

4. Natural Resources Conservation Element

4.1 VISION STATEMENT

The natural resources present in Riverhead today — including stream corridors and wetlands, the Central Pine Barrens region, and the aquifer that provides high quality water to the Town — are integral to Riverhead’s long-term health, safety, and well-being, as well as its identity and economic vitality. As such, the ecological integrity of Riverhead’s natural resources must be maintained and protected.

Riverhead occupies a unique place within the much admired landscape of eastern Long Island. Riverhead lies literally “at the head of a river” — the Peconic — which is Suffolk County’s largest. The Town also serves as the geographic bridge between the north and south forks of the East End, lying as it does at the juncture of these two landforms, and the Peconic River is the lynchpin of the juncture. The fact that the community derives its name from a major natural feature goes to show how much that natural environment shapes the Town's identity.

Riverhead is a coastal community, bounded by water on much of its perimeter. In addition to its waterfront along the Peconic Estuary system (which includes the Peconic River, Flanders Bay and the Great Peconic Bay), Riverhead is bounded to the north by Long Island Sound. Many of the shoreline and coastal areas in Riverhead are scenic — particularly the Sound waterfront, with its picturesque bluffs — and all of them have distinctive plant and animal communities. Finally, the Town is an agricultural community, where natural resources play an important role in the livelihood of residents, property owners, and businesspeople.

In all these ways, the natural environment shapes the way of life in Riverhead. Through the Comprehensive Plan, Riverhead has an opportunity to plan for new development in such a way that the natural environment can be better preserved. The condition and quality of natural resources not only affect public health and safety, but play a significant role in the local economy. The local agricultural economy, for example, relies upon the Town's water and soil resources for business. This Element discusses three major categories of natural resources:

- ***Water Resources.*** The surface waters of Long Island Sound and the Peconic Estuary are unique natural and scenic resources that are used for fishing and recreational activities (like canoeing, kayaking, sailing, and swimming). Other sensitive water resources include non-coastal surface waters, such as rivers, ponds and intermittent streams. Protection of surface water from contaminated runoff is critical for the protection of both the fishing and tourism industries. Less visible but equally critical are the underground water aquifers. Protection of aquifer recharge areas is essential to maintaining the thousands of wells, public and private, that the community depends upon for drinking water.
- ***Soils and Topography.*** The characteristics of soils and landforms determine those areas best suited for agricultural use. Many of the soil types in Riverhead are particularly well-suited to agriculture. (Chapter 3, the Agriculture Element, provides a more detailed discussion of farmland resources and farmland preservation strategies.) Also, by affecting whether septic systems can successfully be installed and used, soils may shape the type and density that development that can be accommodated. Topography is an important economic resource as well. The Town's rolling landscape and coastal bluffs contribute to the unique visual character of the community, attractive to residents and visitors alike. Erosion and flooding issues are also addressed in this chapter.
- ***Plant and Animal Communities.*** Found in woodlands, meadows, and freshwater and tidal wetlands, these communities are important for a number of reasons. Many of

them are rare or special; some provide food and habitat for other species; they contribute to Riverhead's natural heritage; and they perform important environmental and ecological functions. In particular, plants filter the water that flows into the region's aquifers and water bodies, removing pollutants and sediments, and their roots act as sponges to absorb the surge of excess water that comes with storms and flooding. In this way, plant communities can help reduce the potential for groundwater contamination and reduce the risks to life or property during a flood.

4.2 SUMMARY OF BACKGROUND RESEARCH

WATER RESOURCES

Water resources are important economic assets to the community. In Riverhead, local fishermen depend upon the water for their livelihood; fish and shellfish must be safe to eat and must occur in high enough abundance so that fish populations are sustainable. Because of the scenic beauty of the Town's water bodies, many of the waterfront areas in Riverhead attract water sports enthusiasts, as well as hikers, bikers, motorists, and tourists. Thus, from the point of view of the tourism industry, water bodies serve as attractions that draw potential customers. Residential property values are also tied to water resources and their quality. Coastal property is generally valued higher, because of the views.

At the same time, while water bodies and waterfront areas may be desirable economically, they are often some of the most fragile areas from an environmental standpoint. Human activity can easily upset the delicate environmental balance of those areas. Insensitive site planning, poor building design, or badly conceived planning efforts can compromise the beauty and integrity of these fragile and sensitive areas. Landscaping practices of both homeowners and businesses can put these waterfront areas at risk. Chemicals applied to field crops, golf courses, parkland, and athletic fields (i.e., herbicides, pesticides and fertilizers) can also harm a community's water resources.

Another important quality of the Town's water bodies is the unique plant and animal life found there. Water bodies, particularly freshwater and tidal wetlands, serve as critical habitat areas that support distinctive plant and animal populations.

Long Island Sound

Long Island Sound is approximately 110 miles long from east to west and is about 21 miles across at its widest point. More than 8 million people live within its watershed. According to research commissioned by the Long Island Sound Study (LISS), more than \$5 billion is generated annually in the regional economy from boating, commercial and sport fishing, swimming and beachgoing associated with the Sound.¹ The ability of the Sound to support

¹ See "References," at the end of this "Findings" section.

these activities depends on the quality of its waters, living resources and habitats – all of which are affected by the amount and type of development that occurs along the borders of the Sound and throughout its watershed. Communities, like Riverhead, along the north shore of Long Island are closely tied to the Sound and its overall health and visual character.

An Estuary of National Significance

Long Island Sound is an estuary,² a place where fresh and salt water mix. Like other estuaries, Long Island Sound is rich in fish, shellfish, and waterfowl. It provides feeding, breeding, nesting, and nursery areas for diverse animal and plant life and is an important component of the overall landscape and economy of the region.

Estuarine environments are among the most biologically rich on earth, creating more organic matter each year than comparably-sized areas of forest, grassland, or farmland. Estuaries provide habitat for more than 75 percent of America’s commercial fish catch, and 80 to 90 percent of the recreational fish catch. Other benefits of estuaries include educational and recreational opportunities, provision of migratory habitat for birds, and provision of coastal wetland areas. Wetlands filter water from upland areas, serve as natural buffers between the land and ocean (absorbing floodwaters and dissipating storm surges), and help prevent erosion and stabilize the shoreline.

In 1987, as part of the National Estuary Program (NEP), Long Island Sound was designated an “Estuary of National Significance.” Two years earlier, in 1985, the Sound’s importance had been formally recognized by citizens and government through the formation of the Long Island Sound Study (LISS), a cooperative endeavor focused on analyzing and correcting the Sound’s most pressing environmental problems.

As part of that effort, a group of stakeholders — known as the LISS Management Conference — first met in 1988 and has continued to work together collectively to implement the Comprehensive Conservation and Management Plan (CCMP) for the Sound that was released in 1994. The group of stakeholders working on this project includes citizens, environmental groups, businesses and industries, academic institutions and local, State, and federal agencies. Four threats to the Sound's water quality were identified by the LISS Management Conference group:

1. ***Low Dissolved Oxygen (Hypoxia)***. Just as people need oxygen to breathe, so do marine organisms. The oxygen used by marine organisms is “dissolved” in the water in which they live; when the level of dissolved oxygen falls below a certain

² An estuary is a partially enclosed body of water that is formed where freshwater from rivers and streams flows into the ocean. Estuaries are characterized by the mixing of freshwater and salty sea water. Although influenced by the tides, estuaries are protected from the full force of ocean waves, winds, and storms by reefs, barrier islands, or fingers of land, mud, or sand that define an estuary’s seaward boundary.

point, the organisms become stressed. They may become ill, die, or move to more oxygen-rich waters, thus decreasing the health and vitality of the water body. One of the major contributing factors to low dissolved oxygen is the release of nitrogen from land-based sources, such as sewage treatment facilities, stormwater runoff, and agriculture. Nitrogen over-fertilizes the Sound, fueling the growth of algae, which ultimately sinks to the bottom and decays, depleting oxygen in the bottom waters.

2. **Toxic Contaminants.** Of the 55,000 chemicals in use today, many are toxic. In high concentrations, some of these substances can kill marine life. Others can have more subtle effects on behavior and reproduction, or may impact intricately balanced food webs. Additionally, toxic substances can accumulate at high levels in the tissue of marine organisms, creating a health risk for seafood consumers. Fortunately, pollution controls and changes in manufacturing trends have decreased the amount of contaminants discharged into the Sound, resulting in lower concentrations of contaminants in the surface sediments.
3. **Pathogen Contamination.** Disease-causing bacteria and viruses can enter the Sound from inadequately treated human sewage and animal waste (domestic or wild). People can become sick by swimming in waters contaminated by pathogens or by eating raw or partially cooked shellfish that contains pathogens. Some of the primary sources of the Sound's pathogens are overflowing sewer systems; malfunctioning septic systems or sewage treatment plants; and illegal connections to storm sewers. Another source is the discharge of sewage from boats.
4. **Floatable Debris.**

These four items represent problems that are created primarily by human activity and/or development practices and impacts. Some of these conditions and their development-related impacts are described more fully in Appendix B.

Taxpayer dollars have been and will continue to be invested in the Sound to deal with contamination issues. New York State citizens have shown their support for efforts to protect and improve the quality of their natural resources through legislation such as the 1996 Clean Water/Clean Air Bond Act. The act included \$200 million for projects to address the priorities identified in the Long Island Sound CCMP, including the reduction of nitrogen releases. To date, \$83.2 million has been committed for projects to upgrade and improve sewage treatment plants, restore critical aquatic habitat, purchase open space and reduce non-point sources of pollution.

The Peconic Estuary

Many of the issues identified above for Long Island Sound are also of concern for the Peconic Estuary system, with extends from the mouth of the Peconic River out to the Atlantic Ocean and includes a portion of Block Island Sound. It also includes what is known as the “stormwater runoff-contributing watershed” and the “groundwater contributing area.”

Altogether, the system is composed of more than 100 distinct bays, harbors, embayments, and tributaries spanning more than 110,000 acres of land and 121,000 acres of surface water. It encompasses 340 miles of coastline.

Riverhead is at the western end of the estuary system, which includes Flanders Bay and the mouth of the Peconic River. The Peconic River supports a wide variety of plants and animals, both within its water and along its banks. The shores of the bay contain an 800-acre, undisturbed salt marsh complex, which is considered a rich marine ecosystem that serves as a nursery for a variety of marine life.

Although the Peconic Estuary system generally has high water quality, development in its watershed areas, wastewater effluent, and dirty stormwater continue to threaten water quality and other important resources associated with the estuary.³ Water quality in the western end of the system (mouth of the Peconic River and Flanders Bay, near Riverhead) is particularly vulnerable, because the waters there are poorly flushed compared to waters further east.

The Economic Value of the Peconic Estuary

As part of a project to help the Peconic Estuary Program and coastal managers determine priorities for managing and protecting the Peconic Estuary, the Department of Environmental and Natural Resource Economics at the University of Rhode Island has assessed the economic value of the Peconic Estuary. As part of that study, 29 estuarine-dependent economic sectors were identified. For the Peconic Bay, these included over 1,000 establishments that employ more than 7,000 people, pay wages in excess of \$117 million and have total annual revenues of over \$400 million. Overall estuarine-dependent economic activity accounted for about 20 percent of the local economy. Tourism and recreation establishments make up more than 80 percent of the estuarine-dependent economy.⁴

The Peconic Estuary Program

The Peconic Estuary is one of 28 estuaries in the National Estuary Program (NEP), administered by the U.S. Environmental Protection Agency (EPA), and was accepted into the program as an “Estuary of National Significance” in 1992. The Peconic Estuary Program

³ The National Estuary Program. *Coastlines: Information About Estuaries and Near Coastal Water* (August 1999, Issue 9.4). National Estuary Program, U.S. Environmental Protection Agency, 1999.

⁴ Grigalunas, Thomas A. and Jerry Diamantides. *The Peconic Estuary System: Perspective on Uses, Sector and Economic Impacts*. (February 1996; unpublished technical report submitted to the Peconic Estuary Program); Opaluch, James J.; Thomas A. Grigalunas, Jerry Diamantides, Marisa Mazzotta and Robert Johnston. *Recreational and Resource Economic Values for the Peconic Estuary System*. (February 1999; unpublished technical report submitted to the Peconic Estuary Program); The National Estuary Program. *Coastlines: Information About Estuaries and Near Coastal Water* (August 1999, Issue 9.4). National Estuary Program, U.S. Environmental Protection Agency, 1999.

(PEP) is part of the NEP and is sponsored by the EPA, the State's Department of Environmental Conservation (DEC), and the Suffolk County Department of Health Services (SCDHS). The SCDHS operates the program and provides day-to-day management, as well as technical and administrative support.

In 2001, a group of citizens, technical experts, and federal, State, and local officials — known as the PEP Management Conference — completed the Comprehensive Conservation and Management Plan (CCMP) designed to protect and preserve the Peconic Estuary system. The CCMP was endorsed by Governor Pataki in July 2001 and was forward to the EPA, with the hope that the federal agency would allocate funding to help implement the plan.⁵ On October 30, 2002, County Executive Robert Gaffney joined with representatives from state, local and federal government to approve the CCMP.⁶

In addition to pathogen contamination and toxic chemicals (two of the same issues affecting Long Island Sound), the CCMP also identified "brown tide" and "nutrient pollution" as serious issues in the estuary system. Also, as discussed in the subsection on plants and animals, the CCMP also expressed concern about ongoing threats to habitat areas and living resources.

Brown Tide

An algae bloom caused by a small and previously unknown species (*Aureococcus anophagefferens*), Brown Tide was first detected in June 1985 and has appeared and re-appeared sporadically since then. Its onset, duration, and cessation have been unpredictable. Although advances have been made regarding the identification and characterization of the brown tide organism and its growth needs, the causes of the brown tide are not known.

The impacts of the recurring Brown Tide blooms are widespread, having a serious effect on natural resources, the local economy, and the general aesthetic value of the estuary. Brown Tide has been particularly devastating to shellfish resources. The estuary's scallop harvest accounted for 28 percent of U.S. landings in 1982 with a dockside value of \$1.8 million dollars. By 1988, the scallop harvest had dropped from 150,000 to 500,000 pounds per year (pre-Brown Tide) to only 300 pounds per year (post-Brown Tide). By 1994, the scallop population had rebounded but was then hit with a brown tide in 1995 which caused significant scallop mortality again.⁷

⁵ "Governor Pataki Endorses Peconic Estuary Conservation Plan" Press Release, New York State, Office of the Governor, July 19, 2001, <www.state.ny.us/governor/press/year01/july19_01.htm>.

⁶ "Gaffney Signs the Peconic Estuary Plan" Press Release, Suffolk County, Office of the County Executive, October 30, 2002, <http://www.co.suffolk.ny.us/pressreleases.cfm?ID=822&dept=19>.

⁷ Peconic Estuary Program, Office of Ecology. *Draft Comprehensive Conservation and Management Plan – September 1999*. Suffolk County Department of Health Services, September 1999, Riverhead: New York.

In 1992, the SCDHS released the Brown Tide Comprehensive Assessment and Management Program Report (BTCAMP) in response to the Brown Tide problems. The BTCAMP study recommended that a host of pollution abatement strategies be pursued in the Peconic Bay area, including:

- Upgrading of the Riverhead Sewage Treatment plant;
- Stricter zoning;
- Restoration of wetlands and eelgrass beds;
- Stormwater runoff management;
- Boating and marina controls; and
- Further monitoring of water quality and the Brown Tide.

Nitrogen

Prior to the establishment of the Peconic Estuary Program, the ground and surface water quality of the Peconic Estuary and its surrounding watershed was studied in some depth. The primary emphasis at that time was on the western estuary, including the Peconic River and Flanders Bay — the area of the estuary bordered by the Town of Riverhead. At that time, significantly elevated nitrogen concentrations were found along the North Fork (typically 5 to 7 mg/liter). These elevations were attributed to agricultural and residential influences, resulting in part from the fertilizers used in these areas.

At that time, studies also found that groundwater in the Peconic River was of relatively high quality. This was attributed to that fact that much of that land draining into the river was at the time vacant, consisting primarily of undeveloped land, parkland, or nature preserves. As land in the Peconic River watershed becomes more highly developed, the river's water quality would tend to degrade, unless adequate land use planning and site design requirements are established. Careful attention is required not only to streamside development, but to any development projects Townwide that could impact groundwater resources.

Studies also revealed another area of concern, namely the need to control point source loading — most notably nitrogen — into the Peconic Estuary system from the municipal sewage treatment plant whose discharge location is at the mouth of the Peconic River. The PEP has adopted “no net increase” nitrogen loading recommendations for the tidal Peconic River and Flanders Bay. This nitrogen level “freeze” is being implemented through point source discharge permits for the three sewage treatment plants in the area.

AQUIFER AND GROUNDWATER RESOURCES

Central Pine Barrens

The Central Pine Barrens helps maintain the water quality of the sole source aquifer that provides drinking water for more than 2.5 million residents on Long Island. This aquifer is

regularly replenished by rainwater. Water percolates downward into the soil through a hydrological phenomenon known as “deep flow recharge.” Because the soils in the Pine Barrens area are so porous, they are very good at recharging the aquifer.

The Central Pine Barrens once covered approximately 250,000 acres in central Suffolk County. However, due to landscape changes wrought by development, the ability of portions of the original area to serve their original ecological function as aquifer recharge areas has been diminished or lost. As a result, the Central Pine Barrens area now consists of less than half its original area, covering approximately 100,000 acres of relatively undeveloped land.

The soil features that make the Central Pine Barrens an ideal area for groundwater recharge also make the drinking water supply especially vulnerable to the risk of pollution. Because the soils are so permeable, they are not as capable of filtering contaminants as well as some other soils. Thus, contaminants can enter, and in sufficient quantity, contaminate the aquifer system.

Comprehensive Land Use Plan

Because of the importance of the Central Pine Barrens, many important laws and policies were adopted at the County, State, and federal levels to protect it from the negative impacts of development throughout the 1970s and 1980s. These initiatives culminated in 1993, when the State adopted the Long Island Pine Barrens Protection Act. The act established a 5-member Central Pine Barrens Joint Planning and Policy Commission and mandated that the Commission prepare the *Central Pine Barrens Comprehensive Land Use Plan*. This plan was adopted in June 1995.

The plan identifies two regions within the Central Pine Barrens — the Core Preservation Area and the Compatible Growth Area. The Core Preservation Area consists of 55,000 acres (4,720 in Riverhead), in which all new development is essentially prohibited, with limited expansion of existing agricultural uses being permitted. The Compatible Growth Area consists of 47,500 acres (5,484 in Riverhead), in which appropriate patterns of compatible residential, commercial, agricultural, and industrial development are permitted. Figure 4-1 illustrates the boundaries of the Core Preservation and Compatible Growth Areas in Riverhead.

The plan includes a strategy for the public acquisition of private vacant property in the Core Preservation Area, with a goal of purchasing 75 percent of the remaining privately owned vacant land. To this end, a transfer of development rights (TDR) program called the Pine Barrens Credit (PBC) Program has been created. Property owners in the Core Preservation Area may transfer the right to develop a parcel in the Core to another parcel outside the Pine Barrens region.

Groundwater Resources and Protection

Figure 4-1 depicts the Groundwater Management Zone (GMZ) system in Riverhead, as defined by Article 7 of the Suffolk County Sanitary Code. GMZs or hydrogeological zones correspond with the type of aquifer that lies beneath the surface, as well as the characteristics and groundwater quality in each zone. Zone III is a deep recharge area that extends to Sound Avenue on the north and Roanoke Avenue on the west. It includes the Core Preservation and Compatible Growth Areas of the Pine Barrens. A good portion of Zone III is undeveloped and contains high quality groundwater in the upper glacial, Magothy and Llyod aquifers. Zone IV extends east of Roanoke Avenue to the Southold town line and is characterized by shallow flow systems that discharge to streams and marine waters. Zone VIII is located west of Roanoke Avenue and extends north to the Long Island Sound from Sound Avenue. Groundwater in Zone VIII flows towards the Long Island Sound.⁸

Figure 4-1 also shows the Central Suffolk Special Groundwater Protection Area (SGPA) boundaries in Riverhead. Article 55, Sole Source Aquifer Protection, of the New York State Environmental Conservation Law seeks to protect designated sole source aquifers and prevent contamination of high quality groundwater. Article 55 sets forth an ambitious program of groundwater protection requirements, including the preparation of a comprehensive management plan. The requirements generally seek to limit development in the SGPA, to identify all known existing and potential point and non-point sources of groundwater degradation, and to develop specific watershed rules and regulations.

SOILS AND TOPOGRAPHY

Geological Formations

Over time, a variety of forces have shaped and continue to shape the landscape of Long Island. These forces have included the advance and retreat of glaciers thousands of years ago; the weathering action of rain that erodes the landscape over time; the movement of soil particles through the landscape by rivers and streams; and the shifting of landforms created by the movement of large water bodies, particularly those that are tidally influenced. The most prominent landforms in Suffolk County are:

- Two hilly ridges (called moraines) that extend in long strips from west to east;
- Two gently sloping outwash plains that fall to the south of each moraine;
- Eroded headlands found along the northwestern shore of the county;
- Barrier beaches of the south shore; and
- Tidal marshes.

⁸ The Long Island Comprehensive Special Groundwater Protection Area Plan. Long Island Regional Planning Board, 1992.

Figure 4-1

Back of Figure

The moraines and outwash plains were formed by the action of glaciers. The weathering effect of rainfall that has occurred over many hundreds, even thousands of years, has slowly eroded those hills and other upland features. Meanwhile, the barrier beach and tidal marshes have probably been formed in relatively shorter time frames by water movement and particle deposition, from streams, rivers, oceans, and bays. Elevation in the County ranges from almost 400 feet at West Hills to sea level.

Glacial Formations

The advance and retreat of glaciers played a primary role in forming the soils and landforms of Long Island. The Wisconsin stage, the last of four major glacial stages, produced Long Island Sound as well as many of the significant topographic features apparent on Long Island today. In Suffolk County and Riverhead, glacial landforms define the overall landscape character and correlate strongly to the existing soil associations.

During the earlier part of the Wisconsin stage, the glacier moved south across what is current-day Long Island. The glacier acted much like a bulldozer, pushing a complex mix of soil and glacial debris ahead of it. When the glacier retreated, the pile of debris was left behind, forming an extensive, irregular, hilly mound called a moraine. This moraine, known as the ***Ronkonkoma moraine*** extends in a long band from the Nassau County line (near Smithtown) to Montauk Point. Part of this moraine passes through Riverhead, along the southern edge of the town, in the area of course-textured, excessively drained soils just north of the Peconic River. This area corresponds to the Plymouth-Carver Rolling and Hilly soil association.

Following this period of glacial retreat, the glacier advanced one last time. However, with this final advance, the glacier did not advance as far south before beginning its retreat. Once again, the bulldozer effect of the glacier left behind a hilly pile of morainal debris. In Suffolk County, this second moraine — known as the ***Harbor Hill moraine*** — forms the northern shore of the county, extending in a long band from the western edge of the county all the way to Orient Point. In Riverhead, this morainal landform is found along the northern edge of the town, in the hilly strip that borders Long Island Sound. This area corresponds to the Carver-Plymouth-Riverhead soil association described below.

Each time the glacier reached its southern limit, it began to melt. As the glacier melted, streams flowed south away from the glacier and its morainal deposits. These “meltwater” streams carried large amounts of sand and gravel that were deposited in a more or less flat plain, forming broad, flat landscape features known as outwash plains. There are two outwash plains in Suffolk County:

- One outwash plain lies between the Ronkonkoma moraine and the Atlantic Ocean and forms the southern edge of the County.
- The other outwash plain lies between the Harbor Hill moraine and the Ronkonkoma moraine. In Riverhead, this outwash plain occupies the majority of the Town’s land area, extending from west to east in a broad band across the entire Town. This central landform, framed by the Harbor Hill moraine to the north and the Ronkonkoma

moraine to the south, forms the agricultural core of Riverhead. This area corresponds to the Haven-Riverhead soil association described below.

Riverhead Soils

There are several important soil associations and types found in Riverhead; these are described below. A soil association gives a general idea of the soils in an area and encompasses a distinctive pattern of soils, typically consisting of one or more major soils and at least one minor soil. The first three soil associations described below are key to understanding the geographic makeup of the Town. They cover the majority of the land area within Riverhead and occur in three bands parallel to Long Island Sound. The remaining are four soil types that are unique or especially fragile soil types covering a much smaller percentage of land area, found in pockets or narrow strips near the coastal edges.

- ***Carver Plymouth Riverhead Association (Harbor Hill Morainal Area — North Shore)***. “Deep, rolling, excessively drained to well-drained, coarse and moderately coarse textured soils.” Located mainly along the Sound. In the eastern part of the area covered by these soils, there are some sharp slopes. Many areas are currently wooded. The sandy texture and steep slopes make the soil poorly suited to farming. Slope is the dominant limitation to the use of these soils as building sites. Steep slopes are also more prone to erosion, particularly if construction, grading, or clearing are being conducted.
- ***Haven-Riverhead Association (Outwash Plain Area — Central Agricultural Zone)***. “Deep, nearly level to gently sloping, well-drained, medium-textured and moderately coarse textured soils.” These soils are located in a wide band across the central area of the Riverhead. Soils are typically level and have short, gentle slopes along shallow drainage ways. Some areas are pitted by steep-sided kettle holes. Most of the areas covered by this soil in Riverhead have been cleared, and a large part is being used for farmland. These soils are well-suited to agriculture, as they have moderate-high moisture capacities, and crops respond well to applications of lime and fertilizer. Because drainage is good in these soils, and they can be excavated with ease, this association also has excellent potential for housing developments and similar uses. In some places, the water table is high limiting development potential.
- ***Plymouth-Carver Association, Rolling and Hilly (Ronkonkoma Morainal Area — South)***. “Deep, excessively drained, coarse-textured soils.” Steep slopes, ranging from 8 to 35 percent. Soils of this association are coarse-textured and prone to drought. Permeability is rapid, and natural fertility is low to very low, making them ill-suited to farmland. Development is severely limited due to steep slopes. Some areas have high water tables, which also limit potential development. Rapid permeability has the potential to result in groundwater contamination. These soils are located in a narrow band along the southern edge of the Town, bordering the Peconic River and Flanders Bay.
- ***Beaches (Bc)***. Made up of sandy, gravelly, or cobbly areas that develop between dunes and escarpments and the line of water at mean sea level. The slope of beach

soils is nearly level in most areas but it is as much as 16 percent in some places on the Atlantic shore. All beaches along Long Island Sound are gravelly and cobbly. In most places, beaches on the bays are sandy, but varying amounts of gravel are mixed with the sand.

- ***Escarpments (Es)***. Escarpment soils are made up of bluffs that have slopes greater than 35 percent. In Riverhead, *Es* occurs along the north shore. With such steep slopes, there are highly subject to erosion. Except for a few scattered areas, soils are generally devoid of vegetation. Along the north shore of Long Island, the material in the escarpments is sand. Many escarpments have large boulders embedded in the soil, which roll to the beach as the escarpment erodes. Escarpments are used as habitat by some species of songbirds.
- ***Muck (Mu)***. Muck is made up of very poorly drained organic soils that have formed from partly decomposed or almost completely decomposed woody or herbaceous plants. Muck is made up of 16 to 48 inches of spongy, black or dark-reddish organic material over loose sand and gravel. The water table is at or near the surface most of the year. Muck areas are nearly level and occur in the bottom of closed depressions and along streambeds. In Riverhead, most areas are found along the Peconic River in depressions that are irregular in shape. Most of this land type is covered with woodland or marsh grass. It is best suited to habitat for wetland wildlife.
- ***Tidal Marsh (Tm)***. Tidal marsh soils are made up of wet areas that occur throughout the County around the borders of calmer embayments and tidal creeks. These level areas are not inundated by daily tide flow, but they are subject to flooding during abnormally high moon or storm tides. Tidal marsh soils have an organic mat on the surface that ranges from a few inches to several feet in thickness. The organic mat overlies pale-gray or white sand. In many places the profile of the marsh is made up of alternating layers of sand and organic material, that has developed as a result of sand being deposited on the organic mat during abnormally high storm tides. These very poorly drained areas are not suitable to any kind of farming. They are best suited to use as habitat for types of wildlife.

Capability Grouping System of Soils

Figure 4-2 illustrates the soil classes in Riverhead cataloged by the U.S. Department of Agriculture Soil Survey. The purpose of designating soil classes is to measure the suitability and limitations of soils when used for field crops. Soil classes are part of the capability grouping system, which orders soils three different levels: 1) classes; 2) subclasses; and 3) units. Soil classes are the part of the broadest level of the capability grouping system and range from Class I soils, which have few limitations that restrict their use, to Class VIII soils, which have many limitations that restrict their use. Table 4-1 below lists each soil type in Riverhead and its corresponding soil class.

Table 4.1: Riverhead Soil Classes and Types

<i>Class</i>	<i>Soil</i>
Class I	HaA – Haven loam, 0 – 2% slopes
Class II	HaB – Haven loam, 2 – 6% slopes He – Haven loam, thick surface layer MfA – Montauk fine sandy loam, 0 – 2% slopes MfB – Montauk fine sandy loam, 3 – 8% slopes PsA – Plymouth loamy sand, silty substratum, 0 – 3% slopes RdA – Riverhead sandy loam, 0 – 3% slopes RdB – Riverhead sandy loam, 3 – 8% slopes ScB – Scio silt loam, till substratum, 2 – 6% slopes SdA – Scio silt loam, sandy substratum, 0 – 2% slopes SdB – Scio silt loam, sandy substratum, 2 – 6% slopes Su – Sudbury sandy loam
Class III	De – Deerfield sand HaC – Haven loam, 6 – 12% slopes MfC – Montauk fine sandy loam, 8 – 15% slopes MnB – Montauk loamy sand, sandy variant, 3 – 8% slopes PIB – Plymouth loamy sand, 3 – 8% slopes PIC – Plymouth loamy sand, 8 – 15% slopes Ra – Raynham loam RdC – Riverhead sandy loam, 8 - 15% slopes Wd – Walpole sandy loam
Class IV	At – Atsion sand MnC – Montauk loamy sand, sandy variant 8 – 15% slopes PIC - Plymouth loamy sand, 8 – 15% slopes We – Wareham loamy sand
Class V	Bd – Berryland mucky sand
Class VI	–
Class VII	CpA - Carver & Plymouth sands, 0 – 3% slopes CpC - Carver & Plymouth sands, 3 – 15% slopes CpE - Carver & Plymouth sands, 15 – 35% slopes Mu – Muck PmB3 - Plymouth gravelly loamy sand, 3 – 8% slopes PmC3 - Plymouth gravelly loamy sand, 8 – 15% slopes
Class VIII	Bc – Beaches Du – Dune land Es – Escarpments Tm – Tidal marsh
Unclassified	CuB - Cut and fill land, gently sloping CuC – Cut and fill land, sloping Cue – Cut and fill land, steep Fd – Fill land, dredged material Gp – Gravel pits Ma – Made land Rc – Recharge Basin RhB - Riverhead & Haven soils, graded, 0 – 8% slopes Ur – Urban land

Figure 4-2: Soil Capability Classes

Back of Figure

WOODLANDS

The most well-known woodland area in eastern Long Island is the Central Pine Barrens region, which as noted, is composed of nearly 100,000 acres of Pitch Pine and Pine Oak forests. The Central Pine Barrens is protected from nearly all future development, due to its function as a groundwater recharge area. The forest is considered a unique and rare habitat area for both plant and animal species.

Another important woodland area is found along the shoreline of Long Island Sound in Riverhead. The moraine that forms the Long Island shoreline has a mix of rocky bluffs and sand hills, which extend roughly from Wading River to Northville. Along the upland of the escarpment lies the Coastal Oak Beech woodland, which is considered old growth. In certain areas along the escarpment are stands of dwarf beech considered globally rare by the New York Heritage Program of the New York State Department of Environmental Conservation.

In 1994, New York State Department of State, Division of Coastal Resources, stated: "portions of the Riverhead Bluffs around Friars Head are covered by a maritime beech forest, a unique plant community on the Sound considered by the NYS Natural Heritage Program to be globally rare. It is one of three known maritime beech forests in New York (and in size, the largest, by far), and one of three known along the east coast. The tree extent of the maritime beech forest is not known, but it may stretch beyond the immediate area of Friars Head." Other occurrences of dwarf beech forest have been found in Wildwood State Park and sites about 2 to 3 miles east of Friar's Head.

PLANTS AND ANIMALS

In protecting plants and animals, the focus is often on individual species of plants and animals, those that are especially rare, endangered or at risk. However, it is also important to understand that these native species are part of a larger ecological framework — one that is often visualized as a community. The individual species are part of a larger, interrelated whole that involves complex relationships between many species and their surroundings. Plants and animals are woven together into a complex web of food, water, and shelter relationships. Thus, when a particular plant or animal is endangered or threatened, its broader habitat must be adequately protected from adverse impacts in order to ensure the continued existence of the species.

The natural environment of Riverhead includes a variety of unique and highly productive ecosystems, some aquatic and some terrestrial. These ecosystems support a diverse array of living species, including microscopic plants and animals, seaweed, fish and shellfish, crustaceans, birds, sea turtles, and marine mammals (associated with aquatic habitats), as well as trees, flowering plants, insects, amphibians and mammals (associated with terrestrial habitats).

Riverhead is part of the Peconic Region, which encompasses the watershed of the Peconic Estuary and spans the area between the western edge of the Central Pine Barrens to the tips of

the North and South Forks. The Peconic Region provides habitat for one of the highest concentrations of rare plants and animals in the state. Of these, 21 species are globally rare. Additionally, the beaches in the Peconic Region provide habitat for two federally endangered shorebirds — the Piping Plover and the Roseate Tern.

Native Species

Plants and animals that are “native,” or indigenous, to the region are considered particularly valuable. They are part of the region’s natural and environmental heritage, and they also contribute to the natural scenery, which appeals to not only nature enthusiasts, visitors, and tourists, but also local residents. Many residents moved to the East End from more urbanized areas to live closer to nature. In many areas, agricultural and landscaping practices introduce “non-native, invasive” species that choke out the more fragile native species. While only a few such plants may be planted, their seeds are easily transferred by wind, water, birds, or insects. One example is the popular landscaping plant Norway Maple (*Acer platanoides*), whose seeds quickly spread into natural areas and new plants end up taking over native plant and animal communities.

Native plants and animals are an essential part of the ecological, scenic, historic and economic fabric of the community. Protection of native plants and animals promotes ecological diversity, thereby ensuring the survival and sustainability of a wide range of plant and animal species. Native plants and animals are also important as educational and scientific resources. In addition, native plants and animals are part of the scenic and recreational amenities of a region; they provide opportunities for enjoying and observing nature and contribute to the community’s unique identity.

Plants and Animals of the Estuaries

Riverhead’s estuarine environments — which include the Long Island Sound and Peconic systems — support unique communities of plants and animals specially adapted to life at the interface between land and water, and between salt water and fresh water. Many different habitat types are found in and around estuaries, including shallow open waters, freshwater and salt marshes, sandy beaches, mud and sand flats, rocky shores, oyster reefs, river deltas, tidal pools, sea grass and kelp beds, and wooded swamps. Estuaries are ecologically diverse and scenically varied environments.

The salt marshes and submerged eelgrass beds found within estuary give food and shelter to commercially important fish and shellfish. Sea turtles, such as the Kemp-Ridley, seals, whales, and countless shorebirds also use the estuary for breeding or feeding grounds.

The productivity and variety of estuarine habitats results in abundant and diverse wildlife and plant communities. Shore birds, fish, crabs and lobsters, marine mammals, clams and other shellfish, marine worms, sea birds, and reptiles are just some of the animals that make their homes in and around estuaries. They provide important habitat, as well as spawning and nursery grounds, for fish (e.g., bay anchovy, Atlantic silverside, scup or porgy, summer

flounder or fluke, winter flounder, windowpane flounder, weakfish or grey sea trout, and tautog or blackfish) and shellfish (e.g., bay scallops, hard clams). These animals are linked to one another and to an assortment of specialized plants and microscopic organisms through complex food webs and other interactions.

As noted, both Long Island Sound and the Peconic Estuary are wrestling with the combined threats of hypoxia, toxic contamination, pathogen contamination, floatable debris, brown tide, nitrogen loading, and nutrient pollution. All of these are areas of concern for the plants and animals of the estuary systems.

Shellfish

Long Island Sound produces some of the best shellfish in the nation. Oysters are the dominant commercial shellfish. However, commercial and recreational shellfishers also harvest hard clams (or quahogs), soft-shell clams (or steamers), bay scallops, blue mussels, surf clams, and razor clams. At the end of the nineteenth century, oyster farming had developed into a major industry in the Sound. Today, after a period of decline, the Sound's oyster industry is once again one of the largest in the nation. The Sound's oysters are marketed nationally, and their high quality commands a premium price. The oyster is, by far, the most economically important shellfish harvested in Long Island Sound.

Lobster Landings

The American lobster is one of the most important and valuable seafood products harvested in New York. Long Island Sound's lobster fishery was the third largest in the country behind Maine and Massachusetts, earning a dockside value in New York alone of over \$29 million in 1998. However, the health of the Long Island Sound lobster industry is now in question. Lobster fishermen and dealers began reporting dead and dying lobsters in their gear in the western third of Long Island Sound in mid-September of 1999. Continuing through 1999 and 2000, the die-off was unprecedented in scope and catastrophic to the lobster fishery.

Scientists are unsure what is causing the lobsters to die in the western Sound, although all the dead lobsters had the same protozoan parasite called *Paramoeba*. Research is under way to determine whether changes in weather conditions (such as storms or average temperature fluctuations), pollutants in the water or sediments, hypoxia (lack of oxygen), dietary change, or management practices (such as dredging and pesticide applications) could have weakened the animals so that they became susceptible to diseases and parasites.

Estuarine and Coastal Birds

There are more than 125 species of birds, mainly waterfowl, water birds, and raptors that rely on the estuary systems of eastern Long Island for food and habitat. Bird populations in and near eastern Long Island vary seasonally. In winter, mergansers, scaups, scoters, mallards, black ducks, loons, cormorants, and Canada geese are found in large concentrations. Spring

brings the annual migration of a wide variety of plovers, terns, sandpipers, waterfowl, herons, egrets, and songbirds. During the summer months, birds are busy tending their nests and young. Fall, once again, brings masses of birds migrating along the coast to southern wintering grounds.

The Peconic Bay region is considered an “Important Birding Area” (IBA) by the New York State Audubon Society. An IBA is a site providing essential habitat to one or more species of breeding or non-breeding birds. The region is an important breeding area for American Oystercatchers; Piping Plovers; Common Terns; Least Terns; Black Skimmers. In addition, Ospreys nest in the Peconic Bay region and forage in the wetlands. The area is also important as a wintering and staging area for waterfowl, loons, and grebes, particularly Common Loons, Canadian Geese, American Black Duck, Scaup, Long-tailed Duck, and Red-breasted Mergansers.

The populations of Piping Plovers and Least Terns are lower now than in the past. Increasing development and recreational use of the species’ essential habitat — Long Island’s beaches — is the cause of their decline. Specific threats include:

- Loss of coastal habitat available for nesting and feeding, due to commercial, residential, and recreational development.
- Both eggs and the young birds are very well camouflaged, putting them in danger of being stepped on or otherwise disturbed by humans. Off-road vehicles pose a serious threat.
- Even innocent sunbathing can have its effects on the birds; if the beach is crowded with people, feeding is interrupted and young birds may not get the nourishment they need to survive. Those that do survive need to be strong enough for the long migration south.
- Dogs roaming unleashed disturb the birds. Cats prey on chicks and adults at night.
- Predation can be a major limiting factor on nesting success. Predators such as foxes, gulls, crows, raccoons, and skunks feed on eggs and young plover and tern chicks. Picnic waste attracts predators to the beach.

Eelgrass

Eelgrass is an aquatic plant that grows in shallow water generally less than 10 feet deep, and is found in temperate coastal bays and estuaries around the world. Eelgrass is important because it provides critical habitat for shellfish and finfish. Its long blades create an aquatic jungle that provides a hiding place for many juvenile fish. Without this nursery habitat, many young fish would not be able to escape from predators. It also performs other important functions within estuarine systems, including bottom stabilization and nutrient cycling. Eelgrass is very efficient at capturing nutrients from the water column and helps to reduce eutrophication (a buildup of nutrients). The roots stabilize the sediment and the plants themselves slow currents and allow suspended sediments to settle out — all of which helps

improve water quality. The Long Island Chapter of The Nature Conservancy highlighted the importance of eelgrass in 2000 by naming it “Species of the Year.”

In the Peconic Estuary, eelgrass is mostly found east of Shelter Island (anecdotal evidence suggests that eelgrass once existed in Flanders Bay), and eelgrass beds are currently declining in the Peconic Estuary. Exact causes are not known, but it is believed that the beds have been impacted by the effects of the brown tide and by poor water quality conditions including high levels of nitrogen and suspended sediment (which are often side effects of human development, building, and other activities). Other factors causing declines in eelgrass include eelgrass wasting disease, dredging and filling operations, and disturbance by power boats. Loss of eelgrass beds may eliminate other species by no longer providing them with specific habitat requirements.

Plants and Animals of the Central Pine Barrens

Ecologically, the Central Pine Barrens is a mosaic of regionally distinctive — and in some cases globally rare — plant and animal communities. A low, flat forest on nutrient-poor, glacially deposited sandy soils, the Pine Barrens region includes a globally rare natural community of Dwarf Pine Barrens. Also found within the Pine Barrens area are Pitch Pine and Pine-Oak forests, Coastal Plain Ponds, marshes, and streams.

The region contains an unusually high concentration of species that have officially been classified as endangered, rare, or subject to the protection of federal laws. Among the more important species inhabiting the Central Pine Barrens are the Tiger Salamander, the Red-Shouldered Hawk, the Northern Harrier, the Mud Turtle, the Common Nighthawk, and the Whip-poor-will. The area includes the last remaining viable grassland bird community on Long Island with breeding Upland Sandpipers, Vesper Sparrows, and Grasshopper Sparrows. Other characteristic pine barren species found in the Central Pine Barrens area include: Brown Thrashers, Blue-winged Warblers, Pine Warblers, Prairie Warblers and Field Sparrows.

Calverton Ponds Preserve

Contained within the Central Pine Barrens area, and located within the Towns of Riverhead, Brookhaven and Southampton is the Calverton Ponds Preserve, a 350-acre assemblage of Pine Barrens and coastal plain ponds that is one of the rarest and most fragile wetland ecosystems in New York State. The preserve is cooperatively owned and managed by The Nature Conservancy and Suffolk County Parks.

Coastal plain ponds are characterized by nutrient-poor, acidic water and gently sloping shores. Most coastal plain ponds are not stream-fed, but are directly connected to groundwater. Pond water levels rise and fall with the water table, reflecting seasonal and annual rainfall patterns. As a result, a unique community of plants grows along the pond shores. Periods of both low and high water levels are essential for their survival.

Calverton Ponds Preserve and the headwaters of the Peconic River contain one of the highest concentrations of rare and endangered species in New York State, with more than 30 rare plants, including three that are globally threatened. The ponds are home to several rare amphibians, fish and insects, including Tiger Salamanders and Banded Sunfish. White Cedar swamps are found in the vicinity of the Calverton Ponds Preserve.

In February of 1999, the New York State Department of State, Division of Coastal Resources Habitat, issued an ecological assessment of the waters, wetlands and uplands of the Peconic River Basin. The document assessed the ecosystem rarity, species vulnerability, human use, population levels and replacibility of the Peconic River with a focus upon the aforementioned Coastal Plain Pond Resource. In the overall assessment, the resource was deemed irreplaceable.

As a result of being connected to groundwater resources, coastal plain ponds and their associated plant and animal communities are extremely sensitive to fluctuations in water levels and to any physical or chemical change in the water, such as increased nutrient loads. Changes in ground and surface water level due to human activity such as building and development could alter the normal hydrological conditions of the ponds and thereby endanger these communities. Even development located at some distance from these ponds has the potential to alter groundwater conditions.

Other Significant Plant Communities

In addition to the plant and animal species and communities described above, there are several other significant native plant communities in Riverhead. These communities, which have been identified and tracked by the New York Natural Heritage Program, are listed in Table 4.1. Potential threats to these communities include:

- Displacement from filling;
- Cutting of trees;
- Spread and invasion of non-native, invasive species;
- Impacts from road runoff;
- Alterations in hydrology;
- Removal of downed wood;
- Loss of surrounding forest integrity;
- Increase in trails;
- Impacts from development and building;
- Impacts from recreational use;
- Changes in vegetation due to fire suppression;
- Impacts from residential development (septic tanks);
- Impacts from fertilizer use, weeding, and mowing;
- Erosion and/or changes associated with stormwater runoff.

Table 4.1: Significant Plant Communities

<i>Community Name</i>	<i>Acres in Riverhead</i>
Maritime Beech Forest	97
Coastal Oak-Beech Forest	410
Coastal Plain Pond	3
Coastal Plain Pond Shore	162
Coastal Plain Poor Fen	10
Pine Barrens Shrub Swamp	26
Pitch Pine-Oak Forest	500

FLOODING AND EROSION

The coastal bluffs found along the Long Island shoreline are important barriers against erosion. Tidal marshlands found along the Peconic Estuary, and along the north shore, perform important ecological functions. They filter water from upland areas, cleanse it of sediments, nutrients and other pollutants, and ultimately release cleaner and clearer water to larger bodies of water. Wetland plants and soils also act as natural buffers between the land and ocean, absorbing flood waters and dissipating storm surges. These wetland areas help alleviate potential damage to valuable real estate from storm and flood damage. Finally, salt marsh grasses and other estuarine plants help to prevent erosion and stabilize the shoreline.

There are significant threats to Riverhead’s natural resources, including tidal wetland areas and plant communities. These include: displacement from filling; cutting of trees; spread and invasion of exotics; impacts from road runoff; alterations in hydrology; removal of downed wood; loss of surrounding forest integrity; increase in trails; impacts from development and building in surrounding landscape; impacts from recreational use; changes in vegetation due to fire suppression; impacts from residential development (septic tanks); impacts from fertilizer use, weeding, mowing; erosion; and changes in plant and animal communities due to changes associated with stormwater runoff.

Coastal Erosion Hazard Areas

Chapter 12 of the Riverhead Town Code was promulgated to protect and preserve the natural protective features such as dunes and bluffs of coastal areas, limit erosion, and ensure that erosion control structures are properly constructed. In Riverhead, these regulations apply to Long Island Sound shoreline.

There are two categories of regulated areas: Natural Protective Features and Structural Hazard Areas. “Natural Protective Features” (NPFs) include: the nearshore, beaches, bluffs,

primary dunes, and secondary dunes. “Structural Hazard Areas” (SHAs) are located landward of the NPFs and are found on shorelines that have a demonstrated long-term average annual recession rate of one foot per year or greater. The Town of Riverhead has not had any SHA demonstration made along its shorelines. Permits are required from the State’s Department of Environment Conservation (DEC) for development along sensitive shoreline areas subject to erosion.

According to the Federal Emergency Management Agency (FEMA), which publishes the Flood Insurance Rate Maps (FIRM) for land areas throughout the country, there are several critical flood hazard areas throughout Riverhead. Nearly all of these are found along the Peconic Estuary and Long Island Sound. More land areas along the Peconic are prone to floods, because those areas are relatively low lying. Areas along the Sound tend to be more buffered from flooding impacts, due to the presence of the bluffs. Major 100-year flood hazard areas include:

- Areas along Wading River, west of Sound Road, from the Wading River hamlet going north.
- Parts of the NYS Conservation Area and the Boy Scout Camp in Baiting Hollow.
- Portions of Iron Pier Beach and Park, as well as some of the adjacent residential areas and open spaces.
- Portions of the open space areas included in the Central Pine Barrens region located south and southwest of Enterprise Park in Calverton. These areas drain into the Peconic River.
- Most of the banks along the Peconic River are subject to flooding. The width of the flood hazard area varies greatly, from 50 feet in some areas to about 200 feet in others, to as much as 1,000 feet in a few spots. East of the LIE, the flood hazard area is contained south of both the LIRR rail line and Route 25. In downtown, Grangebél Park and the parking lots on the south side of Main Street are subject to flooding, and the buildings on the south side of Main Street could be impacted by floods. The portion of the Peconic east of the dam in Grangebél Park is influenced both by the coastal tides and the freshwater flow from upstream.
- Many of the beachhead areas and stream corridor along Flanders Bay and the Great Peconic Bay could be subject to flooding:
 - Large portions of Indian Island County Park and the County Golf Course;
 - Areas along Meetinghouse Creek, extending as far north as Route 25;
 - Areas along Reeves Creek, extending as far north as the LIRR;
 - A wetland area between Reeves Creek and Simmons Point, extending as far north as Route 25;
 - All of Simmons Point and Miamogue Lagoon;
 - All of Miamogue Point, including the residential area along South Jamesport Avenue south of Peconic Bay Boulevard;

- All of East Creek Marina and East Creek extending north past the LIRR tracks; and
- Portions of Browns Point, reaching north past Peconic Bay Boulevard.

4.3 GOALS & POLICIES

Goal 4.1: Protect and preserve the ecological integrity of Riverhead's Central Pine Barrens area and the water quality of Long Island's sole source aquifer.

The Central Pine Barrens area and its associated aquifer are among the most critical natural resource areas in the Town, from a public health point of view, because the aquifer provides drinking water to about 2.5 million people. In 1995, the *Central Pine Barrens Comprehensive Land Use Plan* was adopted by the State, Suffolk County, and the Town. The plan defines a series of interrelated areas, including a Core Preservation Area, a Compatible Growth Area, and Critical Resource Areas and is designed to ensure protection of the area's critical natural resources while directing development appropriately. This plan is essential to protecting natural resources that are critical to both Riverhead and the region for the long-term, and the Town should continue to abide by and support its directives.

Policy 4.1A: Continue to fully support and implement the Central Pine Barrens Comprehensive Land Use Plan, and abide by or exceed the development standards and guidelines in the plan.

Policy 4.1B: Continue to provide ample receiving zones for Pine Barrens Credits in Riverhead.

In Chapter 2, the Land Use Element, there are descriptions of several new commercial zoning districts, which would be applied to Route 58, downtown Riverhead, and the Town's hamlet centers. Many of these zoning districts would be eligible for floor area bonuses if they purchase Pine Barrens Credits.

Policy 4.1C: Cooperate with local non-profit organizations who are working to acquire and protect lands in the Central Pine Barrens area.

Policy 4.1D: Protect the Central Pine Barrens area from potential contamination (i.e., nutrient/nitrogen loading, toxic contamination) or altered hydrological patterns as a result of new development, business practices, or household practices in adjacent areas.

Goal 4.2: Protect the quality of ground water and surface waters throughout the Town.

Surface waters that warrant protection include Long Island Sound, the Peconic River, and the entire Peconic Estuary system, as well as the small inland wetlands and streams found throughout the Town.

Policy 4.2A: Strive to reduce potential contamination of surface waters by continuing to meet or exceed water resource protection standards established by the New York State Department of Environmental Conservation.

Policy 4.2B: Work cooperatively with all federal, State, and County agencies that may regulate the region's water resources.

Wetlands are regulated at both the federal and state level. The State's Department of Environmental Conservation regulates surface water resources, freshwater and tidal wetlands. In addition, the Suffolk County Department of Health Services and Water Authority work to protect water quality countywide.

Policy 4.2C: Communicate with and administratively support the efforts of The Nature Conservancy to protect sensitive, unique, and/or rare habitat areas.

Policy 4.2D: Work to limit new inputs of nitrogen, other nutrients, and toxic materials into surface waters emanating from developed areas and sewage treatment plants.

Sensitive landscape practices and appropriate stormwater management techniques can help limit the potential for contamination. The Town should encourage environmentally friendly landscaping practices and require appropriate stormwater management for new development. Sewage effluent should continue to be properly treated and disposed, so as to reduce the potential for contamination.

Policy 4.2E: Ensure that in all areas where wastewater is discharged to the ground (i.e., septic systems, constructed wetlands, and package treatments plants) are built with the appropriate densities and appropriately designed so as to prevent nitrogen contamination of groundwater or surface water.

Policy 4.2F: Improve enforcement of requirements for proper waste discharge from boats and houseboats.

Boating is a popular recreational attraction in Riverhead. Boats are required to discharge wastewater into the sewer connections available at Town docks. Municipal pump out stations are located at the East Creek marina and at the downtown municipal dock. To minimize the potential for boats improperly discharging their wastewater directly into the Sound or the

Peconic Estuary, the Town should pursue the acquisition of a marine pump-out vessel, enlisting the financial assistance of the State, County, or federal agencies, if possible.

Policy 4.2G: Determine whether flushing, dredging, and/or other improvements are needed for small water bodies adjacent to the Sound: Baiting Hollow, Iron Pier, Wading River.

Some participants of CAC meetings cited the need for improvement at these locations. Siltation and mosquitoes have been cited as problems at Baiting Hollow and Wading River, and dredging has been suggested as a possible solution to increase flushing. The Town should investigate the environmental merits of such actions and provide that administrative support commensurate with its findings.

Policy 4.2H: Require any future development proposals on key waterfront sites to be regulated by Planned Development District Zoning.

Planned Development District is a zoning technique whereby the landowner is required to develop and follow a detailed master plan for the site. The development of such a plan would allow the opportunity to plan out development and conservation on those sites in a sensible way, with the intent of protecting natural resources and scenic views and promoting waterfront access. Some of the uses suggested for key waterfront sites include water-dependent uses, boat basin, resort, public recreation, open space, public access, additional setbacks, bluffs, clearing.

Policy 4.2I: Determine whether dredging and/or other improvements may be needed at East Creek Marina or other docking facilities in Riverhead.

Policy 4.2J: Require golf courses to be designed in an environmentally friendly manner, such that the potential for contaminated run-off is reduced to a minimum.

The golf course industry has in and of itself taken steps to become far more environmentally friendly in recent years. The Town can require that golf course meet the high environmental standards that are being employed on courses throughout the country. Requirement should include the following:

- Golf course grading should be consistent with a stormwater management plan, and the grading should be designed to result in stormwater being collected and retained on-site. Collection ponds can provide stormwater management, flood control, and water supply for irrigation purposes, reducing the demand on off-tract water supplies.
- A water resource monitoring program should be provided, and it should be designed to minimize the use of off-tract surface water and groundwater resources while maximizing the use of stormwater retained on site.
- Water quality should be tested for nutrients, pesticides, and potential contaminants.

- Drought-tolerant turf and landscaping material should be used, and irrigation practices should be explained.
- An integrated pest management and turf management plan should be provided and should define the nature and use of the pesticides and other chemicals and fertilizers involved. Turf should absorb and filter fertilizers, pesticides, herbicides, and other pollutants to minimize contamination of streams and groundwater.
- New plantings should be native, non-invasive species, when possible.

Goal 4.3: Limit risk of personal injury or property damage by addressing flooding concerns throughout the Town, but particularly along the Peconic River.

Recognizing that portions of downtown Riverhead have historically suffered from flooding of the Peconic River, it is essential that steps be taken to limit the potential for flooding events.

Policy 4.3A: Develop regulations requiring that new development utilize state-of-the-art best management practices to better manage stormwater.

This strategy would help ensure that non-point stormwater runoff does not contribute unmitigated additional flow to the Peconic River.

Policy 4.3B: Implement impervious surface coverage limits to development Townwide, so as to limit the amount of stormwater runoff.

This policy is further articulated under Goal 4.11. Another option to be explored for Riverhead is the increased installation of detention basins for commercial sites, such that the stormwater is prevented from flowing directly into nearby streams and exacerbating floods. Also, detention ponds reduce the amount of pollutants that flow into surface waters, because some of the contaminants settle to the bottom of the detention pond itself.

Policy 4.3C: Limit new development and the addition of new impervious surfaces within flood hazard areas.

Because of the Peconic River's designation as a Scenic and Recreational River, State law strictly limits development along the immediate banks of the river. Also, as discussed in Chapter 11, the Park and Recreation Element, it is a goal of the Town to purchase land along the Peconic River waterfront for walking trails. These combined factors, in effect, will limit increases in impervious surfaces along the river's floodplain. Continued application and enforcement of Chapter 65 of the Riverhead Town Code will protect the floodplain resources of the Peconic Estuary.

Policy 4.3D: Explore the potential for retrofitting existing stormwater conveyance devices and structures so as to provide stormwater quantity and quality control.

Policy 4.3E: Continue working with the State to reduce property damage or personal injury for residents living in coastal flood hazard areas.

Goal 4.4: Conserve the bluffs and woodlands overlooking the Long Island Sound and the sensitive woodland and habitat areas found between Sound Avenue and the Sound.

The hilly bluffs along Long Island Sound are an important area of natural and scenic beauty. Moreover, the dwarf beech and maritime beech forests constitute a unique ecological area that is sensitive to development impacts. While development can continue to occur in this general area, it should be planned and designed in such a way as to conserve the bluffs and the woodlands, which make the area so unique and so valuable for low-density residential development.

An important component of Chapter 3, the Agriculture Element, is the preservation of the agricultural areas north and south of Sound Avenue, as well as south of Route 25 at Jamesport. The Element calls for the use of Transfer of Development Rights (TDR) to shift development from the agricultural greenbelt to areas north of Sound Avenue, as well as to the Town's hamlet areas, Enterprise Park, Route 58, and areas within and around downtown. This would result in a higher density of residential development than would be permitted within the APZ. The following recommendations are intended to limit the impacts of additional development in the subject area.

Policy 4.4A: Require new development to provide significant open space setbacks from Long Island Sound.

In development review, the Town should determine the appropriate width of the setback, based on a careful analysis of the extent of the woodland areas along the Sound, as well as existing lots sizes. The setback would prohibit any building from being erected within the stated distance from the waterfront.

In the case of a large-scale subdivision, the actual land area in the setback can be set aside as part of the subdivision's park or open space requirements. Alternatively, the land area could be included in private lots, but the setback would still apply. Thus, those lots would have to be large enough to accommodate the distance, such that no buildings would have to be built in the setback. Also, deed restrictions would have to be required for those lots, such that no structure could be built in that area.

Policy 4.4B: Establish woodland clearing limits for properties located along Long Island Sound.

Clearing limits would be a very effective means of conserving tree stands along the bluffs and within the Coastal Oak Beech woodland. These limits should be integrated into the zoning code. The Town could research clearing techniques that have been employed by other

communities throughout the country. The clearing limits should be targeted to areas along the shoreline, and they should be effective in providing contiguous forest cover (as opposed to individual tree protection).

Policy 4.4C: Establish Town-wide environmental performance standards that carefully regulate development along Long Island Sound.

In particular, environmental performance standards need to ensure that septic systems are so located and designed that they do not result in any detrimental environmental impacts on the bluffs, the woodlands or the Long Island Sound Estuary. Stormwater control is also a critical concern and should be addressed in the performance standards.

Policy 4.4D: Continue to require that new development along Long Island Sound be consistent with State and local coastal management policies.

The Town is currently preparing a Local Waterfront Revitalization Program to be integrated within the Town's Comprehensive Plan. The LWRP would result in the establishment of a local coastal commission and the establishment of coastal management policies for all sites along Riverhead's shorelines. This commission would review all development to determine compliance with these policies and generally evaluate any potential impacts of development proposals on the Sound and the shoreline.

Policy 4.4E: Ensure that the Local Waterfront Revitalization Program includes policies that will help protect the bluffs, woodlands, and the Long Island Sound Estuary.

Goal 4.5: Limit development on soils that are particularly well-suited to agricultural use.

The area lying between Sound Avenue and the Long Island Sound from Baiting Hollow East to Northville contains areas of prime agricultural soils that have been historically tilled. Although these soils are not targeted for preservation, such soils should be considered to the greatest extent practicable through cluster subdivision review while maintaining established clearing standards for Coastal Oak Beech woodlands. As stated in Chapter 2, the Land Use Element, the RAB-80 district would give landowners north of Sound Avenue the flexibility to send development rights in order to preserve farmland and priority open space.

Goal 4.6: Continue to protect rare and/or endangered plant and animal species and their habitat areas.

The best habitat areas for plant and animal species are concentrated in the Central Pine Barrens, along shoreline areas, along riverbeds and streambeds, and in woodland areas. These policies are intended to target such areas for conservation.

Policy 4.6A: Require open space setbacks along river and stream corridors.

Setbacks do not necessarily need to be established along the Peconic River, because development is strictly limited within 500 feet on either side of the riverbanks, under the State's Scenic and Recreational Rivers Act. Creek corridor buffers, however, should be required along creeks feeding the Peconic Bay Estuary.

Policy 4.6B: Require open space setbacks along Flanders Bay and the Great Peconic Bay.

The appropriate size of the setback needs to be determined by examining the size of existing lots, current development patterns, the extent of floodplains, and existing topography. Policy 4.4B calls for open space setbacks along Long Island Sound as well.

Goal 4.7: Encourage the preservation and planting of native plants and avoid the planting of invasive plants.

Policy 4.7A: Compile a list of resources where residents and developers can obtain information about native and invasive plants.

Potential sources include the Cornell Cooperative Extension, local landscaping businesses, local nurseries, the U.S. Department of Environmental Protection, the NYS Department of Environmental Conservation (DEC), the Invasive Plant Council of New York State, the Peconic Land Trust, and the North Fork Environmental Council. This information should be made available at Town Hall and the local libraries.

Policy 4.7B: Encourage developers to identify and protect existing native plants on properties that are subject to development or redevelopment.

Some participants in the CAC meetings suggested that all existing native plants be protected and preserved on undeveloped land. It would be onerous to require a land developer to document all such species, which could include anything from a wildflower to an old-growth tree, and could number in the hundreds. Even if full documentation were possible, the effort to protect all such plants already in the ground could complicate or prevent effective site planning.

Developers are already and will continue to be required to protect areas where such species are likely to be concentrated — wetlands, stream and creek corridors. Open space preservation helps protect native species that may already exist. Beyond these measures, the Town should encourage but not require developers to protect any native plants that they have on their sites. Making information available on native plants (see Policy 4.7A) would allow developers to recognize native species on their properties.

Policy 4.7C: Explore grant opportunities to fund the landscaping of Town-owned properties with non-invasive native plants.

Policy 4.7D: Continue to encourage County and State agencies to plant native species alongside roadways or in roadway medians when they have jurisdiction.

Policy 4.7E: Work with the Cornell Cooperative Extension and local non-profit and advocacy organizations to assess experiences with using native plant species in Riverhead.

Generally, native plants would be expected to thrive in their home environment, requiring less water and maintenance than non-native plants. However, such a study could highlight any problems or issues that arise with their use. It could help identify whether there are certain native species that take to the local soils and microclimate better than others. It could also help understand the conditions under which native species have the best success. The results of the study should be made available at Town Hall and the local libraries, and should be distributed to local landscaping and nursery businesses.

Goal 4.8: Support initiatives for natural resource conservation and open space preservation undertaken by private property owners, non-profit organizations, and other public agencies.

Policy 4.8A: In order to protect and preserve natural resources and open space, administratively support organizations like The Nature Conservancy, the Peconic Land Trust, the North Fork Environmental Council, and other legitimate not-for-profit environmental organizations.

In eastern Long Island, non-profit conservation organizations work with landowners to protect natural resources, scenic vistas, water quality, and productive farmland. They use a variety of preservation techniques, including: gifting, purchase of land or conservation easements, property leases or exchanges, and cooperative ventures with government agencies.

Policy 4.8B: Continue to employ conservation and scenic easement provisions to allow tax abatement for property owners.

In order to preserve priority natural and scenic resources, this provision would provide landowners with the ability to place a conservation or scenic easement on their properties in exchange for a reduction in tax valuation for that portion of the property under the easement.

Policy 4.8C: When appropriate, and on a case by case basis, structure the Town's preservation and conservation efforts such that they dovetail with the initiatives of federal, State, and County agencies.

Certain taxes paid by Riverhead residents help support federal, State, and County efforts for natural resource conservation. Riverhead should optimize the use of those tax dollars by ensuring that the Town's own initiatives build off of the efforts being undertaken in other levels of government. This creates a larger pool of resources for and greater momentum

behind conservation efforts, resulting in a greater potential preservation of environmentally sensitive lands.

Goal 4.9: Increase public education with regard to best practices for natural resource conservation.

On rare occasions, environmental degradation may result from catastrophic disasters (such as an oil spill, as a hypothetical example), but on a day to day basis, degradation can also result from the incremental actions of residents, businesses, and developers. Although these individual actions may be small and environmentally insignificant in and of themselves, their cumulative impacts may have serious environmental consequences that are widely felt throughout the Town or the region. The Town should endeavor to work with the Cornell Cooperative Extension, in order to educate the general public about ways to avoid environmental degradation through construction practices and day-to-date household and business activity.

Policy 4.9A: Work with the Cornell Cooperative Extension or similar academic institutions to prepare a best practices manual that instructs environmentally friendly techniques to residents, property owners, businesses, and developers. The manual would be used in construction, site planning and architectural design, landscaping, property maintenance, septic maintenance, disposal of hazardous materials, and other day-to-day practices.

With regard to site planning and landscaping, key issues to be addressed in the manual are stormwater management and landscaping materials, including the benefits of reduced hardscape, turf areas, and the impact of plant selections. The use of species native to the East End should be encouraged, and the use of invasive plants discouraged. Where appropriate, the manual should also discuss federal, State, and/or County laws and requirements (i.e., with regard to wetland protection or hazardous waste disposal). Also, steps to be taken in case of septic system malfunctions should be described. The information in the manual should also be made available on the Town's web site. The Town should consider whether there are any types of incentives that can be given to homeowners to encourage environmentally-friendly building and landscaping practices.

Policy 4.9B: Administratively support local non-profit organizations to develop and distribute information and to organize a public education campaign to educate property owners, homeowners, businesspeople, developers, and contractors about environmentally friendly practices.

By supporting non-profit organizations, the Town can build off of their knowledge, enthusiasm, manpower, and financing to distribute accurate information and reach more people. The public education campaign may include — but should not be limited to — the distribution of brochures, the sponsoring of public workshops, and the posting of information to the Town's web site. Organizations such as The Nature Conservancy and the Long Island chapter of the Wild Ones (a national organization dedicated to promoting environmentally

friendly landscaping) are examples of some of the types of groups with which the Town could work.

Policy 4.9C: Educate Town landscape workers about environmentally-friendly landscaping design and practices, and implement those techniques on Town properties.

Potential sites include Town Hall, Stotzky Park, the new Senior Center on Shade Tree Lane, and other parks. This initiative would help demonstrate the effectiveness and achievability of environmentally-friendly landscaping.

Policy 4.9D: Work with Sea Grant to make available a best practices manual that instructs boat owners and operators with regard to proper vessel discharge practices.

The appropriate legal requirements for vessel discharges should be outlined in the manual. Regulating agencies and resources for more information should be cited as well.

Goal 4.10: Increase the Town's administrative resources for working on natural resource conservation efforts.

Policy 4.10A: Provide the human resources necessary to help implement the goals and recommendations of this element.

A number of the recommendations of this element call upon the Town to utilize its resources to administratively support public agencies, academic institutions and not-for-profit environmental organizations in the implementation of conservation initiatives. Further, certain recommendations call Town efforts in the preparation of best management practice manuals and general public educational materials. As the responsibility of administrative and technical support to these ends will fall to the Town Planning Department, it is necessary to provide the Department with human and technical resources necessary to succeed in the implementation of the program contained herein. In order to achieve this goal, it is recommended that an additional staff person be provided to the Planning Department; that access to Geographic Information Systems (GIS) be provided in a user-friendly way; and that the time of the Environmental Planner position be readily available to Cornell Cooperative Extension and the Riverhead Conservation Advisory Council at the direction of the Planning Director.

Policy 4.10B: Improve enforcement of environmental regulations in Riverhead.

Improved enforcement capabilities are needed with regard to all environmental regulations contained in the Town Code of the Town of Riverhead. Currently, the Town is also expected to play a role in enforcing the provisions of the Wild and Scenic Rivers Act. In the future, a great deal of open space monitoring will be required as well, to ensure that open space set

asides in cluster subdivisions and open space setbacks along shoreline areas and streambeds are not being cleared, developed, or otherwise inappropriately used.

In order to meet these obligations, it is recommended that the Town employ an additional Code Enforcement Officer to work on the enforcement of environmental regulations and private covenant restrictions exclusively.

Goal 4.11: Limit future increases in impervious surfaces and stormwater runoff

This goal is intended to help reduce flood impacts, as well as surface water pollution. Increases in impervious surfaces results in increased water flow into storm drains, which dump into the Town’s creeks and streams. Stormwater runoff may be polluted with a variety of contaminants, such as:

- Excess fertilizers, herbicides, and insecticides from agricultural lands, residential areas, and golf courses;
- Oil, grease, and rubber particles from cars and trucks, which are deposited on paved roadways and parking lots;
- Toxic chemicals from energy production and improper disposal of hazardous waste;
- Sediment from improperly managed construction sites, crop and forest lands, and eroding streambanks;
- Bacteria and nutrients from livestock, pet wastes, and faulty septic systems.⁹

Limiting stormwater runoff is particularly critical in Riverhead, as much of the Town drains into the environmentally sensitive Peconic Estuary.

Policy 4.11A: Establish maximum impervious coverage limits on all new development in Riverhead.

Policy 4.11B: Require detention basins for large-scale residential and commercial development.

Detention basins collect stormwater into a closed area, and stormwater is eventually evaporated and/or absorbed into the groundwater, rather than being discharged into the stormwater system. This helps prevent adverse impacts upon downstream resources.

Policy 4.11C: Review and revise the Town of Riverhead highway specifications, and off-street parking regulations to provide stormwater quantity and quality control.

The requirements to be reviewed include street design, curbs and gutters, parking ratios and lot design, setbacks and frontages, sidewalks, driveways, buffer systems, stormwater outfalls, and tree and land conservation.

⁹ U.S. Environmental Protection Agency, www.epa.gov/owow/nps/qa.html, visited July 18, 2002.

Goal 4.12: Protect properties from risk of damage and persons from risk of injury as a result of wildfires.

Policy 4.12A: Tap into the expertise of the Central Pine Barrens Wildfire Task Force to protect properties, residents, employees, and visitors from wildfires.

Due to a combination of human activity and dry weather conditions, the Central Pine Barrens region occasionally experiences wildfires. The Central Pine Barrens Commission has established a Wildfire Task Force, which prepared a Fire Management Plan in 1999. The Task Force has amassed a considerable repository of knowledge that can be used to protect Townspeople from wildfire impacts.

Policy 4.12B: Continue to enforce State building code requirements that are intended to help prevent and/or stop fires and to reduce the potential for damage as a results of fires.

Fire sprinklers, fire extinguishers, and use of fire-resistant materials are required for some types of development. These requirements help protect safety and reduce the potential for property damage.