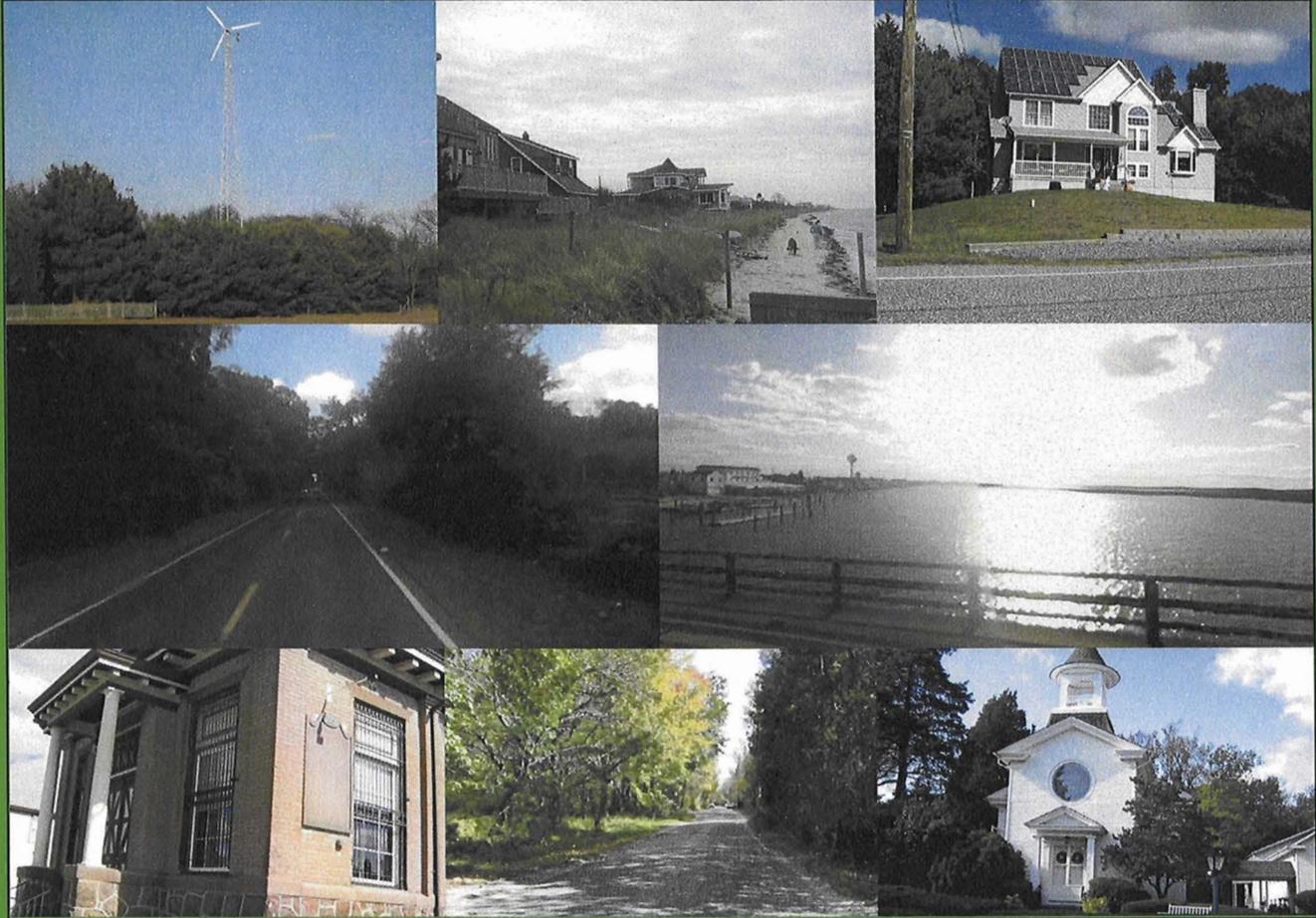


CONSERVATION PLAN ELEMENT UPDATE

TOWNSHIP OF UPPER CAPE MAY COUNTY, NEW JERSEY



January 2011

Adopted by the Upper Township Planning Board on:
February 17, 2011

Prepared by:



Marcia R. Shiffman

Marcia R. Shiffman, PP, AICP, LLA
NJ Professional Planner's License #02428

Daniel N. Bloch

Daniel N. Bloch, PP, AICP
NJ Professional Planner's License #06107

The original of this document has been signed and sealed in accordance with New Jersey Law.

ACKNOWLEDGEMENTS

Upper Township Planning Board

Renee Scrocca, Chair
James Kelly, Vice Chair
Richard Palombo, Mayor
Frank Conrad, Township Committeeman
Daniel Bready
William Brown
Donald Kissling
Janet McCrosson
Susan Ragan
Gary Riordan
James Schroder

Upper Township Engineer

Paul E. Dietrich, Sr. P.E., P.P.

Upper Township Planning Board Solicitor

Dean Marcolongo, Esq.

Maser Consulting P.A.

Marcia R. Shiffman, AICP, PP, LLA, *Project Manager*
Daniel N. Bloch, PP, AICP, *Project Planner*

TABLE OF CONTENTS

INTRODUCTION	1
GOALS AND OBJECTIVES	3
MUNICIPAL SUMMARY	4
PHYSICAL RESOURCES	5
PHYSIOGRAPHIC LANDSCAPE AND GEOLOGY	5
TOPOGRAPHY AND SLOPES	5
SOILS AND SEPTIC SUITABILITY	6
<i>Development Limitations</i>	8
<i>Contaminated Sites</i>	11
WATER RESOURCES	12
GROUNDWATER RESOURCES	12
<i>Aquifers</i>	12
<i>Aquifer Recharge</i>	14
<i>Wellhead Protection Area</i>	15
SURFACE WATERS	18
<i>Watersheds</i>	20
FLOODPLAINS	22
WETLANDS	24
BIOLOGICAL RESOURCES	27
VEGETATION	27
<i>Wetlands Plant Communities</i>	27
<i>Uplands Plant Communities</i>	27
<i>Wildfire Fuel Hazard</i>	28
WILDLIFE	30
<i>Aquatic Animals</i>	30
<i>Terrestrial Animals</i>	30
CRITICAL HABITATS AND SPECIAL ECOLOGICAL COMMUNITIES	32
<i>Rare Plant and Animal Species and Species of Special Concern</i>	32
<i>Federal Habitat Complexes</i>	32
<i>Critical Habitat</i>	34
<i>Natural Heritage Priority Sites</i>	35
<i>Township of Upper Beach Management Plan</i>	37
CULTURAL AND COMMUNITY RESOURCES	39
ARCHAEOLOGICAL RESOURCES	39
HISTORIC RESOURCES	40
OPEN SPACE	42
GREENWAYS	49
AESTHETIC RESOURCES	50
ENERGY RESOURCES	52
MUNICIPAL ENERGY CONSERVATION	52
<i>Energy Audits for Municipal Facilities</i>	53
<i>Sustainable Jersey Certification</i>	53
ALTERNATIVE ENERGY RESOURCES	54

Wind Energy.....54
Large-Scale Wind Turbines.....55
Small-Scale Wind Turbines.....56
Solar Energy.....58
WASTE MANAGEMENT.....61
GREENHOUSE GAS EMISSIONS.....62
NOISE POLLUTION.....63
APPENDIX.....**64**

\\NJNCAD\Projects\2009\09000724G\Reports\Conservation Plan\Draft 3\022211_Final Conservation Plan.docx

INTRODUCTION

This Conservation Plan is adopted as an Element of the *Upper Township Master Plan* and constitutes an update and replacement of the current Conservation Plan Element prepared as part of the *1994 Master Plan*. The Master Plan reflects the overall vision for the future of Upper Township and the Conservation Plan Element provides the structure for the protection, preservation, conservation and utilization of natural and cultural resources, including energy, open space, water supply, forests, soils, marshes, wetlands, rivers, fisheries, endangered or threatened wildlife species and other resources.

The New Jersey Municipal Land Use Law (MLUL) provides guidelines for the content of a conservation plan element as part of a municipal master plan, as follows:

A conservation element providing for the preservation, conservation and utilization of natural resources, including, to the extent appropriate, energy, open space, water supply, forests, soil, marshes, wetlands, harbors, rivers and other waters, fisheries, endangered or threatened species wildlife and other resources, and which systematically analyzes the impact of each other component and element of the master plan on the present and future preservation, conservation and utilization of those resources. [N.J.S.A. 40:55D-28]

This Conservation Plan Element, together with the *Upper Township Natural Resources Inventory (NRI)*, addresses the MLUL guidelines. The *NRI* was adopted by the Township of Upper Planning Board on November 16, 2006. It provides a detailed inventory of the Township's natural assets and environmental resources. The *NRI* serves to inform the planning process by providing a factual basis for land use decision-making. The mapping and description of sensitive areas facilitates the proper use and protection of existing natural areas, the appropriate development of the few remaining vacant, privately-owned land parcels and the redevelopment of developed lands. The identification and understanding of natural systems and their inherent and regulatory limitations for development serve to prevent future environmental problems and associated mitigation costs.

In order to implement the protection of those resources identified in the *NRI*, the Township has adopted an Environmental Assessment Ordinance, which requires a comprehensive analysis of the variety of problems that may result and the measures that can be taken to minimize the adverse impacts on the environment associated with development projects. Environmental assessment requires a written description and analysis of all possible direct and indirect effects a proposed development will have on the site, as well as on the region, with particular attention to the potential effects on public health, safety and welfare, and the preservation and enhancement of the natural environment, and historic, cultural and other sensitive resources.

The Conservation Plan Element establishes policy guidelines and recommendations to address the resources and problems discussed in the *NRI* that are not addressed by the Environmental Assessment Ordinance. It also establishes a sustainable basis for long-term natural resource protection and conservation relative to other objectives of the *Upper Township Master Plan*.

This Conservation Plan Element seeks to advance the following Purposes of the MLUL (as set forth in N.J.S.A. 40:55D-2):

- Purpose (a) To encourage municipal action to guide the appropriate development of all lands in this State, in a manner which will promote the public health, safety, morals and general welfare;*
- Purpose (b) To secure safety from fire, flood, panic and other natural and manmade disasters;*
- Purpose (c) To provide adequate light, air and open space;*
- Purpose (e) To promote the establishment of appropriate population densities and concentrations that will contribute to the wellbeing of persons, neighborhoods, communities and regions and preservation of the environment;*
- Purpose (g) To provide sufficient space in appropriate locations for a variety of agricultural, residential, recreational, commercial and industrial uses and open space, both public and private, according to their respective environmental requirements in order to meet the needs of all New Jersey citizens;*
- Purpose (j) To promote the conservation of open space and valuable natural resources and to prevent urban sprawl and degradation of the environment through improper use of land;*
- Purpose (k) To encourage planned unit developments which incorporate the best features of design and relate the type, design and layout of residential, commercial, industrial and recreational development to particular site;*
- Purpose (m) To encourage coordination of the various public and private procedures and activities shaping land development with a view of lessening the cost of such development and to the more efficient use of land;*
- Purpose (n) To promote utilization of renewable energy resources; and*
- Purpose (o) To promote the maximum practicable recovery and recycling of recyclable materials from municipal solid waste through the use of planning practices designed to incorporate the State Recycling Plan goals and to complement municipal recycling programs.*

GOALS AND OBJECTIVES

The Goals of the Conservation Plan Element are:

1. To enhance the overall quality of life for Township residents.
2. To promote preservation and maintenance of the natural, ecological, historic, visual, agricultural, scenic and cultural resources within and around Upper Township.
3. To mitigate detrimental impacts of land development upon such critical resources.
4. To increase understanding of natural systems and their limitations.
5. To identify critical areas for conservation, and direct growth in an appropriate manner.
6. To provide a rational and factual basis to support long term resource management planning, environmental protection, and land use planning.
7. To analyze land capabilities to determine appropriate development intensity, and provide a basis to amend the Master Plan and zoning regulations.
8. To guide the review of proposed site development plans.
9. To provide an educational tool for residents to learn about their community and its environment.
10. To promote resource protection with public input.

Many of the Master Plan policy goals and objectives, as refined and updated in the Land Use Plan Element, support the Conservation Plan Element. Those goals and objectives are incorporated by reference into this Conservation Plan Element. Additionally, each topic area of this plan contains individual goals, objectives and strategies for resource protection, many of which draw from and expand upon the Master Plan goals and objectives.

MUNICIPAL SUMMARY

Upper Township is located at the northern end of Cape May County, which occupies a peninsula at the southern tip of the state of New Jersey, where it adjoins Atlantic and Cumberland Counties. The Township, incorporated in 1798, occupies a land area of approximately 68.5 square miles (or 43,830 acres). Within Cape May County, Upper Township is bordered by Dennis Township and Woodbine Borough to the south and Sea Isle City and Ocean City to the east. Upper is also bordered by Maurice River Township in Cumberland County to the west and Corbin City, Egg Harbor Township and Somers Point City in Atlantic County to the north. The Atlantic Ocean and inter-coastal waterways make up the eastern border of the Township. Strathmere, located on the northern half of Seven Mile Island, shared with Sea Isle City, is also a part of Upper Township. Tuckahoe River and the Great Egg Harbor Bay form the majority of the Township's northern boundary. Major roadways that run through Upper Township include the Garden State Parkway, U.S. Route 9 and State Routes 49 and 50. (See [Figure 1 - Regional Location Map](#) in the Appendix.)

Upper Township is completely encompassed within either the New Jersey Department of Environmental Protection ("NJDEP") Coastal Zone, subject to the Coastal Area Facility Review Act (CAFRA) - N.J.S.A. 13:19, or the Pinelands Management Area, subject to the Pinelands Protection Act - N.J.S.A. 13:18A. Approximately 46.2 square miles of Upper Township are located within the Coastal Zone; the remaining 22.3 square miles (14,276 acre) are within the Pinelands Management Area. The dividing line runs along State Route 49, State Route 50 and County Route 610. Approximately 33.7 square miles of the Coastal Zone are overlapped by the Pinelands National Reserve.

Upper Township received Plan Endorsement from the New Jersey State Planning Commission on February 21, 2007, which designated the Centers and planning area classifications of the *State Development and Redevelopment Plan (SDRP)* as Suburban, Fringe, Rural, Environmentally Sensitive and Barrier Island/Environmentally Sensitive Planning Areas. The designated Centers include the Marmora-Palermo-Beesley's Point and Seaville Town Centers and the Tuckahoe and Petersburg Village Centers. Upper has defined its growth areas in Centers that reflect existing development patterns along the Route 9 corridor in the Town Centers of Marmora-Palermo-Beesley's Point and Seaville; with smaller villages reflecting again existing development patterns in Tuckahoe and Petersburg. These Centers both reflect existing growth and provide opportunities for development and affordable housing.

Much of Upper Township consists of public lands, which is environmentally constrained by wetlands, floodplains and Category One waters. According to the NJDEP, almost 50 percent of the Township (20,880 acres) is constrained by freshwater or coastal wetlands, with an additional 10 percent containing open waters (4,500 acres). Much of this land corresponds to the 13,000 acres of federal, state, county, municipal and not-for-profit preserved open space and the 80 acres of preserved farmland.

PHYSICAL RESOURCES

Physiographic Landscape and Geology

As a low-lying community bordering on the Atlantic Ocean and Tuckahoe River, Upper Township is situated in the Outer Coastal Plain Physiographic Province, the largest of the physiographic provinces in New Jersey and part of the Atlantic Coastal Plain, which extends along the entire Atlantic Coast from Maine to the Gulf of Mexico. In general, the Atlantic Coastal Plain is flat and slopes gently seaward, having moderate elevation with 80 to 90 percent lying less than 100 feet above mean sea level. Low ridges of sand parallel the coast offshore, forming the Barrier Islands, which are physically separated from the coast by quiet water lagoons, also known as the Inter-Coastal Waterways.

Like most areas of the Atlantic Coastal Plain not formed by glaciations, Upper Township's surface geologic materials are made up of unconsolidated deposits of sediment and particles that were carried in rain water, river flows and wind after being worn away from mountains by forces, such as rain and snow, freeze and thaw. The geology of the Coastal Plain is characterized by unconsolidated sand, gravel, silt and clay thickening seaward from a feathered-edge at the Fall Line (the boundary between the Piedmont and Inner Coastal Plain) to more than 6,500 feet thick in southern Cape May County. These materials are very porous and allow rainwater to quickly sink to underground aquifers, except in areas in which clay lenses lie between the surface and the aquifer. When this is the case, deep aquifers used for the community water supply cannot be recharged adequately by rainfall. Consequently, seawater may begin to seep into the aquifer, so that the aquifer begins to lose its usefulness as a source of fresh water.

Over time, fluctuations in sea level and intense wave action during storms act upon these sediments. During periods of higher ocean levels, which can completely cover the Coastal Plain sediments, marine deposits are added. The geological classification for the surface sediment layer, or veneer, is called the Cape May Formation and is described as a "terraced" sediment layer, outcropping along the edge of the Cape May Peninsula. As a veneer, the Cape May Formation is a thin covering overlying the productive Cohansey Formation, which has importance as a drinking water reservoir. The Cape May deposits are visible inland on the edges of the many streams. These deposits were laid down during a time when the level of the ocean was 30 to 50 feet lower than today.

(Refer to the [Figure 2 - Geology Map](#) in the Appendix to view the extent of the geologic formations within Upper Township).

Topography and Slopes

Upper Township exhibits very little topographic relief. According to United States Geological Survey topographic mapping, elevations range from 0 feet on Township beaches to about 15 feet above sea level in the westernmost portion of the Township. Slopes are minimal. Steep slopes generally only occur where they are manmade, such as along roadway embankments, or the dunes along the beaches. The Cedar Swamp Creek area is a large depression which drains north into the Great Egg Harbor Bay.

Soils and Septic Suitability

The soils of Upper Township were formed in the sediments laid down in glacial outwash plains and marine sediments laid down when the ocean covered the current land area. Coastal Plain soils, as indicated in the Geology section, represent a “geologic-ecologic” blend. Unlike soils in the northern part of the State, which can be identified with a particular location, the Coastal Plain soils are influenced by greater variability during geologic formation and subsequent modification.

The Soil Conservation Act of 1935 led to the establishment of the Soil Conservation Service and with it a focus on new characteristics. Today, we draw on a combination of factors to describe soils. The U.S. Department of Agriculture (USDA) has taken the lead in describing the characteristics of soils in New Jersey. Because of their complexity, soils are described as groups with similar characteristics, often based on location. The soils types found in Upper Township are illustrated on [Figure 3 – Soils Map](#) in the Appendix and are described below:

Appoquinimink-Transquaking-Mispillion complex (AptAv), 0 to 1 percent slopes very frequently flooded. This soil is very poorly drained and annual ponding is frequent. The parent material consists of loamy stream sediments over herbaceous material. This soil type is considered hydric.

Aura sandy loam (AugA), 0 to 2 percent slopes. This soil is well drained. Annual flooding and annual ponding are none. The parent material consists of old loamy or gravelly alluvium. This soil is prime farmland. This soil is not considered hydric.

Beaches (BEADV), 0 to 15 percent slopes. This soil is excessively drained. Annual flooding is very frequent and ponding is none.

Berryland and Mullica soils (BEXAS), 0 to 2 percent slopes. Both annual flooding and ponding are occasional. Parent material consists of sandy stream deposits. This soil is not suitable for crops. This type is considered a hydric soil.

Dennisville sandy loam (DenA), 0 to 2 percent slopes. This soil is well-drained. There is neither annual flooding nor annual ponding.

Downer loamy sand (DocB), 0 to 5 percent slopes. This soil is well-drained. Annual flooding and annual ponding do not occur. The parent material consists of loamy and gravelly stream deposits.

Downer sandy loam (DoeA), 0 to 2 percent slopes. This soil is well drained. Annual flooding and ponding do not occur.

Evesboro sand (EveB), 0 to 5 percent slopes. The parent material consists of sandy wind and stream deposits. The soil is excessively drained with no annual flooding or ponding.

Fort Mott sand (FobB), 0 to 5 percent slopes. The soil is well drained. Annual flooding and ponding do not occur. This soil is farmland of statewide importance.

Galloway loamy sand, (GamB), 0 to 5 percent slopes. The soil is somewhat poorly drained. There is neither annual flooding nor ponding. This soil is farmland of statewide importance.

Hammonton sandy loam (HboA), 0 to 2 percent slopes. This soil is moderately well drained. There is neither annual flooding nor annual ponding. This soil is prime farmland.

Hammonton loamy sand (HbmB), 0 to 5 percent slopes. This soil is moderately well drained. This soil has low potential productivity for cultivated crops. This soil is farmland of statewide importance.

Hooksan sand (HorDr), 2 to 15 percent slopes. This soil is excessively drained. Annual flooding is rare, and annual ponding is none. This soil is not suitable for cultivated crops.

Ingleside loamy sand (IngB) 0 to 5 percent slopes. This soil is well drained. Annual flooding and ponding do not occur. This soil has medium potential productivity for cultivated crops.

Ingleside sandy loam (InnA), 0 to 2 percent slopes. This soil is well drained. Annual flooding and ponding do not occur. This soil has medium potential productivity for cultivated crops. This soil is prime farmland.

Manahawkin muck (MakAt), 0 to 2 percent slopes. This soil is very poorly drained. Annual flooding is frequent and ponding is frequent. This soil is not suitable for cultivated crops. This soil is farmland of unique importance. This is a hydric soil.

Mispillion-Transquaking-Appoquinimink (MmtAv), 0 to 1 percent slopes. This soil is poorly drained. Annual flooding is very frequent and annual ponding is frequent. This soil is not suitable for cultivated crops. This soil is farmland of unique importance and is a hydric soil.

Pawcatuck-Transquaking complex (PdwAv), 0 to 1 percent slopes. This soil is very poorly drained. Annual flooding is very frequent and ponding is frequent. This soil is not suitable for cultivated crops. This soil is farmland of unique importance and is a hydric soil.

Psamments, sulfidic substratum (PstAt), 0 to 3 percent slopes. This soil is excessively drained. Annual flooding and annual flooding are frequent. This soil is not suitable for cultivated crops.

Psamments, wet substratum (PsvAr), 0 to 3 percent slopes. This soil is excessively drained. Annual flooding is rare and annual ponding is none. The soil is not suitable for cultivated crops.

Swainton sandy loam (SwbmA), 0 to 2 percent slopes. This soil is well drained. Annual flooding and ponding are none. This soil has low potential productivity for cultivated crops, but still is classified as prime farmland.

Swainton sandy loam (SwbmB), 2 to 5 percent slopes. This soil is well drained. Annual flooding and ponding do not occur. This soil has low potential productivity for cultivated crops, but still is classified prime farmland.

Transquaking mucky peat (TrkAv), 0 to 1 percent slopes. This soil is very poorly drained. Annual flooding is very frequent and annual ponding is frequent. This soil is not suitable for cultivated crops. This soil is farmland of unique importance and is a hydric soil.

Udorthents, refuse substratum (UdrB), 0 to 8 percent slopes. This soil is moderately well drained. Annual flooding and ponding do not exist. This soil is not suitable for cultivated crops.

Urban land-Psamments, sulfidic substratum complex (USPSAS), 0 to 2 percent slopes. This soil is excessively drained. Annual flooding is occasional and annual ponding is none. This soil is not suitable for cultivated crops. The Urban Land soil type is used to describe areas where much of the surface has been covered over by buildings or asphalt pavement.

Urban land-Psamments, wet substratum (USPSBR), 0 to 8 percent slopes. This soil is excessively drained. Annual flooding is rare and annual ponding is none. This soil is not suitable for cultivated crops. The Urban Land soil type is used to describe areas where much of the surface has been covered over by buildings or asphalt pavement.

Development Limitations

As Upper Township has no public sanitary sewer system and, therefore, must depend on septic systems and alternative sewage treatment plants, soils take on an added significance for the Township. The septic suitability of soils requires that there be adequate but not excessive drainage. Too much drainage will not allow time for natural bacteria in the soil to break down fecal material, thus endangering the water supply; not enough drainage, and the soil may become oversaturated with effluent. Onsite percolation tests are needed for specific placements of buildings. Criteria used for septic suitability of soils include its permeability, depth to water table, slope and hazard of flooding.

Soil found in Upper Township are rated its suitability for septic tank absorption fields and sewage lagoons (see **Table 1 - Development Limitations of Soils**). Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. Most of the soils in Upper Township are classified as "Very Limited". These limitations generally cannot be overcome without major soil reclamation, special design or expensive installation procedures. Poor performance and high maintenance can be expected.

The limitations for building foundation rating of “Slight” means that there are few or no significant limitations, “Moderate” means that there is one limitation or more that can normally be overcome at moderate cost by careful design and construction, and “Severe” means that there is one limitation or more that cannot be overcome without considerable cost.

Within the Pineland Management Area, the Pinelands Comprehensive Management Plan (CMP) considers developable lands are those privately held, non-wetland lands with a depth to seasonal high water table of greater than five feet. Where sewer systems are available, lands with a depth to seasonal high water table exceeding 1.5 feet shall also be considered developable.

Table 1: Development Limitations of Soils

Mapping Units	Depth to Seasonal High Water Table (feet)	Septic Limitations	Erosion Potential (Kw)	Limitations for Building Foundations
Appoquinimink Transquaking Mispillion	0	Very limited	0.37	Severe
Aura Sandy Loam	10	Very limited	0.24	Slight
Beaches	3 - 12	Not rated	0.1	Not rated
Berryland Mullica	0	Very limited	0.10	Severe
Dennisville Sandy Loam	4	Very limited	0.32	Slight
Downer Loamy Sand	4	Very limited	0.28	Slight
Downer sandy Loam	>6	Very limited	0.28	Slight
Evesboro Sand	>6	Very limited	0.10	Slight
Fort Mott Sand	6	Very limited	0.15	Slight
Galloway Loamy Sand	1.75	Very limited	0.17	Moderate
Hammonton Sandy Loam	1.5	Very limited	0.10	Moderate
Hooksan Sand	6	Very limited	0.10	Severe
Ingleside Sandy Loam	3.5	Very limited	0.20	Slight/ Moderate
Ingleside Sandy Loam	3.5	Very limited	0.20	Slight/ Moderate
Manahawkin Muck	0	Very limited	0.10	Severe
Pawcatuck Transquaking Complex	0	Very limited	0.10	Severe
Psamments, Sulfidic Substratum	0	Very limited	0.20	Slight
Psamments, Wet Substratum	1.5	Very limited	0.28	Slight
Swainton Sandy Loam	6	Very limited	0.32	Slight
Transquaking Mucky Peat	0	Very limited	---	Severe
Urban Land	---	---	---	Not rated
Urban land-Psamments, Sulfidic Substratum	0	Very limited	0.20	Not rated
Udorthents, refuse substratum	>6	Very limited	0.37	Not rated

Contaminated Sites

Often soils are contaminated by leaky underground chemical or fuel storage tanks or by surface spills. The *NRI* lists 18 sites that had known contamination, as identified by the NJDEP, at the time of its adoption in 2006. The NJDEP maintains the Known Contaminated Sites List (KCSL), which is updated quarterly. The latest update occurred on January 7, 2010 and includes 21 sites in Upper Township having one or more active case with any number of pending and closed cases; no sites having one or more pending cases, no active cases, and any number of closed cases; and 33 sites having only closed cases. Information gathered from the databases indicates that the contaminant source is often unknown and the potential for groundwater contamination is present. (See [Figure 4 - Contaminated Sites Map](#)). Not only is there a risk for soil loss due to contamination, but water resources can also be impacted.

Goals and Objectives for Soils

1. To assure soil diversity and quality throughout the Township.
2. To minimize loss of quality soil due to erosion and contamination.
3. To enhance the quality and natural functions of existing soils.
4. To ensure that development of septic and alternative wastewater treatment plants do not exceed the limitations of the soils.

Recommended Strategies for Soils

1. Encourage residents to properly compost appropriate yard and organic food wastes, which reduces municipal solid waste disposal costs and provides a local source for low-cost soil nutrients.
2. Encourage and support the prompt and efficient remediation of the Township's Known Contaminated Sites to avoid further seepage of contaminants into the soil and water sources. The list of Known Contaminated Sites in the *NRI* should be updated on a regular basis, with strategies for expediting remediation.
3. Avoid removal of existing vegetation in erosion-prone areas, especially near and along stream banks, should be an ongoing policy. While state regulations governing wetlands usually protect these areas, certain non-wetland areas near streams may benefit from local regulations aimed at preventing soil erosion, especially in small areas of disturbance that may fall below the minimum thresholds for County Soil Conservation District jurisdiction.
4. Minimize disturbance of vegetation in natural drainage and flood-prone areas to help sustain the water-cleansing properties of established groundwater recharge areas.
5. Prepare and adopt a riparian buffer ordinance. The Model Riparian Buffer Conservation Zone Ordinance, prepared by the Passaic River Coalition and the NJ Department of Environmental Protection (NJDEP), can be found on the NJDEP Division of Watershed Management website at www.state.nj.us/dep/watershedmgt/DOCS/WQMP/riparian_model_ordinance.pdf.

WATER RESOURCES

Water is a critical resource for life. Groundwater provides wells with drinking water and contributes the base flow of streams and water bodies. Groundwater is found below the ground surface in the spaces between soil and sediment particles in unconsolidated sediment and in the cracks and pore space within bedrock. Surface water, in contrast to groundwater, is water flowing in natural channels carved into the surface of the earth. We refer to these waters as streams, rivers, or creeks. Surface water has many uses, including drinking water and recreation for humans. It provides habitat for fish and other aquatic life. Historically, surface water also had an enormous role in waste disposal until surface waters became degraded and required remediation. Groundwater also has been subject to degradation by underground septic disposal, over application of fertilizers and pesticides and leaking underground fuel and other chemical storage tanks. This experience has shown that it is technically and economically much easier to take steps to avoid contamination than it is to restore the resource to the original state. The groundwater and surface water resources of Upper Township are described below.

Groundwater Resources

Aquifers

An aquifer is an underground water-bearing bed or stratum of permeable rock, sand, or gravel capable of fielding considerable quantities of water to wells or springs. Groundwater, located mostly out of sight, is one of our most important resources. The underground rock and accompanying soils provide a framework for storing groundwater. Between the rock and within the soil are spaces or openings that store water and allow fresh water, or precipitation, to replenish or recharge the supply.

Rainfall is able to flow through the pores or empty spaces between the rock and soil to recharge the existing ground water supply. The process of recharge occurs quickly if the rock or soil is permeable. Water, in useful amounts, which naturally collects within soil or rock underground and that can be removed easily by pumping (as in a well) is called an aquifer. If ground water seeps out onto the surface, it is called a spring.

Sometimes there is a confining layer, which is not as permeable and does not allow rain to easily flow into stored ground water. Its presence defines a “confined aquifer”. Freshwater aquifers along the coast of the Atlantic Ocean, such as those located in Cape May County, are bordered by saltwater. Groundwater withdrawals from these aquifers can cause movement of surrounding saltwater, and saltwater intrusion has been documented throughout the east coast, including Cape May County. Withdrawals can change the patterns of ground-water flow and discharge to coastal ecosystems, which may alter the salinity of coastal waterways and wetlands.

In Cape May County, five ground water reservoirs or freshwater aquifers have been mapped and studied by county, state and federal agencies such as USGS. These aquifers are named as follows:

- Holly Beach is a shallow water bearing zone that is in direct contact with seawater
- Estuarine Sand Aquifer (about 50' thick)
- Cohansey aquifer (varies from 60' – 180' thick)
- Rio Grande water bearing zone (50' – 100' thick)
- Atlantic City Sand (800' thick)

The sediments underlying Cape May County consist mostly of unconsolidated gravel, sand, silt, clay and shell fragments. In most cases, these materials are permeable and readily allow rainfall to recharge ground water supplies. These sediments are also capable of storing large amounts of water. Residents in Upper Township primarily supply water to their homes from individual wells which draw water from the Cohansey Aquifer.

The Cohansey aquifer system is composed of fine to coarse sand and gravel sediments that vary from 60 feet to 180 feet thick. In general, this aquifer is described as unconfined. However, in the area of Upper Township, two confining or low permeability layers do exist, creating partially confined water bearing layers. A veneer, identified as the Cape May Formation, is the uppermost layer. The confining layers contain increased amounts of silt and clay which reduce permeability and slow recharge. The Cohansey aquifer is very productive.

The Holly Beach water bearing zone which is at or near sea level, is in direct connection with seawater and therefore has limited use for freshwater supply. However, Holly Beach supplies non-potable uses, i.e. golf course and agriculture irrigation. Lower level water bearing layers, Rio Grande and Atlantic City 800-foot Sand, are not included in Upper Township's potable water source.

One of the principal water resource issues within this management area is drinking water supply. The resource is largely dependent upon ground water that is in turn highly vulnerable to saltwater intrusion from the west, south and east, especially in the southern portion of the peninsula. The expected increase in population for Upper Township and the rest of Cape May County will put further stress on the already overextended water supply.

Water supply issues in Cape May County have been the topic of studies by the USGS and NJDEP for some time and were the topic of the *Hydrogeologic Framework, Availability of Water Supplies, and Saltwater Intrusion, Cape May County, New Jersey, Water-Resources Investigations Report 01-4246* in 2002. The report provides guidelines for future withdrawal volumes and recommended well locations in order to safeguard potable water supplies in the future. Alternative strategies for safeguarding freshwater include conservation and groundwater recharge using recycled supplies.

The USGS recently published its study, *Future Water-Supply Scenarios, Cape May County, New Jersey, 2003-2050*, which provides an analysis of the impacts of nine different scenarios on the water supply in Cape May County. Baseline Scenarios 1, 2 and 3 represent withdrawals using existing wells and projected water demands until 2050, which indicates that there would be severe saltwater intrusion into the Cohansey aquifer as to adversely affect production wells used by Lower Township and the Wildwoods, as well as some other near-shore domestic wells. Scenarios 4 through 9 analyzes the potential impacts of various mitigating measures, such as drilling of new wells in specific locations, eliminated or reduced withdrawals from certain existing wells, desalination plants, freshwater injections, tertiary treatment systems and reverse osmosis units. The locations of Upper Township wells remain as exist currently in each of the nine scenarios.

According to the USGS, stewardship of the potable, non-potable, and ecological water supplies of Cape May County will likely modify and incorporate many of the concepts developed and simulated in Scenarios 4 to 9. Past and ongoing practices to use and improve the potable water supply include:

- Relocating wells in the interior of the county to lessen the impact of saltwater intrusion;
- Using multiple aquifers to disperse the stresses of groundwater withdrawal;
- Locating wells farther apart to reduce drawdown; drilling deeper to maintain water quality;
- Using legislation to increase water conservation; employing conservation practices at tourist accommodations and government and educational facilities;
- Closely monitoring irrigation at golf courses, farms, public parks, and residences; using native vegetation for landscaping;
- Adjusting price structure for water;
- Improving solid waste and wastewater management facilities;
- Employing desalination; and
- Using aquifer storage and recovery techniques.

Aquifer Recharge

The NJ Geological Survey (NJGS) has developed a method to estimate ground water recharge for Cape May County. Land-use, soil and climate data were combined to generate ground water recharge rates shown on [Figure 5 - Groundwater Recharge Map](#). New Jersey receives an average of 44 inches of precipitation annually, of which approximately 15 to 39 inches recharge the ground-water reservoir by seeping into the ground. The majority of Upper Township is ranked W for wetlands and open waters or L for hydric soils, which do not have recharge potential. The upland areas range from 1 to 14 inches of recharge per year, depending on soil conditions.

Wellhead Protection Area

For a community, such as Upper Township, in which water is supplied by a well drilled into the aquifer or underground water reservoir, knowledge about potential contamination and how contaminants can travel help safeguard the water supply. Safeguarding the susceptible area to prevent contaminants from entering the water supply reservoir is important for both individual wells and larger wells serving multiple dwellings. Wells become vulnerable to contamination when contaminated groundwater accrues within the area that a well draws water from. “Wellhead Protection Areas” are delineated around public wells, so that extra care can be taken in the development of these areas.

The Federal Safe Drinking Water Act (SDWA) Amendments of 1986 and 1996 established the first nationwide program—the Source Water Assessment Program (SWAP)—designed to protect public water supplies from contaminants that may have adverse impacts on the health and welfare of the public. The SDWA seeks to protect these water resources with the development and implementation of Wellhead Protection Programs (WPP) at the state level. The New Jersey Wellhead Protection Program (NJWPP) was approved by the U.S. Environmental Protection Agency (EPA) in December 1991. In 1997, the NJDEP New Jersey Geological Survey (NJGS) published its delineation of public community water supply (PCWS) wells in New Jersey. Public non-community water supply (PNCWS) wells were later released in 2004.

The NJGS defines a PCWS well as “a public water system that serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents”. A PNCWS well is “a public water system that is not a PC well and which serves at least 15 service connections or regularly serves at least 25 individuals more than 60 days of the year”. Additionally, PNCWS wells can be either transient or nontransient. A transient PNCWS well serves year-round for at least sixty days of the year but does not serve the same individuals during that time period (i.e. rest stop areas, restaurants and motels). A nontransient PNC well serves at least 25 of the same individuals over a period of six months during the year (i.e. schools, factories and office buildings).

The delineated Wellhead Protection Areas (WPA) for PCWS wells and PNCWS wells were released by the NJGS in 2002 and 2004, respectively. These WPAs delineate the horizontal extent of ground water captured by a well pumping at a specific rate over a two-year (Tier 1), five-year (Tier 2) and twelve-year (Tier 3) period for unconfined wells. Confined wells have a 50-foot radius delineated around each well serving as the wellhead protection area to be controlled by the water purveyor. The colored tiers, one for each time period, provide a visual guide to the surface area which needs protection to safeguard a well’s supply of water.

In 2003, the NJGS published its *Guidelines for Delineation of Wellhead Protection Areas in New Jersey*. WPAs are defined by the NJGS as “an aquifer area described in plan view around a well, from within which ground water is reasonably likely to flow to the well and through which ground-water pollution, if it occurs, is reasonably likely to pose a significant threat to the water quality of the well.” The guidelines assume that WPA delineation and protection will be targeted to three general threats. The first is the direct introduction of contaminants to the area immediately contiguous to the well through improper casing, road

runoff, spills and accidents. The second basic threat is from microbial contaminants such as bacteria and viruses. The third major threat is the broad range of chemical contaminants, including inorganic and naturally occurring or synthetically derived organic chemicals.

As depicted on [Figure 6 – Wellhead Protection Areas Map](#), there are 5 unconfined PCWS wells in Upper Township, servicing various mobile home and other more permanent uses. The data also indicates that there are 3 confined PCWS wells in the Township, which are operated by the New Jersey American Water Company. Each unconfined PCWS well has a delineated three-tiered Wellhead Protection Areas surrounding it. The confined PCWS wells include a 50-foot radius classified as Tier 1. With an average well depth of 450 feet, the majority of the PCWS wells (76) draw water from the Kirkwood and Cohansey aquifers. The PNCWS wells are typically much shallower (100-foot average depth) and draw from the Cape May Formation.

There are also 56 PNCWS wells in Upper, serving a wide range of transient and non-transient uses—such as campgrounds, retail stores, schools and other community facilities. Each PNCWS well has a delineated three-tiered Wellhead Protection Areas surrounding it.

In addition to the NJWPP, in 1991 the Cape May County Planning Board, in cooperation with the NJDEP and under a pass-through grant by the Environmental Protection Agency, implemented the pilot Cape May County Wellhead Protection Program (CMCWPP) to locate and delineate domestic well cluster areas within the four Townships of Cape May County, including Upper Township, for current and future ground-water resource preservation. The CMCWPP found that there are 1,894 domestic wells in cluster areas, representing 36 percent of the total dwellings in Upper Township.

Cape May County developed the program to protect domestic clusters of wells from pollutant sources. Data on the unconfined aquifer was developed, three tier structures were produced around each well cluster and placed on tax maps, and the clusters were based on the time-of-travel by which a drop of water would reach the individual wells. The pollutant sources surrounding the wells were field investigated and were found to include septic systems, above and below ground storage tanks, and cemeteries.

Goals and Objectives for Groundwater Resources

1. To assure sustainable recharge of the Township's groundwater with uncontaminated fresh water.
2. To optimize natural groundwater recharge through clean, vegetated areas.
3. To promote the participation of property owners in increasing aquifer recharge with clean water.
4. To protect the surface and subsurface areas surrounding PCWS and PNCWS wells, through which contaminants are reasonably likely to move toward.
5. To protect the surface and subsurface areas surrounding domestic wellhead cluster areas, through which contaminants are reasonably likely to move toward.

Recommended Strategies for Groundwater Resources

1. Continue to regulate the appropriate amount of impervious surfaces in the Township, in accordance with CAFRA and Pinelands regulations. Impervious surfaces, such as buildings and pavement, convert all surface water into runoff instead of letting it absorb into the groundwater supply.
2. Maintain the amount of vegetated land in Upper Township. Vegetation acts as a filter in the aquifer recharging process. Naturally cleansed water that is not absorbed by the plants recharges the aquifer.
3. Water conservation should be promoted to ensure the long-term viability of the groundwater supply. Promoting water conservation in schools and to the general public is an important awareness measure.
4. Discourage the use of toxic and hazardous household chemicals and substances, which can lead to contamination of groundwater. The Township can promote the use of eco-friendly and sustainable products through special purchasing programs and by setting an example through its own use of sustainable products in the maintenance of its municipal buildings and schools.
5. Encourage the expedited remediation of known contaminated sites within the wellhead protection areas. According to the Contaminated Sites and Wellhead Protection Areas Maps, there are several Known Contaminated Sites in Tier 1 and Tier 2 Wellhead Protection Areas. It is crucial to secure or clean up these KCSs as a priority since they present the greatest chance of leaking pollutants into the groundwater supply. The Township should work with property owners to get these sites cleaned up as quickly and effectively as possible.
6. Sites that contain hazardous materials (such as storage tanks, road salt piles, landfills, etc.) should be secured to prevent leakage into the aquifer.
7. Educate residents and business owners about the importance of their actions on groundwater resources and what they can do to improve aquifer stewardship.

Surface Waters

Cape May County, located at the southern-most point of New Jersey, contains a continuation of the Atlantic Coastal Plain along its eastern border. The County is 267 square miles in area and is bounded on the north by Atlantic and Cumberland Counties, on east by the Atlantic Ocean and on the west and south by the Delaware Bay. The region is characterized by a low-lying, gently rolling plain whose highest point is 54 feet above sea level and whose surface is largely covered by wet soils and wetlands. Large swamps (Great Cedar, Timber and Beaver Swamps) occupy the north-central part of the County. Most, if not all streams are tidal in their lower reaches and terminate by flowing into fresh water swamps that, in turn, discharge into saltwater marshes near the shore.

Surface waters in the Pinelands portion of Upper Township include streams, lakes, and bogs. The streams are slow-moving with sand and gravel substrates. Ground water discharge comprises 89% of annual stream discharge. This groundwater input keeps the streams relatively cool (about 25°C [77°F] in summer). Water quality is generally exceptionally good. Surface water is colored brown like tea. Acidity of pinelands waters is high, with an average pH of 4.4. Indigenous fish and amphibian communities are tolerant of the acidity of the waters. Many non-indigenous plant and animal species cannot colonize these waters, due to acidity. However, elevated levels of pH, biochemical oxygen demand, magnesium, calcium, nitrates, and phosphates occur in wetlands disturbed by agricultural, residential, and urban land uses.

The NJDEP has established use designations in its Surface Water Quality Standards (N.J.A.C. 7:9-4.1). These designations are described briefly below.

- FW – signifies fresh waters and include all non-tidal and tidal waters with a salinity of less than 3.5 parts per thousand.
- FW-1 – fresh waters that originate in and are wholly within federal or state parks, forests, fish and wildlife lands, and other special holdings, that are to be maintained in their natural state of quality and not subject to any man-made wastewater discharges.
- FW-2 – refers to fresh waters that are not designated FW1 or PL.
- PL – includes all waters within the boundaries of the Pinelands Area, as established in the Pinelands Protection Act.
- SE – is a general surface water classification of waters with salinity greater than 3.5 parts per thousand.
- C1 (Category One) - waters are to be protected “...from measurable changes in water quality characteristics because of their clarity, color, scenic setting, other characteristics of aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries resource(s)” (N.J.A.C. 7:9-4.1-1.4, p. 3).

Waters that are classified by the NJDEP as Category One waters receive extra protection under the State’s Stormwater Management Rules (N.J.A.C.7:8). These Rules apply to development projects that involve the

disturbance of at least one acre of land or the placement of one quarter acre of impervious cover on a site. A Special Water Resource Protection Area (SWRPA) must be established along all waters designated Category One. This includes perennial or intermittent streams that drain into or upstream of the Category One waters, as shown on the USGS Quadrangle Maps or in the County Soil Surveys, within the associated HUC 14 drainage area. The SWRPA will consist of a 300-foot buffer on each side of the waterway. (See [Figure 7 – Surface Waters Map](#)).

Table 2: Surface Water Quality Classifications of Upper Township Waters

Water body	Water Quality Classification
Tuckahoe Lake	FW2-NT(C1)
Tuckahoe River (Source to Pinelands Protection and Preservation Area boundary at Rt. 49)	PL
Tarkiln Brook (within the Pinelands)	PL
Mill Creek (within the Pinelands)	PL
Back Run (within the Pinelands)	PL
Unnamed	PL
Great Egg Harbor	FW2-NT/SE1(C1)
Cedar Swamp Creek	FW2-NT/SE1
Halfway Creek	FW2-NT/SE1

Segments of the Great Egg Harbor River and its tributaries were the first river in New Jersey designated as components of the National Wild and Scenic Rivers System in October 1992. The purpose of the National Park Service designation is to protect remaining selected free-flowing rivers with outstanding natural, cultural and/or recreational value. Participating municipalities receive assistance in preparing a management plan to serve as the foundation for long-term protection of the resource.

As an included tributary in the Great Egg Harbor National Scenic and Recreational River Plan, the Tuckahoe River is under the protection of the Wild and Scenic Rivers Act. Due to variations in requirements, specific segments of the Tuckahoe River and nearby Cedar Swamp Creek have been classified as shown below.

Table 3: Wild and Scenic Rivers in Upper Township

River/Tributary	Segment	Miles	Classification
(Lower) Tuckahoe River	Confluence to Route 50 bridge	9 miles	Scenic
(Upper) Tuckahoe River	Route 50 bridge to Route 49 bridge	7.3 miles	Recreational
Cedar Swamp Creek	Confluence to headwaters	6.0 miles	Scenic

Watersheds

The NJDEP defines a watershed as “the area of land that drains into a body of water such as a river, lake, stream or bay. It is separated from other systems in the area by high points such as hills or slopes. It includes not only the waterway itself but also the entire land area that drains to it.” Watershed Management Areas are designated by the NJDEP.

The high points in the land that direct the flow of surface water within Upper Township form the boundaries of the Tuckahoe River drainage area. The Tuckahoe River is the largest river and collects much of the surface water drainage in Upper Township. The Tuckahoe River drainage basin contributes to the larger Great Egg Harbor Watershed Management Area, WMA #15. The remaining land area in Upper Township is located within the Cape May Watershed Management Area #16. This basin drains lands located parallel to the Atlantic Coast. Refer to [Figure 8 – Watersheds Map](#) to view the boundaries of the two watersheds and the Watershed Management Area boundaries within Upper Township.

In addition to Watershed Management Area designations, Hydrologic Unit Codes (HUC 11 and HUC 14) are identifiers used by the NJDEP and USGS. Surface water management is based on the concept of watersheds. HUC 11 codes define Great Egg Harbor Basin (HUC 11: 02040302060040) and Cape May Basin (HUC 11: 02030902940020) watersheds. The subwatersheds of the HUC 11 watersheds subdivide Upper Township into smaller drainage areas within the larger Great Egg Harbor and Cape May Watersheds.

Great Egg Harbor Watershed. The Tuckahoe River discharges into Great Egg Harbor Bay, located in Atlantic County, which also includes the watersheds of the Great Egg Harbor River, the Tuckahoe River, Absecon Creek and Patong Creek. The Tuckahoe River, as the largest contributor to Great Egg Harbor Bay, is the largest river in the Great Egg Management Area (WMA #15) and Upper Township. The river fans upstream into expansive marshes and lowland forests. The drainage area of the Tuckahoe River upstream of Route 49 is 1023.8 acres. The drainage area of the Tuckahoe River below Route 49 is 6,431.2 acres. Tarkiln Brook drains 1764.4 acres. The Mill Creek/Black Run sub-watershed covers 4503.1 acres. Halfway Creek drains 2433.9 acres. Cedar Swamp Creek/Cedar Swamp upstream of Route 50 drains 8850.9 acres and 4230.7 acres below Route 50. The combined subwatersheds for Willis Thorofare and Hughes Creek include 3154.50 acres.

Cape May Watershed. Watershed Management Area 16 includes watersheds draining Cape May County south and east of the Tuckahoe River Watershed. The region contains minimal surface water flow. Ground water and shellfish harvesting water quality are the principal water issues. No fixed physical/chemical fresh (surface) water monitoring locations are currently located within this management area. The area includes the following watersheds: Dennis Creek, Delaware Bay Coastal Drainage, and Cape May Atlantic Coastal Drainage.

Goals and Objectives for Surface Waters

1. To maintain healthy rivers and estuaries to support important ecosystem functions, including maintenance of native plant and animal biodiversity.
2. To ensure the long-term viability and function of natural drainage resources.
3. To reduce or eliminate pollutants in water entering streams.
4. To promote responsible actions by property owners so as to prevent contaminants from entering surface waters.
5. To restore stream beds, channels and buffers and optimize flood retention areas.
6. To incorporate by reference the Goals and Techniques of the Upper Township Stormwater Control Plan and Stormwater Control Ordinance (codified at Section 7.7 of Chapter XIX, the Land Subdivision and Site Plan Chapter of the Township of Upper).

Recommended Strategies for Surface Waters

1. Prepare and adopt a riparian buffer ordinance. The Model Riparian Buffer Conservation Zone Ordinance, prepared by the Passaic River Coalition and the NJ Department of Environmental Protection (NJDEP), can be found on the NJDEP Division of Watershed Management website at www.state.nj.us/dep/watershedmgt/DOCS/WQMP/riparian_model_ordinance.pdf.
2. Where natural stream banks have been degraded, the Township should make efforts to stabilize and restore the banks, using the original channel location as a guide.
3. Enlist community participation in the planting of stream buffers and stabilizing of banks, perhaps by establishing a Township Service Day for this purpose.
4. Conservation easements, which are typically long-term deed restrictions that prevent land from being developed, should be obtained for land abutting streams to help create and protect buffers.
5. Minimize use of harmful fertilizers and pesticides on public landscaping, which will result in better water quality in the Township. Choosing native grasses and vegetation for landscaping reduces the need for fertilizers and pesticides and sets a good example for local businesses and residents to follow.
6. Residents should be educated in environmentally-friendly lawn maintenance practices, including attractive, low-maintenance alternatives to grassed lawn.
7. Signs should be placed on storm drains to discourage the depositing of litter that travels directly into streams, clogs them and impairs aquatic resources.
8. The Stormwater Control Plan and Ordinance should be reviewed on a regular basis to ensure that it continues to advance its purposes of establishing minimum stormwater management requirements and controls for major development, consistent with the statewide stormwater requirements at N.J.A.C. 7:8, the regulations and standards contained in the Pinelands CMP, and the provisions of the adopted master plan and land use ordinances of Upper Township. Best-management-practices should be incorporated into the requirements as they continue to evolve.

Floodplains

As a coastal community, Upper Township is subject to occasional flooding. Floodplains are commonly understood to be the level of flood water expected to be equaled or exceeded every 100 years on average. However, floods below the 100-year flood plain line may occur more frequently. According to the Federal Emergency Management Agency (FEMA) mapping, much of easterly portion of Upper Township is located within the 100-year floodplains of the Atlantic Ocean, Great Egg Harbor Bay, Ludlam Bay, Peck Bay, Cedar Swamp Creek, the Tuckahoe River and its tributaries (see [Figure 9 – Flood Prone Areas Map](#)). Publicly-owned lands encompass a large portion of the areas prone to flooding. Strathmere and lands located adjacent to the Tuckahoe River to the west of the extensive wetland area located at the confluence of Cedar Swamp Creek and the Tuckahoe River are areas that contain development within floodplains. The NJDEP regulates development in floodplains and the Flood Hazard Area Control Act Rules (N.J.A.C. 7:13)

Upper Township has the added concern of the flood hazards of a coastal community. Flooding on the coastline occurs by a combination of rising tides, wind and surf, normally during a hurricane or other coastal storm. The greatest occurrence of flooding in Upper Township was during a 1944 hurricane. Strathmere and other coastal areas are subject to tidal flooding with wave action. The greatest flood that is expected for the southern coast of New Jersey (although not the greatest possible flooding), from a combination of meteorological forces, is known as the Standard Project Tide. As fragile areas subject to damage by natural forces, development in coastal areas of New Jersey is managed by the Coastal Area Facilities Review Act (CAFRA). Most of the Township lies within the area of CAFRA's review jurisdiction. Only the area south and west of Routes 49, 50, and 610 are exempt.

Goals and Objectives for Floodplains

1. To protect human life and health from impacts of flooding.
2. To minimize expenditure of public money for costly flood control projects.
3. To minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public.
4. To minimize prolonged business interruptions.
5. To minimize damage to public facilities and utilities such as water and gas mains, electric, telephone, and sewer lines, and streets and bridges located in areas of special flood hazard.
6. To help maintain a stable tax base by providing for the second use and development of areas of special flood hazard so as to minimize future flood blight areas.
7. To insure that potential buyers are notified that property is in an area of special flood hazard.
8. To ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

Recommended Strategies for Floodplains

1. Continue to pursue and promote the preservation of open space, through municipal, county, state or not-for-profit entities, to protect natural floodplains. Naturally vegetated riparian corridors help reduce the extent of flooding.
2. The Township has a Flood Damage Control Ordinance in place, which includes provisions for flood hazard reduction in the Township. The Township should continue to enforce these provisions in order to implement the Goals and Objectives listed above.
3. The Township should consider amending its Flood Damage Control Ordinance to provide additional level of protection to homes in the Special Flood Hazard Area, which would provide protection to homes and provide lower flood insurance premiums.

Wetlands

According to the EPA, wetlands are defined as “those areas that are inundated or saturated by surface or groundwater at a frequency or duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil condition” (EPA, 40 CFR 230.3 and CE 33 CFR 328.3). Activities in wetlands have been regulated under Section 404 of the Clean Water Act, since its passage in 1972. Wetlands occur between dry uplands and land permanently inundated with water.

The NJDEP has taken over the regulation of wetlands in the New Jersey. Wetlands which are regulated under New Jersey’s Freshwater Wetlands Protection Act (N.J.A.C. 7:7A) are identified and delineated using the Army Corps of Engineer’s three-parameter approach. Wetlands must exhibit evidence that the seasonal high water table occurs near the surface, wetlands vegetation must be present and evidence that water stands or flows through the area should be evident (Federal Interagency Committee for Wetland Delineation 1989).

The freshwater wetlands included in this Conservation Plan Element were originally mapped under the Fresh Water Wetlands Mapping Program, an effort undertaken to support the 1988 New Jersey Freshwater Wetlands Protection Act. These mapping efforts are based on aerial photography and are subject to site-specific review and confirmation.

Wetlands are a critical component to ecosystems. According to the NJ Wetlands Act of 1970 (N.J.S.A. 13:9B-2), wetlands are valuable because they:

- Protect and preserve drinking water supplies by serving to purify surface water and groundwater resources;
- Provide a natural means of flood and storm damage protection through the absorption and storage of water during high runoff periods and the reduction of flood crests;
- Serve as a transition zone between dry land and water courses, thereby retarding soil erosion; provide essential breeding, spawning, nesting, and wintering habitats for a major portion of the state’s fish and wildlife, including migrating birds, endangered species, and commercially and recreationally important wildlife; and
- Maintain a critical baseflow to surface waters through the gradual release of stored flood waters and groundwater, particularly during drought periods”

Approximately 24% of total land mass in Upper Township is occupied by Freshwater Wetlands (see [Figure 10 – Wetlands Map](#)), and a similar amount of land mass contains Saltwater Wetlands. Freshwater Wetlands are found associated with the Tuckahoe River and Great Cedar Swamp, both of which are discussed in detail within this report.

Saltwater wetlands have formed adjacent to the main tidal water bodies of:

- Ludlam Bay
- Corsons Sound
- Peck Bay
- Great Egg Harbor Bay

The U.S. Fish and Wildlife Service has designated several wetlands on the Cape May Peninsula as priority wetland sites under the Federal Emergency Wetlands Resources Act of 1986, including Cape Island/Pond Creek, Great Cedar Swamp (Cape May National Wildlife Refuge), Great Egg/Jarvis, and Sewall Point.

Freshwater wetlands are regulated by the NJDEP, under the Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A). Some activities are prohibited in wetlands, while other activities are allowed, but are restricted in areal extent. In some cases mitigation is required for the disturbance or destruction of wetlands. In these cases, wetlands must be created, existing wetlands must be enhanced or a monetary donation to a wetlands mitigation bank must be made.

The NJDEP also determines the size of wetlands transitional areas assigned to freshwater wetlands. Activities in these buffers are also regulated. The buffer assigned is 0 feet for human made ditches and swales. A buffer width of 150 feet is assigned to exceptional resource value wetlands. Wetlands known to contain threatened or endangered animal species would be assigned this larger buffer width. Intermediate resource value wetlands receive a buffer of 50 feet.

Goals and Objectives for Wetlands

1. Assure the continuous protection and optimal function of wetland resources.
2. Promote the restoration of lost and degraded wetlands to their natural state.

Recommended Strategies for Wetlands

1. Municipalities are encouraged to establish procedures for reviewing development applications involving wetlands. Upper Township adopted an Environmental Assessment Ordinance in 2007, which requires, among other items, freshwater wetlands, transition areas and state open waters to be delineated and certified pursuant to the Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A) outside of the Pinelands Management area, and pursuant to the Pinelands Protection Act Rules within the Pinelands Management area. The delineation report and plan shall be submitted as part of the Environmental Assessment Report and the preliminary application. To ensure that the Environmental Assessment Report is achieving its goal of wetlands protection, the following actions are also recommended:
 - a. Designated Planning and Zoning Board staff and/or the construction officials should check all development applications with the Township Natural Resource Inventory, New Jersey Wetlands Maps, National Wetlands Inventory Maps and hydric soils and poorly drained soils delineated on County Soil Survey maps for presence or proximity to wetlands.
 - b. Each Board should designate a person to respond to public notice for Letters of Exemption, Letters of Interpretation, Statewide General Permits, and Individual Permits to allow timely comment by municipal agencies to the NJDEP. Local comments can be helpful to the Department since knowledge of a particular area can include more information. Limited time is allowed for response.
 - c. The Township should establish a process for the Town Clerk to notify immediately the designated person of each Board of receipt of notice of applications for Letters of Interpretation, Statewide General Permits, Individual Permits, and Transition Area Waivers.
 - d. Each board should insure that applicants obtain permits from other levels of government by withholding signature on plans until these permits are obtained.
 - e. Reasonable protection measures beyond state requirements should be explored with willing applicants during plan review. Additional protections can be required by the Zoning Board of Adjustment as conditions of approval of a use variance involving a wetland resource.
2. The Township should obtain a freshwater wetlands permit for all municipal projects that will affect wetlands. Wetlands regulations require local government compliance.
3. All observed or suspected violations of the Freshwater Wetlands Protection Act should be reported to the NJDEP Enforcement Office at (877)-WARNDEP [877-927-6337].
4. Wetland restoration is an essential tool to protect, improve and increase wetlands. Restoring lost and degraded wetlands to their natural state is vital to ensure the health of the watersheds. Areas of former wetlands retain their characteristic soil and hydrology, which allows their natural functions to be reclaimed. Restoration is a complex process that requires planning, implementation, monitoring and management. Opportunities for wetlands restoration projects should be identified. (For more information, visit EPA's River Corridor and Wetland Restoration webpage: www.epa.gov/OWOW/wetlands/restore/).

BIOLOGICAL RESOURCES

Biological resources include the vegetation and wildlife related attributes of Upper Township. Botanical resources include the flora (e.g., checklist and analysis of species) and vegetation (plant communities) and the zoological resources include the invertebrate and vertebrate animals and animal communities. Rare, threatened, and endangered species and species of special concern also are considered.

Vegetation

Plant communities can be broadly divided into wetland and upland communities. (See the *NRI* for lists of typical plant species that occur in each of the major plant communities likely to be present in Upper Township and greater detail on each of the community types). Wetland communities consist of plant species that are specifically adapted to the unusual water conditions and soils lacking in oxygen that occur in coastal and wetland areas. Upland communities generally consist of grasslands and mixed shrub and forestlands where soils are not saturated with water.

Wetlands Plant Communities

In coastal areas, extremely dry or xeric sandy soils are typical. These harsh conditions strongly limit the number of vegetation species able to grow on beaches and coastal sand dunes. The composition of wetland communities in coastal areas is controlled by the concentration of salt in adjacent water bodies. Important wetland types include the Low Tidal Salt Marsh and High Tidal Salt Marsh, which compose the Salt Marsh Complex and the Brackish Tidal Marsh. Also notable in coastal areas are sub-tidal aquatic plant communities, such as eelgrass beds. Activities in the latter community type are regulated by the NJDEP under the Rules on Coastal Zone Management (N.J.A.C. 7:7E-1.1 et seq). Upland coastal communities include the Marine Intertidal Gravel/Sand Beach Community, the Dunegrass Community, the Beach Heather Community, the Shrub Thicket Community and the Dune Woodland Community.

Uplands Plant Communities

Upland plant communities can be found in Upper Township beyond the influence of tides, coastal winds or salt spray. The westerly portion of the Township is located within the New Jersey Pinelands. This is an ecological, as well as a jurisdictional, designation. While the jurisdictional boundary of the Pinelands Area does not encompass the entire geographic area that would include all inland plant communities in Upper Township, ecologically, they are pinelands communities. Pinelands vegetation is strongly influenced by the low-nutrient status of the sandy soils and frequent forest fires. Upland communities that are found in Upper Township include pine-oak forests and oak-pine forests, with pines predominating in areas with higher fire frequencies.

Wildfire Fuel Hazard

Forest fires are not an uncommon occurrence in New Jersey, especially in the Pine Barrens. The New Jersey Forest Fire Service (NJFFS) recently developed Wildfire Fuel Hazard mapping (see Figure 11 – Wildfire Fuel Hazard Map in Appendix). The NJFFS assigned Wildfire Fuel Hazard Rankings to each land classification of the NJDEP Modified Anderson Land Use/Land Cover Classification System. The ranking system is as follows: Water, Low, Moderate, High, Very High, Extreme, Urban, Agriculture, and Barren Land.

Low hazard includes Atlantic White Cedar and hardwood swamps. Moderate hazard includes mixed hardwood, mature oak, mature oak-pine, mature pine-oak, and mature upland pine (dense and large, greater than 20' tall and less than 20' spacing) and non-Pine Barrens forest. High hazard includes open uplands pine (pine-oak or oak-pine, less than 20' tall and greater than 20' spacing). Extreme hazard consists of immature, small or variable upland pine (immature pine-oak, scrub oak-pine, pine-scrub oak, lowland pine-oak or oak-pine) including those less than 20' tall and less than 20' spacing, and pitch pine lowlands (all size classes).

The majority of Upper Township is classified as Low or Moderate, primarily coincident with forested wetlands. High, Very High and Extreme rating are scattered throughout the Township, but occur more frequently in the Pinelands area. (See [Figure 11 – Wildfire Fuel Hazard Map](#)).

Goals and Objectives for Vegetation

1. To sustain and increase the extent of vegetative cover with appropriate species.
2. To control and eradicate invasive and exotic non-native plant species.
3. To encourage property owners to plant and maintain trees.
4. To reduce wildfire hazards.

Recommended Strategies for Vegetation Resources

1. Continue to protect naturally vegetated areas through open space preservation.
2. Local businesses and residents should be encouraged to use native vegetation in their landscaping, instead of just grass. This will reduce the need for pesticides and fertilizers, which are harmful to wildlife; and will also help increase the amount of habitat.
3. Fire safety education and outreach initiatives for local elected and appointed officials, homeowners groups and schools should be considered. Many materials have already been developed by the NJ Forest Fire Service.
4. Consider the possible development of a Community Wildfire Protection Plan (CWPP) and zoning amendments to assure that wildfire safety is an integral element of development design. Establishing and maintaining a CWPP depends on widespread collaboration among Landowners, Emergency Response Agencies and federal, state and local officials.

Additional information can be found on the Healthy Forests and Rangeland website at www.forestsandrangelands.gov, including the publications *Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities* (March 2004) and its supplement, *Community Guide to Preparing and Implementing a Community Wildfire Protection Plan* (August 2008).

5. Work with other entities to implement Watershed-based Invasive Exotic Plant Control Plans to contain invasive species. Invasive exotic plant species are those plants not indigenous to an area, but which tend to dominate the landscape, changing the structure and function of habitats, and usually to the detriment of native plant and animal species. Unless the species are controlled in the upstream portions of watershed, there may be little hope of controlling them in the downstream portion of watersheds.

The Mid-Atlantic Exotic Pest Plant Council (MA-EPPC) provides regional leadership to effectively address the threat of invasive plants. The MA-EPPC coordinates regional efforts to gather and share information on the identification, management and prevention of invasive species. They also provide training, volunteer opportunities, and identify research needs. The MA-EPPC Plant List can be found at www.invasive.org/maweeds and includes 284 species of exotic species that are known to be potentially invasive.

Wildlife

As with plant resources, Upper Township can support a great diversity of wildlife, including many rare, threatened and endangered species. Many species are present at the northerly limits of their range. Since Upper Township encompasses habitats ranging from ocean beaches and dunes to cedar swamps and pine savannahs, specialized coastal and inland species, as well as common and widespread species, have the potential to be present.

Aquatic Animals

The surface waters of Upper Township range from salty ocean waters to brackish rivers and creeks to freshwater rivers and streams and ponds. The vertebrate aquatic biota, or animals with backbones, are the fishes. The state of New Jersey supports the populations of 85 freshwater fish. The waters of the Township are not known to support trout populations, since they require cooler waters than those present in Upper Township. However, Brook Trout are known to occur in South Jersey streams, since it is tolerant of relatively low pH. Anadromous fish, such as American eel, Herring or Shad, migrate upstream and breed in the freshwater portions of rivers discharging to saltwater bays and the ocean. Clupeid species have been observed in the Tuckahoe River moving upstream to spawn.

Water quality is excellent in Pinelands stream waters. Pinelands waters are low in dissolved solids and quite acidic with a pH averaging 4.4. While these high-quality acid waters support indigenous fish and amphibian communities that are tolerant of the acidity of the waters, they are inhospitable to many non-indigenous plant and animal species. On the periphery of the Pine Barrens and in areas where water characteristics are altered by agriculture or development, higher levels of pH allow a greater number of fish species to survive. Freshwater and anadromous fish are listed in the *NRI*.

The bays, estuaries and marine waters of New Jersey can be home to 28 species of marine mammals and 336 species of marine finfish at some point during the year. Saltwater fish, which will also occur in portions of the waters of Upper Township, are also listed in the *NRI*.

Terrestrial Animals

Different habitats in the Township support various wildlife species. Numerous terrestrial habitat types are present in Upper Township, as were discussed in the Vegetation section. Coastal habitats include beaches and dunes. Inland habitats include oak-dominated and pine-dominated forests. Agriculture and other human activities create disturbed habitat types that are attractive to certain types of wildlife.

Dozens of species of native mammals are known to reside in the New Jersey Pinelands and Southern New Jersey, including bats, bears, beavers, chipmunks, coyote, deer, foxes, mice, mink, moles, opossums, otters, rabbits, shrews, skunks, squirrels, and voles. (See the *NRI* for a complete listing).

The diversity of terrestrial fauna in Upper Township is exemplified by the birds. Cape May County is renowned for its bird diversity. The Cape May Peninsula is strategically located on the East Coast Migratory Bird Flyways. (See the *NRI* for a list of over 300 bird species found in Cape May County, the waters of Delaware Bay, and offshore to a distance of 50 miles). The incredible diversity observed in bird species also holds true for butterflies. The *NRI* lists 120 types of butterflies that are likely to be found in the area.

Southern New Jersey is home to numerous herptile species (reptiles and amphibians). As is the case for plants and other terrestrial animals, one of the reasons for this diversity is that many species are at the limits of their ranges, particularly southern Coastal Plain species. Many amphibian species are unable to establish viable populations in undisturbed areas of the central Pinelands, probably due to the low pH of the surface waters. Waters on the fringes of the Pine Barrens can support more of these species. Coastal Plain Intermittent Ponds provide important breeding habitat for amphibians. The *NRI* lists 28 types of reptiles and 14 types of amphibians that are likely to be found in the area.

Goals and Objectives for Wildlife

1. To continue to provide and expand areas of suitable habitat for the diverse wildlife populations found within Upper Township.
2. To maintain appropriate population levels for all species of animals found within Upper Township.

Recommended Strategies for Wildlife Resources

1. Continue to pursue and promote the preservation of open space, through municipal, county, state or not-for-profit entities, to protect natural areas suitable for wildlife habitat.

Critical Habitats and Special Ecological Communities

Rare Plant and Animal Species and Species of Special Concern

The State's Natural Heritage Program (NHP) maintains a database of known rare, threatened and endangered plant and animal species. Numerous threatened and endangered animals are known to occur within Upper Township. Foraging and nesting habitat for Bald Eagles, Least Tern, Black-crowned Night Heron and Yellow-crowned Night Heron are present. Over 50 species of rare vertebrates and terrestrial animals are listed in the *NRI*. Of the rare terrestrial invertebrates that have been observed in Upper Township, the Frosted Elfin is officially listed as threatened. No endangered invertebrates were listed.

According to the NHP database, three types of rare plant communities occur in Upper Township:

- Northern Peatland Coastal Plain Pond Community
- Coastal Plain Intermittent Pond Community
- Freshwater Tidal Marsh Complex

Federal Habitat Complexes

The US Fish and Wildlife Service (USFWS) identified regionally significant habitats and species populations in the New York Bight Watershed. The USFWS recognizes the importance of delineating the larger habitat complexes that link local habitat patches and species populations, forming regional ecological assemblages. This landscape level perspective is critical to establishing uniform and effective management practices to replace site-by-site, uncoordinated practices that do not take into account real ecological complexity. For instance, species may utilize different habitat types at different life stages. Interbreeding between populations of a species promote genetic health. Habitat patches that lose species can be recolonized from populations in other patches, if connectivity is preserved. In identifying these habitat complexes the USFWS was particularly interested in locations of naturally occurring populations of federally and state-listed endangered and threatened species and candidates for listing, and those areas that contain significant concentrations of, or are otherwise important to critical life-history stages of, other indigenous species. The following use categories were prioritized:

- Breeding, nesting, or spawning sites
- Migration pathways and stopover areas, including areas of open space in urban areas
- Roosting sites
- Nursery areas
- Staging areas
- Dispersal corridors
- Core concentration areas
- Overwintering areas
- Major feeding or foraging areas

Upper Township lies at the confluence of three of the important federal habitat complexes:

- Cape May Peninsula Habitat Complex (Complex #1)
- New Jersey Pinelands Habitat Complex (Complex #2)
- Great Egg Harbor Estuary Habitat Complex (Complex #3)

Cape May Peninsula Habitat Complex (Complex #1)

The Cape May Peninsula habitat complex includes the entire Cape May Peninsula, encompassing marine, estuarine, wetland and upland habitats. Within this boundary all uplands, wetlands and open water are included in the habitat complex, except for developed barrier island and inland sites. Within Upper Township, the habitat complex includes the barrier beaches and back barrier lagoon system on the Atlantic side, coastal plain intermittent ponds, hardwood and Atlantic white cedar swamps, upland forests, and agricultural areas. Significant habitat for migratory land birds, raptors, migratory shorebirds, colonial nesting waterbirds, and regionally rare wetland and upland communities and plants are included. Also included are the near-shore waters of the New York Bight, known to be important for marine mammals. The complex includes the Delaware Bayshore and near-shore waters as well, but Upper Township does not include these areas.

New Jersey Pinelands Habitat Complex (Complex #2)

The westerly portion of Upper Township is contained within the NJ Pinelands Habitat Complex. The complex extends from Lakehurst to Cape May, New Jersey. In Upper Township, the NJ Pinelands boundary is to the west of Cedar Swamp Creek. Habitat types include upland, aquatic, and wetland habitats occupying a contiguous area of over one million acres on the Atlantic Coastal Plain of southeastern New Jersey. The NJ Pinelands vegetation is of significance, since it is characterized by dry pine, oak, and heath communities in a humid, temperate, deciduous forest climate. These pine barren communities are maintained in this climate due to the prevalence of low-nutrient sandy soils and frequent fires that allow fire-adapted species and plants tolerant of low-nutrient conditions to invade and maintain ecological communities. Although there is little topographic relief, upland and lowland communities are very different from one another.

As the largest area of contiguous, undeveloped forest and wetland on the Atlantic Coastal Plain of the Mid-Atlantic region, the NJ Pinelands are not only regionally, but also globally, significant. It is the largest pine barrens complex in the world and it supports globally rare upland and wetland communities and species found ranging from several glacial relict species to some northern and numerous southern species that reach their geographical Coastal Plain limits in the Pinelands. The NJ Pinelands are underlain by one of the largest aquifers in the country. The pristine headwaters and wetlands are home to many indigenous species. These clean waters support the productivity of the New Jersey backbarrier lagoon estuaries.

Great Egg Harbor Estuary Habitat Complex (Complex #3)

This habitat complex encompasses the entire Great Egg Harbor River and estuary from its headwater streams to its connection with the open marine waters of the New York Bight through Great Egg Harbor Inlet. Included are all riverine and estuarine wetlands and open water of the Great Egg Harbor River and its tributaries to the limit of tidal influence, the open water and islands of Great Egg Harbor Bay and Peck Bay, and adjacent saltmarsh habitat from the mouth of the river to the inlet, the inlet itself, and the sandy shoreline at the northern end of Ocean City barrier island. The Tuckahoe River is a tributary to the Great Egg Harbor estuary. It forms the northerly boundary of Upper Township. The drainage areas of tributaries to the Tuckahoe River include Cedar Swamp Creek, Hughes Creek, Flat Creek East, Flat Creek West, Jobs Creek, Banks Creek, Halfway Creek and Banks Run.

This estuary complex provides seasonal or year-round habitat for anadromous, estuarine, marine, and freshwater fish and shellfish, nesting and migratory waterbirds and raptors, migratory and wintering waterfowl, and rare brackish and freshwater tidal communities and plants. Also included in the habitat complex are several small, palustrine (nontidal) wetlands immediately adjacent to the estuary that contain exemplary rare natural communities and plant occurrences.

Critical Habitat

The NJDEP Division of Fish and Wildlife (DFW) has developed a series of maps through the Landscape Project identifying critical areas for threatened and endangered species based on land-use classifications and species location. The project focuses on large areas throughout the State that are ecologically similar in regard to plant and animal communities, referred to as Landscape Regions. Cape May County is situated within three Landscape Regions: the Atlantic Coast, Delaware Bay and the Pinelands Landscape Regions.

The Atlantic Coast Region is identified as one of the most productive coastal habitats in the country. The low-lying marsh and beaches of the barrier island communities support some of the State's most important colonies of nesting birds. The Delaware Bay Landscape Region encompasses most of the County and features populations of bald eagles, gray tree frogs and over thirty other endangered species in its vast woodlands. The extensive salt-water marshes support a vital shorebird migration habitat. The Pinelands Landscape Region is a unique ecosystem that supports diverse reptile, amphibian and invertebrate populations. The extensive cedar swamps and wetlands systems support large populations of insects, birds and aquatic communities.

The Landscape Project delineates the State into five habitat classes: forest, grassland, forested wetland, emergent wetland and beaches. These classes are based on information extracted from the NJDEP's Land Use/Land Cover data. Habitat patches within these areas are classified by a ranking system based on the status of the species present in each. The prioritized ranking system is as follows:

- **Rank 5** is assigned to areas containing one or more occurrences of at least one wildlife species listed as endangered or threatened on the federal list of endangered and threatened species.

- **Rank 4** is assigned to areas containing one or more occurrences of at least one state endangered species.
- **Rank 3** is assigned to areas containing one or more occurrences of at least one state threatened species.
- **Rank 2** is assigned to areas containing one or more occurrences of at least one non-listed state priority species.
- **Rank 1** is assigned to areas that meet habitat-specific suitability requirements such as minimum size criteria for endangered, threatened or priority wildlife species, but do not intersect with any confirmed occurrences of such species.

The largest portion of Upper Township's critical habitat is identified as the forested classification, most of which is recognized as containing one or more state endangered species (Rank 4) (see [Figure 12 - Threatened & Endangered Species Map](#)). There are environments within the Pinelands Management Area that are prioritized as Rank 5 for federal endangered and threatened species. The Petersburg section of the Township is forested containing state threatened species (Rank 3). There are small pockets of forested wetlands all of which are also located within the Pinelands Management Area.

Rank 5 habitat mapped in Upper Township is associated with Bald Eagle Foraging Areas and Nest Buffers, since Bald Eagle is a federal threatened and state endangered species. Rank 4 Habitat consists of Black-crowned Night Heron Foraging and Nesting habitat and Least Tern foraging habitat. Both of these species are state endangered. Yellow-crowned Night Heron is a state Threatened species in New Jersey. Foraging Habitat for this species is present in Upper Township. Large areas within Upper Township are mapped as habitat for threatened and endangered species. Much of this habitat occurs on publicly-owned land. Where it occurs on private land, special measures may be needed to preserve valuable wildlife habitat, while allowing necessary economic development and redevelopment in the Township.

Natural Heritage Priority Sites

The NJDEP's Natural Heritage Program has identified Natural Heritage Priority Sites that exhibit exceptional natural diversity or consist of prime habitat for threatened and endangered plant species and ecological communities. These Natural Heritage Priority Sites are assigned a biodiversity rank based on a scale developed by the Nature Conservancy and a network of Natural Heritage Programs. The scale indicates the significance of the diversity of the site on a local versus global level.

The global biodiversity ranks are defined as follows:

- **B1** is assigned to those sites that are of outstanding significance on a global level, which may contain the only known occurrence of an element such as a species or ecological community.
- **B2** is assigned to those sites that are of very high significance on a global level, such as the most outstanding occurrence of an ecological community.

- **B3** is assigned to those sites that are of high significance on a global level, with the occurrence of an element that is imperiled globally, or with a concentration of elements that are critically imperiled within the state of New Jersey.
- **B4** is assigned to those sites that are of moderate significance on a global level, with the only viable state occurrence of an element critically imperiled in the state of New Jersey, or excellent occurrences of elements that are rare in the state.
- **B5** is assigned to those sites that are of general biodiversity interest on a global level.

The state biodiversity ranks are defined as follows (not all sites are assigned a state biodiversity rank):

- **V1** is assigned to those sites that are of outstanding significance on a state level, such as a site containing the only known occurrence of an element in the state.
- **V2** is assigned to those sites that are of very high significance on a state level, and may include sites containing elements that are critically imperiled in the state of New Jersey, or a concentration of imperiled or rare elements.
- **V3** is assigned to those sites that are of high significance on a state level, such as those sites containing the best occurrence in the state of an imperiled element.
- **V4** is assigned to those sites that are of moderate significance on a state level, such as those containing an excellent occurrence of a state rare element.
- **V5** is assigned to those sites with any other occurrence of a state rare element.

The Natural Heritage Program has mapped several of these ecological communities within Upper Township. Approximately 16,000 acres of Upper Township is contained within mapped Natural Heritage Priority Sites (see [Figure 13 – Natural Heritage Priority Sites Map](#)).

In March 2007, the Natural Heritage Program released a new version of priority site mapping that focuses on rare plants and natural communities, as opposed to animals. As a result, some of the previous priority sites were removed from the NHPS mapping, including the Avalon-Stone Harbor Marsh Macrosite, Great Cedar Swamp Macrosite, Middle Thorofare, Strathmere Bay Island, and the Tuckahoe Corbin Salt Marsh Macrosite. The remaining sites are named and described below.

Corson Inlet North Site

This site includes a state park located on the southerly end of the Ocean City barrier island. Plant communities include coastal dune shrubland (bayberry variant), coastal dune grass and marine intertidal sand beach. These communities comprise the beach and dune habitat of rare birds, including a globally rare state endangered bird, and good populations of two other state significant animals. The site is considered to have high biodiversity significance. Approximately 21 acres of this site are located within Upper Township, which appears to be under public ownership.

Corson Inlet South and Whale Beach

The site consists of coastal barrier beach and dune habitat, which are documented habitat of significant bird species. Excellent populations of Piping Plover, Least Tern, and other state endangered birds are present. The site is considered to have high biodiversity significance. Approximately 168 acres of this site are located within Upper Township in Strathmere, about 50 acres of which are within Corson Inlet State Park.

North of Middletown

This site contains fresh to brackish tidal marsh that provides habitat for bird species including a globally rare state endangered bird species. Approximately 130 acres of this site are within the boundaries of Upper Township, about 80 acres of which are within the Tuckahoe Wildlife Management Area (MacNamara).

Seaville Methodist Church Site

This site is located at the headwater of a small creek draining into Ludlam Bay. Wetlands with a federally threatened plant, critical upland buffers and additional upland buffers to the watershed divide are included within the boundaries. Approximately 183 acres of this site are within the boundaries of Upper Township, all of which are under private ownership.

Woodbine Bogs

An abandoned cranberry bog in the Pinelands, Woodbine Bogs is characterized by contiguous wetland habitat for plant and animal species plus uplands that drain towards the wetlands. One globally imperiled plant, one globally rare plant, and one state imperiled animal are documented for the site. The site possesses very high biodiversity significance. Approximately 1,104 acres of this site are situated within the boundaries of Upper Township, approximately 690 acres of which are within the Belleplains State Forest.

Township of Upper Beach Management Plan

In February 2009, Upper Township prepared a *Beach Management Plan* to provide a framework for cooperation among the Township of Upper (Township), the New Jersey Division of Fish and Wildlife's (NJDFW) Endangered and Nongame Species Program (ENSP), and the United States Fish and Wildlife Service's (USFWS) New Jersey Field Office (NJFO) in the stewardship of federally and State-listed endangered and threatened beach-nesting birds and flora (listed species) occurring on the Township's beaches in the Strathmere and Whale Beach sections of Upper Township.

Through this management plan, the parties sought to provide for the long-term protection and recovery of species populations in the Township and the State, while balancing potentially conflicting missions. In the plan, the parties define and describe the roles and responsibilities of the Township, the NJDFW, and the USFWS in the protection and management of listed species within the Township. Protective statutes and regulations are summarized in Section B of this Introduction.

The plan identifies six separate management zones for the Strathmere and Whale Beach beaches consisting of two Protected Zones, two Precautionary Zones, and two Recreational Zones, that are based on their current and historical use by beach-nesting birds and potential re-colonization by listed plants. The relative importance of protective management practices in each management zone considers existing human uses, habitat conditions, and past distribution and occurrence of listed species.

Goals and Objectives for Critical Habitat

1. To provide for appropriate maintenance of natural areas so as to best support diverse wildlife populations.
2. To incorporate by reference the Goals of the *Township of Upper Beach Management Plan*.

Recommended Strategies for Critical Habitat

1. Continue to work cooperatively with county, state and federal agencies, non-profits and other interest groups to acquire conservation easements on lands that contain suitable habitat for rare, threatened and endangered species of plants and animals.
2. Continue to advance the Goals of the Beach Management Plan by completing each of the Action Items under the Township's responsibility.

CULTURAL AND COMMUNITY RESOURCES

Archaeological Resources

One archaeological site is listed for Upper Township in the New Jersey's National and Historic Register of Historic places: the B.L. England Prehistoric Site [Locus 1] (ID#3061). The State Historic Preservation Office (SHPO) issued opinions on the site in 1991 and 1992. While other archaeological sites are not officially listed for Upper Township, the potential exists for additional prehistoric and historic archaeological resources to exist. Since an important prehistoric site was found on a marsh island in the Cape May National Wildlife Refuge, the extensive marshes in Upper Township may yield further resources. It appears that Native Americans utilized the marshes and adjacent upland areas for 12,000 years without interruption. Native American artifacts have recently been discovered at two separate sites in Tuckahoe.

There is a potential that unknown or unprotected prehistoric and historic archeological may be disturbed by development or other activities that could diminish the value of these important resources. Although, conversely, there is also a need for the specific location of valuable archeological sites to be withheld from the general public in order to safeguard the site and its artifacts and information from vandalism and theft.

In 2004, An Act Protecting New Jersey's Publicly Owned Heritage (P.L. 2004, C.7) was signed into law, which enhances the protection of archaeological sites on state, county, and municipal lands. The law makes it illegal to destroy, disturb, remove, sell, or receive archaeological artifacts from public property. The law also establishes penalties for violations of the law. These penalties include: fines; confiscation or forfeiture of vessels, vehicles, or equipment used in the commission of the activity; and additional monetary compensation to cover the remediation of the violation.

Goals and Objectives for Archaeological Resources

1. To preserve and protect the Township's important prehistoric and historic archeological resources.

Recommended Strategies for Archaeological Resources

1. The Township should support avocational archaeological groups, which have the greatest potential for making a real difference in which sites and how many sites are protected in the future.

Historic Resources

Prior to settlements resulting from early European voyages to the new world, populations of early peoples existed throughout North America. Early hunters and gatherers are said to have crossed from Asia into America by way of the land mass now submerged under the Bering Strait. Sophisticated technology reveals information about early settlements. Scientific studies support the existence of early population centers along the Mississippi River, the Delaware River and well into New Jersey. Limited records of European interactions with earlier inhabitants of southern New Jersey do exist and can be used to gain some information. Many archeological artifacts also support the existence of the earliest settlers.

It wasn't until 1524, that the first documented European visit by De Verazano was authenticated, when he dropped anchor at Sandy Hook. Verified interactions, official records and family histories present an expanding picture of early development in Upper Township. The Historic List is the culmination of the work of the Historical Preservation Society of Upper Township New Jersey, Inc. and provides the framework of the Township's history. It is the personal stories and photographs found in their publications, "A History of Upper Township and Its Villages" and "The Upper Township Memories", which reveal the true history. Their website can be found at (<http://hpsout.tripod.com>).

The *NRI* lists 104 historic properties and 2 designated historic districts (Marshallville and South Tuckahoe) in Upper Township, representing one of the largest collections of documented historic sites in the state of New Jersey. Included on this list are three public buildings—the Tuckahoe Train Station (ca. 1893), the John Wesley Gandy House (ca. 1815) and the Friendship School (ca. 1831). These properties can be seen on [Figure 14 - Historic Properties Map](#).

The list of Historic Properties stands on its own merits. The sheer magnitude of the list provides insight into the efforts of many contributors. The Historical Preservation Society of Upper Township New Jersey, Inc. and community members have contributed enormous efforts to reach the accomplishment represented by this list of Historic Properties. Review of the historic list offers an overview of past events and ongoing efforts to maintain the remnants of the record of these events. The Historical Preservation Society of Upper Township NJ, Inc. remains active and continues to meet regularly.

Goals and Objectives for Historic Resources

1. To promote development that is compatible with the historic nature of the Township, especially within adopted Historic Districts and adjacent to national and state registered historic structures.
2. To preserve the Township's historic resources through the creation of historic districts, establishment of a Historical Commission, and implementation of a Historic Preservation Resource Ordinance.
3. To promote the preservation and restoration of those significant individual historic buildings and structures located outside of the historic areas.

Recommended Strategies for Historic Resources

1. Continue to support the efforts of the Historical Preservation Society of Upper Township NJ, Inc. The Historical Preservation Society of Upper Township may be requested to review development projects that may affect an historical site within Upper. If during the development plan review process, it is found that the proposed plans would negatively impact an historical site, an alternative proposal may be discussed with the applicant.
2. Consider adopting zoning and subdivision regulations that will permit and perhaps promote the preservation of historic structures by allowing them to be used for appropriate uses other than single family homes. This might include the dedication of particularly appropriate historic buildings to the Township or non-profit organizations for educational, historic, or recreational sites.

Open Space

The naturally occurring ecosystems and environments of Cape May County have led to a wealth of publicly owned and protected lands. Various government agencies (i.e. U.S. Fish & Wildlife Service, NJDEP and Cape May County Park System) and not-for-profit organizations (i.e. Nature Conservancy) have taken an interest in preserving these unique areas of the County. Cape May County has established a trust fund to preserve open space and agricultural lands. The Trust is funded by a County property tax of 1 cent per 100 dollars of assessed valuation and currently generates approximately 1.3 million dollars a year. Since its inception, the program has preserved approximately 3,000 acres of open space and farmland (almost 5 square miles) in the County.

Open space is defined as undeveloped land that is permanently deed restricted from development. Much of Upper Township consists of publicly-owned land, which is either environmentally constrained or wildlife management areas. Large areas of land within the Township are owned and managed by state and federal agencies for the protection of threatened and endangered species and wildlife habitats.

The following highlights key state and federal open space lands in Upper Township (see [Figure 15 – Open Space Map](#)).

Belleplaine State Forest

Belleplaine State Forest, located in both Cape May and Cumberland Counties, consists of over 13,000 acres of primarily forested land, of which 5,355 acres are located in Upper Township. It is situated on the outskirts of Pine Barren lands, where better soil conditions allow for a wider variety of trees and shrubs, including hickory, beech, and ash. The forest offers a dynamic matrix of lowland hardwood swamps, former agricultural areas in various stages of succession, stands of Atlantic white cedar and plantations of Norway spruce, Eastern white pine and Virginia pine, and marshes.

Belleplaine was established in 1928 by the State for public recreation, timber production, wildlife management and water conservation. Beginning in 1933, the Civilian Conservation Corps (CCC) transformed the Meisle family's cranberry bog into a 26.2 acre reservoir that was first named Meisle Lake and later renamed Lake Nummy (in honor of the last Lenape Sachem, or Chief, to live in the County). Three separate CCC camps operated on the property and the men who served constructed the forest's nature center (formerly the main office) and the maintenance buildings, and created much of the present day road system, bridges and dams. The CCC also improved vast tracts of fields and forest through release-thinnings, hand plantings and other silvicultural techniques.

Belleplaine Forest is accessible by many motorized routes, multi-use trails, and the abandoned railroad bed of the former "Pennsylvania-Reading Seashore Line", which bisects the forest in an east-west orientation. This state forest offers two connecting self-guided nature trails around Lake Nummy—a 6.5 mile East Creek trail which links two recreation areas—and approximately 10 miles of additional marked paths. A bathing area at Lake Nummy is open Memorial Day weekend to Labor Day; a small boat dock is situated on

the southern shore of Lake Nummy and a boat ramp is on the western shore of East Creek Pond. Other amenities include picnic tables and barbeque grills, a 10 station fitness course, a wildlife observation platform, a staffed nature center (seasonal operation), a boat rental and food/novelty concession at Lake Nummy during the summer months, and a trailer dumping station for campers. East Creek Pond is a second body of water located completely within the park's boundaries.

Corson's Inlet State Park

Corson's Inlet State Park was established in 1969 to protect oceanfront land. The Park contains 341 acres of land in Upper Township and Ocean City, of which 223.6 acres lie within the municipal boundary of Upper Township. The area's natural habitats are rich in the diversity of its wildlife with sand dunes, shoreline overwash, marine estuaries and upland areas in which hundreds of wildlife species live and breed. The park offers outstanding scenic beauty and endless opportunities for observing a multitude of migratory and residential wildlife species. Corson's Inlet is extremely popular for hiking, fishing, crabbing, boating and sunbathing.

The Cape May Wetlands Wildlife Management Area

The Cape May Wetlands Wildlife Management Area, located in Cape May County, New Jersey, contains a total of 12,702 acres of which 2,566 acres are located in Upper Township. The majority of this site is bounded by Ocean Drive and the Garden State Parkway east and west, Sea Isle City Boulevard in the south and Roosevelt Boulevard in the north. This coastal wetland area is almost all salt marsh, less than 100 acres is upland-field habitat. The site is covered with tidal salt marsh of cordgrass and salt hay and the main vegetation of upland edges such as red cedar, wild cherry, sweet gum, bayberry, poison ivy and high tide bush. The intercoastal waterway flows through the entire length of the site. The marshes are heavily utilized by waterfowl during the fall and winter months and numerous shore birds nest in the area. Saltwater fishing and crabbing are excellent in all the coastal bays and estuaries.

Peaslee Wildlife Management Area

Peaslee Wildlife Management Area is one of the largest wildlife management areas in the State. Peaslee has thousands of acres of upland pine-oak forests and lowland bogs. Its longest border is the upper part of the Tuckahoe River. Old cranberry bogs and a mill are in the early stages of succession, and offer excellent freshwater marsh habitats. Peaslee includes diverse habitats to explore: the wooded edge, pinelands, cedar bog, hardwood swamp, scrub oak forests, sweet ferns, grassy fields and yellow-clover pasture.

Tuckahoe Wildlife Management Area (MacNamara)

Tuckahoe Wildlife Management Area (MacNamara) is located along the scenic Tuckahoe River as it winds its way to the Great Egg Harbor River and Bay through an expanse of salt marsh and tidal creeks. This area is excellent for bird watching. Six brackish water impoundments on the upland edges of the tract also provide good bird-watching opportunities. Located on the edge of the Pine Barrens, the woodlands bordering the salt marsh are a mixture of pine and oak trees. A hardwood swamp and small freshwater

lake provide additional habitat for beaver, turtles, frogs, and fish. An 8-mile drive provides opportunities for exploring these dynamic habitats.

Cape May National Wildlife Refuge

In response to the National Wildlife Refuge System Administration Act of 1966 and subsequent National Wildlife Refuge System Improvement Act of 1997, the U.S. Fish & Wildlife Service (USFWS) adopted the *Cape May National Wildlife Refuge (CMNWR) Comprehensive Master Plan (CMP)* on June 16, 2004 in order to establish priorities and to ensure consistent and integrated management for the CMNWR. The Cape May National Wildlife Refuge (CMNWR) was established in January 1989 when the U.S. Fish and Wildlife Service acquired the Refuge's first (90-acre) parcel from the Nature Conservancy. Since then, the Refuge has grown to more than 11,000 acres as the Service continues to buy land. Ultimately the Refuge will protect over 21,200 acres of precious wildlife habitat in New Jersey's Cape May Peninsula. CMNWR's key location in the Atlantic Flyway makes it an important link in the vast nationwide network of National Wildlife Refuges administered by the U.S. Fish & Wildlife Service. The Delaware Bay wetlands are one of only 17 designated Wetlands of International Importance in the United States.

The Great Cedar Swamp Division is located in Upper and Dennis Townships near Woodbine Borough and Dennisville Village (Dennis Township). Currently over 3,800 acres are within Upper Township. This area has the largest contiguous forest on the refuge and is part of the Pinelands National Reserve and the Great Egg Harbor National Scenic and Recreational River. This division protects mostly hardwood swamp, salt marsh and bog habitat along with some forested uplands and grassland areas. Unique viewing opportunities exist for Atlantic white cedar stands, a variety of warblers, including prothonotary and pine warblers, wood thrush, bald eagles, wintering short-eared, long-eared and northern saw-whet owls, and northern diamondback terrapin. The Great Cedar Swamp Division also supports large numbers of marsh and water birds, songbirds, raptors, reptiles and amphibians.

Goals and Objectives for Open Space

1. To use open space preservation as a primary tool for conserving natural resources.
2. To use a variety of methods to secure permanent open space, including easements, purchase, residential open space cluster development, noncontiguous parcel density cluster (NCPDC), and partnering with regional and state organizations.
3. Support the expansion of the Cape May National Wildlife Refuge by encouraging the private sale of tracts under consideration by the federal government.
4. To educate the public on the benefits of open space preservation to gain local support for expanded preservation efforts.

Recommended Strategies for Open Space Preservation

1. Prepare and adopt an Open Space and Recreation Plan Element of the *Upper Township Master Plan*. The *1994 Master Plan* contains a Recreation Plan Element, but does not address open space. An Open Space and Recreation Plan Element can advance the goals and objectives of this topic. Building on this valuable foundation, the *NRI* and Conservation Plan Element provide important details on the resource areas that are most vulnerable and of optimal value as open space.
2. Continue to support the County Open Space/Recreation Fund to be used to purchase, construct and maintain central, more extensive recreational lands and facilities.
3. Continue to pursue alternative methods for increasing open space without purchasing property.

Methods for Acquiring and Funding Public Open Space:

1. Fee Simple Acquisition — This involves a direct purchase of a parcel by the municipality or open space trust organization, with the intention of creating permanent open space. Vacant land is the most common target of this type of purchasing technique; but in certain cases, developed property may also be acquired.
2. Bargain Selling — Property owners are sometimes willing to sell their land to the municipality for less than market value for open space or other public purposes. Reasons one might sell below market value include reduced maintenance costs and tax benefits.
3. Property Exchange — Municipalities sometimes have a surplus of unreserved and unconstrained municipally-owned land, which could be used in exchange for privately-held environmentally sensitive properties.
4. Open Space Tax — In recent years, many New Jersey counties and municipalities have, with voter approval, established dedicated open space taxes. The revenues from an open space tax can support a ‘pay-as-you-go’ strategy for open space preservation. As of November 2009, all 21 New Jersey Counties (including Cape May County) and 237 of New Jersey’s 566 municipalities had voter approved open space taxes. No Cape May County municipalities have implemented open space taxes.
5. Green Acres — The Green Acres Program carries out the State’s purchases of conservation and recreation lands, and provides open space matching grants to municipal governments, county governments, and tax-exempt non-profit organizations that qualify as “charitable conservancies”. Several Township parks have already received Green Acres funding. Generally, counties and municipalities can obtain grants for 25 percent of the purchase price, but local governments that have a dedicated open space funding mechanism can qualify for 50 percent grants if they complete certain planning tasks. The Green Acres Program offers loans to local governments, currently at a 2 percent interest rate, payable over 20 years, for purchase of open space and also for the development of recreational facilities.
6. Issuing Bonds — Governments will sometimes borrow money for open space by issuing bonds. The issuance of long-term general obligation bonds to finance open space acquisitions has a compelling rationale: undeveloped land, or easements on such land, may not be available in the future at any

price. Using bond proceeds today for acquisition assures that future generations will enjoy the fruits of preservation.

7. Capitalizing on Economic Conditions — The current national economic downturn has resulted in depressed market values of real property, meaning that this may represent a unique opportunity for purchasing open space.
8. Create an Endowment — Individual donors, through bequests and donations help create endowments. Endowments can be coordinated by non-profits/foundations and used for the acquisition and maintenance of open space.

Methods for Increasing Open Space without Purchasing Property:

1. Conservation Easements — Conservation easements are permanent deed restrictions that prevent land from being developed. These restrictions typically are effective in perpetuity, or at least beyond the tenure of the current owner. These easements can allow for public access, which is useful when trying to construct hiking trails or bikeways.
2. Master Plan Adjustments — Changes to the Master Plan and resulting conservation zoning designations should be made as open space protection priorities are refined.
3. Native Landscaping — Landscaping decisions made on both private and public property are potentially useful for creating or extending open space. An important step is to encourage the planting of native trees, shrubs, and groundcover in yard areas instead of invasive non-native and exotic plants. This can allow the plant and animal habitat established in existing open space to be broadened. Natural areas are also usually less costly and easier to maintain than formal lawns and ornamental plantings.
4. Conservation Residential Cluster — Cluster development is the grouping of residential units on a site in order to preserve a large portion of land as open space, recreation or agriculture. Although the residential lots would be smaller, the overall density of the tract would be the same as under a traditional subdivision design. Residential cluster is permitted under the planned development provisions of the Municipal Land Use Law (N.J.S.A. 40:55D-65c) for properties at least 5 acres in size. Conservation Residential Cluster may be permitted as an option or may be required.

As recommended by the 2006 Land Use Plan update, Upper Township revised its Zoning Ordinance in 2007 to permit Conservation Residential Cluster Subdivisions as a development option within the “AR” Agriculture and Rural Density Residential, “C” Conservation, “RD” Rural Development, “F3” Rural Density Forest, “F10” Low Density Forest, and “F25” Forest Conservation Districts.

5. Non-contiguous Parcel Density Cluster — NCPDC is another zoning technique permitted under the planned development provisions of the Municipal Land Use Law. It is similar to an open space residential cluster, but it also allows for density to be transferred between non-contiguous properties. The overall density of all lands involved in the transfer would remain the same, except

where a density bonus may be provided as an incentive. Properties from which the density is transferred would be permanently dead-restricted as preserved land.

As recommended by the 2006 Land Use Plan update, Upper Township revised its Zoning Ordinance in 2007 to permit the voluntary transfer of density into the “TC” Town Center and “TCC” Town Center Core Districts from the “AR” Agriculture and Rural Density Residential, “C” Conservation, “RD” Rural Development, “F3” Rural Density Forest, “F10” Low Density Forest, and “F25” Forest Conservation Districts.

6. Transfers of Development Rights (TDR) – TDR is a realty transfer mechanism permitting owners of land within a designated ‘Sending Area’ to separate the development rights of their property from the property itself and sell them for use elsewhere. Developers who purchase these ‘development credits’ may then develop areas deemed appropriate for growth, known as ‘Receiving Areas’, at densities or intensities greater than otherwise permitted. Once the development rights of a property are sold the land will be permanently restricted from further development.

Cape May County completed the *Cape May County Smart Growth Strategic Plan - Transfer of Development Rights Feasibility Study* in 2009, the purpose of which was to assess development strategies, such as TDR, that would preserve the unique environmental ecosystems, farmland, open space, historic resources and other factors that make Cape May County a prime tourist resort destination in New Jersey. The Report includes a Municipal Profile for Upper Township, which included a series of three GIS maps that highlighted properties suitable for additional development as potential “Receiving Areas” and those sites that need to be protected as potential “Sending Areas”. The study summarized the potential TDR options for Upper Township, as follows:

Potential TDR Receiving Areas

Upper Township contains large areas of vacant and unreserved farmland, which is primarily outside of the existing and proposed Centers or within the Pinelands Management Area. These areas outside of the Centers would be subject to onsite wastewater treatment systems and would therefore not be appropriate for TDR Receiving Areas. Within the proposed Centers, there are approximately 700 acres of developable uplands, as well as over 20 acres of greyfield and brownfield properties, which could be feasible as TDR Receiving Areas. In addition, the Township anticipates fairly extensive redevelopment and revitalization to occur within the cores of Town Centers of Seaville and Marmora-Palermo-Beasley's Point. The known brownfield sites are generally not large enough in Upper Township to accommodate a Receiving Area. The contaminated mines do not have much potential as a TDR Receiving Area since there will be little developable land remaining after extraction and restoration. The feasibility for development of Receiving Areas would be subject to water and wastewater capacity to support additional growth; and the feasibility of an intra-municipal TDR program would depend on the viability of Receiving Areas.

Potential TDR Sending Areas

The 125 acres of unreserved farmland and 400 acres of vacant uplands outside of the proposed Centers represent viable opportunity for inclusion in a TDR Sending Area, either in an intra-municipal or inter-municipal program. There are a significant amount of unreserved lands containing critical wildlife habitat and Natural Heritage Priority Sites in Upper Township, including lands within the CMNWR acquisition area, which could be preserved through TDR. The Historic Districts could also serve as Sending Areas.

Over half of the developable and redevelopable properties are located within the Pinelands Management Area, including nearly 1,500 acres of unreserved farmland and vacant uplands and 28 acres of brownfield. As the Pinelands Commission maintains its own TDR program, special considerations and coordination with the Pinelands Commission will be required to implement a TDR program between the lands under Pinelands jurisdiction and lands outside of the Pinelands. The Commission has already approved the Upper Township Non-Contiguous Parcel Density Cluster Ordinance, allowing for transfer of development potential from within the Pinelands to the Town Centers.

Greenways

Although this was not discussed in the *NRI*, greenways are an essential component of a Conservation Plan Element. A greenway is a primarily natural place designed to preserve and protect desirable natural features for use and enjoyment by wildlife and people. The most recognizable form of a greenway is a linear park, often located along a stream or ridgeline. This type of greenway increases the benefit of protected natural resources because they are connected in an unbroken corridor, which often link larger protected areas. Such areas provide a contiguous area for natural processes to occur with less encroachment by human activities. Additionally, these parks are also useful tools for increasing recreational opportunities and non-automotive mobility; they are logical locations for foot and bicycle trails. Greenways can also adjoin streets and may include water bodies with vegetated shorelines or beaches.

Goals and Objectives for Greenways

1. To create and maintain sustainable network of greenways within Upper Township.
2. To identify appropriate locations for new and expanded greenways in Upper Township.
3. To link greenways and other natural and recreational areas within the Township to nearby greenway systems and other recreational land and/or permanent open space.

Recommended Strategies for Greenways

1. Prepare a Greenways Plan as part of the Master Plan or as part of the Open Space and Recreation Plan Element, showing the location of all existing, proposed and potential greenways in the Township. A Greenway Plan should provide the following:
 - a. A prioritized inventory of existing open space and recreation areas that should be connected via greenways;
 - b. A prioritized inventory of existing access location, trail and parking areas that should be connected via greenways;
 - c. A prioritized inventory of lands under public ownership, easements, utility rights-of-way, abandoned rail lines and other lands that may be suitable for greenways; and
 - d. The goals, objectives, guidelines, expected benefits and recommendations for developing a comprehensive network of greenways in Upper Township.
2. Seek to include lands not suitable for development with buildings or parking in the Greenways Plan.
3. Add trails between natural areas, preferably for walking or hiking and biking. This allows people to enjoy the entire greenway and provides a more scenic and peaceful alternative for travel.
4. Obtain easements for strategic properties within greenway corridors.
5. Explore acquiring the parcels of vacant land located in delineated greenway corridors.
6. Require dedicated greenway easements for properties located on the Greenways Plan at the time of application for development.

Aesthetic Resources

Both the natural and the built environment are components of the aesthetic resources available in Upper Township. Intact historical buildings, with their varied architectural styles together with historic gardens and trees, provide a human historical context. Perhaps more striking is the natural setting of Upper Township. Scenic resources are present at many scales. Long distance vistas encompass ocean, beaches and dunes or extensive salt marsh and bay views. The rare plant and animal populations and rare ecosystems, such as intermittent ponds and fens, provide for a smaller scale appreciation of natural beauty. These resources are valuable in their own right, but also have value because they are beautiful and provide a unique sense of place. As development continues to occur throughout Upper Township, these natural areas may become degraded and their aesthetic qualities may be lost.

Scenic byways highlight transportation corridors (public roads, streets, highways or other travel-ways) that have outstanding scenic, natural, recreational, cultural, historic or archaeological significance. They seek to preserve and enhance our valuable scenic, historic and culturally significant roadways. Each scenic byway is a representation of the uniqueness and diversity of the area. The intrinsic qualities associated with the byway create a unifying theme of the area's heritage, unique characteristics and beauty.

The National Scenic Byways (NSB) Program was established under the Intermodal Surface Transportation Efficiency Act of 1991, and reauthorized in 1998 under the Transportation Equity Act for the 21st Century. Under the program, the U.S. Secretary of Transportation recognizes certain roads as National Scenic Byways or All-American Roads, based on their archaeological, cultural, historic, natural, recreational, and scenic qualities. National Scenic Byways must possess characteristics of regional significance within at least one of the intrinsic qualities; All-American Roads must possess characteristics of national significance in at least two of the intrinsic qualities. There are neither designated National Scenic Byways nor any All-American Roads in New Jersey.

New Jersey Department of Transportation (NJDOT) maintains the New Jersey State Scenic Byways Program. State scenic byway designated roads must have at least one of the intrinsic cultural, historic, archaeological, natural, recreational, or scenic qualities. Within five years of designation, a Corridor Management Plan (CMP) must be prepared and submitted to the NJDOT. This plan must include a scenic inventory, long term management and maintenance recommendations, viewshed management (including land use), economic benefits, funding needs and sources, and any other relevant information. There are only seven designated scenic byways in New Jersey:

- Bayshore Heritage Byway
- Delaware River Scenic Byway
- Millstone Valley Byway
- Palisades Interstate Parkway Scenic Byway
- Pine Barrens Byway
- Route 57 Byway
- Upper Freehold Historic Farmland Byway

The 130-mile Pine Barrens Byway, designated in 2005, meanders through areas of striking and subtle natural beauty and rich historic heritage. The Southern Route of the Pine Barrens Byway runs through the Pinelands Management Areas of Upper Township, along Routes 49, 50, 550, 638 and 548.

The 122-mile Bayshore Heritage Byway captures the unique natural and historical landscapes along southern New Jersey's "western shore" in Salem, Cumberland and Cape May counties. It extends from Salem County, through Cumberland County and enters into Cape May County along Route 47, ending in Cape May Point. The Bayshore Heritage Byway runs near but not through Upper Township. There may be a potential to develop another spur of this byway that include portions of Upper Township.

Upper Township's Pinelands Area Development Standards Ordinance contains scenic requirements that are consistent with the Pinelands Comprehensive Management Plan (CMP) (N.J.A.C. 7:50-6.101 et. seq.) which requires municipalities to provide a program for the protection of the scenic values of the Pinelands in their Master Plan or Land Use Ordinance in order to be certified by the Pinelands Commission. All public, paved roads in the Preservation Area District, the Rural Development and Forest Areas, except for those roads which provide for internal circulation within residentially developed areas, shall be considered scenic corridors. Buildings must be set back at least 200 feet from the center line of the scenic corridor. Additionally, structures within 1,000 feet of the center line of rivers are designated to be wild and scenic rivers and scenic corridors of special significance to the Pinelands, including the Tuckahoe River, must be designed to avoid visual impacts as viewed from the river, in accordance with the Pinelands CMP.

Goals and Objectives for Aesthetic Resource Conservation

1. To preserve and maintain the invaluable aesthetic resources within Upper Township.

Recommended Strategies for Aesthetic Resources

1. Consider developing a Scenic Roadway Plan to identify those roadways or sections of roadways within Upper Township that possess such a high degree of visual quality that driving, biking or walking along these roadways is a pleasurable and enjoyable experience.
2. Consider whether it is feasible to pursue Scenic Byway designation, either as a new designation or an extension of the existing Pine Barrens Byway or Bayshore Heritage Byway.

ENERGY RESOURCES

Municipal Energy Conservation

The state of New Jersey adopted an *Energy Master Plan (NJEMP)* in October 2008, which includes a number of challenges that the State must address, including New Jersey's increasing contribution to global warming. The NJEMP seeks to address this challenge in a number of ways. One goal of the NJEMP is that the State meets 30 percent of its electricity needs from renewable sources by 2020.

The *NJEMP* states that "renewable energy provides the State with an opportunity to produce electricity that does not contribute to greenhouse gas emissions, and relies on renewable and most of the time free fuel sources, such as wind and solar". To achieve this goal, the *NJEMP* calls for at least 3,000 megawatts (MW) of offshore wind capacity, 200 MW of onshore wind capacity, and 2,120 gigawatt hours (approximately 1,800 MW) of solar energy production.

The Cape May County Board of Chosen Freeholders adopted the *Cape May County Energy Master Plan (CMCEMP)* in October 2009, which is modeled after the *NJEMP* and includes a number of Challenges, Goals and Action Items that the County must address. The majority of these Challenges, Goals and Action Items deal with ways that Cape May County can reduce its carbon footprint and become a more sustainable entity, in and of itself. The *CMCEMP* recommends, for example, installing alternative energy sources (solar, wind, etc.) on all county-owned and operated facilities based on the energy audit that was performed in 2003.

Upper Township should strive to meet the NJEMP goal of meeting 30 percent of its electricity needs from renewable sources by 2020. The conservation of energy within Upper Township can be addressed in a number of ways, including the use of sustainable energy resources. There are several strategies that Upper Township can implement in order to become a more sustainable municipal entity.

Goals and Objectives for Municipal Energy Conservation

1. To strive to reduce the carbon footprint of Upper Township by reducing reliance on nonrenewable resources, such as fossil fuels, as a means of energy.
2. To meet 30 percent of the Township's electricity needs from renewable sources by 2020.
3. To increase the overall awareness of energy efficiency and the need for future sustainability in Upper Township.

Recommended Strategies for Energy Conservation

1. Perform an energy audit of all municipally-owned and operated facilities to determine direct ways in which the Township can reduce its carbon footprint.
2. Consider pursuing Sustainable Jersey Certification. Several of the Action Items have already been completed by the Township as part of its participation in Plan Endorsement, or are otherwise recommended by this Conservation Plan.

Energy Audits for Municipal Facilities

An energy audit can be conducted of all municipally-owned and operated facilities to establish where and how energy is being used in buildings and facilities, and to identify opportunities for energy and cost savings. The audit process itself is simply an assessment of energy consumption. It doesn't fix anything, but reveals annual energy use and costs associated with particular buildings and facilities, costs of suggested improvements, potential energy and cost savings, and the length of time that will be needed to recover improvement costs. In addition, an audit provides data that the municipality will need to create a carbon footprint and develop policies aimed at reducing greenhouse gas emissions.

An energy audit also provides guidance on cost-effective practices and technologies that can improve energy efficiency. Recommendations in an audit can range from improved energy data management, to appropriate energy saving technologies, to structural improvements and system retrofits, to behavior change strategies for energy conservation. Significant funding for conducting an energy audit is available through the NJ Board of Public Utilities (NJBPU), Office of Clean Energy Municipal/Local Government Energy Audit Program at www.njcleanenergy.com/lgea.

Sustainable Jersey Certification

Sustainable Jersey is a certification and incentive program for New Jersey municipalities that want to “go green”, save money, and take steps to sustain their quality of life over the long term. Sustainable Jersey has required and elective “actions” that municipalities can implement to receive the certification. The actions address issues such as global warming, pollution, biodiversity, buying locally, community outreach, green building and sustainable agriculture. Sustainable Jersey provides municipalities with a comprehensive package of tools, guidance materials, training and financial incentives to support and reward progress. Sustainable Jersey does not certify that a municipality is “sustainable”; it simply indicates that the municipality has taken the first significant step on a long journey towards sustainability.

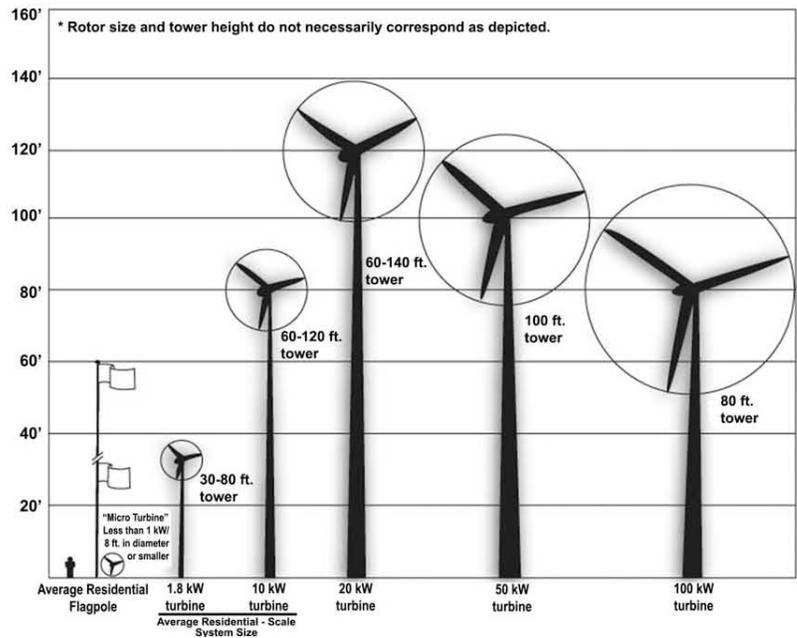
Certification is valid for three years from the time it is approved and the municipality is notified. The program currently includes Silver and Bronze levels of certification, both of which require the establishment of a mandatory Green Team. Additionally, the Silver level of certification requires the implementation of 3 out of 6 priority actions and a total of 350 points. Bronze requires implementation of 2 out of 6 priority actions and a total of 150 points. Additional information on the Sustainable Jersey can be found at www.sustainablejersey.com.

Alternative Energy Resources

Wind Energy

Wind is a naturally occurring power source created by the unequal heating of the Earth's surface by the sun, which can be harnessed using wind turbines, and converted into a clean and usable form of electricity. Wind turbines convert the kinetic energy of wind into mechanical power that runs a generator to produce clean electricity. The force of moving air (wind) causes its blades to rotate, which generates clean and sustainable energy.

Wind turbines come in a variety of sizes and designs. Wind turbines can vary dramatically in height, ranging anywhere from 35 feet to 350 feet. They can be constructed on either a horizontal or a vertical axis, and consist of several components, including blades, nacelle, rotor and tower. Towers, which support the other components of the turbine, can be constructed of tubular steel poles, steel lattice, poles with guy wires and other designs. The nacelle contains components, such as a gear box, brakes and generator, and is located on top of the tower. The rotor, also located atop the tower, is comprised of the blades and the hub, which are connected to the generator through the gear box.



Source: American Wind Energy Association (AWEA). (2008). *In the Public Interest: How and Why to Permit for Small Wind Systems*

Wind turbines are generally classified as small-scale or large-scale. The amount of energy that can be extracted from the wind using a wind turbine depends on three factors: (1) area swept by the propellers, (2) air density, and (3) wind speed. As demonstrated by the equation below, wind speed is the most influential factor on the amount of extractable power.

$$\text{Maximum extractable power (P)} = \frac{1}{2} \times (\text{swept area}) \times (\text{air density}) \times (\text{wind speed})^3$$

Since wind speed is generally greater at a higher elevation, the higher a wind turbine can be constructed, the greater the power output.

Large-Scale Wind Turbines

Large-scale wind turbines are normally tied directly into the utility grid and are used to provide electrical power for entire communities and municipalities. Each of these large-scale wind turbines can have blade lengths up to 150 feet, a tower up to 350 feet high, and produce enough electricity for 500-600 average homes per year. These are generally constructed using a freestanding monopole design.

Facilities that produce electric power are defined as 'development' under CAFRA (N.J.S.A. 13:19-1 et seq.), and are therefore regulated by the NJDEP when proposed in the CAFRA area. In addition, development of such facilities is regulated under the Waterfront Development Law, (N.J.S.A. 12:5-3) and the New Jersey Flood Hazard Area Control Act, (N.J.S.A. 58:16A-50 et seq.), depending on the proposed location, which are also regulated by the NJDEP. In order to assist the State in meeting the ambitious renewable energy goals of the NJEMP, the NJDEP is proposing amendments to address the regulation and permitting of wind turbines and solar panels and to facilitate review and construction of these facilities in appropriate locations.

As the height and size of wind turbines increase, so does the potential for adverse impacts to both birds and bats due to the operation of the turbines. The NJDEP has evaluated the land in the coastal zone and prepared the Large Scale Wind Turbine Siting Map, which identifies specific areas where wind turbines 200 feet in height or taller or having a cumulative rotor swept area of greater than 4,000 square feet are unacceptable due to the operational impacts of the turbines on birds and bats. These areas include the NJDEP mapped areas of documented bird concentration and nesting for resident threatened and endangered bird species, as well as areas of documented bird concentration and stopover locations for migratory songbirds, migratory raptors, and migratory shorebirds. In accordance with proposed N.J.A.C. 7:7-7.31 and 7:7E-7.4(r), in order to minimize adverse effects on birds and bats, wind energy facilities located on land shall be sited such that no portion of the wind turbine(s), including blades, towers and site disturbance is located in areas identified on [Figure 16 – Wind Turbine Siting Map](#).

In Upper Township, there are two general areas that are prohibited from large-scale wind turbines. The area along the Tuckahoe River is a documented Bald Eagle foraging area. The area of Upper Township that is along the Atlantic Ocean, including Strathmere, is an area of documented bird concentration and stopover locations for migratory songbirds, migratory raptors, and migratory shorebirds.

Figure 16 also shows the wind power classifications in Upper Township at 50 meters, as established by the National Renewable Energy Laboratory. The majority of Upper Township is classified as having wind speeds of 0 to 12.5 miles per hour (mph) at 50 meters. The areas along the eastern side of the Township are generally classified as having wind speeds of 12.5 to 14.3 mph at 50 meters. The highest wind speed classification found in Upper Township is 14.3 to 15.7 mph at 50 meters. These areas are located at the extreme eastern boundary, along Strathmere and the Cape May Wetlands Wildlife Management Area.

Small-Scale Wind Turbines

Small-scale wind turbines allow homeowners, farmers, small business owners, and public facilities to generate their own clean, safe, and reliable energy for on-site use. They are technologically advanced but mechanically simple, with only two or three moving parts. Most feature three blades of 2 to 15 feet in length, a generator located at the hub, and a tail. The turbine is mounted on a steel tower between 35 and 140 feet high, which is designed as a freestanding monopole, a lattice tower or a guyed monopole. Small-scale wind energy systems generate between 6 and 12 kilowatts per year.

Small-scale wind systems have benefits to both the owner of the system and to the public. Owners of small-scale wind systems enjoy personal energy independence, relief from high and volatile prices of other forms of electricity, free electricity after recouping costs of the system, increased property values, and the ability to support clean energy and fight global warming in a tangible way.

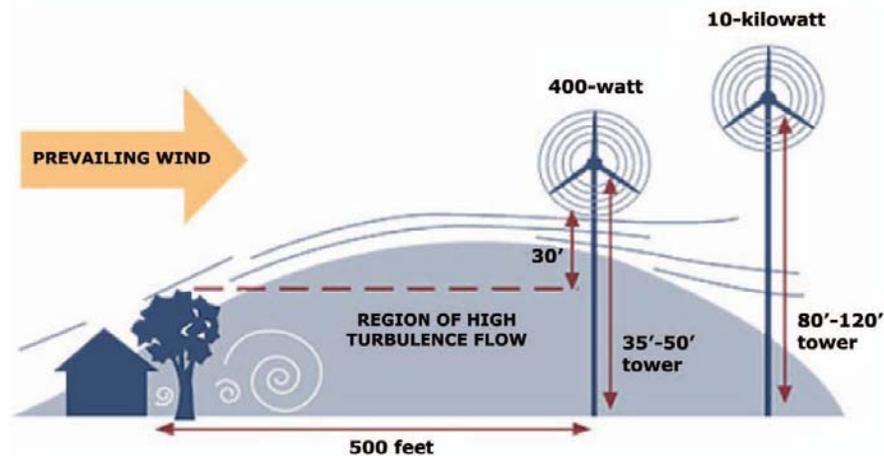
Though the power generated by a small wind system is used only by a single residence or facility, the benefits of wind power extend to the entire community. Community benefits include reduced pressure on the local electricity grid, increased security (i.e. back-up power to strategic applications like police stations or hospitals for "hazard mitigation" purposes), increased local energy independence, increased property values, enhanced reliability and power quality of the power grid, reduced peak power demands, increased in-state electricity generation, diversified energy supply portfolio, reduced pollutants from traditional forms of energy, increased market competition from more consumer choice, increased visible indicators of community support for clean energy, and increased regional economic growth.

Issues To Be Considered:

Several issues are key components of land use law and public acceptance of small wind systems. These issues are discussed in greater detail in the Guide for State and Local Governments from the American Wind Energy Association (AWEA) entitled *In the Public Interest: How and Why to Permit for Small Wind Systems*, which can be found on their website at www.awea.org/smallwind/pdf/InThePublicInterest.pdf. The following issues are critical for the successful placement of a turbine and should be considered prior to adopting any ordinance permitting small-scale wind turbines in Upper Township:

1. **Setback Distances and Height.** Tower height and setback are the most critical issues in permitting small-scale wind turbines in developed neighborhoods. Because wind speeds are typically greater and less turbulent at higher altitudes, wind turbines are more efficient and effective the taller they are. Conversely, the general public opinion is that taller towers are more visually offensive. These issues create a potential conflict between the system owner and the surrounding neighbors over the height and placement of the proposed turbine.

In order to avoid stressful air turbulence, which ensures that the turbine reaches consistent, fast wind speeds and prolongs the life of the turbine, the AWEA recommends that the bottom of the turbine rotor be a minimum of 30 feet above the highest obstruction (such as buildings or dense trees) within 500 feet of the tower.



Source: American Wind Energy Association (AWEA). (2008). *In the Public Interest: How and Why to Permit for Small Wind Systems*

New Jersey offers financial incentives to promote small wind turbines and clean energy. Height and setback requirements need to be carefully considered so that they balance the needs of a tall tower with the NIMBYism¹ that surrounds these issues.

2. **Aesthetics.** The need for tall tower makes wind turbines inevitable visible from neighboring properties and the appearance of these towers is often perceived to be offensive. This may incite the NIMBY conflict between the system owner and the neighbors. This is a common issue in the siting of wireless cellular antennae. The small-scale wind ordinance can require that certain design features be required, encouraged, discouraged or prohibited in the tower's design. However, regulating the visual preference of the community can be a difficult task and may wish to be avoided by the Township.
3. **Sound.** Excessive noise from wind turbines is another NIMBY concern of the neighboring property owner. However, modern wind turbines are designed have better insulation, lower rotation speeds, fewer moving parts, and more efficient blades than older systems. These modern turbines emit sound that is barely discernible from ambient noise. The AWEA recommends that zoning require that small wind systems be installed and operated such that sound pressure levels do not exceed the definition of "nuisance noise" as established by existing noise control ordinances or regulations (i.e. the New Jersey Noise Control Act of 1971 [N.J.S.A. 13:1G-1 et seq.]).

¹ NIMBYism is an acronym for "not-in-my-back-yard", which refers to the opposition by residents to a new development proposal close to them. The new project being opposed is generally considered a benefit for many but has negative side-effects on many local residents who would rather it be located elsewhere. Projects that typically incite NIMBYism may include tall buildings, wind turbines, desalination plants, landfill, incinerators, power plants, prisons, and especially transportation improvements (e.g. new roads, passenger railways or highways) and wireless communication towers. (<http://en.wikipedia.org/wiki/Nimby>)

4. Abandonment. Occasionally, wind turbines can malfunction and become non-functioning. The Township should require that non-functioning turbines be removed after a period of time to prevent unnecessary clutter in a community. The AWEA recommends that any small wind turbine owner whose equipment is inoperable for six months be notified by the zoning officer that the owners have six months from the notice date to restore their system to operating condition. If the owner fails, the wind turbine should be removed from the tower for safety reasons and the tower itself would then be managed under the Property Maintenance Ordinance.

5. Potential of Structural or Electrical Failure. Wind turbines are professionally engineered structures and are designed to withstand decades of near-constant operation and hurricane force winds (110-130 mph). According to the AWEA, requiring code compliance and manufacturer drawings should provide sufficient assurance that each installation will be safe, practical, reliable, and affordable.

6. Soil Studies. Due to the need for a tall tower, many wind turbines require a rather large foundation. Various types of soil may be more or less stable for these types of foundations. According to AWEA, as standard practice, manufacturers engineer foundations for "worst-case" scenarios by assessing soil conditions. For "abnormal" soils (i.e. rock, gravel, sand, or hydric soils), a manufacturer or local professional engineer would conduct a project-specific soil review and design a custom foundation for the site. The Township should consider whether it wants to include soil analysis requirements in the small-scale wind ordinance.

Solar Energy

Solar energy is the radiant light and heat from the sun that can be harnessed and converted into a clean and usable form of heat or electricity. The simplest and most direct application of solar energy is the direct conversion of sunlight into low-temperature heat (up to a temperature of 212 degrees F). In general, two classes of technologies can be distinguished: passive and active solar energy conversion.

Passive solar design refers to the use of the sun's energy for the heating, cooling and day-lighting of living spaces. In this approach, the building itself or some element of it takes advantage of the natural energy characteristics in materials and air created by exposure to the sun. Passive systems are relatively simple, having few moving parts, no mechanical systems, and requiring minimal maintenance. Since optimal application of passive solar energy requires consideration of a building's orientation, thermal mass, window placement and ventilation, it is more practical and economically advantageous to provide for passive solar energy use in new building design and construction than to attempt to integrate solar energy into an existing structure.

The application of passive principles can contribute significantly to the reduction of energy demands for heating, cooling, lighting and ventilating homes and buildings. Some of the key principles are:

- Ensure that the structure is well-insulated
- Provide for responsive, efficient heating systems

- Orient buildings to face south
- Avoid overshadowing by other buildings
- incorporate materials that have high heat capacity for “direct” or “diffuse” thermal mass storage

Active solar energy technologies require the transport of heat through a medium and require components to transform and transfer the solar energy into usable light, heat, or air-movement (for ventilation or cooling). Energy from active solar sources has two major applications or uses for homes and buildings. One is as a source of electricity, and the second is as source of heat for household hot water and space heating. Simple collectors, usually placed on the roof of a structure, absorb the sun’s energy and then transfer the heat to a media that moves it to points of usage.

Some of the common applications of active solar are:

- Solar Domestic Hot Water (SDHW) Systems consist of three components: a solar collector panel, a storage tank and a circulation system to transfer the heat from the panel to the tank. SDHW systems for households range in size and technology type depending on hot water demands and climate conditions. The energy payback time of a SDHW system is now generally less than one year.
- Solar Space Heating Systems can be sized for single houses or for collective buildings and district heating (i.e., using a central collector area). Space heating systems are available as water systems or as air heating systems (which are generally cheaper). Water-based systems are usually combination systems that supply domestic hot water and space heating.
- Photovoltaic (PV) solar energy systems involve the direct conversion of sunlight into electricity by flat plates and concentrators. To make use of the electricity from photovoltaic cells and modules, one has to build a complete system, comprising electronic parts, support structures, and sometimes electricity storage. The essential component of these systems is the solar cell, in which the “photovoltaic effect” - the generation of free electrons using the energy of light particles - takes place. These electrons are used to generate electricity.

Issues To Be Considered:

By nature, solar energy systems are generally more widely accepted and encounter less NIMBY resistance from neighbors than the wind turbine systems. In fact, the issues surrounding solar energy systems are minimal. One of the foremost issues is the location of the solar panels. Often times, solar panels are applied directly to the southern-facing roof of a structure. Other times, they may be mounted on the ground in the southern-facing yard. The Upper Township Zoning Board recently made an interpretation that solar panels (both building mounted and ground mounted) are an implied accessory use in all zones, provided that they meet the accessory setback and height standards in the zone.

Goals and Objectives for Alternative Energy Resources

1. To strive to reduce the carbon footprint of Upper Township.
2. To reduce reliance on nonrenewable resources, such as fossil fuels, as a means of energy.
3. To promote the safe, effective and efficient use of small-scale wind and solar energy systems to reduce the onsite consumption of utility-supplied electricity.
4. To ensure that the implementation of alternative energy systems, such as small-scale wind or solar, does not present a significant detriment to the public good, especially in terms of safety and aesthetics.

Recommended Strategies for Alternative Energy Resources

1. Install small-scale wind turbines and/or solar panels on municipal property, where feasible, which would reduce the energy costs, and subsequently reduce tax burdens of Township residents.
2. Amend the Township’s zoning to permit small-scale wind turbines and solar panels as accessory uses in certain districts. The Township needs to consider the issues presented in this Conservation Plan Element regarding the requirements for wind and solar energy systems (i.e. setbacks, height, etc.) in crafting this ordinance. It should be noted that the recent New Jersey law (P.L. 2009 Chapter 146) now regulates wind, solar and photovoltaic energy facility or structure as an inherently beneficial use whether such facility or structure is a principal use, a part of the principal use, or an accessory use of structure.
3. Public education and outreach programs should be initiated to promote energy conservation for local businesses and residents. The use of small-scale wind turbines and solar panels on private property should be encouraged.
4. Work with the New Jersey Board of Utilities, New Jersey Clean Energy, or other entity to pursue other alternative energy initiatives on a community-wide or neighborhood-wide scale.
5. Amend the Township’s site plan and subdivision ordinances to provide recommended or required building orientation to maximize potential for active or passive solar energy systems to be utilized.

Waste Management

Improving waste management is among the easiest and fastest ways for a community to make progress toward a more sustainable future. Recycling not only saves resources and energy, but also reduces the need for landfills and resource recovery facilities. Recycling aids in natural resource conservation, energy conservation, greenhouse gas reductions, and reductions in emissions of air and water pollutants. The New Jersey Statewide Mandatory Source Separation and Recycling Act (N.J.S.A. 13:1E-99.11 et seq.) requires that 50% of municipal solid waste and 60% of all waste is recycled.

Municipalities are required by New Jersey law to have a recycling ordinance in place that specifies those recyclable materials that must be recycled from the residential, commercial and institutional sectors. The municipal ordinance must be consistent with those materials designated for recycling in the County Recycling Plan at a minimum, but may require the recycling of more materials than that listed in the county recycling plan. Upper Township is already dedicated to the benefits of recycling, having the highest recycling rate in all of Cape May County. Many recyclable items are added to the Township recycling ordinance before they are even added to the Cape May County Recycling Plan and become mandatory items to be recycled.

Municipal recycling ordinances can be enforced by local or county health department officials as per the County Environmental Health Act or by other municipal staff empowered by the municipality for this purpose. Police officers can also enforce recycling ordinances, although they typically are not involved in this municipal function.

Goals and Objectives for Waste Management

1. To encourage a reduction of the overall waste in the Township from municipal facilities, businesses, and households.
2. To reuse as much municipal, business, and household waste as possible.
3. To encourage the maximum recycling effort from all Township residents as well as from all businesses in the Township.

Recommended Strategies for Waste Management

1. Review and update the Recycling Plan Element, if necessary.
2. Ensure that the Solid Waste and Recyclables Ordinance is up-to-date and being enforced appropriately. Consider amending ordinance to require additional items to be recycled.
3. Encourage residents to properly compost appropriate yard and organic food wastes, which reduces municipal solid waste disposal costs and provides a local source for low-cost soil nutrients.
4. Educate residents about smart consumption and waste reduction. Residents should be encouraged to avoid purchasing products that use excessive packaging.

Greenhouse Gas Emissions

One of the central concerns within the Township is traffic, especially along the Route 9 corridor; much of which has been a result of commercial and residential land development in and around Upper Township. The existing residential development in Upper Township consists almost exclusively of single-family homes, with the most concentrated areas located in the Centers of Seaville, Petersburg and Marmora-Palermo-Beesley's Point and Tuckahoe. In addition, the barrier island community of Strathmere represents the Township's highest density of residential development with an average lot size of between 4,000 and 8,000 square feet.

The *2006 Master Plan Land Use Plan Amendment* and subsequent zoning amendments are geared to focus future development into the Route 9 Centers, with an emphasis on clustered and mixed-use patterns of land use, as well as infill development, which will support walkable and diverse Centers with mixed-uses and multimodal transportation facilities (motor vehicles, bicycles, pedestrians, transit connections) to create attractive places to live and work. As development and redevelopment occurs under the center-based new zone plan, it is expected that multifamily and mixed-use structures would be more prominent, which could potentially sustain future growth while preserving valuable natural resources outside of the Centers. The walkable pedestrian-friendly environment will help to reduce automobile dependency.

Increased opportunities for public transit can also reduce automobile dependency. Excursion rail service between Tuckahoe and Richland commenced in 2005 through the Cape May Seashore Line. Eventually rail service will be extended south to link to Cape May City. The stretch of rail line through Dennis and Upper Township will need to be replaced. Long term future rail connections north to the Atlantic City railroad should continue to be pursued on a regional level.

Another technique to reduce greenhouse gas emissions is through the use of bio-fuels, such as biodiesel or ethanol. Biodiesel is a biodegradable and non-toxic fuel that can be used in any diesel powered vehicle. Bio-fuels are relatively low-cost alternatives to gasoline as a fuel source, usually made from corn, grain or other crops. Compressed natural gas is another alternative fossil fuel, which is more environmentally clean than traditional fossil fuels, in terms of greenhouse gases.

Goals and Objectives for Greenhouse Gas Emissions

1. To reduce the amount of greenhouse gases emissions from automobiles in Upper Township.

Recommended Strategies for Greenhouse Gas Emissions

1. Encourage alternative modes of transportation, such as walking, bicycling, or roller-skating, especially within the Town Centers along Route 9. A comprehensive network of adequate sidewalks and bikeways should be implemented. Ensure that at a minimum, primary points-of-interest, such as schools, parks, and major shopping areas, are connected.
2. Advocate for increased public transit opportunities within Upper Township.
3. Install signage to prohibit idling of vehicles.
4. Convert the Township's vehicle fleet to alternative fuels, such as biodiesel, compressed natural gas, electric or hybrid.

Noise Pollution

The regulation of noise disturbances is currently regulated by state law (N.J.A.C. 7:29-1 et seq.) under the authority of the Noise Control Act of 1971 (N.J.S.A. 13:1G-1 et seq.). This law prohibits persons from producing sound levels greater than 65 decibels from 7am to 10pm and 50 decibels from 10pm to 7am. This law protects residents from noise made by industrial, commercial, and public service facilities. It does not regulate sound produced by vehicles, residents, pets and other disturbances.

Goals and Objectives for Noise Pollution

1. To protect to the public health, welfare, safety, and the quality of life from the serious hazards of excessive noise.

Recommended Strategies for Noise Pollution

To enforce the recently enacted Noise Control Ordinance that was adopted on December 20, 2010.

APPENDIX

- Figure 1 - Regional/Location Map
- Figure 2 - Geology Map
- Figure 3 - Soils Map
- Figure 4 - Contaminated Sites Map
- Figure 5 - Groundwater Recharge Map
- Figure 6 - Wellhead Protection Areas Map
- Figure 7 - Surface Waters Map
- Figure 8 - Watersheds Map
- Figure 9 - Flood Prone Areas Map
- Figure 10 - Wetlands Map
- Figure 11 - Wildfire Fuel Hazard Map
- Figure 12 - Threatened and Endangered Species Map
- Figure 13 - Natural Heritage Priority Sites Map
- Figure 14 - Historical Properties Map
- Figure 15 - Open Space Map
- Figure 16 - Wind Turbine Siting Map

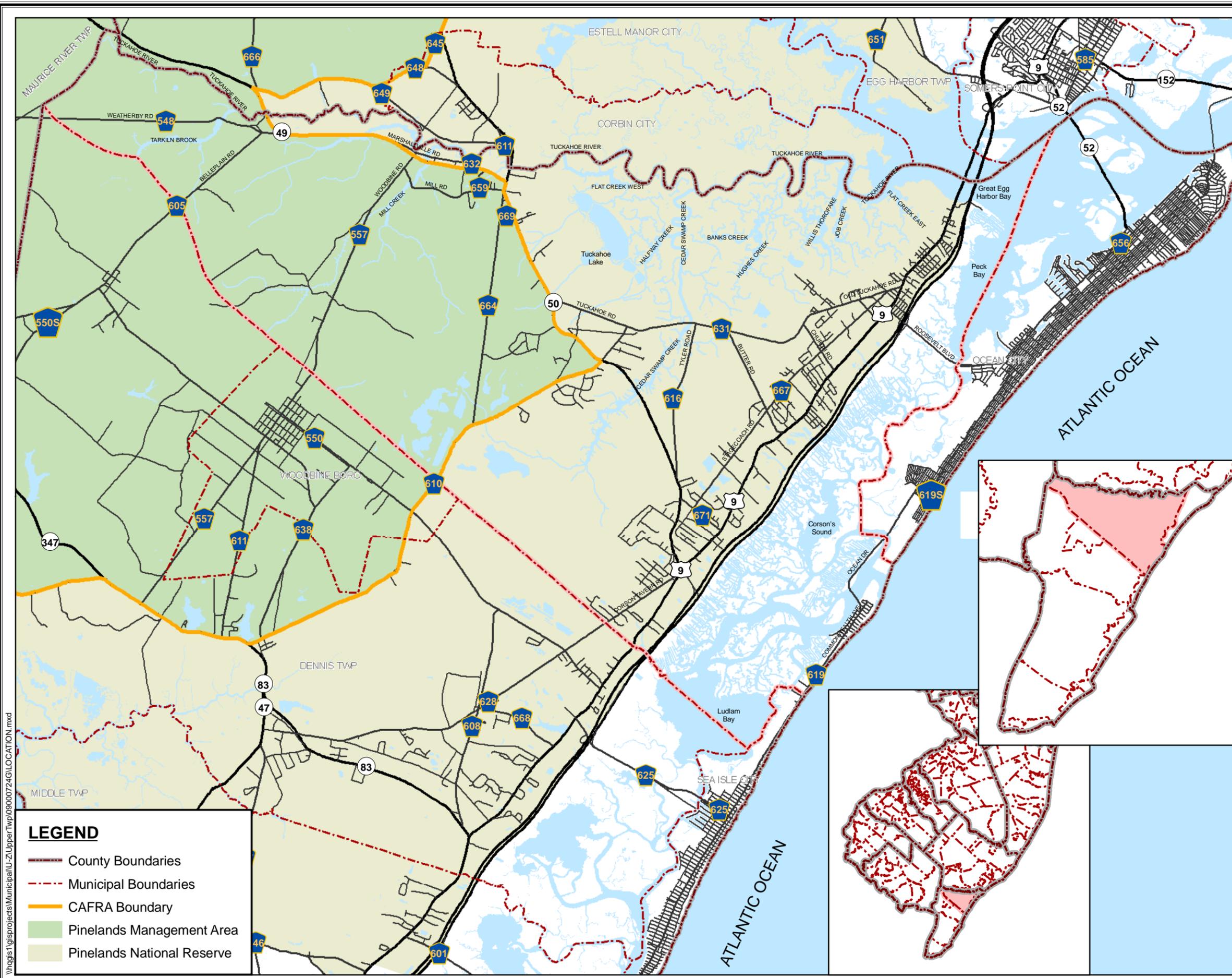
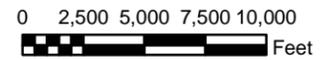


FIGURE 1

REGIONAL LOCATION

TOWNSHIP OF UPPER

CAPE MAY COUNTY
NEW JERSEY



- DIGITAL SPATIAL DATA SOURCES:
- CAPE MAY COUNTY GEOGRAPHIC INFORMATION SYSTEM
 - NEW JERSEY DEPARTMENT OF COMMUNITY AFFAIRS, OFFICE OF SMART GROWTH
 - NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF GEOGRAPHIC INFORMATION
 - UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICES
 - NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY, OFFICE OF GIS



FEBRUARY 2010

\\hgis\gis\projects\Municipal\U-Z\UpperTwp\090000724\LOCATION.mxd

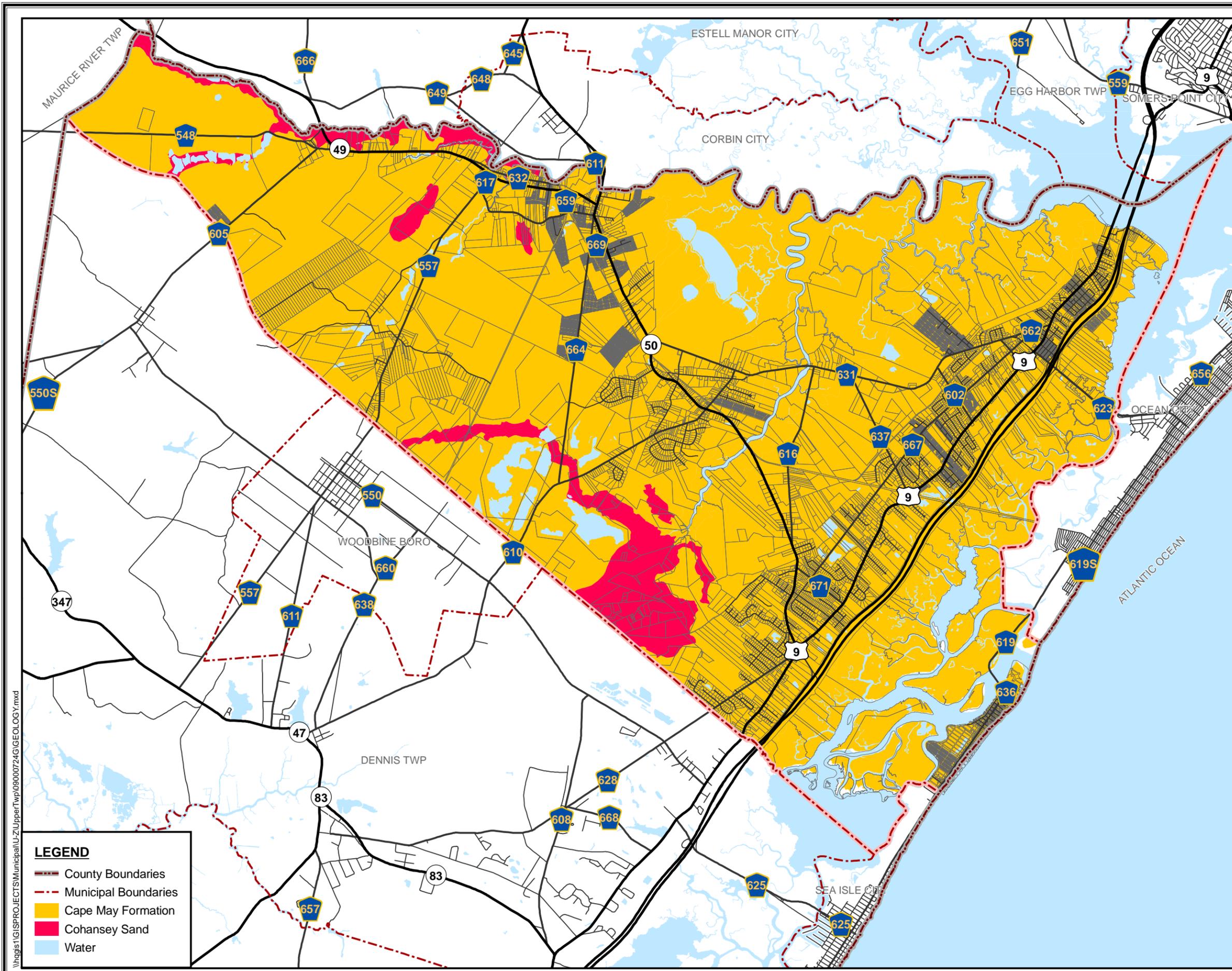
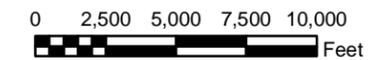


FIGURE 2

GEOLOGY

TOWNSHIP OF UPPER

CAPE MAY COUNTY
NEW JERSEY



DIGITAL SPATIAL DATA SOURCES:
 - CAPE MAY COUNTY GEOGRAPHIC INFORMATION SYSTEM
 - NEW JERSEY DEPARTMENT OF COMMUNITY AFFAIRS, OFFICE OF SMART GROWTH
 - NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF GEOGRAPHIC INFORMATION
 - UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICES
 - NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY, OFFICE OF GIS

LEGEND

- County Boundaries
- Municipal Boundaries
- Cape May Formation
- Cohansey Sand
- Water



FEBRUARY 2010

\\hgis1\GIS\PROJECTS\Municipal\U-Z\UpperTwp\09000724\GEOLOGY.mxd

FIGURE 3

SOILS

TOWNSHIP OF UPPER

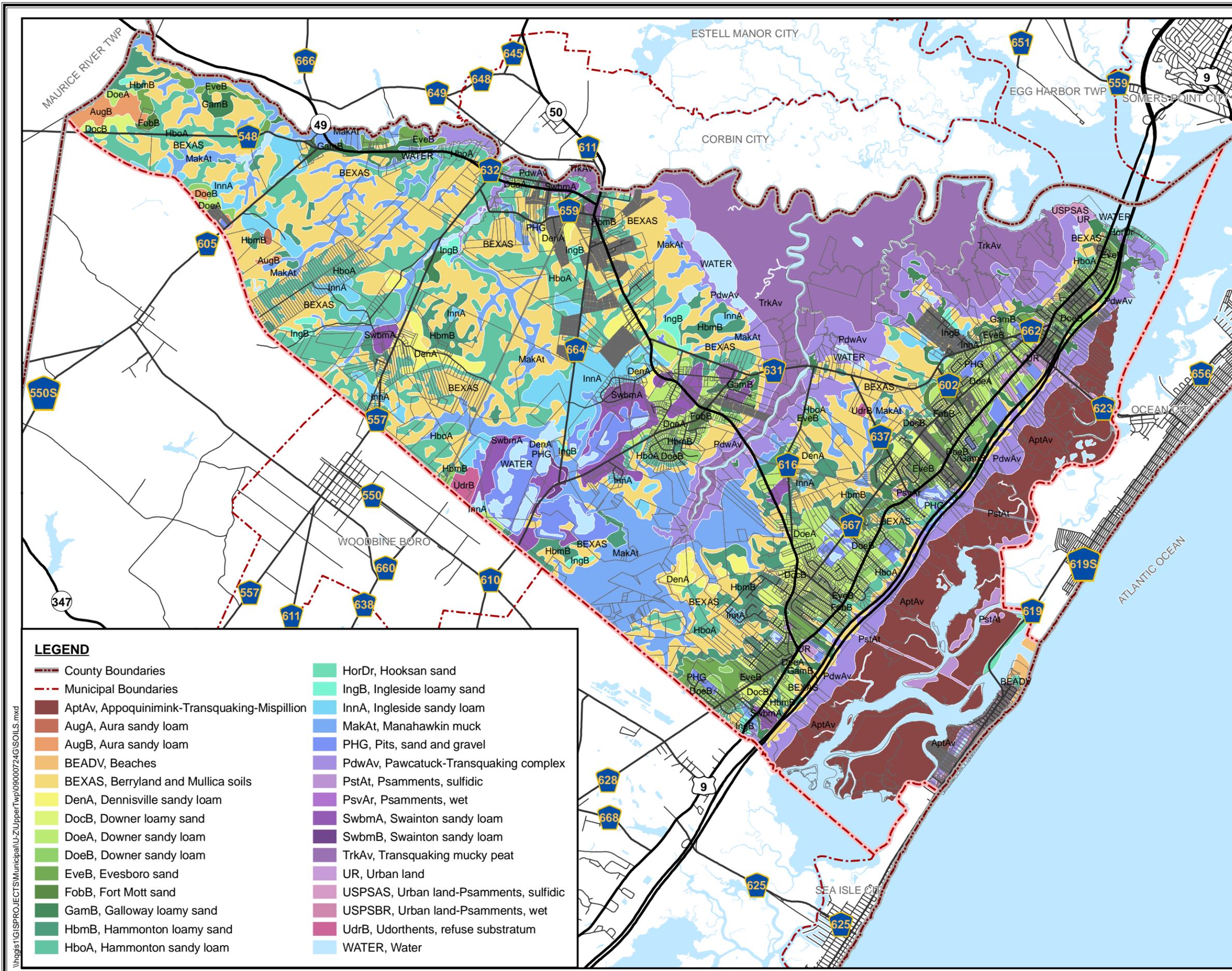
CAPE MAY COUNTY
NEW JERSEY



DIGITAL SPATIAL DATA SOURCES:
- CAPE MAY COUNTY GEOGRAPHIC INFORMATION SYSTEM
- NEW JERSEY DEPARTMENT OF COMMUNITY AFFAIRS, OFFICE OF SMART GROWTH
- NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF GEOGRAPHIC INFORMATION
- UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICES
- NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY, OFFICE OF GIS



FEBRUARY 2010



LEGEND

- County Boundaries
- Municipal Boundaries
- AptAv, Appoquinimink-Transquaking-Mispillion
- AugA, Aura sandy loam
- AugB, Aura sandy loam
- BEADV, Beaches
- BEXAS, Berryland and Mullica soils
- DenA, Dennisville sandy loam
- DocB, Downer loamy sand
- DoeA, Downer sandy loam
- DoeB, Downer sandy loam
- EveB, Evesboro sand
- FobB, Fort Mott sand
- GamB, Galloway loamy sand
- HbmB, Hammonton loamy sand
- HboA, Hammonton sandy loam
- HorDr, Hooksan sand
- IngB, Ingleside loamy sand
- InnA, Ingleside sandy loam
- MakAt, Manahawkin muck
- PHG, Pits, sand and gravel
- PdwAv, Pawcatuck-Transquaking complex
- PstAt, Psammments, sulfidic
- PsvAr, Psammments, wet
- SwbmA, Swainton sandy loam
- SwbmB, Swainton sandy loam
- TrkAv, Transquaking mucky peat
- UR, Urban land
- USPSAS, Urban land-Psammments, sulfidic
- USPSBR, Urban land-Psammments, wet
- UdrB, Udorthents, refuse substratum
- WATER, Water

\\hgis1\GIS\PROJECTS\Municipal\U-Z\UpperTwp\090000724\SOILS.mxd

FIGURE 5

GROUNDWATER RECHARGE

TOWNSHIP OF UPPER

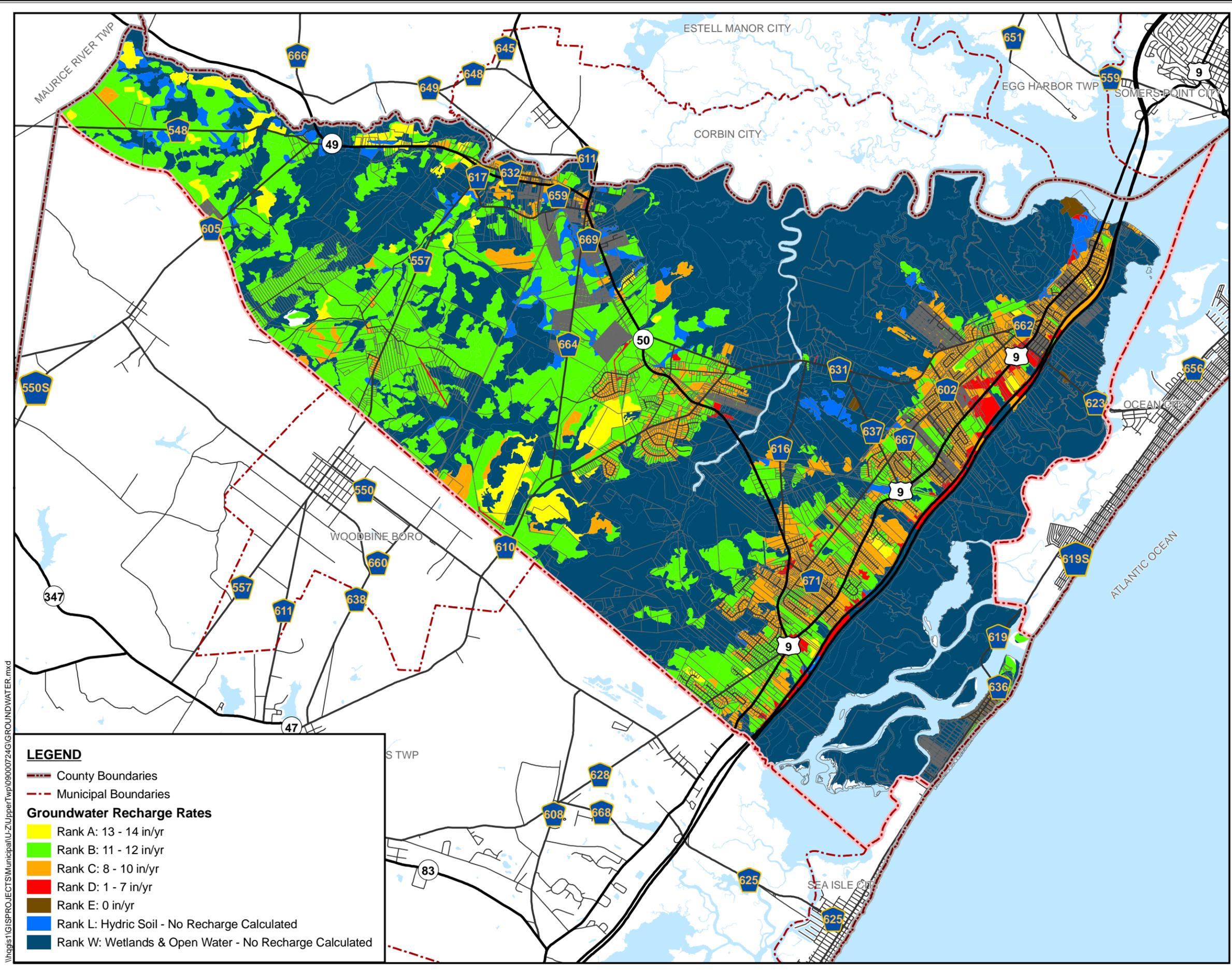
CAPE MAY COUNTY
NEW JERSEY



DIGITAL SPATIAL DATA SOURCES:
- CAPE MAY COUNTY GEOGRAPHIC INFORMATION SYSTEM
- NEW JERSEY DEPARTMENT OF COMMUNITY AFFAIRS, OFFICE OF SMART GROWTH
- NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF GEOGRAPHIC INFORMATION
- UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICES
- NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY, OFFICE OF GIS



FEBRUARY 2010



LEGEND

- County Boundaries
- Municipal Boundaries

Groundwater Recharge Rates

- Rank A: 13 - 14 in/yr
- Rank B: 11 - 12 in/yr
- Rank C: 8 - 10 in/yr
- Rank D: 1 - 7 in/yr
- Rank E: 0 in/yr
- Rank L: Hydric Soil - No Recharge Calculated
- Rank W: Wetlands & Open Water - No Recharge Calculated

\\hgis1\GIS\PROJECTS\Municipal\U-Z\UpperTwp\090000724\GROUNDWATER.mxd

FIGURE 7

SURFACE WATERS

TOWNSHIP OF UPPER

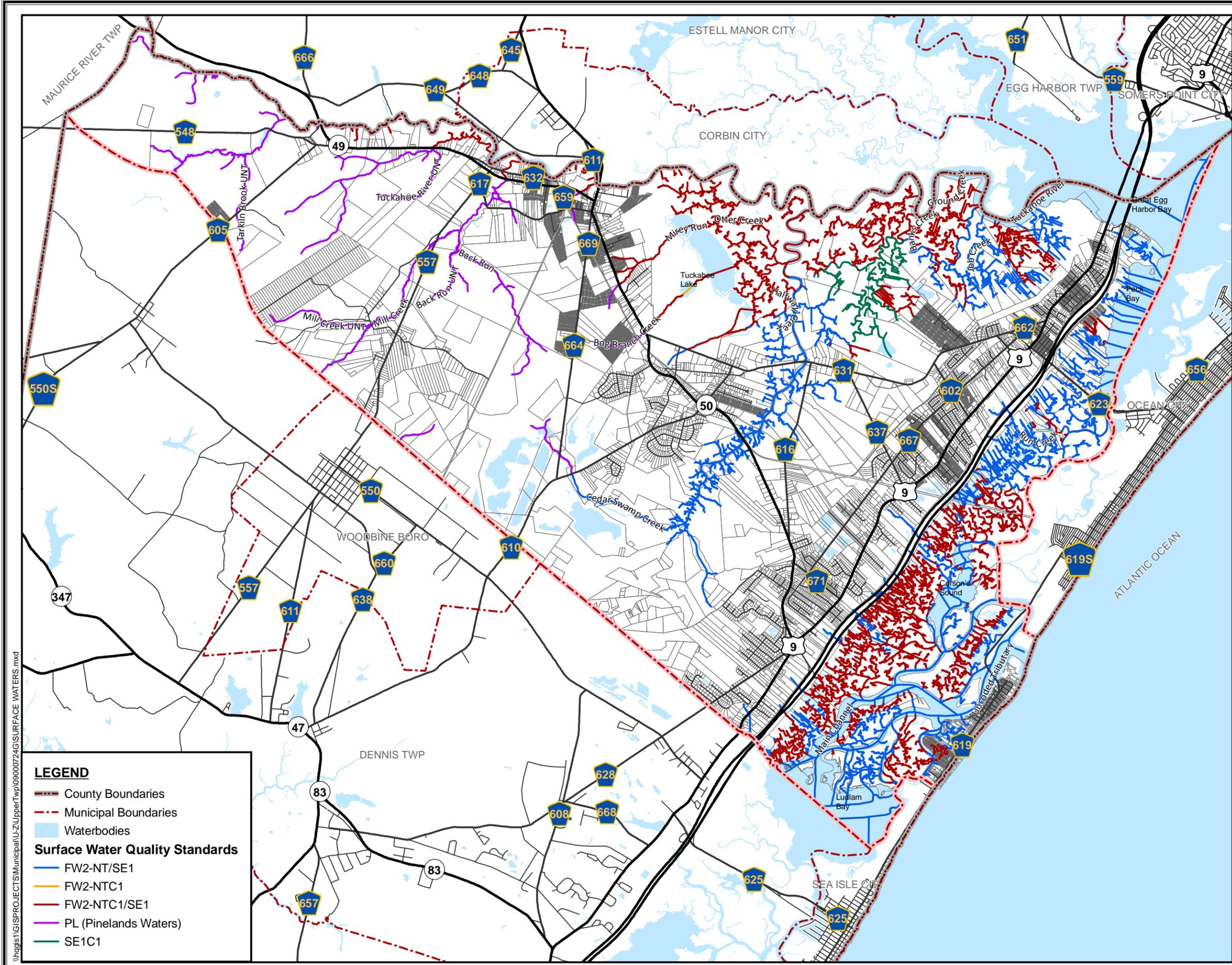
CAPE MAY COUNTY
NEW JERSEY



DIGITAL SPATIAL DATA SOURCES:
- CAPE MAY COUNTY GEOGRAPHIC INFORMATION SYSTEM
- NEW JERSEY DEPARTMENT OF COMMUNITY AFFAIRS, OFFICE OF SMART GROWTH
- NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF GEOGRAPHIC INFORMATION
- UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICES
- NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY, OFFICE OF GIS



FEBRUARY 2010



LEGEND

- County Boundaries
- Municipal Boundaries
- Waterbodies

Surface Water Quality Standards

- FW2-NT/SE1
- FW2-NTC1
- FW2-NTC1/SE1
- PL (Pinelands Waters)
- SE1C1

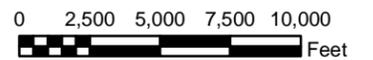
\\hgis1\GIS\PROJECTS\Municipal\U-Upper\wp09000724\GIS\SURFACE WATERS.mxd

FIGURE 8

WATERSHEDS

TOWNSHIP OF UPPER

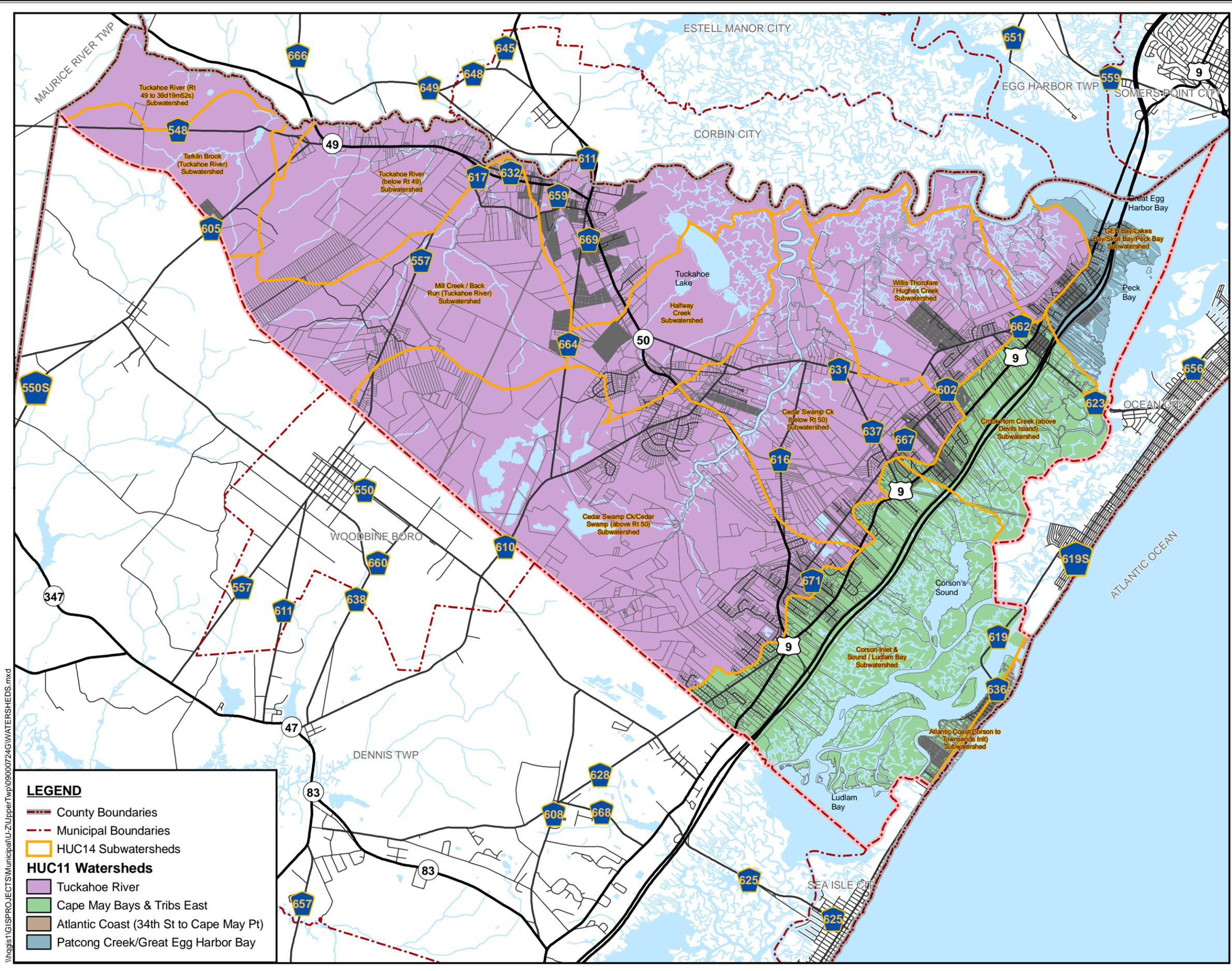
CAPE MAY COUNTY
NEW JERSEY



DIGITAL SPATIAL DATA SOURCES:
- CAPE MAY COUNTY GEOGRAPHIC INFORMATION SYSTEM
- NEW JERSEY DEPARTMENT OF COMMUNITY AFFAIRS, OFFICE OF SMART GROWTH
- NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF GEOGRAPHIC INFORMATION
- UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICES
- NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY, OFFICE OF GIS



FEBRUARY 2010



LEGEND

- County Boundaries
- Municipal Boundaries
- HUC14 Subwatersheds

HUC11 Watersheds

- Tuckahoe River
- Cape May Bays & Tribs East
- Atlantic Coast (34th St to Cape May Pt)
- Patcong Creek/Great Egg Harbor Bay

\\hgis1\GIS\PROJECTS\Municipal\U-Z\UpperTwp\090000724G\WATERSHEDS.mxd

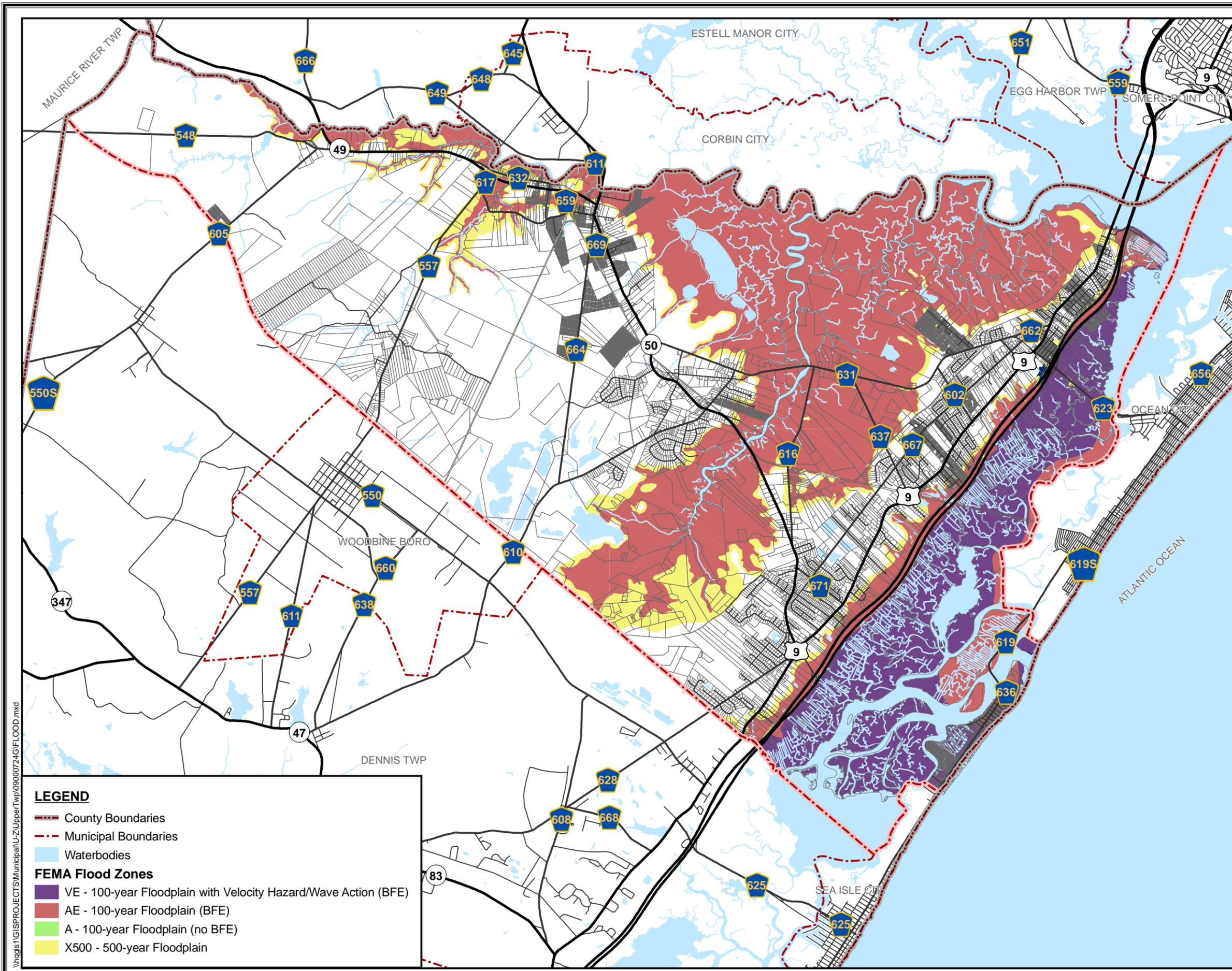


FIGURE 9

FLOOD PRONE AREAS

TOWNSHIP OF UPPER

CAPE MAY COUNTY
NEW JERSEY



LEGEND

- County Boundaries
- Municipal Boundaries
- Waterbodies
- FEMA Flood Zones**
- VE - 100-year Floodplain with Velocity Hazard/Wave Action (BFE)
- AE - 100-year Floodplain (BFE)
- A - 100-year Floodplain (no BFE)
- X500 - 500-year Floodplain

DIGITAL SPATIAL DATA SOURCES:
 - CAPE MAY COUNTY GEOGRAPHIC INFORMATION SYSTEM
 - NEW JERSEY DEPARTMENT OF COMMUNITY AFFAIRS, OFFICE OF SMART GROWTH
 - NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF GEOGRAPHIC INFORMATION
 - UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICES
 - NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY, OFFICE OF GIS



FEBRUARY 2010

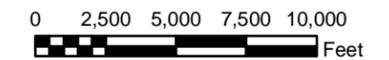
\\hgis1\GIS\PROJECTS\Municipal\U-Z\UpperTwp\090000724\FLOOD.mxd

FIGURE 10

WETLANDS

TOWNSHIP OF UPPER

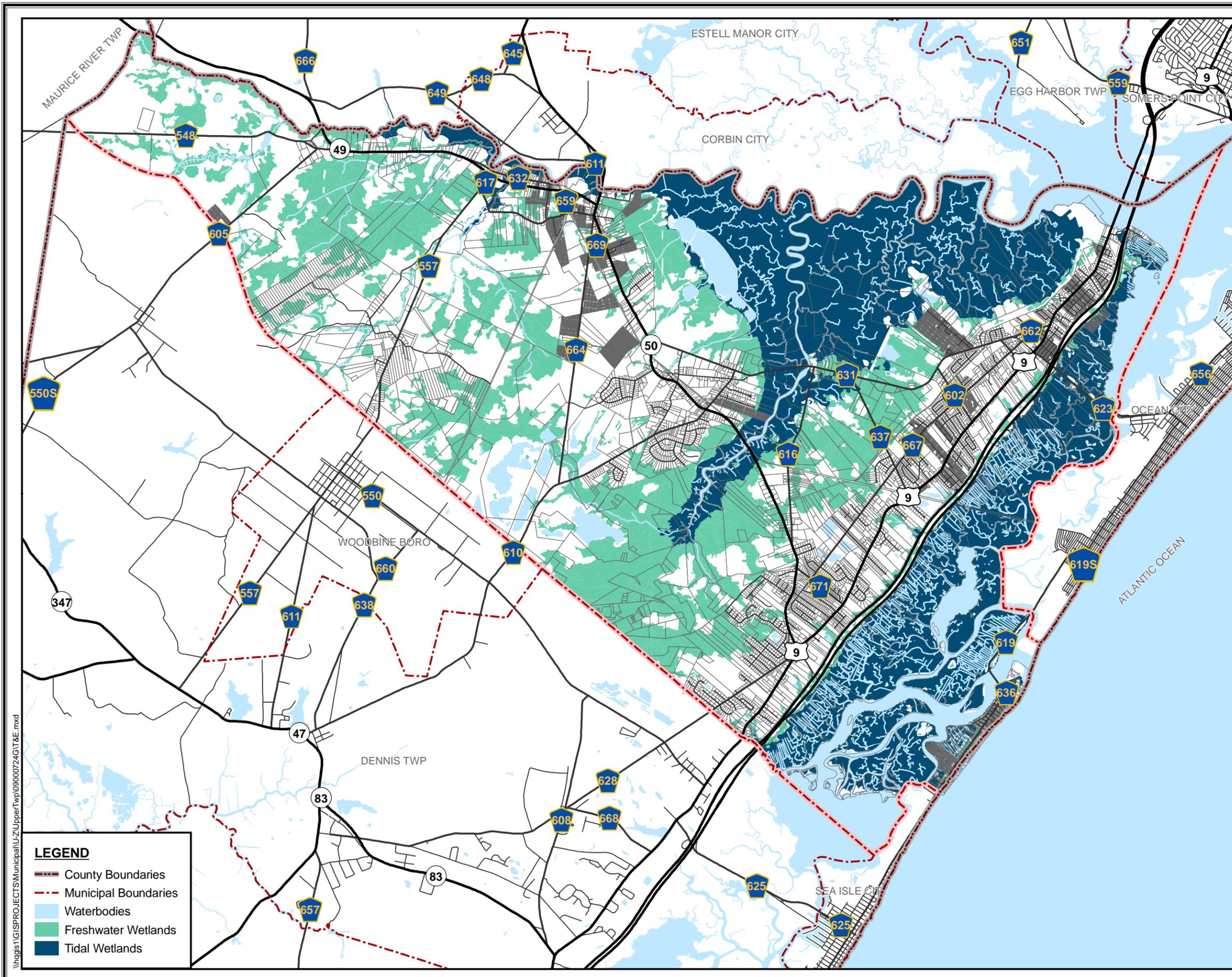
CAPE MAY COUNTY
NEW JERSEY



DIGITAL SPATIAL DATA SOURCES:
- CAPE MAY COUNTY GEOGRAPHIC INFORMATION SYSTEM
- NEW JERSEY DEPARTMENT OF COMMUNITY AFFAIRS, OFFICE OF SMART GROWTH
- NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF GEOGRAPHIC INFORMATION
- UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICES
- NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY, OFFICE OF GIS



FEBRUARY 2010



LEGEND

- County Boundaries
- Municipal Boundaries
- Waterbodies
- Freshwater Wetlands
- Tidal Wetlands

\\hgis1\GIS\PROJECTS\Municipal\U-UpperTwp\090000724G1T&E.mxd

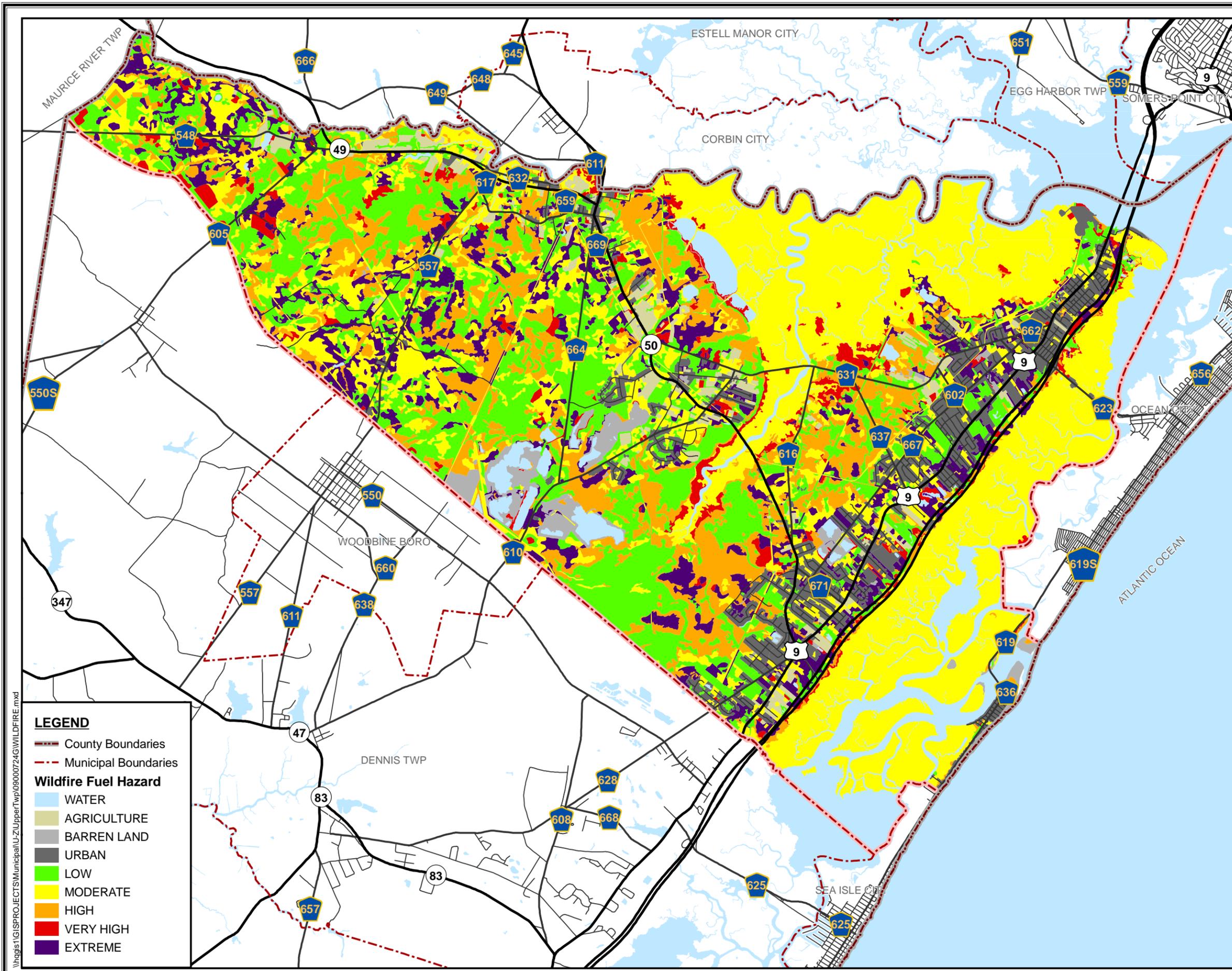
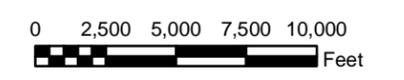


FIGURE 11
WILDFIRE FUEL HAZARD

TOWNSHIP OF UPPER

CAPE MAY COUNTY
 NEW JERSEY



LEGEND

- County Boundaries
- Municipal Boundaries

Wildfire Fuel Hazard

- WATER
- AGRICULTURE
- BARREN LAND
- URBAN
- LOW
- MODERATE
- HIGH
- VERY HIGH
- EXTREME

DIGITAL SPATIAL DATA SOURCES:

- CAPE MAY COUNTY GEOGRAPHIC INFORMATION SYSTEM
- NEW JERSEY DEPARTMENT OF COMMUNITY AFFAIRS, OFFICE OF SMART GROWTH
- NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF GEOGRAPHIC INFORMATION
- UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICES
- NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY, OFFICE OF GIS



FEBRUARY 2010

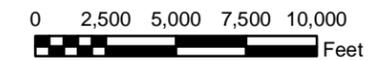
\\hgis1\GIS\PROJECTS\Municipal\U-Z\UpperTwp\090000724G\WILDFIRE.mxd

FIGURE 12

THREATENED & ENDANGERED SPECIES

TOWNSHIP OF UPPER

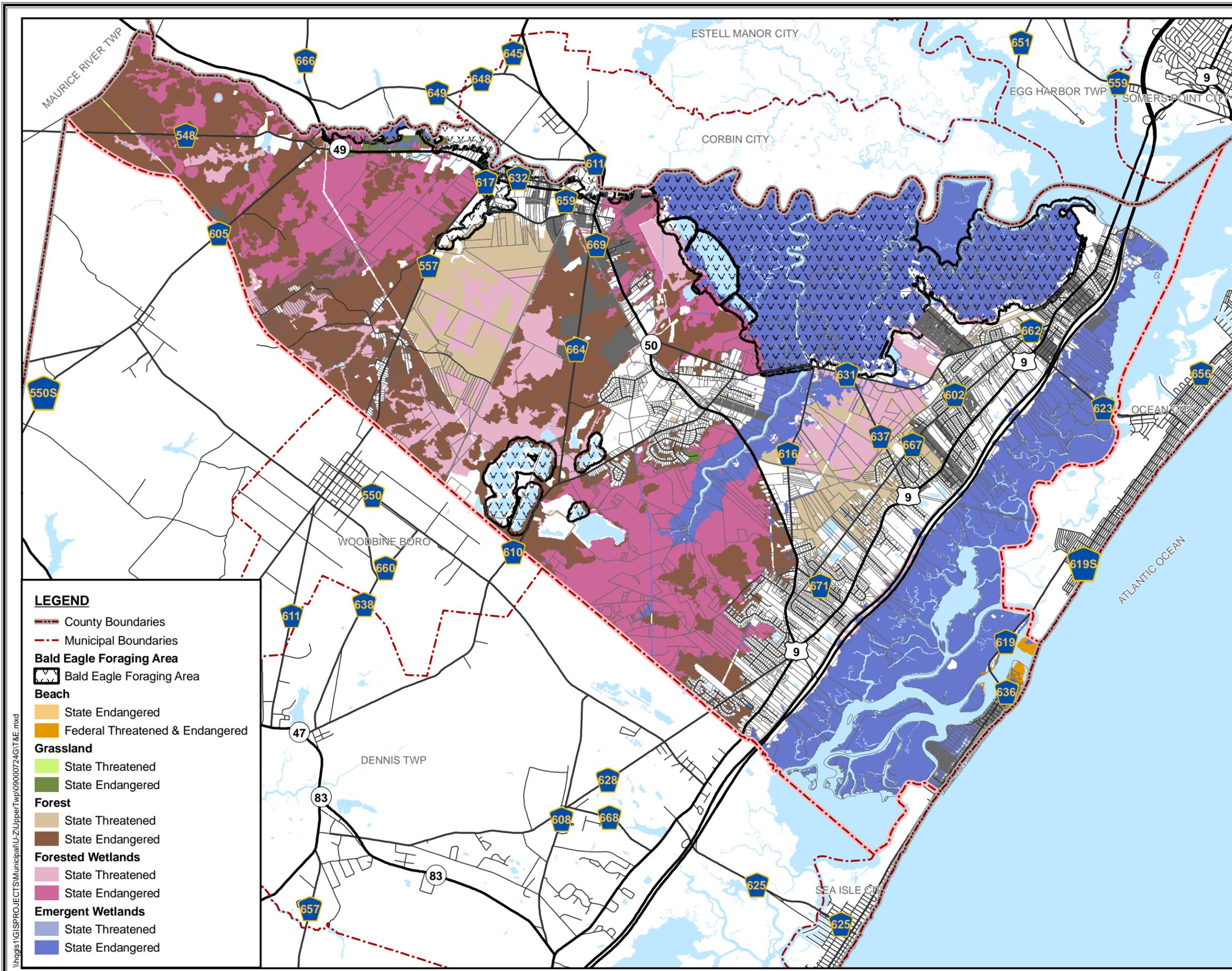
CAPE MAY COUNTY
NEW JERSEY



DIGITAL SPATIAL DATA SOURCES:
- CAPE MAY COUNTY GEOGRAPHIC INFORMATION SYSTEM
- NEW JERSEY DEPARTMENT OF COMMUNITY AFFAIRS, OFFICE OF SMART GROWTH
- NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF GEOGRAPHIC INFORMATION
- UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICES
- NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY, OFFICE OF GIS



FEBRUARY 2010



LEGEND

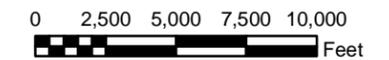
- County Boundaries
- Municipal Boundaries
- Bald Eagle Foraging Area**
- Bald Eagle Foraging Area
- Beach**
- State Endangered
- Federal Threatened & Endangered
- Grassland**
- State Threatened
- State Endangered
- Forest**
- State Threatened
- State Endangered
- Forested Wetlands**
- State Threatened
- State Endangered
- Emergent Wetlands**
- State Threatened
- State Endangered

\\hgis1\GIS\PROJECTS\Municipal\U-UpperTwp\090000724\GIT&E.mxd

FIGURE 13
NATURAL HERITAGE PRIORITY SITES

TOWNSHIP OF UPPER

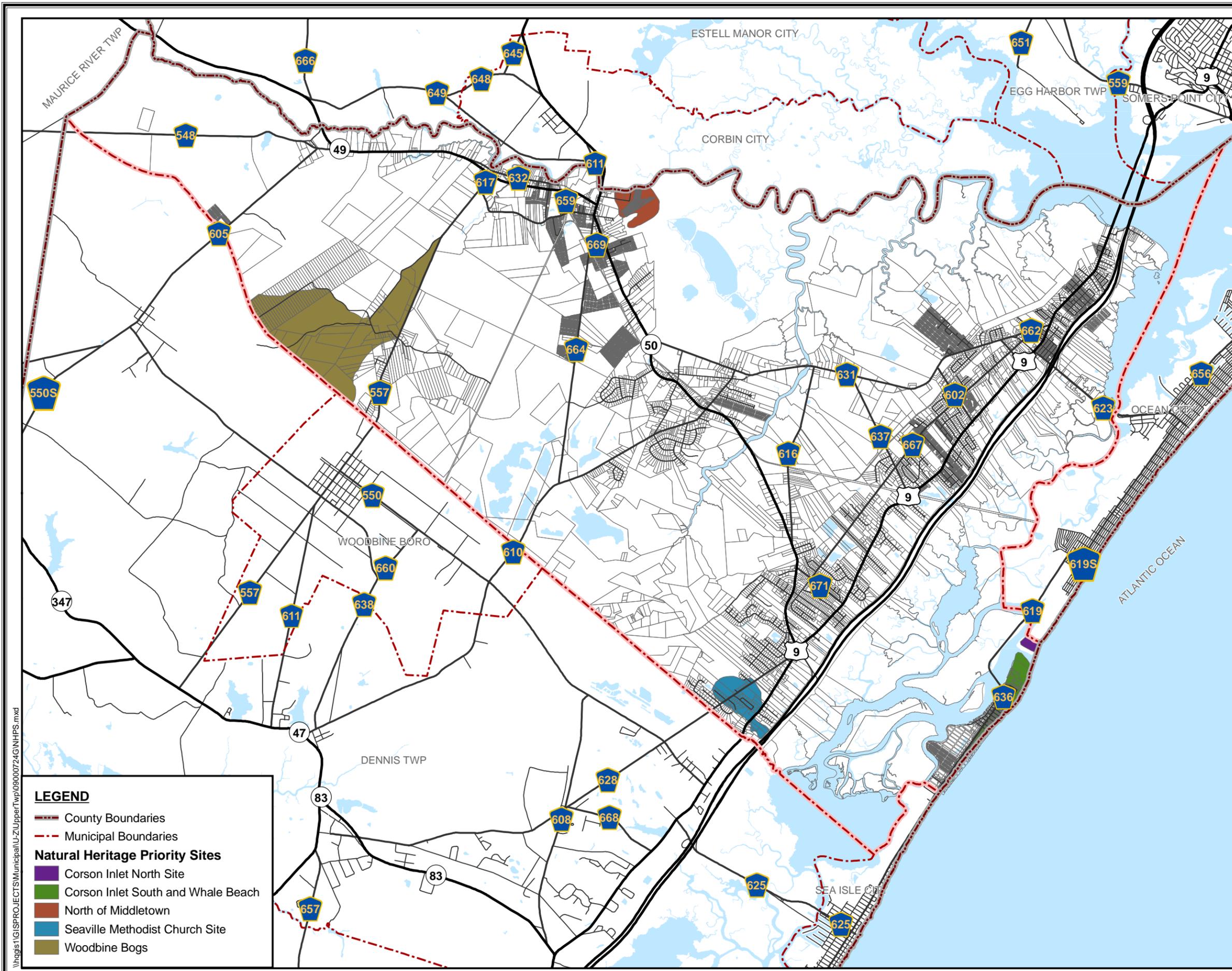
CAPE MAY COUNTY
 NEW JERSEY



DIGITAL SPATIAL DATA SOURCES:
 - CAPE MAY COUNTY GEOGRAPHIC INFORMATION SYSTEM
 - NEW JERSEY DEPARTMENT OF COMMUNITY AFFAIRS, OFFICE OF SMART GROWTH
 - NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF GEOGRAPHIC INFORMATION
 - UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICES
 - NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY, OFFICE OF GIS



FEBRUARY 2010



LEGEND

- County Boundaries
- Municipal Boundaries

Natural Heritage Priority Sites

- Corson Inlet North Site
- Corson Inlet South and Whale Beach
- North of Middletown
- Seaville Methodist Church Site
- Woodbine Bogs

\\hgis1\GIS\PROJ\JE\CTS\Municipal\U-Z\UpperTwp\090000724\G\NHPS.mxd

FIGURE 14

HISTORICAL PROPERTIES

TOWNSHIP OF UPPER

CAPE MAY COUNTY
NEW JERSEY

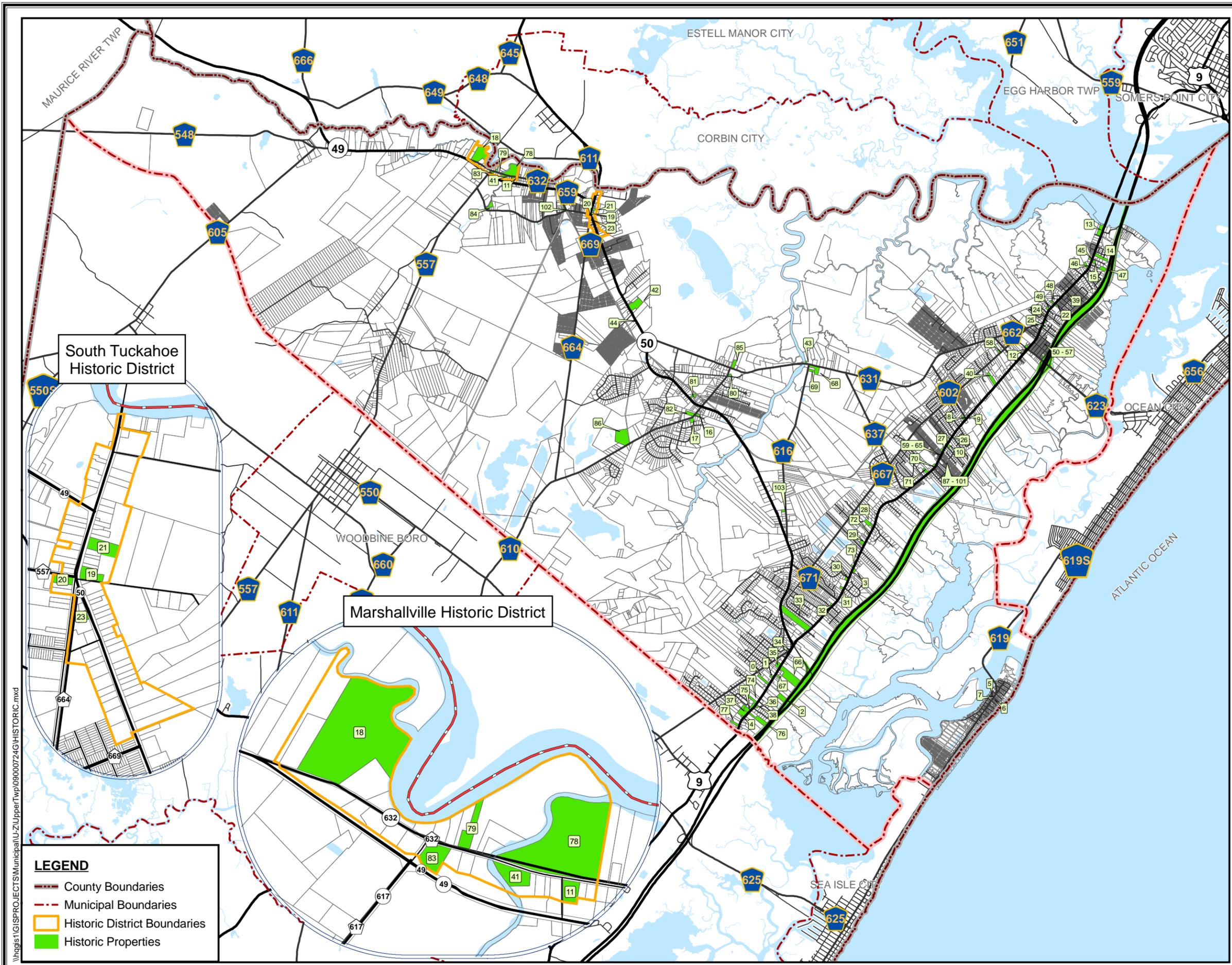


0 2,500 5,000 7,500 10,000
Feet

DIGITAL SPATIAL DATA SOURCES:
- CAPE MAY COUNTY GEOGRAPHIC INFORMATION SYSTEM
- NEW JERSEY DEPARTMENT OF COMMUNITY AFFAIRS, OFFICE OF SMART GROWTH
- NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF GEOGRAPHIC INFORMATION
- UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICES
- NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY, OFFICE OF GIS



MARCH 2010



LEGEND

- County Boundaries
- Municipal Boundaries
- Historic District Boundaries
- Historic Properties

\\hgis1\GIS\PROJECTS\Municipal\U-Upper\wp09000724\HISTORIC.mxd

FIGURE 15

OPEN SPACE

TOWNSHIP OF UPPER

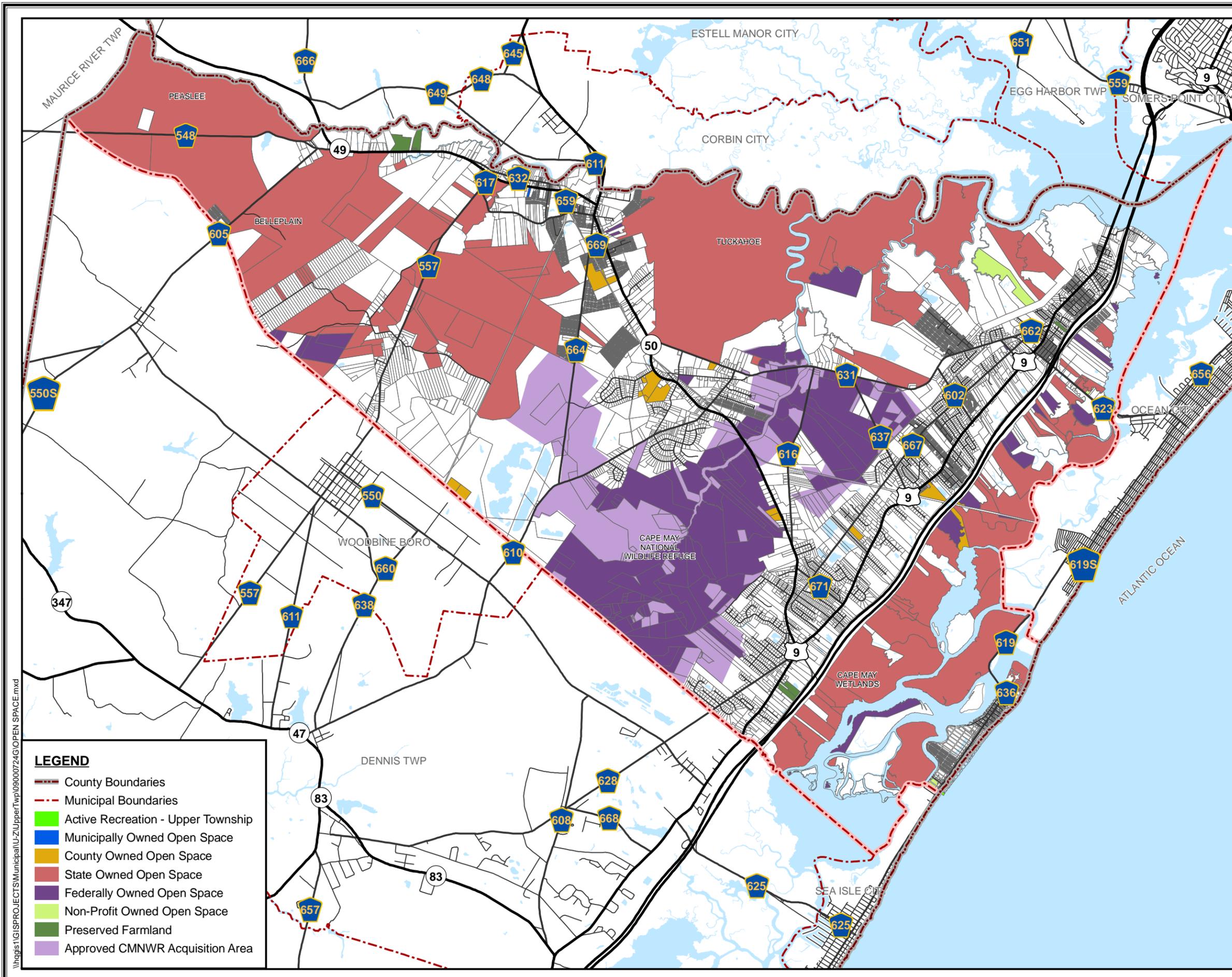
CAPE MAY COUNTY
NEW JERSEY



DIGITAL SPATIAL DATA SOURCES:
- CAPE MAY COUNTY GEOGRAPHIC INFORMATION SYSTEM
- NEW JERSEY DEPARTMENT OF COMMUNITY AFFAIRS, OFFICE OF SMART GROWTH
- NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF GEOGRAPHIC INFORMATION
- UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICES
- NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY, OFFICE OF GIS



FEBRUARY 2010



LEGEND

- County Boundaries
- Municipal Boundaries
- Active Recreation - Upper Township
- Municipally Owned Open Space
- County Owned Open Space
- State Owned Open Space
- Federally Owned Open Space
- Non-Profit Owned Open Space
- Preserved Farmland
- Approved CMNWR Acquisition Area

\\hgis1\GIS\PROJECTS\Municipal\U-Z\UpperTwp\090000724\OPEN SPACE.mxd

