

Surface Water and Wetlands

Freshwater, brackish, and saltwater systems dominate and enhance much of Charlestown's landscape (Figure 6). The northern border of the town is defined by the Pawcatuck River. This river receives water from three broad freshwater wetland systems located within the central portion of the town (Figure 7). To the south, the town is limited by Block Island Sound, with the border being defined by a narrow barrier beach. The coastal lagoons, known as Ninigret (or Charlestown) Pond, and portions of Quonochontaug and Green Hill Ponds are contained within the town of Charlestown, and are located to the north of the barrier beach. The ponds receive freshwater input from several small wetland systems which drain south from the glacial moraine. As a result, the town is provided with several unique brackish and coastal wetland systems.

The Pawcatuck River and extensive inland wetland systems serve valuable functions in terms of providing flood storage, water quality maintenance, and wildlife and recreational habitats. The coastal wetland systems are valued as important sources of food and as commercial and public recreational assets. These inland and coastal waters provide aesthetic qualities which make Charlestown attractive to both residents and visitors.

The inventory and analysis provided herein includes a description of the types of fresh and salt water systems found within the town of Charlestown. Classification of wetlands is according to Cowardin et al. (FWS 1979) and follows designations shown on the U.S. Department of the Interior, Fish and Wildlife Service National Wetlands Inventory (NWI) Maps which depict the Carolina, Kingston and Quonochontaug quadrangles. Open surface waters such as rivers, streams, and ponds are classified as wetlands (water depth ≤ 2 meters or 6.6 feet), or deepwater habitats (water depth >2 meters).

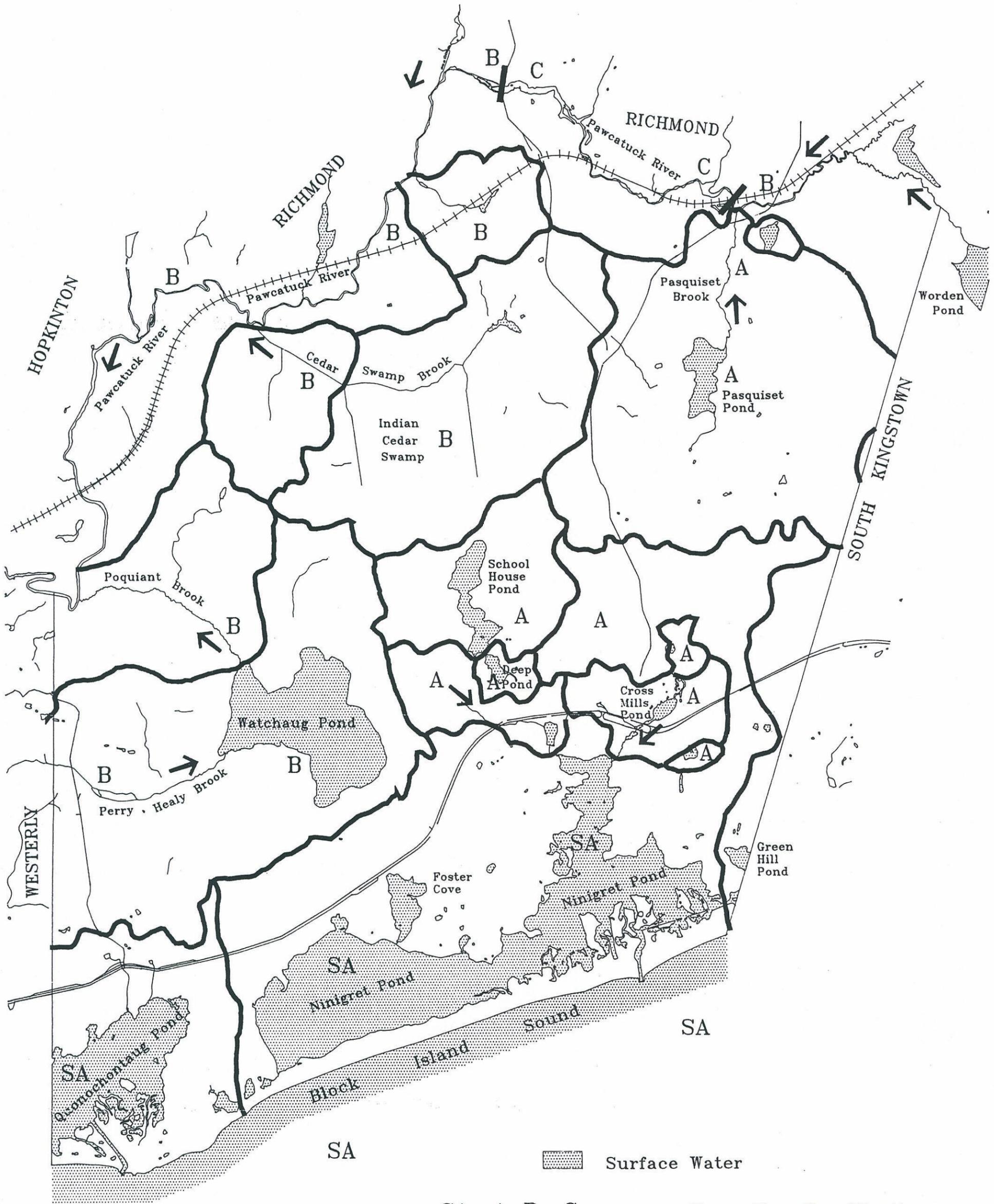
Freshwater Resources

River Systems

The predominant riverine system within the Town of Charlestown is the Pawcatuck River. The river flows southwesterly toward Block Island Sound from Worden Pond, located in the State of Rhode Island's Great Swamp Management Area, in South Kingstown. The nearly 18 miles of river which defines the northern boundary of Charlestown flow through the historic mill villages of Kenyon, Shannock, Carolina and Burdickville.

The Pawcatuck River Basin comprises a major riverine system within the State of Rhode Island. Combined with the Wood River Basin, the Wood-Pawcatuck Watershed covers approximately 300 square miles. Approximately two thirds of the town of Charlestown is located within the Pawcatuck River Basin.

Several tributaries to the Pawcatuck have headwaters located in Charlestown. The most prominent tributaries flow from the three broad wetland systems located in the interior of the town, and include Pasquiset Brook, Cedar Swamp Brook and Poquiant Brook.



SA, A B, C Surface Water Use Classification

 Boundary of Major Watershed

 Flow Direction



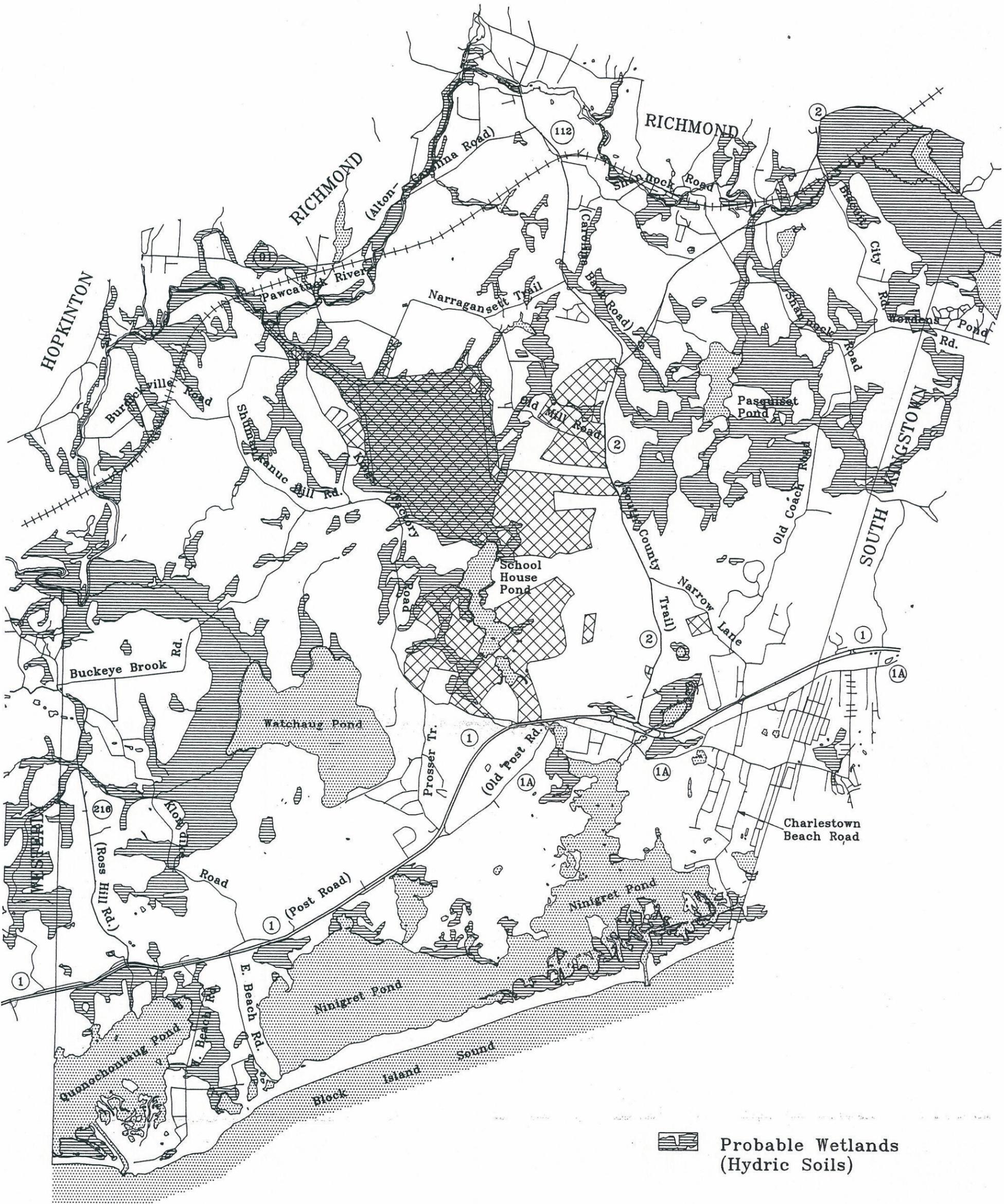
0 4000

Scale in Feet

Data Source: Map prepared by Vanasse Hangen Brustlin, Inc. from Town of Charlestown and RIGIS data.

SURFACE WATER

Figure 6



 Probable Wetlands (Hydic Soils)



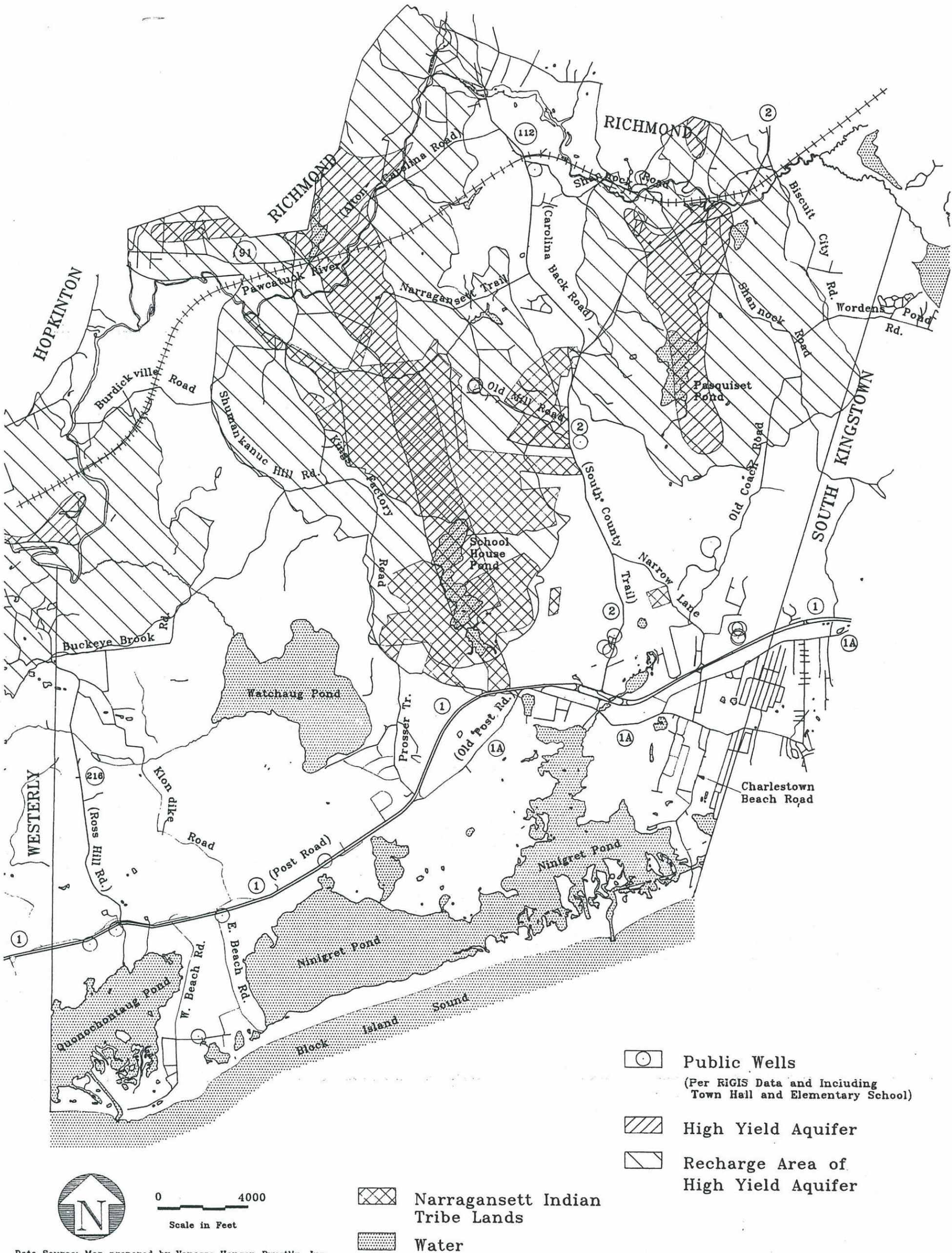
0 4000
Scale in Feet

 Narragansett Indian Tribe Lands
 Water

Data Source: Map prepared by Vanasse Hangen Brustlin, Inc. from Town of Charlestown and RIGIS data.

WETLANDS

Figure 7



GROUNDWATER

Figure 5

CHARLESTOWN COMPREHENSIVE PLAN - 1991

Historically, the Pawcatuck has proved a valuable asset to the people of Charlestown. Prior to the industrial era, a productive salmon fishery provided a staple food source. During the industrial era, dams were constructed to harness the river's energy for the purposes of powering mill machinery. Construction of the dams obstructed the salmon runs to the inland portions of the river. At the same time water quality decreased drastically. Today, water quality has improved and through the efforts of the State Fish and Wildlife Department, salmon has been reintroduced to the river.

RIDEM Division of Water Resources has classified the waters along the segments of the Pawcatuck River which border Charlestown into the following water use classes:

- o Pawcatuck River from and including Worden Pond to dam at Kenyon - B;
- o Pawcatuck River from dam at Kenyon to 1 1/2 mile downstream of Horseshoe Falls Dam at Shannock - C;
- o Pawcatuck River from 1/2 mile downstream of Horseshoe Falls Dam at Shannock to Carolina Dam - B;
- o Pawcatuck River from Carolina Dam to Diddle Hole - B.

According to Section 6 of the Rhode Island Water Quality Standards (6.21 Freshwater) Class B water is suitable for:

- o public water supply with appropriate treatment;
- o agricultural uses;
- o bathing, other primary contact recreational activities;
- o fish and wildlife habitat.

Class C water is suitable for:

- o boating, other secondary contact recreational activities;
- o fish and wildlife habitat;
- o industrial processes and cooling.

Several industrial waste discharge points still exist within the villages of Kenyon (Charlestown), Alton and Bradford (Westerly). The location of the discharges is reflected in the drop in the water quality classification from Class B to Class C after the dam at Kenyon.

Appendix A of RIDEM Water Quality Regulations provides both the current water quality classification, and the current water quality condition the Pawcatuck River. Water quality conditions in the Pawcatuck segments in Charlestown meet the criteria of their designated classes, with the exception of one segment. The segment from the Horseshoe Dam in Shannock to the dam in Carolina is designated as Class B, but its current condition is shown as only meeting Class C criteria.

According to the National Park Service's Nationwide Rivers Inventory (U.S. Department of the Interior, 1982) the fifteen miles of river located between Bradford and Worden Pond have been identified as containing outstandingly remarkable geologic values. The topography, which includes outwash plains and depressions forming kettle hole lakes, is an exceptional example of glacial deposition of the late ice-age. The river has been nominated as a wild and scenic river.

The Wood - Pawcatuck Watershed Association, has jointly developed an Open Space Plan which incorporates recommendations for watershed and river corridor protection along the Pawcatuck (National Park Service, RIDEM, and Wood-Pawcatuck Assoc., 1984). The Association encourages the Town to plan regionally, with a watershed perspective, and to develop protection measures for development in stream corridors. The goals of the Plan are to protect high water quality, wildlife habitat and travel corridors, recreational and scenic values, and flood storage areas of stream environments.

The Pawcatuck is the only riverine system identified within the parameters of the NWI classification system. However, Charlestown contains many more rivers and streams which feed into both freshwater and saltwater wetland systems. Generally, water quality within Charlestown's watercourses is good, owing to the rural character of the town, and the maintenance of vegetated buffer zones (RIDEM, Division of Water Resources, 1988).

RIDEM Division of Water Resources has defined the water use classification of the larger tributaries to the Pawcatuck River as follows:

- o Pasquiset Pond and Pasquiset Brook - A;
- o Indian Cedar Swamp and Brook - B;
- o Poquiant Brook from and including Watchaug Pond to its confluence with the Pawcatuck River - B.

According to Section 6 of the Water Quality Standards, Class A water is suitable for drinking water.

Freshwater Ponds

The National Wetlands Inventory mapping identifies 88 freshwater ponds (this includes bodies of water identified as both palustrine and lacustrine) within the town of Charlestown.

The largest of these ponds are Watchaug, Schoolhouse, Deep and Pasquiset. All four ponds are included in the University of Rhode Island's Watershed Watch Program. Through the program, trained volunteers monitor the quality of water at a selected pond site between the months of April and October. During the 1990 monitoring season, the water quality of the ponds was assessed. Watchaug Pond and Pasquiset Pond have been monitored since 1988.

According to the Watershed Water data, Watchaug and Pasquiset Ponds have exceptionally good water quality. In fact, the data on Watchaug Pond shows an improvement in water quality since 1988 (RI Watershed Watch, 1990). Both ponds represent surface water located at the head of two of the town's high yield groundwater aquifers.

Watchaug Pond is almost entirely surrounded by Burlingame Park, and is approximately 573 acres in size, with an average depth of 8 feet and a maximum depth of 42 feet. The pond provides public access for recreational fishing, boating and swimming.

Pasquiset Pond is located entirely within private land under residential zoning. The pond is 69 acres in size and averages 8 feet in depth. The pond has a history of being mined for iron, and the water today reflects the presence of iron in the color of its water.

According to the results of the Pond Watch monitoring program, water quality in Schoolhouse and Deep Ponds is also high. The ponds lie within the watershed of the coastal ponds, and contribute freshwater inflow to Ninigret Pond.

There are approximately 84 smaller ponds within the Town of Charlestown. Several of the ponds are named and identified on the USGS topographic maps as: Saw Mill, Kenyon, Hanna Clarkin, Cross Mills, King Tom and Perry Ponds.

Small freshwater ponds are also valuable resources in terms of their contribution to the aesthetic and recreational quality of the Town, as well as their value for wildlife habitat and potential for groundwater recharge. It should be noted that according to the NWI mapping system, the smallest wetland unit mapped can vary from one to three acres in size. It is possible that the number of small ponds in the Town of Charlestown could actually be larger. The topographic and geologic formations of the area suggest the presence of a higher number of seasonally flooded basins and ponds which are less than an acre in size. These areas are typically characterized as vernal pools, and are often valuable habitat for rare amphibian, reptile, invertebrate and plant species.

Forested and Shrub Wetlands

According to the NWI mapping, the Town of Charlestown contains 167 forested wetlands, and 101 shrub wetlands. Many of these are distributed throughout the Town, but can be found in greatest concentration in association with the four largest ponds and groundwater aquifer areas.

The majority of the forested wetlands are dominated by deciduous trees such as red maple (*Acer rubrum*), however the Town does contain several atlantic white cedar (*Chamaecyparis thyoides*) swamps; notably the Indian Cedar Swamp. While not a rare habitat type in the State of Rhode Island, cedar swamps are unique, and provide diversity of habitat. Additionally, many pre-existing cedar swamps are now vegetated by red maples, as a result of over harvesting of the white cedar timber which occurred primarily in the 19th to early 20th centuries.

Shrub swamps occur primarily in association with forested wetlands, and may represent wetter areas or earlier successional stages.

Emergent Wetlands

Twenty emergent wetlands are mapped by the NWI. Emergent wetlands can include freshwater marshes, or wet meadows. The amount of emergent habitat present in the northeastern United States has been steadily decreasing over the last fifty years, due to a decline in land use practices, such as mowing or burning, which kept these areas open. The small number of emergent habitats found in Charlestown represents this trend. One emergent habitat of note, which is recognized by the RI Natural Heritage Program is located along the Electric line ROW, where it passes through the Indian Cedar Swamp Management Area.

As residential, commercial and industrial development expands, the Town of Charlestown will be faced with increased pressure to alter previously less desirable wetland areas. In addition to being faced with requests to directly alter wetland areas, the Town will be in the position of evaluating indirect impacts, such as cumulative impacts on the ability of the wetland to moderate flood waters, maintain water quality through groundwater recharge and adsorption of nutrients and pollutants, and impacts on the wildlife habitat provided by the wetland. Additionally, the Town must consider a general degradation of the resource as a unique aesthetic and recreational habitat.

Coastal Resources

Tidal and Coastal Pond Waters

The RI Coastal Resources Management Council (CRMC), through its Coastal Management Plan (CMP) and the Special Area Management Plan (SAM Plan) developed for the coastal pond region, have designated three resource types within the town of Charlestown. Regulations pertaining to the use and alterations permitted within each resource type are based on the designated status of the habitat, and the environmental goals set forth for that habitat.

Type 1 Conservation Areas

Resource areas designated as Type 1 are located within wildlife refuges, conservation areas, or are waters which are undisturbed and maintain natural habitat or scenic values which are unique or significant. They also include areas that are unsuitable for development due to their exposure to wave action, flooding or erosion.

Fosters Cove in Ninigret Pond, and the barrier beach from the Charlestown/Westerly Town line to the Charlestown/Green Hill Town line, are included in this resource designation.

Despite recent development adjacent to Foster Cove, the area maintains a high degree of habitat and scenic value. The cove supports a large oyster population, and has a high potential for oyster production.

The barrier beach receives additional designations due to its exposure to Block Island Sound. The portion of the beach located in front of Ninigret Pond is designated as Type 1(A). (A) implies that the area is a critical resource area, with an annual estimated rate of erosion of 2-2 1/2 feet. The RICMP requires a minimum setback of 75 feet from the inland edge of the coastal feature. Relative

to the Coastal Barrier Resources Act of 1982 (Public Law 97-348), the CRMP additionally designates levels of development on the barrier beach. Pursuant to the criteria set forth by the federal government, approximately 6,400 feet of beach in Charlestown is designated as Undeveloped. Flood insurance for most forms of construction is not available in these areas. Other, nonrestrictive designations include Moderately Developed and Developed (of which there are approximately 400 and 2,800 feet respectively).

Type 2 Low Intensity Use

As with Type 1 waters, Type 2 areas have a high scenic values, and high fish and wildlife values. The water quality within Type 2 designations is, for the most part, good. RIDEM Division of Water Quality has classified the water quality of the coastal ponds as SA. According to Section 6 of the Water Quality Standards (6.22 Sea Water), Class SA is suitable for:

- o bathing and contact recreation;
- o shellfish harvesting for direct human consumption;
- o fish and wildlife habitat.

Within the town of Charlestown, the main bodies of Quonochontaug and Ninigret Ponds, including Tautog Cove, are included in this designation.

The Coastal Wetlands designated as Type 1 and Type 2 waters include salt marshes and all contiguous freshwater or brackish wetlands. Areas of open water within coastal wetlands are considered as part of the wetland.

Type 4 Multipurpose Waters

Waters within this designation lie within Narragansett Bay and the Sounds. Waters the coast of Charlestown are within Block Island Sound. Type 4 waters are utilized for commercial and recreational activities, and maintain good value as fish and wildlife habitat. These open waterways could support water-dependent commercial, industrial and/or high intensity recreational activities.

According to NWI mapping of the town of Charlestown, there are 27 areas of salt marsh and 3 areas dominated by shrub species lying adjacent to, and within the coastal ponds. These areas are all classified as intertidal. Numerous freshwater ponds and wetlands are contiguous to the intertidal areas, and are included in the discussion on freshwater resources. Subtidal open water areas are mapped and include Ninigret Pond and its coves, and portions of Quonochontaug and Green Hill Ponds. Three small subtidal areas located along the barrier beach and intertidal mud flats, are also included in this designation.

Several intertidal marsh habitats and nontidal wetlands located in Quonochontaug and Ninigret Ponds have been identified by the Rhode Island Natural Heritage Program as significant wildlife habitats. Additionally, the SAM Plan identifies several areas as Priority Sites for Preservation. Included are a portion of the barrier beach (designated as developed) located east of the Charlestown Breachway, and a portion to the southwest of Ninigret Pond which occurs in both Developed and Undeveloped areas. The SAM Plan also identifies the wetland to the northwest, and including, Reed's Point, and a broad area north of Tautog Cove which includes wetlands flowing from Cross Mills Pond and the School House/ Deep Pond complex.

Pressure to develop the remaining coastal areas is severe. The Town must consider this pressure in terms of the long term impacts on the coastal pond habitat. Nutrient input to the ponds is already high from the existing high density residential areas surrounding the ponds. Groundwater flowing toward the ponds carries nutrients from individual septic systems. Surface water drains from the pond watersheds and carries nutrients and bacteria off lawns and impermeable surface areas. Continued development within the coastal areas may reduce the scenic and fish and wildlife habitat values of the coastal ponds to a point that the Town and its residents find unacceptable.

Floodplains

Development in floodplains places obstructions in the way of floodwaters, presenting risks to property or lives. Structures within the floodplain reduce the amount of water that a floodplain can hold, extending flooding to higher elevations. The 100 year floodplain represents the extent of flooding in a storm with a 1 percent chance per year of occurring. Because structures are generally in place for more than one year, the chances of encountering a 100 year storm during the life of a structure are much greater than 1 percent. For instance, over thirty years, the chances of a 100 year storm occurring are approximately 22 percent.

The damage that can result from building in floodplains and the frequency with which major storms may occur has been demonstrated vividly in Charlestown. Two major hurricanes in the 1900s, occurring 16 years apart, decimated beach colonies. It is important to plan for such storms as regularly occurring events, and not treat them as freak occurrences.

The Federal Emergency Management Agency has delineated two types of floodplains for the 100-year storm in Charlestown (Figure 8):

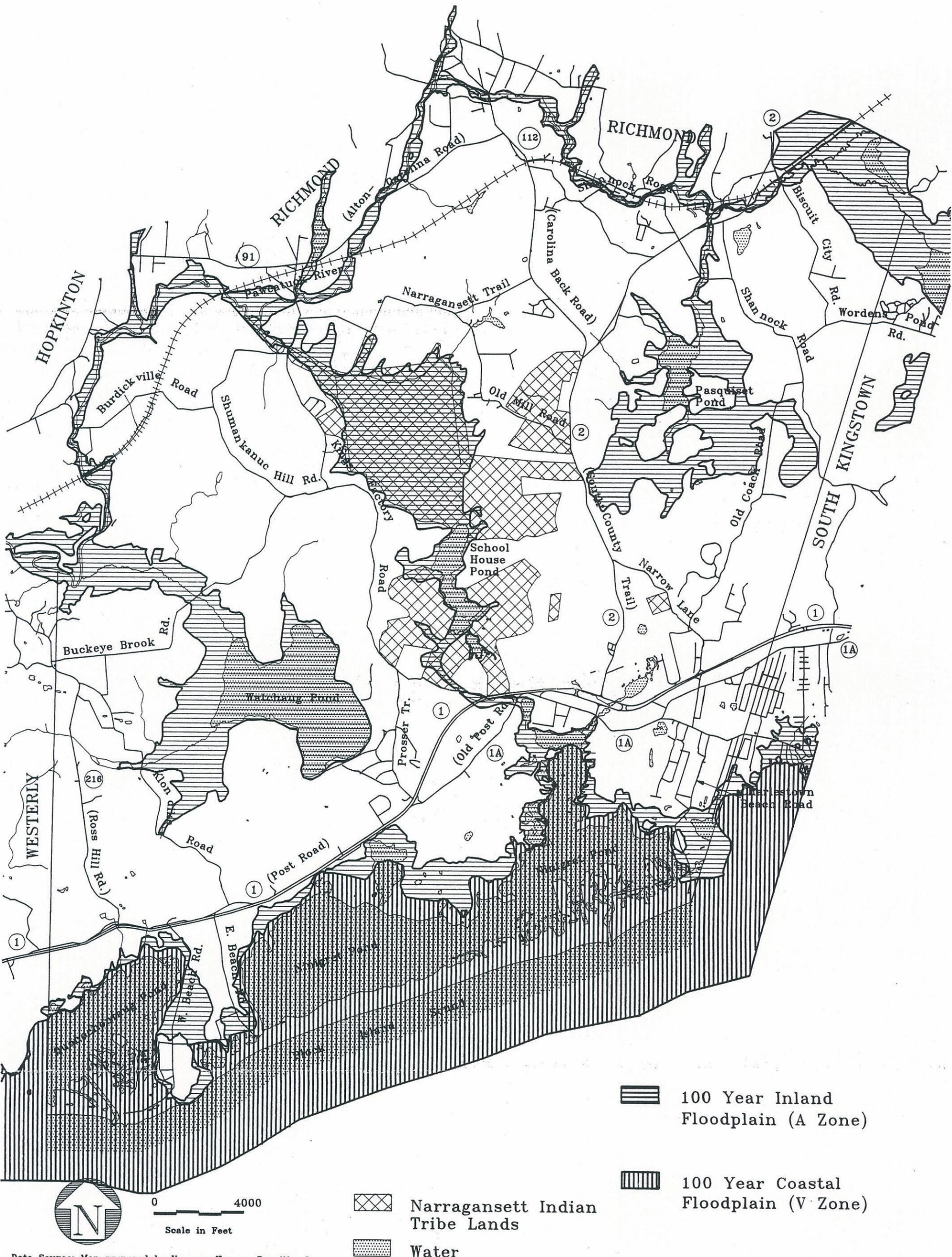
- o A-zones, which would be flooded to a depth less than 3 feet;
- o V-zones, where floodwaters would be deep enough (> 3 feet) to cause damage by waves.

Inland Areas: A Zones

The largest floodplains inland of the coast are associated with major wetland systems and large water bodies:

- o Great Swamp/Worden's Pond;
- o Pasquisset Pond and adjacent wetlands;
- o Schoolhouse Pond/Indian Cedar Swamp; and
- o Watchaug Pond, Poquiant Brook, Perry Healy Brook, and adjacent wetlands.

The Pawcatuck River generally has a floodplain ranging from 200 to 500 feet from either side of the river, which widens at several places along the western section of the river. The tributary streams also have floodplains of similar size. The Town is fortunate to have such extensive wetlands associated with the



FLOODPLAINS

Figure 8

Pawcatuck River, for they provide extensive flood-storing capacity that can reduce downstream flooding of the river.

Coastal Flood Areas: V Zones

The greatest damage during the major hurricanes occurred along the coast, where waves swept homes from their foundations. The extent of coastal flooding is determined less by distance inland and mostly by elevation above sea level. During a major storm, powerful onshore winds combine with high tides and extremely low atmospheric pressure to build up a mound of water (storm surge) that hits the coast. If the water is deep enough, waves raise the damaging level of the water above the storm surge.

In Charlestown, the storm surge and waves associated with a major storm can reach 18 feet in elevation. Because the elevation of the Charlestown barrier beach system reaches only 12 feet at the highest points, a major storm surge will entirely wash over the barrier system. The barrier breaks the waves, dispersing much of the force, but the waves can rebuild to some extent across the salt ponds, reaching a level of 16 feet above sea level.

The V zone in Charlestown encompasses the entire barrier beach system and much of the headland areas such as Quonochontaug Neck. The V zone has also been mapped along the inland margin of the salt ponds, extending from 100 feet to 2,000 feet inland.

The A zone, representing damage from flooding only, extends from 100 feet to 2,500 feet inland from the V zones, averaging approximately 500 feet. A few till uplands along the coast provide islands protected from floodwaters.

Land Use in Flood Zones

With the exceptions of a few small areas in the villages, most of the inland floodplains are sparsely developed and will probably remain so. Burlingame Park and Management Area encompasses almost the entire Watchaug Pond floodplain system. The State of Rhode Island owns much of the Great Swamp floodplain area, the rest is relatively inaccessible. Much of Cedar Swamp/Schoolhouse Pond floodplain is owned by the Narragansett Tribe of Indians, the Boy Scouts, or the Town. Many of the remaining areas, including the Pasquiset Pond floodplain, are wetland, where development is strictly regulated by the DEM. Certain areas along the Pawcatuck, such as at Burdickville, are developed and developable.

Public agencies also own large areas of the coastal floodplain, including Ninigret (East) Beach and Ninigret Park/Wildlife Refuge. The village of Cross Mills generally is outside of the flood damage zones. However, a considerable amount of the beach and coastal areas around the salt ponds has been developed for residential use and offers additional developable land.

Natural Habitats

Rhode Island Natural Heritage Program

The RI Natural Heritage Program has identified eleven areas within the Town of Charlestown which contain rare plant and animal species, and which represent unique habitat types. (See Figure 9)

Deep Pond/Schoolhouse Pond Complex

The Natural Heritage Program considers the coastal plain pondshore habitat surrounding these ponds as some of the best in the state. Habitats of this type are found almost exclusively in Washington County, south of the recessional moraine. The habitat is characterized by widely fluctuating water levels, sandy substrate, and gently sloping shorelines. This habitat is typical of that required for six species of rare plants; most of which are considered regionally rare.

The delicate balance of the coastal plain pond habitat makes it particularly vulnerable to degradation of water quality from nutrient overloading and household chemicals. Erosion of the shoreline, and consequently siltation of the bottom, are also destructive to this type of habitat. Removal of native vegetation, either through hand collection or extensive impact to the shoreline resulting from walking or recreational vehicles, would significantly reduce the populations of these rare plant species. Additionally, manipulation of the water levels of the ponds would eliminate the fluctuating conditions necessary to the life cycle of the plant species.

Shumankanuc Hill

The area west of Shumankanuc Hill includes a variety of habitats which support three State Endangered plant species, as well as a number of other unique species. Habitat types in this area include coastal plain quagmire and wet meadow. Quagmires are usually associated with wooded swamps, primarily those dominated by Atlantic white cedar (*Chamaecyparis thyoides*). They are similar in many respects, to the coastal plain pond habitats, except that the water levels are fairly stable.

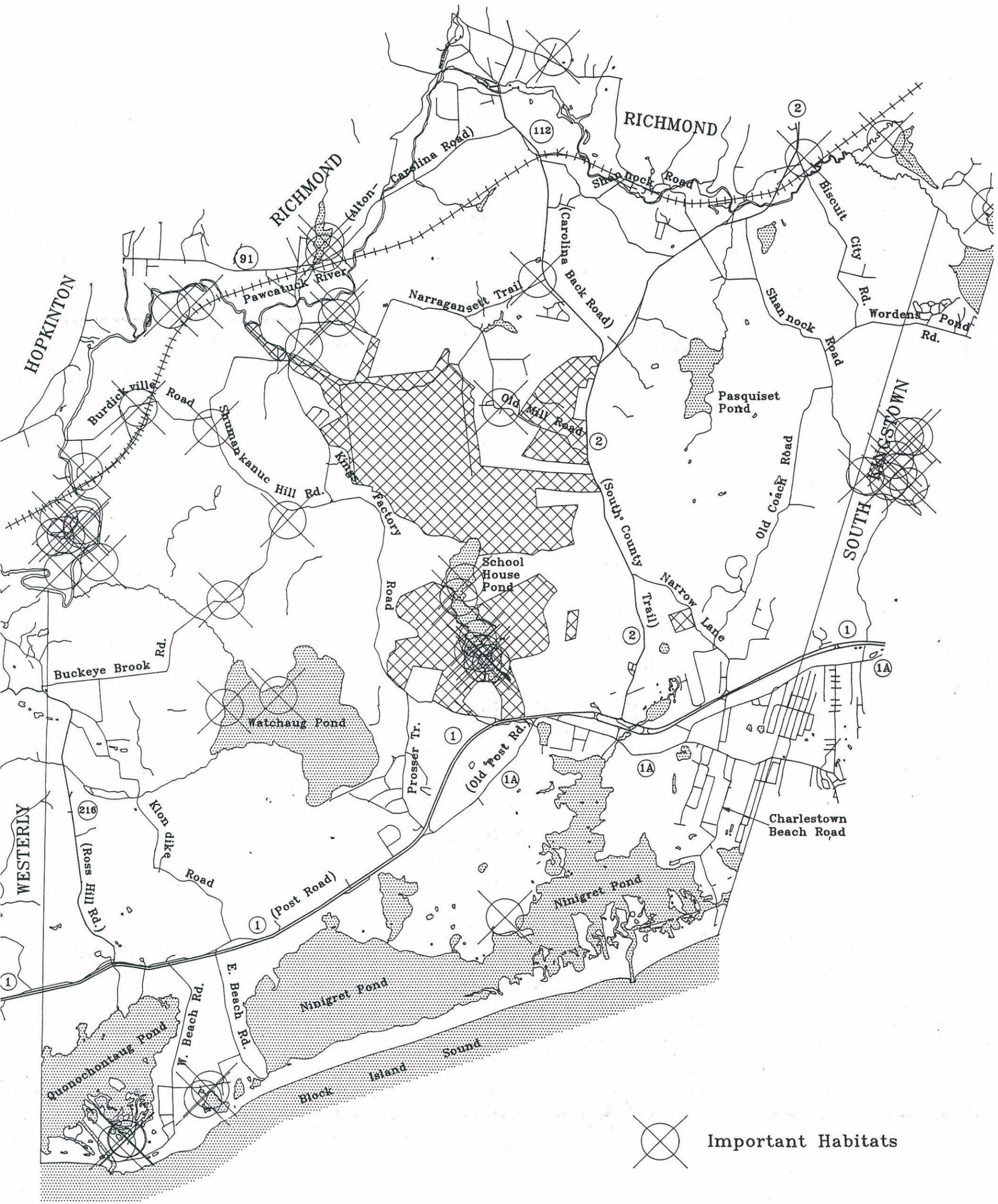
As the majority of this land is privately owned, development and loss of vegetated buffers are a threat to the health of the habitat.

King's Factory Road/Power Line Right of Way

To the south of the point where King's Factory Road crosses the Pawcatuck River, a power line Right of Way provides a maintained wet meadow habitat. This area includes several state listed rare plants.

Ninigret and Quonochontaug Ponds

Two areas within Quonochontaug Pond, and one within Ninigret Pond have been identified by the Heritage Program as significant habitat sites. The areas include the Quonochontaug Breachway and tidal flats located to the northeast and the freshwater wetlands and Fresh Pond located between Quonochontaug and Ninigret Ponds. The third area is roughly defined as the southern part of the Ninigret Wildlife Refuge, including Hall, Grassy and Marshneck Points.



⊗ Important Habitats



0 4000
Scale in Feet

- Narragansett Indian Tribe Lands
- Water

Data Source: Map prepared by Vanasse Hangen Brustlin, Inc. from Town of Charlestown and GIS data.

IMPORTANT HABITATS Figure 9
CHARLESTOWN COMPREHENSIVE PLAN - 1991

SCIENTIFIC NAME.....	COMMON NAME.....	FAMILY.....	SRANK:	SPROT	LAST08S.....
CHARADRIUS MELCOUS	PIPING PLOVER	CHARADRIIDAE	S1	FT	1985
BOTAUBUS LENTIGINOSUS	AMERICAN BITTERN	ARDEIDAE	S1	SE	1978
ICTERIA VIRENS	YELLOW-BREASTED CHAT	EMBERIZIDAE	S1	SE	1906-04-04
ICTERIA VIRENS	YELLOW-BREASTED CHAT	EMBERIZIDAE	S1	SE	1987-05
ENALLAGMA RECURVATUM	BARRENS BLUET DAMSELFLY	COENAGRIONIDAE	S1	SE	1987-06-15
HINUAUTIA GLABRA	SMOOTH SANDWORT	CARYOPHYLLACEAE	S1	SE	1971
RHYNCHOSPORA INUNDATA	INUNDATED HORNED RUSH	CYPERACEAE	S1	SE	1986-08-05
RHYNCHOSPORA TOREYANA	TORREY'S BEAKED RUSH	CYPERACEAE	S1	SE	1987-10-02
SAGITTARIA TERES	SLENDER ARROWHEAD	ALISMATACEAE	S1	SE	1985-07-02
SCLERIA TRIGLOMERATA	TALL HUT-RUSH	CYPERACEAE	S1	SE	1987-10-02
AHHODRAMUS SAVANNARUM	GRASSHOPPER SPARROW	EMBERIZIDAE	S1	ST	1981-07
AHHODRAMUS SAVANNARUM	GRASSHOPPER SPARROW	EMBERIZIDAE	S1	ST	1982-07-08
AHHODRAMUS SAVANNARUM	GRASSHOPPER SPARROW	EMBERIZIDAE	S1	ST	1915-06-20
HIRUNDO PYRAGONOTA	CLIFF SWALLOW	HIRUNIDINIDAE	S1	ST	1937-05
MALACLEMYS TERRAPIN	NORTHERN DIAMONDBACK TERRAPIN	EMYDIDAE	S1	ST	1982-05-06
SCAPHIOPUS HOLBROOKII	EASTERN SPADEFoot	PELOBATIDAE	S1	ST	1981-06-25
TYTO ALBA	COMMON BARN OWL	TYTONIDAE	S2	ST	1975
DESMODIUM CILIARE	SMALL-LEAVED TICK-TREFOIL	FABACEAE	S1	ST	1933-10-12
LACHNANTHES CAROLIANA	CAROLINA REDFOOT	HAEMODORACEAE	S1	ST	1985-07-02
PLATANATHERA BLEPHARIGLOTTIS	WHITE FRINGED ORCHID	ORCHIDACEAE	S1	ST	1984-07-22
POLYGALA CRUCIATA	CROSS-LEAVED MILKWORT	POLYGALACEAE	S1	ST	1979
RHYNCHOSPORA MACROSTACHYA	TALL BEAKED RUSH	CYPERACEAE	S1	ST	1986-08-05
SABATIA STELLARIS	SEA PINK	GENTIANACEAE	S1	ST	1919-10-13
SABATIA STELLARIS	SEA PINK	GENTIANACEAE	S1	ST	1978
CISTOTHORUS PALUSTRIS	MARSH WREN	TROGLODYTIDAE	S2	SSI	1984
IXOBRYCHUS EXILIS	LEAST BITTERN	ARDEIDAE	S2	SSI	1986-06
NYCTICORAX NYCTICORAX	BLACK-CROWNED NIGHT HERON	ARDEIDAE	S2	SSI	1977
PORZANA CAROLINA	SORA	ARDEIDAE	S2	SSI	1916-06-04
RALLUS ELEGANS	KING RAIL	RALLIDAE	S1	SSI	1984-07-21
RALLUS LONGIROSTRIS	CLAPPER RAIL	RALLIDAE	S2	SSI	1984-07-21
STERNA ANTILLARUM	LEAST TERN	LARIDAE	S2	SSI	1985
ELEOCHARIS EQUISETOIDES	HORSETAIL SPIKE-RUSH	CYPERACEAE	S2	SSI	1985-08-10
ELEOCHARIS EQUISETOIDES	HORSETAIL SPIKE-RUSH	CYPERACEAE	S2	SSI	1985-07-02
HELIANTHEMUM PROPINQUUM	LOW ROCKROSE	CISTACEAE	S1	SSI	1978
PANICUM RIGIDULUM	LONG-LEAVED PANIC GRASS	POACEAE	S1	SSI	1989-07-15
PRUNUS PUMILA VAR SUSQUEHANAE	SAND CHERRY	ROSACEAE	S1	SSI	1989-07-15
SCIRPUS ROBUSTUS	LEAFY BULRUSH	CYPERACEAE	S1	SSI	1949
SCIRPUS ROBUSTUS	LEAFY BULRUSH	CYPERACEAE	S1	SSI	1949
AMBYSTOMA OPACUM	MARbled SALAMANDER	AMBYSTOMATIDAE	S2	C	1987-07-03
AMBYSTOMA OPACUM	MARbled SALAMANDER	AMBYSTOMATIDAE	S2	C	1984-07-07
AMBYSTOMA OPACUM	MARbled SALAMANDER	AMBYSTOMATIDAE	S2	C	1986-08-18
AMBYSTOMA OPACUM	MARbled SALAMANDER	AMBYSTOMATIDAE	S2	C	1988-06
AHHODRAMUS MARITIMUS	SEASIDE SPARROW	EMBERIZIDAE	S2	C	1981
AHHODRAMUS MARITIMUS	SEASIDE SPARROW	EMBERIZIDAE	S2	C	1979
CATHARTES AURA	TURKEY VULTURE	CATHARTIDAE	S2	C	1986-08-22
HEMIDACTYLUM SCUTATUM	FOUR-TOED SALAMANDER	PLETHOONIIDAE	S3	C	1987-07-03
HEMIDACTYLUM SCUTATUM	FOUR-TOED SALAMANDER	PLETHOONIIDAE	S3	C	1987-07-03
ZONOTRICHIA ALBICOLLIS	WHITE-THROATED SPARROW	EMBERIZIDAE	S1	C	1971
ASTER MACROPHYLLUS	LARGE-LEAVED ASTER	ASTERACEAE	S1	C	1979-08-12
ASTER CONCOLOR	EASTERN SILVERY ASTER	ASTERACEAE	SH	SH	1924-09-13

Rhode Island Natural Heritage Program
 83 Park Street
 Providence, Rhode Island 02903 (401) 277-2776

Rare Species and Exemplary Natural Communities in CHARLESTOWN as of 13 JUN 1990: page 2

SCIENTIFIC NAME.....	COMMON NAME.....	FAMILY.....	SRANK:	SPROT	LASTOBS.....
MONARDA FISTULOSA VAR MOLLIS	WILD BERGAMOT	LAMIACEAE	SH	SH	1965
PARULA AMERICANA	NORTHERN PARULA	EMBERIZIDAE	SH	SX	1941-06-08
NEW ENGLAND COASTAL PLAIN	NEW ENGLAND COASTAL PLAIN		S2		1986-07
PONDSHORE	PONDSHORE				
NEW ENGLAND COASTAL PLAIN	NEW ENGLAND COASTAL PLAIN		S2		1986-08
PONDSHORE	PONDSHORE				
NEW ENGLAND COASTAL PLAIN	NEW ENGLAND COASTAL PLAIN		S2		1987-07
PONDSHORE	PONDSHORE				
NEW ENGLAND COASTAL PLAIN	NEW ENGLAND COASTAL PLAIN		S2		1989-07-15
PONDSHORE	PONDSHORE				
NEW ENGLAND COASTAL PLAIN	NEW ENGLAND COASTAL PLAIN		S1		1985-09
QUAGMIRE	QUAGMIRE				
NEW ENGLAND INLAND DUNE/SAND	NEW ENGLAND INLAND DUNE/SAND		S1		1987-07-07
BARREN	BARREN				
NEW ENGLAND INLAND DUNE/SAND	NEW ENGLAND INLAND DUNE/SAND		S1		1987-07-07
BARREN	BARREN				
NEW ENGLAND PITCH PINE-SCRUB	NEW ENGLAND PITCH PINE/SCRUB		S1		1989-05-08
OAK BARREN	OAK BARREN				
SOUTHERN NEW ENGLAND BASIN	SOUTHERN NEW ENGLAND BASIN		S2		1989-07-15
MARSH	MARSH				
ENALLAGMA LATERALE		COENAGRIONIDAE	S1S2		1987-06-15

These areas support a variety of plant and animal communities, and provide important habitat for wintering waterfowl, and breeding sites for shorebirds. The areas support at least six state listed rare bird species.

Development within the pond buffer zones, succession from open field habitat to shrub habitat, or conversion of open fields to other land uses, reduces the available nesting habitat for these species of bird, and thereby threatens the species' population.

Great Swamp/Kingston Pine Barrens

Two sites, identified by the Heritage Program, are located largely within the Town of South Kingstown. These include The Great Swamp and an area known as the Kingston Pine Barrens. Both areas are considered high priority areas for protection.

The Great Swamp comprises the largest wetland complex in the State, and contains a multitude of unique habitat types. Wetlands located to the south of the Pawcatuck River, though not contained within the Great Swamp Management Area, are a valuable portion of this wetland.

The Kingston Pine Barrens is one of the few remaining scrub oak/pitch pine (*Quercus illicifolia*/*Pinus rigida*) habitats in the area. This type of habitat is suitable for a variety of rare plants and animals, including invertebrates specifically adapted to the presence of scrub oak. This area is located in the vicinity of Gravelly Hill Road and Shannock Road, in South Kingstown.

Land within Charlestown lying adjacent to these two areas provides valuable buffers from encroaching development. As this land is privately owned, the integrity of the buffer areas is threatened.

Additional areas identified by the Heritage Program include the western shore of Watchaug Pond, which receives inflow from Healy Brook, and serves as the headwaters of Poquiant Brook. Also identified is the area northwest of Shumankanuc Hill, north of the railroad tracks, and a large area of pitch pine habitat northwest of the United Nuclear site on Narragansett Trail.

In addition to the sites identified above, the Town of Charlestown contains a diversity of habitat types which provide potential habitat for a number of state endangered (SE), state threatened (ST) species, and species of state interest (SSI) and special concern (C). Additionally, one federally threatened (FT) species, the piping plover nests within the Town of Charlestown. Table 4 provides a list of the rare species and unique habitats found within Charlestown. The list is dated June 13, 1990, and should not be considered as a finite list. The status of rare species changes frequently, depending on updates to the data base concerning the location of additional populations or loss of habitat. The list includes the rarity status as designated by the RI Department of Environmental Management or the US Fish and Wildlife Service. LASTOBS gives the last date of observation. It should be noted that many of these dates are old, and represent a lack of more recent information.

Fisheries and Hunting Resources

Freshwater fisheries are a valued aspect of the many ponds and streams located within the Town of Charlestown. Additionally, the Pawcatuck River provides a unique opportunity for salmon and trout fishing.

Fishing occurs on most of the public and privately owned water bodies. Due to the small size of many of the ponds, access to open water can be by canoe or row boat, however the use of electric or gasoline motors is permitted on some ponds.

Recreational fishing involves both warm and cold water species. Warm water species, found primarily in the freshwater ponds, include largemouth bass, yellow perch, pickerel and sunfish. Cold water fisheries are provided mainly through the efforts of RIDEM Fish and Wildlife, through the stocking of trout species and the reintroduction of salmon to the Pawcatuck. There is one State owned trout hatchery in Charlestown, located on Yawgunsk Brook, which feeds into Cross Mills Pond. Additional fisheries occurring in the Pawcatuck and its tributaries include alewife, american eel and white perch.

The continued quality of the freshwater fisheries resource depends on the quality of the water. Increased input of industrial waste, sediments, and nutrients and bacteria from individual septic systems will adversely affect the habitat. The population of certain species will decline, and the remaining species may be unfit to eat, depending on the severity of the situation.

Saltwater fisheries include both shellfish and finfish resources. Within the town of Charlestown, these activities mainly serve both recreational and commercial functions. Important fisheries resource areas include the coastal ponds, the barrier beach shoreline, and the breachways in both Ninigret and Quonochontaug Ponds.

The coastal ponds are valued for their supplies of shellfish which include quahog, oyster, scallop and soft-shell clam production. The ponds provide a year-round supply of shellfish, which is enjoyed by both residents and visitors to the area. Ninigret Pond provides the only unlimited oyster supply in the area, as others are periodically closed due to pollution levels. Three active aquaculture enterprises are located within Ninigret Pond, and the potential for oyster production is high. Oysters are found in the back cove areas, where salinity levels are low due to the inflow of freshwater from the wetland systems to the north.

In recent years increased nutrient levels entering the ponds have increased the rate of plant growth. As the plants and algae decay, organic matter accumulates on the pond floor causing a decrease in oxygen levels, and gradually changes the bottom substrate from a hard sand into a soft muck. Oyster spat need hard clean surfaces to settle on, and quahogs require a hard sandy substrate that has relatively few plants growing in it. As the bottom of the ponds continue to change, so will the composition of shellfish populations.

The coastal ponds also provide popular fishing areas, and function as the spawning and feeding grounds for many commercial and recreational fish species.

Recent surveys of the fish populations in Ninigret Pond, seem to indicate a decline in the overall diversity of species, as well as a decline in the individual population sizes. According to RIDEM Fisheries Biologists, this decline can be attributed to an increasing loss of habitat, resulting from incremental salt marsh

filling and construction of bulkheads. Additionally, gradual sedimentation of the pond, and increased plant growth also contribute to the loss of finfish spawning grounds.

Commercially important fisheries available in Ninigret Pond are limited to winter flounder. Additional species of recreational importance include: bluefish, striped bass, american eel, butterfish, tautog, hickory shad, and scup.

Inflow from the freshwater streams and wetlands adjoining the coastal ponds provide an essential element for flushing the ponds. Any increase in nutrients into upstream water bodies, or reduction in flow, will ultimately affect the water quality of the fisheries habitat.

The barrier beach and coastal pond breachways provide valuable sites for salt water fisheries in the late summer and early fall. Fish appear to be attracted to the coastal ponds and deep offshore waters. From the recreational fisherman's point of view the permitted use of four-wheel drive vehicles makes the entire shoreline accessible. The breachways provide access, as well as a confined area where fish entering the ponds to feed, can be caught. Recreational fishing in these areas is primarily for bluefish, striped bass, scup, summer flounder, and to a lesser extent, squeteag. The attraction of saltwater fish to the Charlestown area is dependent, in part, on the health of the salt ponds and their suitability for feeding and spawning grounds.

Hunting in Charlestown, can be divided into two main areas of activity. Within the inland State owned properties, and on private land, hunting involves forest game species such as white tailed deer, ruffed grouse, and wild turkey. Hunting that occurs on State owned management areas, and in the coastal ponds, is primarily for waterfowl such as black duck, canvas backs, and canada goose.

The vast areas of State-owned property provide sufficient habitat for forest game species. The coastal ponds are the wintering grounds for many of the waterfowl sought after by hunters. The availability of food, which is linked to the water quality of the ponds, is essential to the continued importance of the coastal area as a wintering ground for these game species.

CURRENT REGULATIONS AND POLICIES

Federal, State and Town regulations place constraints on development within and adjacent to both freshwater and coastal wetlands. The following is a summary of the jurisdictional areas of the various agencies and their regulations. Included is a description of what the agencies cite as reasons for protecting those resource areas. The reader should consult the official documents for a full description of the restrictions and requirements.

Federal Regulations

The United States Army Corps of Engineers (COE) and the Environmental Protection Agency (EPA) under Section 404 of the Clean Water Act as amended by the Water Quality Act of 1987 (Public Law 100-4) have jurisdiction over the discharge of dredged and fill material in all wetlands of the United States.

The United States Congress enacted the Clean Water Act to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Section 404 of the Clean Water Act regulates the discharge of dredged and fill material into waters of the United States. Waters of the United States are defined as rivers, streams, estuaries, the territorial seas, and most ponds, lakes and wetlands.

Wetlands are recognized as a particularly important and sensitive segment of our waters. Wetlands provide critical habitat for many important species of fish and wildlife, and export plant particles (detritus) that serve as food for aquatic organisms in adjacent waters. Peak floodwaters are absorbed by wetlands, reducing damage to downstream property. Water quality is improved as a result of natural processes that remove pollutants from water flowing through wetlands. In addition, aesthetic, recreational, scientific, and educational values are provided by these natural aquatic areas.

Federally sponsored projects within 100 year floodplains are required to minimize and mitigate for alterations within the floodplain. The Federal Emergency Management Agency has developed standards for development within floodplains to minimize flood damage. These standards are incorporated in state building codes and enforced at the local level.

State Regulations

Wetlands. The Rhode Island Department of Environmental Management (RIDDEM) Division of Groundwater and Freshwater Wetlands, has regulatory authority over the alteration of freshwater wetlands according to the authority granted under the Freshwater Wetlands Act of 1971 (RIGL 2-1-18 et seq.).

Rhode Island law recognizes the public value of four wetland functions: flood control; groundwater recharge; and wildlife and recreational habitat. Freshwater wetlands are defined by the State as including, but not being limited to, marshes; swamps; bogs; ponds; rivers; river and stream floodplains and banks; emergent and submergent plant communities in any body of freshwater including rivers and streams and that area of land within fifty feet (50') of the edge of any bog, marsh, swamp or pond. The term river bank is further defined to be that area of land within two hundred feet (200') of the edge of any flowing body of water having a width of ten (10') or more and that area of land within one hundred feet (100') of any flowing body of water having a width of less than ten feet (10') during normal flow.

DEM Wetlands permits include certification of compliance with the Clean Water Act. DEM requires mitigation for development within floodplains, strengthening the federal floodplain policies.

The State of Rhode Island maintains civil jurisdiction over the Narragansett Indian Land Claim Settlement Area. The rules and regulations governing the protection of wetlands, are therefore extended onto the Tribal Lands.

ISDS. RIDEM Division of Groundwater and Freshwater Wetlands also has regulatory authority over the location, design, construction and maintenance of individual sewage disposal systems (ISDS). Authority was granted under Section 42-17.1-2(1), (m), (r) and (s) and Section 23-19.5-4 and Chapter 42 - 35 RIGL, 1956 (1977 re-enactment) as amended.

ISDS regulations stipulate that the minimum distance between any wetland or watercourse and a proposed ISDS must be 50 feet. In areas designated as Critical Resource Areas (such as Ninigret, Quonochontaug and Green Hill Ponds) a distance of 150 feet is required between the system and the coastal ponds or any wetland contiguous to the ponds. Watercourses not directly connected to the coastal ponds, but located within the Critical Resource Area, must be given a separation distance of 100 feet. In excessively permeable soils in Critical Resource Areas, wells must be located 150 feet from ISDS.

The ISDS Regulations entertain three categories of review; Category A, Category B, and Prohibited (for which a variance may be sought). Review under the Prohibited category is required where the percolation rate within a Critical Resource Area is 1 minute per inch. Areas where the depth to the water table is less than 3 feet from the original ground surface, also require review under the Prohibited category.

Wellhead Protection Program. The State has recently adopted a wellhead protection program. Communities and water suppliers will be required to develop protection plans for groundwater reservoirs and recharge areas and recharge zones for public community wells, all of which will be delineated by the state.

Coastal Regulations. The Rhode Island Coastal Resources Management Council (CRMC), through the Coastal Management Plan (CMP) as authorized under the provisions of the Enabling Legislation of 1971 (RIGL 46-23-1 et seq.).

Rhode Island law recognizes that coastal resources provide a rich variety of commercial, industrial, recreational, and aesthetic assets of immediate and potential value to the present and future development of this state. It is further recognized that the sea and its adjacent lands are major sources of food and public recreation, and that these resources are used by and for industry, transportation, waste disposal and other purposes. Additionally, the legislation mandates that the preservation and restoration of ecological systems shall be the primary guiding principal upon which environmental alteration of coastal resources will be measured, judged and regulated.

Between 1978 and 1982, CRMC jointly funded a research project to document the condition of the coastal ponds and to describe foreseeable trends. The project was funded through the University of Rhode Island's Sea Grant Program, CRMC, RI Division of Statewide Planning, and the Towns of Narragansett and South

Kingstown. In 1986, the resulting product was incorporated into Rhode Island's Salt Pond Region: A Special Area Management Plan (SAM Plan). The SAM Plan complements and adds to the policies and regulations of the CMP. Seven of the eight goals set forth in the SAM Plan are appropriate for the Town of Charlestown. The goals are as follows:

- o To maintain the exceptional scenic qualities of the salt pond region, and a diversity in the mix and intensity of the activities they support;
- o To prevent expansion near areas of the salt ponds that are contaminated by potentially harmful bacteria or eutrophic conditions;
- o To ensure that groundwater will be unpolluted;
- o To preserve and enhance the diversity and abundance of fish and shellfish;
- o To restore barrier beaches, salt marshes, and fish and wildlife habitats damaged by past construction or present use;
- o To prepare a post-hurricane restoration plan;
- o To create a decision-making process appropriate to the management of the region as an ecosystem.

CMP Review. Development affecting coastal features or contiguous wetlands is subject to CRMC review. The CRMC review generally considers impacts to flora and fauna, sedimentation, protection of native vegetation, and scenic qualities. The CRMC review also considers impacts to historic and archaeological sites. Proposed alterations are evaluated on the impacts on the designated use classification. For instance, waters designated for conservation are the most strictly regulated. Shoreline protection structures are prohibited, and new sources of stormwater discharge are permitted only when no other alternatives exist and there will not be a significant adverse impact. In Class 3 waters (High-Intensity Boating), however, priority is given to promotion of boating.

Development on barrier beaches and dunes is regulated under the CRMC policies on coastal features. Development is not allowed on barriers designated as Undeveloped. Development on barriers must meet design criteria that minimize risk of flood damage, with inhabited structures located above the base flood elevation and structures located below this elevation containing "break-away" walls. Structures built in high erosion zones must meet additional setbacks from the edge of the coastal feature (dune scarp) of 30 times the annual erosion rate. These setbacks are defined in the CRMC handbook. Vehicular use on the beaches or dunes is strictly controlled. Development on barriers must also minimize damage to native vegetation.

An important factor in development on barrier beaches is that any structure destroyed 50 percent or more by storm-induced flooding, wave or wind damage may not be reconstructed.

SAM Plan Review. The SAM Plan policies and regulations apply to the watershed of the coastal ponds, which extends onto the moraine. SAM Plan policies take precedence over both the CMP and local zoning, requiring additional

review but also allowing dredging of the Ninigret and Quonochontaug Breachways.

Residential development of 6 units or more or any development requiring an acre or more of parking can be subject to coordinated review. This involves a variety of agencies, including the Soil Conservation Service, DEM, CRMC, local agencies, and the state Historic Preservation Commission. Standards for development in the SAM Plan area are strict and are based on the degree to which the land has already been developed or is zoned. The SAM Plan recognizes the use of wide buffers, denitrifying septic systems, and septic system maintenance as important in maintaining water quality. Underground fuel oil storage tanks are prohibited in SAM Plan developments.

Town regulations

The Town of Charlestown has adopted measures into its zoning ordinance which places additional constraints on developed areas adjacent to wetlands and other natural areas.

Cluster zoning allows for clustered in areas of low density zoning, maintaining the designated density. This provision encourages the protection of natural resources and significant wildlife habitats, by offering the developer a less costly mode of development. As a part of the cluster, the developer is also required to set aside a portion of the total developable land as open space, and to maintain a vegetated buffer of at least 100 feet, around the entire perimeter of the residential cluster subdivision. The Town staff and boards encourage developers to explore cluster subdivision alternatives.

The subdivision regulations further stipulate that wetlands (which includes all areas regulated by RIDEM and CRMC), are considered as land Unsuitable For Development, and must be subtracted from the total acreage allotted for the maximum number of developable lots. In R5A and R3A zoning districts, the Planning Commission has the authority to divide the acreage of the Land Unsuitable For Development by one half. The reduction is not to adversely impact the environment, nor may it be accomplished in a groundwater reservoir and recharge area (as they are defined by RIDEM). As part of the subdivision review, the town may require the developer to submit an Environmental Analysis if the site contains environmental constraints or natural resources, including the following:

- o Groundwater reservoirs or recharge areas;
- o wetlands or high water tables ;
- o slowly or rapidly permeable soils;
- o boulders or bedrock outcrops;
- o steep slopes;
- o 100 year flood zones;
- o areas designated by the Rhode Island Natural Heritage Program;
- o areas designated by the CRMC/SAM Plan as being of Critical Concern or developed beyond carrying capacity.

The Town has included requirements for a soil erosion and storm runoff control plan within its subdivision regulations. However, enforcement has been difficult. The State has passed enabling legislation allowing towns to adopt Soil Erosion and Sediment Control Ordinances, which would allow some review of any

development, including frontage lots (presently difficult to regulate). The enabling legislation allows the town to hold surety from the developer for at least one year after the roads are in place and slopes have been stabilized. This would ensure that slope stabilization was performed correctly.

The specific requirements are discussed in full in the town's Subdivision Regulations.

Commercial/Industrial Site Plan Review

The Town has adopted a Commercial/Industrial/Multi-family Residential development site plan review requirement that considers impacts to native species, runoff and erosion, flood zones, water bodies, traffic, and significant habitats or species.

RECOMMENDATIONS/IMPLEMENTATION

Prioritized Recommendations

High Priorities

1. Designate the protective overlay district described in the Land Use section.
2. Develop and implement a soil erosion and sediment control ordinance based on the recent State Enabling Legislation.
3. Develop a planner's database, combining environmental/cultural resource and constraints maps with lot information to be used as a "red flag" in reviewing developments.
4. Implement Wastewater Management District.
5. Work with Tribe and neighboring communities to delineate and protect shared resources.
6. Continue educational efforts and group activities that raise awareness of environmental protection.
7. Develop additional provisions for water resource protection through zoning and other land use management tools.

Medium Priorities

8. Develop a land trust for conservation purposes.
9. Promote access to and appreciation of many of the natural resources as appropriate through the continued development of shore access points, hiking paths, and other opportunities for outdoor activities.
10. Continue to cooperate with agencies such as the Wood Pawcatuck Association and pond watcher groups in educational activities and preservation of undeveloped parcels.

Lower Priorities

11. Identify and promote acquisition of areas for increased protection through dedication or acquisition of development rights or property.
12. Explore alternative measures of resource protection as they become available or feasible.

5-Year Implementation Program

High Priorities

1. **Designate the protective overlay district** described in the Land Use section.
Refer to the Land Use section.

2. Develop and implement a soil erosion and sediment control ordinance based on the recent State Enabling Legislation.

- The ordinance will require examination of natural features such as wetlands, slopes, and soils for most developments (even frontage development) and will provide means to collect fees for evaluation and to enforce the requirements of the ordinance.

Time Frame: 0-2 years

Responsible Parties: Town Planner, Building Official, Town Solicitor, Planning Commission, Conservation Commission, Town Council.
Administered by Building Official/or designee (Must meet qualifications specified in Enabling Act. Agent may become qualified by attending Soil Conservation Service training course.) Plans may be reviewed by Planning and Conservation Commissions and appropriate department heads.

Resources Needed:

Developing the ordinance:

Staff/board/commission time to develop and review ordinance. The State has developed a model ordinance;

Advertising.

Implementing the ordinance:

Natural resource mapping/planner's database;

Town staff trained to review erosion control plans.

Note: The Enabling Act allows municipalities to collect fees to fund review of the erosion control plans.

Estimated Capital Costs: \$5,000

3. Develop a planner's database, combining environmental/cultural resource and constraints maps with lot information to be used as a "red flag" in reviewing developments.

- Map accuracy of constraints maps and lot maps would allow town staff and developers to identify likely resource or constraint areas, requiring verification by site visit. (Burden of proof on developer to prove constraints not on site.) Information should be included in development reviews.

- Natural resources mapping developed in this Plan will provide graphic data base. Eventually, a computer database should be developed that incorporates lot numbers with natural and cultural resource and constraint information.

Time Frame: 0-5 years

Responsible Parties: Town Planner, possibly with assistance from student intern.

Resources Needed:

Natural resources/constraints mapping;

Town's database management system;

Staff/intern time to analyze lot maps versus constraints maps and enter data.

Estimated Capital Costs: \$0-\$10,000

4. Implement Wastewater Management District:

- **Compile existing water quality data** into single source of information, regularly maintain this database;

- **Intensive water resources management survey in densely developed areas**, especially south of Route 1 and in historic villages in north (Shannock, Carolina). This is a crucial step to determine what the specific problem areas and issues are. The study should include surveys of water quality of well water and nearby pond water, shoreline surveys to identify single sources of pollutants, lot by lot surveys of water usage, water-using appliances, and age and condition of septic treatment facilities;

- **Investigate and develop solutions based on results of the above study**, including regular septic system pumpout, upgrading current systems, multi-family wastewater treatment options. Provision of public water should be investigated. This task could be included in above study;

- **The town should use the services of URI** (e.g., Planning or Natural Resources interns or studios) as much as possible to minimize costs in performing time-intensive studies.

Time Frame (studies): 0-3 years

Responsible Parties: Town Planner, Planning Commission, Conservation Commission, Building Official, Department of Public Works Director, Town Administrator. Outside assistance from student interns or studio classes, volunteers, or private firms is required.

Resources Needed:

Funding for private firm/student interns to perform studies;

Staff/intern time to compile existing water quality information;

Staff time to direct and review studies.

- Critically review and amend existing draft wastewater management ordinance as appropriate in light of the above studies and this Comprehensive Plan.

- Develop wastewater management function in town government, either based on subwatershed or individual homeowner responsibility, depending on results of the above study.

Time Frame: 3-4 years or earlier as studies are complete.

Responsible Parties: Town Planner, Building Official, Department of Public Works Director, Town Administrator, Town Solicitor, Planning Commission, Conservation Commission, Town Council.

Resources Needed:

Staff/Board/Commission time for development, review of ordinance;

Staff time to administer/enforce ordinance;

Physical improvements/upgrades to septic systems to be paid for by homeowners or assessed on a watershed basis.

Estimated Capital Costs (studies and implementation): \$15,000-\$60,000

5. **Work with Tribe and other neighboring communities to delineate and protect shared resources.**

- Opportunities for cooperation include groundwater protection overlay districts, wastewater management program, reaching agreement on appropriate land uses.

- Natural resources mapping developed in this Plan and those of neighboring communities will provide basis for defining shared features.

Time Frame: Immediate, on-going

Responsible Parties: Town Planner, Town Administrator, Planning Commission, Conservation Commission. Tribal land use planner, and other officials.

Resources Needed:

Meetings of South County Planners;

Periodic meetings with Tribe officials.

6. **Continue educational efforts and group activities that raise awareness of environmental protection.**

- Examples: septic system brochure, Conservation Commission sponsored clean-ups, or activities for schoolchildren, such as sponsoring a science fair prize or working with teachers in developing a yearly "theme" week.

Time Frame: On-going

Responsible Parties: Conservation Commission, Planning Commission, Town Planner, volunteers/interns

Resources Needed:

- Volunteer efforts including Conservation Commission and residents; small amounts of staff time periodically; newspaper stories; other outreach efforts;
- Small amounts of funding to sponsor activities.

Estimated Capital Costs: \$5,000

7. **Develop additional provisions for water resource protection through zoning and other land use controls.**

- Enforcement of state vegetated setbacks from streams and wetlands through development review processes - revise ordinances as necessary.
- Water quality performance standards, initially in groundwater protection overlay and Planned Development Districts.

Time Frame: 0-2 years to develop ordinances; ongoing afterward

Responsible Parties: Town Planner, Building Official, Department of Public Works Director, Planning Commission, Conservation Commission,

Resources Needed:

Staff/Board/Commission time to develop, review ordinances;
Natural resources constraints maps.

Medium Priorities

8. **Develop a land trust for conservation purposes.**

- Consider the use of a land transfer fee or other measures to fund land trust purchases.

Time Frame: 3-5 years

Responsible Parties: Town Planner, Planning Commission, Conservation Commission, Town Council. Administered by Board of Directors (to be determined).

9. Promote access to and appreciation of many of the natural resources as appropriate through the **continued development of shore access points, hiking paths, and other opportunities for outdoor activities.**

- Shore access points - refer to Open Space and Recreation.
- Use, improve existing town owned land where possible for trails, shore access.
- Promote outdoor activities such as migratory bird watch, nature-oriented festivals at Ninigret Park .
- Work with local organizations (e.g., Chamber of Commerce, Conservation Commission) and nearby businesses to develop brochures for visitors or residents to draw attention to specific opportunities and resources.
- Work with neighboring communities and businesses to provide regional opportunities and educational materials.
- Support development of North-South Hiking Trail.

Time Frame: On-going as feasible

Resources Needed:

- Staff/volunteer time to develop trails, clear brush, maintain sites;
- Brochures associated with specific resources.

10. **Continue to cooperate with agencies such as the Wood Pawcatuck Watershed Association and pond watcher groups** in educational activities, preservation of undeveloped parcels, and protection of resources.

- Periodically invite representatives of Pond Watchers or WPWA to discuss water quality and on-going programs with Town staff/Boards/Commissions.
- Provide technical assistance in developing grant proposals, etc.
- Identify projects for joint sponsorship (e.g., Septic System brochure).

Time Frame: On-going

Resources Needed:

Staff/Volunteer time

Lower Priorities

10. Identify areas for increased protection through dedication or acquisition of development rights or property. **Promote acquisition of these sites** by the town, land trust, or other conservation organization, as the opportunities present themselves.
 - Use resource/constraints maps developed in this Element to identify areas to protect (e.g., Important/threatened habitats, land adjacent to water bodies, scenic views, areas of many natural resources occurring together).
 - Land for exactions or cluster development open space should be chosen to help protect on-site natural resources as much as possible.
 - Open space parcels should be linked to the extent possible to provide larger open habitat areas. Use natural barriers such as dense bushes rather than fences wherever possible between open space parcels.
 - Other tools for the town or other organizations include acquisition of development rights, conservation easements, dedication or purchase of land.
- Time Frame:** On-going as feasible
- Resources Needed:**
- Natural resources/constraints maps;
- Staff/Board/Commission time to identify sites for protection;
- Funding for acquisition (from grants, land trust bonds).

20-YEAR IMPLEMENTATION PROGRAM

High Priorities

1. **Overlay district**

Monitor effectiveness, revise as necessary

Time Frame: At comprehensive plan update (every 5 years) or more often as needed

Resources Needed:

Staff/Board/Commission time to monitor effectiveness and revise as necessary
2. **Soil erosion and sediment control ordinance**

Continue to implement, revise if necessary as enabling legislation allows

Time Frame: On-going

Resources Needed:

Staff time to review plans

3. Planner's database.

Maintain natural resources/property parcel database, entering new data as available to reflect resources and parcels; development plans submitted to the town will contain new information.

Consider developing GIS capabilities.

Consider detailed mapping of lots or natural resources.

Identify state or federal assistance programs for mapping resources, take advantage of such opportunities as possible.

Time Frame: On-going

Resources Needed:

Maintenance of computer database - staff time

GIS capabilities would require computer plotter, digitizing tablet, software, staff training.

Additional mapping would require detailed studies, possibly using photogrammetry.

4. Implement Wastewater Management District:

- Regularly maintain water quality database.

- Continue to monitor densely developed areas for problems or improvement.

- Continue to investigate alternative technologies for sludge disposal and septage treatment.

Time Frame: On-going

Resources Needed:

Staff/intern time

5. Work with Tribe and neighboring communities to delineate and protect shared resources.

On-going

6. **Continue educational efforts** and group activities that raise awareness of environmental protection, e.g., septic system brochure, Conservation Commission sponsored clean-ups, or activities for schoolchildren.

On-going

7. **Develop additional provisions for water resource protection** through zoning and other land use controls. Examples:

- Enforcement of state vegetated setbacks from streams and wetlands;
- Water quality performance standards for coastal areas.

Time Frame: On-going

Responsible Parties: Town Planner, Building Official, Department of Public Works Director, Town Administrator, Planning Commission, Conservation Commission, Zoning Board of Review, Town Council.

Resources Needed:

Staff/Commission/Board time to develop and review standards/ordinances.

Medium Priorities

8. **Land trust**

Continue coordination and technical assistance.

9. Promote access to and appreciation of many of the natural resources as appropriate through the continued development of shore access points, hiking paths, and other opportunities for outdoor activities.

- Consider developing river corridor policy for the Pawcatuck River (Stonington Ct. model), coordinating with adjacent communities.
- Explore alternatives for developing additional shore access (discussed in Open Space and Recreation element).
- Continue to promote outdoor activities such as migratory bird watch, nature-oriented festivals at Ninigret Park .
- Use state hiking/bicycle paths and villages as focus points for new paths or other access sites; work with neighboring communities to link path systems.

Time Frame: On-going as feasible

Responsible Parties: Parks and Recreation Director, Town Planner, Department of Public Works Director, Town Administrator, Conservation Commission, Planning Commission, Town Council, volunteer groups.

Resources Needed:

Funding for acquisition of parcels, development of paths or sites (e.g., Open Space grants, local bonds, land bank funds).

Litter control, maintenance of paths/sites.

10. **Continue to cooperate with agencies such as the Wood Pawcatuck Association and pond watcher groups** in educational activities and preservation of undeveloped parcels.

- Consider adopting the National Park Service's River Classification System relative to the Pawcatuck and defining and adopting innovative and effective land management techniques.

Time Frame: On-going

Lower Priorities

11. Identify areas for increased protection through dedication or acquisition of development rights or property. **Promote acquisition of these sites** by the town, land trust, or other conservation organization, as the opportunities present themselves.

- Coordinate protection and preservation of open space, post-hurricane coastal areas, aquifers, recharge areas, floodplains, and prime habitats.

- Consider establishing goals for National Park Service designated areas.

- Promote conservation and preservation of agricultural areas.

- Consider designating prime wetlands - based on habitat evaluation similar to CT/NH evaluation.

- Over the long term, linked conservation areas can be established through incremental acquisition of parcels or development rights by the Town, State, and non-profit organizations.

Time Frame: On-going

Responsible Parties: Parks and Recreation Director, Town Planner, Department of Public Works Director, Town Administrator, Conservation Commission, Planning Commission, Town Council, volunteer groups.

Resources Needed:

- Funding for acquisition (town funds, grants, Land Trust funds).

12. **Explore alternative measures of resource protection** as they become available or feasible, including alternative flexible zoning measures, and the use of alternative technologies to treat wastewater.

- Revise zoning as needed.
- Encourage use of alternative technologies.

Time Frame: Update this Plan and amend zoning to comply at least every 5 years; review alternatives as they become available.

Resources Needed:

Staff/Board/Commission time to identify/implement alternative measures.