recent increase in sewered neighborhoods, the Town does not have a large enough user base to comfortably support a significant increase in the debt service related to the Wastewater Enterprise Fund. As a true Enterprise Fund, there are no property tax contributions to this fund, and actual sewer customers only are billed.

Unfortunately, neglect or improper operation on the part of the property owner, along with unsatisfactory site conditions, can lead to early failure of the on-site system. Failing septic systems can threaten the health of the residents and adversely impact the environment.

The Town must first adopt rules and regulations establishing a Wastewater Management District for all systems outside of the sewered areas. As part of the Ordinance, a Wastewater Management Commission must be formed to administrate the rules and regulations of the Wastewater Management District.

Information Management

Once the Town adopts an ISDS Wastewater Management Plan, provisions are to be made to manage the information in an effective way. Currently, the Town has no data on the existing ISDS system. Information such as plat, lot, owner, address, owner's address, date of pumping and hauler's name should be collected.

The data collection can begin by identifying each non-sewer user, which can provide the basic data. This data can be cross-referenced into the tax records to aid in the information database. As inspection reports are returned to the Planning Department, the additional data, such as system type, system condition, date of pumping and hauler's name, can be added.

As part of the Plan, over the next five year period each of the septic systems will need to be inspected to determine the operating condition of the system. From the inspection results, the homeowner will then be required to take the appropriate action. All cesspools are to be considered to be malfunctioning systems and will be required to be replaced with an on-site wastewater system that conforms with current state and local standards within twelve (12) months after the sale of a property, or within five (5) years of the date of the first maintenance inspection (whichever comes first).

Inspections

ISDS inspections should be conducted in accordance with Septic System Check-Up: The Rhode Island Handbook for Inspection, as published by the Rhode Island Department of Environmental Management. This guidance document provides a complete review of all ISDS concerns, including installation, maintenance and proper operation.

New installations, repairs and alterations are inspected by Rhode Island Department of Environmental Management, or the licensed designer. As such, for these items, it would be redundant for the Town to participate in the inspection process.

The purpose of inspections is to assess the current condition of the ISDS in order to determine:

a) what maintenance is required;
b) when the maintenance should be undertaken;
c) the date of the next inspection; and
d) the need for system upgrade or replacement.

Maintenance requirements shall be based upon inspection results. Information from the inspections will also be used to complete a town-wide ISDS inventory and to track system inspections, maintenance, and upgrades.

The inspections shall be conducted by a private, town-approved ISDS inspector. Town approved septic system inspector(s) shall determine the maintenance and pumping requirements for each ISDS based upon criteria outlined in RIDEM's handbook. In order for an inspector to be approved by the Town, he/she must satisfactorily complete a training course in inspecting methodology consistent with the use of the handbook.

The Planning Department shall maintain a list of town-approved inspectors and make such list available to property owners for the purpose of arranging the inspection of their own ISDS.

Once inspected, the property owner will have an inspection report that details the ISDS condition, components, inspection schedule and maintenance requirements. The property owner shall assume all responsibility for hiring a septage hauler or maintenance contractor to complete the maintenance and inspection requirements contained in the ISDS inspection report within the time frame required. As proof of compliance, the property owner shall submit a receipt for pumping and other documented system maintenance to the Town Planner within thirty (30) days of the date stipulated in the ISDS inspection report.

Education

The Town, through its Planning Department, shall establish a public education program to inform people about the findings, benefits, and goals of the on-site wastewater management. The education program shall include, at a minimum:

- Proper inspection, operation and maintenance of ISDS.
- Operation and management framework of the program.
- Proper disposal of hazardous waste, including household hazardous waste.
- Water conservation.
- Protection of sensitive resources.
- Use of environmentally sensitive cleaning products.
- Use of alternative and innovative septic systems and associated technologies.
- Availability of financial assistance.
- Costs to homeowners to ensure compliance with a good operating system.

7.0 ANTICIPATED ENVIRONMENTAL IMPACTS

RECOMMENDED PLAN

In this section of the Facility Plan, a brief abstract of each portion of the selected plan is presented in combination with a brief description of the environmental impacts that may result from implementation of the plan. A preliminary review of the sites proposed for addition to the North Smithfield Wastewater Collection System was made by our staff to assess the potential for environmental concerns. Based on the reviews, construction will occur within roadways that currently exist minimizing environmental impacts because the areas are already disturbed and developed. New pump stations will occur on land currently owned by the Town of North Smithfield or within the highway right-of-way. There are wetland crossings along the roadways that need further evaluation to determine the need for a Department of Environmental Management wetland alteration permit. At minimum most crossings are covered by the use of staked hay bales, sedimentation basins and silt fence along the edge of the highway.

Interceptor sewers for conveying wastewater flows from planned system expansions and population increases are evaluated. It was determined that the capacity of the existing system is adequate. The interceptor installation program is based on a forty (40) year planning period. The alternative that is the most environmentally sound and cost-effective was selected to present preliminary plans and cost estimates for the proposed system additions.

7.1 NO CONSTRUCTION ALTERNATIVE

The Town of North Smithfield wants to improve the water quality of the groundwater and surface waters within the Town. As demonstrated in earlier sections, the greatest number of Individual Sewer Disposal System failures needs to be addressed through additional sewers or within the confines of the Wastewater Management District Plan. The soils at most locations are shallow to bedrock raising the potential to contaminate surface water. The future wastewater flows generated by the proposed and existing service area were evaluated to determine the need to add interceptors and pump stations to the existing system. Future areas are lateral sewers tied into the existing system for transmission to the Regional Wastewater Treatment

Facility. The proposed routes for the lateral sewer lines was based on the existing road system and existing wastewater collection system to minimize cost and environmental impact.

The alternative to the expansion of the wastewater collection system lies within the development of the Wastewater Management District Plan. Under the Wastewater Management District Plan, the use of an ordinance and wastewater management district will establish the active operation and management of Individual Sewer Disposal Systems throughout the Town on lands not serviced by a public wastewater collection system. The Town of North Smithfield is moving forward with a Wastewater Management District Plan for those areas of Town outside of the sewer area. Then as areas are added to the collection system the Individual Sewer Disposal Systems are eliminated obviating the need for management plan oversight.

Each of the proposed areas is briefly discussed in Section 8 to indicate the flow and cost to install the new system. Cost will determine which areas are developed and the time frame for that development. Otherwise, these areas will continue to utilize Individual Sewer Disposal Systems for their wastewater disposal and will become subject to the Wastewater Management District Plan.

Great Road East Wastewater Collection System

The Great Road East Wastewater Collection System will serve 31 dwelling units with an average flow 11,315 GPD and the peak flow is 29,915 GPD The collection system will consist of 2,200 linear feet of low pressure sewer system.

Greene Street Wastewater Collection System

The Greene Street Wastewater Collection System will serve 60 residential dwellings and flows from the Victory Highway/Dawley Brook Service Area. The collection system will consist of 5,800 linear feet of 8-inch gravity sewers and a submersible grinder pump station and 1,000 linear feet of 3-inch force main. The Greene Street Pump Station will have a capacity of 84,900 (60 GPM) and will be equipped with two submersible grinder sewer pumps, pump connection for bypass pumping during emergencies and power outages, and a manual transfer switch. The incremental average sewer flow of the collection system is 21,900 GPD, with an

associated peak flow of 57,900 GPD The total average flow, including the Victory Highway/Dawley Brook Area, processed by the Greene Street Wastewater Collection System is 32,100 GPD with a peak flow of 84,900 GPD

Lamoureux Boulevard Wastewater Collection System

The Lamoureux Boulevard Wastewater Collection System consists of 400 linear feet of 8-inch gravity sewer serving 3 residential dwellings.

North Smithfield Industrial Park Wastewater Collection System

The North Smithfield Industrial Park Wastewater Collection System consists of 6,300 linear feet of gravity sewers serving the North Smithfield Industrial Park and 3,600 linear feet of low pressure sewers serving the surrounding residential area consisting of 61 dwelling units and 139 acres of land zoned for manufacturing. This collection system will include an above-ground pump station and force main. The average wastewater flow generated by the service area is 161,300 GPD, and the peak flow is 475,900 GPD The above-ground pump station will consist of two centrifugal sewer pumps rated at 200 GPM, an emergency generator, pump connection for emergency pumping, and a Data Acquisition Panel that will transmit wastewater flow readings and alarms to the central office. The 4-inch force main from the North Smithfield Industrial Park Pump Station will traverse along North Smithfield Industrial Drive in a northerly direction to its point of termination at a sanitary manhole located 2,000 feet south of Steel Street.

Park View Wastewater Collection System

The Park View Wastewater Collection System will serve 33 dwelling units. The average wastewater flow generated by Park View is 12,000 GPD, and the peak flow is 31,840 GPD. The collection system will consist of 3,400 linear feet of 8-inch gravity laterals, a submersible grinder pump station and 500 linear feet of 2-inch force main. The pump station will consist of a pump chamber and valve chamber, with a capacity of 30 GPM discharged to the North Main Street Sewer System. The pump station will be equipped with a pump connection for bypass pumping during power outages and pump failures.

Providence Pike No. 1 Wastewater Collection System

The Providence Pike No. 1 Wastewater Collection System will serve 259 dwelling units from Providence Pike No. 1, 160 dwelling units plus Providence Pike No. 2, 99 dwelling units. The average wastewater flow generated by Providence Pike No. 1 Service Area is 94,500 GPD, and the peak flow is 249,900 GPD The incremental average flow of Providence Pike No. 1 is 58,400 GPD with an associated peak flow of 154,400 GPD

The Providence Pike No. 1 system will consist of approximately 9,100 linear feet of 8-inch gravity sewers and 4,700 linear feet of low pressure sewers.

Providence Pike No. 2 Wastewater Collection System

The Providence Pike No. 2 Wastewater Collection System average wastewater flow is 36,100 GPD, and the peak flow is 95,500 GPD The sewer system will consist of 8,500 linear feet of low pressure sewers and will discharge to the Providence Pike No. 1 Wastewater Collection System.

St. Paul Wastewater Collection System

The St. Paul Collection System will consist of a gravity system, low pressure sewer system, a pump station and force main. The collection system will serve 101 dwelling units and 36 acres of land zoned commercial. The average wastewater flow from the St. Paul area is 72,900 GPD with a peak flow of 205,500 GPD The collection system will consist of 9,700 linear feet of 8-inch gravity sewer mains, 3,100 linear feet of low pressure sewers, an above-grade pump station, and 2,400 linear feet of 6-inch force main. The St. Paul Pump Station will accommodate flows from the Willerval/Tanglewood and St. Paul service areas consisting of 357 residential dwellings and 76 acres of land zoned for manufacturing, commercial and business neighborhood. The capacity of the pump station will be 572,500 GPD (400 GPM). The station will consist of a separate wet well and dry well chamber, consisting of two centrifugal sewer pumps rated at 400 GPM, an emergency generator, and a pump connection for emergency pumping. The 6-inch force main will traverse 300 feet along St. Paul Street in a southerly direction onto Great Road. From this point, the force main will traverse along

Great Road in an easterly direction to its point of termination at the existing sanitary manhole, located at the intersection of Great Road and Mendon Road.

Victory Highway Wastewater Collection System

The Victory Highway Wastewater Collection System will serve 159 residential dwelling units, consisting of 7 acres of highway business properties, contributing a daily average wastewater flow of 65,000 GPD, with an associated peak flow of 174,400 GPD The collection system will consist of 10,300 linear feet of 8-inch gravity sewers and a pump station. The Victory Highway Pump Station will have a capacity of 80 GPM using two submersible grinder sewer pumps.

Victory Highway/Dawley Brook Wastewater Collection System

The Victory Highway/Dawley Brook Wastewater Collection System will consist of conventional gravity sewers, low pressure sewers and a below-grade pump station with a force main serving 49 residential dwellings. The total length of the gravity system is 3,400 linear feet of 8-inch sewer mains, 1,700 linear feet of low pressure sewers, and 1,400 linear feet of force mains. The average flow generated by the Victory Highway/Dawley Brook service area is 17,900 GPD, with an associated peak flow of 47,300 GPD The Victory Highway/Dawley Brook Pump Station will be located in the vicinity of the connector road on Victory Highway. The pump station will be the below-ground type consisting of two submersible grinder pumps, each rated at 28,800 GPD (20 GPM). The 2-inch force main will traverse approximately 1,400 linear feet along Victory Highway to its point of termination at the gravity section of the Greene Street collection system.

Warren Avenue/Park Drive Wastewater Collection System

The Warren Avenue/Park Drive Wastewater Collection System will serve 18 residential dwellings. The low pressure sewer system will consist of 1,900 linear feet of 2-inch PVC sewer. The average daily flow will be 7,300 GPD with an associated peak daily flow of 19,300 GPD

Waterford Wastewater Collection System

The Waterford Wastewater Collection System will consist of low pressure sewers serving 86 residential dwelling units. The total length of the low pressure system is 8,300 linear feet with an average flow of 31,400 GPD, and an associated peak flow of 83,300 GPD The low pressure sewer system will connect to the existing sewer manhole located on Elizabeth Avenue.

WillervalTanglewood Wastewater Collection System

The collection system will consist of conventional gravity sewers, low pressure sewers with individual grinder pumps, and a pump station discharging the wastewater via a force main to the St. Paul Wastewater Collection System. Approximately 120 individual grinder pump units are required for the existing dwelling units located in the vicinity of Willerval Avenue and Tanglewood Road. The low pressure system will discharge to the summit sewer manhole location on Old Great Road. The gravity sewer consisting of 2,700 linear feet of 8-inch sewer mains located on Old Great Road and Great Road. The gravity sewer will discharge to the Great Road Pump Station located in the vicinity of Branch River Bridge. The 4-inch force main will cross the river within a new pipe bridge and connect to the St. Paul Wastewater Collection System. The average daily flow generated by the Willerval/Tanglewood service area is 133,400 GPD with an associated peak flow of 367,000 GPD, serving 133 existing dwelling units, 123 future dwelling units, 7 acres of land zoned neighborhood business, and 37 acres of land zoned for manufacturing.

The capacity of the Great Road Pump Station will be 367,000 GPD (255 GPM). The station will consist of a separate wetwell and drywell chamber, containing two centrifugal sewage pumps rated at 255 GPM, an emergency generator, and a pump connection for emergency pumping.

Wastewater Management District

A Wastewater Management District is proposed for the areas of Town that are not served by the public sewer system. The District will provide a means for the proper operation and maintenance of the Individual Sewer Disposal Systems in these portions of Town. Most of the residential units in the non-sewered areas are served

by their own private well, so proper operation and maintenance of the Individual Sewer Disposal System is critical to public health and safety.

The water table is within one and a half (1.5') feet of the surface in many areas because of the shallow to bedrock nature of the soil. With no addition of domestic sewers to this area, the contamination of the existing Individual Sewer Disposal Systems will continue to back up, pond in the yard and contribute contaminants to the flow into surface water bodies.

It is in the best interests of the Town to have a wastewater collection system that is adequate to handle the service area. A "no construction" alternative will result in the non-point source pollutants migrating into surface water bodies and groundwater reservoirs. Construction of pump stations for these projects will occur on land owned by the Town of North Smithfield. Force mains and gravity sewers will be installed in the highway and will follow the existing alignments of the highways.

7.2 DIRECT IMPACTS

7.2.1 TRAFFIC & DAILY ACTIVITIES

Sewer lines are usually installed in the middle of the road with laterals extended to either side of the road to service the user. This makes keeping the road open to traffic difficult. Efforts shall be made to preserve some traffic flow on all roads, however, this is difficult on the narrow roads because no room is available during the construction. One lane of traffic may be open for traffic at maximum. At the end of each day the roads are made passable through the night time hours, although some restriction may occur around the open cut. At all road crossings where "open cut construction" will be allowed, an attempt will be made to keep at least one lane of traffic preserved. When it is necessary to close a street temporarily, detours shall be provided and plainly and adequately marked, and conform to the local authority and Rhode Island Department of Transportation standards. Adequate barricades, lights and other warnings shall be provided and erected to protect the public from the Work. Local police may direct traffic at all construction sites.

Traffic impacts that result from construction operations and police details can be minimized by these temporary traffic actions. The impacts will be confined to the localized area of installation. Traffic control measures that comply with MUTAPS will be instituted prior to the construction and maintained during construction.

Construction will occur in the existing streets. Traffic on narrow roads will require closing the street for a portion of time due to the narrow configuration of the street and the need to install laterals across the road. The impact will be for residences on the street. This can be mitigated by prior notice to each residence of the upcoming construction and potential for road closure.

Great Road East Wastewater Collection System

This installation of low pressure sewer line on Pound Hill Road will confine traffic to one lane. The work on the side streets Lapre Road and Hillview Avenue could have the roads closed because the opportunity exists to detour around the closed area.

Greene Street Wastewater Collection System

A portion of the construction is along the edge of Victory Highway and Greene Street where traffic may be limited to one lane around the construction site. Other portions of the installation occur in the middle of Victory Highway where one lane traffic is definite and a detour may be needed for a portion of the time.

Lamoureux Boulevard Wastewater Collection System

This project serves three residential units and the road for these three homes will require the road to be closed.

North Smithfield Industrial Park Wastewater Collection System

Taber Hill Road and Pound Hill Road will require closure to install the main in the road and laterals to the homes. Along Smithfield Industrial Drive, the sewer line in the middle of the road may permit one way traffic

for most of the construction. The construction of the pump station will occur off the road, so there is no traffic impact.

Park View Wastewater Collection System

The roads within this development will need to be closed during construction to permit installation of the gravity line in the middle of the road. Installation of the force main from the pump station to North Main Street will occur closer to the edge of the road, so there is a possibility that one way traffic may be permitted. The construction of the pump station will occur off the road, so there is no traffic impact.

Providence Pike No. 1 Wastewater Collection System

In this area the construction consists of mostly gravity sewers and manholes in the middle of the road. Closures and detours will be needed during the installation of the sewer line. The force main installation occurs in a residential development area where the roads will be closed.

Providence Pike No. 2 Wastewater Collection System

The installation of the low pressure sewer line and laterals will occur along the middle of the road. Roads in this area are narrow, so closure is definite.

St. Paul Wastewater Collection System

This project has all the elements, gravity sewers, low pressure sewers, force main and pump station. This will require closure and detour for most of the project, except the pump station.

Victory Highway Wastewater Collection System

This project has all the elements, gravity sewers, low pressure sewers, force main and pump station. This will require closure and detour for most of the project, except the pump station.

Victory Highway/Dawley Brook Wastewater Collection System

This project has all the elements, gravity sewers, low pressure sewers, force main and pump station. This will require closure and detour for most of the project, except the pump station.

Warren Avenue/Park Drive Wastewater Collection System

In this area a limited amount of low pressure sewer line will be installed to service a key area. Traffic closure and detour will occur along the construction route, but is easily mitigated.

Waterford Wastewater Collection System

Low pressure sewers will be installed throughout this highly developed area. During construction the closure and detour will be employed to mitigate traffic issues. Traffic on St. Paul Street will be most difficult to manage with the curves, high traffic volume and steep slope. Many of the side streets scheduled for low pressure sewers can be closed during construction.

WillervalTanglewood Wastewater Collection System

This project has all the elements, gravity sewers, low pressure sewers, force main and pump station. This will require closure and detour for most of the project, except the pump station. The high water table will result in groundwater removal particularly where gravity sewers are installed and can cause a muddy surface on the road.

Wastewater Management District

Establishment of the Wastewater Management District will have no impact on traffic within the Town.

7.2.2 HISTORIC, ARCHEOLOGICAL, CULTURAL, RECREATIONAL

The Town of North Smithfield is rich in historical and cultural resources. Many of the resources are buildings, National Registers of Historic Places and Historic District nominees. The sewer lines are installed in the disturbed areas of the road way and when complete are underground out of sight having no impact on historic resources. Pump Stations are installed on public property along the roadway, these stations are constructed either underground with no above ground structure or they are buildings that are designed to blend with the surrounding structures.

Great Road East Wastewater Collection System, Lamoureux Boulevard Wastewater Collection System, North Smithfield Industrial Park Wastewater Collection System, Providence Pike No. 1 Wastewater Collection System, Providence Pike No. 2 Wastewater Collection System, St. Paul Wastewater Collection System, WillervalTanglewood Wastewater Collection System

These areas are not within listed sites.

Victory Highway Wastewater Collection System, Victory Highway/Dawley Brook Wastewater Collection System, Greene Street Wastewater Collection System, Park View Wastewater Collection System

All of these areas are in close proximity to a Historic District listed on State and National Registers of Historic Places.

Warren Avenue/Park Drive Wastewater Collection System

This area is near the Union Village which is a Town Historic District and listed on State and National Registers of Historic Places.

Waterford Wastewater Collection System

Waterford is a Historic District nominated for State and National Registers of Historic Places. The proposed sewer project is adjacent to the designated area for nomination.

Historical Preservation & Heritage Commission

A review by the Rhode Island Historical Preservation & Heritage Commission staff has indicated that the various project areas are to varying degrees likely to contain significant archaeological site. Even though the majority of the proposed work will take place in existing streets, important below-ground cultural resources may still be present beneath the level of disturbed soils. Environmental factors which increase the probability that Native American sites are present include the lack of modern ground disturbance, well-drained soils, and proximity to fresh water. It appears that many of the project segments cross archaeologically sensitive areas. It is also likely that historic resources, primarily those associated with Union Village, a National Register Historic District, may be present within the proposed areas of impact.

The Rhode Island Historical Preservation & Heritage Commission recommends that an archaeological assessment survey be conducted for each project area. This survey would evaluate the possibility that significant cultural resources are present and would make recommendations on the need for any further archaeological survey.

Wastewater Management District

Formation of the Wastewater Management District will encompass all of the Town that is not serve by public sewers, so the operation and maintenance of Individual Sewer Disposal Systems may occur in a historic place or on a historic site. Individual Sewer Disposal Systems are buried underground out of sight, but some of the new technologies use above ground structures designed to be a part of the building and its surrounding landscape.

7.2.3 SOILS AND HYDROLOGY

7.2.3.1 Agricultural Land

There are scattered occurrences of agricultural lands in the Town of North Smithfield mostly along the rivers, streams and water bodies. The Town has a great deal of bedrock and large boulders as part of the soil type, so agriculture is difficult to perform. Lands within all of the project areas that may be affected by the project work are well developed and do not provide opportunities for agricultural operations. The sewer line installations are in the roads and the pump stations installations are on Town properties.

7.2.3.2 Soils

Great Road East Wastewater Collection System

Canton Urban Complex - The surface consists of up to 10% bedrock outcrops, 2-10% covered with stones and boulders and about 6% with slopes ranging from 0-15%. Where the soil is present it has a moderately rapid permeability in the surface layer and rapid in the substratum. Concern is for Individual Sewer Disposal System failure due to seeping of effluent due to the bedrock and boulder blockage.

Greene Street Wastewater Collection System

Hinckley and Merrimac soils - These soils are well drained with slopes ranging from 3-15%. Permeability in the surface is rapid and very rapid in the substratum. Concern is the rapid leaching to the groundwater of contaminated waters prior to proper treatment.

Lamoureux Boulevard, Park View, Victory Highway, Victory Highway/Dawley Brook, Warren Avenue/Park Drive Wastewater Collection System

Merrimac Urban Complex - Well drained developed sites. Slopes can range from 0-15%, the permeability of the soil is moderately rapid in the surface and rapid in the substratum leading to concerns for rapid leaching to the groundwater. Also of concern in the Lamoureux area is the proximity to the Cedar Swamp that consists of Carlise Muck. Carlise Muck is nearly level and poorly drained. Contamination of this feature is not easily rectified.

North Smithfield Industrial Park, Providence Pike No. 1, Providence Pike No. 2, St. Paul, Waterford, WillervalTanglewood Wastewater Collection System

Canton/Urban Complex and Canton/Charlton complex - Consists of areas that have 3-15% slope and moderately rapid permeability in the surface and rapid in the substratum. Stones, boulders and bedrock outcrops present difficulty installing Individual Sewer Disposal Systems. These developed areas are at risk for seeping due to the bedrock and boulders and in some areas subject to groundwater contamination. The slopes of these areas go to a drainage way that feeds to the Branch River.

Wastewater Management District

The land areas beyond those in the sewer district and proposed for public sewer service, consist of soils that have slopes that may exceed 15% and are shallow to bedrock. The risk for seeping and groundwater contamination is high in many of these areas. A strong Wastewater Management District is needed to address the concerns of the Town wide impact of Individual Sewer Disposal Systems that serve most of the residential and commercial establishments outside of public sewers.

7.2.3.3 Hydrology

Impacts of the proposed facilities on the hydrology of the area will be negligible. Installation of sewer lines will act as a drain when the groundwater reaches the layer of stone around the pipe, however, normal construction practices tend to prevent this water from moving horizontally. The proposed sewer line installations do not occur in high water table areas, but where the roads cross intermittent streams, drainage ways and small streams, the potential exists for water seeping into the trench. Much of the Town is shallow to bedrock and movement of liquid is along and through the rock fissures. Septic waste within these fissures can contaminate groundwater. It is imperative that in areas where sewer lines can be installed that old Individual Sewer Disposal Systems be properly abandoned. In the Wastewater Management District the operation, maintenance and inspection program will greatly aid in the prevention of groundwater contamination.

7.2.4 EROSION CONTROL

It is anticipated that during construction of all the proposed projects that actions are needed to prevent exposed soils from migrating off site either by wind or rain. This will require dust control and erosion control measures to be instituted by way of staked hay bales, silt fence and covering of stock piled materials. During construction extra care is needed prevent erosion on the unstable slopes where the soils are either very permeable or slopes over 3%. All of the areas where sewer lines are proposed will be exposed to erosion risk because the Town is composed of rolling terrain with slopes ranging from 0 to over 15%. Proper installation of Individual Sewer Disposal Systems is critical as well to the prevention of erosion, so even in smaller developments the appropriate measures are needed.

7.2.5 WATER QUALITY

Non-point pollution is obvious in many of the areas where these projects are proposed. Drainage and runoff from the land areas of the project area are significant sources of non-point source pollution. All of the proposed projects are designed to improve the water quality of the adjoining surface waters by removing the

septic waste leaching from inadequate systems into the soil. Improved water quality of the adjoining areas may benefit aquatic life through the reduction of bacteria and nutrient loading.

Great Road East Wastewater Collection System

The low pressure sewer lines installed in the Pound Hill Road will connect to an existing manholes on Hillview Avenue and Lapre Road. The new line will occur in the ground at the manhole without the need for by-pass pumping. There is no exposure of spill occurring during this connection. All of the line installed in Pound Hill Road will be new and dry until the laterals are connected to the homes.

Greene Street Wastewater Collection System

The gravity lines will be installed in the road and connect to two new pump stations, Victory Highway/Dawley Brook and Greene Street. The force main from the pump stations will feed to the existing gravity line through a manhole at Greene and School Streets.

Lamoureux Boulevard Wastewater Collection System

This is a short section of gravity sewer to serve only three residential homes. Impact of construction to water quality is minimal, but the removal of septic waste via public sewer benefits the groundwater.

North Smithfield Industrial Park, Providence Pike No., 1Providence Pike No. 2 Wastewater Collection Systems

This complex of gravity sewers and low pressure sewers provides service to a large area that has residential development now, industrial development now and proposed for the future. The new sewers will feed to the new North Smithfield Industrial Park Pump Station. A major improvement to the groundwater and surface water will occur with this project.

Park View Wastewater Collection System

A new Parkview Pump Station will serve a new gravity line that will provide wastewater collection for 33 dwelling units in an area subject to seeping and groundwater contamination.

St. Paul Wastewater Collection System

A combination of gravity sewer lines, low pressure sewer lines and a new St. Paul Pump Station will serve to remove an average flow of 72,900 GPD from this service area. The pump station will also handle flows from the WillervalTanglewood Wastewater Collection System.

Victory Highway Wastewater Collection System

A combination of gravity sewers, low pressure sewers and a new Victory Highway Pump Station will serve 159 residential units and a large area of highway business properties.

Victory Highway/Dawley Brook Wastewater Collection System

A new Victory Highway/Dawley Brook Pump Station will serve the installed gravity sewers and low pressure sewers. The pump station will collect wastewater from the residential dwellings and transmit it to the Greene Street Pump Station.

Warren Avenue/Park Drive Wastewater Collection System

This consists of low pressure sewers that will discharge to the manhole on Milton Avenue. Removal of wastewater will occur for 18 dwelling units.

Waterford Wastewater Collection System

This area is shallow to bedrock and a low pressure system is proposed to remove wastewater from 86 residential units and discharge to an existing manhole on Elizabeth Avenue. Removal of an average of 31,400 GPD from this area is critical to solving seeping problems from failed Individual Sewer Disposal Systems.

WillervalTanglewood Wastewater Collection System

A complex of low pressure sewers in the northern section of this project will connect to a new gravity line that will discharge to the Great Road Pump Station. This area is shallow to bedrock and has dwelling units, potential for 123 future dwelling units, areas of neighborhood business and 37 acres of land zoned for manufacturing. The potential for peak flow from this area is 367,000 GPD which a great deal of wastewater that should be collected before contamination due to failed Individual Sewer Disposal Systems.

Wastewater Management District

A Wastewater Management District will improve the non-point sources of pollution by managing the largest portion of the wastewater generated in the Town. Areas that are outside the public sewer system rely on Individual Sewer Disposal Systems that do not receive attention from the owners. Individual Sewer Disposal Systems are underground and out of sight. They can be polluting groundwater without any notice to those above the surface of the system. When an Individual Sewer Disposal System fails it is not functioning properly to treat the wastewater, that failure can be noticed by pooling on the surface, or not noticed by untreated water moving into the subsurface. Through the enactment of the Wastewater Management District a system of inspection, maintenance and proper operation of the Individual Sewer Disposal System is made to reduce the potential failure and contribution to non-point source pollution.

Complete failures of an Individual Sewer Disposal System that require replacement or repair of the system can be accomplished using alternate technologies. Each year, new homes added to the community will use a septic tank with a minimum of 1,500 gallons of capacity and every tank will have an effluent filter installed. Effluent filters are very efficient in their function of keeping solids in the tank for processing. The filters do require maintenance by the owner because they can plug up causing a back up of the system. Access to the filters is

key for the simple maintenance task of rinsing the filter off. System failures are drastically reduced with the use of the filters and this leads to a more effective operation of the Individual Sewage Disposal System without the need for replacement of the system.

Many of the new Individual Sewage Disposal Systems installed now and in the future can consist of the alternate technology sewer systems that provide more advanced treatment. These new systems need attentive maintenance and inspection, but will not require an extensive pump out regimen, thus reducing the volume of septic waste pumped. This method displays a simplistic view of the future volume of septic waste generated in the Town of North Smithfield. The obvious change with the district is the elimination of cesspools and failed systems and replacing them with alternate technologies and 1,500 gallon tanks. With the use of new septic disposal technologies, replacement of failed systems, replacement of cesspools, use of the larger tank size and effluent filters, the risk of non-point source pollution is reduced due to the more efficient treatment of septic waste on site rather than in a central wastewater treatment facility.

The Wastewater Management District is vital to the enforcement of the conversion of the cesspools and the inspection, operation and proper pumping of all systems. With good oversight in the District, on-site treatment of septic waste will improve and lessen the impact of pollution concerns. Pretreatment practices for grease, silver and grit will improve the quality of septic waste from the commercial establishments in the Town. The Wastewater Management District can monitor the pretreatment practices through the inspection program to make sure septic waste quality is kept high.

7.2.6 BUILDING DISPLACEMENT

No buildings, residences, or commercial structures will be displaced during any of these projects. Construction of the pump stations will occur on land owned by the Town. All sewer lines are installed in the existing roadways.

7.2.7 NOISE, AIR OR VISUAL POLLUTION

During construction there will be noise from the operation of heavy equipment preparing the trench for the sewer main. After construction the new sewer line will not produce noise because all operations occur underground. Air quality effects during construction are principally related to suspended dust particles due to

trench excavation, stockpiling material and vehicular solids breakdown and transport. These effects are obviously local and of short duration, although potentially aggravating and annoying. Other effects on air quality during construction will be increased emissions of carbon monoxide and hydrocarbons from heavy duty vehicles and gasoline driven pumps and generators. These effects will not significantly change the area's atmosphere and are considered inconsequential. After construction the sewer main is buried in the road and no noise, air or visual impacts will occur.

pump station. After construction the new facility will not produce noise because all operations occur within the building and consists of the operation of pumps. The building area is minimal in size and designed to be similar to the surrounding structures. Air quality effects during construction are principally related to suspended dust particles due to trench excavation, stockpiling material and vehicular solids breakdown and transport. These effects are obviously local and of short duration, although potentially aggravating and annoying. Other effects on air quality during construction will be increased emissions of carbon monoxide and hydrocarbons from heavy duty vehicles and gasoline driven pumps and generators. These effects will not significantly change the area's atmosphere and are considered inconsequential. The pump station is constructed in such a way to blend with the surrounding area and operate with no impact to noise or air quality.

7.2.8 FLOODPLAIN

Floodplains are a concern for protection because they absorb and store storm water from either fresh water bodies or coastal water bodies. North Smithfield's terrain confines much of the potential to flood along the rivers, reservoirs and streams. Typically, the 100 year floodplain, A zone, is described as the area that is likely to flood once in a hundred years. Similarly, the 500 year floodplain, X zone, is described as the area that is likely to flood once in every five hundred years. Septic tanks, cesspools and leach fields in a floodplain expose a great deal of potential contamination during a flood. Fortunately, in North Smithfield this is not the case the majority of the Town is located in areas determined to be outside the 500 year flood.

Great Road East Wastewater Collection System

To the west of this area is a flood zone along Cherry Brook. The specific project is not in a flood zone.

Greene Street Wastewater Collection System

There are no flood zones in this project area.

Lamoureux Boulevard Wastewater Collection System

Cherry Brook lies to the north and east of this area. There is a flood zone along the brook that is found on three sides of the project area. The project area itself is not in a flood zone.

North Smithfield Industrial Park Wastewater Collection System

This project area is in a well drained area, there are no flood zones and the terrain directs run off away from the project area.

Park View Wastewater Collection System

There is no flood zone in this project area.

Providence Pike No. 1and Providence Pike No. 2 Wastewater Collection System

This is a high area along a ridge with terrain sloping down both sides of the road. No flood zones are present in both of these project areas.

St. Paul Wastewater Collection System

This project area is located in areas determined to be outside the 500 year flood zone.

Victory Highway Wastewater Collection System

This project area is located on the opposite side of the highway from the Slatersville Reservoir and the accompanying Branch River. There is no flood zone in the project area. The flood zone is confined to the area along the edge of the Reservoir.

Victory Highway/Dawley Brook Wastewater Collection System

While this project area has the Dawley Brook and Pratt Pond, only the area immediately around Pratt Pond and an area to the south of Mechanic Street are listed as Zone X, subject to 500 year flood. The project area is along the Victory Highway and is not in the X zone.

Warren Avenue/Park Drive Wastewater Collection System

The project area is outside of any flood zone.

Waterford Wastewater Collection System

This project area is along the edge of a steep slope that flows to the east. The Blackstone River is at the base of the slope. No work is proposed for a flood zone.

WillervalTanglewood Wastewater Collection System

There are no flood zones in this project area.

Wastewater Management District

The earlier discussion about flood zones in general within the Town applies to the Wastewater Management District. Much of the development in the Town is not in a flood zone. The steep slopes and shallow bedrock lend support to development that is not impacted by flooding.

7.3 INDIRECT IMPACTS

7.3.1 URBANIZATION

Urbanization can result from the development of land in areas where public sewer lines permit lower densities and development of land previously undevelopable due to environmental constraints.

Great Road East Wastewater Collection System

This project provides sewer lines in an existing sewer area. This project will connect existing manholes and provide service to a small number of units that are not currently connected.

Greene Street Wastewater Collection System

This project will connect dwelling units and provide for the capacity to add additional dwelling units. The pump station in this project will carry the necessary peak flow from the area, if it is completely developed.

Lamoureux Boulevard Wastewater Collection System

This project connects three dwelling units, a small impact. Additional services are not likely with this project.

North Smithfield Industrial Park Wastewater Collection System

This project provides for a great deal of development potential because it serves vacant land that is zoned for manufacturing. The existing dwelling units and potential for additional dwelling units will be handled by the new gravity sewer line, low pressure sewer lines and the new pump station.

Park View Wastewater Collection System

Opportunities will exist for further development in this area, however, the goal is to connect the existing dwelling units and provide for a new pump station. The Park View area is densely developed now and the soils have rapid permeability.

Providence Pike No. 1 and Providence Pike No. 2 Wastewater Collection System

Much of the road sides in this project area are already developed. There is potential for development in subdivisions located off the arterial road.

St. Paul Wastewater Collection System

This project will serve 36 acres of land zoned as commercial, so the potential for development is high once the sewer lines are installed. The connection of the 101 dwelling units in this project area will greatly improve the groundwater by removal of so many Individual Sewer Disposal Systems. A pump station is proposed for this project area. This pump station will also handle the flow from the Willerval/Tanglewood area.

Victory Highway Wastewater Collection System

This project area serves both dwelling units and business properties permitting further expansion of the village complex. A new pump station will have the capacity to handle the collective volume from the project area.

Victory Highway/Dawley Brook Wastewater Collection System

In this project area, the main service is for residential dwelling units. A new pump station is included in this project area to readily handle existing and projected flows. Increase in development in this area may occur with the installation of public sewers.

Warren Avenue/Park Drive Wastewater Collection System

This is a short section of low pressure sewer line that will serve 18 existing dwelling units. Increased urbanization is not likely due to the nearly developed nature of this area.

Waterford Wastewater Collection System

The total length of this low pressure sewer is nearly a mile and a half, but serves mostly existing dwelling units that have shallow to bedrock soils. While more urbanization is unlikely due the to nearly developed nature, the area where bedrock precluded development of a lot, that lot will be more attractive for development.

WillervalTanglewood Wastewater Collection System

This project area has a high number of failed Individual Sewer Disposal Systems due to the shallow to bedrock nature of the soils. A combination of low pressure sewers, gravity sewer lines, a pump station and grinder pumps will be used to connect the dwelling units along the roads in this project area. Urbanization is likely in this area because there is potential to more than double the dwelling units and there are 7 acres zoned for neighborhood businesses and 37 acres of land zoned for manufacturing.

Wastewater Management District

Better management of Individual Sewer Disposal Systems will likely allow more development, but the conditions for an Individual Sewer Disposal System would have been favorable in the first place. The likelihood of increased urbanization with the addition of the Wastewater Management District is minimal because zoning is less favorable, much of the land is rural in nature, large lot development is preferred and other utilities are not readily available.

7.3.2 LOCAL SUPPLIERS

Improvements to the collection system obviously have the potential to provide short-term benefits to local skilled and unskilled workers with jobs in the construction trades. The project will require the skills of excavating contractors, pipe installers and paving companies. Construction will create a demand for materials such as pipe, soils, pumps and asphalt, plus the work will promote local economic benefits due to worker needs for food, beverage and personal equipment.

Some of the neighborhood zoned areas that are proposed for sewer lines will enhance the opportunity for local suppliers of goods and services to develop in the neighborhood zones.

7.3.3 LOCAL SERVICES

Local vendors will receive minimal increase in business during construction. The work crew will be less than 15 people and will not increase demand for local services. No businesses will be impacted because these projects are in residential areas.

Future development in the manufacturing, neighborhood business, commercial and industrial zones will occur with the added utility of sewers. Other utilities exist in these zones that make development favorable and adding the sewer system will complete the utility needs of many potential users.

7.3.4 RECREATION

The primary beneficiary of the installation of sewer lines is the improvement to the recreation waters that abut the projects. Recreation opportunities can be limited because of the non-point source pollution from Individual Sewer Disposal Systems. Overall, improved water quality for the surface and ground waters are two of the main reasons for the construction of these projects.

7.3.5 LAND USE

Impacts to land use are predominantly construction related short-term impacts associated with pavement breaking, sewer trench excavating, pipe placement, trench backfilling and paving of the existing street. Nearly all of the construction occurs within existing roads and on properties already owned by the Town. Increased use of the surrounding lands may occur after the installation of sewer lines due to the ability to develop vacant lots that can be served by a sewer line, but the primary development potential lies in the vacant land in the business, commercial, manufacturing and industrial zones.

7.3.6 ENERGY

Energy consumption during construction will be in the form of gasoline and diesel engines, electricity for small hand tools and potable water for testing, cleaning and drinking. After construction the pump stations will have pumps in constant operation. A small electric heater, an exhaust fan, fluorescent lighting and receptacles will operate in the pump stations.

7.3.7 ECONOMICS

Minimal impact to the local economy during construction. After construction the increased sewer capacity will provide better recreation, industrial, manufacturing and business development potential. Tourism is an economic engine in North Smithfield and good water quality in the ponds and rivers keeps tourism up.

7.3.8 PUBLIC SAFETY

Care is needed with flaggers, signs and warning devices. Traffic control was addressed earlier in this Section. Fortunately, during a majority of the day there is little residential traffic except on the main thoroughfares such as Great Road, Victory Highway, Smithfield Industrial Drive, Providence Pike and Pound Hill Road.

7.3.9 AESTHETICS

For all of the projects the paving of the roads will improve the surface and appearance of the road once the sewer lines are installed. The installation of gravity sewer lines and manholes will not change the view from the current view. When completed the sewer line is underground and only the manhole covers are exposed as a flush unit in the roadway. Pump station buildings are constructed of materials similar to those in surrounding buildings and blends with the adjoining facilities. Force main installation will occur underground where they are not visible. When completed there will be little change from the present view for all the gravity sewer lines, low pressure sewer lines, manholes and pump stations..

7.3.10 VISUAL AMENITIES

No change to the visual impact of any of these projects over the present conditions.

7.4 SUMMARY

Primary adverse impacts associated with the project to install the pump stations, force mains and interceptors are construction activity and temporary disruption of traffic. All wetlands and storm water catch basins need protection with soil erosion methods including silt fence and hay bales. The potential for soil erosion exists because the soils are so permeable and the slope of the land is steep enough to cause rapid surface runoff.

The project will provide increased sewer capacity in the North Smithfield Wastewater Collection System. Installation of sewer lines in the critical land areas will improve water quality by collecting waste water before it leaches into the soil. Soils that are shallow to bedrock cause surface seepage of wastewater, so this work is important for improved water quality.

LIST OF TABLES

LIST OF FIGURES

8.0 PRELIMINARY IMPLEMENTATION PLANS

8.1 WASTEWATER COLLECTION SYSTEM PRELIMINARY DESIGN

The criteria used for the design of the wastewater collection systems and pumping station was the build-out scenario. The important criteria are summarized below:

- Present residential per dwelling wastewater flow selected for the computation is equal to 180 gpd per dwelling, based on the sewer flows obtained from the North Smithfield Sewer Department.
- Based upon the existing plumbing code which promotes water conservation measures, it would continue to result in a stabilization of water consumption.
- Future residential per housing unit wastewater flow will be based on 300 gpd.
- Wastewater flows for Silver Pines, Rockcliff Farm, Laurel Woods and Slatersville Mill are based on design flow data from each entity.
- Future infiltration will be increased by 65 gpd (25 gpdp x 2.61 persons per housing unit) for the future dwellings.
- Future inflow will remain at the current level.
- Peak flow factor for future residential, industrial and commercial flows is based on flow records from TR-16.

Sanitary sewers and pumping stations have been designed to conform to requirements of the Rhode Island Department of Environmental Management and the recommendations of the New England Interstate Water Pollution Control Commission published standard TR-16.

The proposed routes for the lateral sewers were chosen based on the existing roadway system and location of the existing wastewater collection system. The future service areas are located adjacent to the existing sewers; therefore, the point of connections are defined. The installation of the proposed laterals will minimize the environmental impacts, as there will be no alterations to wetlands and floodplains. Erosion and sediment control of wetlands adjacent to the roadways will be mitigated by the utilization of hay bales and silt fences and sedimentation basins.

Design and Cost Computations

As previously stated, the system design assumed the "build out" scenario which represents areas to be fully developed. Pipes have been sized in compliance with DEM standards for sewer design to obtain a depth of sixty to seventy percent of the full depth of flow at the peak design flows. The gravity pipeline design also includes design for minimum flow velocities of 2.0 feet per second in pipes flowing full. The maximum recommended flow velocity is 12.0 feet per second for pipes flowing full. In order to reduce excavation costs by maintaining shallow excavation depths, the interceptors have been designed for minimum slope and flow velocity and to parallel the existing roadway profiles. In calculating minimum design slopes for interceptors, Manning's Equation for open-channel flow was used.

The estimate of probable project construction costs have been prepared including labor, materials, and administrative expenses likely to be incurred by the Town of North Smithfield. Actual recent bid prices for similar work in the area supplemented, as appropriate, by equipment suppliers, materials suppliers, and by standard cost estimating guides to prepare the estimate of probable cost were used. The construction costs are based on 2006 costs. The pipe in place cost includes trench excavation and backfill, cost of pipe installation, diverting, sheeting, stone bedding, sedimentation and erosion control, pavement removal, temporary pavement, and traffic control. Rock excavation was assumed to be five percent of all excavation, and bank run gravel was assumed to be thirty percent of all excavation.

An allowance of twenty-five percent has been provided for construction contingencies. The magnitude of this contingency factor directly reflects design and construction uncertainties attributable to the lack of detailed subsurface information and planimetric and topographical mapping at this stage of the project design development.

Below-Ground Pump Stations

The submersible pump stations will consist of a pumping chamber and a separate valve chamber conforming to the Town's and Department of Environmental Management's (DEM) requirements.

The pump chamber will consist of two submersible grinder pumps, slide rail, ventilation, ladder rungs with a safety rail system and an access hatch. The electrical equipment within the pump chamber will be non-corrosive and explosion-proof, conforming with the requirements for Class I, Group D, Division I.

The valve chamber will consist of a precast concrete chamber, and contain check valves, plug valves, aluminum steps and an access hatch. A power and control cabinet would be provided to house the electrical panelboard, manual transfer switch and the pump control panel. A temperature controlled fan and heater will be controlled by a float switch system consisting of five floats to start and shut pumps off, and also for the low water and high water alarm.

An alarm system will be provided for the pump stations, with the alarm signals transmitted through the telephone system. The alarm will be activated in any one of the following incidents: high water and low water in pump station; loss of normal power; intrusion to pump chamber; intrusion to valve chamber; intrusion to control chamber; pump seal failure for each pump; and pump failure for each pump.

Above-Ground Pumping Stations

The above-ground pump station will consist of a separate drywell and wetwell conforming to the Town's and Department of Environmental Management's requirements. The pump stations have been designed to provide for telemetering of wastewater flow, alarms, etc. Each pump station will be equipped with an emergency generator for standby power and with a pump connection to be used for a portable sewage pump.

The drywell will consist of two centrifugal pumps capable of passing spheres three inches in diameter, with running meters and pressure gauges on suction and discharge piping, and a sump pump capable of passing 1½ inch solids discharging to the wetwell. Check valves will be installed on discharge piping, plug valves on suction and discharge piping. A connection will be provided on the discharge piping including valves and piping to be used to drain the force main. A dehumidifier, heating system, aluminum railing and ladders will be installed. A control system will be provided for the on-off control of pump operation as well as for high and low water alarms.

The wetwell will consist of divided wells, interconnected and gated to facilitate repairs and cleaning. An accessible bar rack with clear openings of 1½ inches will be provided at the influent piping. The electrical equipment within the we well will be non-corrosive and explosion-proof conforming with the requirements for Class I, Group D, Division I.

Ventilation will be provided for both chambers. Continuous operation will be designed for twelve air changes per hour, and intermittent operation will be designed for thirty air changes per hour.

An alarm system will be provided for the pump station with the alarm signals transmitted through the telephone system. The alarm will be activated in any one of the following incidents: high water in wetwell, loss of one or more phase of power supply, high water level in pump room sump, loss of the alarm transmission line, generator failure, loss of normal power and intrusion.

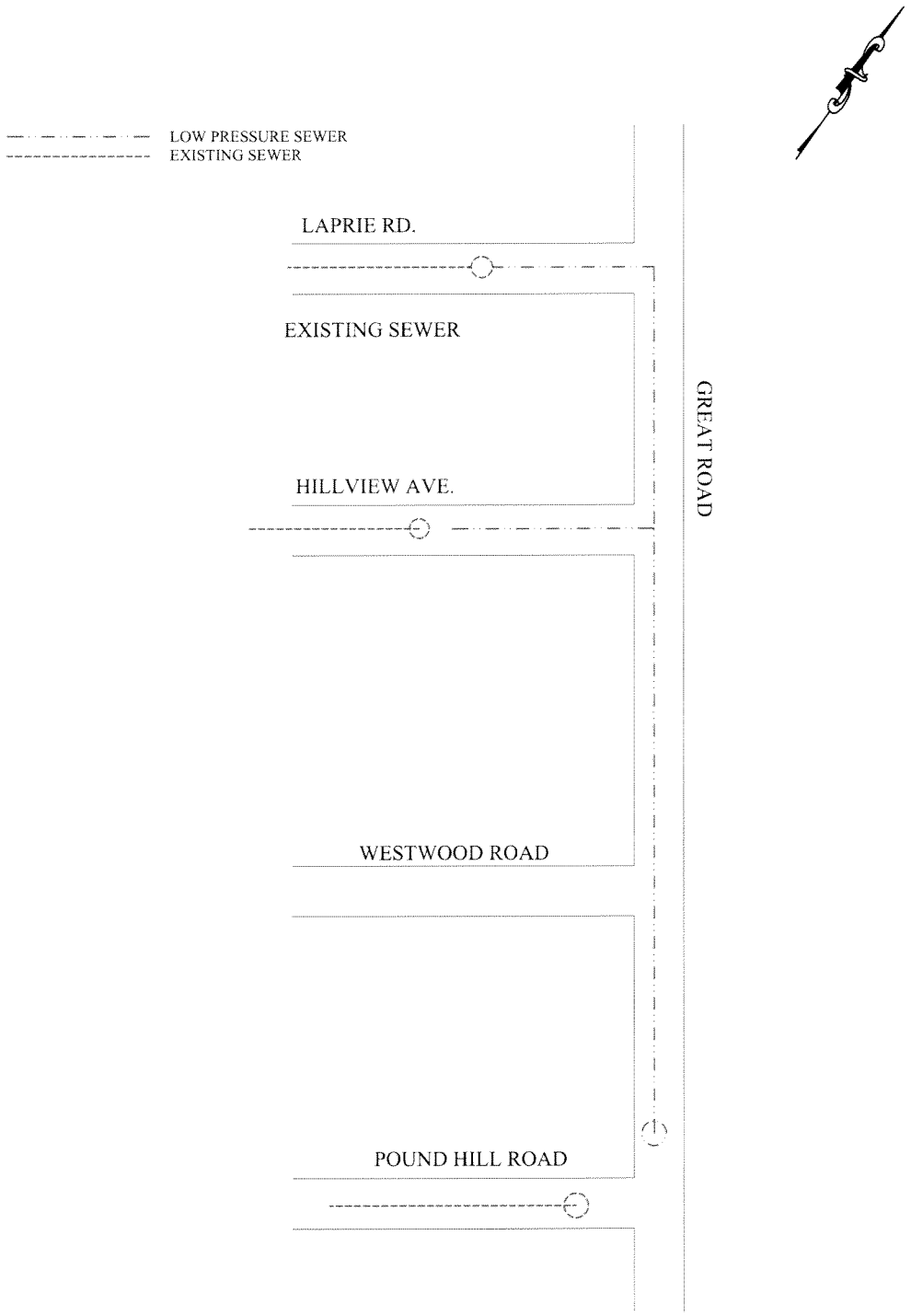
8.2 FUTURE SERVICE AREAS

Great Road East Wastewater Collection System

The Great Road East Wastewater Collection System will serve 31 dwelling units as depicted in Figure 8-1. The average wastewater flow generated by Great Road East Service Area is 11,315 GPD and the peak flow is 29,915 GPD. The collection system will consist of 2,200 linear feet of low pressure sewer system. Table 8-1 summarizes the estimated cost of the project which is $1,696,200.

Greene Street Wastewater Collection System

The Greene Street Wastewater Collection System will serve 60 incremental residential dwellings along Greene Street, Country Way, Pacheco Drive, Ridge Road, and the Victory Highway/Dawley Brook Service Area. The Collection System will consist of 5,800 linear feet of 8-inch conventional gravity sewers and a submersible grinder pump station and 1,000 linear feet of 3-inch force main, as shown in Figure 8-2. The gravity sewers will discharge to the Branch River Interceptor. The Greene Street Pump Station will have a capacity of 84,900 (60 GPM). The station will be equipped with two submersible grinder sewage pumps, pump connection for



Town of North Smithfield
Rhode Island

Figure 8-1
GREAT ROAD EAST
WASTEWATER COLLECTION SYSTEM

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Phone: 401-454-7000 Fax: 401-454-7415

Source: North Smithfield

Date: 2006

Scale: No Scale

TABLE 8-1 PROBABLE PROJECT COST FOR THE GREAT ROAD EAST WASTEWATER COLLECTION SYSTEM		
Low Pressure Sewer	$	88,000
Low Pressure Sewer Service		29,500
Grinder Pumps		142,600
Flushing Manholes		6,000
Rock Excavation		8,000
Gravel Refill		14,400
Test Pits		20,000
Traffic Control		30,000
Pavement Restoration		873,000
Sub-Total	$	1,211,500
Contingencies (25%)		302,900
Sub-Total	$	1,514,400
Engineering Design Services		60,600
Construction Administration and Resident Inspection		121,200
TOTAL	**$**	**1,696,200**

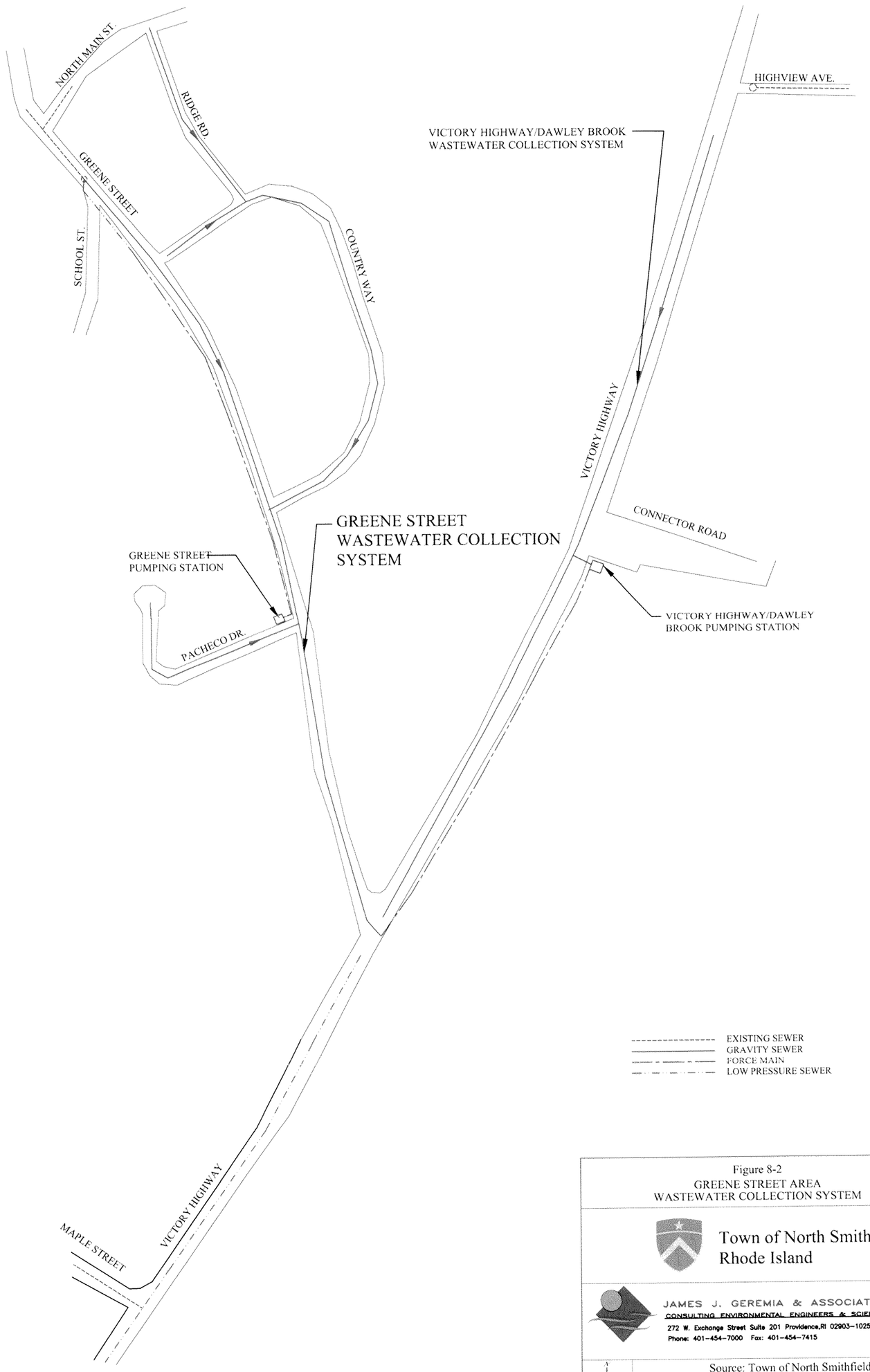

Figure 8-2
GREENE STREET AREA
WASTEWATER COLLECTION SYSTEM

Town of North Smithfield
Rhode Island

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Source: Town of North Smithfield

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bypass pumping during emergencies and power outages, and a manual transfer switch. The incremental average sewage flow of the collection system is 21,900 GPD, with an associated peak flow of 57,900 GPD. The total average flow processed by the Greene Street Wastewater Collection System is 32,100 GPD with a peak flow of 84,900 GPD. The total estimated cost for the Greene Street Wastewater Collection System is $1,520,900as summarized in Table 8-2.

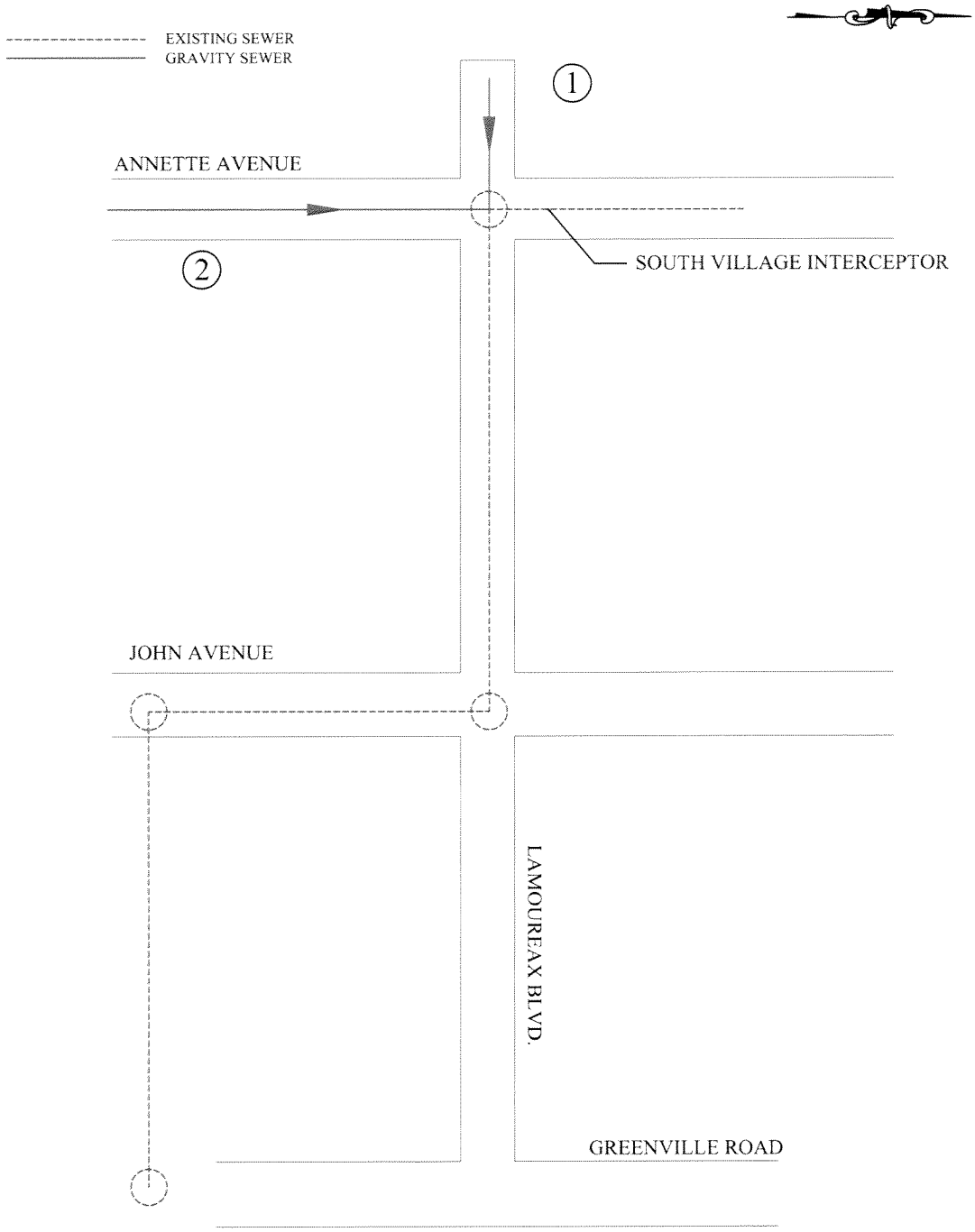
Lamoureux Boulevard Wastewater Collection System

The Lamoureux Boulevard Wastewater Collection System consists of 400 linear feet of 8-inch gravity sewer serving 3 residential dwellings discharging to the South Village Interceptor, as shown in Figure 8-3. The estimated cost for the Lamoureux Boulevard Collection System is $98,600 as summarized in Table 8-3.

North Smithfield Industrial Park Wastewater Collection System

The North Smithfield Industrial Park Wastewater Collection System consists of 6,300 linear feet of gravity sewers serving the North Smithfield Industrial Park and 3,600 linear feet of low pressure sewers serving the surrounding residential area consisting of 61 dwelling units along Pound Hill Road and Taber Hill Road and 139 acres of land zoned for manufacturing, including an above-ground pump station and force main as shown in Figure 8-4. The average wastewater flow generated by the service area is 161,300 GPD, and the peak flow is 475,900 GPD. The average wastewater flow that will be conveyed by the Industrial Park Pump Station will be 95,300 GPD with an associated peak daily flow of 277,900 GPD (200 GPM). The above-ground pumping station will consist of two centrifugal sewage pumps rated at 200 GPM, an emergency generator and pump connection for emergency pumping, and a Data Acquisition Panel which will transmit wastewater flows and alarms. The 4-inch force main from the North Smithfield Industrial Park Pump Station will traverse along North Smithfield Industrial Drive in a northerly direction to its point of termination at a sanitary manhole located 2,000 feet south of Steel Street. The gravity lateral will then proceed north along the roadway and connect to Steel Street. Table 8-4 summarizes the project cost which is estimated to be $3,097,600.

TABLE 8-2 PROBABLE PROJECT COST FOR THE GREENE STREET WASTEWATER COLLECTION SYSTEM		
8-inch PVC Pipe	$	435,000
6-inch PVC Pipe and Wyes		96,000
3-inch Force Main		50,000
Precast Concrete Manholes		45,000
Rock Excavation		25,000
Gravel Refill		30,000
Test Pits		10,000
Traffic Control		25,000
Erosion Control		20,000
Pavement Restoration		200,400
Greene Street Pump Station		150,000
Sub-Total	$	1,086,400
Construction Contingencies (25%)		271,600
Sub-Total	$	1,358,000
Engineering Design Services		54,300
Construction Administration and Resident Inspection		108,600
TOTAL	**$**	**1,520,900**



Town of North Smithfield
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Figure 8-3
LAMOUREUX
WASTEWATER COLLECTION SYSTEM

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TABLE 8-3 PROBABLE PROJECT COST FOR THE LAMOUREUX BOULEVARD WASTEWATER COLLECTION SYSTEM		
8-inch PVC Pipe	$	30,000
6-inch PVC Pipe and Wyes		4,800
Precast Concrete Manholes		6,000
Gravel Refill		800
Pavement Restoration		13,300
Sub-Total	$	54,900
Construction Contingencies (25%)		13,700
Sub-Total	$	68,600
Engineering Design Services		10,000
Construction Administration and Resident Inspection		20,000
TOTAL	**$**	**98,600**

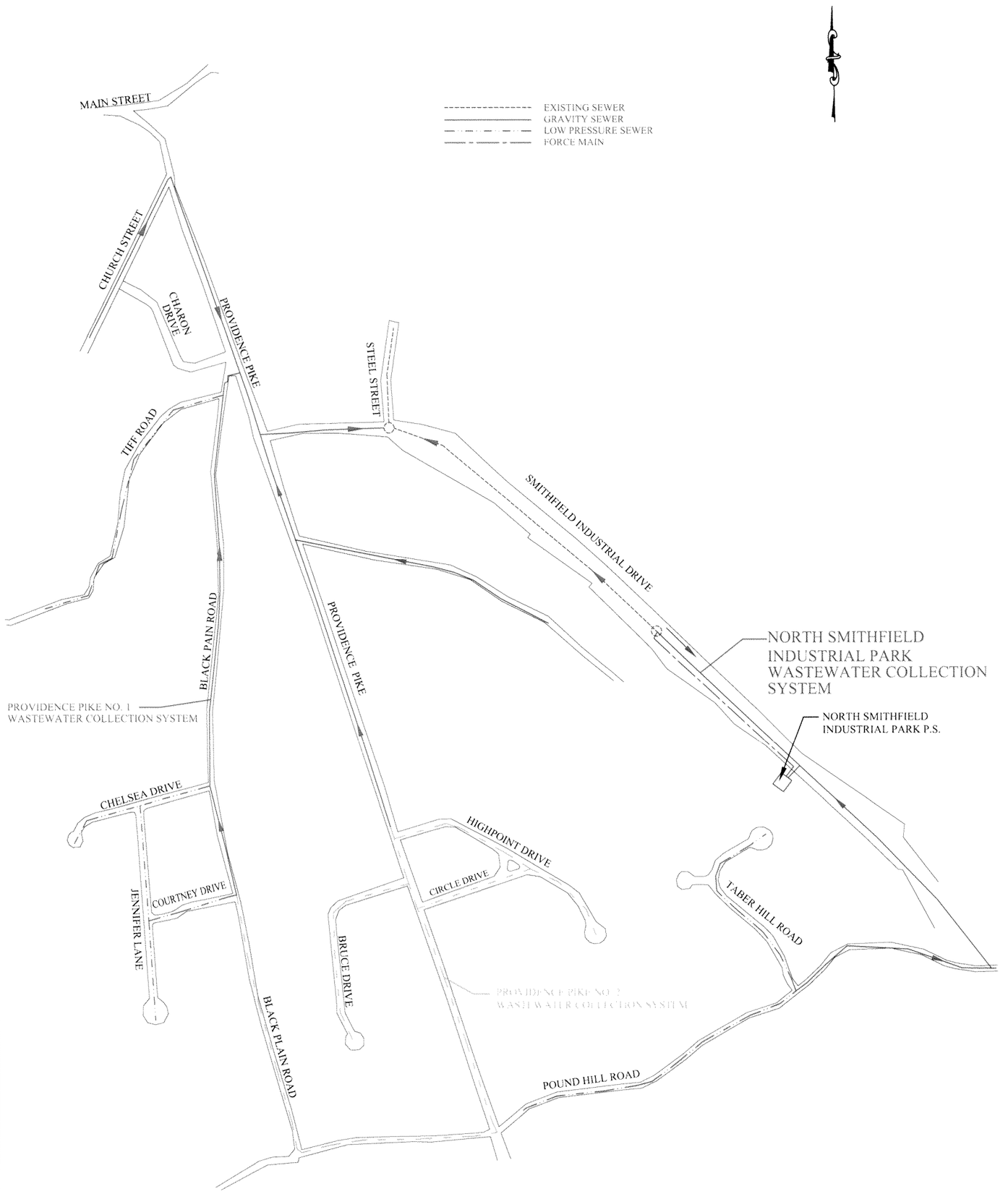

Figure 8-4
NORTH SMITHFIELD INDUSTRIAL PARK
WASTEWATER COLLECTION SYSTEM

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TABLE 8-4 PROBABLE PROJECT COST FOR THE NORTH SMITHFIELD INDUSTRIAL PARK WASTEWATER COLLECTION SYSTEM		
8-inch PVC Pipe	$	472,500
6-inch PVC Pipe and Wyes		28,500
Low Pressure Sewer		144,000
Low Pressure Sewer Service		27,600
4-Inch Force Main		100,000
Precast Concrete Manholes		105,000
Flushing Manholes		9,000
Grinder Pumps		133,400
Rock Excavation		180,000
Gravel Refill		72,000
Test Pits		20,000
Erosion Control		30,000
Traffic Control		50,000
pavement Restoration		390,000
North Smithfield Industrial Park Pump Station		450,000
Sub-Total	$	2,212,600
Construction Contingencies (25%)		553,200
Sub-Total	$	2,765,800
Engineering Design Services		110,600
Construction Administration and Resident Inspection		221,200
TOTAL	**$**	**3,097,600**

Park View Wastewater Collection System

The Park View Wastewater Collection System will serve 33 dwelling units. The average wastewater flow generated by Park View is 12,000 GPD, and the peak flow is 31,840 GPD. The collection system will consist of 3,400 linear feet of 8-inch gravity laterals, submersible grinder pump station and 500 linear feet of 2-inch force main (Figure 8-5). The pump station will consist of a pumping chamber and valve chamber, having a capacity of 30 GPM discharging to the North Main Street Sewer System. The stations will be equipped with a pump connection for bypass pumping during power outages and pump failures and a manual transfer switch. Table 8-5 summarizes the estimated cost of the project, which is $908,600.

Providence Pike No. 1 Wastewater Collection System

The Providence Pike No. 1 Wastewater Collection System (Figure 8-6) will serve 259 dwelling units (Providence Pike No. 1 [160 dwelling units] plus Providence Pike No. 2 [99 dwelling units]). The average wastewater flow generated by Providence Pike No. 1 Service Area is 94,500 GPD, and the peak flow is 249,900 GPD. The incremental average flow of Providence Pike No. 1 is 58,400 GPD with an associated peak flow of 154,400 GPD. The collection system will discharge to the Branch River Interceptor.

The Providence Pike No. 1 Wastewater Collection System will consist of approximately 9,100 linear feet of 8-inch gravity sewers and 4,700 linear feet of low pressure sewers at an estimated cost of $4,216,700.00 for the components necessary for the construction of the sewer system.

Providence Pike No. 2 Wastewater Collection System

The Providence Pike No. 2 Wastewater Collection System (Figure 8-7 will serve 99 dwelling units. The average wastewater flow generated by Providence Pike No. 2 is 36,100 GPD, and the peak flow is 95,500 GPD. The sewer system will consist of 8,500 linear feet of low pressure sewers and will discharge to the Providence Pike No. 1 Wastewater Collection System. Table 8-7 summarizes the estimated cost of the project, which is $2,248,900.

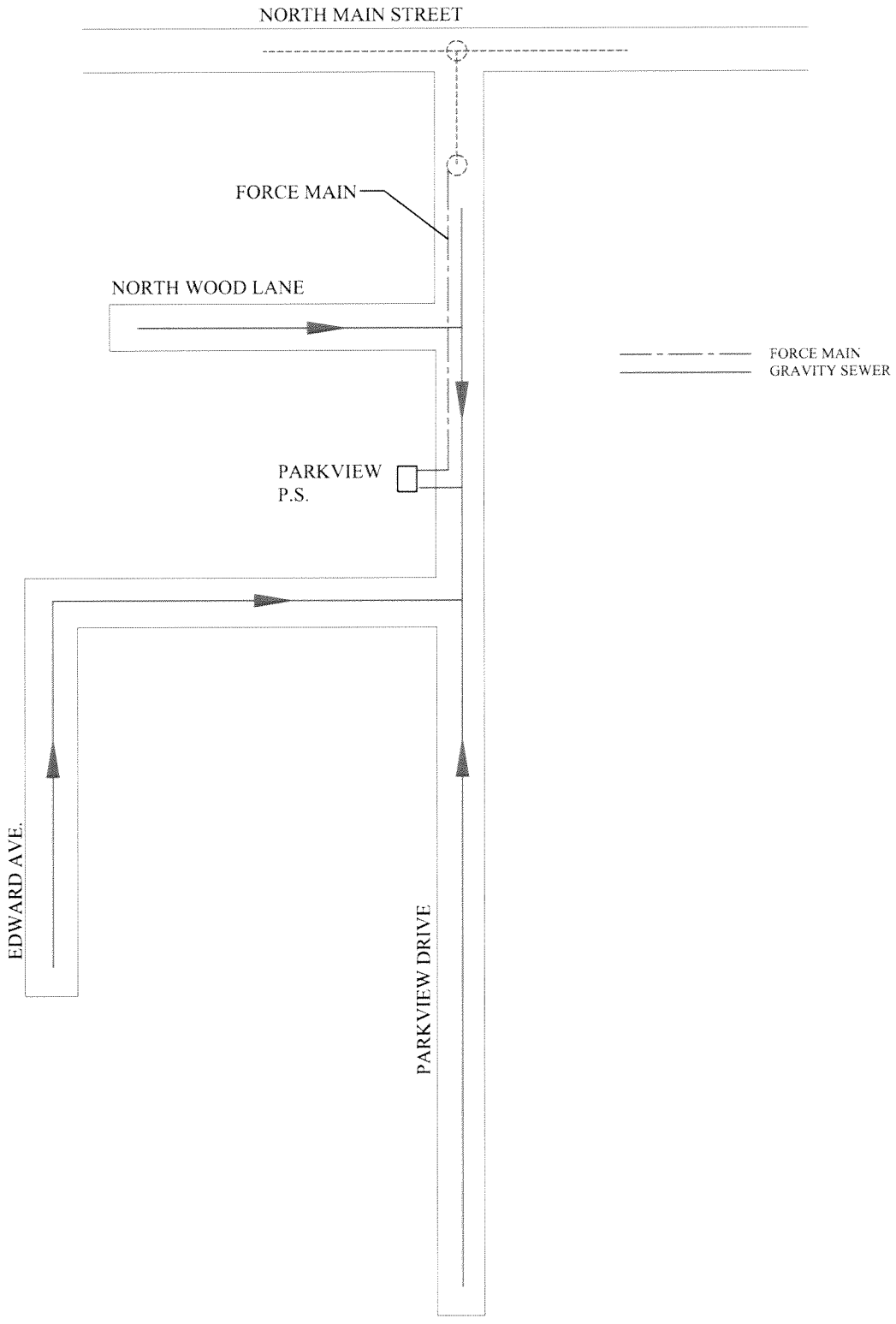

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Figure 8-5
PARKVIEW
WASTEWATER COLLECTION SYSTEM

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TABLE 8-5 PROBABLE PROJECT COST FOR THE PARK VIEW WASTEWATER COLLECTION SYSTEM		
8-inch PVC Pipe	$	255,000
6-inch PVC Pipe and Wyes		52,800
2-inch Force Main		25,000
Precast Concrete Manholes		45,000
Rock Excavation		13,000
Gravel Refill		15,000
Test Pits		10,000
Pavement Restoration		133,800
Park View Pump Station		100,000
Sub-Total	$	649,600
Construction Contingencies (25%)		162,400
Sub-Total	$	812,000
Engineering Design Services		32,200
Construction Administration and Resident Inspection		64,400
TOTAL	**$**	**908,600**

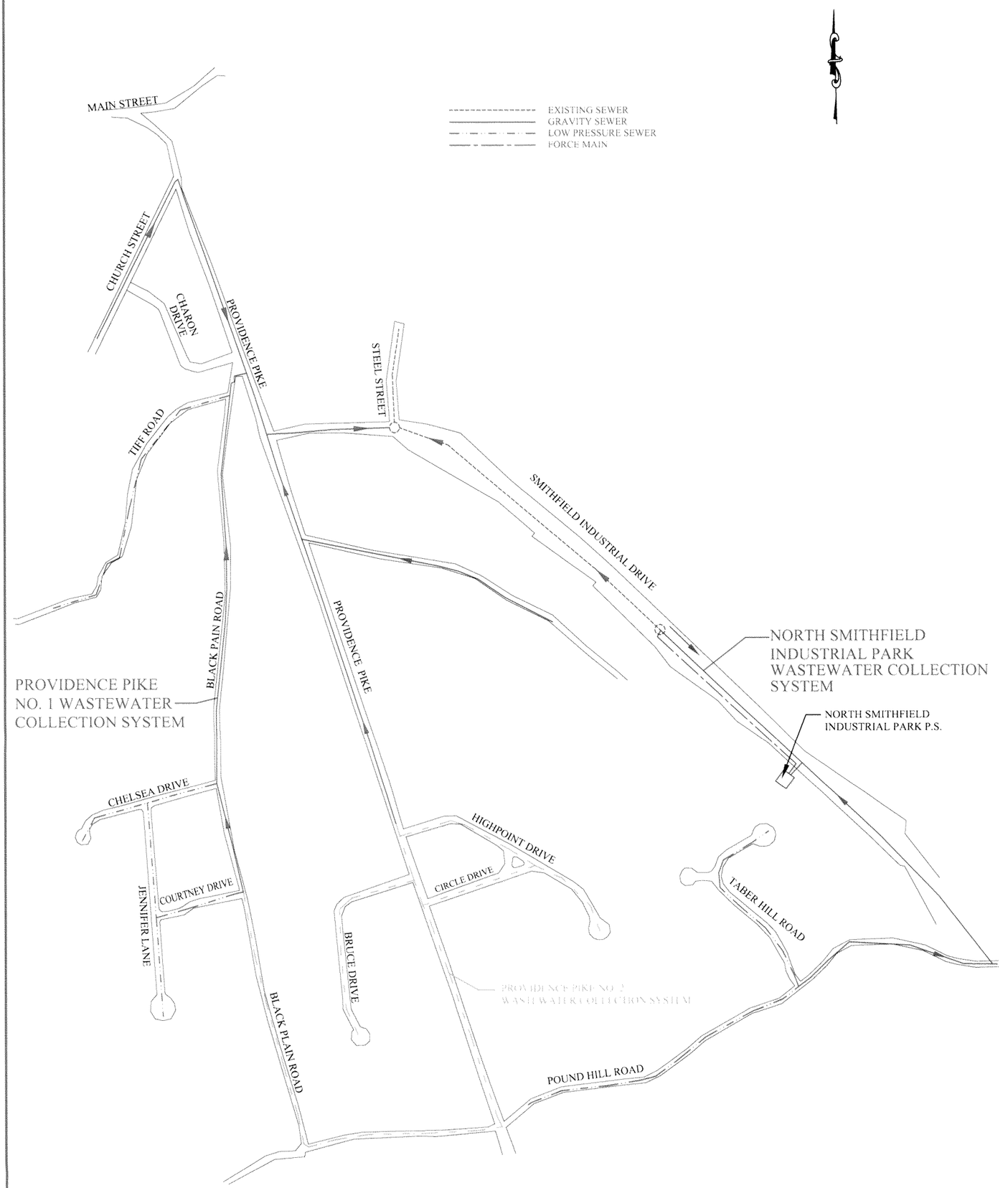

Figure 8-6
PROVIDENCE PIKE NO. 1
WASTEWATER COLLECTION SYSTEM

Town of North Smithfield
Rhode Island

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TABLE 8-6 PROBABLE PROJECT COST FOR THE PROVIDENCE PIKE NO. 1 WASTEWATER COLLECTION SYSTEM		
8-inch PVC Pipe	$	655,200
6-inch PVC Pipe and Wyes		105,600
Low Pressure Sewer		188,000
Low Pressure Sewer Services		36,100
Grinder Pumps		174,800
Precast Concrete Manholes		150,000
Flushing Manholes		18,000
Rock Excavation		270,000
Gravel Refill		108,000
Test Pits		30,000
Erosion Control		50,000
Traffic Control		100,000
Pavement Restoration		1,126,200
Sub-Total	$	3,011,900
Construction Contingencies (25%)		753,000
Sub-Total	$	3,764,900
Engineering Design Services		150,600
Construction Administration and Resident Inspection		301,200
TOTAL	**$**	**4,216,700**

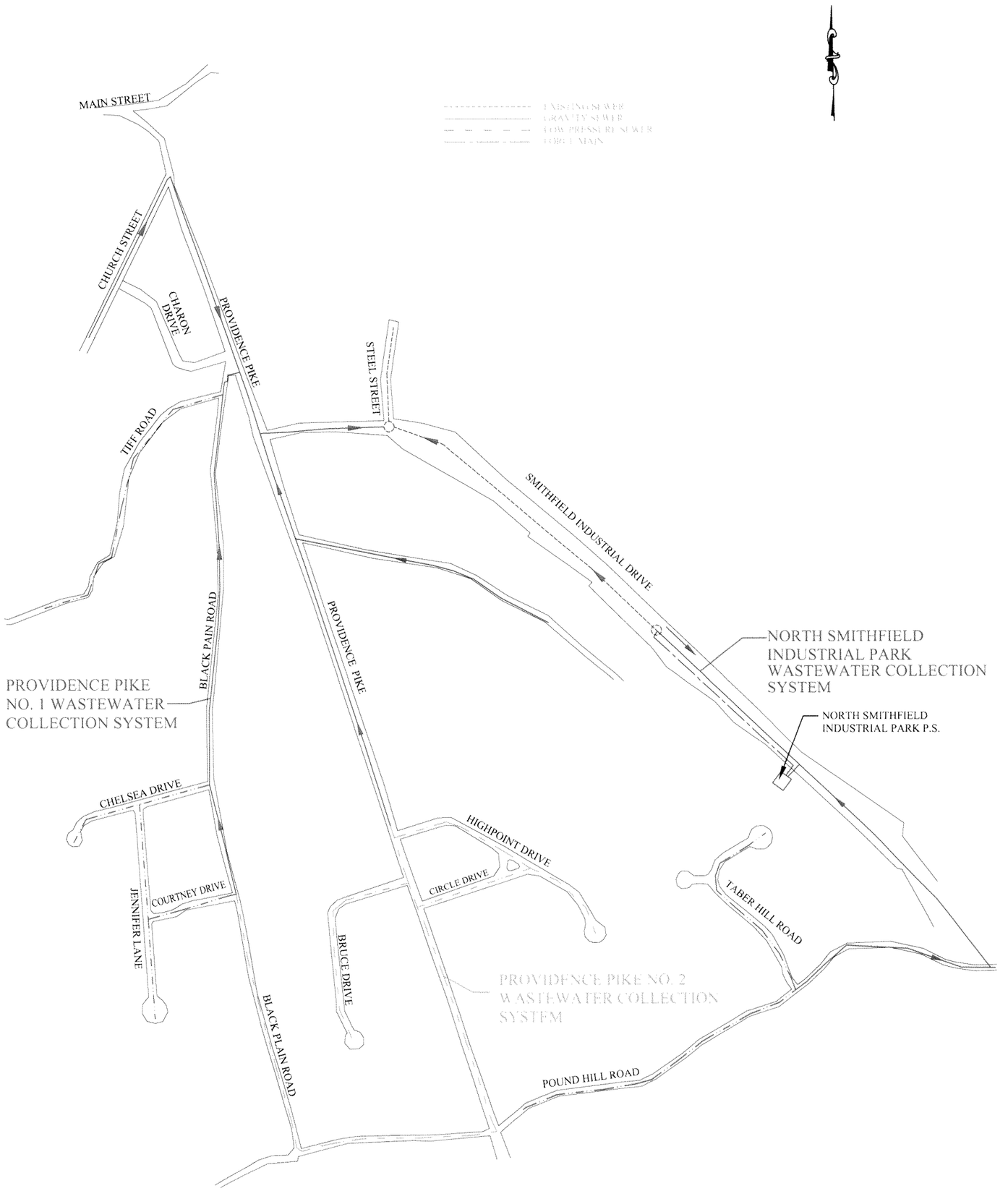

Figure 8-7
PROVIDENCE PIKE NO. 2
WASTEWATER COLLECTION SYSTEM

Town of North Smithfield
Rhode Island

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TABLE 8-7 PROBABLE PROJECT COST FOR THE PROVIDENCE PIKE NO. 2 WASTEWATER COLLECTION SYSTEM		
Low Pressure Sewer	$	340,000
Low Pressure Sewer Services		74,800
Flushing Manholes		24,000
Grinder Pumps		312,800
Rock Excavation		220,000
Gravel Refill		36,000
Test Pits		20,000
Erosion Control		20,000
Traffic Control		100,000
Pavement Restoration		458,500
Sub-Total	$	1,606,100
Construction Contingencies (25%)		401,500
Sub-Total	$	2,007,600
Engineering Design Services		80,300
Construction Administration and Resident Inspection		160,600
TOTAL	**$**	**2,248,500**

St. Paul Wastewater Collection System

The St. Paul Collection System will consist of a gravity system, low pressure sewer system, and a pump station and force main as shown in Figure 8-8. The collections system will serve 101 dwelling units and 36 acres of land zoned commercial. The average wastewater flow from the St. Paul area is 72,900 GPD with a peak flow of 205,500 GPD. The collection system will consist of 9,700 linear feet of 8-inch gravity sewer mains, 3,100 linear feet of low pressure sewers, an above-grade pump station, and 2,400 linear feet of 6-inch force main. The St. Paul Pump Station will accommodate flows from the Willerval/Tanglewood and St. Paul service areas consisting of 357 residential dwellings and 76 acres of land zoned for manufacturing, commercial and business neighborhood. The capacity of the pump station will be 572,500 GPD (400 GPM). The station will consist of a separate wet well and dry well chamber, consisting of two centrifugal sewage pumps rated at 400 GPM, an emergency generator, and a pump connection for emergency pumping. The 6-inch force main will traverse 300 feet along St. Paul Street in a southerly direction onto Great Road. From this point, the force main will traverse along Great Road in an easterly direction to its point of termination at the existing sanitary manhole, located at the intersection of Great Road and Mendon Road.

The total cost for St. Paul Wastewater Collection System is $6,179,700, as summarized in Table 8-8.

Victory Highway Wastewater Collection System

The Victory Highway Wastewater Collection System will serve 159 residential dwelling units, consisting of 7 acres of highway business properties, contributing a daily average wastewater flow of 65,000 GPD, with an associated peak flow of 174,400 GPD. The collection system will consist of 10,300 linear feet of 8-inch gravity sewers and a pump station as shown in Figure 8-9. The Victory Highway Pump Station will have a capacity of 80 GPM consisting of two submersible grinder sewage pumps. An exterior mounted generator will provide power during power failures. Table 8-9 summarizes the estimated project cost of $5,439,300.

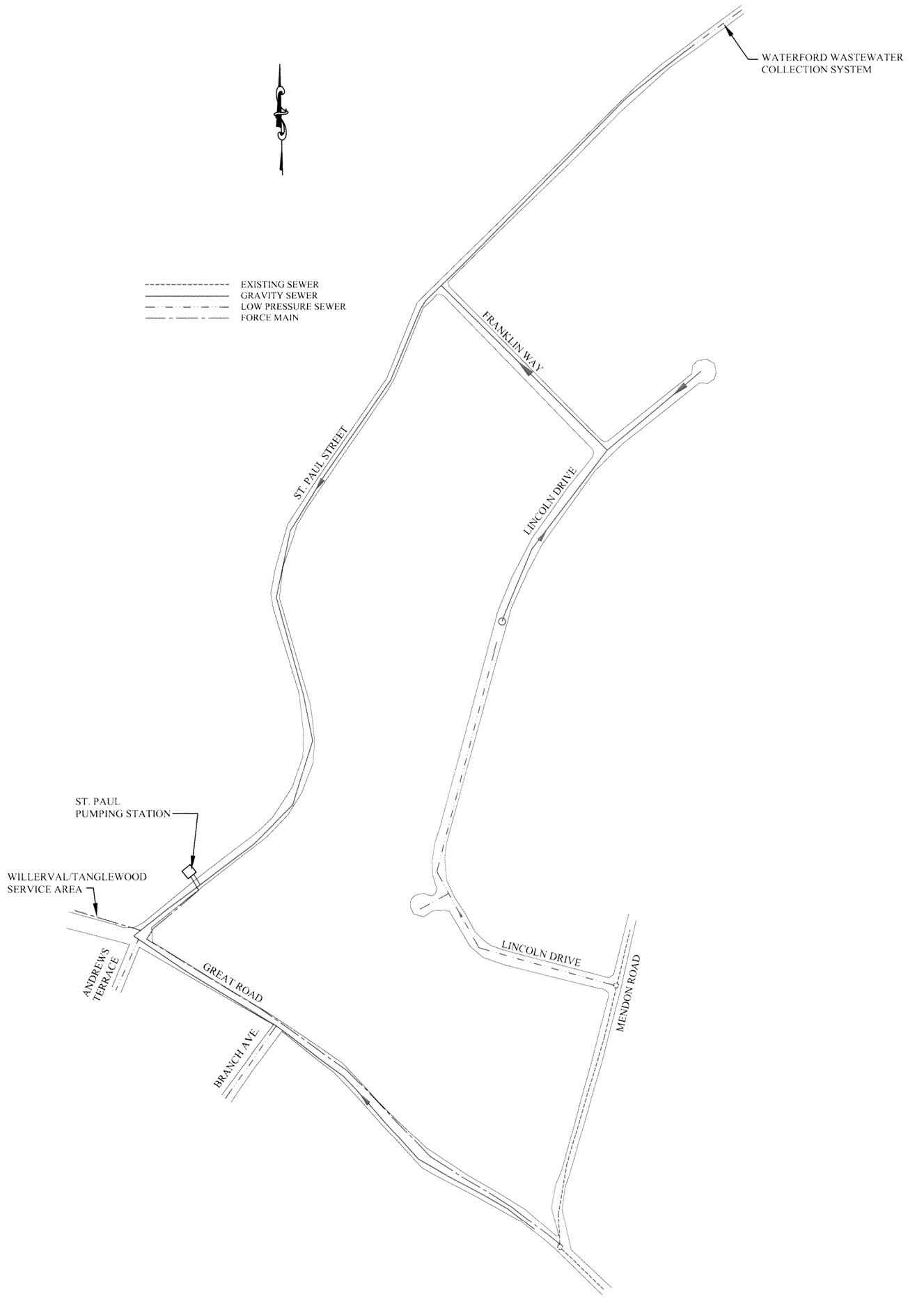

Figure 8-8

ST. PAUL WASTEWATER COLLECTION SYSTEM

Town of North Smithfield
Rhode Island

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TABLE 8-8 PROBABLE PROJECT COST FOR THE ST. PAUL WASTEWATER COLLECTION SYSTEM		
8-inch PVC Pipe	$	727,500
6-inch PVC Pipe and Wyes		112,000
Low Pressure Sewer		124,000
Low Pressure Sewer Services		29,500
6-inch Force Main		144,000
Grinder Pumps		142,600
Precast Concrete Manholes		150,000
Flushing Manholes		9,000
Force Main Cleanouts		8,000
Rock Excavation		501,900
Gravel Refill		112,500
Test Pits		20,000
Erosion Control		50,000
Traffic Control		75,000
Pavement Restoration		1,592,900
St. Paul Pump Station		500,000
Sub-Total	$	4,298,900
Construction Contingencies (25%)		1,074,700
Sub-Total	$	5,373,600
Engineering Design Services		268,700
Construction Administration and Resident Inspection		537,400
TOTAL	**$**	**6,179,700**

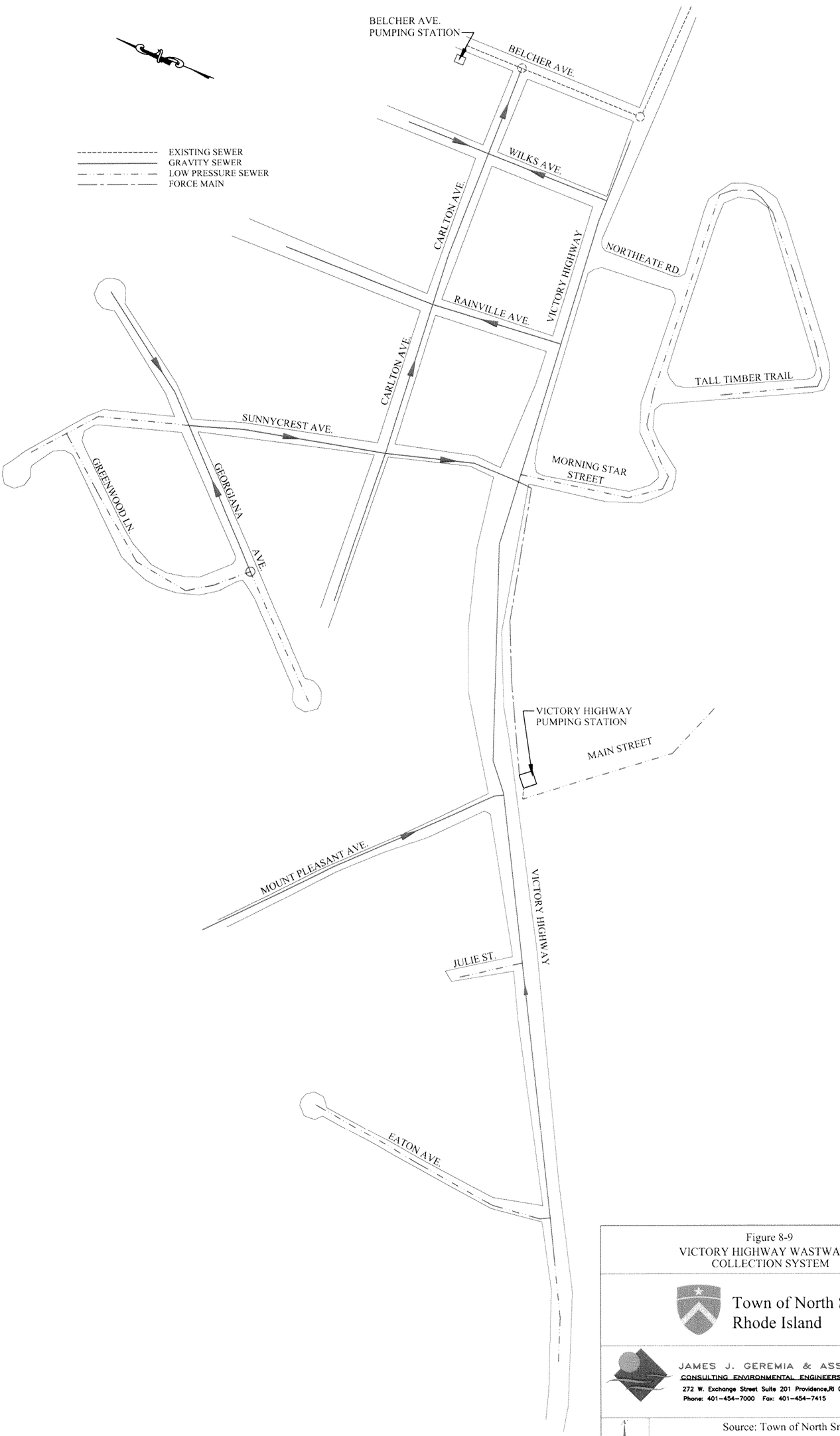

Figure 8-9
VICTORY HIGHWAY WASTWATER
COLLECTION SYSTEM

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Rhode Island

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Date: 2006

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TABLE 8-9 PROBABLE PROJECT COST FOR THE VICTORY HIGHWAY WASTEWATER COLLECTION SYSTEM		
8-inch PVC Pipe	$	772,500
6-inch PVC Pipe and Wyes		136,000
3-inch Force Main		75,000
Low Pressure Sewer		280,000
Low Pressure Sewer Services		55,500
Grinder Pumps		340,400
Precast Concrete Manholes		165,000
Flushing Manholes		30,000
Force Main Cleanout		4,000
Rock Excavation		80,000
Gravel Refill		72,000
Test Pits		20,000
Erosion Control		75,000
Traffic Control		100,000
Pavement Restoration		1,379,700
Victory Highway Pump Station		300,000
Sub-Total	$	3,885,100
Construction Contingencies (25%)		971,300
Sub-Total	$	4,856,400
Engineering Design Services		194,300
Construction Administration and Resident Inspection		388,600
TOTAL	**$**	**5,439,300**

Victory Highway/Dawley Brook Wastewater Collection System

The Victory Highway/Dawley Brook Wastewater Collection System (Figure 8-10) will consist of conventional gravity sewers, low pressure sewers and a below-grade pump station and force main serving 49 residential dwellings. The total length of the gravity system is 3,400 linear feet of 8-inch sewer mains, 1,700 linear fet of low pressure seers, and 1,400 linear feet of force mains. The average flow generated by the Victory Highway/Dawley Brook service area is 17,900 GPD, with an associated peak flow of 47,300 GPD. The Victory Highway/Dawley Brook Pump Station will be located in the vicinity of the connector road on Victory Highway. The Pump Station will be the below-ground type consisting of two submersible grinder pumps, each rated at 28,800 GPD (20 GPM). The 2-inch force main will traverse approximately 1,400 linear feet along Victory Highway to its point of termination at the gravity section of the Greene Street collection system. Table 8-10 summarizes the project cost which is estimated to be $2,711,200.

Warren Avenue/Park Drive Wastewater Collection System

The Warren Avenue/Park Drive Wastewater Collection System will serve 18 residential dwellings located on Warren Avenue, Park Drive and on Great Road (from Warren Avenue to Park Drive). The low pressure sewer system will consist of 1,900 linear feet of 2-inch PVC sewer discharging to Milton Avenue, as shown in Figure 8-11. The average daily flow will be 7,300 GPD with an associated peak daily flow of 19,300 GPD.

The total project cost is estimated to be $857,400, as summarized in Table 8-11.

Waterford Wastewater Collection System

The Waterford Wastewater Collection System will consist of low pressure sewers serving 86 residential dwelling units, as depicted in Figure 8-12. The total length of the low pressure system is 8,300 linear feet. The average flow generated by Waterford is 31,400 GPD, with an associated peak flow of 83,300 GPD. The low pressure sewer system will connect to the existing sewer manhole located on Elizabeth Avenue.

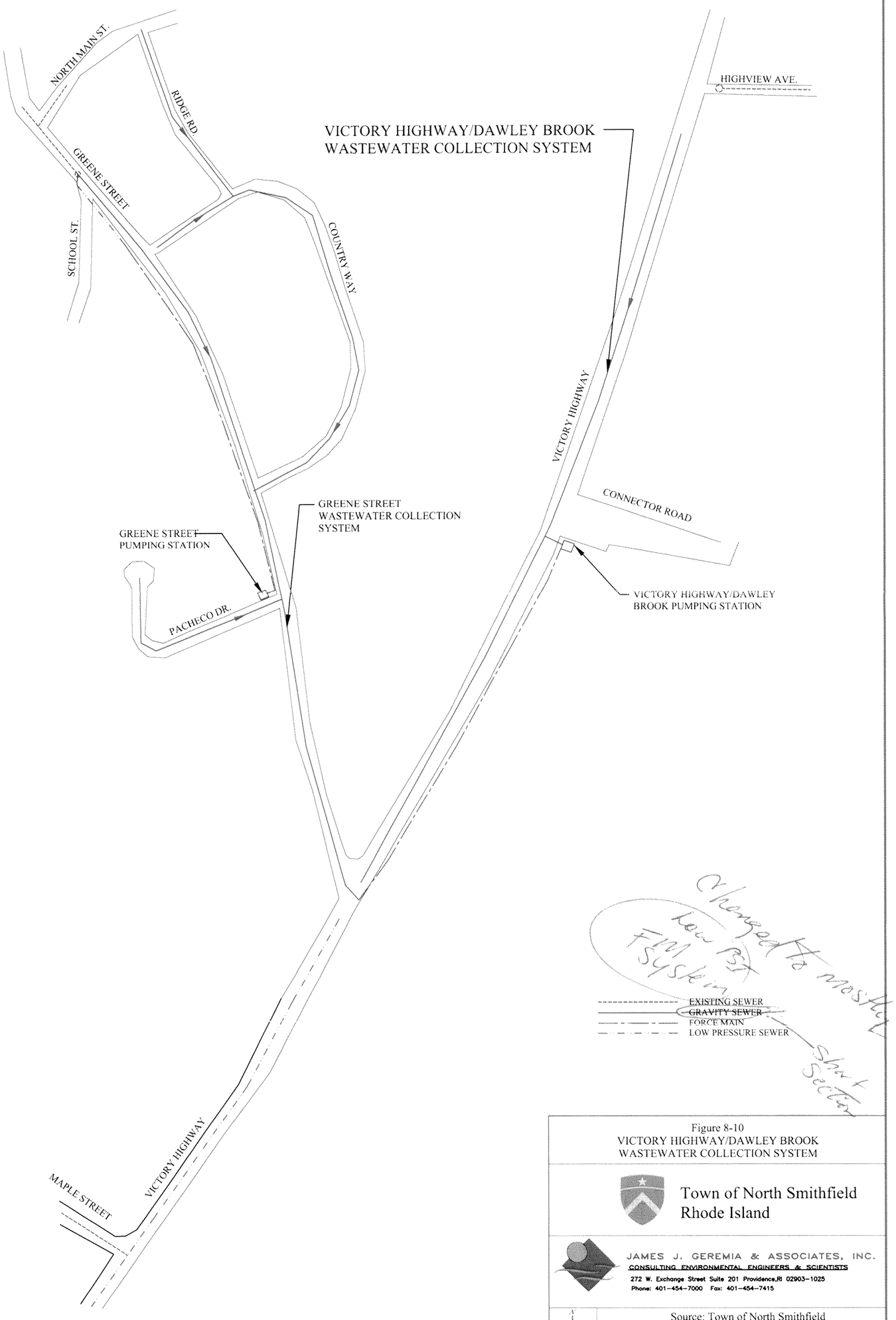

Figure 8-10
VICTORY HIGHWAY/DAWLEY BROOK
WASTEWATER COLLECTION SYSTEM

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TABLE 8-10 PROBABLE PROJECT COST FOR THE VICTORY HIGHWAY/DAWLEY BROOK WASTEWATER COLLECTION SYSTEM		
8-inch PVC Pipe	$	255,000
6-inch PVC Pipe and Wyes		32,000
2-inch Force Main		70,000
Low Pressure Sewers		85,000
Low Pressure Sewer Services		26,000
Flushing Manholes		6,000
Grinder Pumps		92,000
Precast Concrete Manholes		51,000
Rock Excavation		20,000
Gravel Refill		24,000
Test Pits		10,000
Erosion Control		20,000
Traffic Control		40,000
Pavement Restoration		1,005,000
Pump Station		150,000
Sub-Total	$	1,886,000
Construction Contingencies (25%)		471,500
Sub-Total	$	2,357,500
Engineering Design Services		117,900
Construction Administration and Resident Inspection		235,800
TOTAL	**$**	**2,711,200**

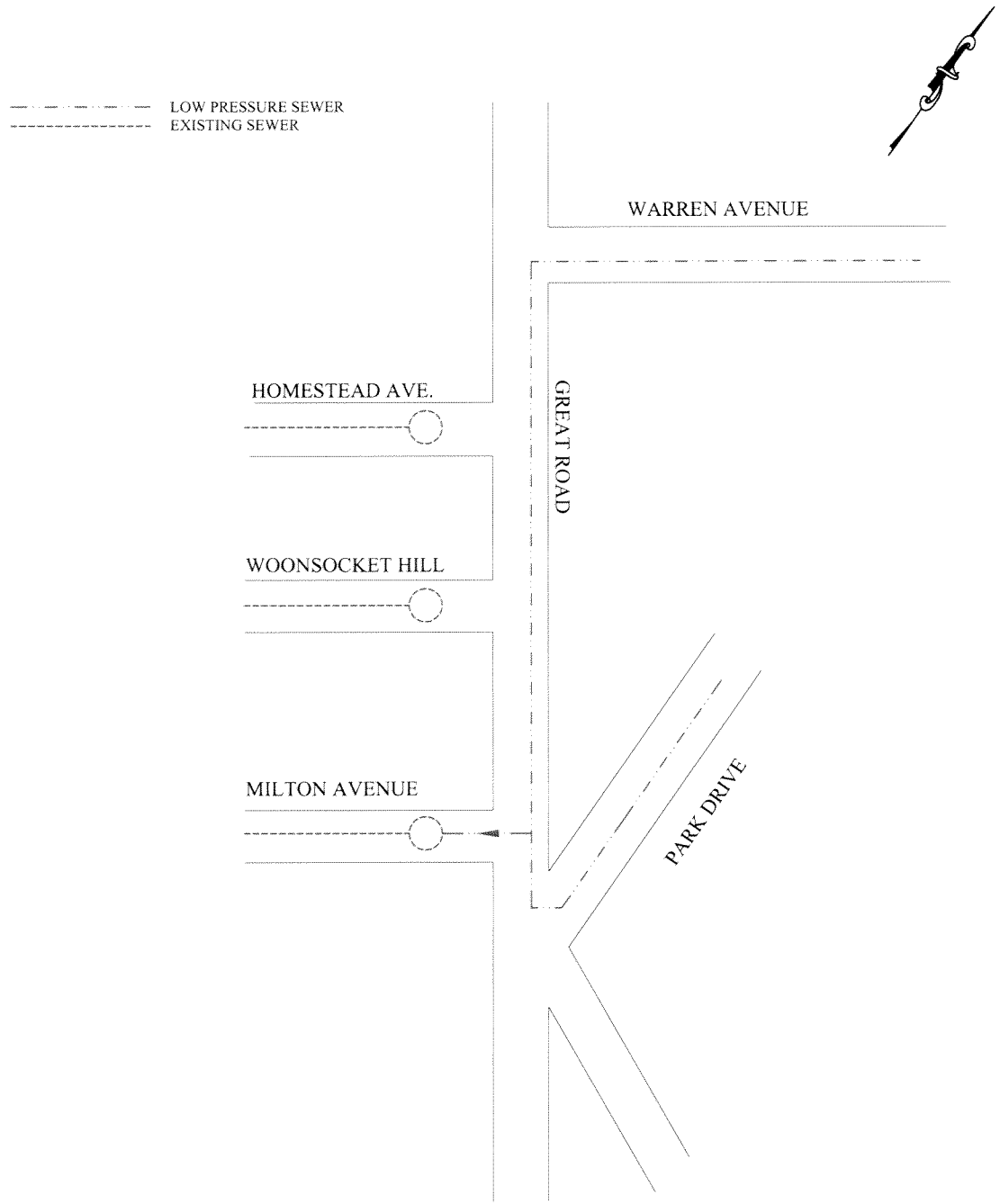

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Figure 8-11
WARREN AVENUE/PARK DRIVE
WASTEWATER COLLECTION SYSTEM

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TABLE 8-11 PROBABLE PROJECT COST FOR THE WARREN AVENUE/PARK DRIVE WASTEWATER COLLECTION SYSTEM		
2-inch Low Pressure Sewers	$	95,000
1½-inch Low Pressure Sewer Services		29,000
Flushing Manholes		7,000
Grinder Pumps		88,000
Rock Excavation		40,000
Test Pits		20,000
Erosion Control		3,600
Water Main Relocation		39,400
Pavement Restoration		323,900
Traffic Control		40,000
Sub-Total	$	685,900
Construction Contingencies (10%)		68,600
Sub-Total	$	754,500
Engineering Design Services		27,400
Construction Administration and Resident Inspection		75,500
TOTAL	**$**	**857,400**

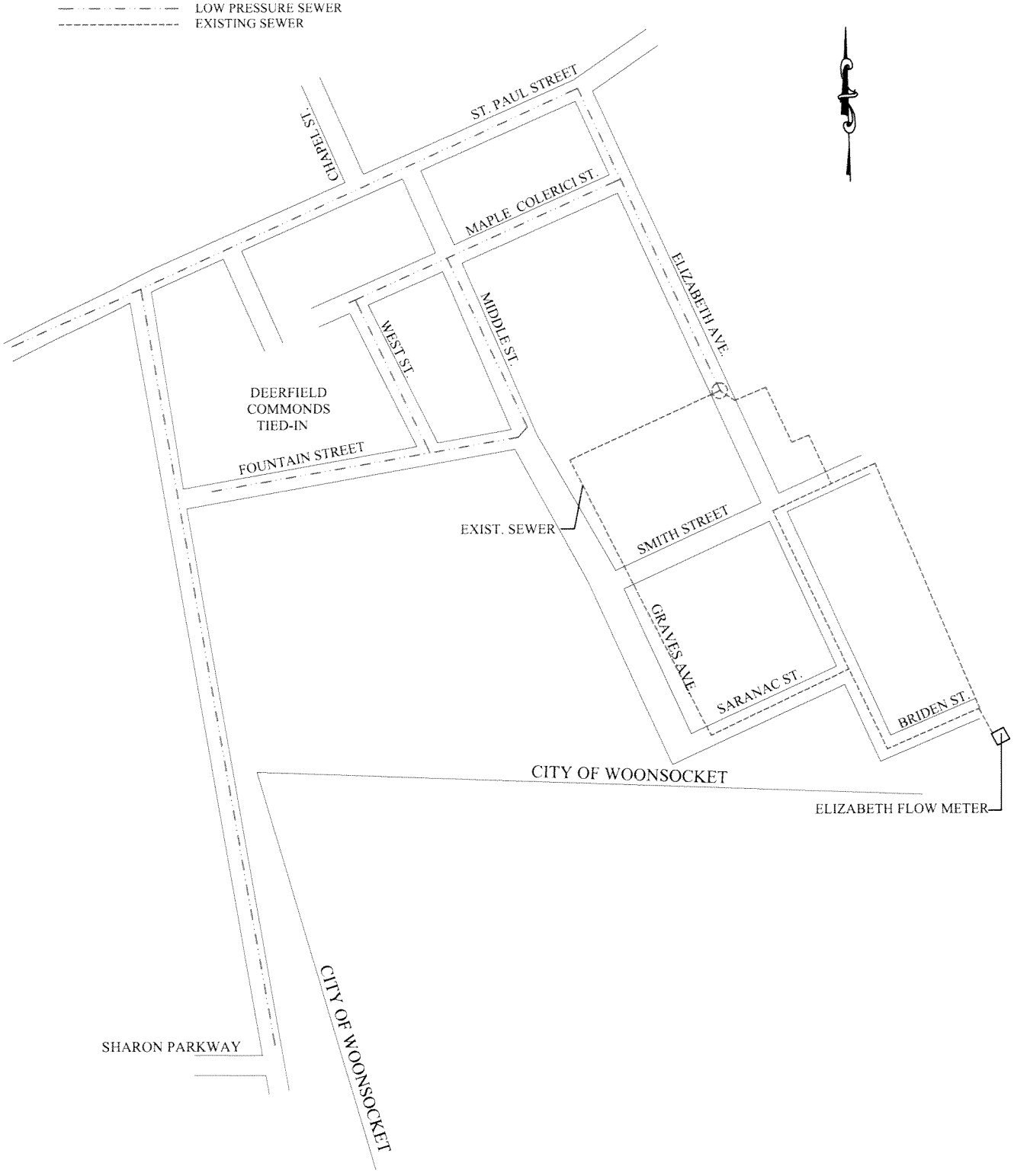

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Figure 8-12
WATERFORD
WASTEWATER COLLECTION SYSTEM

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TABLE 8-12 PROBABLE PROJECT COST FOR THE WATERFORD WASTEWATER COLLECTION SYSTEM		
Low Pressure Sewer Pipe	$	332,500
Low Pressure Sewer Services		81,700
Flushing Manholes		18,000
Rock Excavation		200,000
Gravel Refill		45,000
Test Pits		10,000
Traffic Control		50,000
Erosion Control		30,000
Grinder Pumps		395,600
Pavement Restoration		334,000
Sub-Total	$	1,496,800
Construction Contingencies (10%)		374,200
Sub-Total	$	1,871,000
Engineering Design Services		93,600
Construction Administration and Resident Inspection		187,200
TOTAL	**$**	**2,151,800**

WillervalTanglewood Wastewater Collection System

The Willerval/Tanglewood Collection System will serve an area that has a high water table and shallow bedrock with a high rate of on-site disposal system failures. The collection system will consist of conventional gravity sewers, low pressure sewers and grinder pumps, and a pump station discharging the wastewater generated by the Willerval/Tanglewood Service Area via a force main to the St. Paul Wastewater Collection System. Approximately 120 grinder pump units will be required for the dwellings located in the vicinity of Willerval Avenue and Tanglewood Road, as shown in Figure 8-13. The low pressure system will discharge to the summit sewer manhole location on Old Great Road. The gravity sewer consisting of 2,700 linear feet of 8-inch sewer mains will be located on Old Great Road and Great Road. The gravity sewer will discharge to the Great Road Pump Station located in the vicinity of Branch River Bridge. The 4-inch force main will cross the river within a new pipe bridge and connect to the St. Paul Wastewater Collection System. The average daily flow generated by the Willerval/Tanglewood service area is 133,400 GPD with an associated peak flow of 367,000 GPD, serving 133 existing dwelling units, 123 future dwelling units, 7 acres of land zoned neighborhood business, and 37 acres of land zoned for manufacturing.

The capacity of the Great Road Pump Station will be 367,000 GPD (255 GPM). The station will consist of a separate wetwell and drywell chamber, consisting of two centrifugal sewage pumps rated at 255 GPM, an emergency generator, and a pump connection for emergency pumping. The total cost of the Willerval/Tanglewood Wastewater Collection System is $5,588,000 as summarized in Table 8-13.

The total cost of the improvements to the North Smithfield Wastewater Collection System is $36,714,500. Table 8-14 summarizes the estimated construction and engineering costs.

8.3 OPERATION AND MAINTENANCE COSTS

The estimated maintenance costs for the North Smithfield Collection System is presented in Table 8-15. These costs are in 2006 dollars and were computed from data obtained from Construction Cost Indices and the Operation, Maintenance and Repair Costs, U.S. EPA Office of Municipal Pollution Control.

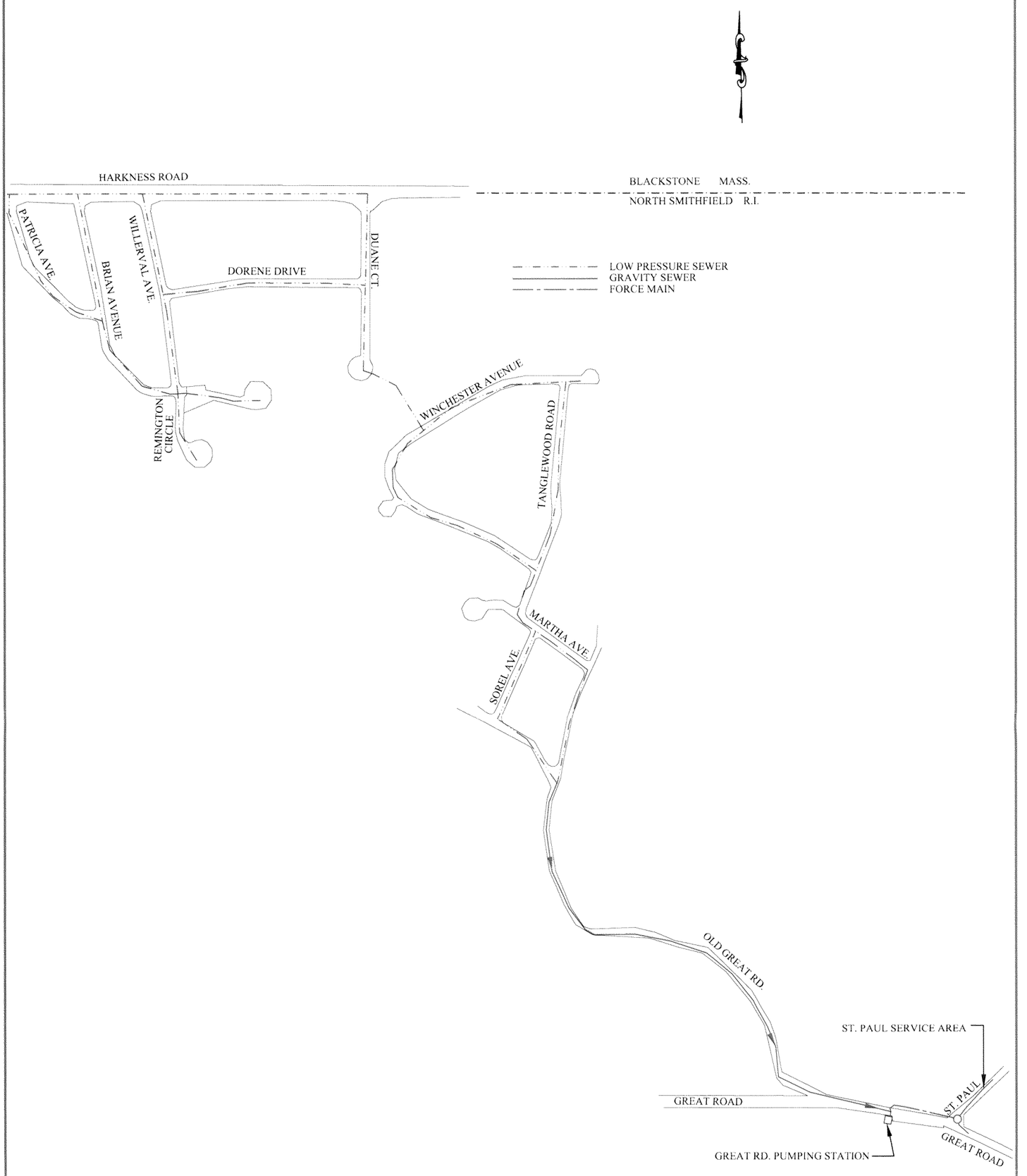

Figure 8-13
WILLERVAL TANGLEWOOD
WASTEWATER COLLECTION SYSTEM

Town of North Smithfield
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Source: Town of North Smithfield

Date: 2006

Scale: No Scale

TABLE 8-13
PROBABLE PROJECT COST FOR THE
WILLERVAL/TANGLEWOOD WASTEWATER COLLECTION SYSTEM

8-inch PVC Pipe	$	203,000
6-inch PVC Pipe and Wyes		21,000
4-Inch Force Main		35,000
Low Pressure Sewers		484,000
Low Pressure Sewer Services		558,000
Grinder Pumps		552,000
Pipe Bridge to River Crossing		250,000
Precast Concrete Manholes		33,000
Flushing Connection		39,000
Rock Excavation		280,000
Gravel Refill		63,000
Test Pits		10,000
Traffic Control		50,000
Pavement Restoration		909,000
Great Road Pump Station		400,000
Sub-Total	$	3,887,000
Construction Contingencies (10%)		972,000
Sub-Total	$	4,859,000
Engineering Design Services		243,000
Construction Administration and Resident Inspection		486,000
TOTAL	**$**	**5,588,000**

TABLE 8-14
SUMMARY OF THE TOTAL PROBABLE PROJECT COSTS FOR THE IMPROVEMENTS TO THE WASTEWATER COLLECTION SYSTEM

SERVICE AREA	CONSTRUCT COST	ENGINEERING COST	TOTAL COST
Great Road East	$ 1,514,400	$ 181,800	$ 1,696,200
Greene Street	1,358,000	162,900	1,520,900
Lamoureux Boulevard	68,600	30,000	98,600
North Smithfield Industrial Park	2,765,800	331,800	3,097,600
Park View	812,000	96,600	908,600
Providence Pike No. 1	3,764,900	451,800	4,216,700
Providence Pike No. 2	2,007,600	240,900	2,248,500
St. Paul	5,373,600	806,100	6,179,700
Victory Highway	4,856,400	582,900	5,439,300
Victory Highway/Dawley Brook	2,357,500	353,700	2,711,200
Warren Avenue/Park Drive	754,500	102,900	857,400
Waterford	1,871,000	280,800	2,151,800
Willerval/Tanglewood	4,859,000	729,000	5,588,000
TOTALS	**$ 32,363,300**	**$ 4,351,200**	**$ 36,714,500**

TABLE 8-15 NORTH SMITHFIELD COLLECTION SYSTEM PROBABLE MAINTENANCE COSTS	
EXPENDITURE CATEGORY	**ANNUAL COST**
Salaries	$ 67,287
Secretary	1,884
Training and Dues	2,000
Contingency	2,000
Administration Fee - Town	36,000
Health Insurance	20,359
Life Insurance	467
Dental Insurance	1,398
FICA	5,292
Legal/Engineering	2,000
Audit (per Audit Contract)	3,000
Accounting	2,500
Treatment Charges	570,000
Insurance	19,000
Print/Advertise/Postage	2,000
Computer/Office Supply	2,000
Utilities	24,000
Telephone	5,000
Pump Station Supplies	16,000
Truck Expense	1,500
Truck Lease	4,275
Repair/Maintenance	25,000
Contract Operator	5,000
Renewal/Replace Equipment	12,000
TOTAL (less Deprecation & Debt Service)	**$ 829,962**

8.4 RECOMMENDED STAFFING

A great deal of time, effort, and money will go into the design and introduction of the additions to the Wastewater Collection System. In support of this initial investment, plus the the annual operating costs, it is important for the collection system to be staffed by qualified, competent personnel.

The staffing requirements have been prepared for the completion of the additions to the existing wastewater collection system, based on an employee normal payroll year consisting of 52 weeks at 40 hours per week and a 5 day per week (Monday to Friday), 8 hours per day.

The supervisory personnel for the collection system shall consist of a superintendent. The superintendent shall have a direct responsibility for the administration, operation, and maintenance of the wastewater collection system, including enforcement of safety regulations and, as otherwise required, the superintendent will also serve as the maintenance technician.

The maintenance crew will perform all the prevention and corrective maintenance required in the collection system. The maintenance will be composed of two 2-man crews handling the collection systems and pumping stations. When confined space entry is required, the Public Works Department will provide an addition person to assist during those periods. It is estimated that about half of this person's time would be allocated to the Sewer Department. The crew will be responsible for routine inspections, routine maintenance, and emergencies.

Inspections shall be made at regular intervals, consisting of surveillance of the condition of the collection system, performance of flow measurements and pumping stations. Inspections will reduce the amount of repairs needed and minimize emergency work. Routine maintenance shall include tasks that are required to maintain the collection system in operation and are performed on a periodic basis. The tasks include cleaning and removal of obstructions from sewer lines, maintaining pumping stations, and other operating or monitoring equipment associated with the collection system.

It has been estimated that the staff for the North Smithfield Wastewater Collection System shall consist of two (2) full-time and one (1) part-time employee consisting of one (1) superintendent and two and one-half (2½) maintenance technicians.

8.5 WASTEWATER MANAGEMENT DISTRICT

It is recommended that a Wastewater Management District be implemented for the unsewered areas of Town that are not part of the future service area in accordance with the State of Rhode Island General Laws, Title 45 Chapter 24.5 of General Laws, entitled "Towns and Cities; Wastewater Management Districts".

It is recognized that without proper operation and maintenance of Individual Sewage Disposal Systems (ISDS) failures occur. ISDS failures pose a risk to public health and a potential contamination source to the surface waters and groundwater within North Smithfield. The purpose of the WWMD is to ensure that ISDS are properly operated, regularly inspected, and routinely maintained to prevent malfunctioning of systems and to serve as an alternate to municipal sewers in sparsely developed areas.

The following outlines various methods that the Town of North Smithfield could establish as part of a Wastewater Management District:

Data Collection

The first step is to perform an ISDS inventory by establishing a mailinglist/data base for all dwellings within the Wastewater District, followed by an inspection of the ISDS systems. The purpose of the inspections is to create an inventory of all ISDS within the WWMD, determine which systems need pumping, and determine which systems have failed and are in need of repair.

A record of each ISDS inspection should include the following: Owner's name and address; owner's telephone number; Tax Assessor's Plat and Lot Number; number of bedrooms; ISDS location (sketch with dimensions); dates of previous maintenance; ISDS condition; well location if applicable; and any additional pertinent information.

Pumping

A mandatory pumping program for ISDS within the WWMD should be implemented. The pumping program will serve to ensure that all ISDS are pumped in a regular cycle, therefore reducing the number of system failures, determine which ISDS systems are in need of repair or replacement, and to verify the location and condition of the ISDS systems. The order of pumping should be prioritized according to frequency of failure and proximity to critical environmental features. A record of when each ISDS has been pumped and when it is due to be pumped again should be maintained.

System Upgrade

If an inspection and/or pumping record reveals a malfunctioning or failing ISDS, the system should be repaired or replaced. Under the authority of the State Legislature, the Town has the authority to issue bonds or notes, receive grants or to assess ISDS owners for the purpose of establishing a revolving fund to make low interest loans or grants available to owners for the improvement, correction, or replacement of the failed ISDS.

Education

A public education program will inform people about the benefits and goals of the WWMD. The educational program will help people understand why proper maintenance of ISDS helps the environment and provides financial benefits by facilitating resource protection and helping to extend the life of the ISDS.

Report

An annual report detailing the status of the WWMD should be prepared, which will include number and location of septic systems inspected, repaired, failed or in need of repair, the number of grants and loans initiated, and the status and activity of the education program.

It is recommended that the Town of North Smithfield adopt a Wastewater Management District Program which will initiate the development of a Wastewater Management District for the on-site disposal systems. The estimated cost for implementation and first year operation of the WWMD is $250,000, as summarized in Table 8-16.

TABLE 8-16 ESTIMATE OF PROBABLE COST FOR THE WASTEWATER MANAGEMENT DISTRICT		
Engineering Services (Ordinance/Technical Consultation	$	20,000
Professional Staff (part-time)		35,000
ISDS Location and Inventory		10,000
Mailings		2,000
Public Education		5,000
Office Equipment		15,000
TOTAL	**$**	**87,000**

LIST OF TABLES

9.0 ARRANGEMENTS FOR IMPLEMENTATION

9.1 INSTITUTIONAL RESPONSIBILITIES

The Town of North Smithfield is responsible for providing an adequate wastewater collection system for areas of Town that either presently have sewers or are in need of sewers due to on-site disposal problems. In addition, the Town is obligated by the State of Rhode Island General Laws, Title 45, Chapter 24.1 entitled "Towns and Cities: Wastewater Management Districts" to establish a Wastewater Management District for the unsewered sections of the Town. The processing of wastewater will be accomplished at the Woonsocket Regional Wastewater Treatment Facility in accordance with the Wastewater Disposal Service Contract between the City of Woonsocket and Town of North Smithfield dated 7 December 1977.

As a Regional Partner of the Woonsocket Regional WWTF, North Smithfield will contribute to the capital cost for the design and construction of the unit process upgrades, which are required due to effluent discharge limitations set forth by the Facility's RIPDES Permit or other alterations or additions as determined jointly by the regional users as required. The design and construction cost related to these improvements will be apportioned in accordance with the agreement.

Annual operating and maintenance fees of the WWTF will be apportioned based on the sum of the monitored flow at the Alice Avenue Metering Station, the Elizabeth Avenue Metering Station, and, for those units which are not connected directly with the WWTF without passing through the Alice Avenue Meeting Station, will be based on water usage records. The cost will be distributed equally per unit.

9.2 IMPLEMENTATION

9.2.1 WASTEWATER MANAGEMENT DISTRICT

The Town of North Smithfield will implement a Wastewater Management District (WWMD) for the unsewered section of Town. The purpose of the WWMD will be to ensure that individual on-site disposal systems are

properly operated, regularly inspected and routinely maintained to prevent malfunctioning systems and to serve as an alternative to municipal sewer systems in sparsely developed areas of Town.

9.3 MAINTENANCE, OPERATION AND REPLACEMENT

Operation and maintenance of the wastewater collection system remains the administrative responsibility of the Town of North Smithfield and will be physically performed by the Wastewater Division. Costs of operation and maintenance of the Facility will be borne by the various users.

An operating and maintenance manual which provides detailed management and training requirements for these facilities will be prepared at time of construction.

9.4 STAFFING REQUIREMENTS

As the collection system expands and the number of pump stations increases, the Town may consider the need to establish a road crew whose purpose is to provide routine maintenance for the pump station laterals and interceptors.

9.5 CAPITAL COST DISTRIBUTIONS

9.5.1 COLLECTION SYSTEM IMPROVEMENTS

The total estimated capital cost for the collection system improvements is presented in Table 9-1. These costs are the responsibility of the town of North Smithfield.

TABLE 9-1 SUMMARY OF THE TOTAL PROBABLE PROJECT COSTS FOR THE RECOMMENDED IMPROVEMENTS TO THE WASTEWATER COLLECTION SYSTEM		
SERVICE AREA	TOTAL COST	PROGRAM IMPLEMENTATION YEAR
Great Road East	$ 1,696,200	2009
Greene Street	1,520,900	2009
Lamoureux Boulevard	98,600	2019
North Smithfield Industrial Park	3,097,600	2009
Park View	908,600	2014
Providence Pike No. 1	4,216,700	2014
Providence Pike No. 2	2,248,500	2019
St. Paul	6,179,700	2009
Victory Highway	5,439,300	2019
Victory Highway/Dawley Brook	2,711,200	2014
Warren Avenue/Park Drive	857,400	2009
Waterford	2,151,800	2014
Willerval/Tanglewood	5,588,000	2019
TOTALS	**$ 36,714,500**	

All costs presented in 2006 dollars.

9.5.2 FINANCIAL IMPACTS OF THE PROJECT

As part of this Wastewater Facilities Plan, financial impacts for the wastewater collection system have been considered. This review includes larger capitalization projects, and conforms to financial arrangements expressed in the Community
Comprehensive Plan.

Operational and Maintenance Improvements

Operational and Maintenance improvements are typically smaller scale, maintenance related projects which are performed during the course of the fiscal year. The Town identifies various projects and improvements to complete for the period July 1 through June 30 of each year during the budget preparation process. At the present time the annual sewer charge per dwelling unit is $319 per year.

Since these smaller projects do not require the sale of municipal bonds, funding (revenue) is provided the general tax role. Each user will be responsible for its proportional share of these cost improvements. The Town user charge system is structured such that the revenue is equal to the expenses.

For those projects where all users will benefit, the system improvement cost will be distributed throughout the entire system through the annual sewer charge.

Capitalized Improvements

As defined by the Town Finance Department, capitalized improvement shall be those projects of a larger magnitude which typically require the sale of municipal bonds to fund the related improvements. Funding of the Town of North Smithfield improvements to the wastewater collection system are paid through sewer bonds. Yearly service for the original infrastructure has, and will continue to be paid via the user charge system.

It is anticipated that the yearly debt service for future capitalized improvement to the collection system will be via third party specific benefit assessments. For example, property owners in the Victory Highway Area will be required to pay for those wastewater improvements which specifically provides them a benefit.

The new sewer users would be responsible for the cost directly related to their service area. The anticipated cost and population to be serviced are summarized in Table 9-2. Table 9-3 summarizes the implementation schedule and rankings of the sewer collection system improvements.

9.5.3 FINANCIAL IMPACTS RELATING TO WASTEWATER TREATMENT IMPROVEMENTS

Currently, the Woonsocket Wastewater Treatment Facility is undergoing revisions to their wastewater discharge permit. As a result of the permit modification, the Woonsocket Wastewater Treatment Facility will be required to undertake significant upgrades to the wastewater treatment process. Since North Smithfield is a regional participant in this facility, they will be responsible for 25% of the capital cost relating to this upgrade.

TABLE 9-2
SUMMARY OF THE ANTICIPATED COST PER DWELLING FOR THE IMPROVEMENTS TO THE WASTEWATER COLLECTION SYSTEM

	TOTAL COST [1]	20 YEAR BOND 3% INTEREST	EQUIVALENT DWELLING UNITS	ANNUAL COST / DWELLING UNIT
Great Road East	$ 1,696,200	$ 2,257,700	31	$ 3,641
Greene Street	$ 1,520,900	$ 2,024,370	60	$ 1,687
Lamoureux Boulevard	$ 98,600	$ 131,240	3	$ 2,187
North Smithfield Industrial Park	$ 3,097,600	$ 4,123,011	N/A	$ N/A [2]
Park View	$ 908,600	$ 1,209,327	33	$ 1,832
Providence Pike No. 1	$ 4,216,700	$ 5,612,572	160	$ 1,754
Providence Pike No. 2	$ 2,248,500	$ 2,992,830	99	$ 1,512
St. Paul	$ 6,179,700	$ 8,225,392	209	$ 1,968
Victory Highway	$ 5,439,300	$ 7,239,894	180	$ 2,011
Victory Highway/Dawley Brook	$ 2,711,200	$ 3,608,700	49	$ 3,682
Warren Avenue/Park Drive	$ 857,400	$ 1,141,229	18	$ 3,170
Waterford	$ 2,151,800	$ 2,864,120	86	$ 1,665
Willerval/Tanglewood	$ 5,588,000	$ 7,437,820	376	$ 989

[1] All costs presented in 2006 dollars.
[2] Industrial Lands

TABLE 9-3
SUMMARY OF THE IMPLEMENTATION SCHEDULE FOR THE IMPROVEMENTS TO THE NORTH SMITHFIELD WASTEWATER COLLECTION SYSTEM

	IMPLEMENTATION YEAR	PRIORITY
Great Road East	2009	High
Greene Street	2009	High
Lamoureux Boulevard	2019	Low
North Smithfield Industrial Park	2009	High
Park View	2014	Medium
Providence Pike No. 1	2014	Medium
Providence Pike No. 2	2019	Low
St. Paul	2009	High
Victory Highway	2019	Low
Victory Highway/Dawley Brook	2014	Medium
Warren Avenue/Park Drive	2009	High
Waterford	2014	Medium
Willerval/Tanglewood	2019	Low

APPENDIX A

Wastewater Disposal Service Contract

(City of Woonsocket and Town of North Smithfield
December 7, 1977)

WASTEWATER DISPOSAL SERVICE CONTRACT
between
CITY OF WOONSOCKET and TOWN OF NORTH SMITHFIELD

AGREEMENT made this 7th day of December A.D. 1977 by and between the City of Woonsocket, a municipal corporation in the State of Rhode Island, party of the first part, and hereinafter called the "City", and the Town of North Smithfield, a town corporation in said State of Rhode Island, party of the second part, and hereinafter called the "Town",

WHEREAS, the United States Environmental Protection Agency (sometimes hereafter "EPA") and the State of Rhode Island Department of Health require local action under the Federal Water Pollution Control Acts and Amendments of 1972, and

WHEREAS, the City of Woonsocket, Town of North Smithfield, Town of Blackstone and Town of Bellingham have given consideration to the establishment of a regional system to solve the problem of wastewater collection and sewage treatment, and

WHEREAS, C. E. Maguire, Inc., Architects, Engineers and Planners, have issued a report entitled, "Engineering Report on Additions and Modifications to Existing Wastewater Treatment and Collection Facilities for the City of Woonsocket, R.I. 1973" recommending regional solutions to said problems, and

WHEREAS, it is deemed in the best interest of the respective Towns and City, as well as the State of Rhode Island and EPA, that each town dispose of its raw sewage through the existing and proposed facilities of the City of Woonsocket, rather than each town to construct and maintain its own separate sewage treat-

ment plant, and

WHEREAS, certain modifications and additions must be made to the existing City of Woonsocket wastewater collection and disposal facilities in order to collect and treat the influx of sewage from the "Greater Woonsocket Area", and

WHEREAS, it is proposed that each of the other towns concerned enter into similar agreements with the City, and

WHEREAS, the problem and solution of wastewater collection and disposal thereof is a mutual problem involving financing for construction, operation and maintenance of facilities, and,

WHEREAS, each participating community must share the costs, of said facilities in an equitable manner as shown in Exhibits A and C.

NOW, THEREFORE, in consideration of the mutual covenants herein contained, it is agreed by and between the parties as follows:

TERMS OF CONTRACT

1. Definitions and Representations.

The following are definitions of terms used in this Agreement together with representations and agreements pertaining thereto.

1.01. "Woonsocket Project" means development, design and construction work in connection with enlargements to the existing Woonsocket Wastewater Treatment and Collection System including a new Low Level Sewer Intercepter consisting of Intercepter Contract 1, Intercepter Contract 2, and Intercepter Contract 3 and the improvements to the existing City wastewater treatment plant (Contract 4). The City agrees with respect to the Woonsocket

Project as follows: (a) that the Woonsocket Project has been approved by the Environmental Protection Agency and the State of Rhode Island Department of Health, (b) that grants for the design and construction thereof have been made pursuant to which Federal and State funds will be available to the extent of 90% of the total cost thereof, (c) that each of said intercepters and said improvements to the City sewage treatment plant is the subject of a separate contract with respect to design, construction and supervision, and (d) that attached hereto as Exhibit A is a fair and equitable allocation of each category of the Project Costs of the Woonsocket Project among the Participating Municipalities.

1.02. "City Wastewater Treatment and Collection System" means the existing City system as the same may be improved or enlarged by completion of the Woonsocket Project.

1.03. "North Smithfield Project" means the construction of sanitary sewer intercepter lines, associated pumping station and lift station and other appurtenances located in the Town which, together with the North Smithfield Intercepter (defined hereafter) are intended to convey wastewater from sources in the Town to the City Wastewater Treatment and Collection System.

1.04 "North Smithfield Intercepter" means an underground sewage intercepter running from the Town line through portions of the City to the Low Level Sewer Intercepter in approximately the location indicated on the diagram attached hereto as Exhibit B.

1.05 "Project Cost" means the total cost to be incurred in the completion of the Woonsocket Project as shown on Exhibit C attached hereto. The City agrees, with respect to the Project

Cost (a) that it has entered into contracts for architectural and engineering services and construction work for each aspect of the Woonsocket Project as shown on Exhibit C which contracts are either of the fixed price or unit price variety, (b) that the variation from the total budgeted amounts as shown on Exhibit C (excluding amounts related to interest expenses) will be limited to over-expenditure or under-expenditure on unit price contracts as determined by actual construction in the field or the time actually expended in the supervision thereof, (c) that interest expense as shown on Exhibit C is limited to interest expense incurred or to be incurred by the City on funds reasonably and necessarily borrowed in anticipation of bonds and of federal and state grants allocable to shares of the Town and the City for each line or item of the Woonsocket Project as shown on Exhibit A and does not include interest, principal or other charges in connection with any other borrowings including the interest on bonds of any sort issued by the City and (d) that interest or other income earned or to be earned by the City on any of such borrowed funds will be fairly applied to reduce the Town's budgeted share of interest expense as shown on Exhibit C.

1.06. "Town Project Share" means and is limited to the amount of the Project Costs allocated to the Town in accordance with the percentages of each item of Project Cost listed under the column "North Smithfield %" on Exhibit A.

1.07. "O and M Expense" as used in this agreement is the abbreviation for Operating and Maintenance Expense, which term includes the total annual expenses actually incurred by the City in the operation and maintenance of the Woonsocket Project pursuant

to a budget covering the categories of annual operating and maintenance expense, which budget shall be adopted prior to the commencement of each Fiscal Year; provided, however, that O and M Expense (a) shall not exceed in the aggregate the total amount of the budget for such fiscal year, (b) shall not include any principal, interest or other charges in connection with any indebtedness incurred by the City and (c) shall not include any City expenses not directly attributable to and included in such annual budget of the regional wastewater treatment and collection system.

1.08. "Town O and M Share" means that portion of the O and M Expense determined quarterly by multiplying the O and M Expense incurred by a fraction the numerator of which shall be the quarterly Town Flow and the denominator of which shall be the quarterly Total Flow into the City wastewater treatment plant measured at the City treatment plant.

1.09. "Town Flow" means the amount of wastewater flowing into the North Smithfield Intercepter as determined by Article 6 and paragraph 13.03 hereof.

1.10. "Total Flow" includes the total amount of wastewater flowing into the City Wastewater Treatment and Collection Systems and includes the wastewater contributed to such system by the Participating Municipalities.

1.11. "Fiscal Year" means the annual accounting period commencing July 1 and ending June 30 of each year.

1.12. "Participating Municipality" means any one of the following municipal corporations: the City, the Town, and

the Towns of Blackstone and Bellingham, Massachusetts. The term "Participating Municipalities" is the collective designation for more than one Participating Municipality.

1.13. "Wastewater" includes any water-carried waste from residences, business buildings, institutions and industrial establishments but excludes unpolluted storm, surface and subsurface waters.

2. North Smithfield Intercepter.

2.01. It is mutually agreed by the City and the Town that the Town may connect its wastewater system with that of the City and that the City will furnish to the Town wastewater collection, treatment and disposal services. The connection of the Town wastewater system with that of the City shall take place by means of the North Smithfield Intercepter at Siphon No. 5 upon construction of the Town system and upon at least sixty (60) days (the "Notice Period") prior notice from the Town to the City of such completion. The Town and the City will coordinate the time and manner for the introduction of Town Flow into the Woonsocket Project by means of the North Smithfield Intercepter. If for any reason the City shall not be ready to receive such Town Flow at the expiration of the Notice Period, it will, at least thirty (30) days prior to the expiration of the Notice Period so advise the Town by means of a written notice that shall specify a date within sixty (60) days after the Notice Period, by which date the City will receive such Town Flow. If the City fails to receive the Town Flow on or prior to the deadline established in the preceding sentence, such failure shall constitute a material default of this agreement, providing such failure to receive Town Flow is not

caused by an act of God, work stoppage, strike or any other cause beyond the control of the City.

2.02. The Town has provided the City with descriptions of all easements and locations required for the construction and maintenance of the North Smithfield Intercepter whether on land of the City or of private parties. The City will obtain easements from private parties by exercising its power of eminent domain, if necessary. The City will make all such easements and all licenses and permits in highways and City property as shall be necessary for the construction of the North Smithfield Intercepter available to the Town, its agents and contractors so that the Town may cause the North Smithfield Intercepter to be constructed. The Town shall pay all expenses, judgements and costs of acquisition in connection with the foregoing, other than expense of City attorneys in connection with eminent domain proceedings; provided, however, that before the City shall incur any expense that would be chargeable to the Town hereunder the amount thereof shall first be approved by the Town in each case.

2.03 The Town will, at its expense, cause the North Smithfield Intercepter to be constructed substantially in accordance with the plans and specifications therefor which are described on Exhibit D attached hereto, copies of which plans and specifications have been furnished to the City and are hereby approved by the City. Any changes or revisions of such plans and specifications are subject to the approval of the City, which approval will not be unreasonably withheld or delayed. The City will cooperate with the Town and its agents and contractors for the purpose of enabling such construction to proceed without delay

and will promptly provide or obtain all such licenses, permits and approvals as may be necessary to accomplish such construction.

2.04. The Town will require any construction contract for construction of the North Smithfield Intercepter or any part thereof to contain a provision requiring the contractor to maintain liability insurance in which the Town, the City and their respective agents shall be named as additional insureds with limits of coverage of not less than $500,000 with respect to injury to or death of any one person, of not less than $1,000,000 with respect to personal injuries or death occurring as a result of any one accident and of not less than $500,000 with respect to property damage.

2.05. Subject to the provisions of paragraph 11.02 hereof, upon completion of any guarantee period and acceptance of construction by the City's receipt of Town Flow, title to the portion of the North Smithfield Intercepter situated within the City shall vest in and become the property of the City. The connection of the Town wastewater system with that of the City shall thereafter be at the City line. The cost for any future expansion or addition to the North Smithfield Intercepter necessary to accommodate any increases in wastewater flow of the Town shall be borne by the Town at no cost to the City and subject to the approval of the City. The City agrees that during the period of construction and until the City takes title to the portion of the North Smithfield Intercepter situated within the City limits, no real estate tax or assessment shall be levied against the Town with respect to said portion of the Intercepter.

2.06 After such time as the City shall take title to

the portion of the North Smithfield Intercepter situated within the City, the City shall maintain and repair said portion of the Intercepter and remove any obstructions therein, the cost of such maintenance and repair being deemed part of O and M Expense.

2.07 The City hereby grants the Town and its agents and independent contractors authority, right and license to have access to the portion of the North Smithfield Intercepter located in the City, (a) during the period prior to the acquisition of title to such portion by the City, for the purpose of constructing, improving, repairing, using and inspecting the same; and (b) during the period after the City's acquisition of title thereof upon reasonable advance notice to the City, for the purpose of inspecting the same and, if the City fails to make necessary repairs as provided in paragraph 2.06, for the purpose of constructing, improving and repairing the same; and the City will issue, promptly upon request therefor, such permits and licenses as shall be necessary to accomplish any of such purposes.

3. Payment of Town Project Share.

3.01. During the construction phase of the Woonsocket Project the Town will make progress payments to the City not more frequently than monthly on account of the Town Project Share. Such payments shall be based upon the progress payments actually made by the City to contractors on account of the Woonsocket Project in accordance with statements therefor received by the Town substantially in the form of Exhibit C. The Town will make such progress payments within thirty (30) days of the receipt by the Town of such statement.

3.02. Upon completion of the Woonsocket Project and

receipt by the Town of a certificate from the City Finance Director certifying such completion and showing the final amounts paid by the City on account of the Woonsocket Project in each of the categories listed on Exhibit C the Town will pay the balance of the Town Project Share within thirty (30) days of the receipt of such certificate.

4. Conditions on the Obligations of the Town.

4.01. Notwithstanding any other provision of this Agreement, the Town shall not be required to observe or perform any obligation under this Agreement unless each of the following conditions shall have occurred and be continuing in effect:

(a) The City shall have obtained and made available to the Town the necessary easements, licenses, permits and approvals as required by sections 2.02 and 2.03 hereof, and

(b) The Environmental Protection Agency shall have authorized the award of construction contracts for the construction of the North Smithfield Project.

5. Duration of Contract.

5.01. The City agrees to accept and process all wastewater originating in the Town and entering the City Wastewater Treatment and Collection System for a minimum period of thirty (30) years from the date of connection referred to in section 2.01 which period shall be automatically extended thereafter until terminated as hereinafter provided.

5.02. Either the Town or the City may terminate this Agreement any time after the expiration of thirty (30) years from the date referred to in paragraph 5.01; provided, however, that the party terminating shall give to the other party notice in

writing of its intention to terminate at least three (3) years prior to the termination date.

6. Methods of Determining Flows.

6.01. Town Flow shall be measured by a standard metering device to be installed by the Town in the location indicated on Exhibit B. Unless replaced or changed pursuant to a future agreement between the parties such standard metering device will consist of the following apparatus: One Parshall flume, a direct reading totalizer, indicator, and recorder-transmitter with a weekly chart cycle. Such apparatus will contain remote control recorders at the City sewage treatment plant and at the Town Department of Public Works designed to indicate the Town Flow on a continuous basis.

6.02. The City will cause the flow of wastewater from each of the other Participating Municipalities to be measured and recorded on a continuous basis so that the Total Flow and flow from each Participating Municipality shall at all times be known.

6.03. In the event any metering device fails to register or registers incorrectly the flow of wastewater, the City and the Town will agree on an estimate of the period of time during which the metering device failed to register or registered incorrectly and the quantity of wastewater that would have been measured were the metering device operating correctly, and an appropriate adjustment based thereon shall be made in the wastewater flow to be used as the basis on which to determine the Town O and M Share.

6.04. For billing purposes the City shall read all metering devices at intervals of approximately ninety (90) days.

The Town, at its expense, shall periodically, but not less than once each year, inspect and test the metering device referred to in paragraph 6.01 and after any failure of the meter.

7. Payment of the Town O and M Share.

7.01. Within thirty (30) days after the end of each calendar quarter the City will send a statement to the Town showing for the period since the beginning of the Fiscal Year to the end of such quarter (a) the Town Flow, (b) the Total Flow, (c) O and M Expense incurred, (d) the Town O and M Share thereof and (e) the amount, if any, previously paid by the Town on account thereof.

7.02. The Town shall pay the amount of said statement within thirty (30) days after receipt thereof; provided, however, that the Town shall not be obligated to pay with respect to any Fiscal Year an amount on account of the Town Annual Share in excess of its share (a) of the total O and M Expense budget determined in advance of the start of such year pursuant to the procedures described in Article 13 hereof, (b) of a revised total O and M Expense budget adopted during such year pursuant to such procedures, or (c) of the total O and M Expense budget as may be otherwise determined or agreed upon by the City and the Town.

7.03. The City warrants and represents as follows: (a) in 1965 it issued bonds totalling $1,750,000.00 in principal amount with an interest rate of 3.40% per annum maturing as to principal in the amount of $85,000.00 on March 1 of each year, plus interest due thereon, until final maturity on March 1, 1985 (the "1965 Bonds"); (b) the proceeds of the 1965 Bonds to the extent of 53.4% thereof were used to finance construction of the

existing City primary sewage treatment plant, the balance of such proceeds having been expended for laterals and other improvements; and (c) the flows of sewage from the Participating Municipalities under this agreement will be treated by said primary treatment plant as well as by the improvements thereto which are a part of the Woonsocket Project. In the event that Town Flow shall first occur pursuant to Section 2.01 prior to March 1, 1985, the Town will reimburse the City for 19% of 53.4% of payments made by the City on account of the 1965 Bonds after such event, which reimbursement shall be payable by the Town within thirty (30) days after the Town shall receive a statement from the City Finance Director accurately certifying the amount of such payments by the City. It is understood and agreed that the Town shall not be liable hereunder for any principal of or interest on bonds issued by the City to finance the Woonsocket Project or on 1965 Bonds other than the portion of 1965 Bonds that is directly attributable to construction of the City primary sewage treatment plant.

7.04 Notwithstanding any provision of this agreement to the contrary, the Town shall not be liable for any O and M Expense or for any share of 1965 Bonds incurred with respect to any period prior to the time Town Flow shall first occur pursuant to Section 2.01 or after the termination of this agreement. For purposes of this section O and M Expense will be prorated equally over each fiscal year and payments made on account of 1965 Bonds as of March 1 in any year will be prorated equally over the preceding twelve (12) month period.

8. Capital Improvements.

8.01. In the event that after completion of the Woon-

socket Project improvements, alterations or additions (hereinafter "Improvements") to the Woonsocket Project of a capital nature shall be necessary the City will consult with the Town and the other Participating Municipalities to determine jointly the nature of the Improvements, the cost and financing thereof, the allocation of such costs among the Participating Municipalities and other factors. If as a result of such consultation the Participating Municipalities shall reach an agreement concerning such Improvements, the Improvements will be constructed and the capital costs thereof shall be allocated and paid for in accordance with such agreement.

8.02. If as a result of such consultation an agreement cannot be reached among the Participating Municipalities concerning the need for, the cost of or the allocation of costs for Improvements the matter shall be submitted to arbitration pursuant to Article 15 hereof.

8.03. In determining the allocation of costs of Improvements between the Town and any other Participating Municipality, whether by means of an agreement among the parties or by arbitration, the allocations shown on Exhibit A may not be applicable, and new allocations shall be made based on the best projections available at the time.

9. Books, Records and Access to Equipment.

9.01. Each of the City and the Town agree to maintain complete and accurate books and records concerning all the matters relative to this Agreement and the performance thereof, to retain the same for a period of at least seven (7) years following the Fiscal Year to which such books and records relate and to permit

the agents, accountants and other duly authorized representatives of the other party to have access to all such books and records during reasonable business hours for the purpose of examining any of the same and making extracts or copies thereof.

9.02. Each of the City and the Town agree to make available to the representatives and agents of the other for purposes of inspection all facilities and equipment related to the wastewater system of each and especially all meters and metering devices, wastewater samples and effluent test results in the possession of either or to which either may have access.

10. Domestic, Industrial and Other Wastes.

10.01. The Town adopted a sewer use ordinance on December 30, 1974 copy of which has been furnished to the City and has been approved by the City.

10.02. No user located in the Town shall be permitted to discharge its wastewater into the City Wastewater Treatment and Collection System unless it is of a type and consistency suitable for treatment in accordance with the standards enforced by the City Wastewater Treatment and Collection System under the City Wastewater Ordinance, C.2839.

10.03. Notwithstanding the foregoing, the City reserves the right to refuse to grant permission to the Town for the discharge of high strength or incompatible wastewater unless the additional cost for treating the same is paid to the City by the Town as provided in the City's Wastewater Ordinance, C.2839.

10.04. The Town and the City agree that the City has the right to conduct its own analysis of the Town's wastewater and further to require pretreatment with respect to such waste-

water in order to meet the standards of the City Wastewater Ordinance C.2839. The Town further agrees to require pretreatment in order to meet such standards.

10.05. In exercising the foregoing reservations, permissions and rights of the City with respect to the Town and users in the Town, the City agrees that it will not impose any standard or requirement which would be arbitrary, discriminatory or unreasonable or would treat the Town or users in the Town on a different basis than is applicable to users similarly situated in the City or any other Participating Municipality.

10.06. Each of the City and the Town covenant and agree that each will enact and maintain in effect an ordinance which would forbid the discharge into their respective wastewater collection systems of any unpolluted storm, surface or subsurface waters, and that each will, during the term of this Agreement, take reasonable steps to cause its ordinance to be enforced against violators after receiving reasonable notice of a violation.

11. City Use of North Smithfield Intercepter.

11.01. Subject to section 11.02, the City may connect or permit to be connected sewer lines and mains to the North Smithfield Intercepter for the purpose of receiving sewage discharged by users located within the City; provided such connection or connections are made downstream from the location of the metering device referred to in section 6.01, do not interfere with the wastewater collection service to be provided to the Town under this Agreement and are made only after the agreement or determination described in paragraph 11.02 is arrived at concerning payment to the Town.

11.02. Notwithstanding any requirement of law or this Agreement, prior to making or permitting any such connection the City will notify the Town of its intention to do so and a conference shall be held between the parties to determine the charge to be made to the City to enable the Town to recover a fair and equitable share of the Project Costs in connection with the construction of the North Smithfield Intercepter and the cost of financing such construction for the remaining amortization period of the bonds or other indebtedness issued to finance such construction. If no satisfactory agreement can be reached, the matter shall be referred to arbitration pursuant to Article 15 hereof.

12. General Clauses.

12.01. Reasonable notice shall, so far as possible, be given by each of the parties hereto to the other party respecting any material changes proposed in the volume or characteristics of the wastewaters expected to be delivered to the City Wastewater Treatment and Collection System or in the services to be rendered or methods of operations to be carried on in the performance of this Agreement.

12.02. Each of the parties hereto shall use reasonable diligence to provide a regular and uninterrupted supply of service at any service location, but shall not be liable to the other party for damages, breach of contract or otherwise for failure, suspension, diminution or other variations of service occassioned by or in consequence of any cause beyond the control of the party furnishing service, including but not limited to, acts of God or the public enemy, fires, floods, earthquake,

or other catastrophe, strike or failure or breakdown of transmission or other facilities; provided, however, that when any such failure, suspension, diminution or variation of service shall aggregate more than twenty-four (24) hours during any billing period hereunder, an equitable adjustment shall be made in the O and M charges specified in this Agreement by agreement of the parties or in the case of disagreement by arbitration under Article 15 hereof.

12.03. The City will indemnify and hold harmless the Town and all persons, firms or corporations located in the Town from any and all liabilities, claims or damages that may result from any pollution of the waters of the Blackstone River by reason of the discharge of wastewater transmitted to the City Wastewater Treatment and Collection System pursuant to this Agreement; provided all wastewater transmitted to the City by means of the North Smithfield Intercepter is in accordance with paragraph 10.02 of this Agreement.

12.04. Each of the parties hereto agrees to use reasonable efforts to comply with all current and subsequent regulations of the E.P.A. and the Rhode Island Department of Health relating to the administration, operation and control of the City Wastewater Treatment and Collection System during the term of this Agreement, and no party shall be liable for the act or neglect of the other. Each of the Town and the City shall be responsible for instituting an Industrial Cost Recovery system, in accordance with applicable laws and regulations, for the assessment, administration and collection of assessments under such system from industrial users located in their respective jurisdictions and

for the application of amounts so collected in accordance with applicable laws and regulations.

12.05. The Town shall not authorize the use of the North Smithfield Intercepter for the transmission of wastewater to the City Wastewater Treatment and Collection System generated by any source of wastewater that is not located in the Town without first obtaining written permission of the City, except that the construction, maintenance and operation of an intercepter or other sewer main for the purpose of transporting wastewater from the Town of Blackstone through a portion of the Town to the City is hereby approved.

12.06 (a). The Town will submit to the City composite wastewater samples taken from the location of the metering device referred to in section 6.01 at intervals not exceeding two (2) months. At the request of the City, the Town shall provide additional samples in the presence of the representative of the City. Either party may at its own expense obtain certified laboratory analysis of wastewater samples discharged into the City wastewater collection system or the Town wastewater collection system.

12.06 (b). Both the City and the Town shall provide certified lab analysis of the wastewater from each industry within their respective jurisdictions as per EPA regulations. Upon reasonable notification from the City the Town will require industrial users to furnish samples and/or certified laboratory analysis of wastewater that is being discharged to the Woonsocket Project at such intervals as may be necessary in order for the City to maintain its permit for discharge of treated wastewater

into the Blackstone River and other requirements of applicable federal and state authorities.

12.06 (c). In any case, the results of the City laboratory analysis shall be the basis of all charges and surcharges for O and M Expense billed to the Town, and shall be binding upon the parties unless proved to be inaccurate.

12.07. The City agrees that the Woonsocket Project was designed and will be constructed to accommodate annual average daily rates of wastewater flow from each of the Participating Municipalities as follows, not to exceed volumes as follows:

Participating Municipality	Wastewater Treatment Facility Average Flow Million Gallons Per Day
Woonsocket	11.0
North Smithfield	3.0
Blackstone	0.75
Bellingham	1.3

The Town will not authorize, and the City shall exclude, wastewater flows into the City Wastewater Treatment Plant in excess of the rates of flow specified above for each of the Participating Municipalities; provided, however, that before excluding flow from a Participating Municipality hereunder a determination based on actual data over a period of at least twelve (12) months shall have been made that the average flow from such Participating Municipality shall have exceeded the limitation applicable thereto and such Municipality shall have been given at least ninety (90) days prior written notice thereof. The City, the Town and each of the other Participating Municipalities shall be required to take reasonable steps to preclude the introduction into the City

Wastewater Treatment and Collection System of wastewater having characteristics not in accordance with "Engineering Report on Additions and Modifications to Existing Wastewater Treatment and Collection Facilities 1973" by C. E. Maguire, Inc.

12.08. If the City has entered or hereafter shall enter into any agreement or understanding with any other Participating Municipality concerning the acceptance of wastewater from such Municipality on terms or conditions, the basis for which is comparable, that are more favorable than the terms or conditions accorded the Town hereunder, the City shall promptly offer to the Town such more favorable terms and conditions on the basis applicable to the Town and enter into an appropriate amendment of this Agreement with respect thereto and will grant to the Town an appropriate credit against future payments due from the Town under this Agreement for payments previously made to the City by the Town which would not be required had such amendment been in effect as of the date of this Agreement. Promptly after entering into any future agreement or understanding with any such other Municipality the City will furnish a true and exact copy of such agreement or understanding to the Town.

12.09. The City will provide adequate and qualified personnel to operate and maintain the Woonsocket Project. The Town shall pay to the City for training costs in connection with personnel necessarily hired by the City to operate the regional sewage treatment system by the City who require special training for reasonable training periods not exceeding three (3) months with respect to any such personnel; provided, however, that the aggregate amount of such training costs charged to the Town here-

under shall not exceed $6,250.00. Training costs payable hereunder shall be due within thirty (30) days of the receipt by the Town of a certificate from the Director of Finance of the City specifying the amount of such costs.

12.10. In the event that any payment that is due hereunder from the Town to the City under paragraphs 3.01 or 3.02 shall not be made within thirty (30) days of the time it is due, such payment shall thereafter bear interest at the rate of 4% per annum. In the event that any payment (other than payments provided for in the preceding sentence) that is due under this agreement from the Town to the City or from the City to the Town shall not be made within thirty (30) days of the time it is due, such payment shall thereafter bear interest at the rate of 8% per annum until it is paid. An award of interest at the appropriate rate specified herein shall be included in any arbitration decision, court judgment or other award with respect thereto.

12.11. This Agreement supersedes and replaces the agreement between the parties dated September 11, 1974 as modified by the agreement dated June 10, 1975.

13. Town Wastewater Sources With Direct Connection.

13.01. There are certain wastewater sources located in the Town which are presently directly connected to the City Wastewater Treatment and Collection System. Such sources may continue to discharge wastewater into the City Wastewater Treatment and Collection System.

13.02. There may be in the future new wastewater sources located in the Town which can conveniently and economically connect directly to the City Wastewater Treatment and Collection System,

without connecting to the North Smithfield Intercepter. The City will, consistent with its Wastewater Ordinance and the standards generally applicable to the City Wastewater Treatment and Collection System, permit such connection to be made.

13.03. With respect to any sources of wastewater located in the Town which now or hereafter connect directly with the City Wastewater Treatment and Collection System without passing through the North Smithfield Intercepter, the City and the Town shall, at the time specified in paragraph 2.01, agree on, and revise from time to time thereafter, reasonable estimates of the quantity of wastewater discharged from such sources. In estimating wastewater discharges from Town sources, estimates of usage by residential users or commercial users shall be based upon the classifications of usage in effect in the City with respect to users similarly situated in the City. Such estimated quantities shall be added to the wastewater flows determined as provided by Article 6 and in such manner shall be deemed part of Town Flow and used to determine the Town O and M Share, and thereafter the City shall not make any charge to the person, firm or corporation whose source shall be so deemed part of Town Flow and shall rebate to such person, firm or corporation an apportioned part of any sewage use or similar charge, if any, paid in advance with respect to a period when this paragraph shall become operative.

14. Procedures Concerning Administration of the City Wastewater Treatment and Collection System.

14.01. It is the intention of the City and Participating Municipalities to create an official board for the purpose of adopting policies and programs with respect to the City Wastewater

Treatment and Collection System. Such Board shall consist of not less than ten (10) representatives selected by the governing body or authority in each of the Participating Municipalities, the number of such representatives being determined by the proportion that the amount of the Project Cost of the Woonsocket Project borne by each such Municipality shall bear to the total Project Cost of the Woonsocket Project; provided, however, that no Participating Municipality shall have less than one representative on such Board. Such Board shall have such responsibilities as shall be determined by future agreement.

14.02. It is understood and agreed that the official of the City responsible for fiscal administration of the City Wastewater Treatment and Collection System may transfer amounts between accounts within the budget of the City Wastewater Treatment and Collection System in any fiscal year not exceeding $1,000 per transfer.

15. Matters Subject to Conference Between the Parties.

15.01. If, notwithstanding the fact that the Board described in Article 14 hereof may have considered a matter of policy affecting the Town or any residents thereof, the Town is not satisfied the procedures in this Article shall be applicable.

15.02. In the event that the City contemplates any increase in expenditures for maintenance or operation of the City Wastewater Treatment and Collection System that will substantially affect the cost to the Town, including any proposed increase in charges for unmetered service, a conference shall be held by the parties with reference to the same and in case of failure to reach an agreement as to the necessity for or cost of the same,

the matter shall be referred to arbitration as provided in Article 16.

15.03. In the event that the Town deems that a decrease in the cost of operating and maintaining the City Wastewater Treatment and Collection System or that a change in conditions appertaining to the use of any part of the system by the Town would indicate that an equitable adjustment of the charge to the Town should be made, a conference shall be held by the parties with reference to the same and in case of failure to reach agreement as to an adjustment, the matter shall be referred to arbitration as provided in Article 16.

15.04. It is mutually agreed that Participating Municipalities (other than the City and the Town) may be users of the City Wastewater Treatment and Collection System and contribute financially to the O and M Expense of the same and that such use of the City Wastewater Treatment and Collection System and financial contribution to the City from such other Municipalities shall be considered whenever such facts are pertinent to the observance and performance of this Agreement, and that representatives of the said other Municipalities may be requested to attend any conference between the parties where the matters discussed are or may be affected by such use and contribution or may affect such use and contribution.

15.05. The parties agree that day to day operation of matters within the purview of this Agreement (other than the provisions of Article 13 or matters to be submitted to arbitration) are to be carried out and determined in the first instance at the administrative level of the City and the Town. In the event

of a disagreement that cannot be resolved at the administrative level the City Council and the Town Board of Sewer Commissioners will attempt to adjust the matter. If the matter cannot be so resolved within a reasonable time either the City or the Town may file with the other a request in writing that the matter in controversy be submitted to arbitration pursuant to Article 16 hereof.

16. Arbitration.

16.01. Nothing in this agreement shall be construed as precluding either party from having recourse to a court of law or equity to enforce, or to recover damages for breach of, any of the terms hereof, but, any such action shall not be taken with respect to any dispute between the parties prior to the completion of arbitration proceedings.

16.02. In the event that any matter is to be submitted to arbitration under any provision of this Agreement the procedures described in this Article shall be applicable.

16.03. Any controversy or claim arising out of or relating to this Agreement or the breach thereof shall be settled by arbitration in accordance with the rules of the American Arbitration Association, and judgment upon the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof.

16.04. Either party hereto may avail itself of the right to arbitration hereunder by issuing a written request for arbitration to the other party in which it shall stipulate with particularity the matter or matters to be submitted to arbitration and name an arbitrator. Within ten (10) days after receipt

of such request the other party shall give written notice of the name of its arbitrator. The two (2) arbitrators so designated shall, within ten (10) days from and after their designation agree upon a third arbitrator. If within said ten (10) days the arbitrators are unable to agree upon the third arbitrator, such third arbitrator shall be selected in accordance with the rules and procedures of the American Arbitration Association. No person shall be selected or act as such third arbitrator who is a resident of any of the Participating Municipalities or is or may be in any way, either directly or indirectly, interested in the matter.

16.05. Notice of any request for arbitration hereunder shall be given to the other Participating Municipalities any of which may join in the arbitration proceedings as parties.

16.06. A statement of the matter in controversy, together with any documents or other data that may be helpful to the arbitrators, shall be submitted to them as soon as practicable after their appointment, and they shall carefully review the same and shall conduct such hearings as they may deem necessary to enable them to reach a decision. They shall notify the City Clerk of Woonsocket and the Town Administrator of North Smithfield of the date and time of such hearing, and of any additional information that they require. They may, if they deem it necessary, engage technical assistance to enable them to reach a decision, and may also engage the services of a stenographer. The cost of any arbitration proceeding hereunder shall be divided (a) in the case of a two-party arbitration, equally between such parties and (b) in the case of an arbitration involving more than two parties,

in the same proportion as their respective shares of the Project Cost to the total shares of Project Costs of the parties to such arbitration. The decision of the arbitrators or a majority of them, when reduced to writing and communicated to the parties to such proceeding through their designated representatives, shall be final and binding on the parties. If prior to the determination of the arbitrators of the matter in controversy the parties reach an agreement, they shall forthwith notify the arbitrators in writing of that fact, and all further powers and duties of the arbitrators shall be terminated thereby.

IN WITNESS WHEREOF, each of the parties hereto has caused its corporate seal to be affixed to these presents and the same to be signed in its name and behalf by its officer thereunto duly authorized.

In the presence of:

CITY OF WOONSOCKET

_____

By_____
Mayor

TOWN OF NORTH SMITHFIELD

_____

By_____
Town Administrator

APPROVED AS TO FORM:

_____
City Solicitor

_____
Town Solicitor

STATE OF RHODE ISLAND

PROVIDENCE, SC.

In Woonsocket, in said County and State, before me personally appeared Gerald J. Bouley, Mayor of the City of Woonsocket and he acknowledged the foregoing instrument to be the free act and deed of said City of Woonsocket.

_____

Notary Public

STATE OF RHODE ISLAND

PROVIDENCE, SC.

In North Smithfield, in said County and State, before me personally appeared Arthur Denomme, Town Administrator and he acknowledged the foregoing instrument to be his free act and deed of said Town of North Smithfield.

_____

Notary Public

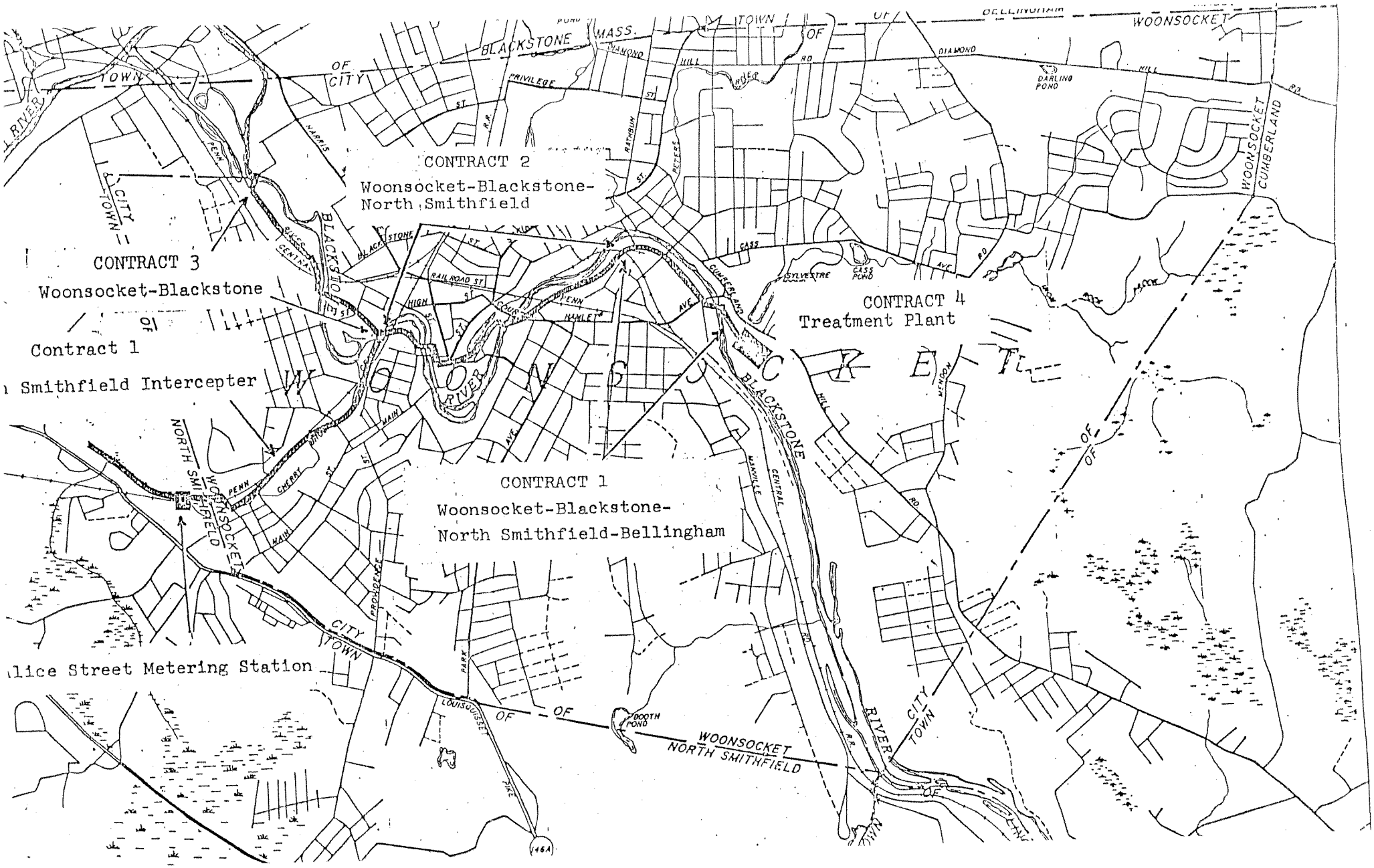
EXHIBIT "A"

TABLE OF PERCENTAGES OF COSTS FOR SEWER PROGRAM

Description	EPA %	Woonsocket %	North Smithfield %	R.I. %	Blackstone %	Bellingham %	Massachusetts %
Contract 1 - Const. Cost*	75.0	4.8	2.9	11.5	1.1	1.2	3.5
Contract 2 - Const. Cost*	75.0	3.8	4.5	12.4	1.7	0	2.6
Contract 3 - Const. Cost*	75.0	4.2	0	6.3	5.8	0	8.7
Contract 4 - Const. Cost**	75.0	6.8	1.9	13.0	0.5	0.8	2.0
Interest	0	57.2	23.5	0	13.6	5.7	0
Adm. Expenses	75.0	6.0	2.3	12.4	1.1	0.6	2.6
A/E Fees Contract 1	75.0	4.8	2.9	11.5	1.1	1.2	3.5
A/E Fees Contract 2	75.0	3.8	4.5	12.4	1.7	0	2.6
A/E Fees Contract 3	75.0	4.2	0	6.3	5.8	0	8.7
A/E Fees Contract 4	75.0	6.8	1.9	13.0	0.5	0.8	2.0
User Charge/ICR	75.0	6.0	2.3	12.5	1.1	0.6	2.5
O & M Manual	75.0	6.8	1.9	13.0	0.5	0.8	2.0
Eng. Report and Assmt.	75.0	6.0	2.3	12.5	1.1	0.6	2.5
Supp. Eng. Services	75.0	6.0	2.3	12.5	1.1	0.6	2.5
Easements/Surv.	75.0	6.0	2.3	12.5	1.1	0.6	2.5
Initial Start-Up Services	75.0	6.8	1.9	13.0	0.5	0.8	2.0
Detailed Inspection- Cont. 1	75.0	4.8	2.9	11.5	1.1	1.2	3.5
Detailed Inspection- Cont. 2	75.0	3.8	4.5	12.4	1.7	0	2.6
Detailed Inspection- Cont. 3	75.0	4.2	0	6.3	5.8	0	8.7
Detailed Inspection- Cont. 4	75.0	6.8	1.9	13.0	0.5	0.8	2.0
Development Costs	75.0	6.0	2.3	12.5	1.1	0.6	2.5
~~Amortization Remaining~~	~~0~~	~~68.0~~	~~19.0~~	~~0~~	~~11.0~~	~~6.0~~	~~0~~
~~Contingencies~~							

* Part of the Low Level Intercepter

** Improvements to the sewage treatment plant


CONTRACT 2
Woonsocket-Blackstone-
North Smithfield
CONTRACT 3
Woonsocket-Blackstone
Contract 1
Smithfield Intercepter
CONTRACT 4
Treatment Plant
CONTRACT 1
Woonsocket-Blackstone-
North Smithfield-Bellingham
lice Street Metering Station
BLACKSTONE
MASS.
WOONSOCKET
NORTH SMITHFIELD
CITY OF WOONSOCKET
TOWN OF BLACKSTONE
TOWN OF BELLINGHAM
BLACKSTONE RIVER
DIAMOND HILL RD
DARLING POND
BOOTH POND
CLASS POND
SYLVESTRE
RAILROAD ST
MAIN ST
PROVIDENCE
CUMBERLAND
LOUISQUISSET PIKE
(146A)

INDEX OF DOCUMENTS

71. CONTRACT DRAWINGS

DRAWING NO.	TITLE
NS-1-1	INTERCEPTER LOCATIONS
NS-1-2	ROUTE LOCATIONS
NS-1-3	CROSS COUNTRY STATION 0+00 TO STATION 8+81
NS-1-4	CROSS COUNTRY STATION 8+81 TO STATION 20+00
NS-1-5	CROSS COUNTRY STATION 20+00 TO STATION 31+68
NS-1-6	CROSS COUNTRY AND ROBERTA STREET STATION 31+68 TO STATION 43+35
NS-1-7	ROBERTA STREET, ALICE AVENUE AND CROSS COUNTRY STATION 43+35 TO STATION 54+70
NS-1-8	CROSS COUNTRY STATION 54+70 TO STATION 64+03
NS-1-9	CROSS COUNTRY STATION 64+03 TO STATION 75+62
NS-1-10	CROSS COUNTRY STATION 75+62 TO STATION 84+30
NS-1-11	GREAT ROAD STATION 0+00 to 10+98
NS-1-12	METERING STATION MECHANICAL-STRUCTURAL
NS-1-13	METERING STATION ELECTRICAL
NS-1-14	STANDARD DETAILS AND SCHEDULES

EXHIBIT D

RESOLVED: That the proposed form of contract entitled "Wastewater Disposal Service Contract Between City of Woonsocket and Town of North Smithfield" presented to and discussed at this meeting be and such contract hereby is approved and the Town Administrator is hereby authorized to execute, acknowledge and deliver said contract on behalf of the Town.

APPENDIX B

Public Meeting / Public Hearing Materials

TOWN OF NORTH SMITHFIELD
SEWER DIVISION

PUBLIC NOTICE

RE: DRAFT WASTEWATER MANAGEMENT FACILITIES PLAN FOR THE NORTH SMITHFIELD SEWER COMMISSION

PUBLIC HEARING DATE: OCTOBER 11, 2006

PLACE: KENDALL DEAN SCHOOL
83 GREENE STREET
SLATERSVILLE, RI

TIME OF HEARING: 7:00 P.M.

ON OCTOBER 11, 2006 THE NORTH SMITHFIELD SEWER COMMISSION WILL PRESENT A DRAFT OF THE TOWN'S WASTEWATER MANAGEMENT FACILITIES PLAN.

THE DRAFT PLAN CAN BE REVIEWED AT THE: TOWN'S PUBLIC LIBRARY
MAIN STREET
NORTH SMITHFIELD, RI

TOWN OF NORTH SMITHFIELD

WASTEWATER MANAGEMENT FACILITIES PLAN

FOR THE

NORTH SMITHFIELD SEWER COMMISSION

PUBLIC MEETING
OCTOBER 11, 2006

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
272 West. Exchange St., Suite 201, Providence, RI 02903-1061
Phone: 401-454-7000 • Fax: 401-454-7415

1.0 EXECUTIVE SUMMARY

1.1 PLAN OVERVIEW

This Facilities Plan, prepared for the Town of North Smithfield, is a comprehensive study addressing both present and future needs of the Town's wastewater collection system. The Facilities Plan is an investigation into the present and future adequacies in the collection system. The study area includes the entire Town of North Smithfield. The study was completed according to the requirements of the State Revolving Loan Program established and managed by the R.I. Department of Environmental Management.

Wastewater generated by the Town is serviced by the Woonsocket Regional Wastewater Treatment Facility. The Town of North Smithfield entered into an agreement with the City of Woonsocket on 7 December 1977 for the treatment and disposal of wastewater generated by the Town. The agreement indicates that the cost disbursement for capital expenses are proportioned based on percentages of total design flow. Operating costs for the Town of North Smithfield, including maintenance, repairs, supplies, and administration are based upon the actual metered flow from either the Alice Avenue Metering Station or the Elizabeth Avenue Metering Station, and water usage records for units that do not pass through the metering station, and are then proportioned based on the total flow treated by the Facility.

1.2 EXISTING CONDITIONS

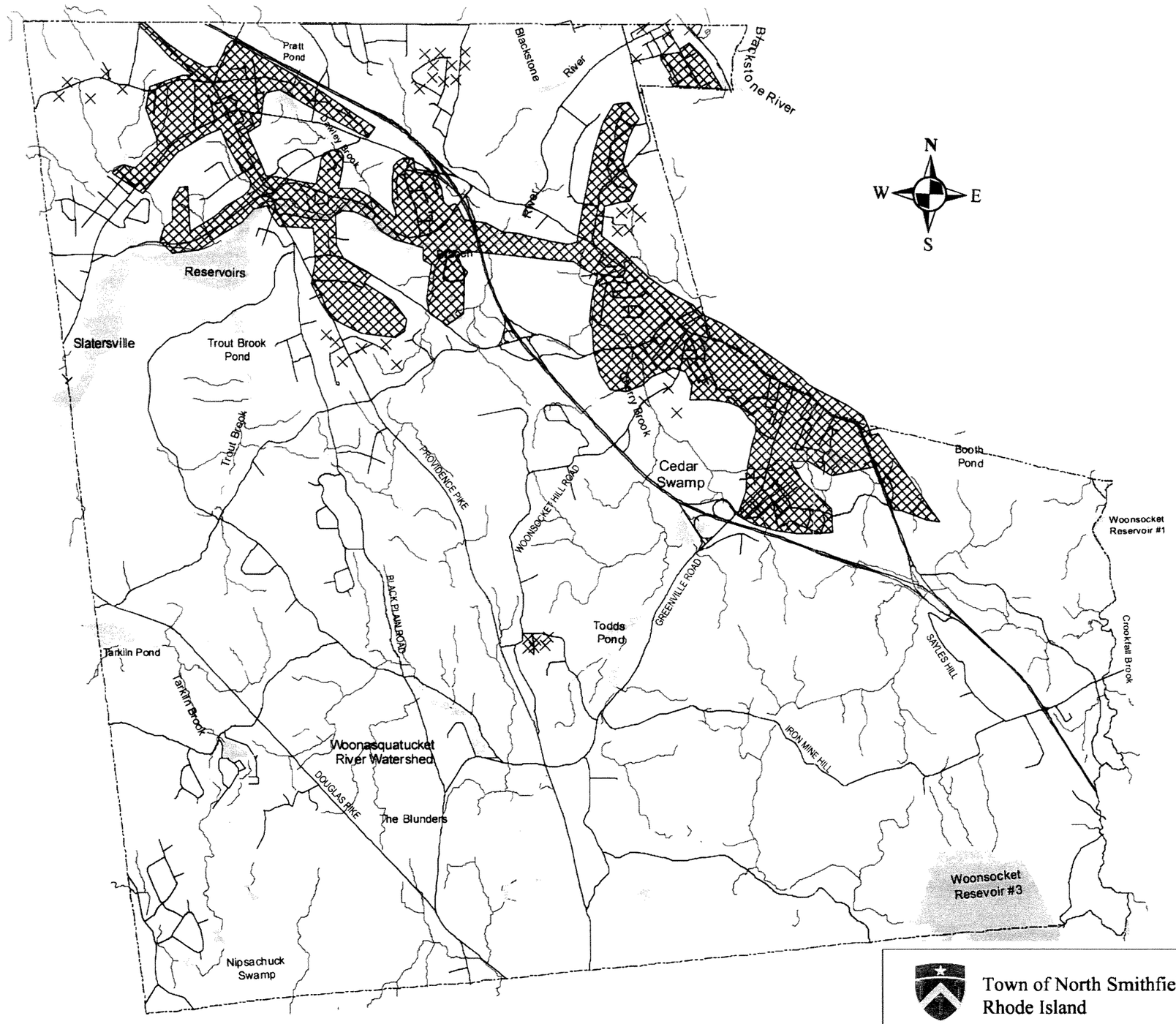
Fifty-one percent (51%) of the residents of the Town are serviced by individual sewage disposal systems, while the remaining forty-nine percent (49%) are serviced by the municipal wastewater collection system. The North Smithfield Sewer System discharges directly to the Woonsocket Regional Wastewater Collection System located in the vicinity of Edward Street at the Blackstone River in the City of Woonsocket. The eastern section of Town is serviced by the Union Village Interceptor and the western section of Town is serviced by the Branch River Interceptor. The North Smithfield Interceptor conveys the majority of the wastewater generated by the North Smithfield users to the Woonsocket system. The confluence of the three major interceptors occurs in the vicinity of Brookside Drive and Cherry Brook.

Figure 1-1 shows the existing sewered areas within the Town of North Smithfield and Figure 1-2 depicts the interceptors and lateral sewers. The system consists of 13 miles of lateral and intercepting sewers. The collection system does not have bypasses or overflows installed, and the system does not have combined sewer overflows. The lateral system contains 5.5 miles of 8-inch diameter clay pipes, 3.5 miles of 8-inch diameter polyvinyl chloride pipes, 0.5 miles of low pressure sewers, and 0.2 miles of 4-inch ductile iron force main and one pumping station. The interceptor sewers consist of 4.4 miles of 10-inch through 24-inch diameter clay pipes, 1.6 miles of 30-inch diameter reinforced concrete pipe, and 0.3 miles of 10-inch and 20-inch diameter ductile iron force mains, eight (8) pump stations and two flow metering stations.

There are 2,122 on-site disposal systems in the Town of North Smithfield, and the majority of these systems are located in the Slatersville Reservoir groundwater recharge area and the watershed area for the Woonsocket Reservoirs (Figure 1-3). Many systems are substandard, beyond their intended life expectancy, and most are not maintained on a periodic basis. A Wastewater Management District is proposed for implementation that will call for the inspection, repair and replacement of individual sewage disposal systems to prevent non-source pollution of the groundwater.

The construction, alteration and repair of ISDS systems are regulated by RIDEM's Division of Water Resources in the Rules and Regulations Establishing Minimum Standards Relating to Location, Design, Construction and Maintenance of Individual Sewage Disposal Systems. These rules state that all installations, alterations and repairs must be approved, in writing, by the Division. In this manner, the Division can inspect and keep track of all ISDS installations and repairs. The review of the ISDS records revealed that 102 system failures were reported between 2000 - 2005, and that the individual owners made the necessary repairs to be in compliance with State and local officials. Figure 1-4 illustrates the location of these failures and repairs.

They are generally considered to be two ways in which an ISDS system can fail. In the first circumstance, the leaching field does not operate, meaning that water cannot pass through the system. The system eventually surcharges, or backs up into the house. In the second instance, the system drains too freely, causing untreated sewage to percolate to the groundwater. In each case of failure, there may be several factors which contribute to the system not operating properly. For example, soils that drain poorly cannot pass large volumes of water. Conversely, soils which drain excessively may result in poor wastewater treatment and short-circuit to the surface or groundwater table. Population density is another factor. Areas which have a high



Legend

- Existing Sewer Service Area *
- On site ISDS Problem Area Identified From Comprehensive Plan

** Map shows approximate limits of existing, approved, and proposed sewer services. Some streets and sections within the delineated areas may not be on sewers.*

This map was prepared for the inventory of real property within the Town of North Smithfield. Users of this tax map are hereby notified that the public primary information sources, including record deeds and plats, should be consulted for the verification of the information contained on this map. The Town of North Smithfield and its mapping contractors assume no legal responsibility for the information contained herein.

Base-map and hydrographic features were provided by Rhode Island GIS as 1"=400' features derived from the 1997 National Grid USA/RIDOT Orthophoto Project.

Applied Geographics, Inc.

Updated: September, 2003

Town of North Smithfield
Rhode Island

Figure 1-1

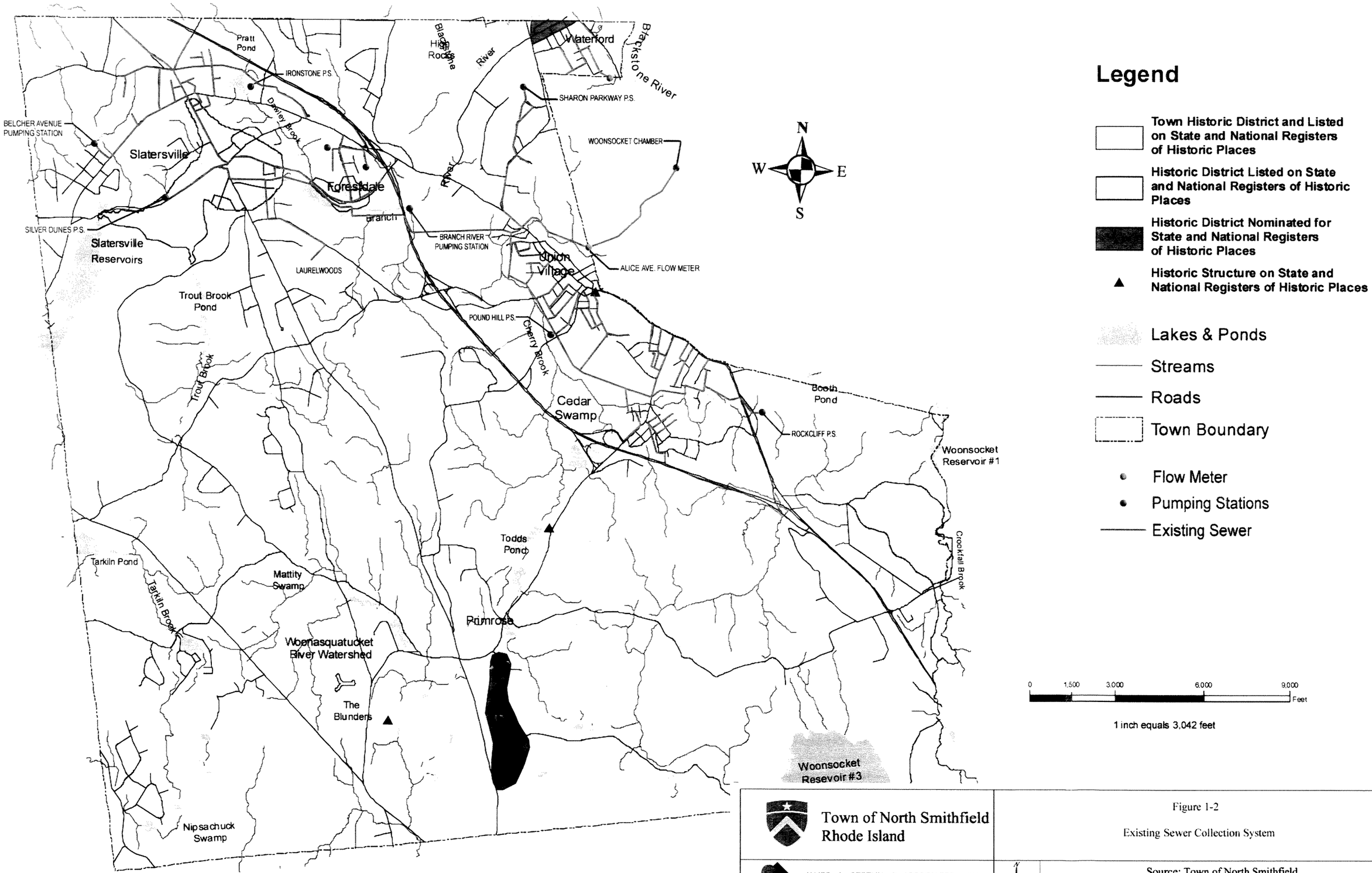
EXISTING SEWER AREA

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
272 N. Gallatin Street Suite 201 Providence,RI 02903-1028
Phone: 401-454-7600 Fax: 401-454-7416

Source: Town of North Smithfield

Date: 2006

Scale: No Scale



Town of North Smithfield
Rhode Island

Figure 1-2

Existing Sewer Collection System

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
272 W. Exchange Street Suite 201 Providence,RI 02903-1026
Phone: 401-454-7600 Fax: 401-454-7615

Source: Town of North Smithfield

Date: 2006

Scale: No Scale

Legend

- Community Wells
- Non-Community Wells
- Groundwater Reservoir
- Groundwater Recharge Area
- Water Supply Basin Boundary
- flood
- EPA - CERCLIS Site
- EPA - CERCLIS Superfund Site
- Town Boundary
- Streets
- Lakes & Ponds
- Streams

Town of North Smithfield
Rhode Island

Figure 1-3

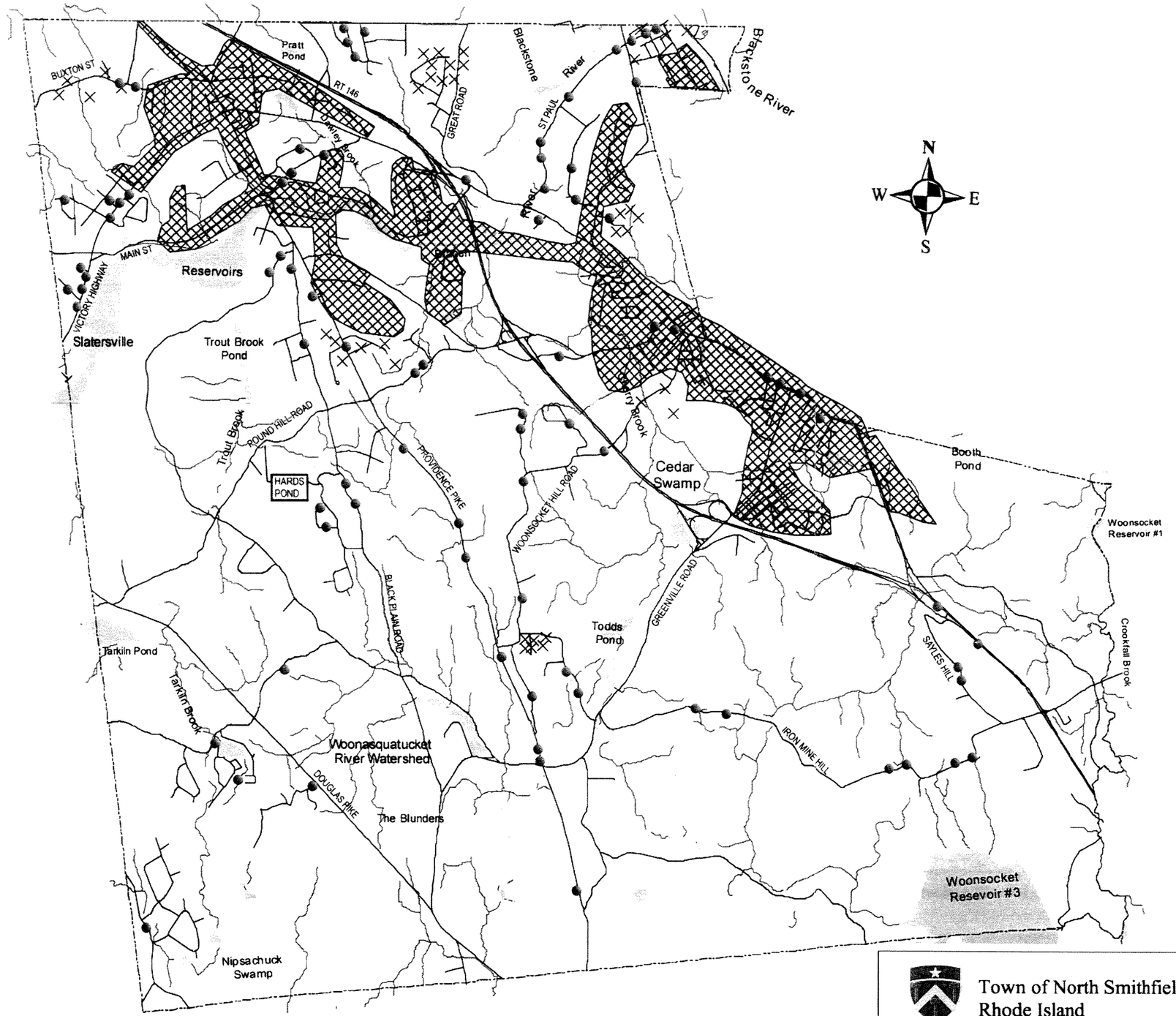
WATER RESOURCES

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
373 S. Main Street Suite 301 Providence, RI 02903-1009
Phone: 401-454-7000 Fax: 401-454-7415

Source: Town of North Smithfield

Date: 2006

Scale: No Scale



Legend

- Existing Sewer Service Area *
- On site ISDS Problem Area Identified From Comprehensive Plan
- Onsite ISDS Problem Area March 19, 2006

** Map shows approximate limits of existing, approved, and proposed sewer services. Some streets and sections within the delineated areas may not be on sewers.*

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Updated: September, 2003

APPLIED GEOGRAPHICS, INC.
Empowering People with Spatial Solutions

Town of North Smithfield
Rhode Island

Figure 1-4

ISDS FAILURES

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
272 N. Exchange Street Suite 201 Providence,RI 02903-1030
Phone: 401-454-7000 Fax: 401-454-7415

Source: Town of North Smithfield

Date: 2006

Scale: No Scale

concentration of residences over a small land area may experience oversaturation of ISDS effluent in the soil, particularly in wetland areas. High groundwater will also restrict a soil's ability to disperse and treat wastewater.

An examination of the soils where the failures have occurred finds they are very permeable soils. These soils have the potential to cause groundwater pollution, slowly permeable soils having a potential for ISDS failures, soils with a seasonally high water table located within 1.5 to 3.5 feet from the surface, and soils consisting of topography with slopes greater than 15 percent and shallow bedrock. The major areas of failure within the Slatersville Reservoir groundwater recharge area (as presented in Figure 1-4) are as follows: Buxton Street, Victory Highway, Greene St. Area, Tanglewood, Waterford area, St. Paul area, Great Road, and Providence Pike area from the Slatersville Reservoir to Pound Hill Road, Route 146 and Sayles Road. There were also areas of on-site disposal failures along Iron Mine Hill Road, Sayles Hill Road and south of Pound Hill Road, which are located within the watershed area of Woonsocket Reservoir.

The continuation of sewering the Slatersville Reservoir groundwater recharge area will improve the quality of the reservoir, groundwater, and adjacent wetlands with the elimination of leaching field effluent containing pathogenic bacteria and viruses, nitrates, phostates and synthetic organic chemicals from septic tank additives and household chemicals. There were 102 ISDS reported to have failed in accordance with DEM records and 64 of these systems are within the Slatersville Reservoir groundwater recharge area. The individual sewage disposal systems predate state-enforced siting and design standards, and have approached their expected life span. In addition, the majority of dwelling with ISDS failures are served by individual wells as a source of portable water supply.

Zoning, along with land use and planning, are important factors in ISDS wastewater management. Zoning, however, establishes the concentration of domestic dwellings in local areas. In areas of concern, this concentration may contribute to soil saturation of groundwater and water quality. Proper planning of zoning regulations can prevent potential ISDS problems.

Residential areas can be generally described as our basic lot sizes: 10,000 square feet, 20,000 square feet, 40,000 square feet and 80,000 square feet.

The zoning map is utilized as a tool to evaluate dense concentrations of residential development. Areas designated R-10 and R-20 reflect small lot sizes.

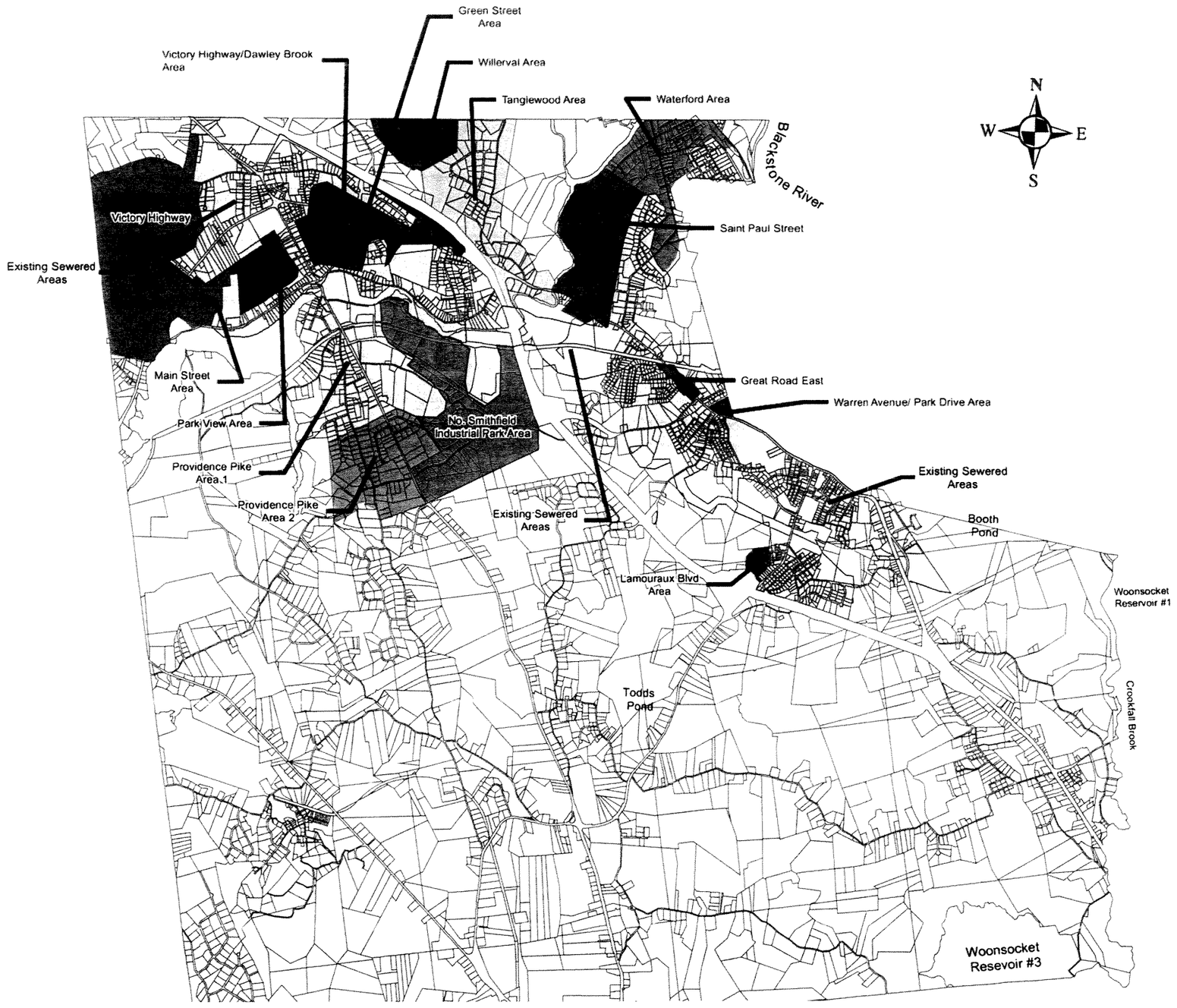
Alternatively, newer developments currently being planned which may potentially experience septic system difficulties can be zoned to help prevent such failures. In those newly developed areas that have been restricted by zoning regulations which classify the area as R-80 (one dwelling unit at 80,000 square feet), such requirements, along with the current State ISDS requirements, greatly reduce the potential of septic system failure. The zoning requirement practically assures ample soil area for leach field distribution systems, and therefore, lessens the chances of soil saturation with ISDS effluent. It is clear, then, that proper and careful zoning of undeveloped land areas can help prevent future septic system failures in such areas.

For those areas where there is less dense development, it is more cost effective to establish a Wastewater Management District to ensure that the groundwater quality is maintained. In Section 6 of this Facilities Plan, the mechanism necessary for the Town to adopt and implement a Wastewater Management Program will be provided.

The Facilities Plan will identify those areas that are to be added to the Sewer District and those areas that are to remain on Individual Sewage Disposal Systems.

1.3 FUTURE SEWERED AREA

The Town of North Smithfield will continue to increase in sewer service population over the next twenty years. Areas that have been defined as future service areas are depicted in Figure 1-5 The future service area is adjacent to the existing areas with sewers and is within the groundwater recharge area of the Slatersville Reservoir. Reviews of the Department of Environmental Management's records for Individual Sewer Disposal Systems for the past five years and discussions with Town officials revealed that there have been failures of Individual Sewer Disposal Systems in the future areas, as depicted in Figure 1-4. The remaining areas without sewers were evaluated and based on the sparsely located dwellings, it was determined that a Wastewater Management District be established to prevent Individual Sewer Disposal System problems and to preserve the water quality of groundwater and surface waters within the Town of North Smithfield. The Wastewater Management District will control the repair, replacement and maintenance of Individual Sewer Disposal Systems within the newly formed District.



1 inch equals 3,208 feet

Town of North Smithfield
Rhode Island

Figure 1-5

FUTURE SEWER SERVICE AREA

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENGINEERS & SURVEYORS
272 W. Exchange Street Suite 201 Providence,RI 02903-1055
Phone: 401-454-7220 Fax: 401-454-7415

Source: Town of North Smithfield

Date: 2006 | Scale: No Scale

It is assumed that 100 percent of a future service area will have sewer lines at build-out. Table 1-1 indicates that the population with sewers will reach 10,148 in the year 2025.

TABLE 1-1
EXISTING AND FUTURE POPULATIONS WITH SEWERS

	2005	2010	2015	2020	2025
Population	5,168	6,961	8,023	9,085	10,148
Dwelling Units	1,980	2,668	3,074	3,481	3,888

The future service area consists of soils that have constraints such as:

- Slow permeability in excess of 40 minutes per inch.
- Seasonally high water table located between 1.5 to 3.0 feet from the surface.
- Shallow bedrock between 1 to 3.0 feet from the surface.

In accordance with the Department of Environmental Management's regulations these soils are not considered suitable for Individual Sewer Disposal Systems.

In accordance with the recommendations of the Comprehensive Plan and the soil characteristics, the areas of the Town listed below in Table 1-2 will constitute the future sewer areas. The Town should monitor growth patterns, environmental conditions, development proposals, and availability of construction funding when evaluating sewer line extensions for these areas.

TABLE 1-2
PROJECTED FUTURE AREAS FOR SEWER EXTENSION

Great Road East	St. Paul
Greene Street	Victory Highway
Lamoureux Boulevard	Victory Highway/Dawley Brook
North Smithfield Industrial Park	Warren Avenue/Park Drive
Park View	Waterford
Providence Pike No. 1	Willerval/Tanglewood
Providence Pike No. 2	

1.4 FUTURE WASTEWATER FLOWS

In order to compute the future wastewater flows, the following assumptions are made based on a realistic, but conservative approach:

- Present residential per dwelling unit wastewater flow selected for the computation is equal to 180 GPD per dwelling unit, based on the sewer flows obtained from the North Smithfield Sewer Department.
- Based on the existing plumbing code that promotes water conservation methods, it will continue to result in the stabilization of water consumption.
- Future residential per dwelling unit wastewater flow will be based on 300 GPD.
- Wastewater flows for Silver Pines, Rockcliff Farm, Laurel Woods, Graves and Slatersville Mill Developments are based on design flow data from each entity.
- Future infiltration will be increased by 65 GPD (25 GPD x 2.61 persons per dwelling unit) for the future dwellings.
- Future inflow will remain at the current level.
- Peak flow factor for future residential, industrial and commercial flows is based on flow records from TR-16.
- Future industrial and commercial flow is based on 1,000 GPD per acre.

The summary of the present and estimated future flows are presented in Table 1-3.

TABLE 1-3
SUMMARY OF ANTICIPATED FUTURE WASTEWATER FLOWS
FOR THE TOWN OF NORTH SMITHFIELD

	2005		2025	
	Average Daily Flow (MGD)	Peak Hourly Flow (MGD)	Average Daily Flow (MGD)	Peak Hourly Flow (MGD)
Residential/Commercial	0.431	1.078	0.995	2.488
Industrial	0.046	0.115	0.218	0.575
Infiltration	0.287	0.287	0.360	0.360
Inflow	0.000	0.575	0.000	0.037
Totals	**0.764**	**2.055**	**1.573**	**3.968**

The increase in flow over the next 20 years (shown in Table 1-3) is from 0.764 MGD to 1.573 MGD. Currently, the average daily flow into the Woonsocket wastewater treatment facility from all sources is 8.35 MGD, that is less than the plant's design flow of 16.05 MGD. Therefore, the average increase of 0.809 MGD is not anticipated to have an adverse impact on the proper operation of the Woonsocket wastewater treatment facility. Furthermore, of the 16.05 MGD design flow, 3.0 MGD is allotted to North Smithfield based on the Intermunicipal Agreement. The total flow from the Town of North Smithfield in the year 2025 is anticipated to be 1.573 MGD, or slightly more than one-half of the design flow allotment to North Smithfield.

1.5 FUTURE WASTEWATER LOADINGS

The residential and commercial waste load contributions for the year 2025 was computed by first making the assumption that per capita waste loads of suspended solids and BOD_5 in the regional system are essentially equal to the nationwide average per capita loadings of these constituents. These average concentrations for the residential and commercial sources are 0.17 pounds of BOD_5 per capita per day and 0.20 pounds of suspended solids per capita per day. These averages, along with previously computed connected population figures, were then compared to minimum design standards for influent BOD5 and TSS. These computer values were less than the minimum design standard of 250 mg/l of BOD and TSS. Therefore, the results presented in Table 1-4 reflect an influent concentration of 250 mg/l.

TABLE 1-4
AVERAGE FUTURE WASTE LOADS AND CONCENTRATIONS
(Residential, Commercial and Industrial)

Year	BOD_5 Load (lb/d)	TSS Load (lb/d)	BOD_5 Conc. (mg/l)	TSS Conc. (mg/l)
2005 [1]	1,592	1,592	250	250
2025 [2 3]	6,255	6,255	250	250

1 Based upon actual flow conditions and concentrations of 250 mg/l.
2 Based upon 250 mg/l influent concentration of BOD_5 and TSS.
3 Based upon the contractual flow of 3.0 MGD with the City of Woonsocket.

1.6 COLLECTION SYSTEM

Current capacities of the interceptor segments were examined with regards to their ability to meet the present and future wastewater flows through the 2025 planning period. Table 1-5 presents these findings.

1.7 FINANCIAL IMPACTS OF THE FUTURE SEWER AREAS

As part of this Wastewater Facilities Plan, financial impacts for the wastewater collection system have been considered. This review includes larger capitalization projects, and conforms to financial managements expressed in the Community
Comprehensive Plan.

Operational and Maintenance Improvements

Operational and Maintenance improvements are typically smaller scale, maintenance related projects which are performed during the course of the fiscal year. The Town identifies various projects and improvements to complete for the period July 1 through June 30 of each year during the budget preparation process.

Since these smaller projects do not require the sale of municipal bonds, funding (revenue) is provided through yearly user fees. Each user will be responsible for its proportional share of these cost improvements.

The Town user charge system is structured such that the revenue is equal to the expenses. At this time, the annual sewer charge per dwelling unit is $319 per year.

For those projects where all users will benefit, the system improvement cost will be distributed throughout the entire system through the annual sewer charge.

Capitalized Improvements

As defined by the Town Finance Department, capitalized improvement shall be those projects of a larger magnitude which typically require the sale of municipal bonds to fund the related improvements. Funding of the

TABLE 1-5
FUTURE INTERCEPTOR SEGMENT ADEQUACY ANALYSIS

INTERCEPTORS	MIN. CAPACITY (MGD)	PEAK DISCHARGE (MGD)	COMMENTS
North Smithfield	14.52	3.968	Adequate
Union Village			
Segment 1	0.62	0.076	Adequate
Segment 2	0.90	0.101	Adequate
Segment 3	1.26	0.247	Adequate
Segment 4	2.29	0.366	Adequate
Segment 5	3.72	0.603	Adequate
Branch River			
Segment 1	8.01	2.196	Adequate
Segment 2	5.61	2.196	Adequate
Segment 3	2.54	0.606	Adequate
Segment 4	1.78	0.606	Adequate
South Union Village	2.29	0.113	Adequate
Great Road	2.82	0.170	Adequate
Mendon Road	2.99	0.170	Adequate
PUMP STATIONS	**MIN. CAPACITY (MGD)**	**PEAK DISCHARGE (MGD)**	**COMMENTS**
Branch River	2.74	2.146	Adequate
Pound Hill	1.58	0.603	Adequate
Sharon Parkway	0.22	0.020	Adequate
Lorraine	0.058	0.030	Adequate
Halliwell	0.062	0.031	Adequate
Ironstone	0.158	0.067	Adequate
Belcher Avenue	0.266	0.182	Adequate
Silver Pines	0.288	0.134	Adequate
Rockcliff Farms	0.259	0.071	Adequate

Town of North Smithfield improvements to the wastewater collection system are paid through sewer bonds. Yearly service for the original infrastructure has, and will continue to be paid via the user charge system.

It is anticipated that the yearly debt service for future capitalized improvement to the collection system will be via third party specific benefit assessments. For example, property owners in the Victory Highway Area will be required to pay for those wastewater improvements which specifically provides them a benefit.

The new sewer users would be responsible for the cost directly related to their service area. The anticipated cost and dwellings to be serviced are summarized in Tables 1-6 and 1-7. Table 1-8 summarizes the implementation schedule and rankings of the sewer collection system improvements.

1.8 FUTURE WASTEWATER MANAGEMENT DISTRICT

On-Site Systems

Individual disposal systems will continue to play an important role in the Town's overall Wastewater Management Plan. The adoption of this *Facilities Plan for Wastewater Management* will essentially provide a long-range (i.e., twenty (20) year) "Master Plan" for sanitary sewer conveyance and treatment systems. The Facilities Plan supported the premise that a WWMD is an appropriate alternative for addressing individual sewage disposal systems (ISDS) problems in certain parts of the Town. While the "ideal" solution to ISDS problems may be the installation of conventional public sanitary sewers, the WWFP included evaluations as to the economic and physical factors related to sewering existing neighborhoods. These factors included the "cost per affected resident" (typically paid through an assessment program wherein the benefitting property owners pay the entire cost) and the cost to the overall Enterprise Fund for infrastructure improvements necessary to handle the increased flows (i.e., increasing the physical capacity of a pump station, or the treatment facilities). The capital costs associated with system-wide infrastructure improvements would typically be distributed equally to all units throughout the Town that are connected to the sewer system.

Given the absence of Federal and/or State grant monies, the aspect of defined WWMD's will be a viable alternative when compared to upgrading either wastewater collection system or the treatment facility. Even

TABLE 1-6 SUMMARY OF THE TOTAL PROBABLE PROJECT COSTS FOR THE RECOMMENDED IMPROVEMENTS TO THE WASTEWATER COLLECTION SYSTEM	
SERVICE AREA	TOTAL COST
Great Road East	$ 1,696,200
Greene Street	1,520,900
Lamoureux Boulevard	98,600
North Smithfield Industrial Park	3,097,600
Park View	908,600
Providence Pike No. 1	4,216,700
Providence Pike No. 2	2,248,500
St. Paul	6,179,700
Victory Highway	5,439,300
Victory Highway/Dawley Brook	2,711,200
Warren Avenue/Park Drive	857,400
Waterford	2,151,800
Willerval/Tanglewood	5,588,000
TOTALS	$ 36,714,500

All costs presented in 2006 dollars.

TABLE 1-7 SUMMARY OF THE ANTICIPATED COST PER DWELLING FOR THE IMPROVEMENTS TO THE WASTEWATER COLLECTION SYSTEM				
	TOTAL COST [1]	20 YEAR BOND 3% INTEREST	EQUIVALENT DWELLING UNITS	ANNUAL COST / DWELLING UNIT
Great Road East	$ 1,696,200	$ 2,257,700	31	$ 3,641
Greene Street	$ 1,520,900	$ 2,024,370	60	$ 1,687
Lamoureux Boulevard	$ 98,600	$ 131,240	3	$ 2,187
North Smithfield Industrial Park	$ 3,097,600	$ 4,123,011	N/A	$ N/A [2]
Park View	$ 908,600	$ 1,209,327	33	$ 1,832
Providence Pike No. 1	$ 4,216,700	$ 5,612,572	160	$ 1,754
Providence Pike No. 2	$ 2,248,500	$ 2,992,830	99	$ 1,512
St. Paul	$ 6,179,700	$ 8,225,392	209	$ 1,968
Victory Highway	$ 5,439,300	$ 7,239,894	180	$ 2,011
Victory Highway/Dawley Brook	$ 2,711,200	$ 3,608,700	49	$ 3,682
Warren Avenue/Park Drive	$ 857,400	$ 1,141,229	18	$ 3,170
Waterford	$ 2,151,800	$ 2,864,120	86	$ 1,665
Willerval/Tanglewood	$ 5,588,000	$ 7,437,820	376	$ 989

[1] All costs presented in 2006 dollars.
[2] Industrial Lands

TABLE 1-8
SUMMARY OF THE IMPLEMENTATION SCHEDULE
FOR THE IMPROVEMENTS TO THE
NORTH SMITHFIELD WASTEWATER COLLECTION SYSTEM

	Implementation Year	Priority	Failed ISDS	Water (1) Quality Benefits	Growth Area
Great Road East	2009	High	X	X	
Greene Street	2009	High	X	X	
Lamoureux Boulevard	2019	Low		X	
North Smithfield Industrial Park	2009	High		X	X
Park View	2014	Medium	X	X	
Providence Pike No. 1	2014	Medium	X	X	
Providence Pike No. 2	2019	Low	X	X	
St. Paul	2009	High	X	X	X
Victory Highway	2019	Low	X	X	X
Victory Highway/Dawley Brook	2014	Medium	X	X	
Warren Avenue/Park Drive	2009	High	X	X	
Waterford	2014	Medium	X	X	
Willverval/Tanglewood	2019	Low	X	X	

with the recent increase in sewered neighborhoods, the Town does not have a large enough user base to comfortably support a significant increase in the debt service related to the Wastewater Enterprise Fund. As a true Enterprise Fund, there are no property tax contributions to this fund, and actual sewer customers only are billed.

Unfortunately, neglect or improper operation on the part of the property owner, along with unsatisfactory site conditions, can lead to early failure of the on-site system. Failing septic systems can threaten the health of the residents and adversely impact the environment.

The Town must first adopt rules and regulations establishing a Wastewater Management District for all systems outside of the sewered areas. As part of the Ordinance, a Wastewater Management Commission must be formed to administrate the rules and regulations of the Wastewater Management District.

Information Management

Once the Town adopts an ISDS Wastewater Management Plan, provisions are to be made to manage the information in an effective way. Currently, the Town has no data on the existing ISDS system. Information such as plat, lot, owner, address, owner's address, date of pumping and hauler's name should be collected.

The data collection can begin by identifying each non-sewer user, which can provide the basic data. This data can be cross-referenced into the tax records to aid in the information database. As inspection reports are returned to the Planning Department, the additional data, such as system type, system condition, date of pumping and hauler's name, can be added.

As part of the Plan, over the next five year period each of the septic systems will need to be inspected to determine the operating condition of the system. From the inspection results, the homeowner will then be required to take the appropriate action. All cesspools are to be considered to be malfunctioning systems and will be required to be replaced with an on-site wastewater system that conforms with current state and local standards within twelve (12) months after the sale of a property, or within five (5) years of the date of the first maintenance inspection (whichever comes first).

Inspections

ISDS inspections should be conducted in accordance with Septic System Check-Up: The Rhode Island Handbook for Inspection, as published by the Rhode Island Department of Environmental Management. This guidance document provides a complete review of all ISDS concerns, including installation, maintenance and proper operation.

New installations, repairs and alterations are inspected by Rhode Island Department of Environmental Management, or the licensed designer. As such, for these items, it would be redundant for the Town to participate in the inspection process.

The purpose of inspections is to assess the current condition of the ISDS in order to determine:

a) what maintenance is required;
b) when the maintenance should be undertaken;
c) the date of the next inspection; and
d) the need for system upgrade or replacement.

Maintenance requirements shall be based upon inspection results. Information from the inspections will also be used to complete a town-wide ISDS inventory and to track system inspections, maintenance, and upgrades.

The inspections shall be conducted by a private, town-approved ISDS inspector. Town approved septic system inspector(s) shall determine the maintenance and pumping requirements for each ISDS based upon criteria outlined in RIDEM's handbook. In order for an inspector to be approved by the Town, he/she must satisfactorily complete a training course in inspecting methodology consistent with the use of the handbook. The Planning Department shall maintain a list of town-approved inspectors and make such list available to property owners for the purpose of arranging the inspection of their own ISDS.

Once inspected, the property owner will have an inspection report that details the ISDS condition, components, inspection schedule and maintenance requirements. The property owner shall assume all responsibility for hiring a septage hauler or maintenance contractor to complete the maintenance and inspection requirements contained in the ISDS inspection report within the time frame required. As proof of compliance, the property

owner shall submit a receipt for pumping and other documented system maintenance to the Town Planner within thirty (30) days of the date stipulated in the ISDS inspection report.

Education

The Town, through its Planning Department, shall establish a public education program to inform people about the findings, benefits, and goals of the on-site wastewater management. The education program shall include, at a minimum:

- Proper inspection, operation and maintenance of ISDS.
- Operation and management framework of the program.
- Proper disposal of hazardous waste, including household hazardous waste.
- Water conservation.
- Protection of sensitive resources.
- Use of environmentally sensitive cleaning products.
- Use of alternative and innovative septic systems and associated technologies.
- Availability of financial assistance.
- Costs to homeowners to ensure compliance with a good operating system.

TOWN OF NORTH SMITHFIELD,
RHODE ISLAND
WASTEWATER MANAGEMENT FACILITIES PLAN
PUBLIC HEARING
Date:
October 10, 2007
Time:
7:00 P.M.
Place:
Kendall Dean School
83 Greene Street
North Smithfield,
Rhode Island
Purpose:

To review the funding of the Town's Wastewater Management Facilities Plan. The Hearing is being held in compliance with the Rhode Island Department of Environmental Management-Division of Water Resources.

The Final Draft Wastewater Management Facilities Plan can be reviewed Monday through Friday (9:00 AM to 4:00 PM) at the Memorial Town Building, Wastewater Department, Main Street, North Smithfield, Rhode Island.

THE TOWN OF NORTH SMITHFIELD

SEWER COMMISSION

PUBLIC HEARING ON FACILITY PLAN
&
REGULAR MEETING

WEDNESDAY – OCTOBER 10, 2007

7:00 PM

KENDALL-DEAN SCHOOL

AGENDA

PUBLIC HEARING ON FACILITY PLAN

1.) FACILITY PLAN – Geremia & Associates

REGULAR MEETING

1.) APPROVAL OF MINUTES
2.) REPORT FROM SUPERINTENDENT
3.) COMMERCIAL DEVELOPMENT FEES
Discussion With Geremia & Associates
4.) KENNETH TOUSIGNANT-Sewer Failure
191 School Street
5.) PROCEDURE FOR NEW CONNECTION TO SEWER
Diane Vadenais – Review Correspondence
6.) CORRESPONDENCE AND COMMUNICATIONS
7.) OLD BUSINESS
8.) NEW BUSINESS
9.) ADJOURN

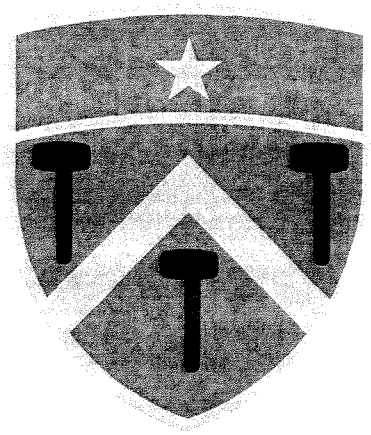
POSTED 10/4/07

TOWN OF NORTH SMITHFIELD

WASTEWATER MANAGEMENT FACILITIES PLAN

FOR THE

NORTH SMITHFIELD SEWER COMMISSION



PUBLIC HEARING
OCTOBER 10, 2007

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
272 West. Exchange St., Suite 201, Providence, RI 02903-1061
Phone: 401-454-7000 • Fax: 401-454-7415

1.0 EXECUTIVE SUMMARY

1.1 PLAN OVERVIEW

This Facilities Plan, prepared for the Town of North Smithfield, is a comprehensive study addressing both present and future needs of the Town's wastewater collection system. The Facilities Plan is an investigation into the present and future adequacies in the collection system. The study area includes the entire Town of North Smithfield. The study was completed according to the requirements of the State Revolving Loan Program established and managed by the R.I. Department of Environmental Management.

Wastewater generated by the Town is serviced by the Woonsocket Regional Wastewater Treatment Facility. The Town of North Smithfield entered into an agreement with the City of Woonsocket on 7 December 1977 for the treatment and disposal of wastewater generated by the Town. The agreement indicates that the cost disbursement for capital expenses are proportioned based on percentages of total design flow. Operating costs for the Town of North Smithfield, including maintenance, repairs, supplies, and administration are based upon the actual metered flow from either the Alice Avenue Metering Station or the Elizabeth Avenue Metering Station, and water usage records for units that do not pass through the metering station, and are then proportioned based on the total flow treated by the Facility.

1.2 EXISTING CONDITIONS

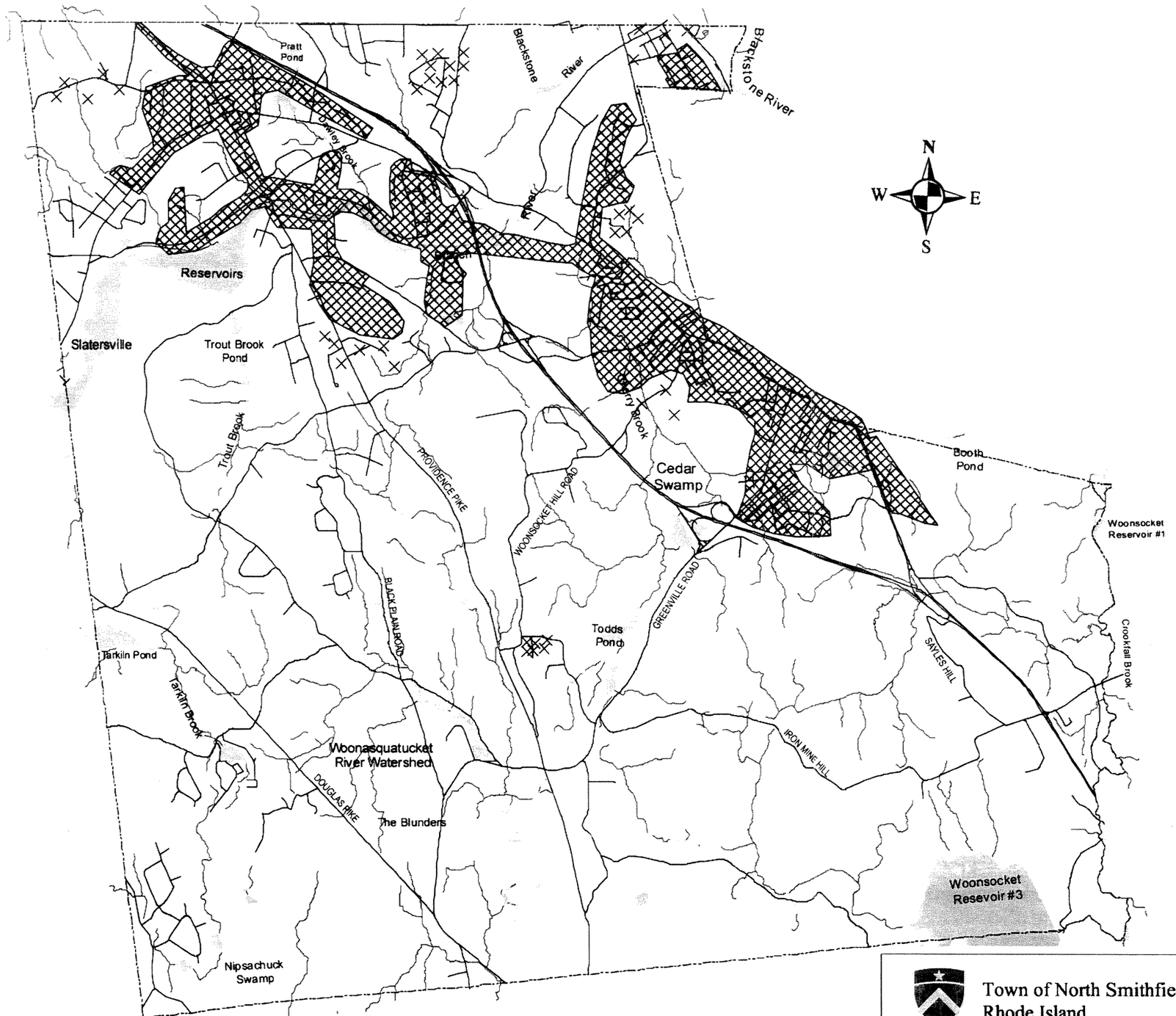
Fifty-one percent (51%) of the residents of the Town are serviced by individual sewage disposal systems, while the remaining forty-nine percent (49%) are serviced by the municipal wastewater collection system. The North Smithfield Sewer System discharges directly to the Woonsocket Regional Wastewater Collection System located in the vicinity of Edward Street at the Blackstone River in the City of Woonsocket. The eastern section of Town is serviced by the Union Village Interceptor and the western section of Town is serviced by the Branch River Interceptor. The North Smithfield Interceptor conveys the majority of the wastewater generated by the North Smithfield users to the Woonsocket system. The confluence of the three major interceptors occurs in the vicinity of Brookside Drive and Cherry Brook.

Figure 1-1 shows the existing sewered areas within the Town of North Smithfield and Figure 1-2 depicts the interceptors and lateral sewers. The system consists of 13 miles of lateral and intercepting sewers. The collection system does not have bypasses or overflows installed, and the system does not have combined sewer overflows. The lateral system contains 5.5 miles of 8-inch diameter clay pipes, 3.5 miles of 8-inch diameter polyvinyl chloride pipes, 0.5 miles of low pressure sewers, and 0.2 miles of 4-inch ductile iron force main and one pumping station. The interceptor sewers consist of 4.4 miles of 10-inch through 24-inch diameter clay pipes, 1.6 miles of 30-inch diameter reinforced concrete pipe, and 0.3 miles of 10-inch and 20-inch diameter ductile iron force mains, eight (8) pump stations and two flow metering stations.

There are 2,122 on-site disposal systems in the Town of North Smithfield, and the majority of these systems are located in the Slatersville Reservoir groundwater recharge area and the watershed area for the Woonsocket Reservoirs (Figure 1-3). Many systems are substandard, beyond their intended life expectancy, and most are not maintained on a periodic basis. A Wastewater Management District is proposed for implementation that will call for the inspection, repair and replacement of individual sewage disposal systems to prevent non-source pollution of the groundwater.

The construction, alteration and repair of ISDS systems are regulated by RIDEM's Division of Water Resources in the Rules and Regulations Establishing Minimum Standards Relating to Location, Design, Construction and Maintenance of Individual Sewage Disposal Systems. These rules state that all installations, alterations and repairs must be approved, in writing, by the Division. In this manner, the Division can inspect and keep track of all ISDS installations and repairs. The review of the ISDS records revealed that 102 system failures were reported between 2000 - 2005, and that the individual owners made the necessary repairs to be in compliance with State and local regulations. Figure 1-4 illustrates the location of these failures and repairs.

They are generally considered to be two ways in which an ISDS system can fail. In the first circumstance, the leaching field does not operate, meaning that water cannot pass through the system. The system eventually surcharges, or backs up into the house. In the second instance, the system drains too freely, causing untreated sewage to percolate to the groundwater. In each case of failure, there may be several factors which contribute to the system not operating properly. For example, soils that drain poorly cannot pass large volumes of water. Conversely, soils which drain excessively may result in poor wastewater treatment and short-circuit to the surface or groundwater table. Population density is another factor. Areas which have a high



Legend

Existing Sewer Service Area *

On site ISDS Problem Area Identified From Comprehensive Plan

** Map shows approximate limits of existing, approved, and proposed sewer services. Some streets and sections within the delineated areas may not be on sewers.*

This map was prepared for the inventory of real property within the Town of North Smithfield. Users of this tax map are hereby notified that the public primary information sources, including record deeds and plats, should be consulted for the verification of the information contained on this map. The Town of North Smithfield and its mapping contractors assume no legal responsibility for the information contained herein.

Base-map and hydrographic features were provided by Rhode Island GIS as 1"=400' features derived from the 1997 National Grid USA/RIDOT Orthophoto Project.

Updated: September, 2003

APPLIED GEOGRAPHICS, INC.
Empowering People with Spatial Solutions

Town of North Smithfield
Rhode Island

Figure 1-1

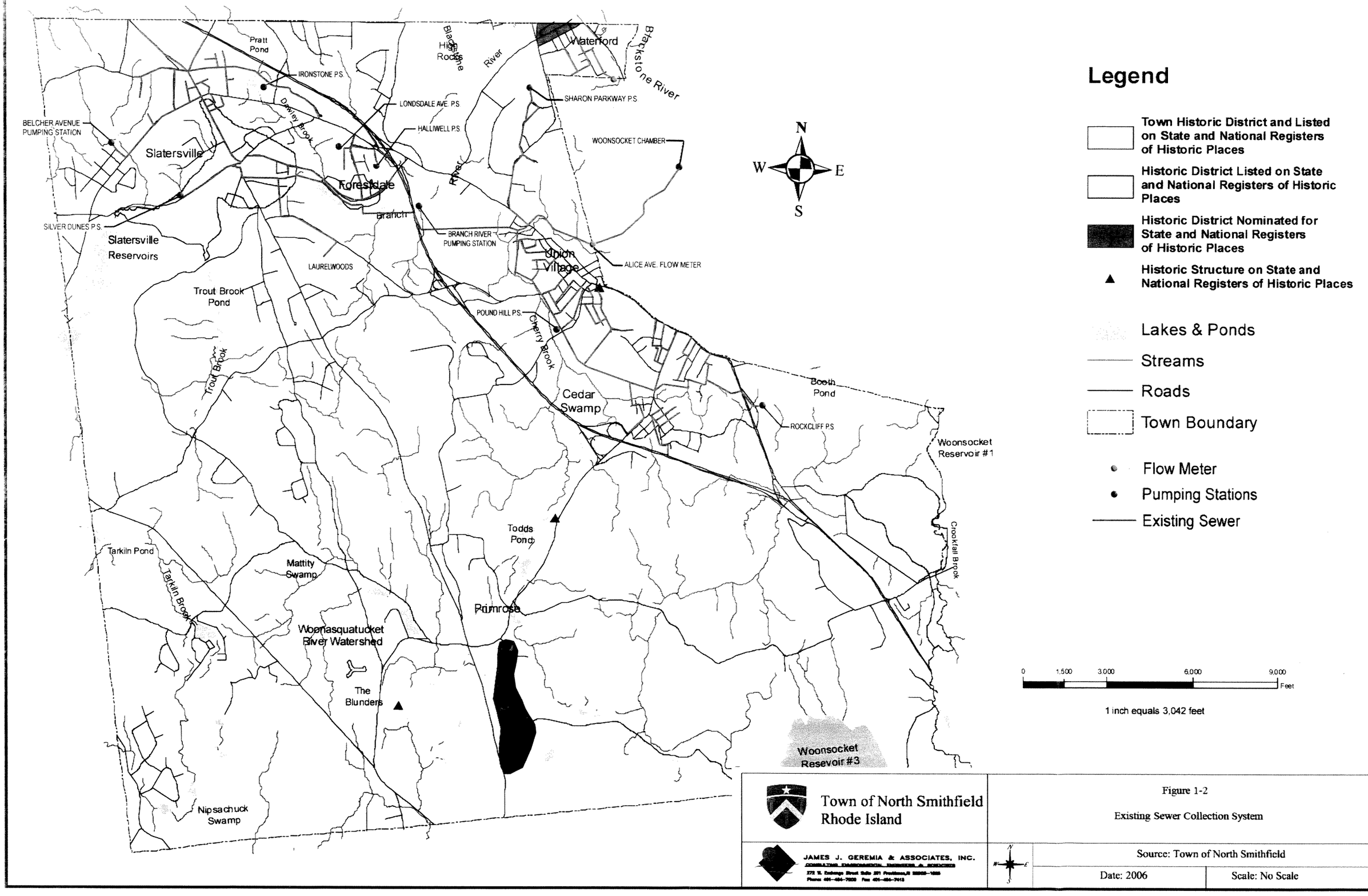
EXISTING SEWER AREA

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
272 N. Exchange Street Suite 201 Providence,RI 02903-7405
Phone: 401-454-7000 Fax: 401-454-7416

Source: Town of North Smithfield

Date: 2006

Scale: No Scale



Town of North Smithfield
Rhode Island

Figure 1-2

Existing Sewer Collection System

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
372 S. Exchange Street Suite 201 Providence, RI 02903-1035
Phone: 401-454-7200 Fax: 401-454-7415

Source: Town of North Smithfield

Date: 2006

Scale: No Scale

Legend

- Community Wells
- Non-Community Wells
- Groundwater Reservoir
- Groundwater Recharge Area
- Water Supply Basin Boundary
- flood
- EPA - CERCLIS Site
- EPA - CERCLIS Superfund Site
- Town Boundary
- Streets
- Lakes & Ponds
- Streams

Town of North Smithfield
Rhode Island

Figure 1-3

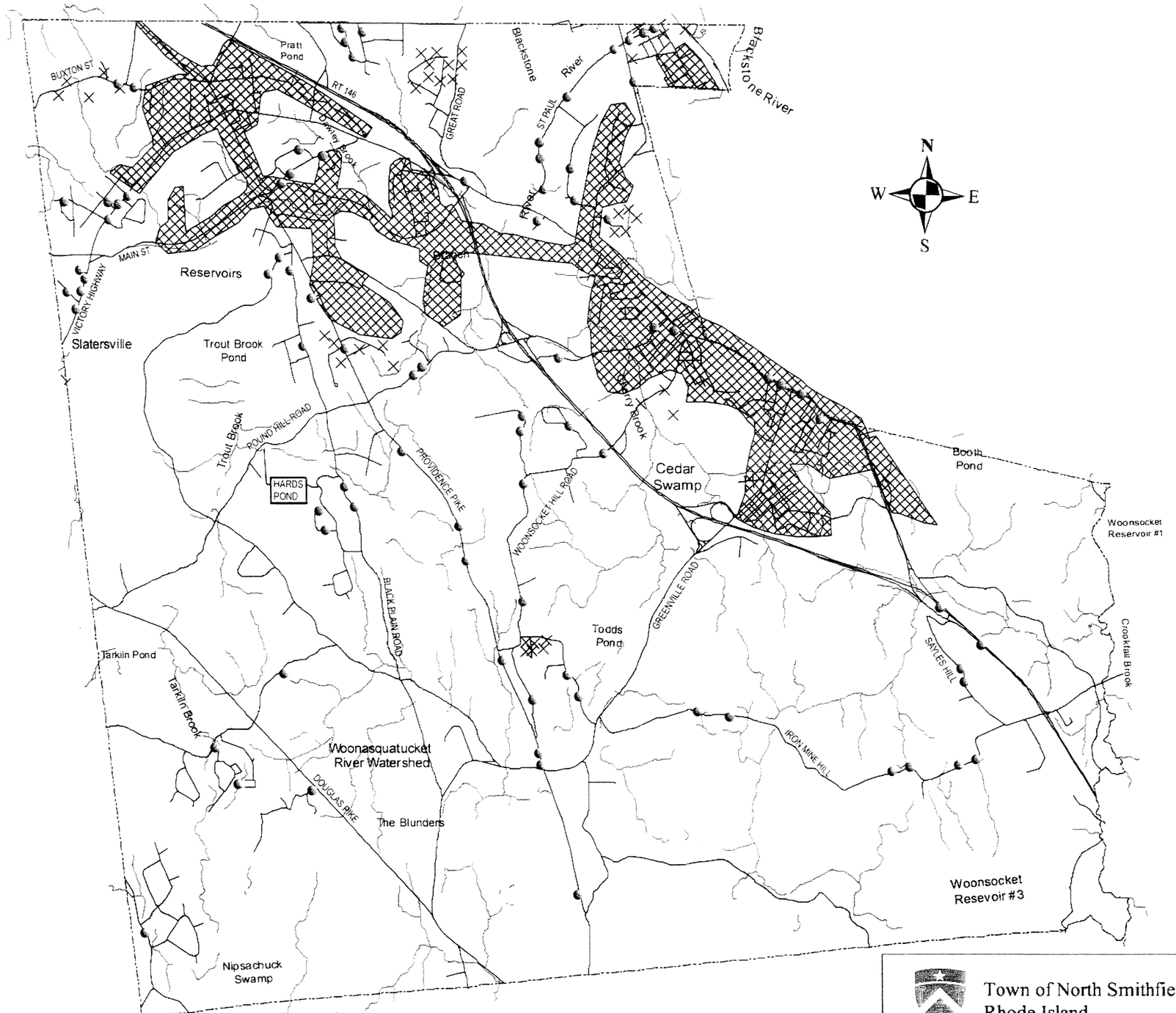
WATER RESOURCES

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
272 W. Exchange Street Suite 201 Providence,RI 02903-1085
Phone: 401-454-7000 Fax: 401-454-7418

Source: Town of North Smithfield

Date: 2006

Scale: No Scale



Legend

- Existing Sewer Service Area *
- On site ISDS Problem Area Identified From Comprehensive Plan
- Onsite ISDS Problem Area March 19, 2006

** Map shows approximate limits of existing, approved, and proposed sewer services. Some streets and sections within the delineated areas may not be on sewers.*

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Updated: September 2003

APPLIED GEOGRAPHICS, INC.

Town of North Smithfield
Rhode Island

Figure 1-4

ISDS FAILURES

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
272 W. Exchange Street Suite 201 Providence, RI 02903-1089
Phone: 401-454-7000 Fax: 401-454-7415

Source: Town of North Smithfield

Date: 2006

Scale: No Scale

concentration of residences over a small land area may experience oversaturation of ISDS effluent in the soil, particularly in wetland areas. High groundwater will also restrict a soil's ability to disperse and treat wastewater.

An examination of the soils where the failures have occurred finds they are very permeable soils. These soils have the potential to cause groundwater pollution, slowly permeable soils having a potential for ISDS failures, soils with a seasonally high water table located within 1.5 to 3.5 feet from the surface, and soils consisting of topography with slopes greater than 15 percent and shallow bedrock. The major areas of failure within the Slatersville Reservoir groundwater recharge area (as presented in Figure 1-4) are as follows: Buxton Street, Victory Highway, Greene St. Area, Tanglewood, Waterford area, St. Paul area, Great Road, and Providence Pike area from the Slatersville Reservoir to Pound Hill Road, Route 146 and Sayles Road. There were also areas of on-site disposal failures along Iron Mine Hill Road, Sayles Hill Road and south of Pound Hill Road, which are located within the watershed area of Woonsocket Reservoir.

The continuation of sewering the Slatersville Reservoir groundwater recharge area will improve the quality of the reservoir, groundwater, and adjacent wetlands with the elimination of leaching field effluent containing pathogenic bacteria and viruses, nitrates, phostates and synthetic organic chemicals from septic tank additives and household chemicals. There were 102 ISDS reported to have failed in accordance with DEM records and 64 of these systems are within the Slatersville Reservoir groundwater recharge area. The individual sewage disposal systems predate state-enforced siting and design standards, and have approached their expected life span. In addition, the majority of dwelling with ISDS failures are served by individual wells as a source of portable water supply.

Zoning, along with land use and planning, are important factors in ISDS wastewater management. Zoning, however, establishes the concentration of domestic dwellings in local areas. In areas of concern, this concentration may contribute to soil saturation of groundwater and water quality. Proper planning of zoning regulations can prevent potential ISDS problems.

Residential areas can be generally described as our basic lot sizes: 10,000 square feet, 20,000 square feet, 40,000 square feet and 80,000 square feet.

The zoning map is utilized as a tool to evaluate dense concentrations of residential development. Areas designated R-10 and R-20 reflect small lot sizes.

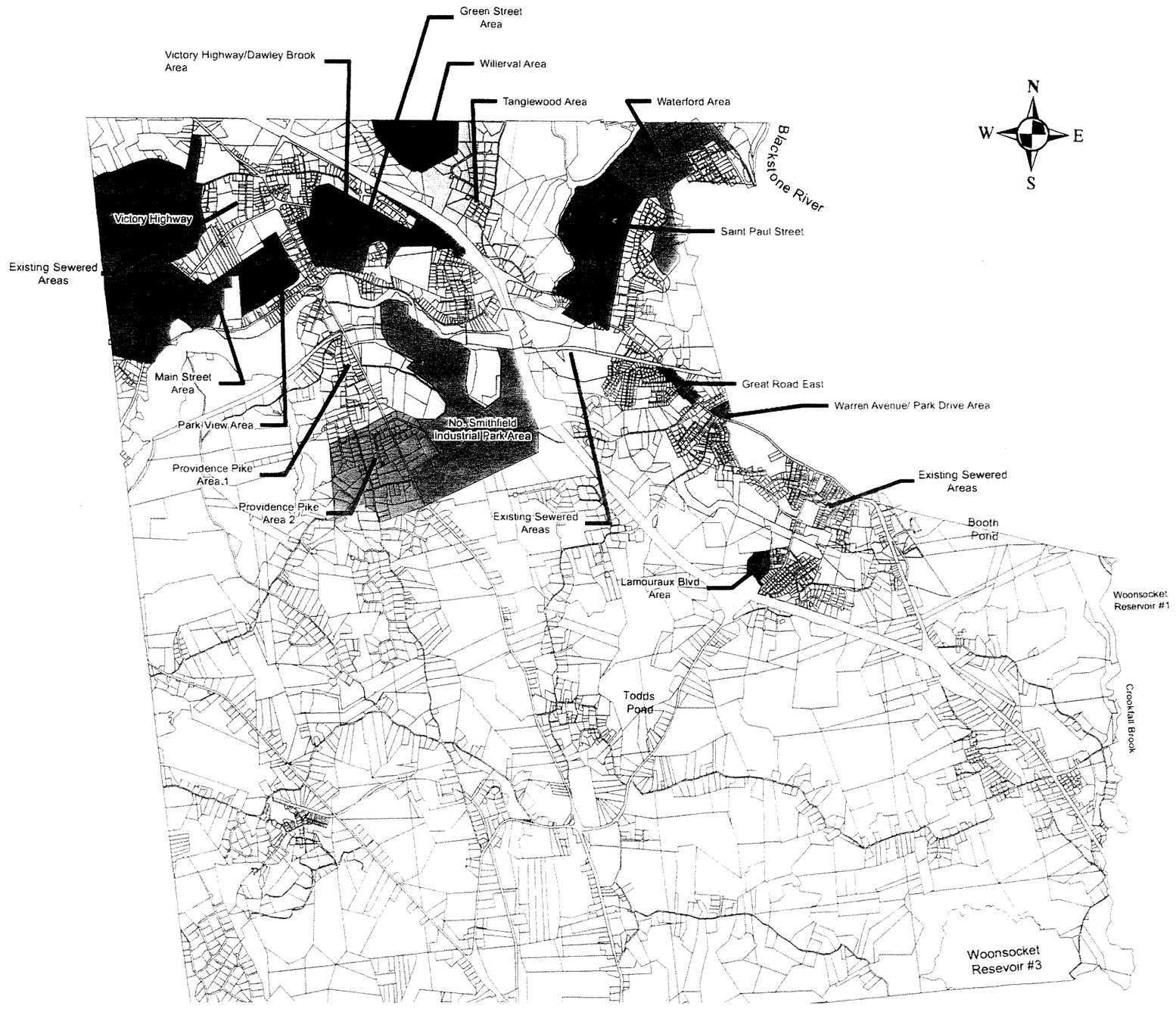
Alternatively, newer developments currently being planned which may potentially experience septic system difficulties can be zoned to help prevent such failures. In those newly developed areas that have been restricted by zoning regulations which classify the area as R-80 (one dwelling unit at 80,000 square feet), such requirements, along with the current State ISDS requirements, greatly reduce the potential of septic system failure. The zoning requirement practically assures ample soil area for leach field distribution systems, and therefore, lessens the chances of soil saturation with ISDS effluent. It is clear, then, that proper and careful zoning of undeveloped land areas can help prevent future septic system failures in such areas.

For those areas where there is less dense development, it is more cost effective to establish a Wastewater Management District to ensure that the groundwater quality is maintained. In Section 6 of this Facilities Plan, the mechanism necessary for the Town to adopt and implement a Wastewater Management Program will be provided.

The Facilities Plan will identify those areas that are to be added to the Sewer District and those areas that are to remain on Individual Sewage Disposal Systems.

1.3 FUTURE SEWERED AREA

The Town of North Smithfield will continue to increase in sewer service population over the next twenty years. Areas that have been defined as future service areas are depicted in Figure 1-5 The future service area is adjacent to the existing areas with sewers and is within the groundwater recharge area of the Slatersville Reservoir. Reviews of the Department of Environmental Management's records for Individual Sewer Disposal Systems for the past five years and discussions with Town officials revealed that there have been failures of Individual Sewer Disposal Systems in the future areas, as depicted in Figure 1-4. The remaining areas without sewers were evaluated and based on the sparsely located dwellings, it was determined that a Wastewater Management District be established to prevent Individual Sewer Disposal System problems and to preserve the water quality of groundwater and surface waters within the Town of North Smithfield. The Wastewater Management District will control the repair, replacement and maintenance of Individual Sewer Disposal Systems within the newly formed District.



1 inch equals 3,208 feet

Town of North Smithfield
Rhode Island

Figure 1-5

FUTURE SEWER SERVICE AREA

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS
272 W. Exchange Street Suite 201 Providence,RI 02903-1035
Phone: 401-454-7000 Fax: 401-454-7415

Source: Town of North Smithfield

Date: 2006

Scale: No Scale

It is assumed that 100 percent of a future service area will have sewer lines at build-out. Table 1-1 indicates that the population with sewers will reach 10,148 in the year 2025.

TABLE 1-1
EXISTING AND FUTURE POPULATIONS WITH SEWERS

	2005	2010	2015	2020	2025
Population	5,168	6,961	8,023	9,085	10,148
Dwelling Units	1,980	2,668	3,074	3,481	3,888

The future service area consists of soils that have constraints such as:

- Slow permeability in excess of 40 minutes per inch.
- Seasonally high water table located between 1.5 to 3.0 feet from the surface.
- Shallow bedrock between 1 to 3.0 feet from the surface.

In accordance with the Department of Environmental Management's regulations these soils are not considered suitable for Individual Sewer Disposal Systems.

In accordance with the recommendations of the Comprehensive Plan and the soil characteristics, the areas of the Town listed below in Table 1-2 will constitute the future sewer areas. The Town should monitor growth patterns, environmental conditions, development proposals, and availability of construction funding when evaluating sewer line extensions for these areas.

TABLE 1-2
PROJECTED FUTURE AREAS FOR SEWER EXTENSION

Great Road East	St. Paul
Greene Street	Victory Highway
Lamoureux Boulevard	Victory Highway/Dawley Brook
North Smithfield Industrial Park	Warren Avenue/Park Drive
Park View	Waterford
Providence Pike No. 1	Willerval/Tanglewood
Providence Pike No. 2	

1.4 FUTURE WASTEWATER FLOWS

In order to compute the future wastewater flows, the following assumptions are made based on a realistic, but conservative approach:

- Present residential per dwelling unit wastewater flow selected for the computation is equal to 180 GPD per dwelling unit, based on the sewer flows obtained from the North Smithfield Sewer Department.
- Based on the existing plumbing code that promotes water conservation methods, it will continue to result in the stabilization of water consumption.
- Future residential per dwelling unit wastewater flow will be based on 300 GPD.
- Wastewater flows for Silver Pines, Rockcliff Farm, Laurel Woods, Graves and Slatersville Mill Developments are based on design flow data from each entity.
- Future infiltration will be increased by 65 GPD (25 GPD x 2.61 persons per dwelling unit) for the future dwellings.
- Future inflow will remain at the current level.
- Peak flow factor for future residential, industrial and commercial flows is based on flow records from TR-16.
- Future industrial and commercial flow is based on 1,000 GPD per acre.

The summary of the present and estimated future flows are presented in Table 1-3.

TABLE 1-3
SUMMARY OF ANTICIPATED FUTURE WASTEWATER FLOWS
FOR THE TOWN OF NORTH SMITHFIELD

	2005		2025	
	Average Daily Flow (MGD)	Peak Hourly Flow (MGD)	Average Daily Flow (MGD)	Peak Hourly Flow (MGD)
Residential/Commercial	0.431	1.078	0.995	2.488
Industrial	0.046	0.115	0.218	0.575
Infiltration	0.287	0.287	0.360	0.360
Inflow	0.000	0.575	0.000	0.575
Totals	**0.764**	**2.055**	**1.573**	**3.998**

The increase in flow over the next 20 years (shown in Table 1-3) is from 0.764 MGD to 1.573 MGD. Currently, the average daily flow into the Woonsocket wastewater treatment facility from all sources is 8.35 MGD, that is less than the plant's design flow of 16.05 MGD. Therefore, the average increase of 0.809 MGD is not anticipated to have an adverse impact on the proper operation of the Woonsocket wastewater treatment facility. Furthermore, of the 16.05 MGD design flow, 3.0 MGD is allotted to North Smithfield based on the Intermunicipal Agreement. The total flow from the Town of North Smithfield in the year 2025 is anticipated to be 1.573 MGD, or slightly more than one-half of the design flow allotment to North Smithfield.

1.5 FUTURE WASTEWATER LOADINGS

The residential and commercial waste load contributions for the year 2025 was computed by first making the assumption that per capita waste loads of suspended solids and BOD_5 in the regional system are essentially equal to the nationwide average per capita loadings of these constituents. These average concentrations for the residential and commercial sources are 0.17 pounds of BOD_5 per capita per day and 0.20 pounds of suspended solids per capita per day. These averages, along with previously computed connected population figures, were then compared to minimum design standards for influent BOD5 and TSS. These computer values were less than the minimum design standard of 250 mg/l of BOD and TSS. Therefore, the results presented in Table 1-4 reflect an influent concentration of 250 mg/l.

TABLE 1-4
AVERAGE FUTURE WASTE LOADS AND CONCENTRATIONS
(Residential, Commercial and Industrial)

Year	BOD_5 Load (lb/d)	TSS Load (lb/d)	BOD_5 Conc. (mg/l)	TSS Conc. (mg/l)
2005 [1]	1,592	1,592	250	250
2025 [2 3]	6,255	6,255	250	250

1 Based upon actual flow conditions and concentrations of 250 mg/l.
2 Based upon 250 mg/l influent concentration of BOD_5 and TSS.
3 Based upon the contractual flow of 3.0 MGD with the City of Woonsocket.

1.6 COLLECTION SYSTEM

Current capacities of the interceptor segments were examined with regards to their ability to meet the present and future wastewater flows through the 2025 planning period. Table 1-5 presents these findings.

1.7 FINANCIAL IMPACTS OF THE FUTURE SEWER AREAS

As part of this Wastewater Facilities Plan, financial impacts for the wastewater collection system have been considered. This review includes larger capitalization projects, and conforms to financial managements expressed in the Community
Comprehensive Plan.

Operational and Maintenance Improvements

Operational and Maintenance improvements are typically smaller scale, maintenance related projects which are performed during the course of the fiscal year. The Town identifies various projects and improvements to complete for the period July 1 through June 30 of each year during the budget preparation process.

Since these smaller projects do not require the sale of municipal bonds, funding (revenue) is provided through yearly user fees. Each user will be responsible for its proportional share of these cost improvements.

The Town user charge system is structured such that the revenue is equal to the expenses. At this time, the annual sewer charge per dwelling unit is $319 per year.

For those projects where all users will benefit, the system improvement cost will be distributed throughout the entire system through the annual sewer charge.

Capitalized Improvements

As defined by the Town Finance Department, capitalized improvement shall be those projects of a larger magnitude which typically require the sale of municipal bonds to fund the related improvements. Funding of the

TABLE 1-5 FUTURE INTERCEPTOR SEGMENT ADEQUACY ANALYSIS			
INTERCEPTORS	**MIN. CAPACITY (MGD)**	**PEAK DISCHARGE (MGD)**	**COMMENTS**
North Smithfield	14.52	3.968	Adequate
Union Village			
Segment 1	0.62	0.076	Adequate
Segment 2	0.90	0.101	Adequate
Segment 3	1.26	0.247	Adequate
Segment 4	2.29	0.366	Adequate
Segment 5	3.72	0.603	Adequate
Branch River			
Segment 1	8.01	2.196	Adequate
Segment 2	5.61	2.196	Adequate
Segment 3	2.54	0.606	Adequate
Segment 4	1.78	0.606	Adequate
South Union Village	2.29	0.113	Adequate
Great Road	2.82	0.170	Adequate
Mendon Road	2.99	0.170	Adequate
PUMP STATIONS	**MIN. CAPACITY (MGD)**	**PEAK DISCHARGE (MGD)**	**COMMENTS**
Branch River	2.74	2.146	Adequate
Pound Hill	1.58	0.603	Adequate
Sharon Parkway	0.22	0.020	Adequate
Lorraine	0.058	0.030	Adequate
Halliwell	0.062	0.031	Adequate
Ironstone	0.158	0.067	Adequate
Belcher Avenue	0.266	0.182	Adequate
Silver Pines	0.288	0.134	Adequate
Rockcliff Farms	0.259	0.071	Adequate

Town of North Smithfield improvements to the wastewater collection system are paid through sewer bonds. Yearly service for the original infrastructure has, and will continue to be paid via the user charge system.

It is anticipated that the yearly debt service for future capitalized improvement to the collection system will be via third party specific benefit assessments. For example, property owners in the Victory Highway Area will be required to pay for those wastewater improvements which specifically provides them a benefit.

The new sewer users would be responsible for the cost directly related to their service area. The anticipated cost and dwellings to be serviced are summarized in Tables 1-6 and 1-7. Table 1-8 summarizes the implementation schedule and rankings of the sewer collection system improvements.

1.8 FUTURE WASTEWATER MANAGEMENT DISTRICT

On-Site Systems

Individual disposal systems will continue to play an important role in the Town's overall Wastewater Management Plan. The adoption of this *Facilities Plan for Wastewater Management* will essentially provide a long-range (i.e., twenty (20) year) "Master Plan" for sanitary sewer conveyance and treatment systems. The Facilities Plan supported the premise that a WWMD is an appropriate alternative for addressing individual sewage disposal systems (ISDS) problems in certain parts of the Town. While the "ideal" solution to ISDS problems may be the installation of conventional public sanitary sewers, the WWFP included evaluations as to the economic and physical factors related to sewering existing neighborhoods. These factors included the "cost per affected resident" (typically paid through an assessment program wherein the benefitting property owners pay the entire cost) and the cost to the overall Enterprise Fund for infrastructure improvements necessary to handle the increased flows (i.e., increasing the physical capacity of a pump station, or the treatment facilities). The capital costs associated with system-wide infrastructure improvements would typically be distributed equally to all units throughout the Town that are connected to the sewer system.

Given the absence of Federal and/or State grant monies, the aspect of defined WWMD's will be a viable alternative when compared to upgrading either wastewater collection system or the treatment facility. Even

TABLE 1-6
SUMMARY OF THE TOTAL PROBABLE PROJECT COSTS FOR THE RECOMMENDED IMPROVEMENTS TO THE WASTEWATER COLLECTION SYSTEM

SERVICE AREA	TOTAL COST
Great Road East	$ 1,696,200
Greene Street	1,520,900
Lamoureux Boulevard	98,600
North Smithfield Industrial Park	3,097,600
Park View	908,600
Providence Pike No. 1	4,216,700
Providence Pike No. 2	2,248,500
St. Paul	6,179,700
Victory Highway	5,439,300
Victory Highway/Dawley Brook	2,711,200
Warren Avenue/Park Drive	857,400
Waterford	2,151,800
Willerval/Tanglewood	5,588,000
TOTALS	**$ 36,714,500**

All costs presented in 2006 dollars.

TABLE 1-7
SUMMARY OF THE ANTICIPATED COST PER DWELLING FOR THE IMPROVEMENTS TO THE WASTEWATER COLLECTION SYSTEM

	TOTAL COST [1]	20 YEAR BOND 3% INTEREST	EQUIVALENT DWELLING UNITS	ANNUAL COST / DWELLING UNIT
Great Road East	$ 1,696,200	$ 2,257,700	31	$ 3,641
Greene Street	$ 1,520,900	$ 2,024,370	60	$ 1,687
Lamoureux Boulevard	$ 98,600	$ 131,240	3	$ 2,187
North Smithfield Industrial Park	$ 3,097,600	$ 4,123,011	N/A	$ N/A [2]
Park View	$ 908,600	$ 1,209,327	33	$ 1,832
Providence Pike No. 1	$ 4,216,700	$ 5,612,572	160	$ 1,754
Providence Pike No. 2	$ 2,248,500	$ 2,992,830	99	$ 1,512
St. Paul	$ 6,179,700	$ 8,225,392	209	$ 1,968
Victory Highway	$ 5,439,300	$ 7,239,894	180	$ 2,011
Victory Highway/Dawley Brook	$ 2,711,200	$ 3,608,700	49	$ 3,682
Warren Avenue/Park Drive	$ 857,400	$ 1,141,229	18	$ 3,170
Waterford	$ 2,151,800	$ 2,864,120	86	$ 1,665
Willerval/Tanglewood	$ 5,588,000	$ 7,437,820	376	$ 989

[1] All costs presented in 2006 dollars.
[2] Industrial Lands

TABLE 1-8
SUMMARY OF THE IMPLEMENTATION SCHEDULE
FOR THE IMPROVEMENTS TO THE
NORTH SMITHFIELD WASTEWATER COLLECTION SYSTEM

	Implementation Year	Priority	Failed ISDS	Water Quality Benefits	Growth Area
Great Road East	2009	High	X	X	
Greene Street	2009	High	X	X	
Lamoureux Boulevard	2019	Low		X	
North Smithfield Industrial Park	2009	High		X	X
Park View	2014	Medium	X	X	
Providence Pike No. 1	2014	Medium	X	X	
Providence Pike No. 2	2019	Low	X	X	
St. Paul	2009	High	X	X	X
Victory Highway	2019	Low	X	X	X
Victory Highway/Dawley Brook	2014	Medium	X	X	
Warren Avenue/Park Drive	2009	High	X	X	
Waterford	2014	Medium	X	X	
Willverval/Tanglewood	2019	Low	X	X	

with the recent increase in sewered neighborhoods, the Town does not have a large enough user base to comfortably support a significant increase in the debt service related to the Wastewater Enterprise Fund. As a true Enterprise Fund, there are no property tax contributions to this fund, and actual sewer customers only are billed.

Unfortunately, neglect or improper operation on the part of the property owner, along with unsatisfactory site conditions, can lead to early failure of the on-site system. Failing septic systems can threaten the health of the residents and adversely impact the environment.

The Town must first adopt rules and regulations establishing a Wastewater Management District for all systems outside of the sewered areas. As part of the Ordinance, a Wastewater Management Commission must be formed to administrate the rules and regulations of the Wastewater Management District.

Information Management

Once the Town adopts an ISDS Wastewater Management Plan, provisions are to be made to manage the information in an effective way. Currently, the Town has no data on the existing ISDS system. Information such as plat, lot, owner, address, owner's address, date of pumping and hauler's name should be collected.

The data collection can begin by identifying each non-sewer user, which can provide the basic data. This data can be cross-referenced into the tax records to aid in the information database. As inspection reports are returned to the Planning Department, the additional data, such as system type, system condition, date of pumping and hauler's name, can be added.

As part of the Plan, over the next five year period each of the septic systems will need to be inspected to determine the operating condition of the system. From the inspection results, the homeowner will then be required to take the appropriate action. All cesspools are to be considered to be malfunctioning systems and will be required to be replaced with an on-site wastewater system that conforms with current state and local standards within twelve (12) months after the sale of a property, or within five (5) years of the date of the first maintenance inspection (whichever comes first).

Inspections

ISDS inspections should be conducted in accordance with Septic System Check-Up: The Rhode Island Handbook for Inspection, as published by the Rhode Island Department of Environmental Management. This guidance document provides a complete review of all ISDS concerns, including installation, maintenance and proper operation.

New installations, repairs and alterations are inspected by Rhode Island Department of Environmental Management, or the licensed designer. As such, for these items, it would be redundant for the Town to participate in the inspection process.

The purpose of inspections is to assess the current condition of the ISDS in order to determine:

a) what maintenance is required;
b) when the maintenance should be undertaken;
c) the date of the next inspection; and
d) the need for system upgrade or replacement.

Maintenance requirements shall be based upon inspection results. Information from the inspections will also be used to complete a town-wide ISDS inventory and to track system inspections, maintenance, and upgrades.

The inspections shall be conducted by a private, town-approved ISDS inspector. Town approved septic system inspector(s) shall determine the maintenance and pumping requirements for each ISDS based upon criteria outlined in RIDEM's handbook. In order for an inspector to be approved by the Town, he/she must satisfactorily complete a training course in inspecting methodology consistent with the use of the handbook. The Planning Department shall maintain a list of town-approved inspectors and make such list available to property owners for the purpose of arranging the inspection of their own ISDS.

Once inspected, the property owner will have an inspection report that details the ISDS condition, components, inspection schedule and maintenance requirements. The property owner shall assume all responsibility for hiring a septage hauler or maintenance contractor to complete the maintenance and inspection requirements contained in the ISDS inspection report within the time frame required. As proof of compliance, the property

owner shall submit a receipt for pumping and other documented system maintenance to the Town Planner within thirty (30) days of the date stipulated in the ISDS inspection report.

Education

The Town, through its Planning Department, shall establish a public education program to inform people about the findings, benefits, and goals of the on-site wastewater management. The education program shall include, at a minimum:

- Proper inspection, operation and maintenance of ISDS.
- Operation and management framework of the program.
- Proper disposal of hazardous waste, including household hazardous waste.
- Water conservation.
- Protection of sensitive resources.
- Use of environmentally sensitive cleaning products.
- Use of alternative and innovative septic systems and associated technologies.
- Availability of financial assistance.
- Costs to homeowners to ensure compliance with a good operating system.

APPENDIX C

Public Hearing Transcript

WASTEWATER MANAGEMENT
FACILITIES PLAN

FOR THE
NORTH SMITHFIELD SEWER COMMISSION

PUBLIC HEARING TRANSCRIPT
OCTOBER 10, 2007

APPENDIX D

Intergovernmental Correspondence

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
HISTORICAL PRESERVATION & HERITAGE COMMISSION
Old State House • 150 Benefit Street • Providence, R.I. 02903-1209
TEL (401) 222-2678 FAX (401) 222-2968
TTY (401) 222-3700 Website www.preservation.ri.gov

10 June, 2007

Mr. James J. Geremia
Geremia and Associates Inc.
272 W. Exchange St. Suite 201
Providence, RI 02903

Re: Wastewater Facilities Plan
North Smithfield, RI

Dear Mr. Geremia:

The Rhode Island Historical Preservation and Heritage Commission staff has reviewed the information provided by you regarding the above-referenced project. The various project areas discussed in this plan are to varying degrees likely to contain significant archaeological sites. Even though the majority of the proposed work will take place in existing streets, important below-ground cultural resources may still be present beneath the level of disturbed soils. Environmental factors which increase the probability that Native American sites are present include the lack of modern ground disturbance, well-drained soils, and proximity to fresh water. It appears that many of the project segments cross archaeologically sensitive areas. It is also likely that historic resources, primarily those associated with Union Village, a National Register Historic District, may be present within the proposed areas of impact.

We therefore recommend that an archaeological assessment survey be conducted for each project area. This survey would evaluate the possibility that significant cultural resources are present and would make recommendations on the need for any further archaeological survey.

These comments are provided in accordance with Section 106 of the National Historic Preservation Act. If you have any questions, please contact Charlotte Taylor, Staff Archaeologist, or Richard Greenwood, Project Review Coordinator for this office.

Very truly yours,

Edward F. Sanderson
Executive Director
Deputy State Historic
Preservation Officer

cc: John Brown, NTHPO
Rae Gould, Nipmuc Nation

070710.02

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS

June 6, 2007

Mr. Edward F. Sanderson
Executive Director
Deputy State Historic Preservation Officer
Historical Preservation & Heritage Commission
Old State House
150 Benefit St.
Providence, RI 02903-1209

Re: Facilities Plan for Wastewater Management
Town of North Smithfield, Rhode Island

Dear Mr. Sanderson:

On behalf of the Town of North Smithfield, James J. Geremia & Associates, Inc. (JGA) is currently preparing a Facilities Plan for Wastewater Management for the Town. Enclosed, please find the draft of the Executive Summary (Section 1) and Section 5 which delineates the proposed future sewer areas for the Town.

We request that you review this information as required by the State Revolving Fund, in order to ensure that these future sewer improvements shall not adversely impact any concerns of the Historical Preservation & Heritage Commission. In doing so, please realize that the vast majority of all planned improvements shall be conducted within existing roadways which already contain underground utilities.

Should you have any questions, please do not hesitate to contact me at (401) 454-7000.

Very truly yours,

JAMES J. GEREMIA & ASSOCIATES, INC.

James J. Geremia, P.E.
Principal

Enclosure

cc: Manual Alvarez
Linda Jean Briggs
Arthur G. Zeman, P.E. (RIDEM)

NO SMITHFIELD\GC\LETTER TO FP REVIEWERS.wpd

272 W. Exchange Street, · Suite 201 · Providence, RI 02903-1025
Telephone: 401.454.7000 · Facsimile: 401.454.7415

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Field Office
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

July 11, 2007

Reference: Project: Wastewater management facilities plan; Location: North Smithfield, RI

James J. Geremia
James J. Geremia & Associates, Inc.
272 W. Exchange St., Suite 201
Providence, RI 02903-1025

Dear Mr. Geremia:

This responds to your recent correspondence requesting information on the presence of federally-listed and/or proposed endangered or threatened species in relation to the proposed activity(ies) referenced above.

Based on information currently available to us, no federally-listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area(s). Preparation of a Biological Assessment or further consultation with us under Section 7 of the Endangered Species Act is not required.

This concludes our review of listed species and critical habitat in the project location(s) and environs referenced above. No further Endangered Species Act coordination of this type is necessary for a period of one year from the date of this letter, unless additional information on listed or proposed species becomes available.

Thank you for your coordination. Please contact us at 603-223-2541 if we can be of further assistance.

Sincerely yours,

Anthony P. Tur
Endangered Species Specialist
New England Field Office

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS

June 8, 2007

Mr. Anthony P. Tur
Endangered Species Specialist
U.S. Department of the Interior
FISH AND WILDLIFE SERVICE
New England Field Office
70 Commercial St. - Suite 300
Concord, NH 03301-5087

Re: Facilities Plan for Wastewater Management
Town of North Smithfield, Rhode Island

Dear Mr. Tur:

On behalf of the Town of North Smithfield, James J. Geremia & Associates, Inc. (JGA) is currently preparing a Facilities Plan for Wastewater Management for the Town. Enclosed, please find the draft of the Executive Summary (Section 1) and Section 5 which delineates the proposed future sewer areas for the Town.

We request that you review this information as required by the State Revolving Fund, in order to ensure that these future sewer improvements shall not adversely impact any concerns of the Tribal Historic Preservation Office. In doing so, please realize that the vast majority of all planned improvements shall be conducted within existing roadways which already contain underground utilities.

Should you have any questions, please do not hesitate to contact me at (401) 454-7000.

Very truly yours,

JAMES J. GEREMIA & ASSOCIATES, INC.

James J. Geremia, P.E.
Principal

Enclosure

cc: Manual Alvarez
Linda Jean Briggs
Arthur G. Zeman, P.E. (RIDEM)

NO SMITHFIELD\GC\LETTER TO FP REVIEWERS.wpd

272 W. Exchange Street, · Suite 201 · Providence, RI 02903-1025
Telephone: 401.454.7000 · Facsimile: 401.454.7415

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Rhode Island Department of Transportation
ENGINEERING DIVISION
Two Capitol Hill, Rm. 226
Providence, RI 02903-1124
PHONE 401-222-2023
FAX 401-222-3006; TDD 401-222-4971

July 13, 2007

Mr. James J. Geremia, P.E.
JAMES J. GEREMIA & ASSOCIATES, INC.
272 West Exchange Street
Suite 201
Providence, RI 02903-1061

Subject: Facilities Plan for Wastewater Mangement
Town of North Smithfield, RI

Dear Mr. Geremia:

We are in receipt of your June 6, 2007 letter transmitting a draft copy of the subject plan for the Town of North Smithfield, RI. Upon review of the subject report it does not appear that there are any conflicts with ongoing or proposed roadway improvement projects within the foreseeable future. Currently the Department is about to begin Rehabilitation of the Main Street Bridge #446 (Over Route 146), and the Great Road Bridge #447 (over Route 146) later this summer. These bridges appear to be outside of the limits of your "Great Road East" project area.

Please note that any proposed sewer work within a state highway will require the approval of a Utility Permit from our Maintenance Division. We greatly appreciate the up front coordination, and the opportunity to comment on the Towns future work. Should you have any further questions, please contact this office.

Very truly yours,

Kazem Farhoumand, P.E.
Deputy Chief Engineer

RAS/cad

cc: Farhoumand, Fish, Moghadam, Parker, Smith, and File

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS

June 6, 2007

Mr. Edmund T. Parker, Jr., P.E.
Chief Engineer
Rhode Island Department of Transportation
Two Capitol Hill, Rm. 226
Providence, RI 02903-1124

Re: Facilities Plan for Wastewater Management
Town of North Smithfield, Rhode Island

Dear Mr. Parker:

On behalf of the Town of North Smithfield, James J. Geremia & Associates, Inc. (JGA) is currently preparing a Facilities Plan for Wastewater Management for the Town.

Enclosed, please find the draft of the Executive Summary (Section 1) and Section 5 which delineates the proposed future sewer areas for the Town.

We request that you review this information as required by the State Revolving Fund, in order to ensure that these future sewer improvements shall not adversely impact any concerns of the Department of Transportation. In doing so, please realize that the vast majority of all planned improvements shall be conducted within existing roadways which already contain underground utilities.

Should you have any questions, please do not hesitate to contact me at (401) 454-7000.

Very truly yours,

JAMES J. GEREMIA & ASSOCIATES, INC.

James J. Geremia, P.E.
Principal

Enclosure

cc: Manual Alvarez
Linda Jean Briggs
Arthur G. Zeman, P.E. (RIDEM)

NO SMITHFIELD\GC\LETTER TO FP REVIEWERS.wpd

272 W. Exchange Street. · Suite 201 · Providence, RI 02903-1025
Telephone: 401.454.7000 · Facsimile: 401.454.7415

State of Rhode Island and Providence Plantations

COASTAL RESOURCES MANAGEMENT COUNCIL
Oliver Stedman Government Center
4808 Tower Hill Road
Wakefield, RI 02879
(401) 783-3370

Michael M. Tikoian
Chairman

Grover J. Fugate
Executive Director

July 6, 2007

Mr. James J. Geremia
James J. Geremia & Associates, Inc.
272 West Exchange Street, Suite 201
Providence, RI 02903-1025

Re: **Proposed North Smithfield Wastewater Management Facilities Plan**

Dear Mr. Geremia:

Thank you for submitting the draft Executive Summary and Future Conditions sections of the proposed Town of North Smithfield Wastewater Management Facilities Plan ("Plan") dated April 2007. In conformance with the requirements of the *Rules and Regulations for the State Revolving Fund Program* (Appendix 1; Section 2) administered by the RIDEM, you have requested the Coastal Resources Management Council ("CRMC") to review the proposed Plan for conformance with the Coastal Resources Management Plan ("CRMP") and as to whether the Plan would pose any adverse impact to coastal resources of the state.

We have reviewed the draft sections and conclude that there will be no adverse impact to coastal resources, provided the proposed project is constructed, operated, and maintained in strict accordance with the state and EPA rules and regulations that govern such facilities. Please contact James Boyd of my staff should you have any questions concerning this determination.

Sincerely,

Grover J. Fugate, Executive Director
Coastal Resources Management Council

/lam

cc: Jeff Willis, CRMC Deputy Director
James Boyd, CRMC Coastal Policy Analyst
Arthur Zeman, RIDEM

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS

June 6, 2007

Mr. Grover J. Fugate
Executive Director
State of Rhode Island and Providence Plantations
COASTAL RESOURCES MANAGEMENT COUNCIL
Oliver H. Stedman Government Center
4808 Tower Hill Rd. - Suite 3
Wakefield, RI 02879-1900

Re: Facilities Plan for Wastewater Management
Town of North Smithfield, Rhode Island

Dear Mr. Fugate:

On behalf of the Town of North Smithfield, James J. Geremia & Associates, Inc. (JGA) is currently preparing a Facilities Plan for Wastewater Management for the Town. Enclosed, please find the draft of the Executive Summary (Section 1) and Section 5 which delineates the proposed future sewer areas for the Town.

We request that you review this information as required by the State Revolving Fund, in order to ensure that these future sewer improvements shall not adversely impact any concerns of the Coastal Resources Management Council. In doing so, please realize that the vast majority of all planned improvements shall be conducted within existing roadways which already contain underground utilities.

Should you have any questions, please do not hesitate to contact me at (401) 454-7000.

Very truly yours,

JAMES J. GEREMIA & ASSOCIATES, INC.

James J. Geremia, P.E.
Principal

Enclosure

cc: Manual Alvarez
Linda Jean Briggs
Arthur G. Zeman, P.E. (RIDEM)

NO SMITHFIELD\GC\LETTER TO FP REVIEWERS.wpd

272 W. Exchange Street, · Suite 201 · Providence, RI 02903-1025
Telephone: 401.454.7000 · Facsimile: 401.454.7415

Department of Administration
Division of Planning – Statewide Planning Program
One Capitol Hill
Providence, Rhode Island 02908-5870
(401) 222-6480

MEMORANDUM

To: James J. Geremia, P.E.
CC: Art Zeman, P.E. RI Department of Environmental Management
Subject: Request for State Guide Plan Consistency
Date: June 29, 2007
From: Nancy Hess, Principal Environmental Planner

Project: Facilities Plan for Wastewater Management Amendment – April 2007
Applicant: Town of North Smithfield

I reviewed your correspondence dated June 6, 2007 concerning amendments to the North Smithfield Regional Wastewater Treatment Facility pursuant to the request of James Geremia for consistency with the Rhode Island State Guide Plan (SGP). The amendment is consistent with the policies of infill and providing infrastructure support as needed for remediating existing water quality concerns and is consistent with the appropriate elements of the SGP related to land use, natural and water resources elements as citied below:

121- Land Use 2025

The purpose of this element is to guide future land use and development, as well as to guide the state and its agencies in activities directly or indirectly affecting land use. There is no conflict with this element since the expansion areas for the amendment are within the Urban Services Boundary.

161- Forest Resources Management Plan

The purpose of this element is to guide public and private decisions involving the use of trees and forestlands. There is no conflict with this element since the projected sites within the amendment will be contained within exiting paved r-o-ws and will not effect the management of the forest resources of the State.

162 - Rivers Policy and Classification Plan

The purpose of this element is to protect and enhance the quality and the use of Rhode Island's freshwater bodies. The regional treatment plant discharges into the Blackstone River under a permit issued by the RIDEM through the RIPEDS program. There is no conflict with this Element.

715 – Comprehensive Conservation and Management Plan for Narragansett Bay
731 – Rhode Island Nonpoint Source Pollution Management Plan

Both of these elements are being addressed together, as they are closely related in purposes. There is no conflict with these elements, as the regional treatment plant operates under a Rhode Island Pollutant Discharge Elimination Systems Permit. On-site septic systems are considered by this Element as a major source of nonpoint source pollution to Rhode Island's waters. The Amendment considers the formation of a Wastewater Management District and Commission for the long term management of these types of systems. There is no conflict with these Elements.

Thank you for the opportunity to comment on the plan. Should you have any questions about this review, please feel free to contact me.

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS

June 6, 2007

Ms. Nancy Hess
Principal Environmental Planner
Rhode Island Statewide Planning Program
One Capitol Hill
Providence, RI 02908

Re: Facilities Plan for Wastewater Management
Town of North Smithfield, Rhode Island

Dear Ms. Hess:

On behalf of the Town of North Smithfield, James J. Geremia & Associates, Inc. (JGA) is currently preparing a Facilities Plan for Wastewater Management for the Town.

Enclosed, please find the draft of the Executive Summary (Section 1) and Section 5 which delineates the proposed future sewer areas for the Town.

We request that you review this information as required by the State Revolving Fund, in order to ensure that these future sewer improvements shall not adversely impact any concerns of the State Guide Plan. In doing so, please realize that the vast majority of all planned improvements shall be conducted within existing roadways which already contain underground utilities.

Should you have any questions, please do not hesitate to contact me at (401) 454-7000.

Very truly yours,

JAMES J. GEREMIA & ASSOCIATES, INC.

James J. Geremia, P.E.
Principal

Enclosure

cc: Manual Alvarez
Linda Jean Briggs
Arthur G. Zeman, P.E. (RIDEM)

NO SMITHFIELD\GC\LETTER TO FP REVIEWERS.wpd

272 W. Exchange Street, • Suite 201 • Providence, RI 02903-1025
Telephone: 401.454.7000 • Facsimile: 401.454.7415

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS

June 6, 2007

Mr. Christopher J. Raithel
RI Department of Environmental Management
DIVISION OF FISH AND WILDLIFE
Great Swamp Field Headquarters
277 Great Neck Road
West Kingston, RI 02892

Re: Facilities Plan for Wastewater Management
Town of North Smithfield, Rhode Island

Dear Mr. Raithel:

On behalf of the Town of North Smithfield, James J. Geremia & Associates, Inc. (JGA) is currently preparing a Facilities Plan for Wastewater Management for the Town. Enclosed, please find the draft of the Executive Summary (Section 1) and Section 5 which delineates the proposed future sewer areas for the Town.

We request that you review this information as required by the State Revolving Fund, in order to ensure that these future sewer improvements shall not adversely impact any concerns of the Habitat Conservation Division In doing so, please realize that the vast majority of all planned improvements shall be conducted within existing roadways which already contain underground utilities.

Should you have any questions, please do not hesitate to contact me at (401) 454-7000.

Very truly yours,

JAMES J. GEREMIA & ASSOCIATES, INC.

James J. Geremia, P.E.
Principal

Enclosure

cc: Manual Alvarez
Linda Jean Briggs
Arthur G. Zeman, P.E. (RIDEM)

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272 W. Exchange Street. • Suite 201 • Providence, RI 02903-1025
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JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS

June 6, 2007

Mr. John Brown
Tribal Council Member
Narragansett Indian Tribe
P.O. Box 268
Charlestown RI 02813

Re: Facilities Plan for Wastewater Management
Town of North Smithfield, Rhode Island

Dear Mr. Brown:

On behalf of the Town of North Smithfield, James J. Geremia & Associates, Inc. (JGA) is currently preparing a Facilities Plan for Wastewater Management for the Town.

Enclosed, please find the draft of the Executive Summary (Section 1) and Section 5 which delineates the proposed future sewer areas for the Town.

We request that you review this information as required by the State Revolving Fund, in order to ensure that these future sewer improvements shall not adversely impact any concerns of the Tribal Historic Preservation Office. In doing so, please realize that the vast majority of all planned improvements shall be conducted within existing roadways which already contain underground utilities.

Should you have any questions, please do not hesitate to contact me at (401) 454-7000.

Very truly yours,

JAMES J. GEREMIA & ASSOCIATES, INC.

James J. Geremia, P.E.
Principal

Enclosure

cc: Manual Alvarez
Linda Jean Briggs
Arthur G. Zeman, P.E. (RIDEM)

NO SMITHFIELD\GC\LETTER TO FP REVIEWERS.wpd

272 W. Exchange Street, • Suite 201 • Providence, RI 02903-1025
Telephone: 401.454.7000 • Facsimile: 401.454.7415

JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS

June 6, 2007

NOAA/NMFS
Habitat Conservation Division
212 Rogers Avenue
Milford, CT 06460

Re: Facilities Plan for Wastewater Management
Town of North Smithfield, Rhode Island

Gentlemen:

On behalf of the Town of North Smithfield, James J. Geremia & Associates, Inc. (JGA) is currently preparing a Facilities Plan for Wastewater Management for the Town.

Enclosed, please find the draft of the Executive Summary (Section 1) and Section 5 which delineates the proposed future sewer areas for the Town.

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Should you have any questions, please do not hesitate to contact me at (401) 454-7000.

Very truly yours,

JAMES J. GEREMIA & ASSOCIATES, INC.

James J. Geremia, P.E.
Principal

Enclosure

cc: Manual Alvarez
Linda Jean Briggs
Arthur G. Zeman, P.E. (RIDEM)

NO SMITHFIELD\GC\LETTER TO FP REVIEWERS.wpd

272 W. Exchange Street, • Suite 201 • Providence, RI 02903-1025
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JAMES J. GEREMIA & ASSOCIATES, INC.
CONSULTING ENVIRONMENTAL ENGINEERS & SCIENTISTS

June 6, 2007

Mr. James Soctomah
Narragansett Indian Tribe
P.O. Box 700
Wyoming, RI 02898

Re: Facilities Plan for Wastewater Management
Town of North Smithfield, Rhode Island

Dear Mr. Soctomah:

On behalf of the Town of North Smithfield, James J. Geremia & Associates, Inc. (JGA) is currently preparing a Facilities Plan for Wastewater Management for the Town.

Enclosed, please find the draft of the Executive Summary (Section 1) and Section 5 which delineates the proposed future sewer areas for the Town.

We request that you review this information as required by the State Revolving Fund, in order to ensure that these future sewer improvements shall not adversely impact any concerns of the Tribal Historic Preservation Office. In doing so, please realize that the vast majority of all planned improvements shall be conducted within existing roadways which already contain underground utilities.

Should you have any questions, please do not hesitate to contact me at (401) 454-7000.

Very truly yours,

JAMES J. GEREMIA & ASSOCIATES, INC.

James J. Geremia, P.E.
Principal

Enclosure

cc: Manual Alvarez
Linda Jean Briggs
Arthur G. Zeman, P.E. (RIDEM)

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272 W. Exchange Street, · Suite 201 · Providence, RI 02903-1025
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