

WATER RESOURCE MANAGEMENT AND PROTECTION PLAN

Introduction

This component of the Town of North Hampton Master Plan addresses the requirements, established by the New Hampshire Office of State Planning under the authority of RSA 4-C:20, I, for the preparation of local water resource management and protection plans.

The purposes of this chapter are to identify and describe surface and groundwater resources: to identify existing and potential threats to these resources; to evaluate the adequacy of water resources to meet the current and future needs of the Town; to evaluate existing local programs which have the potential to impact water resources; and to identify regulatory and non-regulatory programs that could further enhance water resource management and protection efforts.

The protection and wise use of water resources are of critical concern to the Town of North Hampton. With a large majority of the Town dependent on groundwater, from both private wells and the Hampton Water Works Company wells, the quantity and quality of this resource must be protected from depletion and/or contamination. Other Town water resources, such as swamps, ponds, rivers, streams, and wetlands, are important not only because they are often hydrologically related to groundwater, but because they provide ecological, scenic and recreational value to the Town as a whole.

In general, there is a direct relationship between land use and water quality. The right use in the wrong area, or the right use carried out in the wrong way can degrade and contaminate both surface and groundwater, increase flood hazards, destroy water-based wildlife and interfere with scenic and recreational values. It is the responsibility of the Town to take reasonable precautions to protect all water resources from incompatible uses and, in so doing, protect the health and general welfare of the community.

Regarding the source information (both data and maps) used to describe and map the water resources of North Hampton, the municipality considers such information to be, at a minimum, as detailed and accurate as the maps and information replaced. The results of the Little River Watershed Management Study will likely have a bearing on future water resource management and protection strategies. The municipality considers the source information to be the best available information existing at this time.

I. DESCRIPTION OF THE SURFACE WATER RESOURCES

Watersheds

The Town of North Hampton contains two regional watersheds - the drainage areas for Great Bay and the New Hampshire Coast. The watershed boundaries shown on Map A-1 - "Regional Watersheds" - were delineated by the Rockingham Planning Commission using 7.5 minute topographic maps (source: Newmarket Quadrangle, NH; and Portsmouth Quadrangle, NH - ME; Kittery Quadrangle, NH - ME; Exeter Quadrangle, NH; Hampton Quadrangle, NH; Newburyport West Quadrangle, MA - NH; and Newburyport East Quadrangle, MA - NH; 7.5 Minute Topographic Maps; U.S. Geological Survey, 1973).

The following paragraphs provide a general description of each regional watershed.

- a. Great Bay watershed: The Great Bay estuarine system, covering approximately 17 sq. mi. is one of the largest estuaries along the east coast of the United States. This system is formed by the convergence of seven rivers: the Salmon Falls, Cocheco, Bellamy, Oyster, Lamprey, Squamscott, and Winnicut with a total watershed area of 930 sq.mi.

In order to isolate a meaningful drainage area the Great Bay watershed was delineated to cover portions of twelve towns (as shown on Map A-1). The watershed area is approximately 74,930 acres (117 sq. mi.). The land area of the Great Bay watershed contained within North Hampton is about 3,598 acres (5.6 sq.mi.).

- b. Coastal watershed: The receiving water bodies of the Coastal Watershed are the Piscataqua River and the Atlantic Ocean. The Piscataqua River originates in Rollinsford, NH and is fed by the Salmon Falls, Cocheco, and Bellamy Rivers. The Piscataqua River is tidal and flows along the shores of Newington, Portsmouth, and New Castle for about seven miles before emptying into the Atlantic Ocean. New Hampshire's ocean-front shoreline is approximately 18 miles long. The area of the Coastal watershed is about 50,097 acres (78 sq.mi.). The area of the Coastal watershed within North Hampton is about 5,351, acres (8.4 sq.mi.).

Watersheds Within the Municipal Boundaries

North Hampton's portion of the Great Bay watershed is drained by the Winnicut River. The Coastal watershed was divided into four sub-watersheds within Town:

Little River, Philbricks Pond, Berry's Brook, and Bailey Brook. These sub-watersheds are depicted on Map A-2 "Sub-Watershed Map", which depicts the entire area of the watersheds. A more detailed view of the sub-watershed boundaries is shown on Map A-3 "Watersheds, Perennial Water Bodies, and Water Service Area".

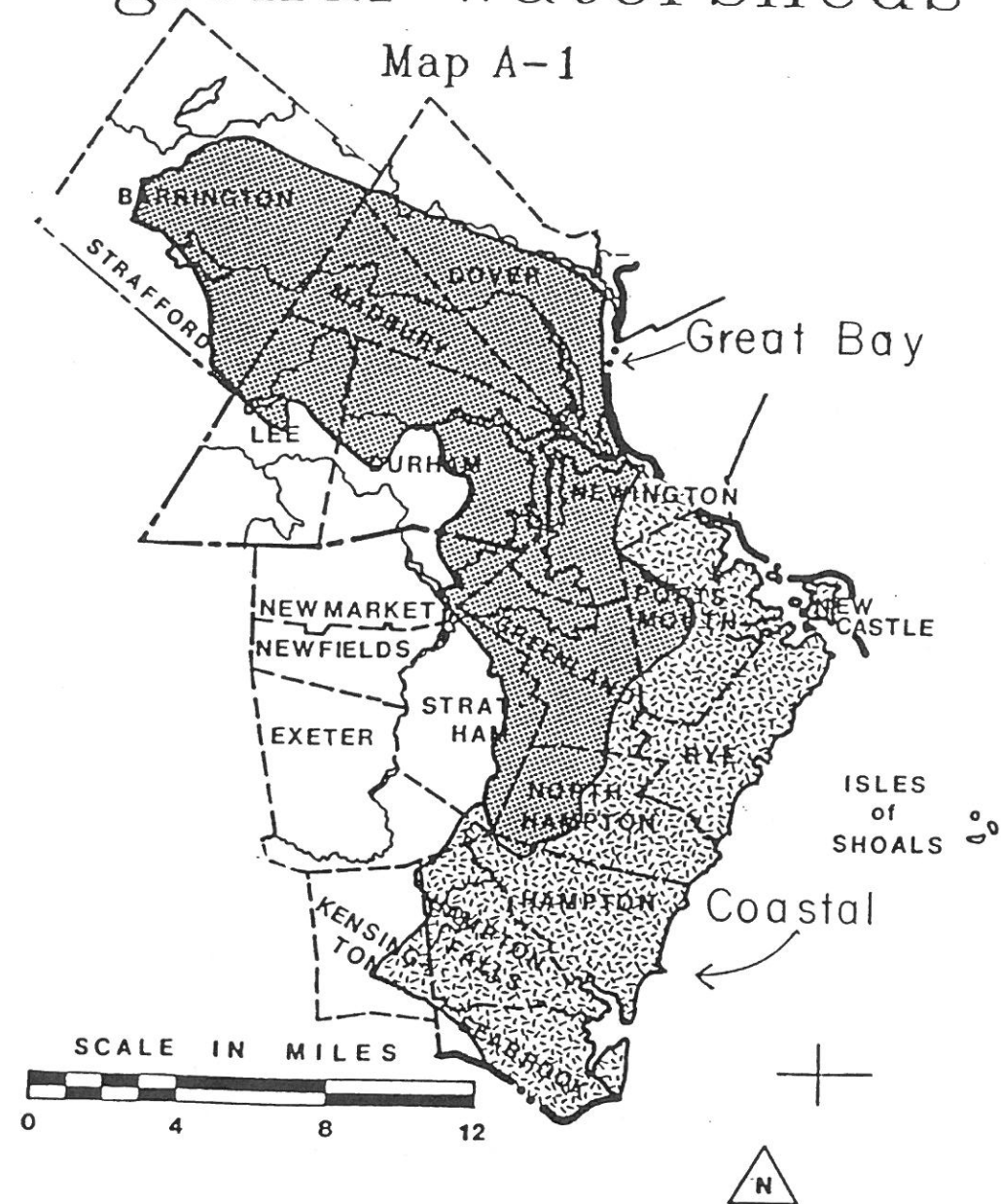
The characteristics of each sub-watershed is described below. All of North Hampton's water bodies have a legislative classification of "B" (see "Potential Surface Water Supplies" of this section for more detail).

- a. Winnicut River: The Winnicut River watershed, which is a sub-watershed of the Great Bay watershed, is 8,274 acres (12.9 sq.mi.). The watershed, which includes portions of Greenland, Stratham, Hampton, and North Hampton, is shown on Map A-2. Within North Hampton, the sub-watershed is 3,598 acres (5.6 sq. mi.). The Winnicut River is one of seven major rivers which empty into the Great Bay. The Winnicut River flows for three miles within North Hampton, from south to north, until it enters Greenland. At one point it dips down into Hampton for a short distance then enters Town again. Within Town, the river drops from an elevation of 70 feet to 35 feet above mean sea level (MSL). The river is impounded at three locations by dams. Two dams are small earth dams located near Walnut Avenue. The third is a four foot high earth dam located near Bashby Road. It is considered a Class "AA" dam by the N.H. Water Resources Board, meaning it would not be a menace to public safety if it were to fail (source: N.H. Code of Administrative Rules Wr 101.15).

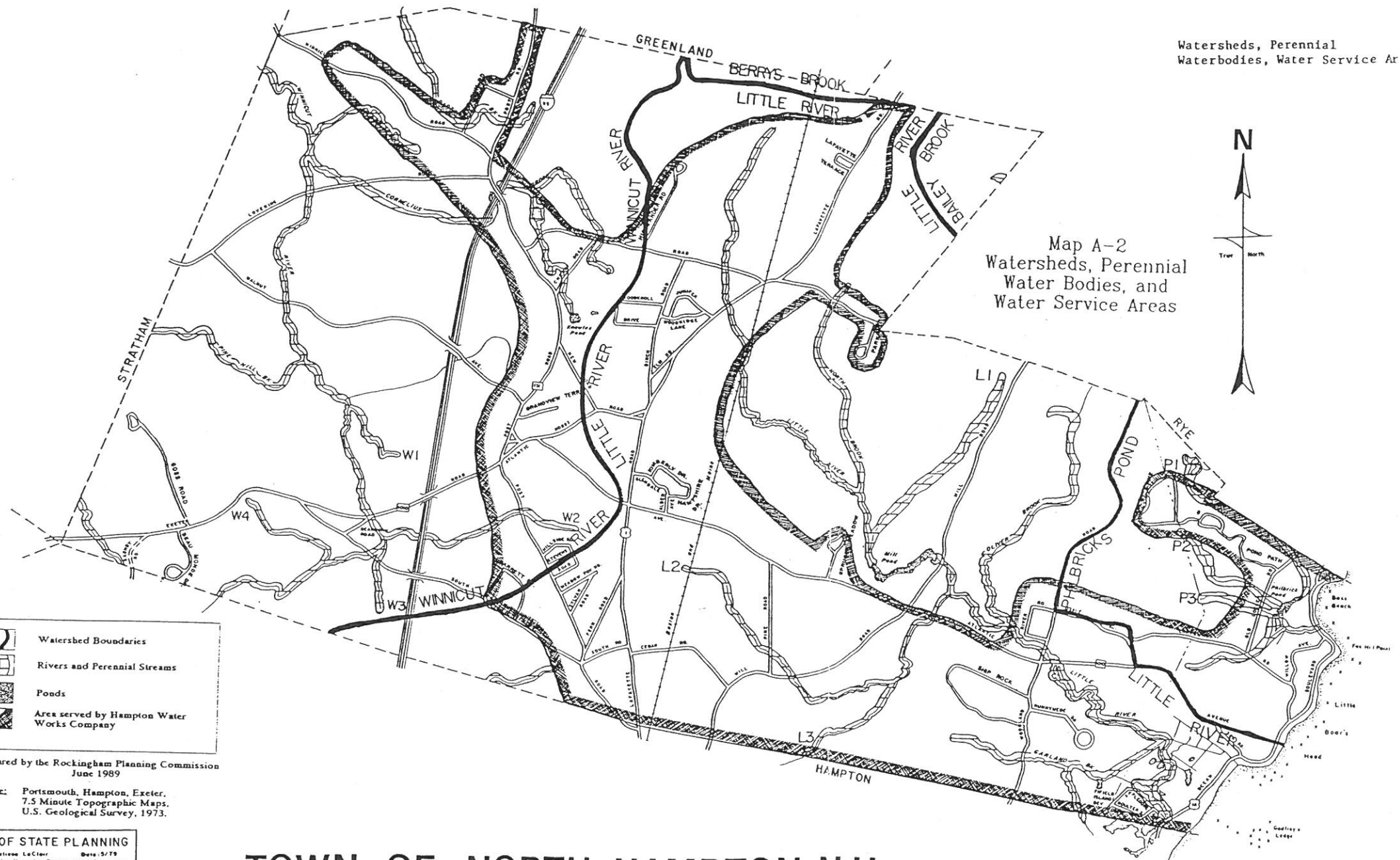
Within the Town of North Hampton, the Winnicut River is fed by seven perennial tributaries, three of which are named: Cornelius Brook, Barton Brook, and Pine Hill Brook. All seven tributaries are free flowing. The four unnamed tributaries are coded as W-1 through W-4 on Map B and Table 1.

- 1) Cornelius Brook: At its origin near Knowles Pond, Cornelius Brook is 80 feet MSL. The Brook flows for two miles west, and drops to 50 feet MSL at the Winnicut River.
- 2) Barton Brook: At its origin in the northwest part of North Hampton, Barton Brook is 60 feet MSL. The Brook flows for one mile northwest and drops to 25 feet MSL at the Greenland border.
- 3) Pine Hill Brook: At its origin at the Stratham Town line, Pine Hill Brook is 95 feet MSL. The Brook flows for 4500 feet east, and drops to 50 feet MSL at the Winnicut River.

Regional Watersheds



Source: U.S.D.A./S.C.S. Hydrologic Unit Map.



- Watershed Boundaries
- Rivers and Perennial Streams
- Ponds
- Area served by Hampton Water Works Company

Prepared by the Rockingham Planning Commission
June 1989

SOURCE: Portsmouth, Hampton, Exeter,
7.5 Minute Topographic Maps,
U.S. Geological Survey, 1973.

OFFICE OF STATE PLANNING
DRAFTED BY: Melissa LeClair Date: 5/79
SOURCE: State of New Hampshire Department of Resources
and Economic Development
ROADS UPDATED, NOV. 1988 R.P.C. Date: 4/80
ACCEPTED BY TOWN

TOWN OF NORTH HAMPTON, N.H.

The New Hampshire Coastal Program provided a grant for the preparation of this map which was financed in part by the Coastal Zone Management Act of 1972, as amended, administered by the Office of Ocean and Coastal Resources Management, National Oceanic and Atmospheric Administration.

North Hampton's Winnicut River watershed also contains Knowles Pond, a 1.2 acre water body at 80 feet MSL. Knowles Pond is not connected to Cornelius Brook.

- b. Little River: As shown on Map A-2, the Little River watershed contains 5,039 acres (7.9 sq.mi.) in Hampton and North Hampton. Within North Hampton, the Little River sub-watershed is 4,488 acres (7 sq.mi.). Little River flows easterly from its origin in northern North Hampton at 70 feet MSL to the Atlantic Ocean. Along its 4.5 mile course the Little River is dammed at five locations, the largest being Mill Dam. It is considered a Class "A" dam by the N.H. Water Resources Board meaning it has a "low hazard potential". In the case of failure, it would result in any of the following: no expected loss of life, minimal economic loss to occasional structures or agriculture; and/or damage to minor town roads (source: N.H. Code of Administrative Rules Wr 101.15). There are two smaller Class "AA" dams along the river - a nine foot tall dam located east of Mill Road and a four foot tall dam near Atlantic Avenue.

Little River is fed by six perennial streams: North Brook, Oliver Brook, Garland Brook and three unnamed streams (coded as L-1, L-2, and L-3 on Map B and Table 1). All six brooks and streams are free flowing.

- 1) North Brook: North Brook originates just above North Road at 70 feet MSL, and flows for one mile southerly to Little River at an elevation of 50 feet MSL.
- 2) Oliver Brook: At its origin near the Rye border, Oliver Brook is 50 feet MSL. It flows for 1.8 miles southerly to Little River at an elevation of 15 feet MSL.
- 3) Garland Brook: Garland Brook originates just west of Woodland Road in North Hampton at 15 feet MSL, and flows for one mile easterly to Little River at an elevation of 5 feet MSL.

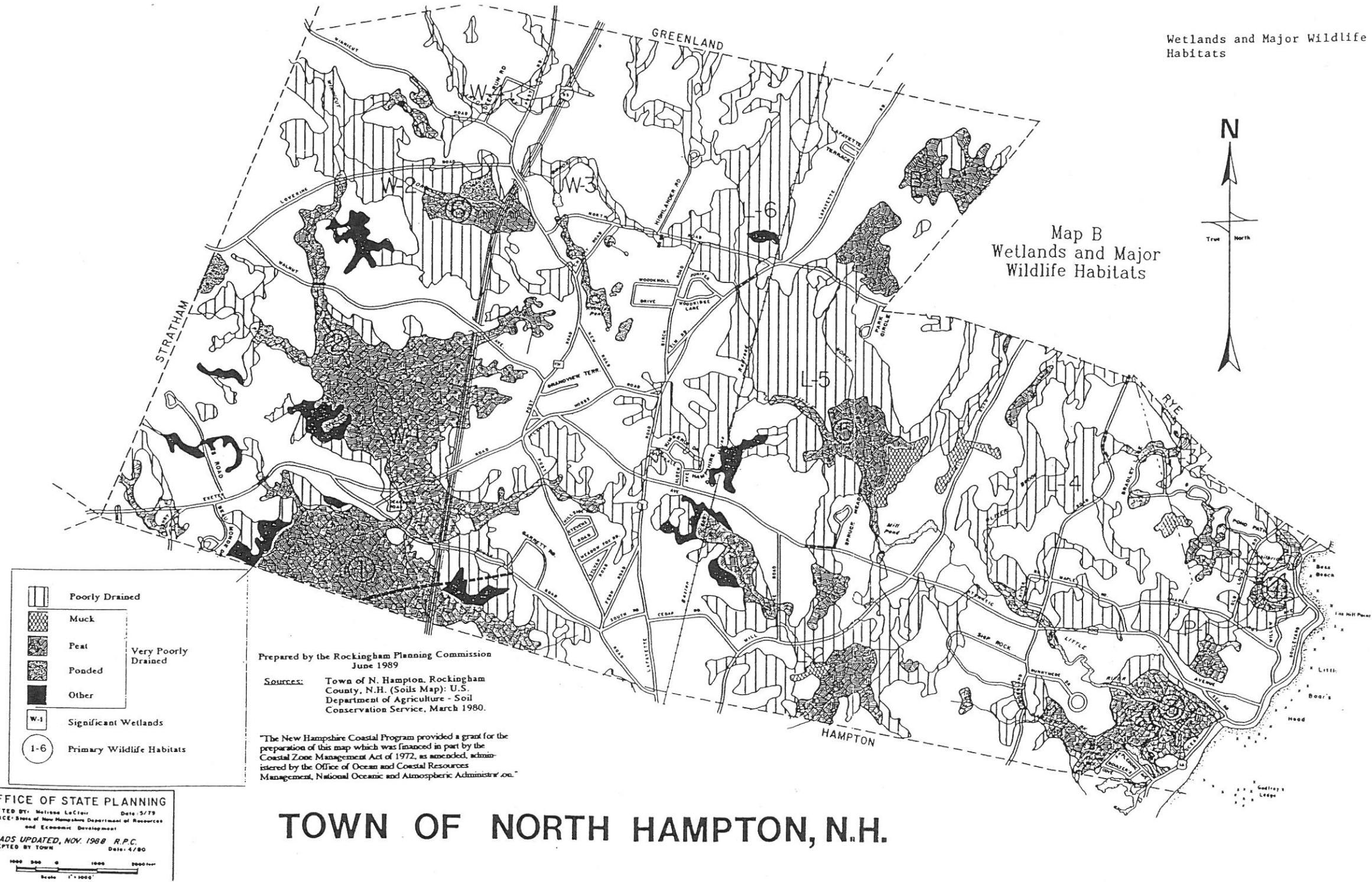


Table 1. Unnamed Perennial Streams

Stream	Location	Length (ft)	Elevation (ft)
W-1	West	2000	55 to 45
W-2	Central	5200	70 to 55
W-3	S. West	1200	55 to 50
W-4	S. West	2600	55 to 50
L-1	N. East	6000	70 to 50
L-2	S. East	10200	80 to 30
L-3	S. East	3000	60 to 50
P-1	N. East	2800	40 to 10
P-2	N. East	4400	20 to 10
P-3	N. East	2000	20 to 10

Note: "Length" is the length of the stream within North Hampton. "Elevation" is the stream's elevation above mean sea level, within North Hampton.

North Hampton's Little River watershed also contains one manmade pond - Mill Pond. Located northwest of the intersection of Mill Road and Atlantic Avenue, Mill Pond is approximately 7 acres and is at an elevation of 45 feet MSL. As explained earlier, the pond was formed by a dam constructed along the Little River.

- c. Philbrick Pond: The Philbrick Pond watershed is located in Rye and North Hampton and is 913 acres (1.4 sq.mi.). Within North Hampton, the Philbrick Pond sub-watershed is 693 acres (1.1 sq. mi.). Located between Central Road, Route 1A and Chapel Road, it is approximately 4.5 acres and is at an elevation of 10 feet MSL. The pond is fed by Chapel Brook and three unnamed perennial streams (coded as P-1, P-2, and P-3 on Map B and Table 1). Philbrick Pond is connected to the Atlantic Ocean and is affected by tidal action.
 - 1) Chapel Brook: At its origin just north of Atlantic Avenue, Chapel Brook is 15 feet MSL. It flows 3000 feet easterly to Philbrick Pond at an elevation of 10 feet MSL. There is a small four foot high dam on Chapel Brook near Chapel Road.
- d. Berry's Brook: The Berry's Brook watershed is located mainly in Rye and Portsmouth. It is 6,500 acres (10.2 sq.mi.), but within North Hampton the

Berry's Brook sub-watershed occupies only 46 acres (0.07 sq.mi.). The land area is located along the Rye Town line between Route 1 and the Boston and Maine Railroad tracks. None of Berry's Brook or any other water body is actually located in North Hampton.

- e. Bailey's Brook: The Bailey's Brook watershed is located mainly in Rye. It is 1,648 acres (2.6 sq.mi.), but within North Hampton the Bailey's Brook sub-watershed occupies only 124 acres (0.19 sq.mi.). The land area is located east of Route 1 along the Rye Town line. Bailey's Brook flows easterly at 75 feet MSL for only 200 feet before it enters the Town of Rye. Within North Hampton it is free flowing. No other water bodies are located within this watershed.

Table 2 - "Total Acreage of Wetlands and Floodplain Areas", presents a breakdown of the acreage of floodplain areas, and poorly drained and very poorly drained soils within North Hampton's five sub-watersheds.

Table 2. Acreage of Wetlands and Floodplain Areas

Regional Watersheds:	Great Bay	Coastal				
Sub-Watersheds:	Winnicut River	Little River	Philbricks Pond	Berrys Brook	Bailey Brook	
Poorly Drained	650	1278	172	7	15	
Very Poorly Drained	827	624	93	0	48	
Floodplain	795	393	112	0	0	

Map B - "Wetlands", depicts the locations of wetland areas throughout North Hampton. This information was taken from an SCS County Soil Survey Map (source: USDA Soil Conservation Service, October 1993). Wetlands are defined as poorly and very poorly drained soils. Approximately 38.1% of the land in North Hampton is considered wetlands, with 14.8% being poorly drained soils and 23.3% being very poorly drained soils. Much of these wetlands are contained in North Hampton's 100-year flood zones, which are depicted on Map C - "Flood Hazards and Bedrock Geology." Flood hazard boundaries are those shown on the Town of North Hampton "Flood Insurance Rate Map" (effective date: June 3, 1986), published by the Federal Emergency Management Agency (FEMA). In general, the 100-year flood zone surrounds the major water courses throughout Town. The three

largest contiguous flood areas surround the Winnicut River, Little River and Philbrick Pond.

Table 3 - "Areas of Significant Wetlands and Floodplains," presents the approximate acreage of each significant concentration of wetlands within North Hampton's five sub-watersheds. A "significant concentration" of wetland is herein defined as a contiguous and localized area of 20 acres or more. The wetland area codes correspond to those depicted on Map B. In the same fashion, Table 3 lists the approximate acreage of each floodplain area within North Hampton's sub-watersheds, as depicted on Map C.

Development should be located away from wetlands and floodplains. The filling of and use of wetlands for building construction not only destroys wetlands and their benefits, but may also lead to groundwater contamination. Building within a flood zone may also reduce the floodplain's capacity to absorb and retain water during periods of excessive precipitation and runoff. Moreover, in regard to building within floodplains, contamination may result from flooding damage to septic systems. Without specific flood-proofing design and construction, development within floodplains poses threats to public health, safety, and welfare.

Table 3. Areas of Significant Wetlands and Floodplains

Wetland Area	Acreage ¹	Floodplain Area	Acreage ²
W-1	845	W-1	245
W-2	431	W-2	285
W-3	36	W-3	256
W-4	57	W-4	9
L-1	124	L-1	88
L-2	391	L-2	73
L-3	171	L-3	232
L-4	248	P-1	112
L-5	651		
L-6	247		
P-1	116		
P-2	63		
P-3	36		
B-1	62		

¹See Map B
²See Map C

In accordance with N.H. Code of Administrative Rules (Wr700), the Water Management Bureau (of the Water Resources Division, N.H. Department of

Environmental Services (DES)) compiles data on all water users throughout the State which withdraw or discharge more than 20,000 gallons of water per day. According to the Bureau, the Town of North Hampton presently has no major users of surface water.

Potential Surface Water Supplies

The two largest rivers in North Hampton, the Winnicut River and the Little River, have a legislative classification for water quality of "B" which means they would require adequate treatment before being suitable for public consumption. According to the 1988 New Hampshire Water Quality Report to Congress 305 (b), Winnicut River and Little River are in compliance with the water quality standards set by their legislative classification. However, due to their small flows, these rivers are unsuitable as a public drinking water supply within North Hampton. Furthermore, none of the Town's ponds are of sufficient size to be used as a municipal water supply.

At this time, the most economical and practical source for public water in North Hampton continues to be from groundwater, which requires much less treatment. The Hampton Water Works Company, which services North Hampton, obtains its water from ten gravel-packed wells and one bedrock well, five of which are located in North Hampton. An additional three bedrock wells are scheduled to come on line in 1999.

II. DESCRIPTION OF GROUNDWATER RESOURCES

Stratified Drift Aquifers

The U.S. Geological Survey Aquifer Delineation Maps for the Lower Merrimack/Coastal Area, which includes North Hampton, have not been published as of this date. Therefore, other previous studies and sources have to be utilized.

One important source is a study from the U.S.G.S. entitled Availability of Groundwater in the Piscataqua and Other Coastal River Basins, Southeastern New Hampshire, by John E. Cotton, Water-Resource Investigations 77-70. This study identified areas of high, medium or low potential to yield significant quantities of groundwater (see Map D). The reference map provides the following narrative with respect to the delineated aquifers:

Potential High Yield Aquifers - "Areas inferred to be underlain by medium to very coarse sand or sand and gravel with sufficient saturated thickness to have high potential to yield water. Included are areas with fine-grained surficial deposits, which are inferred to be underlain by medium to very coarse sand or sand and gravel. Wells located by systematic ground-water exploration within these areas

should yield sufficient quantities to meet or augment municipal and industrial requirements. Deposits are thinner and wells would be less productive along the margins of these areas. Pumping wells adjacent to streams or lakes may induce surface water to infiltrate the aquifer."

Potential Medium Yield Aquifers - "Areas inferred to be underlain by relatively thin saturated sections of medium to very coarse sand or sand and gravel that have medium potential to yield water. Shallow wells and infiltration galleries located by systematic groundwater exploration within these areas may yield sufficient quantities of water for small municipal and rural water districts and commercial and light industrial use. Deposits are thinner and wells would be less productive along the margins of these areas, except where they border areas of high potential. Pumping wells adjacent to streams or lakes may induce surface water to infiltrate the aquifer."

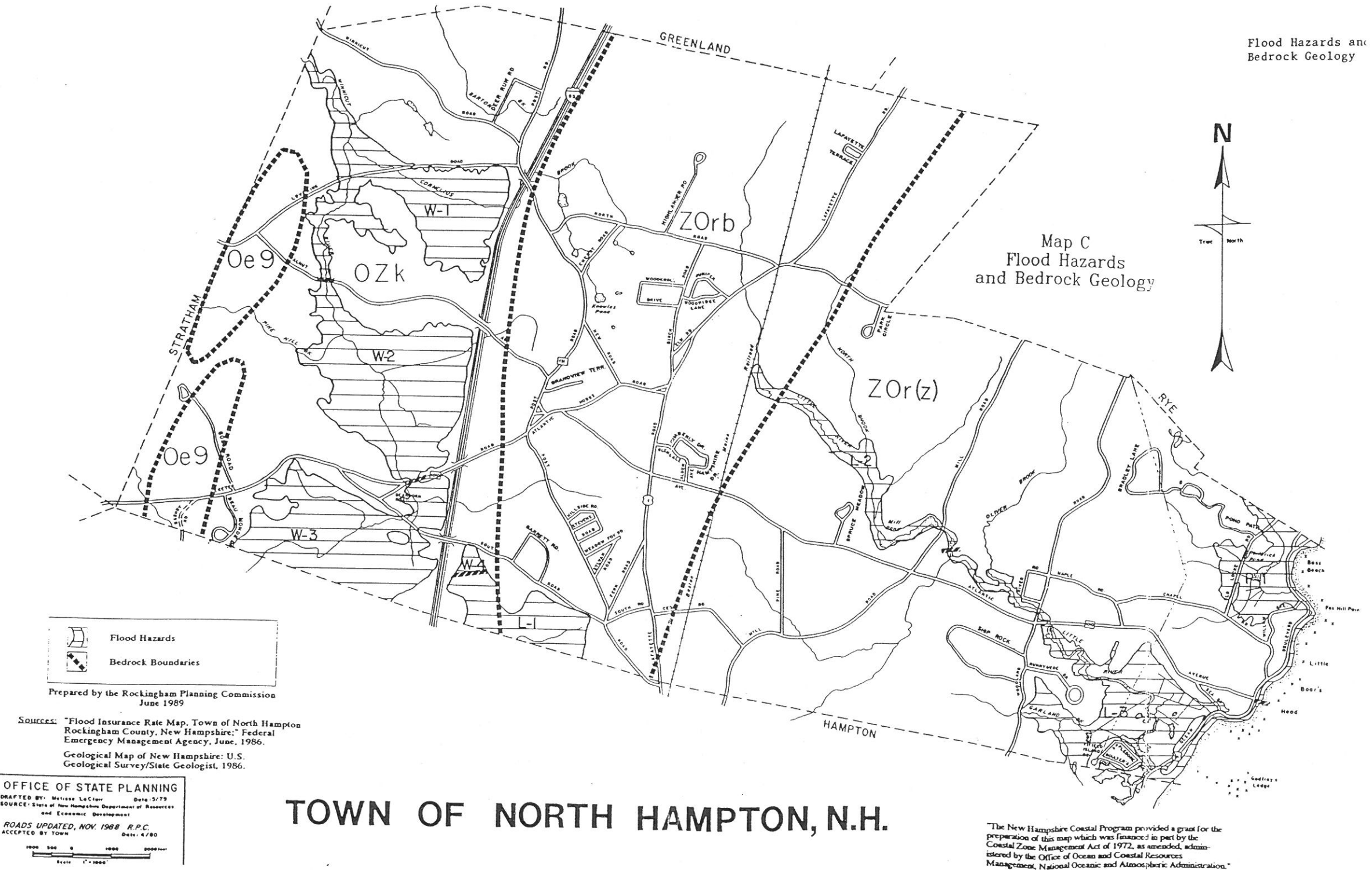
Potential Low Yield Aquifers - "Areas inferred to be underlain by fine and very fine sand, silt, and clay that have low potential to yield water. These deposits may yield sufficient water to wells for domestic and light commercial use. In places, thin lenses of coarse sand and gravel with higher potential yield may occur within or underlie these deposits, but these lenses may or may not have adequate storage or recharge to provide large sustained well yields. Pumping wells adjacent to streams, lakes, or tidewater may induce surface water to infiltrate the aquifer."

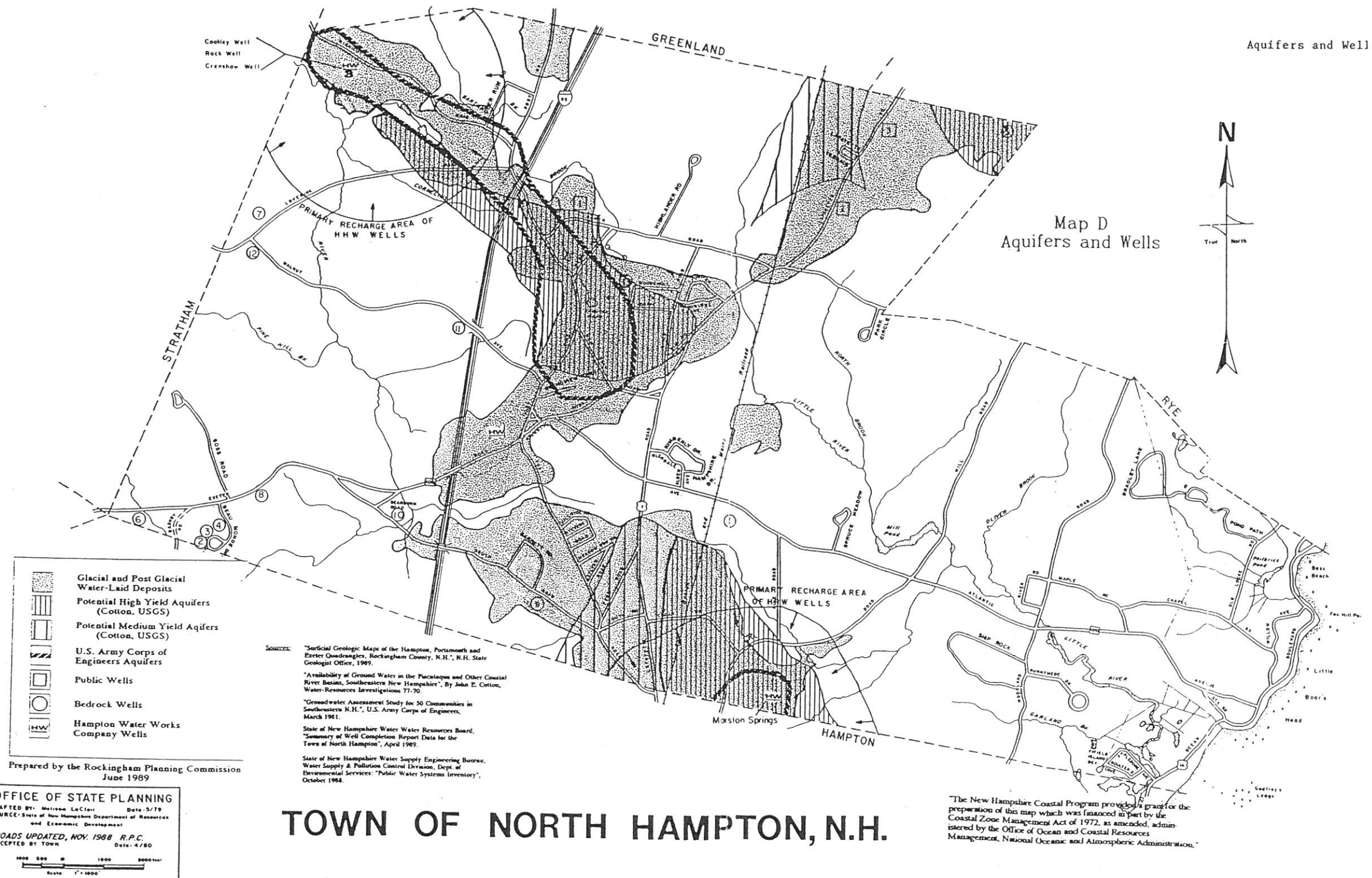
Map D identifies three high yield aquifer areas, and two medium yield aquifer areas. Due to the unlikelihood of yielding water supplies adequate enough for municipal use, the low yield aquifers were not included on Map D. A large part of North Hampton is shown to have potential to yield significant groundwater supplies.

Another source of groundwater information, that is at least as detailed and accurate as the Cotton maps, is the U.S. Army Corps of Engineer's report entitled, Groundwater Assessment Study for 50 Communities in Southeastern New Hampshire. This report identified two aquifers, one wholly within town and a smaller one on the Hampton town line (see Map D). The larger aquifer, which stretches from the New Road/Knowles Pond area to the point where the Stratham, Greenland and North Hampton town lines meet, is 397 acres in size. This aquifer is recharged by the Winnicut River and precipitation. Located within the Winnicut River watershed, this aquifer is the location of several Hampton Water Works Company wells.

The smaller aquifer, which extends into Hampton, is 224 acres in total, with only 46 acres in North Hampton. Marston Springs Well, owned by the Hampton Water Works Company is located within the North Hampton portion of the aquifer. Precipitation is the source of recharge for this aquifer.

The Utilities and Public Services chapter of this plan discusses capacity, yields and specifics on the number and location of wells.





Map D also identifies the primary recharge areas for the Hampton Water Works Company wells, which are also shown. The information was obtained from a 1987 report prepared by Leggette, Brashears & Graham, Inc., entitled Evaluation of Recharge Areas for Water Supply Wells of the Hampton Water Works Company.

The latest and most reliable source of information concerning stratified drift aquifers is from the N.H. State Geologist's Office. Identified as "glacial and postglacial water-laid deposits" these stratified drift aquifers are identified according to their general location in North Hampton. (Hereinafter, these aquifers will be referred to as the "northwest" aquifer, "northcentral" aquifer, "northeast" aquifer, "central" aquifer, "east central aquifer" and "southern" aquifer.) The U.S.G.S. Aquifer Delineation Maps and the surficial geology maps provide the most accurate delineation of North Hampton's stratified drift aquifers.

According to the State Water Management Bureau, North Hampton has no major users of groundwater. However, the Hampton Water Works Company's records indicate that each of their four wells in Town withdraw more than 20,000 gallons a day. Each of the wells are located with the stratified drift aquifers. Three wells are located in the "northwest" aquifer and one is in the "southern" aquifer. As of 1998 the total sustained yield for the system is 5.39 mgd with a short term yield of 6.4 mgd. (including the additional three wells).

According to the Water Resources Division of the N.H. Department of Environmental Services (DES), 27 wells were reported as being completed between January 1984 and February 1988. The well log data is presented in the "Summary of Well Completion Report Data for the Town of North Hampton, dated April 18, 1989, and is contained herein as Appendix I.

Map D depicts the locations of 13 of these wells which were mapped by the Water Well Board of the N.H. DES (denoted by circles). Of these, three are located within a stratified drift aquifer as identified by the N.H. State Geologist. All of the wells are bedrock wells with depths ranging from 120 to 180 feet. Two of the wells had discharges of 50 gallons per minute while the third had 20 gallons per minute.

Map D shows three other well locations, all of which are classified as public water systems by the Water Supply and Engineering Bureau of the DES Water Supply and Pollution Control Division (denoted by squares). These water systems are labelled A, B, and C and are indexed by name in Appendix II, "Public Water Systems Inventory". The Hampton Water Works Company reports that water service is available to the King Motel, but it is not utilized.

Bedrock and Till Aquifers

The State Geologist map (previously cited), which depicts North Hampton's surficial geology, contains information regarding the location and extent of till (and marine

sediment) formations. In general, till material has poorly sorted grain sizes, which results in limited porosity, transmissivity and hydraulic conductivity. Given these qualities, till formations would not be suitable for municipal water supply wells. Hence, these areas have not been delineated in this plan.

The bedrock geology of North Hampton was determined using the "Interim Geologic Map of New Hampshire", U.S. Geological Survey/State Geologist (1986), prepared at a scale of one inch equals approximately four miles. As previously stated, Map D depicts the bedrock wells which were mapped by the Water Well Board. In addition, the fault lines of different formations are shown on Map C, "Flood Hazards and Bedrock Geology".

North Hampton has four general types of bedrock geology:

1. Rye Gneiss (metamorphic)
 - a) ZOr (z) - light colored to gray schists, and gneisses, quartzites, and amphibolites;
 - b) ZOrb - Breakfast Hill member, quartz-feldspar granitic gneiss and blastomylonitic migmatite;
2. Kittery Formation (metamorphic)
 - a) OZK - well bedded and grade-bedded purple and green phyllite and tan calcareous siltstone;
3. Ordovician Plutons (igneous)
 - a) Oe9 - proxene and pyroxene - hornblende diorite and gabbro, with minor granodiorite and granite;
4. Devonian Rocks of the Plutonic Suite (plutonic)
 - a) D1m - two mica granite of northern and southeastern N.H.

Appendix I includes a list of well log data for North Hampton. Map D depicts the locations of the 10 wells that are located outside the stratified drift aquifers previously identified. Each of these 10 wells are drilled in bedrock at depths ranging from 80 to 425 feet. Discharges from these wells ranged from 3 to 40 gallons per minute.

Radon

Radon contamination in water from bedrock wells has recently become a concern throughout the U.S. Radon is a colorless, odorless, cancer-causing gas produced as

uranium (typically occurring in trace amounts) decays. This gas escapes from water once it is brought up from the ground. For example, when a shower is used in a home with radon-containing water, radioactive gas diffuses into the air.

Several years ago New England was surveyed for its susceptibility to radon using remote sensing techniques. A map was produced from this project entitled: "Generalized Bedrock Geologic Map of New England with Emphasis on Uranium Endowment and Radon Production," (W.J. Olszewski, Jr.; UNH, 1986). Around this time the U.S.G.S. drafted a map (unpublished, but available for inspection at the State Geologist Office) showing the uranium concentration in rocks throughout New Hampshire. In April 1989, the State Geologist devised a "radon susceptibility rating" system for the bedrock types in the region, based on the probability of radon occurrence. This rating system ranged from "Very Low" to "Very High". The bedrock types listed above and shown on Map C have been rated as follows:

D1m = Very High
Zor(z) = High
Zorb = Medium
Ozk = Medium
Oe9 = Very Low

Potential Groundwater Supplies

Groundwater is a very valuable resource for the Town of North Hampton. For decades, it has been the source of water for individual wells and the Hampton Water Works Company. Groundwater has the potential to provide the Town with drinking water for many generations to come. However, as North Hampton has learned from experience, the resource is vulnerable to contamination or depletion if not properly managed and protected.

Groundwater quality can be impaired by a variety of materials. Sources of groundwater contaminants include landfills, commercial and industrial wastes, agricultural fertilizers, human sewage, road salting, etc. Groundwater quantity is reduced by contamination of available groundwater supplies, over-pumping in the aquifer zone, and increasing impervious surfaces such as roof tops and parking lots, thereby preventing recharge of the aquifer. These threats to groundwater are discussed further herein (see Section III).

Each of the five present and three potential Hampton Water Works Company wells in North Hampton and three public water systems are located within the Town's aquifer areas. The "northwest aquifer" contains three of the Hampton Water Works Company wells; the "northeast aquifer" contains two public water systems; the "central aquifer" contains one public water system; and the "southern aquifer" contains one of the Hampton Water Works Company wells. Otherwise, the groundwater within the aquifer areas is primarily used for private homes and some businesses.

North Hampton's "northeast" aquifer also contains several potential pollution threats directly within its boundaries. These include: the Coakley Landfill; a State of New Hampshire covered salt pile just over the Rye Town line; and two subsurface concentrations of effluent from on-site sewage disposal (from the North Hampton Mobile Home Park and Granite Post Green Mobile Home Park).

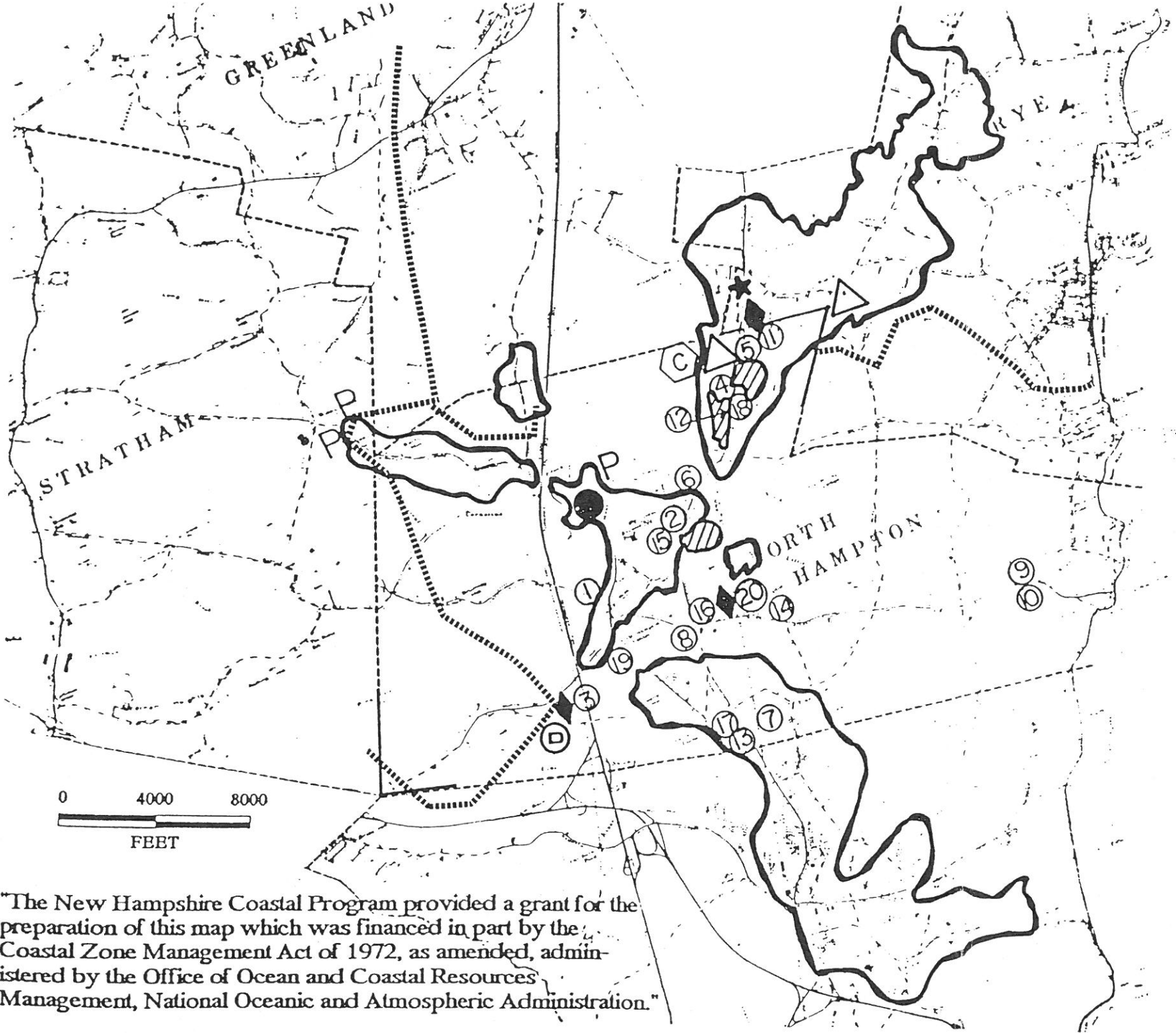
North Hampton's "central" aquifer also contains several potential pollution threats near its periphery. These include the potential pesticide application on the Sagamore Hampton Golf Club on the northern edge of the aquifer; and several inactive gravel pits.

Aside from several open pits, the remaining aquifers have no potential threats located within their boundaries. A full description of these threats is presented within Section III, entitled "Identification of Potential Threats to Water Resources", and on Map E "Existing Potential Pollutant Sources", contained herein.

Map F "Generalized Zoning" shows that North Hampton's Industrial Business Zone overlays most of the "northeast" aquifer, about half of the "southern" aquifer and a portion of the "central" and "east central" aquifers. Given the extent of vacant land within these aquifer areas, and the rapid development along Lafayette Road which runs through three of the aquifers, there is high potential for further commercial, industrial, and residential development. Map G "Generalized Future Land Uses" indicates that no expansion of the Industrial Business Zone into known aquifers is planned. Low density residential is the preferred use of the aquifer areas not already covered by commercial or industrial uses. The Town should continue to closely scrutinize and monitor development in these areas in order to prevent potential groundwater contamination or depletion.

The USGS published information regarding North Hampton's aquifers in 1990. This report quantifies important pumping factors, such as water table elevation, saturated thickness, transmissivity, direction of groundwater flow, and water quality. This data will assist in determining which aquifers are best suited for additional water supplies. Also the U.S. Environmental Protection Agency has listed the Coakley Landfill as a "super fund" site and recommend remedial actions be taken. These remediation efforts will have a definite impact on the potential use of the aquifer. Hopefully, the long-range sampling program currently in place will render the area suitable for recreation at some point in the future.

North Hampton's most practical source for additional water supplies is from its aquifers because of their accessibility and, in certain cases, their relative purity. It is therefore necessary for the Town to protect its aquifers by enforcing measures which will promote groundwater recharge and reduce the risk of contamination. This course of action will help to safeguard an excellent source of drinking water for the future residents of North Hampton.



Map E
Existing Potential
Pollutant Sources

- Brush Dump
- ⓓ Abandoned Dump
- △ Closed Landfills
- ★ Active Dump
- ◆ Covered Salt Piles
- ▨ Subsurface Disposal Concentrations
- Ⓟ Pesticides Permits
- River
- ~ Aquifer
- Underground Tank Sites
- Ⓢ Coakley Landfill Hazardous Waste Site

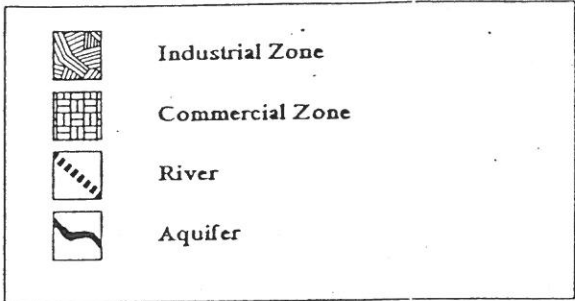
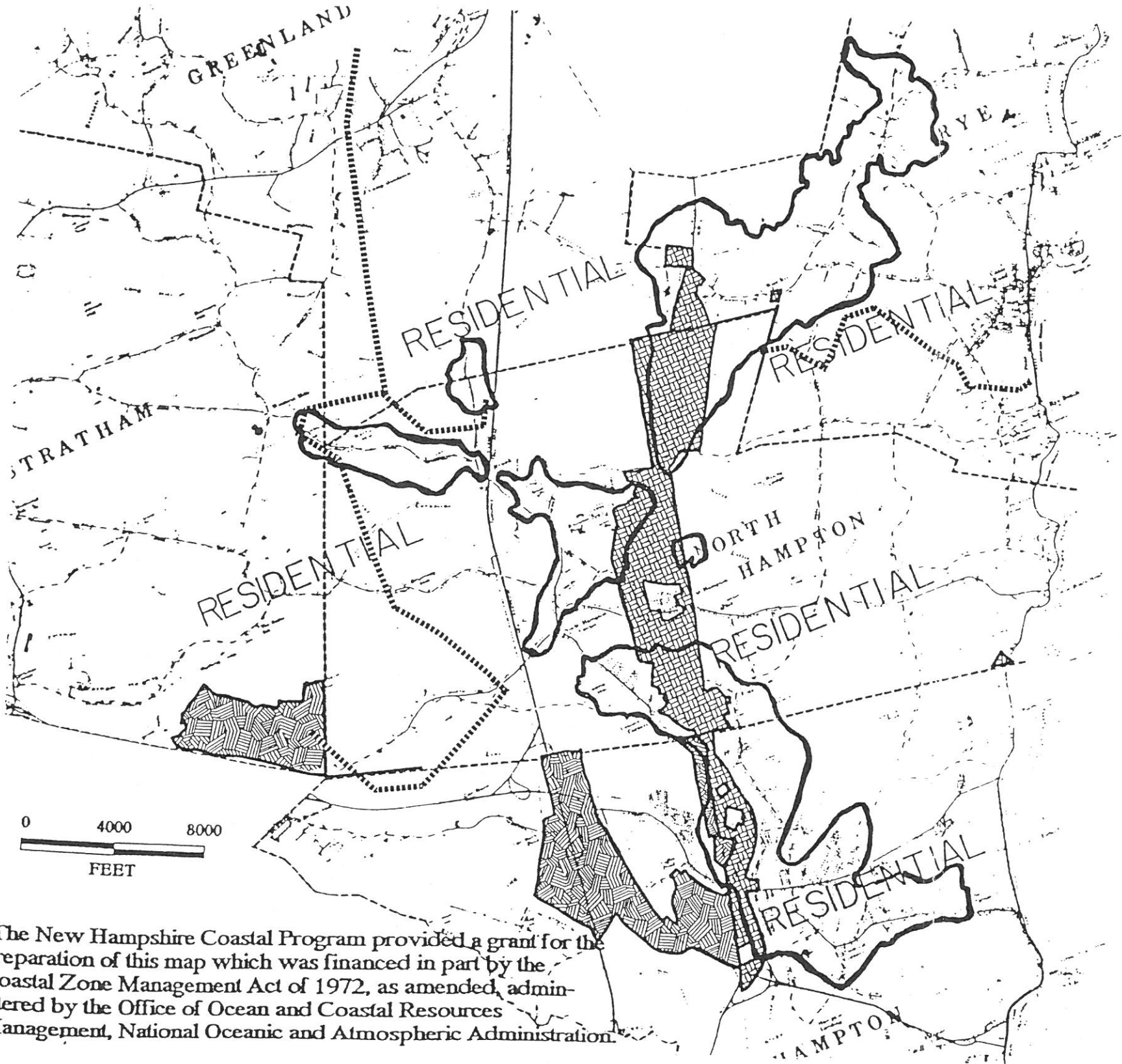
Prepared by the Rockingham Planning Commission
June 1989

Sources: Waste Site Inventory; Waste Management Div. N.H. Department of Environmental Services, November 1986.

"Inventory of Groundwater and Surface Water Potential Nonpoint Pollution Sources", N.H. Dept. of Environmental Services, February 1982.

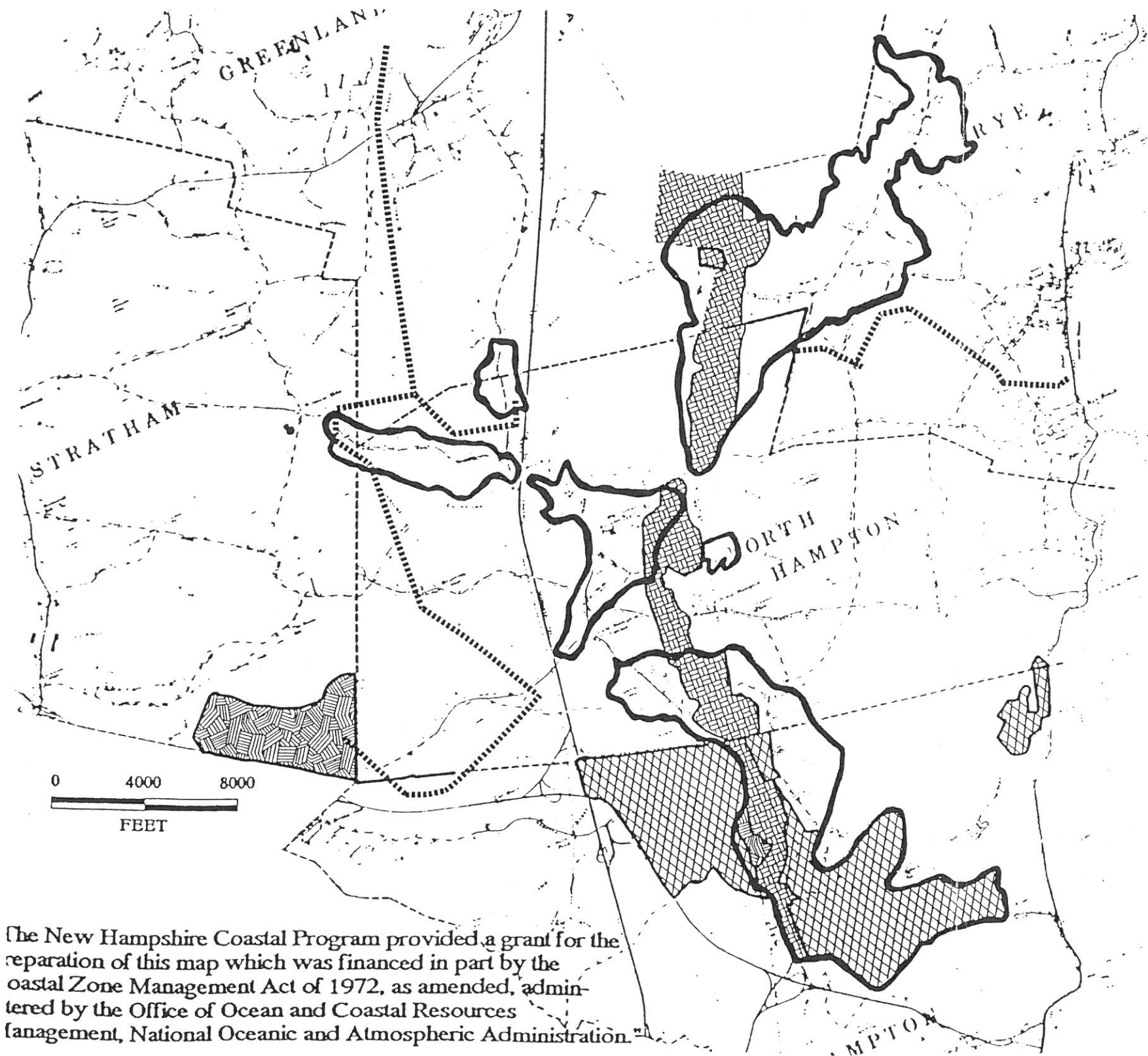
"The New Hampshire Coastal Program provided a grant for the preparation of this map which was financed in part by the Coastal Zone Management Act of 1972, as amended, administered by the Office of Ocean and Coastal Resources Management, National Oceanic and Atmospheric Administration."

Map F Generalized Zoning

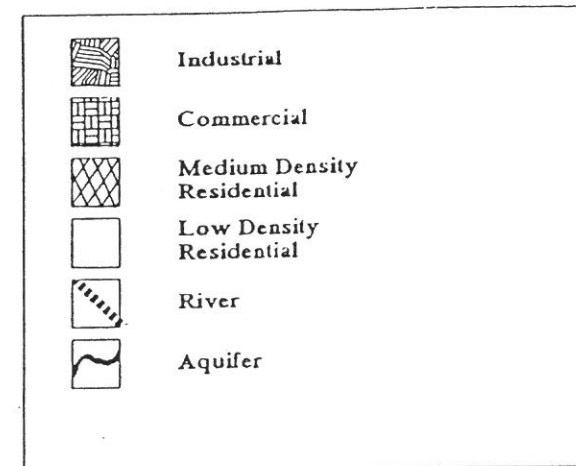


Prepared by the Rockingham Planning Commission
June 1989
Sources: Town Zoning Ordinances.

The New Hampshire Coastal Program provided a grant for the preparation of this map which was financed in part by the Coastal Zone Management Act of 1972, as amended, administered by the Office of Ocean and Coastal Resources Management, National Oceanic and Atmospheric Administration.



Map G Generalized Future Land Uses



Prepared by the Rockingham Planning Commission
June 1989

Sources: Town Master Plans

The New Hampshire Coastal Program provided a grant for the preparation of this map which was financed in part by the Coastal Zone Management Act of 1972, as amended, administered by the Office of Ocean and Coastal Resources Management, National Oceanic and Atmospheric Administration.

III. IDENTIFICATION OF POTENTIAL THREATS TO WATER RESOURCES

Potential Nonpoint Pollutant Sources

- A. Within North Hampton
1. Existing Potential Pollutant Sources:

Nonpoint sources of pollution involve the diffuse discharge of wastes from sources which are widely spread, difficult to identify, and hard to control. Nonpoint pollution is typically produced from land runoff during times of rain and snowmelt.

The following is a general list which briefly describes potential nonpoint pollution sources, and their associated mitigation techniques, within the Town of North Hampton.

Table 4
Nonpoint Pollutant Sources and Remedies

Source	Remedy
subsurface sewage disposal	replacement and/or relocation;
agricultural runoff	best management practices, e.g., concrete manure pits, no winter manure-spreading, etc.;
road salt storage and application	salt sheds, decrease salt to sand ratio, emphasize mechanical snow removal using plows, graders, etc., reduce frequency of application; increase use of calcium chloride and other de-icing chemicals;
storm runoff from construction	erosion control measures e.g., haybales, sites silt fences, straw mulch, etc.;
storm runoff from parking lots	catch basins which trap grit, oil and/or grease;
sediments from silted-in catch basins and detention ponds	maintenance programs
application of lawn fertilizers	integrated pest management, e.g., soil and pesticides testing, biological pest control, timing of lawn care, etc.

(Table 4 cont.)

Source	Remedy
runoff/leachate from junkyards	drainage collection/treatment systems, and abandoned landfills and proper disposal of hazardous materials, e.g. battery acid, gasoline, etc. with a certified hauler;
leaking underground storage	remove abandoned tanks, monitor and tanks regulate existing tanks;
snow dumping into water bodies	prohibit snow dumping in or near surface waters (as well as wetlands, aquifer recharge areas, or gravel pits).

The following paragraphs describe the potential non-point source pollutant categories which were evaluated for the Town of North Hampton in the "Inventory of Groundwater and Surface Water Potential Non-point Pollution Sources," (Water Supply and Pollution Control Division, New Hampshire Department of Environmental Services, February 1982).

Information was also taken from the "Waste Site Inventory", maintained by the Waste Management Division of the New Hampshire Department of Environmental Services, dated September 1987 (the most recent inventory available). Examples of specific existing land uses that represent potential non-point pollutant sources are depicted on Map E, "Existing Potential Pollutant Sources".

- a. Primary Groundwater Impacts
 - 1. Subsurface Disposal Concentrations: A concentration of subsurface sewage disposal was identified at the North Hampton Mobile Home Park and the Shel-Al Mobile Estates. Since that study was completed a third mobile home park, Granite Post Green, was built. These parks represent a minimum impact due to a treatment facilities update that meets State standards.
 - 2. Waste Disposal Sites: The Waste Site Inventory from DES identified only the following three sites in North Hampton. Each site is shown on Map E.

Coakley Landfill: The site, near the Rye town line west of Route 1, was formerly used for solid waste disposal. From 1972 until 1982, the landfill accepted municipal solid waste

from North Hampton, Portsmouth, Rye and New Castle. From 1983 to 1985, Pease Air Force Base deposited incinerator ash at the site. The facility was closed in 1985 after volatile organic compounds were found in nearby private wells. The landfill is on the Environmental Protection Agency's Superfund cleanup list. Approximately 100 monitoring wells are in place around the closed landfill. The locations of the monitoring wells are shown on a map included in Appendix IV. The N.H. Department of Environmental Services ordered in May of 1989 that a six inch layer of gravel be used to cover exposed piles of ash. Since 1989 a lining, clay covering and vegetation was added using Best Available Technology practices.

Water quality data from the monitoring wells is available from a publication entitled, Remedial Investigation Coakley Landfill, North Hampton, New Hampshire - Volume One, October 1988. This report was prepared for the N.H. Department of Environmental Services Waste Management Division by Roy F. Weston, Inc. and Goldberg-Zoino and Associates, Inc.. Benzene and vinyl chloride were the principal volatile organic compounds observed in groundwater at concentrations exceeding primary EPA drinking water standards. Two metals - iron and manganese, were detected at levels exceeding EPA secondary drinking water standards. In addition, chloride and total dissolved solids, both of which are inorganic compounds, were found at levels exceeding EPA standards. For a more detailed list of water quality data and other information, the reader is referred to the numerous studies prepared for DES and EPA concerning the Coakley Landfill, copies of which are available for at the North Hampton Town Library and Town Offices.

Dumps: The former Town dump is located off South Road west of Interstate 95. For many decades this dump was the site of open burning. According to the State Solid Waste Plan, the dump has not been properly closed. The land is now owned by the State. In addition, a 5.74 acre parcel of land off of Cherry Road serves as a brush dump for the Town. According to DES officials, there are no monitoring wells in

place for the two dumps.

3. Salt Pile: North Hampton has two salt piles located in the community. Approximately 100 tons of salt used for Town roads is stored in a concrete shed near the Public Works garage. The State Department of Transportation has a covered salt pile in a shed at its garage on South Road, west of Route 95.
4. Salted Roads: North Hampton has a policy to use as little salt as possible on all their roads. A mixture of salt and sand is used on major roads during severe storm conditions. (State maintained highways (N.H. Routes 95, 1, 1A, 111D, 151, Winnicut Road, Walnut Avenue, Hobbs Road, and Mill Road-south of Atlantic Avenue) are salted as necessary during the winter months.)

b. Primary Surface Water Impacts

5. Erosion Sites: Construction sites covering a large area (i.e. greater than one or two contiguous acres) can cause significant erosion problems if control measures are not properly placed throughout the site, especially on sloping land.
6. Snow Dumps: The 1982 "Inventory ..." identified a Town snow dumping location near the Town Offices, however, that practice has been discontinued. No snow dumping now takes place in North Hampton.
7. Pesticides: The only holder of a permit from the N.H. Department of Agriculture for pesticide application is the Sagamore-Hampton Golf Club on North Road. There are two nurseries in town that may be potential permit holders also.

2. Future Potential Pollutant Sources

Long Term - Map F, "Generalized Zoning" shows that a short section of the Little River runs through land that is zoned as Industrial

Business. In addition three of North Hampton's aquifers are within the Industrial Business District to varying degrees. When reviewing future developments within this district, runoff from commercial and industrial sites should be considered as potential sources of nonpoint pollution to groundwater and surface waters.

Generalized future land uses for North Hampton are shown on Map G, "Generalized Future Land Uses". The Future Land Use Chapter does not recommend any expansion of the Industrial-Business District, so no new commercial or industrial uses would be allowed in any new areas over identified aquifers. The plan does recommend the adoption of an aquifer protection district to provide protection to these areas. Nothing proposed in the plan would increase the potential pollutant hazards in North Hampton.

B. Contributing Areas Outside of North Hampton

In determining the areas outside of North Hampton which exhibit potential threats to the Town's water resources, it was appropriate to categorize North Hampton's water resources into surface water and groundwater.

1. Surface Water - Winnicut River and Little River Watersheds

a. Existing Potential Pollutant Sources

The Towns of Hampton and Stratham have the greatest impact on the Winnicut River before it flows into Greenland and back into Stratham. The Hampton portion is low density residential areas (1 acre per dwelling) and undeveloped woodlands and wetlands. The Stratham portion contains a large industrial park which is connected to the Exeter public sewer and water systems. The remaining portion of Stratham is undeveloped woodlands and wetlands and low density residential areas (minimum 1 acre per dwelling).

For the most part, Little River starts in North Hampton and therefore has no identified pollution problems outside of Town. The one un-named branch that begins in Hampton runs through an undeveloped area.

b. Future Potential Pollutant Sources

Hampton's 1985 (amended in 1989 and supplemented in 1995) Master Plan identifies the future land uses of the areas affecting the Winnicut River as being low density residential (1 dwelling per acre) and conservation/open space areas. Hampton has a Special Flood Hazard Area Ordinance and a Wetlands Conservation District (which identifies poorly and very poorly drained soils and establishes buffer areas within 50' of wetlands), both of which protect land in this area. In 1988 the Hampton Board of Selectmen proposed to re-zone this area to industrial at the request of the Hampton Industrial Development Commission. This amendment was defeated by the voters by a wide margin after being strongly opposed by some Hampton residents who lived in the area and by many North Hampton citizens and officials.

Stratham's 1985 Master Plan identifies the land along its border with North Hampton as being industrial in the south and low density residential in the north. Without careful siting and control of industrial uses, surface runoff and process wastes can present a potential threat to the water quality of an abutting river. Stratham's water resources are protected by a Floodplain District Ordinance, a Wetland Conservation District Ordinance and a Shoreline Protection Ordinance that includes the land within 150' of the Winnicut River.

2. Groundwater

a. Existing Potential Pollutant Sources

North Hampton's aquifers extend into Rye, Greenland, Stratham and Hampton. The aquifer areas contained within these four communities consist primarily of low density residential development with the exceptions of commercial development along Route 1 in Rye and Hampton. The Stratham and Greenland portions have no public water or sewer service, while Hampton has public water and sewer service and Rye's portion has public water from the Rye Water District.

The Town of Rye has the greatest impact on North Hampton's "northeast" aquifer. According to the Waste Site Inventory (previously cited), Rye has three potential threats within 0.5 miles from the North Hampton Town line:

- 1) A State of New Hampshire covered salt pile just over the Town line;
- 2) An abandoned landfill which operated for more than 50 years;
- 3) An inactive dump that has been closed by the State of New Hampshire;

The Town of Stratham has two potential threats near the "northeast" aquifer. Both are pesticide application sites in the Winnicut Hills area (identified by the N.H. Department of Agriculture).

Some of the communities surrounding North Hampton participate in the Seacoast Area Mosquito Control (SAMC) program. The spraying of insecticides along residential streets is considered to be a potential nonpoint pollution source, as identified by the 1982 Inventory (previously cited). Even though the chemical used has a half-life of only 90 minutes, the use of a non-toxic insecticide should be considered within the aquifer areas.

b. Future Potential Pollutant Sources

Future land use information for aquifers extending beyond North Hampton's boundaries is based on the master plans and zoning ordinances of Hampton, Stratham, Greenland, and Rye.

The "southern" aquifer shared with Hampton is zoned as commercial, multi-family residential and medium density single-family residential, and is recommended to continue as such in its Master Plan. However, the Hampton Master Plan recommended the adoption of an aquifer protection district in this area and this was approved at the 1989 town meeting.

North Hampton's "northwest" aquifer is shared with Greenland and Stratham, and the "northcentral" with just Greenland. Their master plans recommend low density residential (one unit per acre) in Stratham and medium density residential (two units per 60,000 square feet) in Greenland.

A large portion of North Hampton's "northeast" aquifer extends into Rye. The Future Land Use section of Rye's Master Plan recommends

this aquifer area to be used for highway oriented commercial along Route 1, rural residential (1 1/2 acres per dwelling unit), and semi-rural (1 acre per dwelling unit).

Point Pollution Sources

Information provided by the Water Division in April 1999 indicates that there are no permits issued in North Hampton under the National Pollutant Discharge Elimination System (NPDES) for surface water discharges.

Information also provided by the Water Division in April 1999 indicates that one permit has been issued in North Hampton for groundwater discharges under the N.H. Code of Administrative Rules (Ws 410). One management permit has been issued for the treatment of contaminated groundwater.

Underground Storage Tanks

As of April 1999, the N.H. Department of Environmental Services has identified 16 underground fuel storage tanks, at 8 sites throughout North Hampton. The capacity of these tanks range from 500 to 12,000 gallons, while the ages range from 4 to 11 years.

See Map E for the location of the 20 underground storage tank sites.

IV. ASSESSMENT OF GROWTH IN DEMAND FOR WATER

Projected Growth in Demand for Water

In June 1987, the Water Management Bureau, of the N.H. Department of Environmental Services' Water Resource Division, initiated the Water User Registration and Reporting Program. The objective of the program is to gather accurate data on the major uses of the State's water and the demands placed upon aquifers, streams, and rivers. To accomplish this objective, all facilities which use an average of 20,000 gallons (or more) of water per day must register with the Division. According to the Bureau's latest list, (1997), the Town of North Hampton has one user of 20,000 gallons of water per day--Hampton Water Works.

In a report from Hampton Water Works from August 1998 titled "Update Report on

Source of Supply Adequacy” the company outlined historical, current and future water demand. This report detailed figures based on the entire service area including Hampton Beach, Hampton, Rye Beach and North Hampton. Due to this fact it is difficult to separate North Hampton’s water demand especially considering population swells in the summer months. In 1997 HWWC served 7,956 customers (1,275 seasonal). The maximum demand for one day was recorded in the summer of 1997 at 4.99 mgd. Projections for the 2015 show peak day demand to reach 5.59 mgd.

The water demand for the non-residential sectors will be entirely dependent upon the types of commercial or industrial uses located within North Hampton and whether or not they are water-intensive uses. A vast majority of the existing non-residential uses are connected to the public water system. At this point, however, it is assumed that the residential water demand will account for the majority of North Hampton's water usage during the next 10 to 20 years. An estimate of water demand by sector for the Hampton Water Works Company is included in a study entitled, Water Supply Study for Southern New Hampshire, prepared for the Water Supply Task Force in May, 1990. The percentage of water demand by sector was estimated as follows: residential (54%), commercial (30%), industrial (less than 1%), public (3%) and unaccounted for (13%). Since the majority of North Hampton is served by the company, the Town's water demand is considered to be similar. Since there are no large agricultural uses in North Hampton, water demand for agriculture use is negligible.

At present, there are three public water systems in North Hampton, none of which are considered to be "community" water systems by the N.H. Water Supply Engineering Bureau. Since all three systems are located within the service area of the Hampton Water Works Company, it is possible that they could tie into the company's system if needed in the future. Non-community water systems will not play a significant role in the future water demand of North Hampton. There are no residential community water systems in Town and none are expected because of the availability of water from the Hampton Water Works Company. Private wells are expected to continue to serve the low density residential uses outside of the public water system service area.

V. DESCRIPTION OF THE INFRASTRUCTURE

A. Septic System Usage

Using 1997 OSP population estimates, approximately 3,978 residents are served by septic systems. North Hampton has no municipal sewer system

and is not planning on developing one in the foreseeable future. North Hampton has a high potential for growth in its number of septic systems given the expense of wastewater facility construction and the diffuse development pattern in much of the Town. It is likely that future development (during the next ten years) will be served by septic systems.

North Hampton's zoning prohibits septic system or leaching field construction within 75 feet of any wetland. The large amount of wetlands in Town will restrict the placement of septic systems in many locations.

North Hampton's future land use map shows the areas along the Little River and Winnicut River being planned as "Conservation/Open Space". This area would most likely exclude septic systems as well.

Soil Potential Ratings

In March 1980, the USDA Soil Conservation Service (SCS) and the Rockingham County Conservation District (RCCD) developed a manual entitled: "Soils Information For Resource Planning - North Hampton, New Hampshire." This manual provided guidelines for land use based on soil types.

Using national standards, virtually all of North Hampton's soil types have received a "severe" rating for septic system development. In fact, there are only a few soils throughout Rockingham County that are not classified as having "severe" limitations for septic system development. In light of this, the Rockingham County Conservation District and the USDA Soil Conservation Service developed a more meaningful set of land use guidelines based on soil types.

In May 1987, the "Soil Potentials for Development - Rockingham County" manual was published. Five soil potential classes were provided: very high, high, medium, low and very low. Low potential is assigned to those soils having severe soil limitations, with costs of design measures extremely high or prohibitive.

Map H, "Soils Suitability for Septic Systems" depicts the general areas of North Hampton which have different soil potentials for septic system development. Soils with low and very low potential were mapped because they had limitations due to steep slopes or high water tables (as well as high shrink-swell properties, short depths to bedrock, and stoniness).

B. Solid Waste Disposal

The Town of North Hampton operates one solid waste disposal facility permitted under RSA 149-M - a stump/brush dump on a 5.74 acre parcel on Cherry Road. All other solid waste is transferred to the Turn-Key Landfill in Rochester, NH by private haulers that provide curb-side pick up.

The Coakley Landfill, now closed, was the site formerly used for solid waste disposal. From 1972 until 1982, the landfill accepted municipal waste. From 1983 to 1985, Pease Air Force Base deposited incinerator ash at the site. The facility was closed in 1985 after volatile organic compounds were found in nearby private wells. The landfill is on the Environmental Protection Agency's Superfund cleanup list. Approximately 100 monitoring wells are in place around the closed landfill. The N.H. Department of Environmental Services ordered in May of 1989 that a six inch layer of gravel be used to cover exposed piles of ash. Since 1989 a lining, clay covering and vegetation was added using Best Available Technology practices.

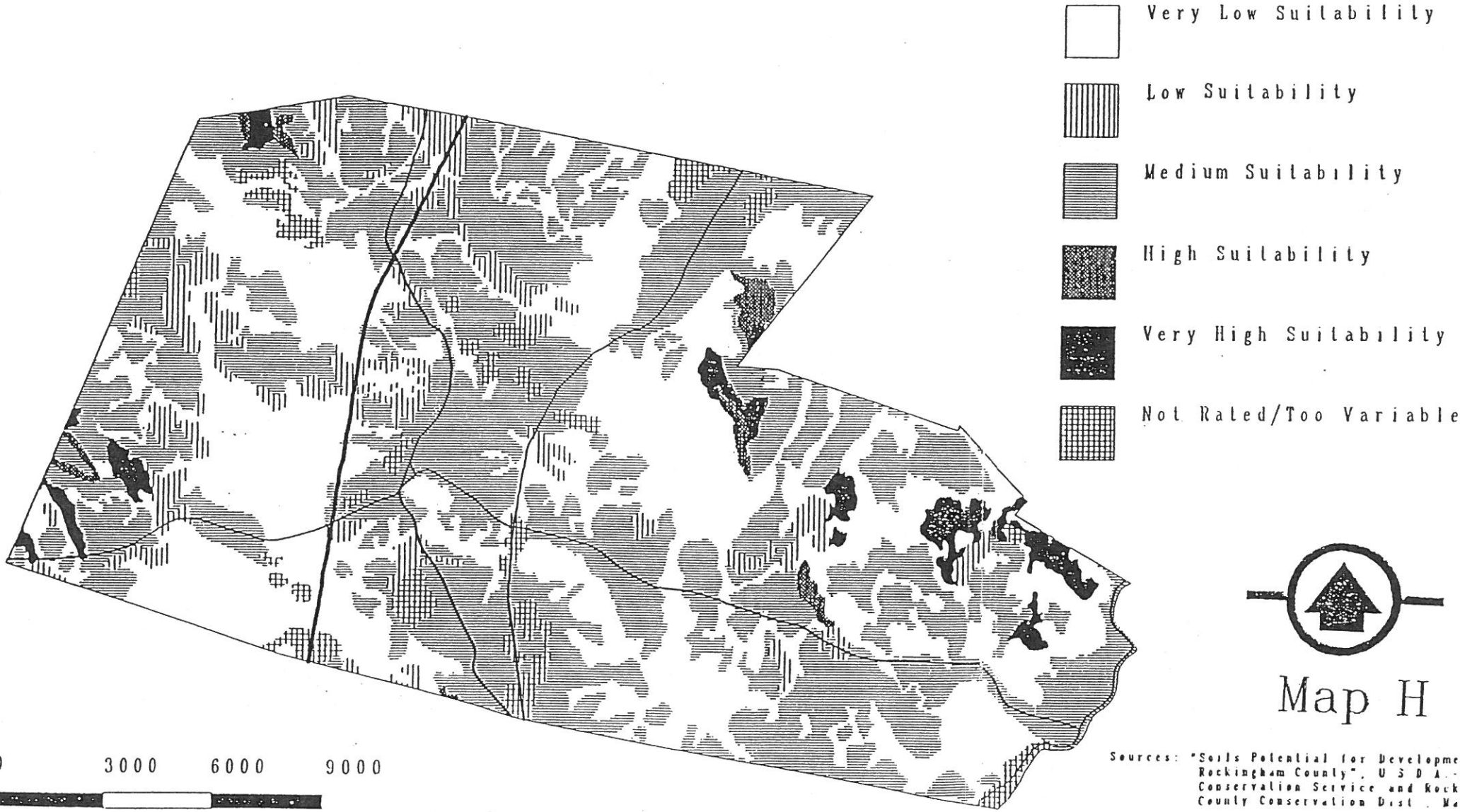
See the Utilities chapter in this plan for a more complete report on solid waste disposal.

C. Public Water Supply

Map D shows the location for three public water systems, all of which draw from groundwater. These systems are considered to be non-community water systems as defined by the N.H. Water Supply Engineering Bureau. Each of these systems are within the service area of the Hampton Water Works Company and could tie in if they desired. Each of the water systems obtain their water from wells and serve only their businesses (two motels and a golf course). Water demand is not expected to increase in the future.

North Hampton's most significant public drinking water supply, in terms of service area and persons served, is the community water system operated by the Hampton Water Works Company. (See Utilities and Public Services chapter of this Master Plan for more information on water services within the town.)

Town of North Hampton
Soil Suitability for Septic System



Sources: "Soils Potential for Development-
Rockingham County", U.S.D.A.-Soil
Conservation Service and Rockingham
County Conservation Dist. May 1987

Rockingham County, N.H. Soils Map.
U.S.D.A.-Soil Conservation Service
Preliminary Data - Subject to Change

Prepared by the Rockingham Planning
Commission, May 1989 SRC

VI. DESCRIPTION OF EXISTING PROGRAMS AND POLICIES

Town ordinances and regulations in North Hampton have the potential to impact on the following eight water resource parameters (WRP):

- 1) Erosion and sedimentation;
- 2) Surface water flows;
- 3) Groundwater recharge;
- 4) Management of existing and potential contaminant sources;
- 5) Flood storage;
- 6) Encroachment on wetlands;
- 7) Nutrients levels; and
- 8) Wildlife and fisheries habitat.

The following is a brief description of what regulations and ordinances can be found in the Town that pertain to water resource protection. Specific section numbers are omitted to avoid confusion in the event amendments cause renumbering or other changes to occur. A thorough study of each of the following resources would be recommended.

Zoning Ordinance

Wetland Conservation Areas: This section limits the use of and encroachment on wetlands which have been identified as tidal wetlands or inland wetlands (very poorly and poorly drained soils) using the standards of High Intensity Soil Survey (HISS) mapping for New Hampshire. The intention of the ordinance is to accomplish the following selected purposes which relate specifically to water resources:

- a) To prevent the destruction of natural wetlands which provide flood protection, recharge the ground water supply, and the augmentation of stream flow during dry periods (WRP #1, 2, 3, 5, and 6);
- b) To control the development of structures and land uses on naturally occurring wetlands which would contribute to pollution of surface and ground water by sewage (WRP #1, 4, 6, and 7); and
- c) To preserve wetlands for other ecological reasons such as those cited in RSA 483-A (WRP #1, 2, 3, 5, 6, 7, and 8).

One section of the ordinance provides for a 75-foot buffer between tidal wetlands and

50-foot buffers for non-tidal wetlands and structures or impermeable surfaces is especially important. The North Hampton Wetlands Ordinance has the potential to impact each of the eight water resource parameters.

District Regulations These provisions require a 75-foot buffer between any tidal wetland, and 50-foot buffer for a septic system or leaching field, and requires State approval of a septic system and leach field prior to a building permit being issued. This pertains to WRP #4 by managing potential contaminant sources (namely septic systems). Potential nutrient levels (WRP #7) in ground and surface waters may also be reduced through this provision.

Filling of Non-Wetland: Any filling of land of more than 3000 cubic yards must be approved by the Planning Board. The purpose is to "... protect its ecology, water supply and natural aesthetics ..." This provision allows control of erosion and sedimentation (WRP #1) and may also be helpful in preventing negative impacts upon flood storage (WRP #5) and encroachment on wetlands (WRP #6).

North Hampton has an excavation ordinance utilizing NHRSA 155E.

Subdivision Regulations

Authority: This section requires a subdivision plat to show surface drainage and utility services that conform to Town standards (WRP #1, 2, 4 and 7).

Issuance of Decision - Disapproval: This section permits the Planning Board to disapprove a plat that would involve danger or injury to health, safety or prosperity by reason of the lack of water supply and drainage, among others (WRP #1 and 2).

Specific Requirements: This regulation requires that all drainage and sewerage facilities be installed in accordance with specifications and that an "as built" plan be provided. A surety is required to cover the cost of making these improvements (WRP #1, 2, 4, and 7).

Other Requirements: Requires appropriate measures to be taken so that uses will not aggravate flood hazards (WRP #5).

Other Requirements: Requires connection to public sewer if available or prove that the area of each lot is adequate to permit the installation and operation of an individual sewerage disposal system (WRP #4 and 7).

Other Requirements: This section requires the installation of adequate drainage

facilities (WRP #1 and 2).

The Preliminary Layout: The preliminary plan must show water courses, ponds, standing water, existing water mains, sewers, culverts, drains, means of providing water supply, disposal of sewerage and surface drainage and culvert designs (WRP #2, 3, 4, 6 and 7).

Street, Drain and Sidewalk Construction Standards: This section details the construction standards for storm drainage including design standards, pipe sizes, catch basin designs and inspection requirements (WRP #1, 2, and 5).

Mobile Home Parks: Among the standards for mobile home parks are the requirements that each space shall have an attachment for water from a supply source that meets local and state regulations and an attachment for sewage disposal that is in compliance with all local and state regulations (WRP #4 and 7).

Site Plan Review Regulations

These regulations also provide for the protection of water resources in North Hampton. The following are some of the requirements under these regulations.

Site plans shall contain information on existing and proposed elevations and elevations for the first and second stories of the proposed structure if located in a flood prone area (WRP #1 and 5).

The site plan must contain information on storm water and roof drainage, how runoff will be contained and assurances that additional runoff will not adversely affect abutters (WRP #1 and 2).

The septic plan must be shown on the site plan (WRP #4 and 7).

Building Code

North Hampton's building code is included in the Zoning Ordinance. All construction must comply with the last revisions of the BOCA Building Code and Fire Prevention Code. The building code has no substantial direct impact on water quality or quantity. Recommendation #7 in Section VIII of this chapter contains one suggestion for an amendment to improve the building code.

Health Ordinance

The Town of North Hampton does not have a health ordinance per se. However, there are many ordinances and regulations which pertain to public health, i.e. standards for septic systems. In addition, the Town has an appointed Health Officer and Assistant Health Officer who assist in the administration of these local health-related laws, as well as State regulations in accordance with RSA 147.

VII. ANALYSIS

Analysis Regarding Water Supplies

The task of assessing whether the existing water supplies are adequate for the next 5 to 10 years is complicated by the fact that the Hampton Water Works Company (HWWC) is a private company serving three communities. As calculated in Section IV, entitled "Assessment of Growth in Demand for Water", North Hampton is projected to need over a million gallons of water a day just to serve its residential population. If the three new wells produce as expected, the total sustained yield from the wells in North Hampton will be approximately 5.4 million gallons per day. Even if commercial and industrial water demands dramatically increase in North Hampton, there should still be a surplus of water in Town. However, this analysis ignores the fact that water pumped in North Hampton is part of a three town system and likely ends up serving HWWC customers outside of North Hampton. Also to be considered is the possibility that one or more of the existing wells could be rendered unusable by contamination.

Analysis Regarding Other Water Resource Purposes

- a. There is little information available regarding potential assimilation problems for North Hampton's surface water bodies. The assimilative capacity of a waterbody is calculated based on its physical and biological characteristics and the character of the proposed discharge.

Detailed studies of the assimilative capability of groundwater and surface water would logically fall under the State's duties since it issues discharge permits and has greater technical and financial capacities than municipalities.
- b. Recreation: In 1977, the N.H. Office of State Planning published a study entitled: "Wild, Scenic, and Recreational Rivers for New Hampshire." Out

of 67 other rivers being classified throughout the State, the study classified the Winnicut River as a "Recreational River." The study defined recreational rivers as those: which provide outstanding recreational opportunities in natural surroundings. These rivers should be protected for their natural qualities which can provide for a wide range of active and passive outdoor recreation activities. Recreational rivers should: be readily accessible; have high water quality; have enough water to provide for fishing and canoeing; and be at least five miles long.

The recreational opportunities, which are very valuable to North Hampton are outlined in detail in the Recreation Chapter of the Master Plan.

- c. Wetlands: There are several different types of wetlands, which include: tidal marshes, meadows, shrub and wooded swamps, and bogs. Wetlands are important, valuable, natural resources and worthy of protection from inappropriate use. They have been found, in general, to provide critical ecological and socially valuable functions, including:

- 1) provide habitat and reproduction areas for plants, fish and wildlife;
- 2) help maintain ground and surface water levels;
- 3) act as flood water storage areas;
- 4) absorption and filtration of pollutants and sediments (caused by up-stream erosion);
- 5) provide opportunities for recreation and education;
- 6) visual aesthetics.

The filling of and use of wetlands for building construction not only destroys wetlands and their benefits, and may lead to groundwater contamination as well. Leaching fields constructed in filled areas are likely to be placed too near the seasonal high water table below and to have an inadequate receiving layer for proper treatment of the septic system's effluent.

There is an ongoing need to protect wetlands in North Hampton. Statewide, wetlands are under increasing development pressure due to the depletion of the most developable land. Although the State of New Hampshire has laws and regulations in place (RSA 483-A, administered by the Wetlands Board and RSA 149 8:a, administered by the N.H. Water Supply and Pollution Control Commission), they do not always provide the degree of protection needed. For these reasons, local control over the use of wetlands should remain in effect indefinitely. The Town of North Hampton has recognized the importance of preserving wetlands, and has acted accordingly by estab-

lishing a Wetland Conservation Area Ordinance.

North Hampton is fortunate to have a series of aerial photographs depicting wetlands at a scale of 1" = 200', prepared through the N.H. Office of State Planning Coastal Program,. The maps and an accompanying report are entitled, "Phase 2 Report, Town of North Hampton, the Coastal Wetlands Mapping Program, New Hampshire," prepared for the N.H. Coastal Program Office of State Planning by Normandeau Associates, Inc., June 30, 1986. More recently in the summer of 1998 aerial photographs were taken of the Little River Watershed.

- d. Wildlife Habitat: River, stream, and wetland corridors provide the richest habitat for the greatest number of fish, wildlife, and flora. Fish and wildlife populations cannot succeed within limited habitat confines. Native wildlife must have travel lanes within their range, and waterfowl and other birds need ground-level nesting habitat. Protection of these linear corridors is essential to the stability of wildlife populations.

Riparian corridors (i.e., shorelands) also contribute much in terms of recreational benefits, i.e. canoeing, hiking, fishing, birding, horse trails, cross country skiing, picnicking, etc. Shorelands are also sensitive due to flooding, erodibility, and proximity to open water. Moreover, soil type and percent slope typically limits the development potential of a shoreland area.

Areas of Town that have prime wildlife habitat potential are listed below and shown on Map B as 1-6.

1. the Line Swamp area west of Route 95 and south of South Road;
2. the Winnicut River corridor;
3. the Little River Swamp; and
4. the area around Philbrick Pond.
5. the area north of Spruce Meadow Drive; and
6. the Cornelius Brook area east of the Winnicut River.

- e. Hydropower: There are no hydropower producing dams in North Hampton, nor are there plans for any in the future.

- g. Fire Protection: The fire flow where provided by the HWWC water system is considered to be more than adequate. Also plans to construct an additional elevated storage tank off of Mill Road will provide better water pressure and storage capacity.

The Planning Board sends all large development plans to the North Hampton Fire Department for their review and recommendations. This process is helpful in insuring adequate fire protection.

Management of Potential Threats

Section III, "Identification of Potential Threats to Water Resources", presents a full discussion of existing and permitted future land uses which pose threats to water resources within North Hampton. A brief discussion of the Town's primary potential threats to identified water resources, including mitigation measures, is presented below.

1. Landfills and dumps: The Coakley Landfill remediation efforts are expected to be completed in 1999 and long-term testing will be in place to monitor potential leachate problems.

The former Town dump (now owned by the State of N.H.) off South Road has been properly closed to prevent any possible off-site contamination problems.

2. On-site sewage disposal: Three concentrations of on-site sewage disposal were identified in Section III. Each of these mobile home parks are located in an identified aquifer. Since no municipal sewer system is planned, these septic systems undergo strict inspection and maintenance.
3. Road salting: A significant number of roads which overlay aquifer areas are being salted during winter months. Of particular concern is Winnicut Road which travels over the "northwest" aquifer for its entire length, and is less than 500 feet from three of the HWWC wells.

Additional management and protection techniques for water resources are described in the following section.

VIII. RECOMMENDATIONS FOR NEW OR REVISED POLICIES AND PROGRAMS

Non-regulatory Programs

It is recommended that the Town of North Hampton employ the following non-regulatory programs in order to manage and protect its water resources:

1. Educational and informational programs should be developed in order to provide the general public with an understanding of the operation, proper use, and maintenance of septic systems and leach fields (i.e., regularly pumping out septic tanks, avoiding disposal of hazardous or harmful wastes, etc.) This would likely prevent unnecessary system contamination and failures, thereby protecting surface and groundwater resources.
2. Investigate the feasibility of adopting a septic system inspection program, especially for aquifer recharge zones, in order to ensure that these systems are adequately maintained.
3. Continue to promote and participate in the annual Household Hazardous Waste Collection, sponsored by the Rockingham Planning Commission. For this past year's collection, North Hampton's share of the costs was provided from its dues to the Southeast Regional Solid Waste District.
4. Continue to appropriate money to the Conservation Commission's land acquisition fund to be used for the protection of land and water resource conservation areas. There are generally five different methods for protecting these natural areas:
 - a) Land Purchase;
 - b) Option of Right of First Refusal;
 - c) Purchase and Resale;
 - d) Bargain Purchase;
 - e) Easements - Conservation Restrictions and/or Purchase of Development Rights

At the 1989 Town Meeting it was voted to deposit 100 percent of the revenues collected from the current use change tax in the Conservation Fund. Conservation funds enable the Town to act on short notice when a valuable parcel of land is threatened. This land may be of critical importance for protecting significant wetlands, shoreland, wildlife habitat, or recreational areas. (See the Conservation and Preservation chapter of this plan for more

- information on land conservation issues.)
5. The Conservation Commission should also seek land acquisition funding through State and Federal grants (e.g. Trust for New Hampshire Lands and The Land and Water Conservation Fund.)
 6. The Conservation Commission should continue to work with people who own land having conservation potential by promoting the tax incentives associated with the donation of land or easement restrictions. The Current Use Assessment Program also provides tax abatements on parcels of 10 acres or more or on "natural preserves" of any size.
 7. The North Hampton Planning Board should work with their counterparts in surrounding towns to promote land use planning practices which are mutually beneficial to protect common watersheds, wetlands, and aquifers. North Hampton may choose to develop intermunicipal agreements (pursuant to RSA 53-A) to protect these shared resources. During the 1989 session, the N.H. Legislature approved Senate Bill 161 which authorizes agreements between municipalities to develop water resources management plans.
 8. Develop a program to reduce the amount of road salt used, especially in aquifer recharge areas. The following methods should be employed:
 - a) Emphasize mechanical snow removal;
 - b) Mix sodium chloride with calcium chloride and/or sand to reduce the total amount of sodium chloride applied;
 - c) Periodically re-calibrate salt spreaders so that they apply the correct amount of salt/sand mix; and
 - d) Post areas where reduced salting is practiced, which will encourage drivers to reduce speeds and drive more cautiously.
 9. Develop a program to inspect and maintain drainage control facilities, (e.g. catch basins and detention ponds, and culverts) throughout Town. If these devices become filled with sediment, they can no longer perform their function.
 10. Work with the Hampton Water Works Company to develop a program emphasizing water conservation, especially in homes and businesses served by the water system.
 11. Encourage farms to employ Best Management Practices (BMP's) as

prescribed by the Soil Conservation Service. BMP's include storage of manure in concrete pits, and more efficient and better timed application of fertilizer and pesticides.

12. Develop a water quality data base for monitoring contamination events in both surface and ground waters throughout Town.
13. The Planning Board should be kept informed by the Rockingham Planning Commission regarding the availability and appropriateness of regional or State water resource data.

The costs of instituting these nonregulatory programs are expected to be variable, but relatively low. For example, any assistance provided by the Rockingham Planning Commission is either at reduced cost or no cost, as part of North Hampton's annual membership in the Commission.

Costs associated with land conservation efforts involving donations of land and easements would involve survey, legal, and recording fees. The outright purchase of these lands or the purchase of development rights would obviously entail substantially greater costs. Land conservation is discussed in greater detail in the Conservation and Preservation chapter of the Master Plan.

Household Hazardous Waste collection and disposal costs, which can be expensive even in a regional program, will likely be covered by the dues paid to the Southeast Regional Solid Waste District. Matching funds are available from the Waste Management Division of the N.H. Department of Environmental Services.

These non-regulatory programs could probably be carried out by existing voluntary and paid manpower. It should not be necessary to hire additional personnel to conduct or supervise any of these activities with the possible exception of #2, establishing a septic system inspection program.

Regulatory Programs

The Town of North Hampton enforces a zoning ordinance, a building ordinance (BOCA), subdivision regulations, and site plan review regulations. All have been reviewed and found to contain provisions specifically pertaining to water resource protection.

All options for regulatory programs required by the Rules were considered, and the following new or revised regulatory programs are recommended in order to improve

