RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF WATER RESOURCES
235 Promenade Street, Providence, Rhode Island 02908

CLEAN WATER ACT
CELEBRATING 50 YEARS
1972-2022

February 8, 2023

CERTIFIED MAIL

Paul Zwolenski, Town Administrator
Town of North Smithfield
83 Greene Street
North Smithfield, RI 02896

RE: Approval of Wastewater Facilities Plan Amendment
North Smithfield, Rhode Island (DEM File No. 22-A)

Dear Mr. Zwolenski:

The Department of Environmental Management, Office of Water Resources (DEM) has completed its review of the North Smithfield Wastewater Facilities Plan Amendment (FPA), dated January 2023, prepared by Wright-Pierce. The purpose of the FPA is to amend the Town's 2007 Facilities Plan to address flows from the proposed Slater Village and Silver Pines Phase II private development projects.

Based on our review, DEM hereby approves this document as a Wastewater Facilities Plan for the Town of North Smithfield.

Please note, as indicated in the Facilities Plan, the Town must upgrade the Belcher Avenue Pump Station when flows from the Slater Village and Silver Pines developments cause peak daily flows at the Belcher Avenue Pump Station to exceed 91,600 gallons per day. Since the Belcher Avenue Pump Station does not currently have flow metering equipment, DEM will require flow metering equipment for the pump station be designed and installed under the Order of Approval that DEM issues for the Slater Village and Silver Pines Phase II developments. The Order of Approval will also require the Town to submit quarterly reports to DEM of monthly average and peak flows at the Belcher Ave Pump station after startup of the sewer extension for the Slater Village development.

An approved copy of the FPA will be forwarded to the Town under separate cover. If you have any questions, please contact Alex Pinto at 222-4700 extension 2777227 or at alex.pinto@dem.ri.gov.

Sincerely,

Joseph B. Haberek, P.E.
Administrator of Surface Water Protection

ecc: Derick Hopkins, Wright-Pierce
Louis Ragozzino, Wright-Pierce

NORTH SMITHFIELD SEWER COMMISSION

JAN 2023

Wastewater Management Facilities Plan

Original Date: April 2007
Amendment Date: January 2023

WRIGHT-PIERCE
Engineering a Better Environment

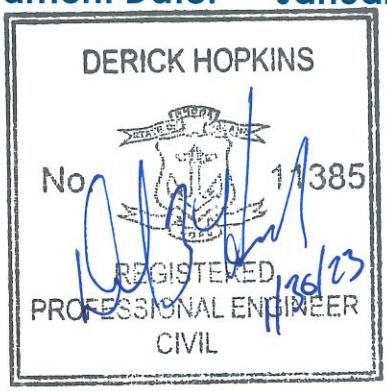
Wastewater Management Facilities Plan

North Smithfield Sewer Commission

North Smithfield, RI

Original Date: April 2007

Amendment Date: January 2023



First Last, PE Derick Hopkins

Rhode Island Engineering License #

Date: 1/30/23

Prepared By:

Wright-Pierce

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Providence, RI 02903

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Section 1 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 (RIDEM).

Wastewater generated by the Town is treated at 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. This agreement was updated via a 2017 agreement between the Town of North Smithfield and City of Woonsocket. The agreement indicates that the cost disbursement for capital expenses is 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 both 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 onsite wastewater treatment 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 onsite wastewater treatment 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 onsite wastewater treatment systems (OWTS) to prevent non-source pollution of the groundwater.

The construction, alteration and repair of OWTS 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 Onsite Wastewater Treatment Systems. These rules state that all installations, alterations and repairs must be approved, in writing, by the RIDEM. In this manner, the RIDEM can inspect and keep track of all OWTS installations and repairs. The review of the OWTS 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 OWTS 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 concentration of residences over a small land area may experience oversaturation of OWTS 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 OWTS 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, phosphates, and synthetic organic chemicals from septic tank additives and household chemicals. There were 102 OWTS reported to have failed in accordance with RIDEM 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 OWTS failures are served by individual wells as a source of portable water supply.

Zoning, along with land use and planning, are important factors in OWTS 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 OWTS 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 RIDEM OWTS 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 OWTS 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 is provided.

The Facilities Plan identifies 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 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 RIDEM's records for onsite wastewater treatment systems for the past five years and discussions with Town officials revealed that there have been failures of onsite wastewater treatment 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 onsite wastewater treatment 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 onsite wastewater treatment systems within the newly formed District.

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 RIDEM regulations these soils are not considered suitable for onsite wastewater treatment 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**
Greenstreet*	Victory Highway No. 1
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	

*Town has substantially completed project
**Town has partially completed project

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	1.031	2.632
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	1.609	4.142

The increase in flow over the next 20 years (shown in Table 1-3) is from 0.764 MGD to 1.609 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 0.845 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, 1.9 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 1.609 MGD, less than the 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 BOD_5 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 Load and Concentration (Residential, Commercial, and Industrial)

Year	BOD_5 Lod (lb./d)	TSS Load (lb./d)	BOD5 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 1.9 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 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 $527.99 per year, subject to change due to budgetary needs.

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.

Table 1-5 Future Interceptor Segment Adequacy Analysis

Interceptors	Max. 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	**Max. Capacity (MGD)**	**Peak Discharge (MGD)**	**Comments**
Branch River	2.740	2.146	Adequate
Pound Hill	1.580	0.603	Adequate
Sharon Parkway	0.220	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	0.612	Not-Adequate
Silver Pines	0.288	0.114	Adequate
Rockcliff Farms	0.259	0.071	Adequate

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 No. 1 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.

1.8 Future Wastewater Management District

On-Site Systems

Onsite wastewater treatment 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 Wastewater Management District is an appropriate alternative for addressing onsite wastewater treatment systems (OWTS) problems in certain parts of the Town. While the "ideal" solution to OWTS problems may be the installation of conventional public sanitary sewers, the Wastewater Management District 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 Wastewater Management District 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.

Table 1-6 Summary of the Total Probable Project Costs for the Recommended Improvement to the Wastewater Collection System

Service Area	Total Cost
Great Road East	*2,721,900*
*Green Street****	*2,440,600*
Lamoureux Boulevard	*158,200*
*North Smithfield Industrial Park*****	*4,970,700*
*Park View****	*1,458,000*
Providence Pike No. 1	*6,766,500*
Providence Pike No. 2	*3,608,200*
*St. Paul *****	*9,916,600*
Victory Highway No. 1	8,648,800
Victory Highway / Dawley Brook	*4,350,700*
*Warren Avenue / Park Drive****	*1,375,800*
*Waterford*****	*3,453,000*
Willerval/Tanglewood	*8,967,100*
Totals	*$58,836,100*

* All costs escalated from 2006 dollars at 3% per year.

** Escalated from 2006 cost plus additional infrastructure from Section 8 revision

*** Town has substantially completed project

**** Town has partially completed project

Italics – information reproduced from original 2007 report.

Table 1-7 Summary of the Anticipated Cost per Dwelling for the Improvements to the Wastewater Collection System

Service Area	Total Cost*	20 Year Bond 3% Interest	Equivalent Dwelling Units	Annual Cost / Dwelling Unit
Great Road East	*$2,721,900*	*$ 3,622,942.*	*31*	*$5,843*
Green Street[1]	*$2,440,600*	*$ 3,248,522*	*60*	*$2,707*
Lamoureux Boulevard	*$158,200*	*$ 210,569.62*	*3*	*$3,509*
North Smithfield Industrial Park[2]	*$4,970,700*	*$ 6,616,171*	*N/A*	*N/A***
Park View[1]	*$1,458,000*	*$ 1,940,647*	*33*	*$2,940*
Providence Pike No. 1	*$6,766,500*	*$ 9,006,443*	*160*	*$2,815*
Providence Pike No. 2	*$3,608,200*	*$ 4,802,637*	*99*	*$2,426*
St. Paul[2]	*$9,916,600*	*$ 13,199,334.09*	*209*	*$3,158*
Victory Highway No. 1* **	**$8,648,800**	**$ 11,511,849**	**180**	**$3,198**
Victory Highway / Dawley Brook	*$4,350,700*	*$ 5,790,931*	*49*	*$5,909*
Warren Avenue / Park Drive[1]	*$1,375,800*	*$ 1,831,237*	*18*	*$5,057*
Waterford[1]	*$3,453,000*	*$ 4,596,061*	*86*	*$2,672*
Willerval/Tanglewood	*$8,967,100*	*$11,935,517*	*376*	*$1,587*

* All costs presented in 2021 dollars.

** Industrial Lands

*** Escalated from 2006 cost plus additional infrastructure from Section 8 revision

[1] Town has substantially completed project

[2] Town has partially completed project

Italics – information reproduced from original 2007 report.

Section 4
Existing Conditions

Section 4 Existing Conditions

4.1 Conditions in the Proposed Planning Area

4.1.1 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 2019). 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, approved April 1, 2019.

Twentieth Century History

Over the past fifty 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 2019 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 2019 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.

The first neighborhood of Union Village initially flourished as a stagecoach stop along Great Road (146A). Subsequent small-lot residential growth within and in areas to the north and south of Union Village represented outward suburbanization of Woonsocket which spilled into North Smithfield.

Slatersville, the Nation's first planned mill village, 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 mills.

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 section of Town retain a rural and rural-residential character furthered by larger lot zoning requirements. Except for the industrial zone along North Smithfield Industrial Drive and the commercial development along Route 146 in Sayles Hill Road area, virtually the entire land area to the south of the Providence and Worchester Railroad and to the west of Route 146 is zoned for residential development.

Although the villages had a few stores and shops to serve the mill workers, 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 the 146A merge and the Lincoln Town line; Park Square area of Eddie Dowling Highway (Route 146A) which is 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; Carpenters' Corner (North Main Street and Route 146A) which is the locus of a shopping center anchored by a supermarket; and Route 102/South Main Street intersection with highway-orientated business activities.

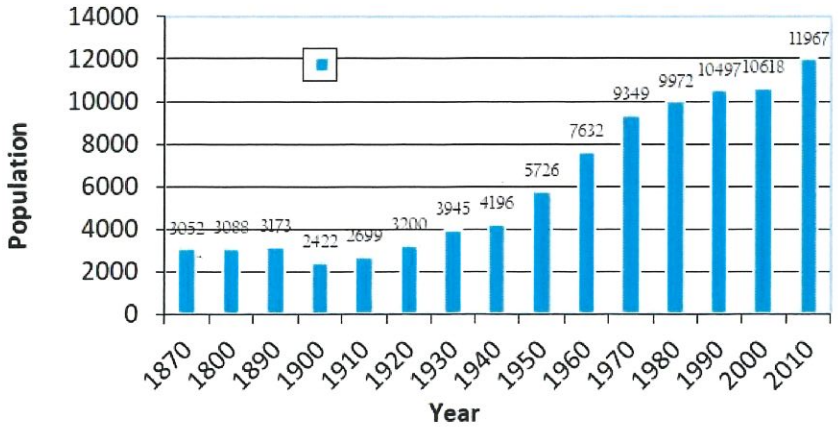
In general, the Land Use Element perpetuates the use and density patterns which have been historically established. The 2014 Community Survey results support the existing land use pattern. Ninety-one percent of the respondents support maintaining the small-town character throughout the town and 90% believe the preservation of open space is important.

Population Trends

Since 1950, North Smithfield's population has climbed from 5,726 to 11,967 (based on final count data from the 2010 U.S. Census), See **Figure 4-1**.

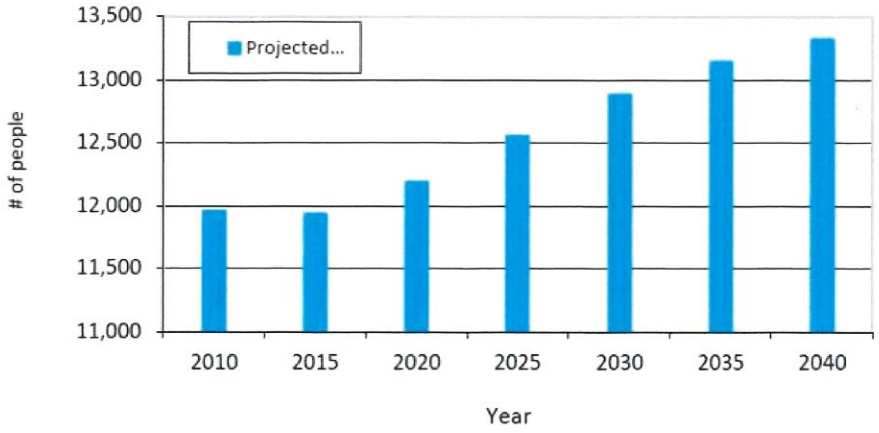
Between 1990 and 2000, average household size declined from 2.7 to approximately 2.6. This compares with 2.9 for 1980 and 3.3 for 1970. Between 2000 and 2010, average household size continue its declined from 2.6 to 2.5.

Figure 4-1 Population Between 1870 and 2010



Source: U.S. Census

Figure 4-2 Population Projections 2010-2040



Source: RI Statewide Planning

Population Projections

Preliminary population projections from the Statewide Planning Program show a continued slow growth rate for North Smithfield. These projections are based entirely on past trends and may prove quite inaccurate if compared with current market trends. Figure 4-2 presents the population projections through 2040.

Since 1980, the Town's population has increased only slightly above 10,000 with the largest increase having occurred between 2000 and 2010. See Table 4-1.

Table 4-1 Population

Year	1980	1990	2000	2010
# of People	9,972	10,497	10,618	11,967

Source: U.S. Census

A substantial increase in the number of housing units occurred between 2000 and 2010. Of North Smithfield's housing units, nearly 75% are single-family, detached housing units, according to the 2010 US Census. The past decade has seen a slight increase in the availability of multifamily housing units, as can be seeing in Table 4-2 Housing Units and Types.

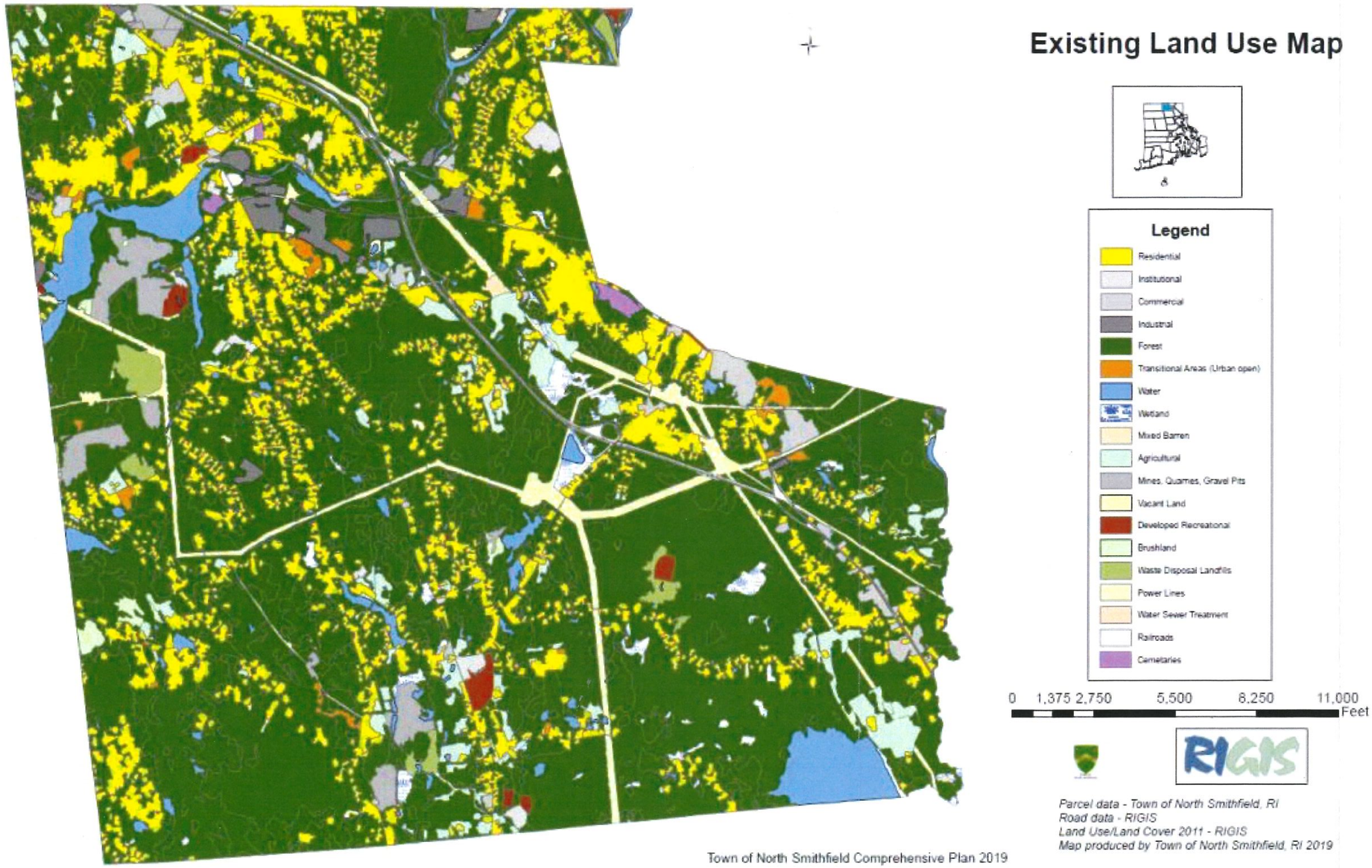
Table 4-2 Housing Units & Types

Housing Units				
Year	1980	1990	2000	2010
# of homes	3,526	3,835	4,070	5,068
Housing Types				
Year	2000		2010	
Single	80%		74.2%	
2-4 Units	10.6%		12.7%	
5+ Units	9.4%		13.1%	

Land Use

In general, the Land Use Element perpetuates the use and density patterns which have been historically established. The 2014 Community Survey results support the existing land use pattern. Ninety-one percent of the respondent's support maintain the small-town character throughout the town and 90% believe the preservation of open space is important. The current pattern of land use can be seen on **Figure 4-3.**

Figure 4-3 Land Use Map



Town of North Smithfield Comprehensive Plan 2019

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 !and use.

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

Table 4-3 Existing Land Use

1995 RI Geographic Information Systems	Percent of Total
Residential	15%
Commercial	1%
Industrial	3%
Transport/Utilities	5%
Recreation	0.5%
Urban Open Land & Cemeteries	1%
Institutional	0.5%
Agriculture	3%
Forest	65%
Brush	0.5%
Water	4%
Wetlands	1%
Barren	0.5%
Other	0%
Total	**100.0**

Source: RIGIS Environmental Data Center Land Use and Land Cover 2011

The Town's vision for its pattern of future development and land conservation is established in **Figure 4-4**. Future Land Use Map (FLUM). While the FLUM presents the general pattern of development and conservation, the Zoning Ordinance is the means by which it is implemented. The Town's zoning was recently amended in conjunction with the development of the 2019 Comprehensive Plan. The future land use categories displayed on the FLUM are, in many instances, broader than the Town's zoning districts. For example, with respect to the FLUM and Zoning Map, low residential density is REA and RA, medium density is RS, and high density is RU. Heavy manufacturing is the M district, Moderate mixed use is the MU1, MU2, BN, and BH district which all speak to mixed use in terms of the use table and what the Town hopes to accomplish in the Branch Village Redevelopment District – Dowling Village is mixed use as well. Light commercial contains both the BC and BN. The FLUM also reflects areas that were down-zoned to open space in the eastern part of town around Old Smithfield Rd. and the Woonsocket Reservoirs.

All 2019 zone changes were done in conjunction with the Town's comprehensive plan review process and have been rendered as part of the comprehensive plan re-write. There are no inconsistences between Official Zoning Map **(Figure 4-5)** and the FLUM.

Figure 4-4 Future Land Use Map (FLUM) Consistency

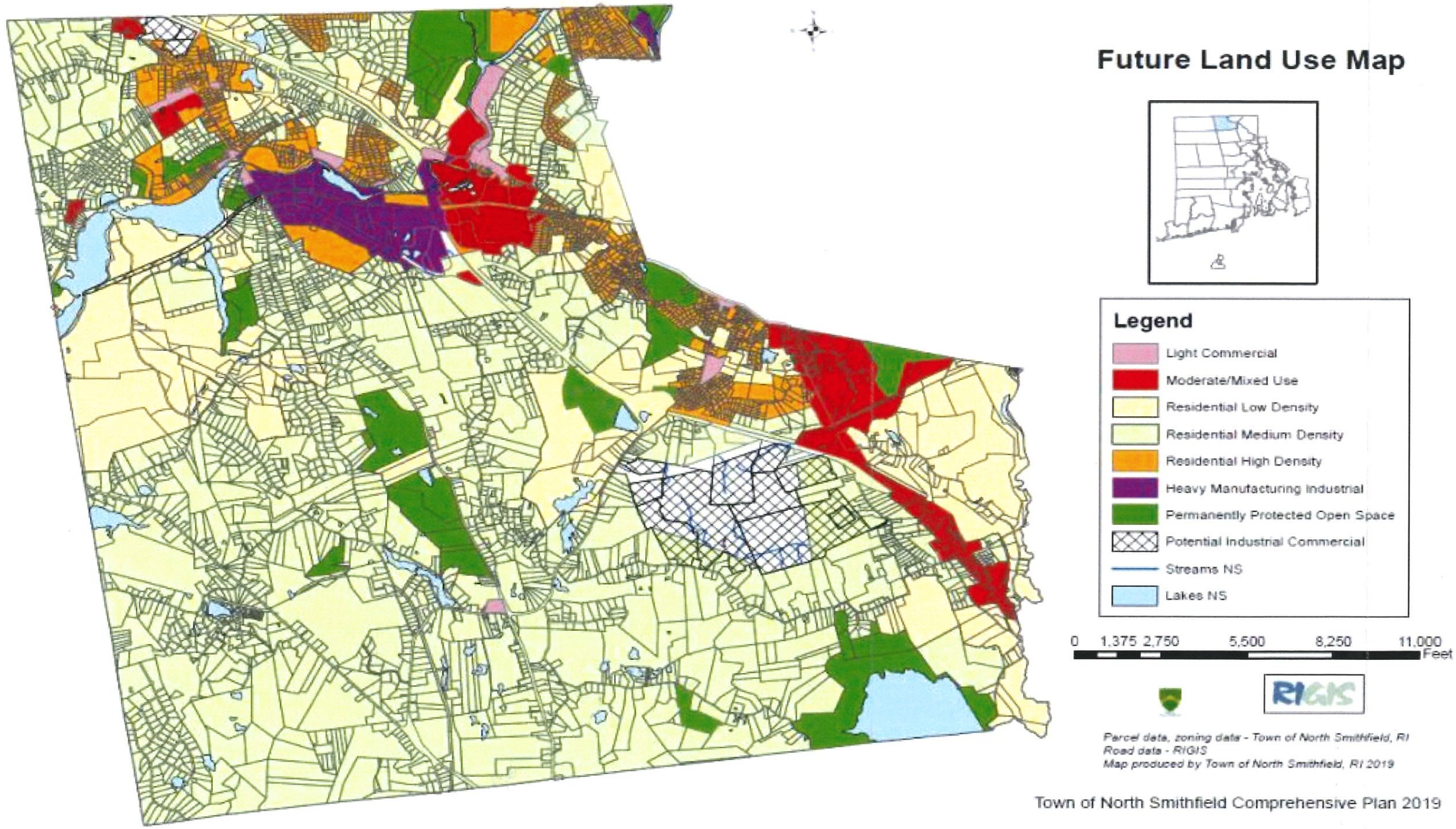
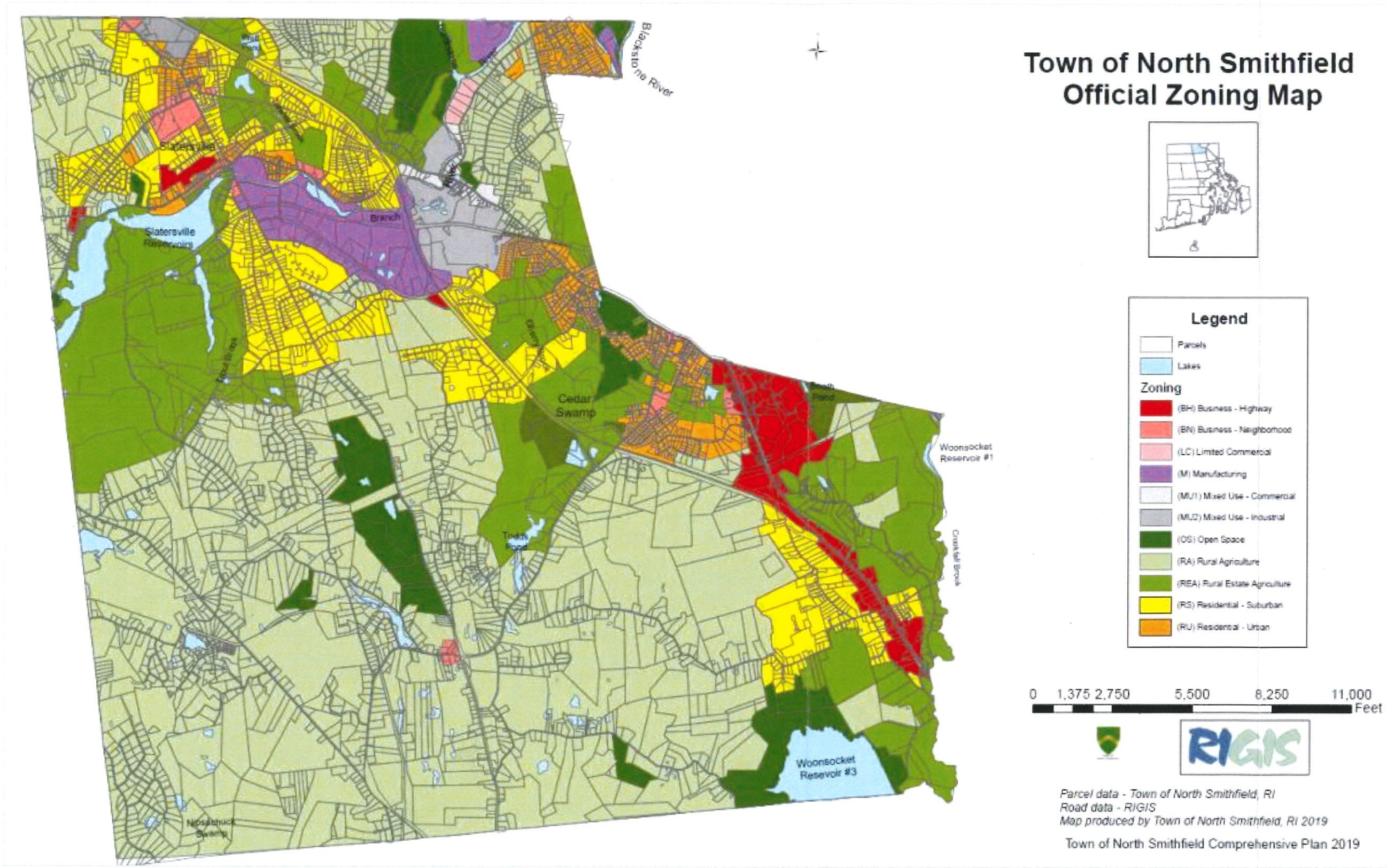


Figure 4-5 Official Zoning Map



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.

In 2019 the town revised its Zoning Ordinances Uses section in order to eliminate zoning use table redundancy amongst districts and to simplify the zoning code. The eliminated districts were:

Urban Residential - Medium High Density (RU) - Urban Residential areas are currently served by water and/or public sewer services. These areas are now included within the RU zoning District which allows the following types of residential development: single-family homes, two-family homes, and multifamily dwellings by Special Use Permit from the Zoning Board of Review.

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 (RS) - 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 Agricultural- Medium Low Density (RA) - Rural Agricultural 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. As such, the Town has revised the Zoning Ordinance and Subdivision and Land Development Regulations to allow for Conservation Development to promote shared open space that is protected.

Under the RA zoning district, single-family homes area 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. 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 RA area is presently developed, substantial section are not suitable for development due to wetlands, ledge or excessive slopes.

Rural Estate Agricultural - Low Density (REA)- The REA area covers land and groundwater aquifer areas requiring conservation action. It includes major natural areas such as Todd's Pond, Cedar Swamp and Cedar Brook, all sensitive areas where utilities should not be provided and open space preserved. The designated area also has been established as a buffer district along Trout Brook, Trout Pond, Dawley Brook/Pratt Pond and around the Slatersville Reservoirs. It is proposed that the buffer be increased to include the portions of the Reservoir's drainage area and the Slatersville Aquifer and aquifer recharge area between the Reservoirs and Pound Hill Road. This area encompasses the Landfill & Resource Recovery and Wester Sand & Gravel EPA Superfund sites. Less than 10 percent of the REA area is currently developed. Development proposals must consider the constraints associated with the existence of the EPAs Superfund sites and the need to protect the Slatersville Aquifer and Reservoirs.

REA currently help protect and serve as a buffer district for Woonsocket's water supply facilities in the Town of North Smithfield including Reservoirs Number 1 and 3 and Crookfall Brook. Expansion of this district is proposed in the Crookfall Brook area along Old Smithfield Road and in the area around Reservoir #3.

Land on either side of the Blackstone River Gorge and along the Blackstone where property has been acquired by the State and the Town, are also designated for REA. Consistent with recreation and open space recommendations for the Mammoth Mill site and Paul S. Kelly Sports complex, REA replaced the Manufacture (M) District.

In the REA District, single-family housing is 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, Dowling Village, was recently completed 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 (BN) - 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.

Business Highway (BH) - Business Highway use areas are designed to serve specialized retail and commercial uses requiring high volumes of passing traffic.

Manufacturing

Manufacturing (M) – Manufacturing uses intent is to provide for industrial development, research and certain transportation, storage and utility uses. In addition, certain commercial services catering to the needs of industry and its employees are permitted. M districts are located at the north side of Route 146A and the Branch River, and along either side of North Smithfield Industrial drive. This represents a continuation present zoning.

Limited Commercial (LC)-Allowed uses include light industry and certain types of retail and commercial development..

Open Space (OS)- The Zoning Enabling Act allows for the designation of Open Space district.

Mixed Use

Mixed Use (MU-1 and MU-2) – In 2013, the Zoning Ordinance was updated to include two mixed use districts, MU-1 and MU-2. MU-1 is intended to provide for compact, planned mixed use development of a village nature with existing commercial, but not big-box retail, with a mix of small-scale businesses such as restaurants, coffee shops, bookstores, retail shops and service industries. The sub-district MU-2 is intended to provide for compact, planned mixed use light industrial/office/accommodation-type development where buildings are preferred to be clustered, campus-style, around shared open space amenities, with most parking preferred to the side and rear of structures.

Build-Out Estimates

The following estimates (Tables 4-4 thru 4-6) were derived using the methodology for basic mathematical assessment in accordance with Statewide Planning's Handbook #13 on Land Use. The Town is estimated to build out by the year 2035 and contain a total of 16,233 residential units.

Table 4-4 Build Out Estimate I

Residential District	Acreage	Net Developable Area by Zone	Units per Acre	Total # of Dwelling Units at Build-Out by Zone	Net Units to Build-Out (Projection-Existing)
RA Total	8,297	5,808	1.5	8,654	
REA Total	2,570	1,799	2.8	5,038	
RS Total	2,077	1,454	1.0	1,454	
RU Total	716	501	2.2	1,088	
Total Acreage	13,660	9,562		16,233	11,165

Source: Town Planning Dept.

Table 4-5 Build Out Estimate II

Persons per HH (2012-2016)	Total Dwelling Units at Build Out	Total Population Estimate
2.65	16,233	43,017

Source: U.S. Census, Planning Dept.

Table 4-6 Build Out Estimate III

Year	Growth Rate	Avg Units per Year Since 1980	Avg Unit Rate 30 Yrs	Estimated Yrs to Build-Out	Yr. By Which Build-Out is Likely to Occur
1980	3,526				
1990	3,835	30.9			
2000	4,070	3.5			
2010	5,068	99.8	51	217	2235
Total/mean		154.2			

Source: Town Planning Dept.

Section 5
Future Conditions

Section 5 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 Onsite Wastewater Treatment Systems (OWTS) problems in areas without public sewers. There are development pressures on land parcels adjacent to the existing sewer service areas and soil constraints for OWTS 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 OWTSs for the past five years and discussions with Town officials revealed that there have been failures of OWTSs 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 OWTS 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 OWTSs within the Wastewater Management 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 Population Projection 2005-2025

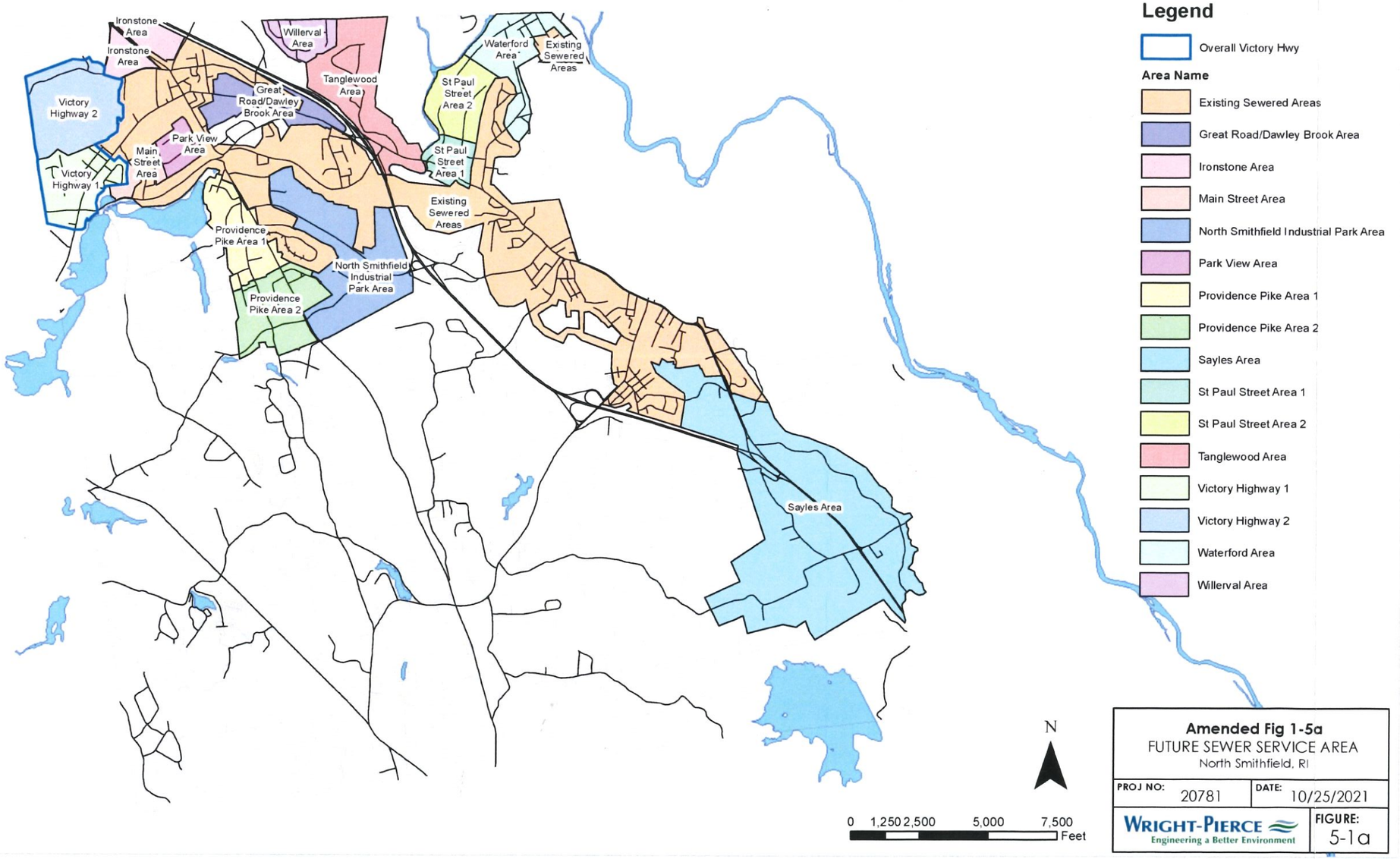
	2005	2010	2015	2020	2025
Population	5,168	6,961	8,023	9,085	10,148
Dwelling Units	1,980	2,668	3,074	3,481	3,888

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 RIDEMs regulations, these soils are not considered suitable for OWTSs.

Figure 5-1 Future Sewer Service Area



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 No. 1
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	

*Town has substantially completed project
**Town has partially completed project

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 2019 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 484 additional dwelling units by 2040. Assuming the average number of people per household holds steady at 2.65, the additional dwelling units could support another 1,283 people in North Smithfield by 2040.

5.3 Future Adequacy of the Interceptor System and Pump Stations

Belcher Avenue Pumpstation

The Belcher Avenue Pump Station will be receiving flows from the Victory Highway Area No. 1 future service area, Slater Village and Silver Pines Phase II, as well as the existing flows. The future average daily flow will be 123,700 GPD and the future peak daily flow will be 406,440 GPD. The capacity of the pump station is currently 266,000 GPD, therefore, the pump station will need to be upgraded for future flows.

If the Belcher Avenue pump station receives flows from the existing sewered area and the proposed Slater Village and Silver Pines Phase II developments it will have an average daily flow of 65,200 GPD with an associated peak of 253,640 GPD. The pump station has a design capacity of 266,000 GPD, therefore, the pump station is adequate for exiting flows and the development of Slater Village and Silver Pines Phase II.

A flow monitoring device will be installed in the Belcher Avenue Pumpstation when the Slater Village and Silver Pines Phase II developments are connected to the pumpstation. Once this flow monitoring devices registers that the flows the pumpstation is experiencing 91,600 gpd, the town will be required to improve the pumpstation so that it will be adequate to handle the existing flows, the Slater Village and Silver Pines flows, and future area flows.

Silver Pines Pumpstation

The Silver Pines Pump Station will convey flows from the Silver Pines Condominium Association Phase I as well as residential dwellings along Main Street. The average daily flow to the pump station will be 28,100 GPD the peak daily flow will be 75,800 GPD, which is less that the capacity of 288,000 GPD, make the station adequate for future flows

Section 6
Alternatives and Plan Selection

Section 6 Alternatives and Plan Selection

6.1.2 Wastewater Collection System

Table 6-2 Estimated Future Sewered Area Flows

Area	Dwelling Units	Residential Flow (GPD)	Commercial Industrial Flow (GPD)	I/I Flow
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 No. 1*	**159**	**103,500***	**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	24,900	0	**
Rockcliff Farm*	71	23,700	0	**
Slatersville*	375	50,000	0	**
Total	1,908	570,100	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.
*** Town has substantially completed the project
**** Town has partially completed the project
Italics- information in reproduced from original 2007 report

Victory Highway No. 1 Wastewater Collection System

The proposed Victory Highway No. 1 Wastewater Collection System will serve an area that extends just south of Mount Pleasant Road and is bounded to the south and east by the Slatersville Reservoir, on the west by the Town of Burrillville, on the north by wetlands and the zoning change from RS to RA, and to the east by the Main Street and Silver Pines sewer collection systems. The collection system will consist of a conventional gravity system, low pressure sewer system and a pump station to convey the flow generated by their 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 southernly direction to Sunnycrest Avenue before entering into the gravity system which flows to the Belcher Avenue Pump Station. The Victory Highway No. 1Wastewater Collection system will also receive flows from the proposed private developments of Slaters Village and Silver Pines Phase II. The flows from the Slaters Village and Silver Pines Phase II private developments total 55,800 gpd with an associated peak of 225,440 GPD.

Section 7
Anticipated Environmental Impacts

Section 7 Anticipated Environmental Impacts

7.1 No Construction Alternative

Victory Highway No. 1Wastewater Collection System

The Victory Highway No. 1 Wastewater Collection System will serve 159 residential units, 7 acres of highway business properties, and two private developments (Slatersville and Silver Pines Phase II). These areas contribute a daily average wastewater flow of 123,700 GPD with an associated peak of 406,440 GPD. The collection system will consist of 10,300 linear feet of 8-inch gravity sewers and three pump stations, the Victory Highway No. 1 Pump Station, the Slaters Village Pump Station, and the existing Belcher Avenue Pump Station.

The Victory Highway pump station will be below grade and located near the intersection of Mount Pleasant Avenue and Victory Highway. The Victory Highway No. 1 Pump Station will be designed as an 80 GPM facility with two submersible grinder pumps discharging to a 3-inch force main to the proposed gravity sewer located at the intersection of Sunnycrest Avenue and Victory Highway. Once the Victory Highway Pumpstation flows join the gravity sewer network they will be conveyed to the Belcher Avenue Pump Station.

The Slaters Village Pump Station is a low pressure pumpstation proposed to be constructed as part of the private Slaters Village development. The pump station will convey flows from the approved build out conditions of both Slaters Village and Silver Pines Phase II. These flows are on average 55,800 GPD with an associated peak of 225,440 GPD. The flows are directed to the gravity main located in Victory Highway and conveyed by that gravity main to the Belcher Avenue Pump Station.

Once this flow monitoring devices registers that the flows the pumpstation is experiencing 91,600 gpd, the pump station should be upgraded to accept all the future flows from the Victory Highway No. 1 sewer collection system and the proposed private development of Slaters Village and Silver Pines Phase II. The pump station will need to be upgraded to either a pair of 430 GPM pumps or by adding a third pump to provide the required capacity. In addition, the force main size shall be increased to 6-inches or a parallel force main installed.

Section 8
Wastewater Collection System Preliminary Design

Section 8 Wastewater Collection System Preliminary Design

8.1 Wastewater Collection System Preliminary Design

- Wastewater flows for Slaters Village, and Silver PinesPhase II are based on design flow data from each entity.

8.2 Future Service Areas

Victory Highway No. 1 Wastewater Collection System

The Victory Highway No. 1 Wastewater Collection System will serve 159 residential dwelling units, 7 acres of highway business properties, Slaters Village, and Silver Pines Phase II. This area will contribute an average daily flow of 123,700 GPD with an associated peak of 406,440 GPD. The collection system will consist of 10,300 linear feet of 8-inch gravity sewers, the Victory Highway below-grade pump station and upgrades to the Belcher Avenue pump station.

The Victory Highway Pump Station will have a capacity of 80 GPM. The major components of the pumpstation will be the two submersible grinder pumps and external generator.

The upgrades to the Belcher Avenue Pump Station will include increasing the size of the submersible pumps to 430 GPM, upgrading/retrofitting necessary site/electrical/mechanical components, and increasing the size of the force main to 6-inches.

Table 8-9 Probable Project Cost for the Victory Highway No. 1 Wastewater Collection System

Collection System	Amount
8-inch PVC Pipe	$1,200,000*
6-inch PVC Pipe and Wyes	$205,700*
3-inch Force Main	$114,000*
Low Pressure Sewer	$423,500*
Low Pressure Sewer Services	$84,000*
Grinder Pumps	$515,000*
Precast Concrete Manholes	$250,000*
Flushing Manholes	$45,000*
Force Main Cleanout	$6,500*
Rock Excavation	$121,000*
Gravel Fill	$110,000*
Test Pits	$30,250*
Erosion Control	$113,500*
Traffic Control	$151,250*
Pavement Restoration	$2,000,000*
Victory Highway Pump Station	$450,000*
Belcher Pump Station Upgrades	$750,000
6-inch Force Main	$200,000
Pavement Restoration	$100,000
Sub-Total	$6,119,100
Construction Contingencies (25%)	$1,529,775
Sub-Total	$7,648,875
Engineering Design Services	$750,000
Construction Administration and Reside Inspection	$250,000
Total	**$8,648,875**

*Escalated 3% per year from 2007 Facilities Plan

Appendix A
Belcher Avenue Calculations

WRIGHT-PIERCE
Engineering a Better Environment

PROJECT NAME/NO. Pump Station Evaluation, 20772A
SHEET NO. 1 OF 4
CALCULATED BY EJL DATE 11/4/2021
CHECKED BY DATE
SUBJECT Capacity Analysis

Pump Station Belcher Avenue

Choose Flow Calculation Type (●) Design ( ) Drawdown/Flowmeter

INPUT DATA

Scenario		Existing Flows	
Design Flow per Pump (GPM)		200.00	
Drawdown/Flowmeter Results (GPM)		258.64	
TDH			
Number of Pumps		2	
Wet Well Type		Circular Wet Well	
Wet Well Diameter (inches)	Ø=	96	-
Force Main Size (in)		4	
Force Main Length		2106	
Pump On Elevation (Feet)		3.5	
Pump Off Elevation (Feet)		2.0	
Estimated Peak Flow (GPM)		39.20	

CALCULATED RESULTS

Wet Well Volume (Gal/Vertical Foot)	375.8	
Pump Operation Distance (Feet)	1.5	
Minimum Effective Pump Cycle Volume (Gal)	49	
Available Wet Well Volume (Gal)	564	
Wet Well Fill Time (Min)	14.38	
Pump Run Time (Min)	3.51	OK
Cycle Time per Pump (Min)	17.89	
Starts per Hour	2	OK <6
Force Main Velocity (ft/sec)	5.11	
Can the current pump capacity handle the design flows?	**Yes**	
Does the wet well have enough capacity to not short cycle pumps?	**Yes**	
Is the force main velocity between 3 and 8 ft/sec?	**Yes**	
Percent Pump Capacity Remaining	80%	
Percent Wet Well Capacity Remaining	91%	
Number of homes that can be built before exceding capacity	72	

WRIGHT-PIERCE
Engineering a Better Environment

PROJECT NAME/NO. Pump Station Evaluation, 20772A
SHEET NO. 2 OF 4
CALCULATED BY EJL DATE 11/4/2021
CHECKED BY DATE
SUBJECT Capacity Analysis

Pump Station Belcher Avenue

Choose Flow Calculation Type (●) Design ( ) Drawdown/Flowmeter

INPUT DATA

Scenario	Facilities Plan Future Flows		Facilities Plan Future Flows (New 270gpm Pump)	
Design Flow per Pump (GPM)	200.00		270.00	
Drawdown/Flowmeter Results (GPM)	258.64		258.64	
TDH				
Number of Pumps	2		2	
Wet Well Type	Circular Wet Well		Circular Wet Well	
Wet Well Diameter (inches)	Ø= 96	-	Ø= 96	-
Force Main Size (in)	4		4	
Force Main Length	2106		2106	
Pump On Elevation (Feet)	3.5		3.5	
Pump Off Elevation (Feet)	2.0		2.0	
Estimated Peak Flow (GPM)	268.80		268.80	

CALCULATED RESULTS

Wet Well Volume (Gal/Vertical Foot)	375.8		375.8	
Pump Operation Distance (Feet)	1.5		1.5	
Minimum Effective Pump Cycle Volume (Gal)	336		336	
Available Wet Well Volume (Gal)	564		564	
Wet Well Fill Time (Min)	2.10		2.10	
Pump Run Time (Min)	0.00	NOT OK	469.74	OK
Cycle Time per Pump (Min)	2.10		471.84	
Starts per Hour	14	NOT OK >6	0	OK <6
Force Main Velocity (ft/sec)	5.11		6.89	
Can the current pump capacity handle the design flows?	No		Yes	
Does the wet well have enough capacity to not short cycle pumps?	Yes		Yes	
Is the force main velocity between 3 and 8 ft/sec?	Yes		Yes	
Percent Pump Capacity Remaining	0%		0%	
Percent Wet Well Capacity Remaining	40%		40%	
Number of homes that can be built before exceding capacity	0		1	

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PROJECT NAME/NO. Pump Station Evaluation, 20772A
SHEET NO. 3 OF 4
CALCULATED BY EJL DATE 11/4/2021
CHECKED BY DATE
SUBJECT Capacity Analysis

Pump Station Belcher Avenue

Choose Flow Calculation Type ◉ Design ○ Drawdown/Flowmeter

INPUT DATA						
Scenario	Facilities Plan, Slater Village, and Silver Pines			Facilities Plan, Slater Village, and Silver Pines (New 430gpm Pump and 6-in FM)		
Design Flow per Pump (GPM)	200.00			430.00		
Drawdown/Flowmeter Results (GPM)	258.64			258.64		
TDH						
Number of Pumps	2			2		
Wet Well Type	Circular Wet Well			Circular Wet Well		
Wet Well Diameter (inches)	Ø= 96	-		Ø= 96	-	
Force Main Size (in)	4			6		
Force Main Length	2106			2106		
Pump On Elevation (Feet)	3.5			3.5		
Pump Off Elevation (Feet)	2.0			2.0		
Estimated Peak Flow (GPM)	425.80			425.80		
CALCULATED RESULTS						
Wet Well Volume (Gal/Vertical Foot)	375.8			375.8		
Pump Operation Distance (Feet)	1.5			1.5		
Minimum Effective Pump Cycle Volume (Gal)	532.25			532.25		
Available Wet Well Volume (Gal)	564			564		
Wet Well Fill Time (Min)	1.32			1.32		
Pump Run Time (Min)	0.00	NOT OK		134.21	OK	
Cycle Time per Pump (Min)	1.32			135.54		
Starts per Hour	23	NOT OK >6		0	OK <6	
Force Main Velocity (ft/sec)	5.11			4.88		
Can the current pump capacity handle the design flows?	No			Yes		
Does the wet well have enough capacity to not short cycle pumps?	Yes			Yes		
Is the force main velocity between 3 and 8 ft/sec?	Yes			Yes		
Percent Pump Capacity Remaining	0%			1%		
Percent Wet Well Capacity Remaining	6%			6%		
Number of homes that can be built before exceding capacity	0			2		

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PROJECT NAME/NO. Pump Station Evaluation, 20772A
SHEET NO. 4 OF 4
CALCULATED BY EJL DATE 11/4/2021
CHECKED BY DATE
SUBJECT Capacity Analysis

Pump Station Belcher Avenue

Choose Flow Calculation Type (●) Design ( ) Drawdown/Flowmeter

INPUT DATA

Scenario		**Facilities Plan, Slater Village, and Silver Pines minus Victory Highway**	
Design Flow per Pump (GPM)		200.00	
Drawdown/Flowmeter Results (GPM)		258.64	
TDH			
Number of Pumps		2	
Wet Well Type		Circular Wet Well	
Wet Well Diameter (inches)	Ø=	96	-
Force Main Size (in)		4	
Force Main Length		2106	
Pump On Elevation (Feet)		3.5	
Pump Off Elevation (Feet)		2.0	
Estimated Peak Flow (GPM)		196.20	

CALCULATED RESULTS

Wet Well Volume (Gal/Vertical Foot)	375.8	
Pump Operation Distance (Feet)	1.5	
Minimum Effective Pump Cycle Volume (Gal)	245.25	
Available Wet Well Volume (Gal)	564	
Wet Well Fill Time (Min)	2.87	
Pump Run Time (Min)	148.34	OK
Cycle Time per Pump (Min)	151.21	
Starts per Hour	0	OK <6
Force Main Velocity (ft/sec)	5.11	
Can the current pump capacity handle the design flows?	**Yes**	
Does the wet well have enough capacity to not short cycle pumps?	**Yes**	
Is the force main velocity between 3 and 8 ft/sec?	**Yes**	
Percent Pump Capacity Remaining	2%	
Percent Wet Well Capacity Remaining	56%	
Number of homes that can be built before exceding capacity	2	

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