ENVIRONMENTAL RESOURCE INVENTORY

ERI

DECEMBER 2011

For the Township of:

HAMILTON

Mercer County, New Jersey

by:

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

with:

The Hamilton Township Environmental Commission

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The Delaware Valley Regional Planning Commission is dedicated to uniting the region's elected officials, planning professionals, and the public with a common vision of making a great region even greater. Shaping the way we live, work, and play, DVRPC builds consensus on improving transportation, promoting smart growth, protecting the environment, and enhancing the economy. We serve a diverse region of nine counties: Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer in New Jersey. DVRPC is the federally designated Metropolitan Planning Organization for the Greater Philadelphia Region — leading the way to a better future.

The symbol in our logo is adapted from the official DVRPC seal and is designed as a stylized image of the Delaware Valley. The outer ring symbolizes the region as a whole while the diagonal bar signifies the Delaware River. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey.

DVRPC is funded by a variety of funding sources including federal grants from the U.S. Department of Transportation's Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), the Pennsylvania and New Jersey departments of transportation, as well as by DVRPC's state and local member governments. The authors, however, are solely responsible for the findings and conclusions herein, which may not represent the official views or policies of the funding agencies.

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The impetus for the creation of this document, and its guidance and review, came from the Hamilton Township Environmental Commission.

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Executive Summary

Hamilton Township is a municipality of over 90,000 people and covers 40.2 square miles (25,728 acres). The township is located in southern Mercer County, the western part of central New Jersey. It is Mercer County's second-largest municipality and its most populated. Hamilton Township lies mostly in the Inner Coastal Plain, a physiographic province characterized by highly productive prime farmland. These agricultural soils, however, are also highly suitable for development. The landscape of the township is heavily dominated by urban development, which covers almost 15,000 acres, or 58 percent of the area.

There are about 131 miles of streams running through Hamilton Township, over 93 miles of which are headwater streams. There are also 200 acres of lakes and ponds, including Gropps Lake, Spring Lake, and Rowan Lake. Hamilton Township receives its public water supply from both the Potomac-Raritan-Magothy aquifer system (PRM) and the Delaware River.

There are portions of two watersheds and 11 subwatersheds located within Hamilton Township. In 2008, all of these subwatersheds were impaired for one or more designated uses, and none had reached full attainment of standards. Water quality impairments include arsenic, mercury, phosphorus, lead, and other contaminants.

Hamilton Township is home to a variety of plant and animal life. The township contains numerous types of habitats, all of which are important for maintaining biodiversity. Wooded wetlands and upland forests are the two most abundant natural ecosystem types found in the township. Approximately 39 percent (9,920 acres) of Hamilton Township has been identified by the Landscape Project as critical or suitable habitat for rare or declining species. The Natural Heritage Database of the NJDEP lists 12 species of rare wildlife found in the township, including the bald eagle, the shortnose sturgeon, Cooper's hawk, the eastern box turtle, and the eastern pondmussel.

Hamilton Township is also home to a number of historic sites, 10 of which are currently listed on the National and State Registers of Historic Places, including the Abbott Farm National Historic Landmark, the Isaac Pearson House, and Bow Hill.

Hamilton has experienced tremendous development pressures over the past few decades. Accommodating development sustainably requires an understanding of the critical natural and community resources within the township. This Environmental Resource Inventory is an important step toward that goal.

CHAPTER 1

Introduction

The purpose of an Environmental Resource Inventory is to identify and describe the natural resources of a community. A community's natural resources–its soil, water, air, forests, fields, and waterways–are fundamental to its character. The protection and wise use of those resources is essential to the public health, safety, and welfare of current and future residents.

The Environmental Resource Inventory provides the basis for the development of methods and steps to preserve, conserve, and utilize those resources, although it does not include specific recommendations to those ends. It is, instead, a compendium of all the existing information that can be found about a township's natural resources, presented in a form that is useful to a broad audience. The inventory reflects a particular moment in time and should be updated as new data becomes available.

Anchor Thread Park

The settlement and growth of Hamilton Township is inherently tied to its natural resources. The area has been inhabited since prehistoric times and contains one of the most important archeological sites in the eastern United States, the Abbott Farm National Historic Landmark, which was occupied by Native Americans for thousands of years. Early settlers from Europe saw the forests, the waters, and the soils as opportunities for industry, development, and prosperity. Hamilton Township's environmental resources enabled the rise of its industries, agriculture, and communities.

As development pressures increase in and around Hamilton Township, documentation of its natural resources becomes a necessity. Special measures to protect and enhance the historic characteristics, agricultural economy, unique forest ecosystems, and water bodies of Hamilton are essential to maintain these resources in the face of increasing population and development. Hamilton Township's water, wetlands, forests, and grasslands provide significant habitat for a wide variety of plants and animals, many of which are threatened and endangered. These areas are also critically important in protecting the health and vitality of the township. Detailed documentation of these resources will aid Hamilton's citizens in balancing the pressures of growth with conservation, and in maintaining and shaping the community's unique identity while preserving its rich historic fabric and exceptional natural environment.

Sources

Several documents and reports were utilized in preparing the *Environmental Resource Inventory (ERI) for Hamilton Township*. These reports and references are listed at the end of this document.

The maps and data relating to natural resources are mainly derived from the New Jersey Department of Environmental Protection's (NJDEP's) Geographic Information System mapping, The Landscape Project, which was produced by the Endangered and Nongame Species Program of the New Jersey Division of Fish and Wildlife, reports by the United States Geological Survey (USGS) and New Jersey Geological Survey (NJGS), and data and maps compiled by the Delaware Valley Regional Planning Commission (DVRPC). Information from these sources specific to Hamilton Township has been included whenever it was available. Information from other reports about specific sites has also been incorporated, along with data provided by the township and county. The ERI has been reviewed and revised by members of the Environmental Commission and other municipal officials.

Hamilton-Trenton-Bordentown Marsh

Descriptive introductions to some topics have been included in the ERI to give readers background on various complex topics. The hope is that this information will also assist the Environmental Commission and other township officials in obtaining additional data from state sources in the future and in determining the types of investigations that still need to be conducted.

CHAPTER 2

Brief History

Long before European settlement, various peoples occupied the land that would become Hamilton Township. Excavations from the Abbott Farm National Historic Landmark site indicate that humans have lived in Hamilton Township for thousands of years. This site, located within the Hamilton-Trenton-Bordentown Marsh, has a concentration of prehistoric artifacts from the Middle Woodland period (circa A.D. 1 to A.D. 900). An excavated garbage pit contained sturgeon, bear, and beaver bones from over one thousand years ago.

By the time of European arrivals, the Algonquin-speaking Native Americans in the region called themselves the Lenni Lenape. Later, they were called the Delaware by the Europeans. The Lenni Lenape occupied the area within the present State of New Jersey, the southeast section of New York State, northern areas of the State of Delaware and the eastern part of the State of Pennsylvania. The Lenni Lenape valued this region for its rich soils and abundance of fish and game. Agriculture provided a substantial portion of their diet. The regional creeks were extensively utilized by the Lenni Lenape for transportation. In Algonquin, Lenni Lenape means “true men” or “original people.” The Europeans called them “Delaware Indians” because they inhabited the Delaware Valley, which itself was named in honor of the Governor of Virginia, Sir Thomas West, and Third Lord de la Warr.

Civil War and Native American Museum at Veterans Park

Although indigenous people lived in the region for thousands of years while leaving a minimal mark on the land, they succumbed to the diseases and encroachment of the newly arrived European settlers. Many departed to areas of New York, Ohio, Wisconsin, and eventually to Oklahoma. By 1758, all remaining Native Americans south of the Raritan River were encouraged to live in the 3,258-acre reservation called Brotherton in what is now Shamong Township, New Jersey; this has been recognized as the first Indian Reservation in the country.

The first European settlers in the Delaware Valley were the Dutch, who, in 1623, established Fort Nassau near what is today Gloucester City, Camden County. In 1644, King Charles II of England took control of much of America’s eastern seaboard, and

deeded most of present-day New Jersey to his brother, the Duke of York, who split it into East and West. Present-day Hamilton Township was located near the divide in West Jersey. The British quickly sought to occupy the land and secure its control. Throughout the 17th century, sections of New Jersey were acquired from the Lenni Lenape tribe, including present-day Hamilton Township.

The area of Hamilton Township was first settled by the British over 300 years ago. In November 1677, two British ships, the "Willing Mind" and "Martha," carrying 114 passengers, anchored in the Delaware River. These early settlers established "Yorkshire Tenth" in West Jersey, named after the division of this land into 10 areas. Yorkshire Tenth was bounded by Assunpink Creek in the North, Rancocas Creek in the South, the Delaware River on the West, and by a province line to the east. On December 10, 1678, a ship from Hull, England, the "Shield," arrived off the shore of Yorkshire Tenth. The passengers, who walked ashore on ice, became the first inhabitants of Nottingham Township, a subsection of Yorkshire Tenth that included present-day Hamilton Township and Trenton south of the Assunpink Creek.

North Crosswicks Historic District

Settlement of what would become Hamilton Township began along the bluff southeast of Chambersburg and further southeast on Crosswicks Creeks. The earliest inhabitants were Episcopalians, although Quakers soon predominated. Presbyterians and Baptists later settled in this area as well. These early European settlers were farmers, tradesmen, wheelwrights, tailors, shipbuilders and carpenters. The tidal waterways of the township provided the principal means for the trade of agricultural goods and other commerce.

In 1783, Congress agreed to make Trenton the nation's capital, which greatly upset the Southern members of Congress. In order to appease them, it was decided to build two capitals: one in Trenton and one near Georgetown. However, General George Washington adamantly disagreed and eventually convinced the entire Congress to build the capital on the banks of the Potomac River on the land that is now Washington, D.C.

The beginning of an extensive transportation system emerged in the 1830s with the construction of both the Delaware and Raritan (D & R) Canal and the Camden and Amboy Railroad. Coal and other freight were pulled down the canal by mule-drawn barges and, later, steam tugboats. The D & R Canal was one of the busiest navigation canals in the country for nearly a century. The Camden and Amboy Railroad was the third formal railroad in the country and was the longest railroad at the time of its construction. Built to connect Trenton and New Brunswick, the right of way of the Camden and Amboy Railroad cut diagonally across many farms in Hamilton Township. The canal and railroad attracted a variety of industries, and by the end of the 19th century, Trenton was a leader in the iron and steel industry. These and other industries brought economic prosperity and employment to the area.

In 1833, the English-made steam locomotive, the “John Bull,” began its cross-state service through Edgebrook in Hamilton Township. The John Bull was retired from service in 1866 and is currently housed in the Smithsonian’s National Museum of American Industry. In 1981 the Smithsonian brought the John Bull out of retirement for a brief run, declaring the John Bull the world’s oldest operable self-propelled steam locomotive.

Mercer County was officially founded in 1838, when the New Jersey State Legislature redrew county lines and formed 15 counties from the original 13. Mercer County was named in honor of the distinguished Revolutionary War hero General Hugh Mercer, who died from wounds inflicted during the Battle of Princeton in 1777. By the time of its founding, Mercer County was a well-established, economically prosperous and historically significant area.

Trenton was established as the state capital in 1790 and soon became one of the most powerful and economically significant cities in the 19th and early 20th centuries due to its advantageous location along the Delaware River and midway between New York City and Philadelphia.

Grafton House

One of the primary commercial centers in Hamilton Township during the 1800s was White Horse. By 1875, approximately 30 farms were located in White Horse, in addition to river-facilitated businesses such as John Abbott’s Dock and Warehouse. Goods such as fabric, wheat, and tea were transported to Philadelphia and Trenton through White Horse. Other early settlements in Hamilton included Lakeside Park, Edgebrook, and Duck Island.

In the mid 1800s, multiple trolley companies began to operate in the area, including the City Railroad Company, the Trenton Horse Railroad Company, and the Trenton & Mercer Traction Corporation. In 1868 the City Railroad Company built more rail lines than the Trenton Railroad Company, and the two companies eventually merged. The Trenton & Mercer Traction Company operated several routes through the neighborhoods of Bromley, Mercerville, and Hutchinson’s Mills. In 1863 the Trenton Horse Railroad Company received authorization to lay tracks on State Street from Clinton Avenue to the western edge of town. By 1892 the Hamilton trolley system had converted to electric trolleys, reaching peak popularity in the early 20th century. By the 1920s, however, the trolley system began to decline due to the increasing affordability of the automobile.

Prior to 1860, the crescent shaped Duck Island had been used primarily for agricultural purposes for crops, including tobacco, horseradish, and corn. With the construction of a gold jewelry factory in 1859, the area began to transform into a community of light industry and commercial enterprises. By 1930 most of the island had been purchased by T. Arthur Karno, who sold the land to oil companies for the housing of petroleum storage tanks. Over the next six years, properties on Duck Island were acquired by numerous oil

companies, including the Atlantic Oil Refining Company, Shell Oil Company, Mobile Oil Company, and American Oil Distributors. In 1932 the Trenton Marine Terminal was built, serving as the only facility designed for handling general cargo. The terminal would go on to play a significant role in the development and success of the Port of Trenton. By the 1960s, the landscape of Duck Island had been completely transformed by industry. In the 1990s, Duck Island would become the site of a 96-acre wetlands mitigation project, compensating for wetlands destroyed by highway construction, the largest such project undertaken by the New Jersey Department of Transportation.

By the 1880s, clay mining was a flourishing industry in several parts of Hamilton Township, notably Cornell Heights and Mercerville. The natural clay deposits of Hamilton helped to fuel the pottery industry in Trenton, which was at the time considered the pottery capital of the country. The two largest clay mining operations in the township were Moon Kaolin Clay Company and the Morton Company.

In 1932 the D & R closed, and went through many years of neglect before becoming a state park in 1974, shortly after being placed on the State and National Registries of Historic Places. A trail along the canal was designated in 1992 as part of the National Recreation Trail System.

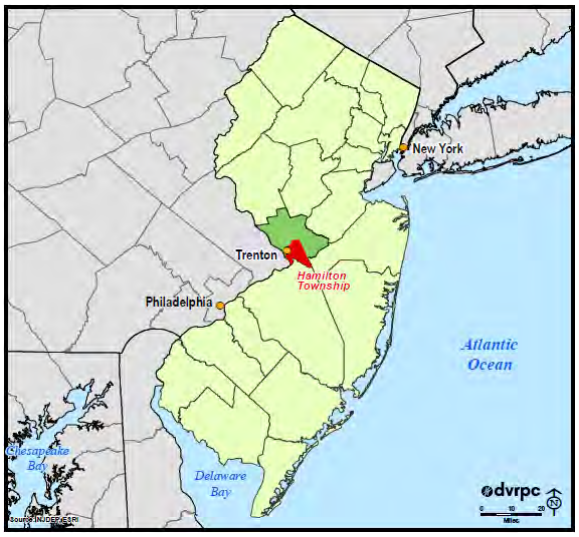
After World War II, large areas of farmland in Hamilton Township were developed to accommodate an expanding population and economy. Most existing farms today are located in southeast Hamilton Township. Hamilton Township's rapid growth after World War II was facilitated by the construction of three major highways within its boundaries. The New Jersey Turnpike began construction in 1950, followed by the Interstates 295 in 1958 and 195 in 1968. These three limited-access highways spurred accelerated population growth in and around Hamilton Township.

The Hamilton Township Transit Center of NJ Transit's Northeast Corridor opened in 1999 and is one of the transit system's busiest stations, with over 1.5 million passengers annually.

CHAPTER 3

Location, Size, and Land Use

Figure 1: Location of Hamilton Township



Source: DVRPC, 2010

Hamilton is an incorporated township located in southern Mercer County, in the western part of central New Jersey. Hamilton Township borders nine municipalities in four counties. See **Map 1: Places in Hamilton Township** and **Map 2: Aerial Photo (2007)**.

There are a number of individual communities/neighborhoods within Hamilton Township, each with its own identity. These include Hamilton Square, Bromley, Yardville, North Crosswicks, White Horse, Mercerville, and Groveville.

Hamilton Township occupies a total area of 40.2 square miles (25,216 acres), and is located within both the Inner Coastal Plain and the Piedmont physiographic provinces. It is Mercer County's second-largest municipality and the most populated. The U.S. Census Bureau estimated in 2009 that Hamilton Township had a population of 90,605 people, a four percent increase from its 2000 population of 87,109.

Hamilton Township is highly accessible by a number of major roadways, including Interstates 195 and 295, the New Jersey Turnpike (Interstate 95), U.S. Highways 130 and 206, and State Highways 33 and 29. There is also a stop on the New Jersey Transit Northeast Corridor Line in Hamilton Township. See the **Transportation** section.

According to 2007 New Jersey Department of Environmental Protection (NJDEP) data derived from aerial photography, the majority of land in Hamilton Township is classified as urban, which makes up 58 percent of the township, or almost 15,000 acres. Wetlands cover 20 percent of the township, or 5,211 acres. The third most common type of land use in Hamilton Township is forest, comprising just over eight percent, or 2,188 acres. This is followed closely by agriculture, which also makes up eight percent of the township, or 2,163 acres.

Table 1: General Land Cover (2007) shows Hamilton Township's land cover grouped into general categories. This is illustrated on **Map 3: NJDEP Land Cover (2007)**. **Table 2: Detailed Land Use/Land Cover (2007)** breaks down the 2007 general land cover categories into detailed categories.

Table 1: General Land Cover (2007)

General Land Classes	Area (Acres)	Percent of Township
Agriculture	2,163.59	8.4%
Barren Land	430.72	1.7%
Forest	2,188.20	8.5%
Urban	14,996.98	58.3%
Water	737.73	2.9%
Wetlands	5,210.99	20.3%
Total	**25,728.20**	**100.0%**

Source: NJDEP, 2007

Table 2: Detailed Land Use/Land Cover (2007)

General Land Class	Detailed Land Type	Area (Acres)	Percent Of Township
Agriculture	Confined Feeding Operations	3.26	0.0%
	Cropland and Pastureland	1,514.89	5.9%
	Orchards/Vineyards/Nurseries/Horticultural Areas	518.35	2.0%
	Other Agriculture	127.09	0.5%
Barren Land	Altered Lands	119.12	0.5%
	Transitional Areas	311.60	1.2%
Forest	Coniferous Forest (>50% Crown Closure)	15.26	0.1%
	Coniferous Forest (10-50% Crown Closure)	3.63	0.0%
	Deciduous Brush/Shrubland	393.53	1.5%
	Deciduous Forest (>50% Crown Closure)	1,153.18	4.5%
	Deciduous Forest (10-50% Crown Closure)	377.04	1.5%
	Mixed Deciduous/Coniferous Brush/Shrubland	132.87	0.5%
	Mixed Forest (>50% Coniferous with >50% Crown Closure)	3.92	0.0%
	Mixed Forest (>50% Deciduous with >50% Crown Closure)	15.73	0.1%
	Mixed Forest (>50% Deciduous with 10-50% Crown Closure)	13.72	0.1%
	Old Field (< 25% Brush Covered)	78.33	0.3%
	Plantation	1.00	0.0%
Urban	Athletic Fields (Schools)	202.36	0.8%
	Cemetery	297.03	1.2%
	Commercial/Services	1,750.20	6.8%
	Industrial	682.58	2.7%
	Industrial and Commercial Complexes	10.14	0.0%

General Land Class	Detailed Land Type	Area (Acres)	Percent Of Township
	Major Roadway	512.32	2.0%
	Military Installations	4.81	0.0%
	Mixed Residential	1.58	0.0%
	Mixed Urban or Built-Up Land	36.49	0.1%
	Other Urban or Built-Up Land	1,307.99	5.1%
	Phragmites Dominate Urban Area	8.27	0.0%
	Railroads	123.29	0.5%
	Recreational Land	541.47	2.1%
	Residential, High Density or Multiple Dwelling	1,413.03	5.5%
	Residential, Rural, Single Unit	827.29	3.2%
	Residential, Single Unit, Low Density	649.72	2.5%
	Residential, Single Unit, Medium Density	5,946.51	23.1%
	Stormwater Basin	226.13	0.9%
	Transportation/Communication/Utilities	262.27	1.0%
	Upland Rights-of-Way Developed	145.33	0.6%
	Upland Rights-of-Way Undeveloped	48.15	0.2%
Water	Artificial Lakes	192.12	0.7%
	Bridge Over Water	5.60	0.0%
	Natural Lakes	8.38	0.0%
	Streams and Canals	102.68	0.4%
	Tidal Rivers, Inland Bays, and Other Tidal Waters	428.94	1.7%
Wetlands	Agricultural Wetlands (Modified)	405.38	1.6%
	Coniferous Wooded Wetlands	3.83	0.0%
	Deciduous Scrub/Shrub Wetlands	333.13	1.3%
	Deciduous Wooded Wetlands	3,290.73	12.8%
	Disturbed Wetlands (Modified)	73.04	0.3%
	Former Agricultural Wetland (Becoming Shrubby, Not Built-Up)	31.20	0.1%
	Freshwater Tidal Marshes	472.15	1.8%
	Herbaceous Wetlands	253.86	1.0%
	Managed Wetland in Built-Up Maintained Rec Area	32.11	0.1%
	Managed Wetland in Maintained Lawn Greenspace	58.92	0.2%
	Mixed Scrub/Shrub Wetlands (Coniferous Dom.)	4.48	0.0%
	Mixed Scrub/Shrub Wetlands (Deciduous Dom.)	12.06	0.0%
	Mixed Wooded Wetlands (Coniferous Dom.)	4.52	0.0%

General Land Class	Detailed Land Type	Area (Acres)	Percent Of Township
	Mixed Wooded Wetlands (Deciduous Dom.)	5.23	0.0%
	Phragmites Dominate Coastal Wetlands	30.12	0.1%
	Phragmites Dominate Interior Wetlands	54.51	0.2%
	Wetland Rights-of-Way	145.70	0.6%
Total		**25,728.20**	**100.0%**

Source: NJDEP, 2007

Complementing this NJDEP land cover data is land-use data provided by the Delaware Valley Regional Planning Commission (DVRPC) based on 2005 digital imagery. Different types of urban development are identified in greater detail than in the NJDEP data. As listed in **Table 3: Land Use (2005)**, single-family detached housing is the most common land use in the borough, covering nearly one-third of all land. This is followed by wooded land, which covers over 22 percent of the township. These land uses are shown on **Map 4: DVRPC Land Use (2005)**.[1]

Table 3: Land Use (2005)

Land Use Description	Area (Acres)	Percent of Township
Agriculture	3,295.69	12.81%
Commercial	1,231.00	4.79%
Community Services	587.69	2.28%
Manufacturing: Light Industrial	452.84	1.76%
Mining	5.88	0.02%
Parking: Agriculture	2.70	0.01%
Parking: Commercial	570.02	2.22%
Parking: Community Services	97.59	0.38%
Parking: Light Manufacturing	40.99	0.16%
Parking: Multi-family	139.92	0.54%
Parking: Recreation	27.22	0.11%
Parking: Transportation	17.22	0.07%
Parking: Utility	4.71	0.02%
Recreation	782.44	3.04%
Residential: Mobile Home	0.05	0.00%
Residential: Multi-family	646.10	2.51%

[1] The slight difference in total acreage of Hamiton Township in the following tables is due to discrepancies in the mapped boundary from different data sources.

Land Use Description	Area (Acres)	Percent of Township
Residential: Row Home	25.90	0.10%
Residential: Single-Family Detached	7,974.58	31.00%
Transportation	763.91	2.97%
Utility	470.54	1.83%
Vacant	2,000.20	7.78%
Water	861.19	3.35%
Wooded	5,726.17	22.26%
Total	**25,724.56**	**100.00%**

Source: DVRPC, 2005

CHAPTER 4

Natural Resources

Physiography

Figure 2: The Physiographic Regions of New Jersey

Source: NJGS

Physiography is the study of a location in relation to its underlying geology. New Jersey is characterized by four main physiographic provinces: the Ridge and Valley, the Highlands, the Piedmont Plateau, and the Atlantic Coastal Plain. The Atlantic Coastal Plain is divided into the Inner and Outer Coastal Plains (see **Figure 2: The Physiographic Regions of New Jersey**).

Hamilton Township is located mostly within the Inner Coastal Plain, although the northwestern portion lies within the Piedmont Plateau. The fall line of the Coastal Plain and the Piedmont Plateau crosses Hamilton Township diagonally from west to northeast and is shown on **Map 14: Geologic Outcrops**. The fall line is the point of contact where the hard crystalline rocks of the Piedmont dip under and disappear beneath the sediments of the Coastal Plain. The Piedmont is underlain by 200 million year old sedimentary rocks, with igneous rocks forming rocky ridges and outcrops. The Inner Coastal Plain is underlain by sands and gravels that are about 135-65 million years old.

The Atlantic Coastal Plain landscape extends from Massachusetts to Texas and generally consists of unconsolidated sands, silts, and clays. As these sediments are prone to erosion, the Coastal Plain is generally characterized by regions of low topography. In New Jersey, the Inner Coastal Plain is made up of interbedded sand and clay. Deposits originating in the breakdown of Appalachian and Catskill sedimentary, metamorphic, and igneous rocks are interbedded with layers formed by oceanic (marine) deposition, which occurred as the ocean shoreline advanced and receded over geologic time.

The Inner Coastal Plain is characterized by relatively flat terrain, underlain by sands and gravel from the Cretaceous Period. Generally, soils of the Inner Coastal Plain are quite fertile. The Outer Coastal Plain was formed more recently than the Inner Coastal Plain. It was laid down by the ocean and developed during the mid-to-late part of the Cenozoic Era, 65 million years ago to the present. The Outer Coastal Plain soils are sandier and less fertile than those of the Inner Plain. The soils in the Outer Coastal Plain do not hold water as well.

The Piedmont Plateau extends from Massachusetts to Georgia. The Piedmont is characterized by slightly folded and faulted Triassic and Jurassic sedimentary rock, and igneous rocks of the Jurassic age. This folding and faulting created the rolling plains of the piedmont, while the igneous intrusions created the mountainous ridges that characterize the province. At the southern edge of the province, small bands of highly metamorphosed rocks from the Middle Proterozoic to Cambrian can be found.

The Piedmont Plateau in New Jersey occupies nearly 1,500 square miles, or one-fifth of the state's total land area. It is primarily composed of sandstone, shale, and argillite. Generally, the rocks in this area are more susceptible to erosion than the rocks to the north in the Highlands physiographic province. The soils of the Piedmont Plateau are rich and well watered and the topography is gently rolling, with hills and valleys lying at elevations between 100 and 400 feet. The region consists of primarily clayey, moderately fertile soils, and historically produced fruits, vegetables, and livestock in the northern portions of New Jersey.

Topography and Surface Landscapes

Topography relates to the surface terrain and features of an area. The vast majority of Hamilton Township is generally flat, which is typical of areas in the Inner Coastal Plain. Low ridges and elevations delineate the boundaries of watersheds, seen in **Map 11: Watersheds**. The lowest elevation in Hamilton Township, zero feet above sea level, is located in the western portion of the township along the Delaware River. At 120 feet above sea level, the highest point is located in eastern Hamilton Township north of U.S. Route 33 and south of Miry Run. The entire topography of Hamilton Township is shown in **Map 5: Elevation**.

John A. Roebling Memorial Park

Because of its low elevation and relatively flat topography, 3,982 acres (16 percent) of Hamilton Township are located in FEMA's 100-year floodplain, and another three percent is located in the 500-year floodplain. These areas are shown on **Map 10: Floodplains (2008)**. Floodplains occur predominantly along the rivers and tributaries in the township. In general, development and agriculture occur on upland areas, with wetlands and forests occurring in the lower elevations. However, there are some developed areas located within the 100- and 500-year floodplains. See the **Floodplains** section for further information.

Although over half of the township is developed land, and another eight percent is occupied by agricultural uses, a network of naturally vegetated areas and ecological communities exists in the township, as seen in **Map 17: Natural Vegetation (2007)**. The remaining natural areas are largely concentrated in stream corridors. The dominant vegetation type is deciduous wooded wetlands, bordered by deciduous upland forest in many places.

Steep Slopes

Slope is measured as the percent of vertical rise to horizontal distance. The majority of Hamilton Township has slopes of less than 10 percent, and steeper slopes are predominantly located in southern Hamilton Township. The steepest slopes in the township are located to the east of the Hamilton-Trenton Marsh, as well as alongside Gropps Lake, Crosswicks Creek, Back Creek, and Doctors Creek. Most of the steep slopes in the township are well vegetated, with a dense forest cover dominated by deciduous trees. Hamilton Township's steep slopes are depicted on **Map 6: Steep Slopes**.

In general, development of areas with steep slopes is inadvisable, as it is likely to result in soil instability, erosion, sedimentation of streams, increased stormwater runoff, and increased flooding. These effects are responsible for habitat destruction, water pollution, and potential damage to property. Erosion on steep slopes is especially prevalent where excessive tree removal has taken place.

On steep slopes bordering creeks and streams, it is not unusual to see trees that have fallen into the gulleys or into the streams themselves. In some places, the rate of tree loss is accelerated beyond natural rates by erosion from flash flooding, which is often caused by increases in impervious surface upstream. However, trees on steep slopes fall for other reasons as well, including age, severe storms (especially if their roots have been exposed from erosion), and heat and water loss, which dries the soil. Where steep slopes remain forested, some very old trees can often be found. No detailed inventory of these sites exists at present, although some of the Hamilton Township's rare plant species, from the state's Natural Heritage Database, may inhabit these areas (see **Appendix C: Plant Species in Hamilton Township, Rare Plant Species**). Some regions have been negatively affected by fertilizers from adjoining farm fields, by runoff from development, or by recent flooding, but there may still be intact sites.

Soils

Soil is the foundation for all land uses. A region's soil defines what vegetation is possible, thereby influencing agricultural uses. Soil properties also affect the location of wells and septic facilities, often determining development potential in certain areas. Soil is a natural resource that cannot be replenished on the human time scale.

Hamilton Township soils consist of 30 series types and 55 variations within those series (excluding water), as identified by the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS). All soil types in the township are listed below in **Table 4: Soils** and shown on **Map 7: Soils**.

Over half of all soils in Hamilton Township are considered hydric soils. Hydric soils, as defined by the NRCS, are soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic (oxygen-free)

conditions in their subsurface. These soils have unique soil properties and are an important element of wetland areas. If a soil is classified as “hydric,” land use may be restricted due to the relationship of hydric soils to the definition of wetlands and to laws regarding wetland preservation. Hydric soils can qualify as soils of prime and statewide importance when the limitations are overcome by measures such as drainage or flood control.

Table 4: Soils

Soil Type	Description	Area (Acres)	Percent of Hamilton Township	Ag. Quality	Hydric (Y/N)
AugmB	Aura sandy loam, moderately firm, 2 to 5 percent slopes	444.82	1.7%	P–1	N
AugmC	Aura sandy loam, moderately firm, 5 to 10 percent slopes	27.57	0.1%	S–1	N
BHSGB	Birdsboro gravelly solum variant soils, 0 to 6 percent slopes	124.55	0.5%	L–1	N
ComC	Collington fine sandy loam, 5 to 10 percent slopes	0.04	0.0%	S–1	N
DohgB	Downer fine sandy loam, gravelly clay loam substratum, 0 to 5 percent	161.16	0.6%	P–1	N
EkaAr	Elkton loam, 0 to 2 percent slopes, rarely flooded	15.75	0.1%	S–1	Y
EkbA	Elkton silt loam, 0 to 2 percent slopes	524.41	2.0%	S–1	Y
EvgB	Evesboro loamy sand, 0 to 5 percent slopes	758.42	3.0%	L–1	N
EveB	Evesboro sand, 0 to 5 percent slopes	0.11	0.0%	N/A	Y
EVXB	Evesboro variant soils, 0 to 5 percent slopes	488.78	1.9%	N/A	N
FapA	Fallsington loam, 0 to 2 percent slopes	8.28	0.0%	S–1	Y
FamA	Fallsington sandy loam, 0 to 2 percent slopes	411.44	1.6%	S–1	Y
FmhAv	Fluvaquents, 0 to 3 percent slopes, very frequently flooded	388.65	1.5%	N/A	Y
FmhAt	Fluvaquents, loamy, 0 to 3 percent slopes, frequently flooded	589.19	2.3%	N/A	Y
FodB	Fort Mott loamy sand, 0 to 5 percent slopes	267.15	1.0%	N/A	N
FodC	Fort Mott loamy sand, 5 to 10 percent slopes	29.94	0.1%	N/A	N
FrkE2	Freehold sandy loam, 15 to 25 percent slopes	1.86	0.0%	N/A	N
FrkB	Freehold sandy loam, 2 to 5 percent slopes	17.41	0.1%	P–1	Y
GadB	Galestown loamy sand, 0 to 5 percent slopes	1,153.03	4.5%	U	N
GASB	Galloway variant soils, 0 to 5 percent slopes	523.20	2.0%	S–1	N
GKAWOB	Glassboro and Woodstown sandy loams, 0 to 5 percent slopes	1,214.07	4.7%	P–1	Y

Soil Type	Description	Area (Acres)	Percent of Hamilton Township	Ag. Quality	Hydric (Y/N)
HumAt	Humaquepts, 0 to 3 percent slopes, frequently flooded	39.66	0.2%	N/A	Y
KeoE	Keyport loam, 15 to 25 percent slopes	0.45	0.0%	N/A	N
LenB	Lenoir-Keyport silt loams, 0 to 5 percent slopes	446.79	1.7%	S–1	Y
MbaAt	Marsh, fresh water, 0 to 2 percent slopes, frequently flooded	1,687.07	6.6%	N/A	Y
MbpA	Matapeake loam, 0 to 2 percent slopes	73.90	0.3%	P–1	N
MbpB	Matapeake loam, 2 to 5 percent slopes	581.01	2.3%	P–1	N
MbpC2	Matapeake loam, 5 to 10 percent slopes, eroded	14.92	0.1%	S–1	N
MBYB	Mattapex and Bertie loams, 0 to 5 percent slopes	1,338.66	5.2%	S–1	Y
OthA	Othello silt loam, 0 to 2 percent slopes	1547.38	6.0%	S–1	Y
PHG	Pits, sand and gravel	158.39	0.6%	N/A	N
PmmA	Plummer sandy loam, 0 to 2 percent slopes	530.38	2.1%	S–1	Y
PmmwA	Plummer sandy loam, very wet, 0 to 2 percent slopes	840.21	3.3%	N/A	Y
PortA	Portsmouth variant silt loam, 0 to 2 percent slopes	206.61	0.8%	S–1	Y
SaaE	Sandy and silty land, steep	330.92	1.3%	N/A	N
SaaD	Sandy and silty land, strongly sloping	139.30	0.5%	N/A	N
SadB	Sassafras gravelly sandy loam, 2 to 5 percent slopes	245.94	1.0%	P–1	Y
SafA	Sassafras loam, 0 to 2 percent slopes	5.99	0.0%	P–1	Y
SagC3	Sassafras sandy clay loam, 5 to 10 percent slopes, severely eroded	104.40	0.4%	N/A	N
SacA	Sassafras sandy loam, 0 to 2 percent slopes	48.38	0.2%	P–1	Y
SacE	Sassafras sandy loam, 15 to 25 percent slopes	12.66	0.1%	N/A	N
SacB	Sassafras sandy loam, 2 to 5 percent slopes	2,439.05	9.5%	P–1	Y
SacC	Sassafras sandy loam, 5 to 10 percent slopes	614.57	2.4%	S–1	N
SacC2	Sassafras sandy loam, 5 to 10 percent slopes, eroded	448.17	1.7%	S–1	N
SaoB	Sassafras-Woodstown sandy loams, 2 to 5 percent slopes	203.18	0.8%	P–1	N
ThgB	Tinton loamy sand, 0 to 5 percent slopes	544.07	2.1%	S–1	Y
UddcB	Udorthents, dredged coarse materials, 0 to 8 percent slopes	528.70	2.1%	N/A	N
UdgB	Udorthents, gravelly substratum, 0 to 8 percent slopes	1,445.99	5.6%	N/A	N
UdstB	Udorthents, stratified substratum, 0 to 8 percent slopes	1,229.21	4.8%	N/A	N
UR	Urban land	1.14	0.0%	N/A	N

Soil Type	Description	Area (Acres)	Percent of Hamilton Township	Ag. Quality	Hydric (Y/N)
USGALB	Urban land-Galestown complex, 0 to 5 percent slopes	1,043.81	4.1%	N/A	N
USSASB	Urban land-Sassafras complex, 0 to 5 percent slopes	613.56	2.4%	N/A	N
WATER	Water	517.61	2.0%	N/A	N
WogA	Woodstown loam, 0 to 2 percent slopes	10.00	0.0%	P–1	Y
WoeB	Woodstown sandy loam, 2 to 5 percent slopes	0.08	0.0%	P–1	Y
WomfB	Woodstown-Fallsington sandy loams, 0 to 5 percent slopes	584.83	2.3%	S–1	Y
Total		**25,726.82**	**100.00%**		**13,684.43**

Source: USDA NRCS, 2004

Agricultural Quality of Soils

Prime Farmland Soils

Approximately 21percent (5,445 acres) of all soils in Hamilton Township are classified as Prime Farmland (P-1). Prime Farmlands are lands that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. They can sustain high yields of crops when managed with correct farming methods. Prime Farmlands are not excessively erodible or saturated with water for long periods of time and do not flood frequently. Prime Farmland is dispersed throughout Hamilton Township, although much of this land has been converted to residential use.

The NRCS outlines specific criteria for Prime Farmland classification. For example, according to Prime and Unique Farmlands federal regulation, soil horizons (layers) within a depth of 40 inches must have a pH between 4.5 and 8.4 (mildly acidic to mildly basic). In addition, the soils must have an average temperature above 32 degrees Fahrenheit at a depth of 20 inches. The USDA outlines additional Prime Farmland requirements for mean summer soil temperature, erodibility factor, water-table depth, permeability rate, and more. Land classified as Prime Farmland does not have to be farmed, but does have to be potentially available for such use. Thus, water and urban land does not qualify as Prime Farmland.

A horse farm in Hamilton's agricultural area

Farmland Soils of Statewide Importance

About 31 percent (8,054 acres) of soils in Hamilton Township are classified as Farmland Soils of Statewide Importance (S-1). These soils are close in quality to Prime Farmland and can sustain high yields of crops when correctly managed under favorable conditions. Criteria for establishing Farmland of Statewide Importance are determined by state agencies. These soils are found throughout the township; however, they are concentrated in the central and southern portions.

Farmland Soils of Local Importance

About three percent (882 acres) of soils in Hamilton Township are classified as Farmland Soils of Local Importance (L-1). These soils are not considered to be prime or statewide importance. Soils considered Farmland of Local Importance can produce food of high value, fiber, or horticultural crops. These soils are located across Hamilton Township.

Farmland Soils of Unique Importance

Four percent (1,153 acres) of soils in the township are considered to be of Farmland Soils of Unique Importance (U-1). The USDA outlines specific criteria for Soils of Unique Importance, which can support particular food or fiber crops. The criteria include temperature, humidity, air drainage, elevation, aspect, or proximity to market. In order for lands to be classified as Unique Farmland, the land must also be used for a specific high-value food or fiber and have an adequate moisture supply for that crop. These soils are mostly associated with wetlands areas and riparian corridors in Hamilton Township.

Soils Not Rated for Agricultural Use

Approximately 41 percent (10,459 acres) of Hamilton Township soils have not been rated for agricultural use by the NRCS and are therefore labeled “N/A.” These soils are not considered suitable for farming due to a number of different constraints, including water saturation, soil composition, human disturbance, or slope. Soils that are not rated are not necessarily limited for agricultural use. See **Table 5: Agricultural Values for Soils** for the acreage of each of these classes of farmland, which are shown on **Map 8: Agricultural Quality of Soils**.

Table 5: Agricultural Values for Soils

Designation	Type/Farm Classification	Area (Acres)	Percentage of Municipality
P-1	Prime Farmland Soils	5,445.01	21.2%
L-1	Farmland Soils of Local Importance	882.97	3.4%
S-1	Farmland Soils of Statewide Importance	7,787.07	30.3%
U-1	Farmland Soils of Unique Importance	1,153.03	4.5%
N/A	Soils Not Rated	10,458.77	40.7%
Total		**25,726.85**	**100.00%**

Source: USDA NRCS, 2004

Soil Suitability

Certain soil characteristics can severely restrict the use of sites for construction and development. **Table 6: Soil Limitations for Development** records the soils and their possible limitations for building foundations and septic systems. As indicated in the table, most of the township's soils are severely limited for on-site septic systems. Septic systems require soils that have a low water table (five feet or more from the surface) and high permeability to allow for proper drainage of wastewater. Soils with high water tables (five feet or less from the surface) create a potential for erosion, wet basements, and low permeability, often allowing wastewater to collect near the surface. Because the suitability of a soil for a septic disposal field is very site specific and relies on many factors, including, but not limited to, the soil type, there is not an accurate source of information regarding this subject. The best way to determine soil suitability for a septic system is to request a site survey by a professional.

Table 6: Soil Limitations for Development

Soil Series	Soil Types	Acreage	Land Use Implications*		
			Building without Basement	Building with Basement	Septic Systems
Aura	AugmB	444.82	A	A	C
	AugmC	27.57	B	B	C
Birdsboro	BHSGB	124.55	A	A	C
Collington	ComC	0.04	B	B	C
Downer	DohgB	161.16	A	A	C
Elkton	EkaAr	15.75	C	C	C

Soil Series	Soil Types	Acreage	Land Use Implications*		
			Building without Basement	Building with Basement	Septic Systems
	EkbA	524.41	C	C	C
Evesboro	EvgB	758.42	A	A	C
	EveB	0.11	A	A	C
	EVXB	488.78	A	A	C
Fallsington	FapA	8.28	C	C	C
	FamA	411.44	C	C	C
Fluvaquents	FmhAv	388.65	C	C	C
	FmhAt	589.19	C	C	C
Fort Mott	FodB	267.15	A	A	C
	FodC	29.94	B	B	C
Freehold	FrkE2	1.86	C	C	C
	FrkB	17.41	A	A	C
Galestown	GadB	1,153.03	A	A	C
Galloway	GASB	523.2	B	C	C
Glassboro	GKAWOB	1,214.07	C	C	C
Humauets	HumAt	39.66	C	C	C
Keyport	KeoE	0.45	C	C	C
Lenoir-Keyport	LenB	446.79	B	C	C
Marsh	MbaAt	1,687.07	NA	NA	NA
Matapeake	MbpA	73.9	A	A	C
	MbpB	581.01	A	A	C
	MbpC2	14.92	B	B	C
Mattapex	MBYB	1,338.66	C	C	C
Othello	OthA	1,547.38	C	C	C
Pits	PHG	158.39	NA	NA	NA
Plummer	PmmA	530.38	C	C	C
	PmmwA	840.21	C	C	C
Portsmouth	PortA	206.61	C	C	C
Sandy	SaaE	330.92	C	C	C
	SaaD	139.3	B	B	C
Sassafras	SadB	245.94	A	A	C

Soil Series	Soil Types	Acreage	Land Use Implications*		
			Building without Basement	Building with Basement	Septic Systems
	SafA	5.99	A	A	C
	SagC3	104.4	B	B	C
	SacA	48.38	A	A	C
	SacE	12.66	C	C	C
	SacB	2,439.05	A	A	C
	SacC	614.57	A	A	C
	SacC2	448.17	B	B	C
	SaoB	203.18	A	A	C
Tinton	ThgB	544.07	A	A	C
Udorthents	UddcB	528.7	A	A	C
	UdgB	1,445.99	A	A	C
	UdstB	1,229.21	A	A	C
Urban land	UR	1.14	NA	NA	NA
	USGALB	1,043.81	NA	NA	NA
	USSASB	613.56	NA	NA	NA
Water	WATER	517.61	NA	NA	NA
Woodstown	WogA	10	A	B	C
	WoeB	0.08	A	B	C
Woodstown-Fallsington	WomfB	584.83	A	B	C
Total		**25,726.82**			

Source: USDA NRCS, 2004

*Key to Land Use Implications	
A = Not Limited	Little or no limitation(s) or easily corrected by use of normal equipment and design techniques.
B = Somewhat Limited	Presence of some limitations, which normally can be overcome by careful design and management at somewhat greater cost.
C = Very Limited	Limitations that normally cannot be overcome without exceptional, complex, or costly measures.
NA = Not Rated	Soil series/type not rated for designated use.

Soil Series

Several soil series appear more frequently in Hamilton Township than others and are briefly described as follows according to the NRCS soil database. **See Table 4: Hamilton Township Soils** for a list of all soils found in Hamilton Township.

Sassafras

The most abundant soil series in Hamilton Township is the Sassafras series, which makes up almost 10 percent of township soils (2,439 acres). This series, which tends to be found on summits and side slopes, is located on upland areas in Hamilton Township. Sassafras soils are well drained and the seasonal high water table tends to be greater than 72 inches. This soil series is strongly to extremely acidic. Considered Prime Farmland, Sassafras soils are mainly used for general crops, truck crops, pastures, fruits, woodland, and a wide variety of nonfarming uses. These soils are highly suitable for construction, onsite effluent disposal, and recreational development. Native vegetation is mixed upland hardwoods, with some shortleaf and Virginia pine.

Marsh, Freshwater

Freshwater marsh is the second most abundant soil series in Hamilton Township, making up seven percent (1,687 acres) of soils. Poorly drained and containing 85 percent water, freshwater marshes are water saturated and are intermittently or permanently covered by water. Slopes range from zero to two percent. Dominant vegetation includes sedges, cattails, and rushes.

Othello

The Othello series makes up six percent (1,547 acres) of township soils. This series is generally found on lowland areas and is very shallow or poorly drained, with a water table from zero to 10 inches. The soil is strongly to extremely acidic. The Othello series is used for woodland and cropland, and it is considered a soil of Statewide Importance when drained. The dominant vegetation, where cultivated, is corn and soybeans, along with acreages of pasture or truck crops. Where wooded, the dominant vegetation is wetland hardwoods, mostly sweetgum, black gum, red maple, wetland oaks, loblolly pine, and pond pine.

Evesboro

The Evesboro series makes up about three percent (758 acres) of township soils. This soil series tends to be found on coastal plain uplands. It is excessively drained, with a water table greater than 72 inches and a slope of zero to 40 percent. Most Evesboro soil series are used for woodland, fruit and vegetable crops, or urban land. The woodland areas are repeatedly cut for wood products. Where irrigated, Evesboro soils are used for production

of peaches, grapes, sweet potatoes, pumpkins, and melons. This series is considered a soil of Local Importance. The dominant vegetation in wooded areas is black oak, white oak, red oak, yellow poplar, and chestnut oak, with scattered hickories, pitch pine, Virginia Pine, loblolly pin and scrub, and blackjack oaks.

Galestown

The Galestown series covers four percent (1,153 acres) of township soils. It is the only soil series considered to be of Unique Importance. Galestown soils are commonly found on marine terraces, uplands, or end marines on an elevation of 10 to 120 feet. This soil series is somewhat excessively drained, with a water table of 30 to 60 inches. The Galestown series is strongly to extremely acidic. These soils generally cultivate corn, soybeans, and truck crops. In the coastal plain areas, the dominant vegetation is black oak, white oak, shortleaf pine, Virginia pine, and loblolly pine. In glacial terminal moraine areas, the dominant vegetation is the eastern white pine, black oak, and Northern red oak.

Climate

Geographically situated approximately halfway between the Equator and the North Pole, New Jersey's climate is extremely variable. The state's temperate, continental climate is influenced by hot, cold, dry, and humid airstreams that vary from hot and humid to cold and dry. From May through September, New Jersey is dominated by moist, tropical air originating in the Gulf of Mexico and carried by prevailing winds from the southwest. In winter, winds generally prevail from the northwest, bringing cold, polar air masses from subarctic Canada.

New Jersey has five distinct climate regions: Northern, Central, Southwest, Pine Barrens, and Coastal. The variations between these climate regions is due to a combination of factors, including geology, distance from the Atlantic Ocean, and prevailing atmospheric flow patterns.

Hamilton Township lies within the Central Climate Zone, which stretches from New York Harbor to the great bend of the Delaware River near Trenton. There are about 15 to 20 days in the Central Climate Zone that reach above 90°F.The many paved surfaces and buildings of the region affect local temperatures by retaining more heat. This causes nighttime temperatures to generally be warmer than surrounding rural areas. This phenomenon is known as the "heat island effect."

Sayen Park

The National Climate Data Center (NCDC) is the world's largest active archive of weather data. Operating over 4,000 stations within the United

States, the closet NCDC station with available data is in Hightstown, less than 10 miles east of Hamilton Township. Based on the data collected at this station, the median annual temperature in the area between 1971 and 2000 was 52°F. January is the coldest month, with a median temperature of 23°F, and July is the hottest month, with a median temperature of 74°F. The mean annual precipitation is 47 inches. July is the rainiest month, with a mean precipitation of five inches, and February is the driest month, with an average of less than three inches. The normal average annual precipitation for the area between 1971 and 2000 was 47.7 inches, nearly identical to the statewide annual average precipitation of 47.9 inches.

Snowfall typically occurs in New Jersey when moist air from the south converges with cold air from the north. During the winter, the northern edge of the Central Climate Zone is considered to be the boundary between freezing and nonfreezing precipitation. In Hamilton Township, snowfall may occur from November to mid-April, but is most likely to occur from December to March. The average monthly snowfall is greatest in February, with a mean of 7.4 inches. In February 2010, Hamilton Township was hit by three major winter storms. Between November 2009 and February 2010, Hamilton Township received a total of 46 inches of snow.

Severe storm events, including thunderstorms, tropical storms, blizzards, ice storms, hail storms, and tornadoes, occur in Mercer County with varying frequency. Tornadoes are infrequent, and only about five generally weak tornadoes occur in New Jersey each year. Most areas in the state experience about 25 to 30 thunderstorms a year, although they strike inland areas like Hamilton Township more often than coastal areas. In recent history, hail has been the only severe storm event to have caused significant damage in Hamilton Township.

While not climate related, earthquakes are another natural hazard. They are very infrequent and very small on average in New Jersey. There have been no reported deaths caused by an earthquake in the state. Cumberland and Union counties are the only two counties in New Jersey not to have been at the epicenter of an earthquake in recorded state history. In 1933, Hamilton Township was the epicenter of an earthquake with a magnitude of 2.8.

Growing Seasons

Hamilton Township is located within U.S. Department of Agriculture (USDA) Plant Hardiness Zone 6B. Hardiness Zones are based on average annual minimum temperatures. The Hardiness Zones are helpful in indicating which plant species are able to survive in each area. There are 11 hardiness zones, with Zone 1 being the coldest and Zone 11 the warmest. The annual minimum temperatures of Zone 6B are typically between -5°F and 0°F. Most of southern and eastern New Jersey is designated as Zone 7B, the warmest Plant Hardiness Zone in New Jersey.

Hamilton Township’s agricultural growing season is approximately six months, or 219 days, from early April through early November. The growing season is generally defined

as the period between the last spring frost and the first autumn frost. However, the harvest of grain crops typically continues throughout November, and winter crops, such as broccoli, cauliflower, and cabbage, are grown until the first hard freeze, usually in early January. On average, the last spring frost occurs in New Jersey on April 4 and the average first frost is November 10. The frost-free growing season in Hamilton Township is about 60 days longer than in northern New Jersey, where frosts generally end in May and begin in October.

Surface Water Resources

Watersheds

A watershed is all the land that drains into a particular waterway, such as a river, stream, lake, or wetland. The high points in the terrain, such as hills and ridges, define the boundaries of a watershed. Large watersheds are made up of a succession of smaller ones, down to the catchment area of a local site. For example, the Delaware Watershed is made up of many smaller watersheds, such as the Crosswicks Creek and Rancocas Creek watersheds, which in turn can be broken into smaller subwatersheds, down to the catchment area of a headwater stream. Watersheds are natural ecological units, where soil, water, air, plants, and animals interact in a complex relationship.

The United States Geological Survey (USGS) has divided the country into hydrologic units, which are each designated by a hydrologic unit code (HUC). There are 21 regions–the largest hydrologic unit–in the U.S. that contain either the drainage area of a major river or the combined drainage areas of a series of rivers. Hamilton Township is located within the Mid-Atlantic region, which ultimately drains into the Atlantic Ocean. The 21 regions are divided into 221 subregions (HUC 4). Hamilton Township is within the Delaware subregion. Subregions are further divided into hydrologic accounting units (HUC 6) and cataloging units (HUC 8), and then into HUC 11 watersheds. In New Jersey, HUC 11 watersheds (identified by an 11-digit code) range in size from 25 to 143 square miles, and each contains a number of HUC 14 subwatersheds (identified by a 14-digit code). The State of New Jersey has 152 HUC 11 watersheds and over 900 HUC 14 subwatersheds.

Hamilton Township falls within two major watersheds: the Assunpink Creek Watershed and the combined Crosswicks-Doctors Creek Watershed. Within the boundaries of Hamilton Township, these areas are divided into six HUC 11 watersheds, which are further subdivided into 11 smaller HUC 14 subwatersheds. These are listed in **Table 7: Watersheds and Subwatersheds** and illustrated on **Map 11: Watersheds**.

Table 7: Watersheds and Subwatersheds

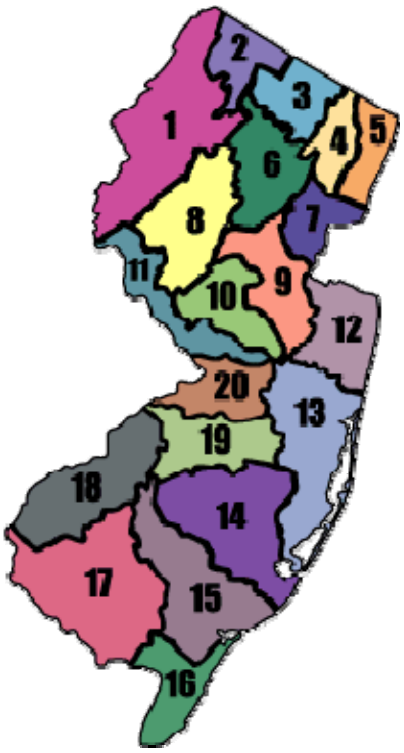
Watershed Management Area (WMA)	Watershed Name	HUC 11	Subwatershed Name	HUC 14	Area within Township (Acres)	Percent of Township
Central Delaware (11)	Assunpink Creek (above Shipetaukin Ck)	02040105230	Assunpink Ck (Shipetaukin to Trenton Rd)	02040105230050	1,016.67	4.0%
	Assunpink Creek (below Shipetaukin Ck)	02040105240	Miry Run (Assunpink Cr)	02040105240030	3,719.28	14.5%
			Pond Run	02040105240040	5,950.50	23.1%
			Assunpink Creek (below Shipetaukin Ck)	02040105240060	792.10	3.1%
Assiscunk, Crosswicks, and Doctors (20)	Duck Creek and Upper Delaware River (UDRV) to Assunpink Ck	02040201030	Duck Creek and Upper Delaware River (UDRV) to Assunpink Ck	02040201030010	901.82	3.5%
	Crosswicks Ck (Doctors Ck to New Egypt)	02040201050	Crosswicks Ck(Doctors Ck-Ellisdale trib)	02040201050070	1,098.70	4.3%
			Crosswicks Ck(Ellisdale trib - Walnford)	02040201050050	753.17	2.9%
	Doctors Creek	02040201060	Doctors Creek (below Allentown)	02040201060030	3,010.36	11.7%
	Crosswicks Ck (below Doctors Creek)	02040201070	Back Creek (above Yardville-H Sq Road)	02040201070010	3,007.23	11.7%
			Shady Brook/Spring Lake/Rowan Lake	02040201070030	2,822.67	11.0%
			Crosswicks Ck(below Doctors Creek)	02040201070020	2,655.71	10.3%
Total					**25,728.20**	**100.0%**

Source: NJDEP, 2000

Watershed Management Areas

The Division of Watershed Management, a division within the NJDEP, manages natural resources on a watershed basis. It administers a variety of programs to protect and restore water quality, to control water pollution, and to ensure adequate water supplies. The state has been divided into 20 Watershed Management Areas (WMAs), as shown in **Figure 3: Watershed Management Areas in New Jersey**. Hamilton Township is located within two WMAs: Central Delaware (WMA 11) and Assunpink, Crosswicks, Doctors (WMA 20).

Figure 3: Watershed Management Areas in New Jersey



1: Upper Delaware
2: Wallkill
3: Pompton, Pequannock, Wanaque, Ramapo
4: Lower Passaic, Saddle River
5: Hackensack, Hudson, Pascack
6: Upper and Mid Passaic, Whippany, Rockaway
7: Arthur Kill
8: North and South Branch Raritan
9: Lower Raritan, South River, Lawrence
10: Millstone
11: Central Delaware
12: Monmouth
13: Barnegat Bay
14: Mullica
15: Great Egg Harbor
16: Cape May
17: Maurice, Salem, Cohansey
18: Lower Delaware
19: Rancocas
20: Assiscunk, Crosswicks, Doctors

Source: NJDEP

WMA 11: Central Delaware Tributaries

Watershed Management Area 11, called the Central Delaware Tributaries, funnels to the Delaware River or the D & R Canal. It encompasses an area of approximately 272 square miles, where the land uses range from agricultural to urban. The dominant waterway is the Assunpink Creek and its tributaries to the south; smaller creeks are found in the north. Suburban development and a dramatic increase in population over the past decade has stressed the water resources and impacted the water quality of WMA 11.

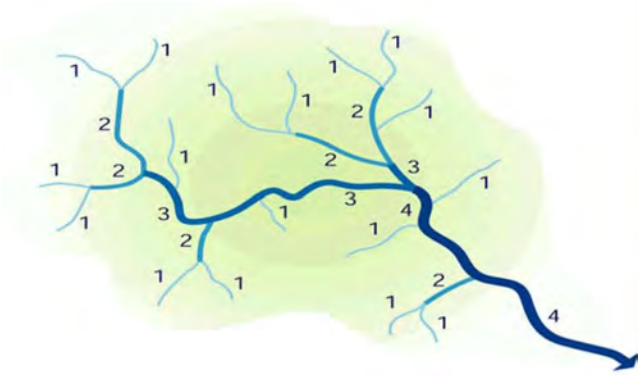
WMA 20: Assunpink, Crosswicks, Doctors

Watershed Management Area 20, located at the upper reaches of the Delaware Estuary, is 253 square miles in size. The major creeks in the area are the Crosswicks, Assiscunk, Blacks, Crafts, Doctors, Duck, and Mill. These freshwater creeks are tidally influenced. Some of the tributaries in WMA 20 include Jumping Brook, Lahaway Creek, North Run, and Doctors Creek. WMA 20 is affected by nonpoint sources of pollution that come from agricultural and suburban construction runoff. Elevated levels of phosphorous and fecal coliform bacteria water have been recorded in WMA 20.

Streams

Waterways are classified by their stream order, which is a hierarchy used to differentiate smaller streams from larger ones. First- through third-order streams are considered headwater streams and constitute the vast majority of streams worldwide. Fourth- through sixth-order streams are considered medium streams, while larger order streams are considered rivers. This system is illustrated in **Figure 4: Stream Order Classification**.

Figure 4: Stream Order Classification



Source: T. A. Endreny, 2003

There are approximately 131 stream miles flowing across Hamilton Township, although stream order is identified for just 103 stream miles. Of these, over 65 miles are first-through third-order (or headwater) streams, meaning they are the initial sections of stream

channels with up to two branching pairs of contributing tributaries. The headwaters are where a stream is “born” and actually begins to flow.

Headwaters are of particular importance because they tend to contain a diversity of aquatic species, and the condition of headwaters affects downstream water quality. Because of their small size, they are highly susceptible to impairment by human activities on the land.

First- and second-order streams are narrow and often shallow and are characterized by relatively small base flows. This makes them subject to greater temperature fluctuations, especially when forested buffers on their banks are removed. They are also easily over silted by sediment-laden runoff and their water quality can be rapidly degraded. In addition, first-order streams are greatly affected by changes in the local water table because they are fed by groundwater sources. Headwaters are important sites for the aquatic life that is at the base of the food chain and often serve as spawning or nursery areas for fish.

See **Table 8: Stream Order** for stream order length in Hamilton Township. For a complete list of streams in Hamilton Township, see **Table 9: Named Streams**. Also see **Map 9: Surface Water, Wetlands, and Vernal Pools.**

Table 8: Stream Order

Stream Order	Length (miles)
1	43.11
2	13.93
3	8.02
4	12.01
5	23.59
Unclassified (Delaware River)	2.82
Total	**103.48**

Source: NJDEP, 1998

Table 9: Named Streams

Assunpink Creek	Edges Brook
Back Creek	Gropps Lake
Crosswicks Creek	Miry Run
Delaware River	Pleasant Run
Doctors Creek	Pond Run
Duck Creek	

Source: NJDEP, 2002

The **Delaware River** flows from New York to Delaware. The headwaters of the Delaware River flow from two branches in the Catskill Mountains. The main branch, also known as the Mohawk branch, is where the western headwaters rise in Schoharie County, New York. The eastern branch begins in Delaware County, New York. The Delaware River is the boundary between Pennsylvania and New Jersey and constitutes part of the boundary between Pennsylvania and New York, as well as between New Jersey and Delaware. The Delaware River meets tide water in Trenton, New Jersey, and ultimately flows into the Delaware Bay, an estuary outlet into the Atlantic Ocean.

The tidal flow of the Delaware River brings water into the surrounding streams twice a day. Tidal flows both help and hinder maintenance of good water quality in affected streams. The flood (incoming) tide carries leaves and nutrients that are beneficial to aquatic organisms, but it also limits the regular flushing out of silt and pollutant-laden waters coming from upstream. Silt deposition within a stream tends to increase during flood tides, although deposition is also a function of stream shape, the presence of specific flow barriers, and the quantity of silt (the load) being carried by the stream.

Crosswicks Creek is a tributary of the Delaware River. It crosses four counties, including Burlington, Mercer, Monmouth, and Ocean. It forms the southern border of Hamilton Township. Crosswicks Creek's headwaters flow in a northwesterly direction from the Fort Dix and McGuire Air Force Base. Upon reaching the Hamilton-Trenton Marsh, Crosswicks Creek takes a sharp turn southward, where it meets the Delaware River in Bordentown.

Gropps Lake

Assunpink Creek is a tributary of the Delaware River. From Millstone Township in Monmouth County, Assunpink flows westward through the Assunpink Wildlife Management Area and Assunpink Lake. Below Assunpink Lake, the creek turns northwest until it reaches Mercer County Park, where it turns west through the Van Nest Refuge. It turns southwest and parallels the D & R Canal until it empties into the Delaware River in Trenton. The soldiers of the Continental Army held a defensive line along the south shore of the Assunpink Creek during the Second Battle of Trenton of the American Revolutionary War in January 1777.

Lakes and Ponds

Lakes and ponds cover a total of about 200 acres in Hamilton Township, including the large Gropps Lake and Spring Lake. Artificial lakes and ponds are formed by dams and were often created for purposes of irrigation, flood control, or recreation.

Gropps Lake, located south of Interstate 195 in western Hamilton Township on Back Creek, is a lowland depression fed by natural springs. At normal levels, the lake has a surface area of 41 acres. It has a capacity of 495 acre feet, while its normal storage capacity is 211 acre feet. The lake was formed when a dam was constructed on the Back Creek in

1900. The dam is 25 feet high, with a length of 485 feet. The maximum discharge is 1,900 cubic feet per second. Lakeside Park was developed near the future site of Gropps Lake in the 1800s around a mill, now known as New Albion Mills. This area was used as a summer colony until the homes were winterized and made permanent. In the winter of 1914, an ice jam burst the dam. It was not restored until winter 1987. Gropps Lake continues to be enjoyed for recreational uses.

Spring Lake, Rowan Lake, and Sturgeon Pond are located in the northern portion of the Hamilton-Trenton Marsh. **Spring Lake** is spring fed, with bluffs vegetated by second-growth forests. The area around the lake was once known as Spring Lake Park and, later, Capitol Park. The White City Amusement Park opened next to Spring Lake in 1907. This renowned park had a roller coaster, scenic railroad, carousel, flume ride, movie theater, dance hall, and many other attractions. The lake was renamed the White City Lake during the park's heyday. The park closed in the 1920s. A remnant of the White City Amusement Park–a concrete staircase–can still be found at the lake, connected to a former trolley stop.

The tidal **Rowan Lake** is a highly vegetated area adjacent to the interchange of Interstates 295 and 195. **Sturgeon Pond** is named for its former use in storing sturgeon, once a major industry on the Delaware River.

Wetlands

Wetlands support unique communities that serve as natural water filters and as incubators for many beneficial species. The term "wetland" is applied to areas where water meets the soil surface and supports a particular biological community. The source of water for a wetland can be an estuary, river, stream, lake edge, or groundwater that rises close to the land surface. Under normal circumstances, wetlands are those areas that support a prevalence of defined wetland plants on a wetland soil. The U.S. Fish and Wildlife Service designates all large vascular plants as wetland (hydric), nonwetland (nonhydric) or in-between (facultative). Wetland soils, also known as hydric soils, are areas where the land is saturated for at least seven consecutive days during the growing season. Wetlands are classified as either tidal (coastal) or nontidal (interior). Tidal wetlands can be either saline or freshwater. There are also special wetlands categories to denote saturated areas that have been altered by human activities.

Hamilton-Trenton-Bordentown Marsh

New Jersey protects freshwater wetlands under the New Jersey Freshwater Wetlands Protection Act Rules: N.J.A.C. A 7:7A. The law also protects transition areas, or "buffers," around freshwater wetlands. The New Jersey freshwater

wetlands maps provide guidance on where wetlands are found in New Jersey, but they are not the final word. Only an official determination from DEP, called a “letter of interpretation (LOI),” can legally determine for sure if there are freshwater wetlands on a property. An LOI verifies the presence, absence, and boundaries of freshwater wetlands and transition areas on a site. Activities permitted to occur within wetlands are very limited and usually require a permit. Additional information on wetlands rules and permits is available through NJDEP. See **Sources of Information**.

All of Hamilton Township’s wetlands are freshwater. Natural wetlands cover approximately 4,464 acres within the township (17 percent of total land area), of which 3,304 acres are wooded wetlands, 603 acres are low-growing emergent, scrub/shrub or herbaceous wetlands, 84 acres are *Phragmites* dominant, and 472 acres are freshwater tidal. See **Map 9: Surface Water, Wetlands, and Vernal Pools**. A more detailed description of Hamilton Township’s natural wetland areas is found in the **Biological Resources** section, under “Wetlands.”

In addition to natural wetlands, Hamilton Township also includes 746 acres (almost three percent of total land area) of modified or disturbed wetlands. Modified wetlands are former wetland areas that have been altered by human activities and no longer support typical wetland vegetation, or are not vegetated at all. Modified wetland areas do, however, show obvious signs of soil saturation and exist in areas shown to have hydric soils on U.S. Soil Conservation Service soil surveys.

Hamilton Township’s modified wetlands fall into the following categories: 405 acres of agricultural wetlands; 146 acres of wetlands used as right-of-ways; 91 acres of wetlands found in maintained green space, lawns, or recreation area; 73 acres of disturbed wetlands; and 31 acres of former agricultural wetlands.

Agricultural Wetlands

Agricultural wetlands occupy 405 acres (a little over one percent) of Hamilton Township. Agricultural wetlands are modified former wetlands that are under cultivation, yet still exhibit evidence of soil saturation in aerial infrared photo surveys. See **Map 9: Surface Water, Wetlands, and Vernal Pools**.

The Natural Resource Conservation Service (NRCS) sponsors the Wetlands Reserve Program, a voluntary program that offers landowners a chance to receive payments for restoring and protecting wetlands, including agricultural wetlands, on their property. Restoring agricultural wetlands would require removing them from agricultural use and restoring them to their natural state. This program provides technical and financial assistance to eligible landowners who can enroll lands through permanent easements, 30-year easements, or restoration cost-share agreements. This and other programs providing financial assistance for environmental initiatives on agricultural land are described in **Appendix A: Federal and State Conservation Programs for Farmers**.

Figure 5: Tile Drain Installation

Sources: (left to right) from Concrete Tile for Land Drainage (Portland Cement Association, 1920); "Voice of the Farm" (Firestone, 1938); and Drain the Wet Land (International Harvester, 1921). Found in Brown, 2004.

Wetlands were sometimes drained for agriculture by a technique called “tile drainage,” shown in **Figure 5**. Tile drainage was a common method of removing excess water from farm fields that exhibited one or more of the following characteristics: (1) small areas of isolated wetlands, (2) very flat land that ponded in wet weather, (3) soils that were slow to warm in the spring because of a relatively high water table, or (4) soils that had a very high clay content and, therefore, drained slowly. Tile drainage was very labor intensive, as it involved installing subsurface drainage pipes throughout a field at a depth of three to six feet. Tile drains were used sparingly–only where there were extremely wet spots. Therefore, the existence of tile drainage strongly indicates a natural wetland hydrology.

Vernal Pools

Vernal pools are bodies of water that appear following snowmelt and during spring rains, but disappear or are dry during the rest of the year. They are highly important sites for certain rare species of amphibians. Particular types of frogs and salamanders will only breed in vernal ponds (obligate breeders), which provide their offspring with a measure of protection because the pond’s impermanence prevents the residence of predators of the eggs and young, especially fish. Other species, called facultative breeders, may use vernal pools but are not limited to them for breeding.

Vernal pools are so intermittent that their existence as wetlands has frequently not been recognized. Consequently, many of them have disappeared from the landscape, or have been substantially damaged. This, in turn, is a principal cause of the decline of their obligate amphibian species.

The New Jersey Division of Fish and Wildlife has been conducting a Vernal Pool Survey project since 2001 to identify, map, and certify vernal ponds throughout the state. A certified vernal pool is one that occurs in a confined basin without a permanently flowing outlet, has habitat documented for one obligate or two facultative herptile (reptile and amphibian) species, maintains ponded water for at least two continuous months between March and September, and is free of fish populations throughout the year.

Once a vernal pond is certified, regulations require that a 75-foot buffer be maintained around the pond. NJDEP's Division of Land Use Regulation oversees this designation and restricts development around vernal ponds by denying construction permits. Local municipalities can provide additional protection by negotiating conservation easements on the land surrounding the pond or by instituting restrictive zoning, such as passing a stream corridor protection overlay ordinance that specifically includes the vernal pools. A township can also include the pools in its official map. The South Jersey Land and Water Trust provides training sessions every March to teach volunteers how to identify, survey, and certify vernal pools. Information is available at its website: http://www.sjlandwater.org/ongoing/vernalpools.htm.

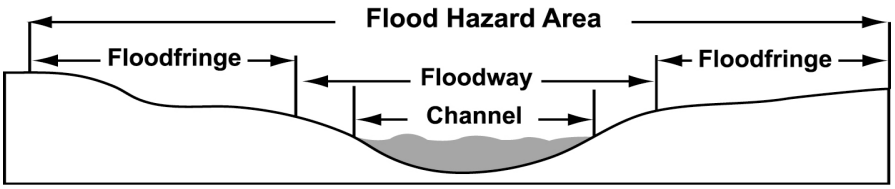
The state has identified 78 potential vernal pools in Hamilton Township and seven vernal habitat locations, which are listed in **Appendix B: Vernal Pools in Hamilton Township** and shown on **Map 9: Surface Water, Wetlands, and Vernal Pools**. These are located throughout the township. There is a concentration of potential vernal pools located in the center of the township in wetlands areas adjacent to Pond Run on both side of Interstate 295. There are also clusters of potential vernal pools in the southeast agricultural area of Hamilton Township. Surveys of each pond are needed to determine if the pond is still in existence as a natural habitat, and if it is, what species are present. Once surveyed, the New Jersey Division of Fish and Wildlife will review the data, and those pools that meet the criteria will be certified.

Floodplains

Areas naturally subject to flooding are called floodplains, or flood hazard areas. Floodplains encompass a floodway, which is the portion of a floodplain subject to high velocities of moving water, and the adjacent flood fringe, which helps to hold and carry excess water during overflow of the normal stream channel. The 100-year floodplain is defined as the land area that will be inundated by the overflow of water resulting from a 100-year flood (a flood that has a one percent chance of occurring in any given year).

Although the terms "flood hazard area" and "100-year floodplain" refers to similar concepts, NJDEP defines them in slightly different ways. New Jersey's regulations define the flood hazard area as the area inundated by a flood resulting from the 100-year discharge increased by 25 percent. This type of flood is called the "flood hazard area design flood" and it is the flood regulated by NJDEP. The different parts of the flood hazard area are shown in **Figure 6**.

Figure 6: Parts of a Flood Hazard Area



Source: NJDEP

Floodplains require protection in order to prevent loss to residents, especially within the boundaries of the floodway. Equally important is the preservation of the environmentally sensitive aquatic communities that exist in floodplains. These communities are often the first link in the food chain of the aquatic ecosystem. In addition, floodplains serve the function of removing and mitigating various pollutants through the uptake by their vegetation of excess chemical loads in the water and by the filtering of sediments generally. All efforts to keep development out of floodplains will help to preserve the flood-carrying capacity of streams and their water quality.

In New Jersey and throughout the country, building in areas subject to flooding is regulated to protect lives, property, and the environment. New Jersey regulates construction in the flood hazard area under the Flood Hazard Area Control Act, N.J.S.A. 58:16A-50 et seq., and its implementing rules at N.J.A.C. 7:13. Activities that are proposed to occur in a flood hazard area will require issuance of a flood hazard area permit or a letter of nonapplicability from the NJDEP.

Because New Jersey's flood hazard area maps are not available in digital form, it is only possible to approximate the spatial extent of the flood hazard area of Hamilton Township by using Federal Emergency Management Agency (FEMA) 100-year floodplain maps. FEMA maps show that almost 4,000 acres (16 percent) Hamilton Township land is within the 100-year flood hazard area, and an additional 844 acres (three percent) are within the 500-year flood hazard area. The floodplains within Hamilton Township are located along Assunpink, Doctors, Crosswicks, and Back creeks, as well as the Delaware River, Miry Run, and Pond Run. See **Map 10: Floodplains (2008)** and **Table 10: Floodplains** below. For more information on flooding, see **Environmental Issues, Flooding**.

Table 10: Floodplains

Floodplain	Area (Acres)	Percent of Township in Floodplain
100-Year Flood Plain	3,981.52	15.5%
500-Year Flood Plain	844.01	3.3%
Total	**4,825.53**	**18.8%**
Total Township Area (Acres)	**25,728.20**	

Source: FEMA, 2010

Surface Water Quality

Water quality standards are established by federal and state governments to ensure that water is suitable for its intended use. The ultimate objective of the Federal Clean Water Act (P.L. 95-217) is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. Standards aim to restore the quality of the nation's waters, to provide for the protection and propagation of fish, shellfish, and wildlife, and to provide for recreation in and out of the water, wherever attainable.

All waterbodies in New Jersey are classified by NJDEP as either freshwater (FW), Pinelands water (PL), saline estuarine water (SE), or saline coastal water (SC). Freshwater is further broken down into freshwater that originates and is wholly within federal or state parks, forests, or fish and wildlife lands (FW1), and all other freshwater (FW2). The water quality for each of these groups must be able to support designated uses that are assigned to each waterbody classification (see Surface Water Quality Standards N.J.A.C. 7:9B-1.12). In addition to being classified as FW1 and FW2, fresh waterbodies are classified as trout producing (TP), trout maintaining (TM), or nontrout waters (NT). Each of these classifications may be subject to different water quality standards.

There are also anti-degradation levels of protection, which include two categories: category one (C1) and category two (C2). C1 waters are protected from "measurable or calculable changes" in water quality. C1 can be applied to any of the surface water classifications except FW1 and PL, and it is frequently applied to waters flowing through parks, wildlife refuges, and to FW2-TP streams. C2 waters are allowed to have water quality changes, provided that they are in the range of changes permissible with existing stream uses and that degradation is necessary to accommodate "important economic or social development." C1 and PL waters have the strictest standards for protection.

All waterbodies in Hamilton Township are FW2-NT classification, meaning they are freshwater nontrout waters. According to NJDEP rules, FW2-NT waters must provide for (1) the maintenance, migration, and propagation of the natural and established biota; (2) primary and secondary contact recreation (i.e., swimming and fishing); (3) industrial and agricultural water supply; (4) public potable water supply after conventional filtration and disinfection; and (5) any other reasonable uses.

In the northeast corner of Hamilton Township, a portion of the Assunpink Creek and a tributary are classified as C1 (FW2-NTC1). This portion of the Assunpink Creek is designated C1 because it passes through the Van Nest Refuge Wildlife Management Area. C1 waters are protected from water quality degradation due to their exceptional significance.

The determination of whether or not water quality is sufficient to meet a body of water's designated use(s) is based on an analysis of certain surface water quality parameters, including fecal coliform, dissolved oxygen, pH, phosphorous, and toxic substances. NJDEP also evaluates water quality by examining the health of aquatic macroinvertebrate life in a stream.

New Jersey's Integrated Water Quality Monitoring and Assessment Report

The Federal Clean Water Act mandates that states submit biennial reports to the U.S. Environmental Protection Agency (EPA) that describe the quality of their waters. States must submit two reports. The first is the Water Quality Inventory Report, or 305(b) Report, which documents the status of principal waters in terms of overall water quality and support of designated uses. The second is the 303(d) List, which lists the waterbodies that are not attaining water quality standards. States must also prioritize the impaired waterbodies on the 303(d) list for Total Maximum Daily Load (TMDL) analyses and identify those high-priority water bodies for which they anticipate establishing TMDLs in the next two years. See the section on **Total Maximum Daily Loads (TMDLs)**.

Beginning in 2002, the NJDEP combined the 305(b) Report and the 303(d) List into a single report, according to the EPA's guidance. The biennial Integrated Water Quality Monitoring and Assessment Report places the state's waters on one of five "sublists." The sublist descriptions are shown in the table following **Table 11**. All of New Jersey's water bodies are assigned to a sublist for a designated use based on the degree of attainment of the designated uses, how much information is available to determine use attainment, and the cause(s) and source(s) of nonattainment.

In 2006, NJDEP began reporting water quality data on a HUC 14 subwatershed basis, and so the assessments of portions of rivers and streams are reported by the subwatershed that they fall within. Subwatersheds (assessment units) are assessed on their attainment of eight different designated uses, although not all uses are applicable to all subwatersheds. The designated uses are as follows:

- Aquatic life (general)
- Aquatic life (trout)
- Recreation
- Drinking water supply

- Industrial water supply
- Agricultural water supply
- Shellfish harvesting
- Fish consumption

Although the Assunpink Creek is stocked with trout, it is not considered a trout-supporting water and is not assessed for the aquatic life of trout. As none of the waters in Hamilton Township support shellfish, this designated use is also not applicable. All 11 subwatersheds within Hamilton Township are impaired (Sublist 5) for at least one designated use. For aquatic life, the most general and encompassing parameter of water quality, 10 subwatersheds are impaired (nine on Sublist 5 and one on Sublist 4A) and one subwatershed has insufficient data. See **Table 11: Integrated Water Quality Monitoring and Assessment Report (2008)**.

Table 11: Integrated Water Quality Monitoring and Assessment Report (2008)

WMA	Subwatershed ID	Subwatershed Name	Aquatic Life (general)	Recreation	Drinking Water Supply	Agricultural Water Supply	Industrial Water Supply	Fish Consumption
11	02040105230050	Assunpink Creek (Shipetaukin to Trenton Rd)	5	2	5	2	2	5
11	02040105240030	Miry Run (Assunpink Cr)	5	4A	2	2	2	3
11	02040105240040	Pond Run	5	4A	2	2	2	3
11	02040105240060	Assunpink Creek (below Shipetaukin Ck)	5	4A	2	2	2	5
20	02040201030010	Duck Creek and Upper Delaware River (UDRV) to Assunpink Ck	3	3	3	3	3	5
20	02040201050050	Crosswicks Creek (Ellisdale trib-Walnford)	5	4A	5	2	2	5
20	02040201050070	Crosswicks Creek (Doctors Ck-Ellisdale trib)	5	4A	5	2	5	5
20	02040201060030	Doctors Creek (below Allentown)	5	4A	2	2	2	3
20	02040201070010	Back Creek (above Yardville-H Sq Rd)	5	3	2	2	2	3
20	02040201070020	Crosswicks Creek (below Doctors Creek)	5	3	5	2	2	5
20	02040201070030	Shady Brook/Spring Lake/Rowan Lake	4A	3	3	3	3	5

Source: NJDEP, 2008

Sublist	Description		
Sublist 1	There is sufficient data to assess the applicable designated uses for the waterbody (with the exception of fish consumption) and the assessment indicates full attainment for the designated uses.		
Sublist 2	An assessment for an individual designated use is complete and results for that assessment indicate full attainment, but other designated uses are unassessed, assessed as nonattain, or have an approved TMDL. When all designated uses are assessed as full attain, (with the exception of fish consumption), these waterbodies will be moved to Sublist 1.		
Sublist 3	The designated use assessment indicated insufficient or no data to assess the designated use.		
Sublist 4	The waterbody is impaired or threatened for one or more designated uses. There are three subcategories:		
	Sublist 4A: The designated use is nonattain due to pollutants, and a TMDL has been adopted in the New Jersey Register and approved by the USEPA.	Sublist 4B: The designated use is nonattain due to pollutants and other enforceable pollution control requirements are reasonably expected to result in the conformance with the applicable water quality standard(s) in the near future.	Sublist 4C: The designated use is nonattain and the impairment is not caused by a pollutant.
Sublist 5	A designated use is placed on this list when designated use assessment is complete and results for the assessment indicate nonattain.		

The subwatersheds in Hamilton Township that do not attain one or more designated uses are each impaired due to one or more parameters (i.e., pollutants) for each use, as shown in **Table 12: Impaired Waters with Priority Ranking (2008)**. The most common causes for impairments include mercury, phosphorus, arsenic, PCBs, and turbidity. Priority ranking is required by Section 303(d) of the Federal Clean Water Act and its purpose is to focus available resources in the most efficient and productive way, taking into account environmental, social, and political factors. Subwatersheds with a high (H) priority ranking are those for which the NJDEP expects to complete a TMDL within the next two years. The NJDEP expects to complete TMDLs for subwatersheds ranked as medium (M) priority in the near future, but not within two years. Subwatersheds with a low (L) priority are those for which TMDLs will likely not be completed in the near future.

Table 12: Impaired Waters with Priority Ranking (2008)

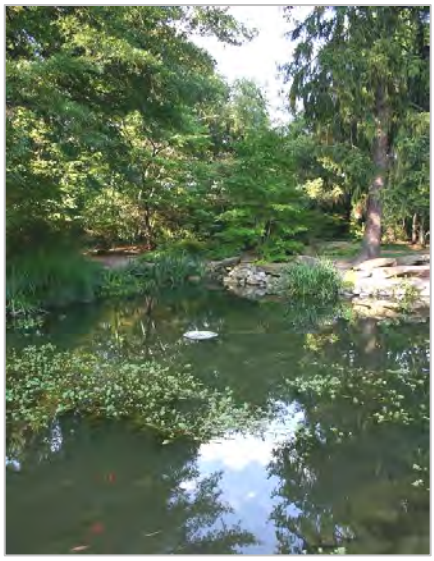
WMA	Assessment Unit ID	Assessment Unit Name	Parameter	Ranking
11	02040105230050	Assunpink Creek (Shipetaukin to Trenton Rd)	Cause Unknown	L
			Arsenic	M
			Mercury	M
11	02040105240030	Miry Run (Assunpink Cr)	Dissolved Oxygen	M
11	02040105240040	Pond Run	Total Suspended Solids	L
			Turbidity	L
11	02040105240060	Assunpink Creek (below Shipetaukin Ck)	Dissolved Oxygen	M
			Phosphorus	M
			Arsenic	M
			Lead	M
			Mercury	M
20	02040201030010	Duck Creek and Upper Delaware River (UDRV) to Assunpink Ck	Mercury	M
			PCB	M
20	02040201050050	Crosswicks Creek (Ellisdale trib-Walnford)	Phosphorus	M
			Arsenic	M
			Mercury	M
20	02040201050070	Crosswicks Creek (Doctors Ck-Ellisdale trib)	Phosphorus	M
			Total Suspended Solids	L
			Turbidity	L
			Arsenic	M
			Mercury	M
			PCB	M
20	02040201060030	Doctors Creek (below Allentown)	Cause Unknown	M
20	02040201070010	Back Creek (above Yardville-H Sq Rd)	Phosphorus	M
20	02040201070020	Crosswicks Creek (below Doctors Creek)	Phosphorus	M
			Turbidity	L
			Arsenic	M
			Mercury	M
			PCB	M
20	02040201070030	Shady Brook/Spring Lake/Rowan Lake	Mercury	M
			PCB	M

Source: NJDEP, 2008

Mercury is an element in the earth's crust that occurs naturally in the air, water, and soil. Mercury in the air eventually settles into water or onto land, where it can be washed away into water. Once in the water, microorganisms can change it into methylmercury, a highly toxic form that accumulates in fish, shellfish, and animals that eat fish. The most common way humans are exposed to mercury is through the ingestion of fish or shellfish that are contaminated with mercury. Exposure to mercury can affect the nervous system and harm the brain, heart, kidney, lungs, and immune system.

Phosphorus exists naturally at low levels within the environment, although excess phosphorus can lead to harmful algae blooms. As the excess algae dies and its decomposition uses the oxygen, "dead zones" can develop where no aquatic life can survive. Causes of phosphorus pollution include the following: over-fertilization of lawns and agricultural areas; runoff from impervious surfaces like parking lots, lawns, rooftops, and roadways; discharge from waste-water treatment plants; and overflow from septic systems. Soil erosion is a major contributor of phosphorus to streams, and streambank erosion occurring during floods can transport high quantities of phosphorous into the water system.

Arsenic is an odorless and tasteless semi-metal element that occurs naturally in rocks, soil, water, air, plants, and animals. It can enter drinking water supplies from natural deposits in the earth or from agricultural and industrial practices. Higher levels of arsenic tend to be found more in groundwater sources than in surface water sources. Arsenic has been linked to cancer of the bladder, lungs, skin, kidney, nasal passages, liver, and prostate. Some noncancer effects include thickening and discoloration of the skin, stomach pain, nausea, vomiting, diarrhea, numbness in hands and feet, partial paralysis, and blindness.



Sayen Park

Polychlorinated biphenyls (PCBs) are considered a highly toxic persistent organic pollutant (POPs) and have been outlawed worldwide. POPs have long half-lives, bioaccumulate in the fatty tissue of animals, and are transmitted up the food chain. PCBs are byproducts of industrial processes used to make electrical, heat transfer, and hydraulic equipment; paints, plastics, and rubber products; pigments, dyes, and bleached paper; herbicides and pesticides; and many other industrial applications. Exposure to PCBs has been proven to cause cancer and damage to the immune, reproductive, nervous, and endocrine systems.

Turbidity is a measure of the cloudiness of water. It indicates water quality and filtration effects, such as whether disease-causing organisms are present. High levels of turbidity are associated with high levels of disease-causing microorganisms that can cause nausea, cramps, diarrhea, and headaches.

Total suspended solids (TSS) refer to solid materials, both organic and inorganic, that are suspended in water. High concentrations of TSS warm water by absorbing sunlight. By blocking sunlight from reaching aquatic plants, photosynthesis is decreased and the

amount of oxygen is reduced, which then kills aquatic animal life. TSS enters waterbodies through stormwater runoff, streambank erosion, industrial wastes, wastewater discharges, improperly managed construction sites, and other sources.

Dissolved oxygen (DO) is necessary for almost all aquatic life; therefore, its concentration provides a good indicator of the health of an aquatic ecosystem. Under low DO conditions, fish are more susceptible to the effects of other pollutants, such as metals and toxics. At very low DO levels, trace metals from sediments are released into the water column. Summer algal bloom die-off has been implicated as a cause of low DO concentrations.

Lead (Pb) is a toxic metal found naturally in the environment. It is also emitted into the air from motor vehicles and industrial sources. It can enter tap water through corrosion of plumbing materials. Lead was used for many years to manufacture everyday products, including paint. Lead can have adverse health effects, including behavioral problems, learning disabilities, kidney problems, high blood pressure, seizures, and death. Children six years old and under are most at risk. The main source of exposure to lead is ingestion of paint chips and inhaling dust. EPA estimates that 10 to 20 percent of human exposure to lead may come from drinking water.

Total Maximum Daily Loads (TMDLs)

Gropps Lake

For impaired waterways with a high-priority ranking for remediation, the state is required by the EPA to establish a Total Maximum Daily Load (TMDL). A TMDL quantifies the amount of a pollutant that a waterbody can assimilate (its loading capacity) without violating water quality standards. The purpose of a TMDL is to initiate a management approach or restoration plan based on identifying the sources of a pollutant and determining the percentage reductions of the pollutant that must be achieved by each source. These sources can be point sources, such as sewage treatment plants, or nonpoint sources, such as stormwater runoff. A TMDL goes through four stages. It is proposed in a report by NJDEP, established when NJDEP finalizes its report, approved by EPA, and adopted when NJDEP adopts it as an amendment to a water quality management plan.

In general, implementation of a TMDL relies on actions mandated by the Municipal Stormwater Management program, which includes the ordinances that municipalities are required to adopt under that program. It also depends on voluntary improvements in stormwater management in agricultural and other areas.

A TMDL determines the percentage reduction needed in order for a stream segment to meet the water quality standard. Nonpoint stormwater sources are the largest contributors, as runoff from various land uses transports pollutants into waterbodies during rain events. Nonpoint sources also include inputs from sources such as failing sewage conveyance systems, sanitary sewer overflows, and failing or inappropriately located septic systems.

Two subwatersheds in Hamilton Township, Miry Run and Doctors Creek, had a high priority for remediation of phosphorus in the statewide TMDL schedule, listed in **Table 13** below. In 2006, phosphorous in Miry Run and Doctors Creek was a high priority. Since then, TMDLs for these subwatersheds were approved.

Table 13: TMDLs for Impaired Waters

WMA	Subwatershed ID	Subwatershed Name	Parameter	TMDL Name/Status	Date
11	02040105240030	Miry Run (Assunpink Cr)	Phosphorus	TMDL for Phosphorus to Address Miry Run	Approved 12/07
20	02040201060030	Doctors Creek (below Allentown)	Phosphorus	TMDL to Address 4 Stream Segments in WMA 20	Approved 12/07

Source: NJDEP, 2008

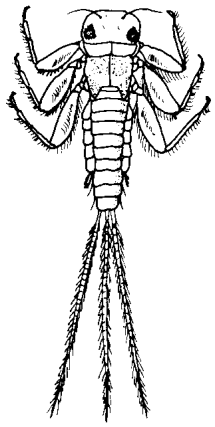
Water Quality Monitoring Networks

New Jersey's *Integrated Report* is based on the water quality assessments of a number of different monitoring networks. The Ambient Surface Water Quality Monitoring Network (ASWMN) and the Ambient Biological Monitoring Network (AMNET) are the two primary sources of surface water monitoring data. There are 16 AMNET monitoring sites in and around Hamilton Township, five of which also serve as ASWMN stations. There are a total of six ASWMN stations in Hamilton Township. The locations of these stations are shown on **Map 12: Water Quality (2008)**. Beyond the information included in the *Integrated Report*, additional water quality data gathered from these monitoring stations is available through the United State Geological Survey (USGS) and the NJDEP.

The ASWMN is a cooperative network between USGS and NJDEP that samples surface water quality at 215 stations in the state, six of which are located in Hamilton Township. These stations monitor stream flow, as well as temperature, dissolved oxygen (DO), pH, carbon dioxide, nitrogen, ammonia, phosphorus, arsenic, and many other parameters.

AMNET, administered by NJDEP, is a statewide network consisting of over 800 freshwater stations across the state. AMNET gauges long-term trends in surface water quality through samples and taxonomic analysis of the in-stream benthic macroinvertebrate communities. Benthic macroinvertebrates are bottom-dwelling aquatic insects considered to be biological indicators of water quality. These species, such as insects, worms, mollusks, and crustaceans, are large enough to be seen by the naked eye. **Figure 7** illustrates the mayfly nymph, a benthic macroinvertebrate indicative of

Figure 7: Mayfly Nymph



Source: W.B. Clapham, 1973

good water quality. New Jersey's five major water regions are sampled on a rotational schedule once every five years. Visual observations, stream habitat assessments, and limited physical/chemical parameters are performed on each site. See **Table 14: AMNET Water Quality Data** for the AMNET assessment of streams in and around Hamilton Township. AMNET stations AN0126, AN0130, AN0131, and AN0134 were not included in the report because they (like many other stations in the state) were determined to be under tidal influence, and were therefore not assessed using the current indices.

For Hamilton Township, the most recent benthic macroinvertebrate data was collected between in 2003 and 2006. The results include both the old and new indices of assessment. In the past, AMNET applied the New Jersey Impairment Score (NJIS), based on family-level taxonomy, to categorize streams as nonimpaired, moderately impaired, or severely impaired. This single index method proved to be inadequate because New Jersey's benthic macroinvertebrates can statistically be grouped into three distinct geographic locations: high gradient (above the fall line), low gradient (Coastal Plain excluding the Pinelands), and Pinelands. A multimetric index, using genus-level taxonomic identifications for each distinct region, was developed in order to accurately evaluate biological conditions. The new indices are called the High Gradient Macroinvertebrate Index (HGMI), the Coastal Plain Macroinvertebrate Index (CPMI), and the Pinelands Macroinvertebrate Index (PMI).

There are four levels of macroinvertebrate assessment: excellent, good, fair, and poor. In HGMI and CPMI streams, "excellent" and "good" indicate an acceptable regulatory range with full attainment of the use of the waterway for aquatic life. "Fair" and "poor" fall below the acceptable regulatory range and are considered impaired from a CWA perspective and not attaining the use.

The health of the benthic macroinvertebrate community is influenced by the physical attributes of the habitat. Habitat assessment is a visual-based quantitative assessment performed independently of the benthic macroinvertebrate community analysis. It is not factored in the final impairment score and is used primarily as supplementary information. Parameters evaluated include in stream substrate, channel morphology, bank structural features, and riparian vegetation. Habitat assessment results in one of four condition categories: optimal, suboptimal, moderate, or poor. Habitat assessment is based on 10 parameters, including vegetated cover, embeddedness of rocks, water velocity and depth, sediment deposition, exposure of stream channel, channel alteration, bank stability or erosion, and other elements of the water, stream banks, and vegetation. Further information can be found at the NJDEP's Bureau of Freshwater and Biological Monitoring website at www.nj.gov/dep/wms//bfbm/.

Table 14: AMNET Water Quality Data

Station	Waterbody	Location	Municipality	County	Sample Date	NJIS Impairment	Index Name	New Score	New Impairment	Habitat Score	Habitat Rating
AN0109	Assunpink Ck	Rt 535 (Old Trenton Rd)	West Windsor	Mercer	5/15/2003	Moderate	CPMI	8	Fair	160	Optimal
AN0112	Little Shabakunk Ck	Princeton Pike (Rt 583)	Lawrence	Mercer	6/3/2003	Moderate	HGMI	15.68	Poor	128	Suboptimal
AN0114	Shabakunk Ck	Rt 206	Lawrence	Mercer	5/13/2003	Severe	HGMI	11.08	Poor	100	Marginal
AN0115	Miry Run	Rt 533 (Quakerbridge Rd)	Hamilton	Mercer	5/15/2003	Moderate	CPMI	4	Poor	140	Suboptimal
AN0115A	Miry Run	Pond Rd	Robbinsville	Mercer	5/15/2003	Moderate	CPMI	6	Fair	153	Suboptimal
AN0116	Assunpink Ck	Mulberry St	Trenton	Mercer	6/3/2003	Moderate	HGMI	22.06	Fair	157	Suboptimal
AN0117	Pond Run	Rt 533 (Whitehorse-Mercerville Rd)	Hamilton	Mercer	6/3/2003	Moderate	CPMI	2	Poor	141	Suboptimal
AN0125	Crosswicks Ck	Extonville Rd	Chesterfield	Burlington & Mercer	6/1/2006	Moderate	CPMI	12	Good	142	Suboptimal
AN0126A	UNT to Crosswicks Ck	Iron Bridge Rd	Chesterfield	Burlington	5/25/2006	Moderate	CPMI	8	Fair	126	Suboptimal
AN0126B	Pleasant Run	Extonville Rd	Hamilton	Mercer	6/1/2006	Severe	CPMI	4	Poor	118	Suboptimal
AN0129	Doctors Ck	Breza Rd	Allentown	Monmouth	6/13/2006	Moderate	CPMI	10	Fair	146	Suboptimal
AN0131A	Back Ck	Yardville-Hamilton Square Rd	Hamilton	Mercer	6/13/2006	Severe	CPMI	4	Poor	152	Suboptimal

Source: NJDEP, 2009

New Jersey Impairment Score (NJIS)		
Assessment	**Score Range**	**Attributes**
Non-Impaired	24-30	Benthic community comparable to other undisturbed streams within the region. A community characterized by a maximum taxa richness, balanced taxa groups, and good representation of intolerant individuals.
Moderate	9-21	Macroinvertebrate richness is reduced, in particular EPT taxa. Taxa composition changes result in reduced community balance and intolerant taxa become absent.
Severe	0-6	A dramatic change in the benthic community has occurred. Macroinvertebrates are dominated by a few taxa that are very abundant. Tolerant taxa are the only individuals present.

High Gradient Macroinvertebrate Index (HGMI)		
Assessment	**Score Range**	**Regulatory Threshold**
Excellent	63-100	Full Attainment
Good	<63-42	Full Attainment
Fair	<42-21	Nonattainment
Poor	<21	Nonattainment

Coastal Plain Macroinvertebrate Index (CPMI)		
Assessment	**Score Range**	**Regulatory Threshold**
Excellent	22-30	Full Attainment
Good	20-12	Full Attainment
Fair	10-6	Nonattainment
Poor	<6	Nonattainment

Habitat Assessment	
Assessment	**Score Range**
Optimal	160-200
Suboptimal	110-159
Marginal	60-109
Poor	<60

Knowing the actual condition of streams and stream banks, and planning for their improvement, requires more frequent surveying and monitoring than the state can provide. The state primarily monitors main channels in nontidal areas, and only does biological assessments through AMNET on a five-year cycle. A community may benefit from additional stream surveys by local organizations, along with regular monitoring of water quality on all local waterways.

Other Monitoring

Certain fish may contain toxic chemicals, such as PCBs, dioxins, or mercury, which accumulate in bottom sediments and aquatic life, including fish tissue. Chemical contaminants, such as dioxin and PCBs, are classified by the U.S. Environmental Protection Agency as probable cancer-causing substances in humans. Elevated levels of mercury can pose health risks to the human nervous system. Infants, children, pregnant women, nursing mothers, and women of childbearing age are considered to be at higher risk from contaminants in fish than other members of the general public. Since 1982, NJDEP has been catching fish at numerous sampling stations throughout the state and testing for contaminant levels. It then adopts advisories to guide residents on safe consumption practices.

The consumption advisories for fish caught in general freshwater are listed in **Table 15: Fish Consumption Advisories (2010)**. Within Hamilton Township, there are additional fish consumption advisories for nine species of fish in three waterbodies, which supersede the general advisories. More details on preparation and consumption of fish are found at the advisory website: www.state.nj.us/dep/dsr/njmainfish.htm

Photo by Lester Finch

Gropps Lake

Table 15: Fish Consumption Advisories (2010)

Species	General Population Eat No More Than:	High-Risk Individuals Eat No More Than:
General Freshwater Advisories		
Trout (Brown, Brook, Rainbow)	One Meal Per Week	One Meal Per Week
Largemouth Bass		One Meal Per Month
Smallmouth Bass		
Chain Pickerel		
Yellow Bullhead	No Restrictions	
Brown Bullhead		
Sunfish		One Meal Per Week
Crosswicks Creek Fish Advisories		
Largemouth Bass	No Restrictions	One Meal Per Week
White Catfish		
Delaware & Raritan Canal (Entire Length) Fish Advisories		
Channel Catfish	One meal per month	Do not eat
American Eel		
Bluegill Sunfish	No Restrictions	One meal per week
Chain Pickerel		
Smallmouth Bass	One Meal Per Week	One meal per month
Largemouth Bass		
Assunpink Creek		
Largemouth Bass	No Restrictions	One meal per week

Source: NJDEP, 2010

Causes of Water Quality Impairments

Point Sources of Pollution

Point sources of pollution, which come from a single source or “point,” such as an industrial pipe discharge, are regulated by NJDEP through the New Jersey Pollution Discharge Elimination System (NJPDES). New Jersey created NJPDES in response to the Federal Clean Water Act of 1972, which mandated that each state develop water quality standards and regulate the amount of pollution entering water bodies. The act classified all water pollution into one of two categories: “point source” pollution coming from a single source, such as an industrial pipe; and “nonpoint source” pollution, which comes from many diffuse sources. Although the Federal Clean Water Act only required

states to regulate point sources, New Jersey also regulates nonpoint sources through the authority of the NJPDES rules. See **Nonpoint Sources of Pollution** following this section.

NJDEP, through the Division of Water Quality and the Bureau of Point Source Permitting, administers the NJPDES program. Under NJPDES, any facility discharging over 2,000 gallons per day (gpd) of wastewater directly into surface water or ground water (generally through a septic system) must apply for and obtain a permit for discharging. Rather than creating individually tailored permits for each and every facility, the Division of Water Quality uses scientific standards to create and issue general permits for different categories of dischargers. NJDEP enforces the terms of the NJPDES permit by visiting discharging facilities and requiring facilities to periodically conduct and submit water quality, biological, and toxicological analyses, and thermal impact and cooling water assessments.

As of June 2010, 35 NJPDES permits for point source pollution were issued to individual facilities in Hamilton Township. These are listed in **Table 16: NJPDES Permits for Point Source Pollution**. Of the 35 permits, seven discharge to surface water (codes A, B, B4B), 24 discharge to stormwater (codes CPM, R9, RF, 5G2), three discharge to ground water (codes GW, I2), and one discharges to publicly owned treatment works (POTW) (code L). The locations of many of these facilities are also shown on **Map 20: Approved Sewer Service Area and NJPDES Permits**.

Although the NJPDES program has made much progress in regulating point source discharges, a great number of minor discharges have been allowed without regard to their cumulative impact on surface water quality. Environmental commissioners and town clerks receive notice from NJDEP when anyone applies for a permit to discharge to surface water under the NJPDES program. The commission should examine the application and evaluate the proposal–the need for the permit, the location of the discharge, and the potential negative impacts. They should communicate their findings to NJDEP, the applicant, and the township.

Table 16: NJPDES Permits for Point Source Pollution

NJPDES Permit Number	PI Number	Facility Name	Effective Start Date	Expiration Date*	Discharge Category	
					Code	Description
NJ0168661	440344	Accumed Pharmaceuticals Inc	10/1/2007	12/31/2009	L	Discharge to POTW (SIU)
NJ0028649	46138	Bordentown City WFP	11/1/2006	10/31/2011	B	Industrial/Commercial/Thermal DSW
NJG0101923	46138	Bordentown City WFP	9/1/2003	8/31/2008	I2	GP Potable Water Treatment Plant Basins/Drying Beds
NJG0119105	48545	Clayton Block Co Inc/Yardville	10/1/2003	9/30/2008	CPM	Concrete Products Management GP
NJ0004537	46238	Congoleum Corp	6/1/2007	5/31/2012	B	Industrial/Commercial/Thermal DSW
NJ0004537	46238	Congoleum Corp	6/1/2007	5/31/2012	RF	Stormwater
NJ0031895	46054	Congoleum Corp	5/1/2006	4/30/2011	B	Industrial/Commercial/Thermal DSW
NJ0031895	46054	Congoleum Corp	5/1/2006	4/30/2011	RF	Stormwater
NJG0143812	195314	Creative Machining Systems Inc	6/1/2007	5/31/2012	5G2	Stormwater Basic GP
NJ0066753	46969	Duck Island Terminal Inc	12/1/2005	11/30/2010	RF	Stormwater
NJG0139840	97928	Federal Express Corp (Pria)	6/1/2007	5/31/2012	5G2	Stormwater Basic GP
NJG0163767	285257	First Student Inc #1241	6/1/2007	5/31/2012	5G2	Stormwater Basic GP
NJG0143332	194843	Gaum Inc	6/1/2007	5/31/2012	5G2	Stormwater Basic GP
NJG0163716	285047	H. Liedtka Co Inc	6/1/2007	5/31/2012	5G2	Stormwater Basic GP
NJG0142590	187743	Hamilton Bus Garage	6/1/2007	5/31/2012	5G2	Stormwater Basic GP
NJG0158259	46419	Hamilton Twp WPCF	6/1/2007	5/31/2012	5G2	Stormwater Basic GP

NJPDES Permit Number	PI Number	Facility Name	Effective Start Date	Expiration Date*	Discharge Category	
					Code	Description
NJ0026301	46419	Hamilton Twp WPCF	7/1/2007	6/30/2012	A	Domestic Surface Water Discharge
NJ0076643	46419	Hamilton Twp WPCF	5/1/2004	4/30/2009	GW	Discharge to Ground Water
NJG0169714	453972	Jersey Precast Corp	1/1/2008	9/30/2008	CPM	Concrete Products Management GP
NJG0165492	290934	KNF Neuberger Inc	6/1/2007	5/31/2012	5G2	Stormwater Basic GP
NJG0118974	48532	Liedtka Trucking Inc	6/1/2007	5/31/2012	5G2	Stormwater Basic GP
NJG0085685	47323	New Jersey Turnpike Authority	12/1/2003	11/30/2008	B4B	GW Petroleum Products Clean-up GP
NJG0165557	291152	Pitt Ohio Express LLC	6/1/2007	5/31/2012	5G2	Stormwater Basic GP
NJG0076473	47120	Quick-Mart Service Station	12/1/2003	11/30/2008	B4B	GW Petroleum Products Clean-up GP
NJ0001198	46376	Robert Frost WTF	12/1/2005	11/30/2010	B	Industrial/Commercial/Thermal DSW
NJG0136646	46376	Robert Frost WTF	9/1/2003	8/31/2008	I2	GP Potable Water Treatment Plant Basins/Drying Beds
NJG0129135	49345	Ross Marine Service	6/1/2007	5/31/2012	5G2	Stormwater Basic GP
NJG0004677	46466	Siemens Demag Delaval Turbomachinery Inc	6/1/2007	5/31/2012	5G2	Stormwater Basic GP
NJG0133876	49719	Simkins Ind	6/1/2007	5/31/2012	5G2	Stormwater Basic GP
NJG0032832	46992	Trane Cac Inc	6/1/2007	5/31/2012	5G2	Stormwater Basic GP
NJG0118311	48473	Union Camp Corporation	6/1/2007	5/31/2012	5G2	Stormwater Basic GP
NJG0118290	48471	United Parcel Service Inc NJTRN	6/1/2007	5/31/2012	5G2	Stormwater Basic GP
NJG0162230	280402	White Eagle Printing	6/1/2007	5/31/2012	5G2	Stormwater Basic GP

NJPDES Permit Number	PI Number	Facility Name	Effective Start Date	Expiration Date*	Discharge Category	
					Code	Description
		Co				
NJG0160563	259704	Yardville Supply Co Inc	6/1/2007	5/31/2012	5G2	Stormwater Basic GP

*Expired permits may still be active, despite not have an updated permit.

Source: NJDEP, 2010

Nonpoint Sources of Pollution

Since the adoption of the Federal Clean Water Act and the implementation of the NJPDES program in subsequent years, water pollution from point sources has decreased dramatically. However, as development has continued to spread throughout New Jersey, nonpoint source pollution has increased substantially in recent decades. Nonpoint source pollution, or stormwater runoff, has the largest effect on the water quality and channel health of streams in Hamilton Township. According to the EPA, about half the pollution in New Jersey's surface water comes from nonpoint sources. Development dramatically increases nonpoint source pollution by increasing the volume of water and the level of pollutants in the runoff. Increased runoff causes erosion and sediment buildup in streams, carries nutrients from fertilizers and washes toxics, bacterial contamination, road salt, motor oils, and litter into the stream.

The sources of polluted stormwater runoff are also the most difficult to identify and remediate because they are diffuse, widespread, and cumulative. Most nonpoint source pollution in Hamilton Township derives from stormwater runoff from paved surfaces such as streets, commercial and industrial areas, residential sites (with and without detention basins), and agricultural fields lacking adequate vegetative buffers. The waterways in Hamilton Township are affected by stormwater runoff both from within the township and from upstream municipalities.

NJDEP's new Stormwater Management Rules focus on reducing and controlling nonpoint sources of water pollution. The Municipal Stormwater Regulation Program was developed in response to the EPA's Phase II rules published in December 1999. The NJDEP issued final stormwater rules on February 2, 2004, and established four NJPDES general permits: the Tier A Municipal Stormwater General Permit (Tier A Permit) for more populous municipalities; the Tier B Municipal Stormwater General Permit (Tier B Permit) for rural communities; the Public Complex Stormwater General Permit (Public Complex Permit); and the Highway Agency Stormwater General Permit (Highway Permit). Hamilton Township is a Tier A municipality. Public complexes include certain large public colleges, prisons, hospital complexes, and military bases. There are no public complexes in Hamilton Township. Highway agencies include county, state, interstate, or federal government agencies that operate highways and other thoroughfares. There are no NJDPES permits for highway agencies in Hamilton Township. Hamilton Township's Tier A Municipal Stormwater General Permit is listed in **Table 17: NJPDES Permits for Nonpoint Source Pollution** below.

Table 17: NJPDES Permits for Nonpoint Source Pollution

NJPDES Permit Number	PI Number	Facility Name	Municipality	Effective Start Date	Expiration Date*	Discharge Category Code	Discharge Category Description
NJG0150258	198044	Hamilton Twp	Hamilton Twp	9/1/2005	2/28/2009	R9	Tier A Municipal Stormwater GP

Source: NJDEP, 2010

Stormwater Management Statewide Basic Requirements
Tier A Towns (Hamilton Township)

1. Control post-construction stormwater management in new development and redevelopment through:
    - Adoption of a stormwater management plan in accordance with N.J.A.C. 7:8.
    - Adoption and implementation of a stormwater control ordinance in accordance with N.J.A.C. 7:8. This ordinance requires retention on site of 100 percent of preconstruction recharge and use of low-impact design in stormwater facilities, among other features.
    - Ensuring compliance with Residential Site Improvement Standards for stormwater management. The RSIS has been revised to incorporate the low-impact design and other requirements of the stormwater control ordinance.
    - Ensuring long-term operation and maintenance of Best Management Practices on municipal property.
    - Requiring that new storm drain inlets meet new design standards.
2. Conduct local public education:
    - Distribute educational information (about stormwater requirements, nonpoint source pollution, and stewardship) annually to residents and businesses and conduct a yearly “event” (such as a booth with these messages at a community day).
    - Have all municipal storm drain inlets labeled with some type of “don’t dump” message.
    - Distribute information annually regarding fertilizer/pesticide application, storage, disposal, and landscaping alternatives, and regarding proper identification, handling, and disposal of wastes, including pet waste and litter
    - Adopt specific ordinances to control waste disposal and other nonpoint sources.
3. Control improper disposal of waste through improved yard waste collection and through adoption of ordinances (pet waste, litter, improper dumping, and wildlife feeding).
4. Control solids and floatables through increased street sweeping, retrofitting storm drain inlets during road repairs, and instituting programs for stormwater facility management, for roadside erosion control, and for outfall pipe scouring/erosion.
5. Improve maintenance yard operations, specifically for deicing material storage, fueling operations, vehicle maintenance, and housekeeping operations.
6. Increase employee training about all of the above.

The NJPDES stormwater program lays out guidance and requirements for management of and education about stormwater at the local level. Municipalities were required to obtain the NJPDES general permit for the stormwater system and its discharges within their borders, which are considered to be owned and “operated” by the municipality. The general permits address stormwater quality issues related to new development, redevelopment, and existing development by requiring regulated entities to implement Statewide Basic Requirements (SBRs).

Under the 2004 NJPDES permit, a town must meet certain specific requirements in planning, ordinance adoption, education, management of township facilities, and investigation of parts of the stormwater system. Fulfillment of these SBRs was scheduled to occur over the course of five years. All of the requirements were intended to reduce the water pollution from stormwater runoff. As of June 2009, NJDEP was in the process of developing a rule-proposal package for readopting the Stormwater Management Rules, with certain amendments.

In 2009, the Township of Hamilton adopted ordinance 08-015, a recodification of land-development ordinances from 1979. This ordinance states that flood control, groundwater recharge, and pollutant reduction through nonstructural or low-impact techniques shall be explored before relying on structural best management practices (BMPs). The ordinance outlines a number of goals and strategies for stormwater management within Hamilton. Further discussion of the problems and issues with regulating runoff is found in the **Environmental Issues** chapter, under **Stormwater Management**.

Impervious Coverage

The volume of stormwater runoff that is carried to a stream impacts the stream channel condition. Increased volume usually results from increased impervious surface within a subwatershed. As an area becomes developed, more stormwater is directed to the streams from neighborhood storm drains, residential and commercial stormwater facilities, and road drainage. In general, scientists have found that levels of impervious cover of 10 percent or more within a subwatershed are directly linked to increased stormwater runoff, enlargement of stream channels, increased stream bank erosion, lower dry weather flows, higher stream temperatures, lower water quality, and declines in aquatic wildlife diversity. When impervious cover reaches 25 to 30 percent, streams can become severely degraded.

As shown in **Table 18: Impervious Coverage by Subwatersheds**, impervious coverage is relatively high in many of the subwatersheds of Hamilton Township. These are depicted on **Map 13: Impervious Coverage by Subwatershed (2002)**.

Special attention should be paid to new developments in the Pond Run subwatershed (HUC 14 ID: 02040105240040). Within this subwatershed, located in the center of Hamilton Township, nearly one-third of the land is made of impervious surfaces. However, there are still some larger areas of undeveloped, unpreserved lands that may be facing development pressure. A 2009 report by Princeton Hydro on the geomorphology (science of stream formations) of Pond Run finds that this stream is severely impacted by historic uncontrolled stormwater runoff from development. The impervious coverage of any potential development within the Pond Run watershed must be carefully scrutinized to prevent further degradation of the stream.

Table 18: Impervious Coverage by Subwatersheds

Watershed Name	Watershed ID (HUC 11)	Subwatershed Name	Subwatershed ID (HUC 14)	Percent of Township (Area)	Impervious Percent of HUC 14
Assunpink Creek (above Shipetaukin Ck)	2040105230	Assunpink Ck (Shipetaukin to Trenton Rd)	02040105230050	4.0%	11.11%
Assunpink Creek (below Shipetaukin Ck)	2040105240	Miry Run (Assunpink Cr)	02040105240030	14.5%	21.05%
		Pond Run	02040105240040	23.1%	32.08%
		Assunpink Creek (below Shipetaukin Ck)	02040105240060	3.1%	43.04%
Duck Creek and Upper Delaware River (UDRV) to Assunpink Ck	2040201030	Duck Creek and Upper Delaware River (UDRV) to Assunpink Ck	02040201030010	3.5%	34.33%
Crosswicks Ck (Doctors Ck to New Egypt)	2040201050	Crosswicks Ck (Ellisdale trib - Walnford)	02040201050050	2.9%	3.27%
		Crosswicks Ck (Doctors Ck-Ellisdale trib)	02040201050070	4.3%	8.18%
Doctors Creek	2040201060	Doctors Creek (below Allentown)	02040201060030	11.7%	12.22%
Crosswicks Ck (below Doctors Creek)	2040201070	Back Creek (above Yardville-H Sq Road)	02040201070010	11.7%	18.88%
		Crosswicks Ck (below Doctors Creek)	02040201070020	10.3%	21.01%
		Shady Brook/Spring Lake/Rowan Lake	02040201070030	11.0%	31.95%

Source: NJDEP, 2002

Stream Buffers and Greenways

A stream buffer is the region immediately beyond the banks of a stream that serves to limit the entrance of sediment, pollutants, and nutrients into the stream itself. Stream buffers are quite effective at filtering substances washing off the land. The vegetation of the buffer traps sediment and can actually utilize (uptake) a percentage of the nutrients flowing from lawns and farm fields. When forested, a stream buffer promotes bank stability and serves as a major control of water temperature. The buffer region also serves as a green corridor—a greenway—for wildlife to move between larger forested habitat areas.

Residents can utilize these greenways for recreation with the addition of trails, bikeways, and access points to water for fishing and canoe/kayak launching.

The importance of a healthy, intact buffer zone (also referred to as a "riparian corridor")–especially for headwater streams–has been well documented scientifically over the past 20 years. However, there is less agreement and much continuing research on the appropriate minimum width of a buffer. In the literature on this issue, a recommended minimum buffer width of 100 feet is most common, with differing activities permitted in each of three zones within the buffer. Buffers of up to 300 feet are recommended for wildlife corridors and potential passive recreational use, such as walking trails.

Hamilton Township adopted a **Stream Buffer Conservation Zone** ordinance, which details performance standards and permitted land uses within the stream buffers. This ordinance establishes a 100-foot buffer along Category One (C1) waterways, and a 75-foot buffer along all other waterways. These buffers are measured from the top of each bank at bank-full flow, maximum pool elevation, the centerline of intermittent streams, or the 100-year flood plain, whichever is greater. The 75-foot stream buffer regulated by Hamilton Township is less than the 100-foot minimum buffer recommended by experts.

Path to Crosswicks Creek at Anchor Thread Park

As shown in **Map 17: Natural Vegetation (2007)**, the majority of streams in Hamilton Township have vegetated buffers, typically made up of wooded deciduous wetlands. However, the presence, width, and integrity of buffers vary greatly across the township.

The New Jersey Freshwater Wetlands Protection Act incorporates buffer requirements into its wetland protection regulations. The width of the "transition zone" extending beyond a wetland is determined by the value of the wetland, based on its current use and on the documented presence/absence of threatened or endangered species. Municipalities may not establish buffers on wetlands that exceed those required by the state statute. However, the municipality can make certain that those limits are accurate through its review of the wetlands delineation process, and it can also monitor use of the land within the transition area and take action against encroachments.

Hamilton Township's Open Space and Recreation Plan (OSRP), created in 2003 and updated in 2009, promotes the creation of greenways along creeks and streams to preserve water quality and create hiking trails. This plan recommends the acquisition of approximately 21 miles of stream corridors within the township. At an average of 200 feet in width, the total area of these preserved stream corridors would occupy 500 acres. Currently, the stream buffers along 23 miles of streams in Hamilton Township, occupying 1,806 acres of land, are owned by the township, county, or state.

There are currently three planned greenways located in Hamilton Township: the Crosswicks Creek/Doctors Creek Watershed Greenway, the Assunpink Creek Greenway, and the D & R Canal Greenway. The OSRPs for both the township and county recommend land acquisition for the Crosswicks/Doctors Creek Greenway. The Crosswicks Creek/Doctors Creek Watershed Greenway Plan was created in 2004 by a planning group of the same name, consisting of representatives from municipalities in the watershed. The greenway plan identified four priority methods to protect the waterbody: managing stormwater, as well as protecting riparian areas, steep slopes, and headwaters areas. The plan recommends that municipalities work with developers and landowners to acquire easements, implement the new NPDES Phase II stormwater permit regulations, and include a water quality protection zone in their zoning ordinances. The plan also suggests preserving the historic features located in Hamilton Township, such as the Abbott Farm, as a way of protecting the watershed.

In 2000, DVRPC published “Closing the Missing Link on the Assunpink Creek Greenway.” The report explores the missing section of the Assunpink Greenway, which runs along the Hamilton-Lawrence Township border between Mercer County Park and the City of Trenton. Where the greenway passes through the Van Nest Wildlife Refuge, the Assunpink Creek is a C1 waterway (see **Surface Water Quality** section). The report recommends that Hamilton Township adopt a stream buffer setback requirement, preserve a riparian buffer of at least 300 feet along the Assunpink Creek, and prioritize stormwater management. The formal protection of lands along the creek in Hamilton and Lawrence townships would create a complete greenway from the Assunpink’s headwaters to its mouth at the Delaware River, and would provide a trail between Mercer County Park and the D & R towpath.

The D & R Canal Greenway runs adjacent to the Hamilton-Trenton Marsh, providing a key corridor for wildlife. The nonprofit D & R Greenway Land Trust has preserved over 14,000 acres along and beyond the D & R Canal. See **Map 19: Historic Resources** for a depiction of the Delaware and Raritan Canal Historic District.

Restoration of stream buffers on agricultural lands is supported by various programs, such as the Conservation Reserve Program (CRP), administered by the U.S. Department of Agriculture’s Farm Service Agency (FSA) and the New Jersey Department of Agriculture. This program compensates farming landowners for the loss of land being converted to a buffer or other habitat. It also funds or directly creates new buffers where they are absent. Programs such as the Environmental Quality Incentive Program (EQIP), administered by the Natural Resources Conservation Service (NRCS) of USDA, encourage the “due care” management of agricultural lands, involving the proper levels of fertilizer and pesticide applications to farmland. It funds up to 75 percent of the costs of eligible conservation practices. These are all programs in which individual landowners volunteer to take part, and they are described in further detail in **Appendix A**.

Protecting riparian areas from development and enhancing or maintaining healthy vegetation in the stream corridor can help improve water quality, reduce flooding, and encourage biodiversity. Environmental commissions can encourage the preservation of existing vegetation and replanting of native vegetation along bare stream banks. Use of

native vegetation in landscaping minimizes the need for pesticide and fertilizer use and requires less frequent watering and mowing.

Groundwater

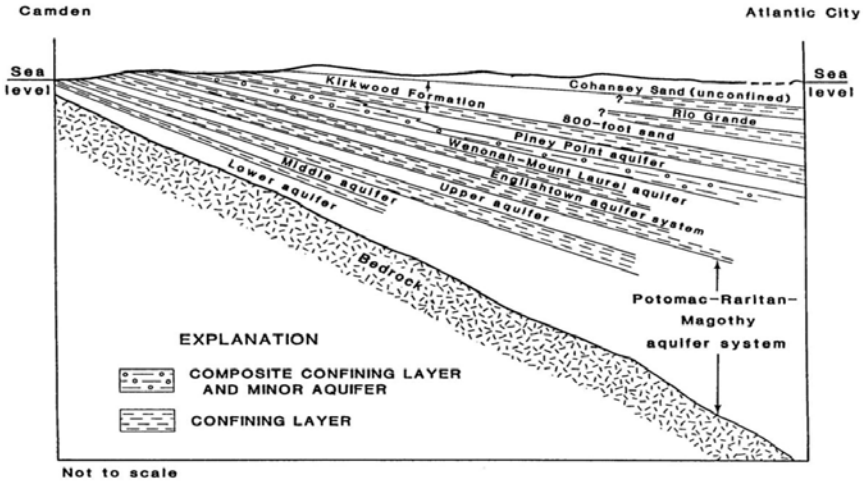
Geologic Formations and Aquifers

Geologic formations in Hamilton Township differ on either side of the fall line between the physiographic provinces of the Coastal Plain and the Piedmont Plateau. See **Figure 2: The Physiographic Regions of New Jersey**. The geology of the New Jersey Coastal Plain can be visualized as a tilted layer cake, with its "layers," or strata, formed of gravels, sands, silts, and clays. The Piedmont Plateau is characterized by hard crystalline rocks and bedrock made of red sandstone, shale, and basalt.

In the Inner Coastal Plain, precipitation seeping through the soil accumulates in the empty spaces between rock particles; this underground water is known as groundwater. An aquifer is an underground layer of rock and soil through which water can easily move. The silt and clay layers, which impede the movement of water, are called confining beds. Confining beds help slow the entry of any surface contaminants into the groundwater.

Coastal Plain aquifers are not horizontal layers, but tilt toward the southeast, getting deeper as they cross the state toward the Atlantic Ocean. This is depicted in **Figure 8**. Because of this tilting, each aquifer emerges on the land surface in a sequential manner. The deepest strata emerge on the surface near the Delaware River. Where each individual layer emerges is called its "outcrop" area. Preventing contamination of the land in outcrop areas is extremely important in order to maintain a safe drinking supply.

Figure 8: Coastal Plain Aquifers



Source: USGS

In the Piedmont Plateau, groundwater is drawn from joints and fractures, or networks of fractures, in the rock. The number and size of these joints and fractures decrease with increasing depth below the ground surface. Shallow parts of bedrock aquifers are generally unconfined, meaning they are not bounded by confining layers made of less permeable materials, while deeper sections may be semiconfined or fully confined.

Map 14: Geologic Outcrops illustrates the geologic outcrops and fall line in Hamilton Township. These are listed and described in **Table 19** below.

Table 19: Geologic Outcrops

Geologic Name	Lithology
Piedmont Plateau Outcrops	
Stockton Formation	Sandstone, mudstone, silty mudstone, argillaceous siltstone, and shale
Gneiss granofels and Migmatite	Heterogeneous felsic, intermediate and mafic rocks, graphitic schist, and minor marble
Gabbro	Gabbro, medium- to coarse-grained
Wissahickon Formation	Schist and gneiss, medium- to coarse-grained
Inner Coast Plain Outcrops	
Potomac Formation	Sand, fine- to coarse-grained, interbedded with white, red, or yellow clay
Magothy Formation	Quartz sand, fine- to coarse-grained, interbedded with thin-bedded clay or clay-silt
Merchantville Formation	Glauconite sand to quartz-glauconite sand, clayey and silty
Woodbury Formation	Clay-silt
Englishtown Formation	Quartz sand, fine- to coarse-grained, locally interbedded with thin to thick beds of clay

Source: NJDEP, 2005

Potomac-Raritan-Magothy Aquifer System (PRM)

Water supply wells in Hamilton Township, used both for drinking water and irrigation, tap the Potomac-Raritan-Magothy (PRM) aquifer system, the deepest and most abundant aquifer in the Atlantic Coastal Plain. The PRM is a deep geological formation underlying the Coastal Plain portion of Hamilton Township. This formation outcrops in a southwest to northeast band across Hamilton Township, as shown in **Map 14: Geologic Outcrops**.

This multiple aquifer is actually a large series of formations that have been combined and described as a single unit because the individual formations–the Potomac group and the Raritan and Magothy formations–are lithologically indistinguishable from one another over large areas of the Coastal Plain. That is, they are composed of materials of like kind and

size laid down by both an advancing and retreating sea across southern New Jersey, and by deposits of material that came from the breakdown and erosion of the Appalachian and Catskill mountains beginning in the Cretaceous Period.

Groundwater Recharge

The water stored in aquifers enters the groundwater system when precipitation seeps into, or infiltrates, the soil in groundwater recharge areas. The amount of precipitation that infiltrates the soil and actually enters an aquifer to become groundwater–the recharge of the aquifer–is a function of many factors, including climatic conditions, the nature of the soil, the vegetation of an area, and the nature and structure of the aquifer itself.

Using precipitation records, soil surveys, and land use/land cover data, the New Jersey Geological Survey has developed a methodology for evaluating land areas for their ability to transmit water to the subsurface. NJDEP has used this methodology to map and rank land areas throughout the state as to their groundwater recharge potential.

When areas with high rates of groundwater recharge potential are developed, less precipitation infiltrates the soil and more is lost as stormwater runoff, thereby decreasing the amount of water available for aquifer recharge. This can increase flooding and erosion, destabilize streambanks, and further impair water quality.

Groundwater recharge potential in Hamilton Township is shown in **Map 15: Groundwater Recharge (1997)**. Areas with the highest rates of groundwater recharge are found throughout the township, particularly in the agricultural southeastern portion of the township. In general, lands immediately adjacent to the creeks' floodplains, marshes, and wetlands of the township exhibit less groundwater recharge. Large amounts of paving and impervious cover on high recharge lands will have the most detrimental impact, although these areas are also usually the places most suitable for building because they are well drained. Conversely, these are also regions where the dilution of substances from septic systems, such as nitrates, may require a larger land area because the soils are usually more "porous." For example, minimum average lot sizes of two to four acres are often needed for proper nitrate dilution from septic systems in areas having 10 or more inches per year of groundwater recharge, depending on the soils.

Groundwater Monitoring

The United States Geological Service (USGS) maintains a network of active groundwater observation sites to provide basic statistics about groundwater levels in the U.S. Within Hamilton Township, there are four groundwater observation sites (listed below in **Table 20**) that are maintained by the New Jersey Water Science Center (NJ WSC) of USGS.

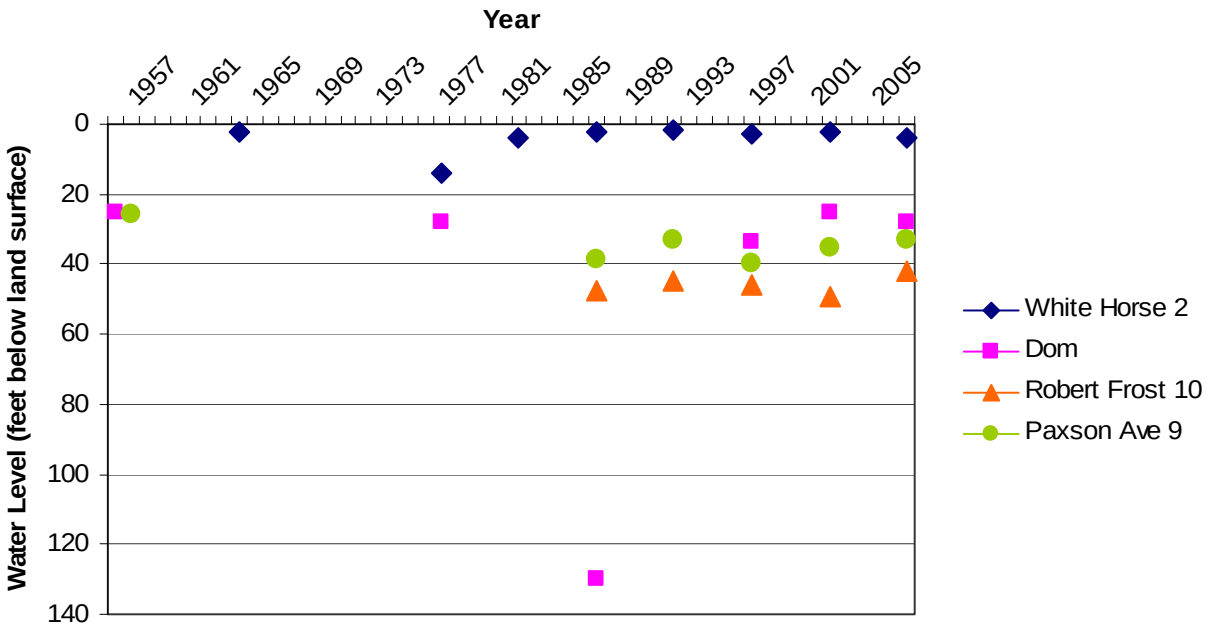
Table 20: Groundwater Observation Sites

USGS Site Number	Site Name	HUC 8 Watershed	Land-surface elevation (feet above sea level)	Depth of Well (feet below land surface)	Aquifer System
401103074415501	White Horse 2	2040201	6	138	PRM Middle
401119074381001	Dom	2040201	60	141	PRM Upper
401318074390401	Robert Frost 10	2040105	85	243	PRM Middle
401419074400701	Paxson Ave 9	2040105	80	144	PRM Middle

Source: USGS, 2010

The groundwater level indicates the depth of the water below the surface of the land. With increased water level depth, wells must be drilled deeper to reach sizable and usable quantities of water. The groundwater levels of the observation sites within Hamilton Township have varied little over the past 50 years. As seen in **Figure 9: USGS Groundwater Observation Site Water Levels**, three of the four sites have groundwater levels that have remained relatively constant. The steep drop in the water level of the "Dom" well in 1987 is not due to seasonal fluctuations, since it was taken the same month (November) as other observations. Groundwater fluctuations occur naturally and may be due to changes in precipitation. These groundwater observation wells are shown on **Map 16: Wells**.

Figure 9: USGS Groundwater Observation Site Water Levels



Source: USGS, 2009

Water Supply Wells

Wells that provide drinking water may be either private or public water supply wells. Private water supply wells are those that serve less than 25 people and are not regulated by the EPA or DEP. On the other hand, public water supply wells–which may be publicly or privately owned–are those that serve at least 25 people or 15 service connections for at least 60 days per year. Public water supply wells are further defined as being either community or noncommunity. A public community water supply well has 15 or more service connections used by year-round residents, or regularly serves at least 25 year-round residents. Public community water supply wells may serve municipalities, subdivisions, nursing homes, or other areas or institutions.

There are 10 active public community water supply wells serving Hamilton Township. They are listed in **Table 21: Public Community Water Supply Wells** below and shown on **Map 16: Wells**. Although the table lists the original owners, Consumers NJ Water Company changed its name in 2004 to Aqua New Jersey. Trenton Water Works also provides drinking water to a large portion of Hamilton Township, although it has no wells in the township because its source is the Delaware River.

Table 21: Public Community Water Supply Wells

Well ID	Original Owner	Address of Well	Depth of Bottom of Well	Primary Aquifer
0065857	Bordentown Water Dept	Rte 206 NB south of I 195	127	Middle Potomac-Raritan-Magothy
0065868	Bordentown Water Dept	Rte 206 NB south of I 195	140	Middle Potomac-Raritan-Magothy
0065940	Bordentown Water Dept	Rte 206 NB south of I 195	137	Potomac-Raritan-Magothy
0066082	Bordentown Water Dept	Rte 206 NB south of I 195	122	Potomac-Raritan-Magothy
0065797	Consumers NJ Water Co	Paxson Ave	156	Middle Potomac-Raritan-Magothy
0065935	Consumers NJ Water Co	Paxson Ave	150	Middle Potomac-Raritan-Magothy
0065835	Consumers NJ Water Co	Robert Frost Dr	269	Middle Potomac-Raritan-Magothy
0065900	Consumers NJ Water Co	Park Ave	200	Middle Potomac-Raritan-Magothy
0066053	Consumers NJ Water Co	Paxson Ave & Wendover Dr	138	Middle Potomac-Raritan-Magothy
0177342	Consumers NJ Water Co	Whatley Rd	151	Lower Potomac-Raritan-Magothy

Source: NJDEP, 2007

Public noncommunity wells are another part of a public water system. There are two types of public noncommunity water systems: transient and nontransient. The name refers to the

type of populations that utilize them and their frequency of use. A transient noncommunity water system serves at least 25 people each day, but this population changes each day. These systems are at places such as rest stops, gas stations, and restaurants. A nontransient noncommunity water system serves at least 25 of the same people daily at a minimum of six months per year at places like schools, factories, and office parks.

There is one public noncommunity well in Hamilton Township, listed in **Table 22** below and also shown on **Map 16: Wells**. This is a transient well that serves the Verizon facility (formerly AT&T) on Whitehorse Hamilton Square Road.

Table 22: Public Noncommunity Water Supply Wells

Well ID	System Name	Depth of Bottom of Well
1103304	AT&T	136

Source: NJDEP, 2004

As required by federal and state regulations, public water supply wells (both community and noncommunity) in the state are monitored by NJDEP on a regular basis. The monitoring schedules for the public water supply wells in Hamilton Township are shown in **Appendix E: Drinking Water Supply Monitoring and Quality**.

Sampling requirements for a water system may change at any time for several reasons, including analytical results and changes in population and/or inventory. It is generally the responsibility of the public water system and its licensed operator to make sure proper monitoring is performed for the entire distribution system and each point of entry for all parameters. Sampling requirements may be confirmed by referring to the Code of Federal Regulations (40 CFR 141) and the New Jersey Safe Drinking Water Act Regulations (N.J.A.C. 7:10).

Well Head Protection Areas

Delineating a Well Head Protection Area (WHPA)

A WHPA consists of three tiers, each based on the time of travel to the well:
Tier 1 = two years
Tier 2 = five years
Tier 3 = twelve years
Calculation of the tier boundaries is based on findings of how long specific contaminants can survive in groundwater, how much time would be required for specific remedies to be undertaken, and on the likelihood of natural dilution over distance.

As part of its 1991 Well Head Protection Program Plan, the New Jersey Department of Environmental Protection has delineated Well Head Protection Areas (WHPAs) around all community wells. A WHPA is the area from which a well draws its water within a specified time frame (tiers). Pollutants spilled directly on or near the well head may enter the well within that time frame. Once delineated, these areas become a priority for efforts to prevent and clean up groundwater contamination. Other components of the Well Head Protection Plan include implementing best management practices to protect groundwater, land-use planning, and

education to promote public awareness of groundwater resources.

Once WHPAs are delineated, potential pollution sources may be managed by landowners or municipalities, in relation to the tier locations. Protection of land and restrictions on activities within well head zones (relating to uses that generate contaminants, and to the storage, disposal, or handling of hazardous materials) are important for maintaining the quality of water within those zones.

The radius of the WHPA depends on a number of factors related to the well and the underlying hydrogeology. The deeper the aquifer and the slower the pumping rate of the well, the smaller the radius of the WHPA. Many of the WHPAs in Hamilton Township, shown on **Map 16: Wells**, are somewhat large due to the fact that the aquifer they draw from, the Potomac-Raritan-Magothy, outcrops at the well locations and is an unconfined aquifer. This means that these wells are more susceptible to contamination.

Air Quality

Air quality has a direct effect on human health, as well as the built and natural environment. Daily industrial activities and roadway traffic release dust and particles into the air. Long-term exposure to air pollution can cause cancer and damage to the immune, neurological, reproductive, and respiratory systems.

Throughout the 20th century, concerns over air quality heightened, resulting in the passage of the first federal air pollution legislation: the Air Pollution Act of 1955. It funded research for the scope and sources of air pollution. The Clean Air Act of 1963 (CAA 63) was the first legislation to authorize the regulation of air pollution. The CAA 63, however, lacked enforcement. Less than a decade later, the much stronger Clean Air Act of 1970 (CAA 70) was passed. It created a more comprehensive federal approach to the cleanup of air pollution.

The CAA 70 identified six criteria pollutants–ground-level ozone, particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide, and lead–that are destructive to human health and the built and natural environment (see descriptions of **Criteria Pollutants** on left). The EPA refers to these six air pollutants as criteria pollutants because they are regulated by human health-based and/or environmentally based criteria that set the permissible levels of exposure.

Criteria Pollutants

Ground level ozone (O_3) is formed when volatile organic compounds (VOC) and nitrogen oxides (NOx) react with sunlight and heat. It is produced more in the summer months and is the primary constituent of smog. Ground level ozone is a pulmonary irritant, which, even in low levels, can be dangerous to sensitive populations, such as people with asthma or emphysema, and the elderly. It can also affect plant growth and is responsible for hundreds of millions of dollars in lost crop production.

Particulate matter (PM), or particle pollution, is made up of dust, ash, smoke, and other small particles formed from the burning or crushing of materials such as wood, rocks, and oil. When ingested, particulate matter can lodge deep in the lungs and can contribute to serious respiratory illnesses, such as asthma or lung disease. Particulate matter also creates haze, reduces visibility, and covers buildings in dirty soot.

Carbon monoxide (CO) is a colorless, odorless gas that is formed when carbon fuel is not burned completely. It is a component of motor vehicle exhaust; therefore, higher levels of CO generally occur in areas with heavy traffic congestion. The highest levels of CO typically occur during the colder months, when air pollution becomes trapped near the ground beneath a layer of rising warm air.

Nitrogen oxides (NOx) are a group of highly reactive gases that contain nitrogen and oxygen in varying amounts. Motor vehicles, electric utilities, and homes and businesses that burn fuels emit nitrogen oxides; they can also be found naturally. Nitrogen oxides are primary components in ground-level ozone (smog), acid precipitation, and other toxic chemicals. Acid precipitation can cause lung ailments in humans, property damage, harm to aquatic life, and other environmental and human health problems.

Sulfur dioxide (SO_2) is released into the atmosphere when fuel containing sulfur, such as coal and oil, is burned, and when gasoline is refined from oil. Sulfur dioxide dissolves in water vapor to form acid precipitation.

Lead (Pb) is a pollutant that was historically released by cars and trucks burning leaded fuel, but metals processing plants and trash incinerators are the major source of emissions today. Lead tends to be a localized air pollutant, found in urban or high traffic areas, and is deposited in soil and water, harming fish and wildlife.

Between 1900 and 1970, emissions of the criteria pollutants increased dramatically. However, total emissions of the six criteria air pollutants decreased by more than 50 percent between 1970 and 2007. The industrial sector reduced its toxic air emissions by 70 percent during this time period. Stricter emissions standards in the auto industry have made cars 90 percent “cleaner” since 1970. Cars also pollute less because refineries are required to produce cleaner fuels; leaded gasoline was completely banned in 1996. In 1977 and 1990, amendments were made to the Clean Air Act to expand enforcement.

Air Quality Monitoring

The Ambient Air Monitoring Program was created by the EPA to help protect and assess air quality. The program is carried out by state and local agencies. The NJDEP’s Bureau of Air Quality Monitoring (BAQM) operates ambient air monitoring sites across the state. These sites assess various air-quality parameters, including pollutant concentrations, population exposure, major pollution sources, background levels, regional pollutant transport, and secondary impacts in rural areas.

As of 2009, NJDEP’s Bureau of Air Monitoring maintained a network of 42 air-quality monitoring stations across the state and proposed the establishment of two new stations. Most of the monitoring stations are clustered in the New York metropolitan area. Each station monitors at least one of 23 parameters, which include many air pollutants, along with wind speed, wind direction, solar radiation, or other parameters. As enabled by the CAA, the EPA has set National Ambient Air Quality Standards (NAAQS) for the six criteria pollutants. There are

two kinds of NAAQS: the primary standard is based on human health effects, while the secondary standard is based on environmental effects and property damage.

Air-quality data from monitoring stations in Trenton and at Rider University assess air pollution relevant to Hamilton Township. Both stations are monitored at the "Neighborhood" spatial scale, representative of one to 10 kilometers from the station, which would include Hamilton Township. In 2007 (the most recent year with available annual data), the Trenton station measured particulate matter and the Rider University station measured nitrogen dioxide and ground-level ozone. Results from these stations are described below.

Particulate Matter

Particulate matter, or particle pollution, is composed of a number of different elements, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. Particles smaller than 10 micrometers[2] in diameter are able to be inhaled and can affect the heart and lungs, causing serious health effects, such as difficulty breathing, aggravated asthma, chronic bronchitis, irregular heartbeat, and premature death in people with heart and lung disease. "Fine particles" ($PM_{2.5}$) are those smaller than 2.5 micrometers, while "inhalable particles" (PM_{10}) are those between 2.5 and 10 micrometers in diameter. Fine particles may be emitted from fires, power plants, industries, and automobiles, while inhalable particles may be found near roadways and dusty industries. Particle pollution from fine particles is the primary cause of reduced visibility (haze) in the United States.

The fine particulate ($PM_{2.5}$) annual primary and secondary standards are set at 15 micrograms per cubic meter ($\mu g/m_3$), and the 24-hour (daily) standard primary and secondary are set at 35 $\mu g/m_3$. The 24-hour primary and secondary standards for inhalable particles (PM_{10}) are set at 150 $\mu g/m_3$ and the annual primary and secondary standards are set at 50 $\mu g/m_3$.

In 2007, all stations, except Atlantic City, exceeded the 24-hour $PM_{2.5,}$ although none exceeded the annual $PM_{2.5}$ standard. Based on the 342 samples of air, the annual mean concentration of fine particles at the Trenton monitoring site was 12 $\mu g/m_3$, the highest daily concentration was 41.0 $\mu g/m_3$, and the second highest daily concentration as 40.7 $\mu g/m_3$. In 2007, the annual average design value[3] for the Trenton monitoring site was 12.6 µg/m3. See **Table 23: $PM_{2.5}$ Air Quality Data (2007)**.

[2] A single strand of hair is approximately 70 micrometers in diameter.
[3] The annual average design value is determined by averaging the annual arithmetic mean concentrations for three calendar years, and is used to determine attainment or nonattainment.

Table 23: $PM_{2.5}$ Air Quality Data (2007)

Monitoring Site	Number of Samples	Annual Mean Concentration (µg/m3)	Highest Daily Concentration (µg/m3)	Second Highest Daily Concentration (µg/m3)	2007 Annual Average Design Values
Trenton	342	12.0	41.0	40.7	12.6
Standard	N/A	15	35	N/A	N/A

Source: NJDEP, 2007

As of 2007, all areas in the State of New Jersey were in attainment for both the annual and 24-hour PM_{10} standards. Of the six sites monitoring inhalable particles, Trenton had the lowest highest daily concentration and the lowest annual mean. The highest daily concentration of inhalable particles was 53.2 µg/m_3, the second highest was 47.9 µg/m_3, and the annual mean was 20.9 µg/m_3. See **Table 24: PM_{10} Air Quality Data (2007)**.

Table 24: PM_{10} Air Quality Data (2007)

Monitoring Site	Number of Samples (µg/m_3)	Annual Mean (µg/m_3)	Highest Daily Concentration (µg/m_3)	Second Highest Daily Concentration (µg/m_3)
Trenton	58	20.9	53.2	47.9
Standard	N/A	50	150	N/A

Source: NJDEP, 2007

Nitrogen Dioxide

Nitrogen dioxide (NO_2), a reddish-brown, highly reactive gas, is one of the several nitrogen oxides (NO_x). Most nitrogen oxides are emitted as nitric oxide (NO) from cars, trucks, buses, power plants, and off-road equipment. However, NO is easily converted into NO_2 in the atmosphere through the oxidation of NO. When NO_2 reacts with other chemicals, it can form ozone, particulate matter, and other compounds that contribute to regional haze and acid rain.

Short-term exposure to low levels of NO_2, ranging from 30 minutes to 24 hours, can aggravate preexisting respiratory illnesses such as asthma, cause respiratory illnesses (particularly in children ages five to twelve), and inflame airways in healthy people. Symptoms of low-level exposure include irritation to eyes, nose, throat, and lungs, as well as coughing, shortness of breath, fatigue, and nausea. Long-term exposure to NO_2 may increase susceptibility to respiratory infection and cause permanent damage to the lungs. Environmental impacts of NO_2 include changes in the composition of some plants in wetland and terrestrial ecosystems, acidification of freshwater bodies, eutrophication of estuarine and coastal waters, increased levels of toxins harmful to fish and other aquatic life, and visibility impairment.

The primary and secondary NAAQs for NO_2 are the same and are set at a calendar-year average concentration of 0.053 parts per million (ppm).The statewide standards are identical to the NAAQ except micrograms per cubic meter (µg/m3) are the standard units and the state standard applies to any 12-month period, not a calendar year. New Jersey uses the State of California's one-hour standard of 0.18 ppm as a guideline in assessing short-term impacts from specific sources.

Routine monitoring for NO_2 in New Jersey began in 1966. The last year that concentrations of NO_2 exceeded the NAAQS in New Jersey was in 1974. In 2007, none of the NJDEP monitoring sites recorded an exceedance of either the National or New Jersey Air Quality Standards for NO_2. As shown in **Table 25: Nitrogen Dioxide and Nitric Oxide (2007)**, the highest one-hour average concentration of NO_2 recorded at the Rider University monitoring site was 0.050 ppm, and the second highest was 0.049 ppm. The 12-month average concentration of NO_2 recorded at Rider University was 0.012 ppm, and the calendar-year average concentration was 0.010 ppm. The highest 12-month average concentration of NO_2 recorded in the state was 0.027 ppm from the Elizabeth Lab.

National health and welfare standards have not been established for Nitric Oxide (NO), although it is considered to be an important pollutant that contributes to the formation of ozone, fine particles, and acid rain. **Table 25: Nitrogen Dioxide and Nitric Oxide Air-Quality Data (2007)** shows that the annual average concentration of NO recorded at the Rider University monitoring station was 0.005 ppm.

Table 25: Nitrogen Dioxide and Nitric Oxide Air Quality Data (2007)

Monitoring Sites	Nitrogen Dioxide 1-Hour Average (ppm)		Nitrogen Dioxide 12-Month Average (ppm)		Nitric Oxide Annual Average (ppm)
	Maximum	2nd Highest	Maximum	Calendar Year	
Rider University	0.050	0.049	0.012	0.010	0.005
Standard	0.18	N/A	0.053	N/A	N/A

Source: NJDEP, 2007

Ground-Level Ozone

Ozone is a gas consisting of three oxygen atoms. In the atmosphere, ozone occurs naturally and is beneficial in protecting the earth from ultraviolet rays. At the ground level, ozone can have detrimental effects on humans and the environment (see explanation of Criteria Pollutants on page 69). Ozone was monitored at 14 stations throughout New Jersey in 2006. Of the 14 sites, 11 operated year-round and three operated only during the ozone season (April 1 through October 31). For ozone, the entire State of New Jersey is considered a nonattainment area, although conditions have been improving greatly since the 1980s.

For ground-level ozone, NAAQS primary and secondary standards are the same. In 1970, the EPA set a one-hour ozone standard at 0.08 parts per million (ppm). The ozone

standard was revised in 1979 to a one-hour ozone standard of 0.12 ppm. This standard, however, proved to be inadequate in protecting the public from the adverse health effects of ground-level ozone. In 1997, the one-hour standard was replaced with an eight-hour standard of 0.08 ppm, although New Jersey has set more stringent standards for ozone. The statewide standard is a one-hour concentration of 0.12 ppm, and the secondary standard is a one-hour concentration of 0.08 ppm.

The Rider University station exceeded the one-hour standard on two days, and it exceeded the eight-hour standard on nine days. Ground-level ozone results from this station are shown in **Table 26: Ozone One-Hour Data (2007)** and **Table 27: Ozone Eight-Hour Data (2007)**.

Table 26: Ozone One-Hour Data (2007)

Monitoring Site	1-hr Max ppm	2nd Highest 1-hr Max ppm	4th Highest 1-hr Average 2004-2006 ppm	# of days with 1-hr Averages above 0.12ppm
Rider University	0.142	0.125	0.120	2
Statewide	0.142	0.134	N/A	3
Standard	0.12	N/A		

Source: NJDEP, 2007

Table 27: Ozone Data Eight-Hour Data (2007)

Monitoring Site	1st Highest	2nd Highest	3rd Highest	4th Highest	Average of 4 Highest 8-hour Averages	# of days with 8-hr above .08 ppm
Rider University	0.106	0.102	0.094	0.094	0.091	9
Statewide	0.107	0.106	0.103	0.102	0.103	22
Standard	0.08	N/A				

Source: NJDEP, 2007

The Air Quality Index

The Air Quality Index (AQI) is an index for reporting regional air quality on a daily basis. The EPA created the AQI to indicate a region's air quality by measuring levels of five of the six criteria pollutants (excluding lead). The AQI is focused on the potential human health hazards experienced by breathing unhealthy air. Scores for the AQI range from 0 to 500 and are divided into six color-coded categories, as shown in **Figure 10: Air Quality Index (AQI)** below. The higher the AQI value, the greater the level of air pollution and associated health concerns.

Figure 10: Air Quality Index (AQI)

Numerical Air Quality Index (AQI) Rating	Descriptive Rating: Levels of Health Concern	AQI Color Code
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for Sensitive Groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very Unhealthy	Purple
301 to 500	Hazardous	Maroon

Source: NJDEP, 2005

The daily score is based on the highest individual pollutant score reported. For example, if ozone scored 150 and particulate matter scored 100, the daily AQI would be 150, which is considered "Unhealthy for Sensitive Groups." The index is also used to measure overall air quality by counting the number of days per year when the AQI of each metropolitan region exceeds 100. An AQI value of 100 generally corresponds to the national air quality standard for the pollutant, which is the level the EPA has set to protect public health.

New Jersey is divided into nine regions, which report their respective AQIs. Mercer County is in part of Region 5: Central Delaware Valley. The monitoring stations for Region 5 are located in Burlington Township and at Rider University. In 2007, the most recent year of annual data, Region 5 reported 317 good (green) days and 39 moderate (yellow) days, eight days that were unhealthy for sensitive groups (orange), one unhealthy (red) day, and 0 very unhealthy (purple) days.

Point Sources of Air Quality Pollution

Under the Clean Air Act, the EPA limits the amount of other air pollutants and toxins that may be emitted by point sources, such as chemical plants, industrial factories, power plants, and steel mills, through the NJDEP Air Quality Permitting Program. Title V of the Clean Air Act requires certain facilities producing potentially harmful air emissions to obtain *operating permits* if they fall within one of the following categories:

- Major source
    - Air emissions of 100 tons per year for any pollutant, although lower thresholds apply in nonattainment areas for pollutants in nonattainment
    - Hazardous air pollutant emissions of 10 tons per year for a single pollutant or 25 tons per year for a combination of pollutants

- Sources of acid rain
- Solid waste incineration units
- Municipal solid waste landfill
- Chemical manufacturing
- Nonmajor sources subject to National Emission Standards for Hazardous Air Pollutants (NESHAP) compliance monitoring

NESHAP establishes standards for hazardous air pollutants for stationary sources. There are 188 hazardous air pollutants defined by the Clean Air Act, including asbestos, beryllium, mercury, vinyl chloride, benzene, arsenic, and radon/radionuclides. These toxic pollutants are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects.

There are 166 air quality permits in Hamilton Township, listed in **Appendix G: Active Air Quality Permits & Emission Statements**. Many of these permits are for gas stations, boilers or heaters, emergency generators, and dry cleaning. All but two of these are preconstruction permits for nonmajor new or modified sources of air pollution. However, there are two major facilities with *operating permits* regulated under Title V of the Clean Air Act. These are the Congoleum Corporation and the PSEG Fossil LLC Mercer Generating Station. These two are considered major facilities contributing significant emissions of air pollutants.

NJDEP enacted the Emission Statement Rule in 1992, requiring certain sites that have an air quality permit to report specific air contaminants, including carbon monoxide (CO), sulfur dioxide (SO_2), ammonia (NH_3), respirable particulate matter (PM_{10} and $PM_{2.5}$), lead (Pb), total suspended particulate matter (TSP), volatile organic compounds (VOC), nitrogen oxides (NOx), and 38 other toxic air pollutants. Emissions statement reporting applies if a facility has a potential to emit: five tons or greater of lead, 10 tons of VOC, 25 tons of NOx, or 100 tons of CO, SO_2, PM_{10}, $PM_{2.5}$, TSP, or ammonia.

There are three facilities in Hamilton Township that are required to submit emissions statements: the Consumers Oil Corporation, Congoleum Corporation, and the PSEG Fossil LLC Mercer Generating Station. Congoleum Corporation has two facilities that both issue annual emissions statements. In 2009, these facilities released data on their air emissions of the following three contaminants: carbon monoxide (CO), nitrogen oxide (NOx), and volatile organic compounds (VOC). The Congoleum Corporation and PSEG Fossil LLC Mercer Generating Station also reported emissions of ammonia, carbon dioxide (CO_2), lead (Pb), respirable particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), and total suspended particulate matter (TSP). In addition, the PSEG Fossil Mercer Generating Station released information on its emissions of acrolein, benzene, dioxins, ethylenedibromide, arsenic compounds, formaldehyde, hexachlorobenze, hydrogenchloride, manganese compounds, mercury compounds, nickel compounds, polycyclic organic matter, and quinoline. The 2009 statements of the three regulated facilities in Hamilton Township are included in **Appendix G: Active Air Quality Permits & Emission Statements**.

The PSEG facility, a coal-fired power plant located on Duck Island in the Trenton-Hamilton-Bordentown Marsh, is one of the-largest sources of air pollution in the State of

New Jersey due to the 1.6 million tons of carbon dioxide and over 8,000 tons of sulfur dioxide that it emits annually. Carbon dioxide, one of the primary greenhouse gases, is emitted through the burning of fossil fuels and has been declared a public danger by the EPA. Sulfur dioxide, one of the criteria pollutants, is also emitted from the burning of fossil fuels. Sulfur dioxide, a precursor to acid rain, has been shown to kill vegetation and has been linked to respiratory illnesses and premature death.

Biological Resources

When a community protects wildlife and habitat, it is also protecting biodiversity, which is important for the health and productivity of ecosystems and their inhabitants, including humans. Biodiversity refers to the variety of genetic material within a species population, the variety of species (plants, animals, microorganisms) within a community, and the variety of natural communities within a given region. Biodiversity facilitates adaptation and evolution, improving a species' chance of survival as the environment changes. A diversity of plant and animal species is also necessary to maintain healthy human environments, working landscapes, and productive ecosystems. Lower organisms, many not well known, contribute to nutrient cycling, decomposition of organic matter, soil rehabilitation, pest and disease regulation, pollination, and water filtering. Once biodiversity declines, it is extremely difficult for an ecosystem to recover or replace species.

Sayen Park

Hamilton Township contains numerous types of habitats, all of which are important for maintaining biodiversity. Wooded wetlands and upland forests are the two most abundant natural ecosystems found in the township. Herbaceous wetlands and scrub wetlands are also present in large areas adjacent to Hamilton Township's stream corridors and creeks. The following sections will identify and describe in more detail the plant and animal communities that inhabit these unique ecosystems within Hamilton Township.

Natural Vegetation

A region's vegetation is dependent upon many factors, the most important of which are climate and soils. The climate of New Jersey, including Hamilton Township, is variable. Due to its geographic location on the East Coast, half way between the North Pole and the Equator, the state is influenced by wet, dry, hot, and cold air streams. Hamilton Township's climate is temperate and is characterized by moderate temperatures, precipitation, and wind, with an annual median temperature of 52°F. The mean annual precipitation is 47 inches and is fairly well distributed throughout the year. A majority of Hamilton Township soils are well drained and support a diversity of trees and crops. However, there is a great deal of poorly drained soils that exhibit ponding and sustain

wetland plants. See the **Soils** section for a detailed description of Hamilton Township's soils.

Hamilton Township's natural vegetation types, along with human-influenced types of land cover, have been tabulated and mapped by NJDEP's 2007 land-cover analysis. This data, based on infrared aerial photography, is the most recent available. The designation of a particular land cover as a vegetation type is based on definitions provided by the Anderson Land Use Classification System, created by the U.S. Geologic Survey. See **Table 28** and **Map 17: Natural Vegetation (2007)**.

Lists of plants found in the township can be found in **Appendix C: Plant Species in Hamilton Township.**

Table 28: Natural Vegetation

Vegetation Type	Area (Acres)	Percentage of Township
Brush/Shrubland	526.40	2.0%
Brush/Shrubland - Oldfield	78.33	0.3%
Tidal Marshes - Freshwater	472.15	1.8%
Upland Forest - Coniferous	18.89	0.1%
Upland Forest - Deciduous	1,530.22	5.9%
Upland Forest - Mixed (Coniferous Dominated)	0.38	0.0%
Upland Forest - Mixed (Deciduous Dominated)	32.99	0.1%
Water	737.73	2.9%
Wetlands - Coastal (Phragmites Dominated)	30.12	0.1%
Wetlands - Herbaceous	253.86	1.0%
Wetlands - Modified	715.16	2.8%
Wetlands - Phragmites Dominated	54.51	0.2%
Wetlands - Scrub/Shrub	380.88	1.5%
Wetlands - Wooded - Coniferous	3.83	0.0%
Wetlands - Wooded - Deciduous	3,290.73	12.8%
Wetlands - Wooded Mixed (Coniferous Dominated)	4.52	0.0%
Wetlands - Wooded Mixed (Deciduous Dominated)	5.23	0.0%
Total	**8,135.91**	**31.6%**

Source: NJDEP, 2007

Wetlands

Wetlands are a critical ecological resource, supporting both terrestrial and aquatic animals and boasting biological productivity far greater than that found on dry land. Wetlands play a vital role in maintaining water quality by naturally filtering surface and ground waters. The ecological importance of wetlands, however, has not always been appreciated. For over three centuries, people drained, dredged, filled, and leveled wetlands to make room for development and agriculture. Although the pace of wetland destruction has slowed markedly in the past three decades, human activities have destroyed approximately 115 million of the original 221 million acres of wetlands in the United States since the beginning of European settlement. See the wetlands section in **Natural Resources** for a definition of wetlands and information on New Jersey regulations.

Hamilton-Trenton-Bordentown Marsh

Wetlands are the second most common land-use classification in Hamilton Township, covering 20 percent of the township's total land, or 5,211acres. Dominant vegetation in the wetlands of Hamilton Township includes rice cutgrass, skunk cabbage, cinnamon fern, northern wild raisin, northern arrowhead, black gum, common greenbrier, pitch pine, and red maple. Most wetlands in Hamilton Township are found in association with the township's many streams and tributaries. Hamilton Township's most abundant wetlands are deciduous wooded wetlands, freshwater tidal marshes, and agricultural (modified) wetlands. Ponds, marshes, swamps, and impoundments caused by beavers are found in many nontidal wetlands areas.

Deciduous wooded wetlands, sometimes referred to as wetland forests or, more typically, hardwood swamps, are found in the Hamilton-Trenton Marsh west of Spring Lake, as well as on the flood plain of Crosswicks Creek upstream of the Route 206 bridge. Deciduous wooded wetlands occupy approximately 3,290 acres (12 percent) of Hamilton Township's total land area and support mixed hardwoods that flourish in lowlands. Deciduous wooded wetlands provide important habitat for a wide variety of mammals, birds, reptiles, and amphibians. The wetland forests west of Spring Lake are dominated by red maple and sweet gum. Some types of ferns found there include rattlesnake fern and netted chain. Grey squirrels, chipmunks, white-tailed deer, raccoons, and red-tailed hawks are found here. Tree species found in wet woods on the flood plain of Crosswicks Creek include willows, box elder, and white ash. Vines of grape, Virginia creeper, and poison ivy are found there as well.

Closely associated with deciduous wooded wetlands are scrub/shrub wetlands, occupying about 270 acres (about one percent) of Hamilton Township. These wetlands are generally composed of young, medium-height, primarily deciduous woody plants. Scrub/shrub wetlands are usually in early successional stages and will later become shrub-dominated

or wooded wetlands. Hamilton's scrub/shrub wetlands are found in the Hamilton-Trenton Marsh along its edges adjacent to upland areas. The scrub/shrub wetlands in Hamilton Township may include silky dogwood, buttonbush, alder, arrowhead, red maple, swamp ash, bitter cress, fringed loosestrife, purple stemmed aster, and turtlehead. Baltimore butterflies, woodchucks, willow flycatchers, Eastern king birds, cardinals, and brown snakes have been sighted in these areas.

Other types of wetlands found in Hamilton Township include herbaceous wetlands, which cover 253 acres, less than one percent of the land cover. Herbaceous wetlands generally occur along lake edges, on open floodplains, and in former agricultural fields. Herbaceous wetlands are found in close proximity to wooded wetlands along some of Hamilton Township's major and minor streams. Herbaceous wetland plants may include rice cutgrass, reed canary grass, pond lily, tearthumb, arrow-leafed tearthumb, broadleaf cattail, and the common reed (*Phragmites*). Herbaceous wetlands may be dominated by *Phragmites*, a native reed that colonizes easily and pushes into wetland areas from adjacent dry land areas, spreading through an underground root system that is difficult to eradicate. In addition to its tendency to aggressively spread, *Phragmites* often become a dominant monoculture and is therefore considered an invasive species.

Modified wetlands are areas that have been altered by human activities and do not support natural wetland vegetation, but do show signs of soil saturation on aerial infrared surveys. Modified wetlands encompass agricultural wetlands, former agricultural wetlands, disturbed wetlands, wetland right-of-ways, and wetlands that occur in maintained green spaces, such as open lawns, golf courses, and stormwater swales. Hamilton Township has several large tracts of modified wetlands, covering 746 acres (three percent) of the township's land area. Some of Hamilton's modified wetlands can be found along the edges of highways built throughout the Hamilton-Trenton-Bordentown Marsh. These "edge habitats" provide a transitory habitat for a variety of bird species, including goldfinches, white-throated sparrows, and indigo buntings.

Duck Island, located between the Hamilton-Trenton Marsh and the Delaware River, is the largest wetland mitigation project in New Jersey constructed by the Department of Transportation. As mitigation for the destruction of 57 acres of wetlands, NJDOT created 70 acres of wetlands, of which 70 percent are tidal. A series of tidal channels and eight islands of varying sizes and elevations above mean high tide were also constructed. Since the completion of the project in 1995, more than 300 plant species, not including landscaping plants, have been found. Some species include the swamp beggar's tick, American waterwort, subulate arrowhead, Torrey's rush, narrow panicled rush, water willow, and hop tree. More than 100 species of birds, including egrets, waterfowl, herons, black vultures, snipe, bobolinks, and blue grosbeaks have also been observed. Other animals include carp, bullhead, banded killfish, shiner, Fowler's toad, American toad, snapping turtle, ribbon snake, raccoon, opossum, woodchuck, white-footed mouse, and microtus. Bluecrabs, Asiatic clam, and river mussel are a few invertebrates found on Duck Island.

Upland Forests

Upland areas are those locations without water at or near the soil surface. Upland forests are located where drainage is sufficient so that soils do not become saturated for extended periods of time. Most of Hamilton Township's upland forests have been cleared and converted to residential or industrial development. The remaining uplands are relegated to a few remnants along stream corridors, or are patchy woodlands associated with farms and areas with less desirable soils.

Upland forests are the second most abundant natural vegetative land cover in Hamilton Township after wetlands, covering about 1,582 acres (18 percent).

Mercer County Park

Practically all upland forests in Hamilton Township are deciduous forest (1,530 acres). The composition of these upland deciduous forests is largely one of mixed oaks, such as black, red, chestnut, scarlet, white, and willow, joined by other hardwoods like American beech, hickory, red maple, tulip-poplar, and sweet gum. Along stream corridors, the Atlantic white cedar and holly tree can also be found. Dominant species in the township's upland forests include black walnut, tulip-poplar, red oak, shagbark hickory, and white oak. The understory is dominated by flowering dogwood, American holly, greenbriar, and sassafras. Vines, such as Virginia creeper, wild grapes, Japanese honeysuckle, and poison ivy, are common.

About 18 acres (less than one percent) of Hamilton Township is covered in coniferous upland forests. These forests are mostly made up of successional, or pioneer, plants–like Virginia pine, scrub pine, and pitch pine–that will eventually be overgrown by dominant deciduous trees, such as walnut, oak, and hickory.

There is no comprehensive inventory of tree varieties in Hamilton Township. However, extensive inventories of plants, including trees, at Duck Island, John A. Roebling Memorial Park, and Van Nest Refuge have been complied by Doctors Mary and Charles Leck. Tree composition in these areas includes oak, maple, spruce, birch, pine, elm, willow, basswood, beech, holy, cherry, dogwood, and cedar.

Grasslands and Agricultural Lands

NJDEP defines grassland habitat as brushland, shrubland, or old fields that were cleared or disturbed at one time and then abandoned. Following abandonment, old fields are overgrown by perennial herbs and grasses. These pioneer plants remain the dominant species for three to 20 years. Later, woody plants take over. This habitat is especially visible along wood edges, roadsides, and in landscapes where mowing is infrequent and where woody plants are not yet the dominant vegetation.

About 604 acres (two percent) of Hamilton Township's land cover consists of brushland, shrubland, or old field. In Hamilton Township, brushland and old field are generally found adjacent to residential and industrial development, and occurs more often near wetland areas. Trees such as sassafras, black cherry, red cedar, and white oak are common on old field lands. Meadow onion, broom-sedge, common dogbane, and vines of Japanese honeysuckle can also be found in grassland habitat.

Landscape Project Priority Habitats

The Landscape Project, developed by the Endangered and Nongame Species Program of the NJDEP Division of Fish and Wildlife, documents the value of various types of habitats within New Jersey. It categorizes these habitats into one of five groups according to their importance (five being the highest). Categories three through five include habitats throughout the state that possess two exceptional conditions: (1) a documented occurrence of one or more species on either the federal or the state threatened and endangered species lists, and (2) a sufficient amount of habitat type to sustain these species. These habitats are collectively known as "critical habitat." Categories one and two include habitats that either have a documented occurrence of a species of special concern[4] in New Jersey, or are deemed suitable for species on the state or federal threatened and endangered species lists, but for which there are no documented occurrences or sightings. These habitats are labeled "suitable habitats."

Approximately 39 percent (9,920 acres) of Hamilton Township has been identified by the Landscape Project as critical or suitable habitat for threatened or endangered species. It is important to preserve both levels of habitat in order to maintain the diversity of species that still exists in the township. The majority of these lands in Hamilton Township provide critical or suitable habitat for the great blue heron or the eastern box turtle. There are also areas in the southeastern corner of the township that provide habitat for the cliff swallow, Fowler's toad, Cooper's hawk, eastern meadowlark, and grasshopper sparrow. See **Map 18: Landscape Project Priority Habitats (2007)** for a depiction of these areas of important habitat.

Table 29: Landscape Project Priority Habitats

Category	Rank	Area (Acres)	Percent of Total Habitat	Percent of Township Land
Emergent Wetlands	Suitable Habitat	1,536.34	15.5%	6.0%
Upland Forest	Suitable Habitat	2,089.77	21.1%	8.1%
	Critical Habitat	308.95	3.1%	1.2%

[4] A Species of Special Concern is a formal definition; it indicates a species that may be under consideration for listing as threatened due to documented population decline or habitat loss.

Category	Rank	Area (Acres)	Percent of Total Habitat	Percent of Township Land
Forested Wetlands	Suitable Habitat	3,482.54	35.1%	13.5%
	Critical Habitat	249.98	2.5%	1.0%
Grassland	Suitable Habitat	2,025.02	20.4%	7.9%
	Critical Habitat	227.86	2.3%	0.9%
Total Habitat		**9,920.45**	**100.0%**	**38.6%**
Total Hamilton Township Area		**2,5726.85**	**-**	**-**

Source: NJDEP, 2007

Landscape Project Data on Wetlands Habitat

The Landscape Project divides wetland habitats into two types–forested and emergent wetlands. Forested wetlands are dominated by woody plants and are often inundated with floodwater from nearby rivers and streams. Within Hamilton Township there are 3,733 acres of forested wetlands (14.5 percent of the Township), 3,482 acres (13.5 percent) of which are designated as suitable habitat and 250 acres (one percent) as critical habitat. Emergent wetlands are marshy areas characterized by low-growing shrubs and herbaceous plants in standing water. About 1,536 acres (six percent of the township) are identified as priority emergent wetlands habitat, of which all is ranked at the suitable level.

Emergent and forested wetlands in Hamilton provide habitat largely for the great blue heron, a species of special concern. Other emergent and forested wetlands areas in the north provide habitat for Fowler's toad, also a species of special concern. Some emergent wetlands in the Hamilton-Trenton Marsh area may provide habitat for the cliff swallow, a species of special concern. Cooper's hawk, a threatened species in New Jersey, may be found in large areas of forested wetlands in the central part of Hamilton Township north of Interstate 195, as well as in the northwest portion of the township.

Landscape Project Data on Grassland-Dependent Species Habitat

The Landscape Project designates nearly 2,253 acres (nine percent) of Hamilton Township as critical or suitable habitat for rare grassland-dependent species. Most of this land is located in the southeast portion of the township. Suitable habitat covers 2,025 acres (eight percent) and critical habitat covers 228 acres (one percent). Grasslands in Hamilton Township may provide habitat for the eastern box turtle, a species of special concern. An area of grasslands in the southeastern corner of the township may also be

home to the Eastern meadowlark, a species of special concern, and the grasshopper sparrow, a threatened species in New Jersey.

Grassland-dependent species (mostly birds) are the most threatened group of species in New Jersey, primarily because the most common form of grassland habitat, agricultural fields, is also the most threatened habitat in the state. This is due to development pressure, as well as changes in agricultural practices on remaining agricultural lands. Many agricultural lands serve as habitat for grassland-dependent species since migrating birds cannot visually distinguish cropland from grassland, and because cropland evolves into grassland when it is fallow for one year or more. Additionally, some crops, like alfalfa and soybeans, provide suitable nesting habitat for small birds like sparrows.

Van Nest Refuge

Landscape Project Data on Upland Forest Habitat

The Landscape Project identifies 2,399 acres (over eight percent) of Hamilton Township's total land cover as upland forest habitat. Of this, 2,090 acres are ranked as suitable habitat and 309 acres are ranked as critical habitat. These areas are located across the township, with large continuous areas of upland forest critical habitat located in the central portion of Hamilton around Pond Run and Back Creek.

Most upland forest areas in Hamilton Township may provide important habitat for the great blue heron and Eastern box turtle, both species of special concern. Some upland forest areas in both the central and northwest portions of the township may also be home to Cooper's hawk, a threatened species.

Animal Communities

Although no comprehensive inventory of the different animal species within Mercer County or Hamilton Township exists, there are records of sightings, biological studies of range, and assessments of endangered and threatened species status. Using federal, state, and other scientific sources, it is possible to identify and describe known and possible animal communities in Hamilton Township. These are included in **Appendix D: Animals Known or Probable in Hamilton Township**.

Invertebrates

Invertebrates are the basis of a healthy environment and are part of every food chain–either as food for amphibians and fish, or as a part of nutrient cycling systems that create and maintain fertile soils. Invertebrates consist of insects (beetles, butterflies, moths, dragonflies, ants, termites, bees, wasps, flies, and others), arachnids (spiders, ticks, and mites), crustaceans (crayfish and microscopic copepods), mollusks (mussels, clams, snails, and slugs), and worms.

Macroinvertebrates are invertebrates that are visible to the naked eye but smaller than 50 millimeters. Benthic (bottom dwelling) macroinvertebrate communities provide a basis for ecological monitoring and are relatively simple to collect from shallow stream bottoms. These communities consist largely of the juvenile stages of many insects, such as dragonflies and mayflies, as well as mollusks, crustaceans, and worms. Monitoring for diverse assemblages of macroinvertebrates reveals the effect of pollutants over a longer period of time, as compared to chemical monitoring, which measures water quality at one moment in time. The Ambient Biomonitoring Network (AMNET) surveys streams for macroinvertebrate communities. See the **Surface Water Quality** section. At the five AMNET monitoring sites in Hamilton Township, 43 benthic macroinvertebrate families were identified in the biological samples. Included in the samples are Ephemerellidae, Asellidae, and Chironomidae.

Ephemerellidae is a family of benthic macroinvertebrate that belong to the order of mayflies called Ephemeroptera. Mayflies are indicative for good water quality. Since they are sensitive to various types of water pollution, including low dissolved oxygen, ammonia, biocides, and metals, mayfly nymphs are abundant wherever the water is clean.

The presence of species in the Asellidae and Chironomidae families may be indicative of poor water quality. Asellidae is a family of freshwater isopods. They are common in waters enriched with organic nutrients and low in dissolved oxygen and are observed in the recovery areas below sewage treatment plants. Chironomidae, or Midge flies, are among the most common of aquatic invertebrates and are very tolerant of pollution.

In New Jersey, there are nine endangered invertebrate species (two beetle species, four butterfly species, and three mussel species) and eight threatened invertebrate species (three butterfly species and five mussel species). Of these species on the New Jersey Endangered and Threatened List, one–the dwarf wedge mussel–is listed as endangered under the federal Endangered Species Act. The tidewater mucket and Eastern Pondmussel are threatened invertebrates that are found in Hamilton Township.

Vertebrates

Vertebrates are less numerous than invertebrates, but their larger size makes them much more visible, and thus better studied and recorded. Fish species are fairly well documented, as are mammals. Although elusive, reptile and amphibian species found in Hamilton Township have been inventoried in environmental site assessments. Birds that nest in the township are also known, but migrants that depend on Hamilton Township's

wetlands and wet forests as stopover sites in which to rest and feed are not as thoroughly inventoried.

Mammals

Mammals appear to be abundant because they tend to be larger and live in habitats also ideal for human development. There are 90 mammal species in New Jersey, nine of which are listed as endangered and none as threatened by the state. Some common mammals found in Hamilton Township include the beaver, Eastern chipmunk, Eastern grey squirrel, vole, muskrat, opossum, raccoon, river otter, white-footed mouse, white-tailed deer, and woodchuck. Coyotes have also been sighted in Veterans Park, and feral domestic cats are present in some parts of the township. None of these animals are considered threatened or endangered in the state.

White-Tailed Deer

White-tailed deer are a common species in New Jersey, and their conflict with humans in suburban areas is an increasing concern. Officially, their state-wide population status is considered “decreasing” due to the combined impacts of habitat loss, crop damage, and vehicle collisions. However, many areas in the state are experiencing great increases in deer populations, as herds are forced to find new habitat. Managing deer populations is difficult, as herds have to ability to double, or even triple, their numbers within a single year. Although highly dependent upon the ecological carrying capacity of the land, a healthy deer concentration is estimated to be 20 deer or less per square mile or less.

Deer thrive in fragmented “edge” conditions and altered areas, since these habitats support the new plant growth and mixed vegetation that deer prefer. New Jersey’s agricultural and suburban landscapes are prime examples of these habitats, and they provide deer with food year-round. An overpopulation of deer will decimate plant communities through overgrazing, which destroys the growth of seedlings and young trees. This loss of habitat then causes the health of deer to decline, making them more susceptible to disease and malnutrition. Habitat loss through overgrazing also threatens the entire ecosystem, since other animals depend upon the same plants for survival.

The Community-Based Deer Management Permit program in New Jersey allows alternative and traditional techniques to manage deer populations in the state. Traditional and controlled hunting, as well as bait and shoot tactics, are lethal ways to control deer numbers. Minimizing the amount of edge habitat also controls numbers and is best achieved by preserving large, contiguous tracts of land. Another strategy to minimize human-deer conflicts is modifying habitat by planting deer-repellant plants, such as lavender, shadbush, ornamental sage, yarrow, and plants with thorns. Other deer management strategies can also be utilized, such as installing reflectors and reducing speed limits on roads, employing traps for relocations, and administering fertility control measures.

Birds

New Jersey has between 350 and 500 species of birds, an exceptional number given the state's small size. Not only is the state an important "rest stop" for birds migrating to warmer climates in Central and South America, but the New Jersey Atlantic Coast and the Delaware Bay are major parts of the Atlantic Flyway, an established migratory air route in North America.

Hamilton Township is home to a great abundance and variety of birds. Within the township's boundaries, there have been documented sightings of over 230 species of birds. See **Birds** in **Appendix D: Animals Known or Probable in Hamilton Township**. Some birds that are very numerous or are common and frequently seen include the turkey vulture, mallard, herring gull, laughing gull, ring-billed gull, red-tailed hawk, mourning dove, red-bellied woodpecker, downy woodpecker, northern flicker, eastern kingbird, blue jay, American crow, tree swallow, barn swallow, Carolina chickadee, tufted titmouse, white-breasted nuthatch, Carolina wren, American robin, gray catbird, brown thrasher, European starling, common yellowthroat, eastern towhee, chipping sparrow, field sparrow, song sparrow, northern cardinal, red-winged blackbird, common grackle, and house sparrow.

Canada Geese

Another common bird is the Canada goose. The State of New Jersey has a "resident" Canada goose population of approximately 100,000 birds that no longer migrate to more southern locales. This number may double in the next five to 10 years. While geese are a pleasant component of the urban/suburban environment, providing enjoyable wildlife opportunities for the public, they can also cause property and environmental damage. Goose droppings that wash into lakes during storm events often elevate coliform bacteria to unhealthy levels, closing lakes to swimming. Goose droppings limit human use of grassy areas in parks, and because geese can be quite aggressive during the nesting season, they can also injure humans.

Removing geese or preventing them from residing in park areas is a difficult task. Because geese move freely, the most effective management solutions are best conducted at the community level. Canada geese are protected by the Migratory Bird Treaty Act. Therefore, a management program may require the U.S. Department of Agriculture's approval and permits. A new federal rule signed into law in December 2005 eases hunting restrictions and allows county and municipal officials to coordinate with state fish and wildlife departments to destroy birds and/or eggs that pose a threat to public health and safety. Management techniques include planting shrubby vegetation around streams, lakes, and ponds to block waterfowl access, discouraging humans from feeding geese, and removing geese eggs and replacing with decoys.

Reptiles and Amphibians

Reptiles and amphibians can be quite elusive when surveys attempt to document them. Some reptiles and amphibians, called herpetological species, are rare because they

depend on vernal ponds, as discussed in the **Surface Water Resources** section. Amphibians in particular tend to be very sensitive to environmental changes, offering a visible warning to humans that significant changes are occurring.

New Jersey is home to approximately 80 reptile and amphibian species. There are just three types of lizards found in the state, none of which have been documented in Hamilton Township. Some common herpetological species that have been documented in Hamilton Township include the bullfrog, green frog, pickerel frog, northern spring peeper, eastern painted turtle, snapping turtle, eastern garter snake, northern brown snake, northern water snake, red-bellied snake, and eastern ribbon snake.

Several more rare herpetological species have been sighted in Hamilton Township, including the Fowler's toad, eastern box turtle, and wood turtle. See **Appendix D: Animals Known or Probable in Hamilton Township, Reptiles and Amphibians** for a complete list of reptiles and amphibians that may be found in the Hamilton Township.

Fish

When European settlers arrived in present-day Mercer County, they encountered the Lenni Lenape, who regularly fished along the inland streams and gathered shellfish in the Delaware River. Shad fishing was an important industry along the Delaware River until the early 20th century, when it collapsed due to overfishing. Due to the unintended consequences of overfishing, urban development, industrial advancement, and mechanized agriculture, the amount and diversity of aquatic life has decreased dramatically throughout most of New Jersey.

Gropps Lake

The New Jersey Division of Fish and Wildlife, under the Bureau of Freshwater Fisheries, monitors and actively aids the propagation, protection, and management of the state's freshwater fisheries. The bureau raises several million fish for stocking in suitable waterbodies and conducts research and management surveys.

There are over 60 species of fish, including the endangered shortnose sturgeon, which may be found in Hamilton Township's many streams, lakes, and wetlands. See **Appendix D: Animals Known or Probable in Hamilton Township, Fish**.

Rare Wildlife, Plants, and Ecological Communities

The New Jersey Natural Heritage Program identifies the state's most significant natural areas through a comprehensive and continuously updated inventory of rare plant and animal species and representative ecological communities. The Natural Heritage

Database compiles information on the distribution, biology, status, and preservation needs of these species and communities. Those threatened and endangered plants and animals identified in Hamilton Township by the Natural Heritage Database are listed in **Appendix C: Plant Species in Hamilton Township, Rare Plant Species** and in **Appendix D: Animals Known or Probable in Hamilton Township, Rare Wildlife**.

Rare Wildlife

According to the Natural Heritage Database and the Landscape Project, many species of rare wildlife have been documented in Hamilton Township over the course of the past 100 years. Unfortunately, a few species have not been recently spotted in the township. The Natural Heritage Database of the NJDEP lists 12 species of rare wildlife found in Hamilton Township. Overall, six of the rare animals are birds, two are reptiles, one is an amphibian, two are invertebrates, and one is a fish. See **Rare Wildlife** in **Appendix D: Animals Known or Probable in Hamilton Township**.

As reported by the Natural Heritage Database, rare birds in Hamilton Township include the bald eagle, cliff swallow, Cooper's hawk, great blue heron, and pied-billed grebe. The bald eagle, northern harrier, and pied-billed grebe are state endangered species. The cliff swallow is a species of special concern in the state, although it is found in impressive numbers within the Hamilton-Trenton Marsh. The great blue heron is also a species of special concern found in Hamilton Township. The cliff swallow and great blue heron warrant special attention due to some evidence of decline and inherent vulnerability to environmental deterioration or habitat modification that would result in their becoming a threatened species. The Cooper's hawk is a threatened species, which may become endangered if its habitat begins to deteriorate.

Brief descriptions of those species listed on the Natural Heritage Database for Hamilton Township, provided by the New Jersey Fish and Wildlife Service, follow.

The **bald eagle** (*Haliaeetus leucocephalus*), an endangered species in New Jersey, was listed as an endangered species in New Jersey in 1974, and as endangered in 1978 in the lower 48 states. The bald eagle was removed from the federal endangered species list in 2007. Bald eagles are sensitive to human disturbance and are proven indicators of a healthy environment. Only found in North America, bald eagles inhabit New Jersey year-round. They mostly consume fish, and thus often choose to build nests in forested areas near water bodies. Population decline caused by hunting, poisoning, and egg collecting was accelerated after the introduction of the pesticide dichlorodiphenyltrichloroethane (DDT) into the environment during the 1950s. DDT causes the thinning of the eggshells, which crack under the weight of the incubating adult bird. Since the ban of DDT in 1972 and with an active state restoration program, bald eagle populations in New Jersey have increased from a single nesting pair in 1970 to 69 nesting pairs in 2008. Within Hamilton Township, bald eagle foraging areas have been identified along the Delaware River.

The **shortnose sturgeon** (*Acipenser brevirostrum*), whose prospects for survival within New Jersey is in immediate danger, is a federal and state endangered species. It is a freshwater amphidormous species, meaning they spawn and remain in freshwater for

most of their lives, but spend some time in saline waters. River mouths, tidal rivers, estuaries, and bays are the prime habitats of the shortnose sturgeon. A significant portion of the New Jersey shortnose sturgeon population inhabits the upper tidal Delaware River. Industrialization from the late 1800s to 1900s caused a substantial loss of suitable habitat for the shortnose sturgeon. Pollution, overfishing, and the construction of dams have also contributed to population decline. By the 1950s, the U.S. Fish and Wildlife Service concluded that the shortnose sturgeon was eliminated from the rivers in its historic range and was in danger of extinction. It has been listed as endangered since the passage of the Endangered Species Act in 1973.

The **Cooper's hawk** (*Accipiter cooperii*) is a threatened species in New Jersey. This raptor resides in both wetland and upland forests and is present year-round in the state. The Cooper's hawk lives in old-growth forests with closed canopies and moderate to heavy shrub cover. It prefers nesting in dense woods, such as cedar forests and conifer groves. The population of the Cooper's hawk began to decline in the 1950s, as development encroached upon its habitat. Like the bald eagle, the Cooper's hawk was affected by the use of DDT. It was placed on the endangered species list for New Jersey in 1974; however, it does not have federal endangered species status. Also, like the bald eagle, the population of the Cooper's hawk has rebounded greatly after the federal ban on DDT, and its status in New Jersey changed from endangered to threatened in 1999. The loss of large, contiguous forest land in the state continues to be a threat to the species.

The **eastern box turtle** (*Terrapene carolina*) is listed as a species of special concern in New Jersey. This small, four- to six-inch turtle can be found all over the state and lives in many different habitats. They are mostly terrestrial and enjoy soaking themselves in water or mud during the summer. Continued residential development has limited suitable habitats and reduced their numbers over the years. People encountering these turtles often keep them as pets, which prevents them from breeding. As with all species, the collection and possession of eastern box turtles is prohibited in New Jersey.

Eastern box turtle

The **eastern pondmussel** (*Ligumia nasuta*), imperiled due to its rarity, is a threatened species of freshwater mussels in New Jersey. It is found from Cape Fear River Basin, North Carolina, to the Saint Lawrence River basin, Canada, and westward through the northern parts of the continent's Interior Basin. In New Jersey, the species inhabits the Delaware River and several of its tributaries. Over the past century, one in 10 of North America's freshwater mussel species has become extinct. The remaining 75 percent are either rare or imperiled. Their decline is directly related to the degradation and loss of habitat due to pollution, dam construction, channelization, and dredging, as well as the invasion of exotic species that compete for space and food with native mussels. Eastern pondmussels were listed as threatened in New Jersey in 2002.

The following threatened and endangered species have been identified in Hamilton Township, although they are not listed on the Natural Heritage Database for the municipality.

The **pied-billed grebe** (*Podilymbus podiceps*) is a duck-like diving bird that is endangered in New Jersey. Grebes are well adapted for swimming underwater and waterproof their feathers by pruning them with secretions from an oil gland at the base of their tail. They nest in freshwater marshes associated with ponds, bogs, lakes, reservoirs, or slow-moving rivers. Breeding sites typically contain open water with submerged or floating vegetation. They can be found in a variety of habitats outside the breeding season. Although common during the 19th century, the pied-billed grebe population suffered from hunting for food and feathers, which were used in earmuffs and hats. Increased habitat loss and degradation led to further population decline, and the species was listed as threatened in 1979 and endangered in 1984. Human disturbance, flooding, contaminated runoff, and the continued loss of wetlands through draining, dredging, filling, pollution, and siltation still threaten the viability of the pied-billed grebe.

The breeding population of the **American bittern** (*Botaurus lentiginosus*), a vocal wading bird, is endangered in New Jersey. During the breeding season, these birds inhabit emergent wetlands, such as cattail ponds, sedge marshes, and marshes created by impoundments or beaver dams. They prefer to nest in shallow water with dense vegetation. Occasionally, American bitterns may nest in wet fields or grasslands containing tall grasses. During the nonbreeding season, American bitterns may occupy a variety of wetlands or grassland habitats. The American bittern was a common species before hunting and wetland destruction caused initial declines by the 1920s. Accelerated habitat loss since the 1950s, however, caused the population to decline at an alarming rate. The American bittern has been documented in the Hamilton-Trenton-Bordentown Marsh.

Photo by Steve Byland

American bittern

The **northern harrier** (Circus cyaneus) is a medium- to large-sized hawk with an endangered status in New Jersey. It was commonly called a “marsh hawk” because its preferred habitat is wet open areas, such as tidal marshes, emergent wetlands, fallow fields, grasslands, meadows, airports, and agricultural areas. Northern harrier nests are found in brackish or saline marshes along the Delaware Bay shore, as well as in freshwater tidal marshes that contain the common reed (*Phragmites australis*), like the Hamilton-Trenton-Bordentown Marsh. Like the Northern goshawk and other raptors, the Northern harrier was commonly shot in the early 20th century because of its predatory nature. The destruction of its wetlands habitat through deforestation, the draining and filling of coastal marshes, and the loss of farmland also contributed to its decline. An additional threat to the Northern harrier was the widespread use of DDT, which was found to cause reproductive failure in the species during the 1950s and 1960s. Since DDT was federally banned in 1972, the numbers of Northern harriers have gradually increased. The

Northern harrier was listed as a threatened species in New Jersey in 1979, a status that was elevated to endangered in 1984.

The **osprey** (Pandion haliaetus) is a threatened species in New Jersey. Ospreys live near coastal and inland bodies of water that support adequate fish populations. The birds build nests near fishing areas on structures such as trees, telephone poles, and channel markers. Occasionally, ospreys nest on the ground in coastal marshes. Habitat destruction, the loss of nesting trees, egg collecting, and shooting contributed to population declines evident by the end of the 19th century. Osprey numbers then dropped further after DDT was introduced into the New Jersey environment in the 1950s. As a result, the osprey was placed on the New Jersey endangered species list soon after the 1974 passage of the New Jersey Endangered Species Act. After DDT was banned, ospreys generally began to recover. Extensive building of nesting platforms also helped its recovery. In 1985, the species was moved to the threatened species list. Monitoring of nesting sites along the Atlantic Coast and Delaware Bay has shown that the osprey population has been steadily reproducing in New Jersey in recent years, with a statewide average of 1.54 young ospreys per nest.

The **peregrine falcon** (Falco peregrinus) is an endangered species in New Jersey that has been observed in Hamilton Township. The peregrine falcon is the world's fastest bird, able to reach diving speeds of up to 200 miles per hour. Peregrines traditionally nested on rocky cliffs, but because of human intrusion in these areas, they have taken to nesting in man-made structures, such as buildings and bridges. Peregrines also nest on artificial nesting platforms that have been constructed in the last 20 years in coastal marshes. The population of peregrine falcons decreased due to the looting of nests by egg collectors and falconers, as well as the shooting of the predatory birds by gunners, game wardens, and pigeon fanciers. Like a number of other birds, the peregrine falcon population was devastated by the introduction of DDT; by the 1960s, there were no known nesting peregrine falcons in the eastern United States. It was listed as an endangered species for the United States in 1970 and for New Jersey in 1974. Young peregrines were released into the wild in the late 1970s to reestablish their nesting populations. By 1986, there were 10 breeding pairs in the state, which increased to 17 by 2001. Peregrine falcons were removed from the federal endangered species list in 1999, although they remain listed as endangered in the New Jersey due to the continued threat of environmental contamination and human disturbance.

Rare Plants

Threatened and endangered plants that have been recorded in Hamilton Township include the purple giant hyssop, pawpaw, and death camas. Descriptions of those plant species listed on the Natural Heritage Database for Hamilton Township, provided by the New Jersey Fish and Wildlife Service, follow. There are a total of 14 rare plant species that have been documented in Hamilton Township. For the complete list, see **Appendix C: Plant Species in Hamilton Township, Rare Plant Species**. Natural Heritage Grid Maps show the general locations of rare plant species and ecological communities, without providing the sensitive detailed information that could place these resources at risk

for vandalism or illegal collection. These maps are available to Environmental Commissions and for research projects, but are otherwise not public.

The **purple giant hyssop** (*Agastache scrophulariifolia*) is a plant species protected by the Highlands Water Protection and Planning Act. It is imperiled in New Jersey because of its rarity (six to 20 occurrences). Globally, it is apparently secure; however, it may be quite rare in parts of its range, especially at the periphery. The purple giant hyssop flowers are purplish-red petals in a crowded, terminal spike with purple bracts. Growing three to six feet high, the purple giant hyssop is a perennial plant that blooms in July, August, and September. Its native habitat is rich woods and thickets, particularly along edges. It requires sun and shade, as well as rich, moist soils.

Photo by USDA Agricultural Research Service

Pawpaw

The **pawpaw** (*Asimina triloba*) is an endangered plant species whose prospects for survival within New Jersey are in immediate danger. It is protected by the Pinelands Commission and the Highlands Water Protection and Planning Act. Globally, the pawpaw is demonstrably secure, although it may be quite rare in parts of its range, especially at the periphery. It is critically imperiled in New Jersey because of extreme rarity (five or fewer occurrences or few remaining individuals or acres). The pawpaw is native to the U.S. and is a small, short-trunked tree or large, multistemmed shrub. It grows 10 to 40 feet tall, with large, tropical-like leaves. In the fall, the deciduous leaves turn yellow and green. Purple, six-petal flowers blossom in April and May before leaf emergence. Large, cylindrical, dark green or yellow edible fruit follows. Native habitats include ditches, ravines, depressions, flood plains, and bottomland. Pawpaws grow in rich, moist, slightly acid soils, as well as in sandy, sandy loam, medium loam, and clay loam or clay soils.

The **death camas** (*Zigadenus leimanthoides*), last observed in 1913, is an endangered species whose prospect for survival within the state is in immediate danger. It is critically imperiled in New Jersey because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres). It is protected by the Pinelands Commission and the Highlands Water Protection and Planning Act. The death camas is apparently secure globally, although it may be quite rare in parts of its range, especially at the periphery. Growing three to five feet high, the stem of the death camas bears elongated, branching clusters of small, creamy or yellow star-like flowers. It is found in wet pinelands and bogs mostly in Virginia south to Florida and west to Texas.

Conservation Areas

Within Hamilton Township there are several natural areas that have special significance for the conservation of rare species and ecological communities. The most ecologically

important area in the township is the Hamilton-Trenton-Bordentown Marsh, which has been designated a Natural Heritage Priority (NHP) site and an Audubon Important Bird Area (IBA). Additionally, the Walnford Floodplain NHP site and the Van Nest Refuge Fish and Wildlife Management Area (WMA) are other significant natural areas.

Hamilton-Trenton-Bordentown Marsh

The Hamilton-Trenton-Bordentown Marsh (also known by variants of that name) is one of New Jersey's most significant natural areas. This is despite being intersected by two major interstates and a railroad line, and containing uses like a former landfill, sewage treatment plant, and a power generating plant. A popular destination for bird watching, hiking, fishing, canoeing, and photography, the Hamilton-Trenton-Bordentown Marsh is the northernmost tidal freshwater wetland on the Delaware River. The Hamilton-Trenton-Bordentown Marsh, located on the eastern side of the Delaware River, is situated among the urbanized areas of Trenton, Hamilton Township, and Bordentown Township. The marsh is bordered by a dense infrastructure network that includes the River LINE, Interstates 295 and 195, and the roadways and associated development. The entire marsh is about 3,000 acres, although the areas designated a Natural Heritage Priority (NHP) site and Important Birding Area (IBA) are smaller.

Hamilton-Trenton-Bordentown Marsh

Marshes are wetlands that are frequently or continually inundated with water and are characterized by emergent soft-stemmed vegetation adapted to saturated soil conditions. They are invaluable natural resources because they store floodwaters, improve water quality, control erosion, provide wildlife habitat, offer recreational opportunities, and provide other environmental services. Freshwater tidal marshes are defined as wetlands frequently or continually inundated with water and are characterized by emergent soft-stemmed vegetation adapted to saturated soil conditions. Influenced by the motion of the tides, freshwater tidal marshes occur in estuaries where freshwater from rivers and streams meet ocean tides. The freshwater tidal marsh complex is considered a rare ecological community in the state.

The **Trenton Marsh NHP Site,** covering 1,250 acres, is a freshwater tidal marsh natural community and is home to several state endangered plant and animal species. The Natural Heritage Database provides the foundation for the designation of Natural Heritage Priority (NHP) sites. NHP sites are exemplary natural communities within the state that provide critically important habitat for rare plant and animal species. Preserving these areas should be a top priority in efforts to conserve biological diversity in New Jersey. Designation as an NHP site does not carry any specific requirements or restrictions on the land. Rather, the designation is made because of a site's high biological diversity value.

Owners of NHP sites are encouraged to become informed stewards of the property and to consider working with the local community, nonprofit groups, or the state to preserve the land permanently.

The Important Bird Area (IBA) Program is a global effort by the Audubon Society, with the help of other groups, to identify and conserve areas that are vital to birds and other species. The **Hamilton-Trenton Marsh IBA**, the only IBA in Mercer County, covers about 2,800 acres. There have been 230 species of birds sighted, 100 of which nest in the marsh. Several state-endangered birds inhabit the Hamilton-Trenton Marsh, including the pied-billed grebe and bald eagle. It also is host to breeding forested wetland bird species, such as wood ducks, prothonotary warblers, and fish crows. During the spring and fall migration period, migratory song birds are also found in the marsh.

Hamilton-Trenton-Bordentown Marsh

The marsh is made up of tidal and nontidal wetlands, shrub forest wetlands, constructed wetlands, deciduous woodland, and upland forests containing second-growth woods and oak woods. There are lakes including Spring Lake, Rowan Lake, and Sturgeon Pond in the north. The Delaware & Raritan (D & R) Canal greenway also passes through the marsh.

The rich diversity of habitats within the marsh supports over 1,200 species of plant and animal life. Over 900 plant species have been identified in the marsh, including 30 species considered endangered, threatened, or rare in the state. Over 200 bird species have been recorded, including the osprey, great blue heron, least bittern, Virginia rail, and cliff swallow.

The wetlands area of the marsh is defined by the tidal waters of the Delaware River and the Crosswicks, Watson, Rowan, and Duck creeks. Plants found here include New York ironweed, sneeze weed, yellow pond lily, and water smartweed. Phytoplankton–tiny microscopic photosynthetic cells–inhabits these waters as well. Phytoplankton is the foundation of the food web and supports other fish found in the Hamilton-Trenton Marsh, such as the killifish, Johnny Darter, alewife, shad, and yellow perch, and the short-nosed sturgeon. These fish populations, in turn, support fish-eating birds such as mergansers, cormorants, osprey, egrets, and herons. The river otter has recently reestablished the Hamilton-Trenton Marsh as home.

To the southeast of the marsh are the uplands on a bluff overlooking Crosswicks Creek. Tulip, black gums, Eastern hemlocks, and pitch pines are the dominant trees. Dense thickets of mountain laurel and great rhododendron, which are unique for New Jersey, are found here as well. A variety of birds, especially migratory species, inhabit the upland forests. Titmice and Carolina chickadees are commonly found in the mountain laurel-rhododendron thickets.

Second-growth forests are found to the northeast of the marsh along the bluffs near Spring Lake, as well as on the islands off of Spring Lake and the Hamilton Water

Treatment Plant. These are former agricultural fields or places that have been altered by human activities, where the second growth of oaks, tulip trees, and other hardwood trees has occurred. Brown thrashers, song sparrows, and Carolina chickadees reside in the second growth forests.

Wetlands are fragile ecosystems susceptible to pollution, development, and nonnative species. Although they are regulated under the New Jersey Freshwater Wetlands Protection Act, this law does not guarantee protection. Under current regulations, wetlands can still be disturbed, drained, or filled. Commercial and residential development threatens the Hamilton-Trenton Marsh. Effluent from the Hamilton Township sewage treatment plant and a coal-fired power plant on Duck Island contribute to pollution problems as well. Recreational overuse from activities such off-road vehicles and unauthorized digging for archaeological artifacts destroy habitats. The marsh is disturbed by construction and maintenance activities along roadways, as well as the railroad. Habitat diversity has been reduced due to nonnative flora, such as the common reed (*Phragmites australis*) and mile-a-minute weed (*Persicaria perfoliata*).

A northern portion of the marsh is designated as the **Abbott Farm National Historic Landmark**, discussed in **Historic Resources**. This district is a collection of several sites of archaeological significance. Among these are prehistoric excavation sites, historic homes, and remnants of the D & R Canal and Camden and Amboy Railroad. The Abbott Farm National Historic Landmark Interpretive Plan, developed in 2009 by Jane Clark Chermayeff & Associates, provides a vision and framework for understanding the cultural and natural resources of the area and enhancing the visitor experience.

The 400-acre **John A. Roebling Memorial Park** is also located in the northern end of the marsh, close to Abbott Farm. The park is home to the under-construction Marsh Nature and Interpretive Center. Housed in a former residence, the center will serve as an educational and recreational gateway to the marsh. A master plan for this center was developed in 2007.

A *Cooperative Stewardship Plan* for the marsh was completed in 2010 by the Friends of the Marsh organization, a project of the D & R Greenway Land Trust. The plan serves as a vision and guide for the marsh and seeks to balance natural conservation efforts with enhancing educational and recreational opportunities within the marsh. Six goals are identified, with strategies and action items identified for each: Protection and Preservation, Stewardship, Education, Recreation, Marsh Identity and Interpretation, and Coordinated Management and Organization.

For a complete list of plant species found in the Hamilton-Trenton Marsh, see **Appendix C: Plant Species in Hamilton Township, Duck Island Vegetation** and **John A. Roebling Memorial Park Vegetation**. For a complete list of animal species found in the marsh, see **Appendix D: Animals Known or Probable in Hamilton Township, Hamilton-Trenton Marsh Wildlife**.

Walnford Floodplain

The **Walnford Floodplain Natural Heritage Priority site** encompasses an extensive floodplain forest adjacent to Crosswicks Creek and forested slopes. This NHP site crosses four municipalities, including Hamilton Township, Upper Freehold Township in Monmouth County, and Chesterfield Township and North Hanover Township in Burlington County. Its biodiversity rank is B3, meaning the site contains a high-quality example of a floodplain forest natural community.

Floodplain forests are diverse natural communities that occupy bottomlands, low-lying areas along streams and rivers. These areas experience seasonal floods that often deposit rich soil and physically remove shrubs and other low-growing plants. Flooding frequency and duration, as well as the species, compositions, and community structure of floodplain forests, vary regionally; however, these forests are typically dominated by silver maples (Acer saccharinum) and red ash (Faxinus pennsylvanica). Floodplain forests represent an interface between terrestrial and aquatic ecosystems and are considered a rare ecological community in the state.

Van Nest Refuge

Van Nest Refuge

The **Van Nest Refuge Fish and Wildlife Management Area**, covering 98 acres, is the only wildlife management area (WMA) within Hamilton Township. It is located in the northern part of the township on Hughes Drive near the intersection with Province Line Road (Route 533), bordering Mercer County Park and West Windsor Township. The Van Nest Refuge has trails for walkers and bikers that follow the Assunpink Creek. The entire property is owned by the State of New Jersey.

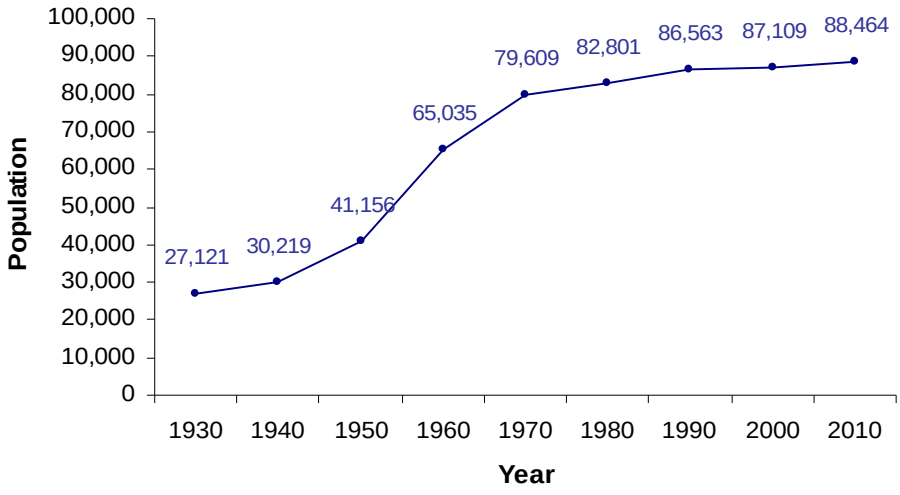
The New Jersey WMA system is administered by the Division of Fish and Wildlife's Bureau of Land Management. From the Delaware Bay coastal marshes to Kittatiny Ridge Mountains, the WMA system preserves a diversity of fish and wildlife habitats. A list of plant species identified at the Van Nest WMA can be found in **Appendix C: Plant Species in Hamilton Township**.

The Built Environment

Population and Housing

In 2010, Hamilton Township had a total population of 88,464 people, just a 1.5 percent increase from its 2000 population of 87,109. **Figure 11: The Population of Hamilton Township, 1930-2010** demonstrates that the population nearly tripled in size between 1930 and 1970. The decade with the greatest growth was the 1950s, when Hamilton Township saw nearly a 60 percent increase in population. Between 1970 and 2010, the population continued to increase by 11 percent, with an addition of 8,855 people over those 40 years.

Figure 11: The Population of Hamilton Township, 1930 - 2010



Source: US Census Bureau, 1930-2010

The population of Hamilton Township has become more diverse in recent years, following state and national trends. The 2010 Census population data related to racial statistics is shown below in **Table 30**.

Table 30: Hamilton Township Population by Race, 2010

Race	Population	Percent
White	64,530	72.9%
Black or African American	10,042	11.4%
Hispanic or Latino*	9,613	10.9%
Asian	2,890	3.3%
Two or More Races	1,144	1.3%
Some Other Race	111	0.1%
American Indian and Alaska Native	93	0.1%
Native Hawaiian and Other Pacific Islander	41	0.0%
Total	**88,464**	**100.0%**

*Hispanic or Latino population is of any race. All other population numbers refer to those not identifying as Hispanic or Latino.

Source: U.S. Census, 2010

There were a total of 36,170 housing units in Hamilton Township in 2010, a five percent increase from the 2000 total of 34,535 units. Of these, 34,534 (95 percent) were occupied and 1,636 (five percent) were vacant in 2010.

Transportation

Hamilton Township is located in a highly strategic location for transportation accessibility by both car and public transit. The New Jersey Turnpike, Interstate Highways 195 and 295, U.S. Highways 130 and 206, and State Highways 33 and 29/129 pass through Hamilton Township. Trenton, the state capitol, is located directly to the west of Hamilton Township. Hamilton Township is about 60 miles southwest of New York City, equivalent to an 80-minute car ride or a 70-minute train ride. Philadelphia is 40 miles southwest of Hamilton Township, about 50 minutes by car or 70 minutes by train. New Jersey shore points are also easily accessible from Hamilton Township via Interstate 195.

Hamilton Township contains one of the most active train stations on New Jersey Transit's Northeast Corridor Rail Line. Built in 1999, the Hamilton Station is an intermodal hub between rail, bus, and automobile. The station is located directly off of Interstate 295 and contains over 2,000 parking spaces, plus 750 overflow spots, as well as bike racks and lockers. The station offers NJ Transit rail service along the Northeast Corridor to the Trenton Transit Center and Penn Station in New York City. NJ Transit also offers bus service from this station via two routes.

Also crossing through Hamilton Township is the Camden and Amboy Railroad, although it is inactive north of Klockner Road. South of Klockner Road, the railroad is occasionally used for freight transportation.

In 2000, of the 43,955 workers in Hamilton Township, 41,187 (94 percent) relied on automobiles for their commute to work, while just 1,311 (three percent) utilized public transportation. The remaining 1,457 workers (three percent) walked, biked, used other means of transportation, or worked from home. The mean travel time to work was 25 minutes, less than the New Jersey average of 30 minutes.

Historic Resources

Hamilton Township has 10 sites that are listed on the National and State Registers of Historic Places. These and other resources are shown on **Map 19: Historic Resources**. The National Register of Historic Places is the official list of the nation's historic resources that are found to be worthy of preservation. In 1935, Congress established the first historical register through the passage of the Historic Sites Act. Through this act, the Secretary of the Interior was enabled to designate worthy properties as National Historic Landmarks. In 1966, with the passage of the National Historic Preservation Act, the National Register began to include significant districts, sites, structures, buildings, and objects of local, state, and national interest. The governor of each state was enabled to appoint a State Historic Preservation Office (SHPO) to work in conjunction with the National Register Office of the National Park Service. In New Jersey, the NJDEP houses the SHPO.

Iron Bridge Road Bridge

The New Jersey Register of Historic Places is the state's official list of historic resources of local, state, and national interest. It closely resembles the National Register program and uses the same criteria for eligibility, nomination form, and review process. The inclusion of a property on the New Jersey and National Registers has many benefits, including a degree of protection from public encroachment. In addition, listed properties are eligible for financial assistance for historic rehabilitation or restoration. Interested parties can take advantage of the Rehabilitation Investment Tax Credit, a federal tax incentive to encourage the preservation and reuse of older income-producing properties, including offices, apartment buildings, and retail stores.

New Jersey municipalities are permitted to identify, designate, and regulate their own historic resources through the adoption of historic preservation ordinances, which are recognized as zoning laws under the New Jersey Municipal Land Use law. The Hamilton Township Historic Preservation Advisory Commission has the responsibility of maintaining the historic character of the municipality. The commission works to further the continued use and reuse of historic resources, to discourage the unnecessary demolition of historic resources, to foster and enhance civic beauty and neighborhood pride, and to safeguard the cultural and architectural heritage of Hamilton Township for the education, pleasure, and general welfare of its citizens and visitors.

The National Park Service and the New Jersey SHPO jointly administer the Certified Local Governments (CLG) program, which provides technical assistance and funding for community-based preservation efforts. As of January 2009, five municipalities in Mercer County were designated as CLGS: Ewing, Hopewell, Lawrence, Princeton Borough, and Princeton Township. To participate, municipalities must maintain a historic preservation commission, survey local historic properties, provide opportunities for public participation in preservation activities, and develop and enforce local preservation laws. If Hamilton Township were to become a CLG, it would be eligible to draw from an exclusive pool of matching federal and state funds for program implementation or rehabilitation work.

Investing in historic preservation efforts can provide a municipality with important and impressive returns. Private and public efforts to preserve and rehabilitate historic districts create attractive places to live, work, and play, and stimulate new investment in older residential and commercial centers. A historic district, like that in nearby Lawrenceville Main Street Historic District, can become a regional draw for tourists and boutique customers. Furthermore, historic preservation maintains a municipality's character, distinctly separating it from other rural and suburban communities, for both new and established residents

Hamilton Township has an abundance of historic resources, including homesteads, farmsteads, churches, bridges, and other buildings, structures, and sites. The properties and historic districts found in **Table 31** below meet the New Jersey and National Register criteria for significance in American history, archaeology, architecture, engineering, or culture, and possess integrity of location, design, setting, materials, workmanship, feeling, and association. In addition to the 10 sites listed on the State and Nation Registers of Historic Places, there are an additional 28 sites that are eligible for the registers. Other sites, such as the Enoch Middleton House, may have the potential to be listed as local, state, or national landmarks, but have not been nominated by local citizens or identified by SHPO for such a designation.

Table 31: Historic Resources

Name	Location	State ID#	Register Status*
State and National Registers of Historic Places			
18th Century Vessel		1670	NR: 8/14/1986 SR: 6/24/1986
Abbott-Decou Mansion	58 Soloff Drive	1656	NR: 7/1/1976 SR: 1/7/1976
Abbott Farm Historic District		1654	NR: 12/8/1976 SR: 8/16/1979 NHL
Bow Hill (Barnt DeKlyn House)	Jeremiah Avenue	1659	NR: 1/25/1973 SR: 5/1/1972

Name	Location	State ID#	Register Status*
Crosswicks Creek Site III		753	NR: 11/26/1990 SR: 8/31/1987
Delaware and Raritan Canal Historic District		1600	NR: 5/11/1973 SR: 11/30/1972
Isaac Pearson House	Hobson Avenue at Emeline Avenue	4575	NR: 2/1/2006 SR: 11/18/2005
Isaac Watson House	151 Wescott Avenue	1672	NR: 1/21/1974 SR: 1/14/1972
John Abbott II House	2200 Kuser Road	1652	NR: 6/18/1976 SR: 11/20/1975
Thomas Maddock Sons Company	240 Princeton Avenue	4425	NR: 3/14/2008 SR: 1/7/2008 SHPO Opinion: 4/14/2005
Eligible Sites for State and National Registers of Historic Places			
Abbottville Archaeological Site (Cubberly-Asey House Site)		1657	DOE: 7/18/1973 SHPO Opinion: 12/19/1975
Assunpink Archaeological Historic District		1815	DOE: 3/18/1975
Bordentown Waterworks/White Horse Circle Prehistoric Site		1658	DOE: 7/16/1983
Camden Amboy Railroad Branch Line Historic District	Camden and Amboy Branch Line Right-of-Way from Bordentown City to Adams Lane, North Brunswick, Middlesex County	2969	SHPO Opinion: 5/21/1991
Camden and Amboy Railroad Main Line Historic District	Camden and Amboy Railroad Right-of-Way	2970	SHPO Opinion: 6/26/1975
The Carney Rose Prehistoric Site		4188	DOE: 7/18/1983
C.C. Abbott Farmstead Archaeological Site		1651	DOE: 7/18/1983 SHPO Opinion: 12/19/1975
Crosswicks-Hamilton Square Road Bridge	Crosswicks-Hamilton Square Road over Doctors Creek	1661	SHPO Opinion: 10/8/1997
Crosswicks Creek Railroad Bridge	Camden and Amboy Railroad over Crosswicks Creek	3255	SHPO Opinion: 10/8/1997
First Presbyterian Church of Hamilton Square	3550 Nottingham Way	4279	COE: 4/30/2004
Grafton Farm Historic Complex	110 Edgebrook Road	4120	SHPO Opinion: 3/29/2001

Name	Location	State ID#	Register Status*
Gropps Lake Prehistoric Site		1633	DOE: 7/18/1983 SHPO: 12/19/1975
Groveville-Allentown Road Bridge	Groveville-Historic Road over Doctors Creek	3957	SHPO: 8/17/2001
Groveville Historic District		4360	SHPO: 2/27/2001
Hendrickson Farmhouse	130 Uncle Pete's Road	4725	COE: 7/17/2007
Hutchinson's Mill Site		1664	DOE: 7/18/1983
Intersection Area	Hamilton Square Road and Nottingham Way	1665	SHPO Opinion: 4/25/1977
Iron Bridge Road Bridge	Iron Bridge Road over Crosswicks Creek	3256	SHPO Opinion: 8/3/1990
Kuser Mansion	390 Newkirk Avenue	4277	COE: 5/3/2004
Lengyen Farm Complex	Bordered by Old York Road, Crosswicks-Hamilton Square Road and Doctors Creek	3856	SHPO Opinion: 4/23/2001
Mount House Complex	Nottingham Way and NJ Route 33	1666	DOE: 7/17/1980 SHPO Opinion: 2/20/1980
North Crosswicks Historic District	Bounded by Church Street, Mill Road, Cross Street, Old York Road, South Broad Street and Crosswicks-Hamilton Square Road	3885	SHPO Opinion: 10/24/2000
Oliphant Steel and Iron Company/National Radiator Company Industrial Complex	1800 State Street	3274	SHPO Opinion: 10/6/1997
Pennsylvania Railroad New York to Philadelphia Historic District		4568	SHPO Opinion: 3/32003
Robert Pearson House and Grounds Site		1668	DOE: 7/18/1983 SHPO: 12/19/1975
Railroad Trestle Vessel		4315	SHPO: 1/29/1998
Shady Brook Prehistoric Site		1669	DOE: 4/15/1982 SHPO: 12/19/1975
Tindall/Pearson Farmstead and Site		1671	DOE: 7/18/1983 SHPO: 1/7/1976
Other Historic Places			
Enoch Middleton House	2 Old York Road		

Source: NJ State Historic Preservation Office, 2010

*Register Status	Description
New Jersey Register of Historic Places (SR)	Indicates that a property is listed on the New Jersey Register of Historic Places (State Register).
National Register of Historic Places (NR)	Indicates that a property is listed on the National Register of Historic Places.
Certification of Eligibility (COE)	Issued by the NJ State Historic Preservation Office when a property is not listed on the NJ Register of Historic Places. It satisfies a prerequisite to apply for funds from the NJ Historic Trust and Mercer County preservation funding programs.
Determination of Eligibility (DOE)	A formal certification that a property is eligible for registration issued by the Keeper of the National Park Service, the Department of the Interior.
SHPO Opinion	An opinion of eligibility issued by the State Historic Preservation Office in response to a federally funded activity that will have an effect on historic properties not listed on the National Register.
National Historic Land Mark (NHL)	A designation by the National Park Service that a property has national significance.

Sites on State and National Registers

The **Abbott-Decou Mansion**, also known as the homestead of Samuel and Lucy Abbott, was built circa 1797. This brick mansion was built in the Quaker Georgian style. The property was listed to the National Register in 1976.

The **Abbott Farm Historic District**, named after the famed 19th century archeologist Charles Conrad Abbott, is one of the country's most important archeological sites. It is the largest known Middle Woodland village site in the coastal Mid-Atlantic and New England region. The Woodland time period is considered an important cultural development stage for prehistoric Native Americans, when pottery making and the cultivation of crops began. In use from about 500 B.C. to 500 A.D., this archeological site has been the center of a controversy of the antiquity of human occupation of the New World. This site has also been the subject of over 100 books and articles. It was designated a National Historic Landmark in 1976. However, a portion of the site had been slated for development in 2002 (the "Bywater" proposal). The state Green Acres program was able to preserve this area, which contained archeological remains. An interpretive plan[5] completed in 2009 proposes a cohesive interpretive program and makes recommendations to improve the public understanding and enjoyment of the district.

The original **Bow Hill** mansion, built circa 1785, was first occupied by Barnt DeKlyn, a prosperous merchant descended from French nobility. The house was destroyed by fire shortly after its construction, but was rebuilt in 1787. Joseph Bonaparte (exiled King of Spain and brother of Napoleon Bonaparte) once rented the mansion from DeKlyn as a retreat for his mistress, Annette Savage, during the 1820s. After about 50 years of vacancy, the Hamilton Township Historical Society purchased the mansion and the

[5] Jane Clark Chermayeff & Associates LLC. *Abbott Farm National Historic Landmark Interpretive Plan*. Prepared for the Mercer County Planning Division, 2009.

surrounding five acres in 1949. However, not enough funding was raised for renovations and the property was resold.

The **John Abbott II House**, located on the North Side of Crosswicks Creek on Kuser Road, was built in 1730. In 1776, the house hid Patriot funds from the British, who were advancing on Trenton. Today, it is located next to the Civil War and Native American Museum within Veterans Park.

John Abbott II House

The **Delaware and Raritan Canal Historic District** consists of the 36 remaining miles of the main D & R Canal and all 22 original miles of the feeder canals. Chartered on February 4, 1830, the 44-mile long D & R Canal operated as a barge canal, transporting Pennsylvania coal to New York. This was during the time of the Industrial Revolution in the United States, and there was a high demand for coal to power steam engines. At the height of the canal's usage in the 1860s and 1870s, 80 percent of the D & R Canal's total freight was coal. By the end of the 19th century, canal use declined due to the efficiency of railroad trains. The canal closed in 1932, and during the 1950s was rehabilitated by New Jersey to become the Canal Water Supply Transmission, a water supply system that still serves that purpose today. In 1974, the D & R Canal was designated a state park and placed on the State and Federal Registry of Historic Places.

The **Isaac Pearson House** was built in 1773 near the intersection of Emeline and Hobson avenues. Pearson was a prominent elected public servant who served as tax collector, justice of the peace, freeholder, township clerk, and delegate to the New Jersey Provincial Assembly. Pearson was murdered in 1776 after the Battle of Trenton, either by robbers or by colonists who suspected him of collaborating with the British. Hamilton Township recently purchased the home and is currently restoring the property to convert it for use as a tourist attraction.

The **Isaac Watson House** is the oldest house in Mercer County. This stone house was built in 1708 on a bluff overlooking Watson's Creek in the area that is now John A. Roebling Park. It is currently the headquarters of the New Jersey State Society of the National Society of the Daughters of the American Revolution (DAR).

The **Thomas Maddock Sons Company** was a pottery company that manufactured crockery for general use, as well as sanitary earthenware, or bathroom fixtures, in the late 19th and early 20th centuries. Thomas Maddock was among the first to produce sanitary porcelain wares in the U.S. and became one of the leading manufactures of bathroom fixtures. In 1929, The Maddock Sons Company was acquired by Sanitary Manufacturing Company, which later merged with American Radiator Company to become American Standard.

Kuser Mansion

Sites Eligible for State and National Registers

The **Camden Amboy Railroad Historic District** was once the original line of the Camden and Amboy Railroad and Transportation Company (C&A), the first rail line in New Jersey and third in the United States. Chartered by the state legislature on February 4, 1830, the C&A rail line connected Philadelphia to New York City, with a stop in Yardville. Cutting through many farms in Hamilton Township, the rail routes carried passengers and freight. The first use of the railroad was in 1832. By 1860, C&A lines carried 500,000 passengers a year. C&A was a pioneer in the transportation industry. Robert Livingston Stevens, president of C&A, created the "T" style rail, which became an industry standard. The C&A also introduced baggage handling methods that established modern freight containerization and installed the first vestibule style passenger cars. The C&A was home to Steam Locomotive #1, "John Bull." First used in 1833 and in service for 35 years, the John Bull is the world's oldest operable, self-propelled steam locomotive. It is currently on display at the Smithsonian's National History Museum of American History. A SHPO opinion was issued to the Camden and Amboy Railroad Main Line Historic in 1975 and to the Branch Line in 1991.

The **Kuser Mansion** was home to the prominent Kuser family from 1892 until 1976, when it was bought by Hamilton Township. One member of the prominent Kuser family, Anthony, was president of the consolidated South Jersey Oil and Electric Company, and also helped finance the Fox Film Company, which eventually became 20th Century Fox. The mansion is a part of a 22-acre farm that includes a laundry house, coach house, barn, garages, gardens, and gazeboes. The house was built in the Queen Anne Victorian style, with steeply pitched roofs and curved porches. The mansion and garden are maintained by the Hamilton Historical Society and are open to the public for guided tours.

Other Historic Places

The **Enoch Middleton House** is named for the wealthy Philadelphia Quaker, who first used the house as a summer home. Built between 1844 and 1848, the house was a station on the Underground Railroad. Middleton, a retired merchant and abolitionist from Philadelphia, guided fugitive slaves from his home to Allentown, Cranbury, or New Brunswick.

Open Space and Civic Resources

Open Space

Although Hamilton Township is a highly urbanized municipality, it still retains large areas of preserved open space, shown on **Map 21: Open Space**. Over 5,000 acres, or about one-fifth of the township, is permanently preserved. As shown below in **Table 32: Preserved Open Space**, about half of all preserved land (over 2,500 acres) is municipally owned.[6] Mercer County holds title to over 1,100 acres. Over 400 acres of land are preserved by the State of New Jersey through either the Department of Environmental Protection (NJDEP) or the Department of Transportation (DOT). There are 21 preserved farm parcels in the township, which cover over 1,100 acres.

Table 32: Preserved Open Space

Ownership	Parcels	Acres
Municipal	297	2,579.97
County	44	1,106.65
State	27	458.89
Preserved Farmland	21	1,144.43
Total	**389**	**5,289.94**

Source: Hamilton Township, 2011

There are over 20 municipal parks in Hamilton Township. The park system is very diverse, ranging from active parks to passive gardens, arboretums, and sculpture grounds. Township-owned parks, as well as school facilities, provide a wide-variety of active recreational opportunities for local citizens. The following are the numbers of some of the recreational facilities within Hamilton Township owned by the municipality or the Board of Education: 48 tennis courts, 28 full-sized soccer fields, 26 full-court basketball courts, 18 half-court basketball courts, 15 Little League baseball fields, 12 baseball fields, 10 football fields, 14 baseball/softball fields, four outdoor volleyball courts, three tracks for track and field events, three indoor swimming pool complexes, two street hockey rinks, one field hockey field, one lacrosse field, and one skateboard park. Additionally, there are almost 50 playgrounds and 22 picnic groves with facilities for outdoor cooking and activities such as fishing, lawn bowling, bocce, quoit, and shuffleboard.

Private facilities in the township also feature many of these same amenities, in addition to outdoor swimming complexes, indoor soccer fields, indoor skating rinks, and a golf course. The municipal Open Space and Recreation Plan recommends future recreational acquisitions including basketball, baseball, football, soccer, and softball facilities, totaling an additional 289 acres of land.

[6] Hamilton Township owns all of these parcels with the exception of a four-acre parcel owned by Robbinsville Township, a 10-acre parcel owned by the City of Trenton, and a 56-acre parcel owned by the City of Bordentown.

The Hamilton Township Recreation Division coordinates a range of programs, including youth sports leagues, adult sports leagues, and a summer camp program. The Recreation Division also organizes a number of annual special events, such as Septemberfest Community Day, the Azalea Festival, the Independence Day Fireworks and Concert celebration, Fall Harvest, and Winter Wonderland.

Built in 1977 to honor Hamilton's veterans, the 333-acre **Veterans Park** is centrally located in Hamilton Township. The park provides walking paths through wooded areas, a large lake with a fountain, picnic grounds, an athletic field complex, and the largest playground facility in New Jersey. Veterans Park is the location of the Recreation Division's Septemberfest and also hosts outdoor concerts, firework displays, and an annual Civil War reenactment.

Mercer County Park

Primarily located in West Windsor Township, **Mercer County Park** also extends into Hamilton and Lawrence townships. Boasting a total of 2,500 acres, the park covers nearly four square miles of grassy fields and tree cover. Mercer County Lake, formed by an impoundment on Assunpink Creek, is located within the park. A variety of activities are offered at the park, including boating, fishing, rowing, mountain biking, nature observation, dog parks, and picnic areas.

Hamilton Township is also home to the **Sayen House and Gardens**, located in historic Hamilton Square. This 30-acre parcel was purchased by Hamilton Township in 1912. It formerly was the private home of Frederick Sayen, an avid gardener who collected plants and flowers in his world travels. Today, there are more than 1,000 azaleas, almost 500 rhododendrons, and more than 250,000 flowering bulbs in the spring. The Sayen House and Gardens is the location of the Azalea Festival held annually on Mother's Day.

The **Grounds for Sculpture**, covering 35 acres, is a public park built on the former site of the New Jersey State Fairgrounds. It was designed by J. Seward Johnson to promote an understanding of and appreciation for contemporary sculpture. Construction of the park began in 1989 and the site was opened to the public in 1992. The grounds contain over 240 permanent sculptures, including pieces by Clement Meadmore, Anthony Caro, Beverly Pepper, Kiki Smith, and George Segal. There is also a museum with seasonal exhibits, many educational programs, and two restaurants on the property.

Hamilton Township also has several natural environments that are accessible to the public. Some of these sites include **Great Bear Swamp**, the **Hamilton-Trenton-Bordentown Marsh**, **Crosswicks Creek**, a wetland restoration project on **Duck Island**, and the **Delaware River**.

Located within the Hamilton Trenton-Bordentown Marsh is the 257-acre **John A. Roebling Memorial Park**. This land was purchased from the Broad Street Park Civic Association in 1958, by the County, for $1.00. The sale was made with a stipulation that the land be preserved and used only for passive recreation. Facilities include eight miles of walking trails, 11 miles of canoe and kayak trails, and several picnic areas. Today, the park is a popular spot for fishing, bird watching, and nature walks. The volunteer group Friends of the Marsh was formed in 2002 to promote and protect the park through education, outreach, and maintenance. This group organizes several recreational outings in the marsh, including nature walks, bird watching, kayaking, and canoe trips. Many other organizations also use the marsh for educational and recreational activities like class field trips and workshops, hiking, bird watching, photography, and botanical and nature studies. The Mercer County Marsh Nature and Interpretive Center at Roebling Park is currently being developed as an educational welcome center for the marsh.

John A. Roebling Memorial Park at the Marsh

In 2003, when Hamilton Township adopted the state-approved Hamilton Open Space and Recreation Plan (OSRP), 4,500 acres (18 percent) were undeveloped in the township. The plan, to be implemented over 20 years, identified 25 tracts as highly desirable for preservation. These parcels, covering about 1,500 acres, are divided into three types of uses: passive recreation, active recreation, and farmland. Since the adoption of the plan, over 500 acres (35 percent) of the top 25 tracts have been developed and over 200 acres (13 percent) have been preserved.

As identified, farmland preservation is one objective of the Hamilton Township OSRP. Communities benefit from farmland preservation environmentally, economically, and aesthetically. Farmlands provide open space, groundwater recharge areas, and wildlife habitat in addition to returning more in tax revenue than the cost of services provided. There are currently 3,340 acres of farmland in Hamilton Township, primarily located east of Route 130 in the southern portion. As of 2003, 882 acres of farmland have been permanently preserved in Hamilton Township.

Cultural and Civic Resources

The **Hamilton Township Free Public Library**, located at 1 Justice Samuel A. Alito Jr. Way, provides the residents of Hamilton Township with access to books, resources, services for education, and information such as internet access, DVDs, and programs for children and teens. Programs for children include story time, toddler time, baby rock and rhyme, a summer reading program, family game night, and crafts. Anyone who lives, works, or goes to school in Hamilton Township may be issued a library card.

Civil War and Native American Museum outbuilding

The **Civil War and Native American Museum** is located within Veteran's Park behind the John Abbott II House. It occupies a two-story, seven-room house that was once a part of the John Abbott Farm. The property also has an historic smoke house, doctor's office, and herb garden. The exhibit showcases uniforms, weapons, equipment, and material relating to the Civil War, as well as Delaware Indian artifacts. It was the first Civil War Museum in New Jersey.

The **Bromely Neighborhood Civic Center** is a facility designed for teenagers between 13 and 17 years old. It is a safe and supervised environment where teenagers can socialize with their peers. The center has computers, video games, board games, pool tables, foosball, ping pong, and air hockey.

To further support Hamilton as a destination for arts and culture, the Hamilton Township Planning Board adopted an Arts and Culture Amendment to the Land Use Plan in September 2009. The amendment established an Arts and Culture Overlay Zone District in order to encourage development that specifically promotes arts and culture. This district extends from the Hamilton Train Station to the Bromley Neighborhood.

Township Utilities and Services

Drinking Water

Much of Hamilton Township receives public water from either Trenton Water Works or Aqua New Jersey (formerly Consumers NJ Water Company). A small portion of Hamilton Township, south of the intersection of Interstate 295 and U.S. Highway 206, is within the Bordentown Water Department service area.

The Trenton Water Works is owned and operated by the City of Trenton and provides water to 205,000 people within Trenton and parts of Hamilton, Ewing, Lawrence, and Hopewell townships. The Trenton Water Filtration Plant can treat up to 50 million gallons of water each day. Trenton Water Works draws its water supply from the Delaware River through one intake.

Residents in North Crosswicks, Mercerville, Hamilton Square, and surrounding areas are served by Aqua New Jersey. Water in the Aqua New Jersey Hamilton system also serves Robbinsville Township, Chesterfield Township, and Upper Freehold Township. Aqua New Jersey receives its drinking water supply from five wells in the Potomac-Raritan Magothy aquifer, a ground water source.

See **Appendix E: Water Supply Quality** for data on the monitoring and quality of the municipal drinking water supply. The residents of Hamilton Township located outside a public water service area receive drinking water from private wells.

Sewer Service

The approved sewer service area in Hamilton Township is shown in **Map 20: Approved Sewer Service Area and NJPDES Permits**. However, a new wastewater management plan is currently in development for Mercer County. The preliminary sewer service areas for the draft countywide plan are slightly different in some places than those areas shown on **Map 20**.

There are three sewer service providers that are responsible for the collection, treatment, and disposal of wastewater in Hamilton Township. They are the Hamilton Township Department of Water Pollution Control (WPC), Trenton Sewer Utility, and the Ewing-Lawrence Sewage Authority. The Hamilton WPC covers a 17,664 acre-(68 percent) service area and provides service to over 92,000 residents of three municipalities, including most of the residents in Hamilton Township. At its regional wastewater treatment center, the Hamilton Township WPC has the capacity to treat 16 million gallons of water per day (mgd) and has an average daily flow of 9.2 mgd. The collection system contains 389 miles of sewer lines and 39 pumping stations. The Hamilton Township WPC has been in operation for 71 years.

Trenton Sewer Utility provides sewer collection within 78 acres (less than one percent) in Hamilton Township, southwest of the intersection of Interstates 295 and 195. The Ewing Lawrence Sewer Authority services 40 acres (less than one percent) along the northern border of Hamilton Township. See **Table 33: Sewer Service Area** for service area size.

Table 33: Sewer Service Area

Sewer Service Provider	Approved Service Area (Acres)	Percent of Township
Ewing-Lawrence Sewage Authority	40.53	0.2%
Hamilton Township Department of Water Pollution Control	17,664.06	68.7%
Trenton Sewer Utility	78.99	0.3%
Total	**17,783.57**	**69.1%**
Township Area	**25,726.85**	**100.0%**

Source: NJDEP, 2006

Trash and Recycling

The Mercer County Improvement Authority (MCIA) administers the disposal of the county's solid waste. The MCIA, in coordination with Central Jersey Waste and Recycling, also operates a curbside recycling program for all municipalities within its jurisdiction

(except for East Windsor, Hightstown, and Robbinsville). Central Jersey Waste and Recycling provides comprehensive waste and recycling services to municipalities, industries, businesses, and office complexes in New Jersey and the Greater Philadelphia region.

Residents of Hamilton Township receive curbside collection of recycling. Small businesses are eligible to participate in the curbside recycling program. Commercial and industrial businesses that are ineligible for the small business program must make their own arrangements for recycling. On January 1, 2010, the recycling process shifted from “dual stream” to “single stream,” so now one truck hauls away all residential and commercial recycling, rather than several separate trucks picking up plastic, aluminum, and paper. A food-waste recycling program has been proposed by the Hamilton Township Department of Public Works and may soon be implemented township-wide.

The MCIA also sponsors disposal days for household chemical and electronics waste. Residents can dispose of dangerous chemicals or unwanted electronic material in an eco-friendly and safe manner. Items such as aerosol cans, car batteries, anti-freeze, mercury, fluorescent lights, camera equipment, circuit boards, copiers, electric wire, laptops, and televisions are accepted.

The Hamilton Ecological Facility (also known as the Britton Industries Inc. Hamilton Location) is where residents can drop off brush, newspapers, grass clippings, motor oil, leaves, unpainted/untreated wood, junk and office mail, tires without rims, auto batteries, and concrete. Residents may also pick up compost and mulch. At the site, vegetative waste is ground, hauled, composted, and then sold to third parties.

Hamilton Township offers a fall and spring leaf pick-up program. During these times, residents may rake and pack leaves into bags for curbside collection. NJDEP storm water regulations forbid the placement of leaves within 10 feet of a storm drain. At other times of the year, residents can dispose of leaves and yard waste by securing them in bags and taking them to the Ecological Facility.

The Hamilton Township Department of Public Works is responsible for road and drain maintenance, street sweeping, snow removal, leaf and brush collection, and maintenance of all municipally owned buildings, grounds, and park facilities, including lawns and shrubs.

Education

Hamilton Township has the eighth-largest public school district in the State of New Jersey, providing education to over 13,000 children. The Hamilton Township School District has 17 public elementary schools: Alexander, Greenwood, Kisthardt, Klockner, Kuser, Lalor, Langtree, McGalliard, Mercerville, Morgan, Robinson, Sayen, Sunnbrae, University Heights/Morrison, George E. Wilson, Yardville, and Yardville Heights. The three public middle schools are Albert Grice, Emily Reynolds, and Richard Crockett. The three public high schools are Hamilton High School West, Nottingham High School–North, and Steinert High School–East. There is also an alternative education school, the Hamilton

Educational Program, which serves students in grades 6 through 12. Within Hamilton Township, there are 11 private nursery through kindergarten schools, eight private elementary and middle schools, and two private high schools.

In neighboring municipalities, there are a number of higher education opportunities, including the College of New Jersey, Mercer County Community College, Thomas Edison State College, Princeton Theological Seminary, Princeton University, Rider University, and Westminster Choir College.

Green Initiatives

Hamilton Township's Department of Public Works has implemented and is in the process of adopting several Green Initiatives in order to reduce energy usage and harmful emissions. As stated in the township-wide Climate Action Plan, the goal is to reduce the township's energy consumption and associated emissions by 20 percent by the year 2010.

Hamilton Township has adopted an **anti-idling policy** for all municipal vehicles and is considering expanding the policy to Board of Education vehicles, or even township-wide. The anti-idling policy is intended to reduce fuel usage costs, reduce emissions, and extend the life of municipal government vehicles.

The **Green Fleet Policy** requires the township to purchase clean-burning fuel vehicles like flexible fueled vehicles, biofueled vehicles, hybrids, and electric vehicles. Hamilton Township's comprehensive and innovative Green Fleet policies help lower costs for government operations and reduce illnesses related to emissions.

Hamilton Township has proposed to **increase mass transit access to the Hamilton Train Station**. The Township plans to work with NJ Transit and new local service providers to increase bus, van, and jitney access to local shopping centers and to the Hamilton Trenton Train Station. Lack of mass transit access to the train station has resulted in growing congestion on the approaches to the Hamilton Rail Station and increased parking expenses for commuters. Currently, there are only two NJ Transit bus lines (606 and 608), with limited schedules during rush hour, that stop at the train station.

The **Community Forestry Management Plan** for 2009 through 2014 seeks to preserve and promote the urban tree resources within the township. Goals and initiatives include the Tree Planting Program and reducing the number of hazard trees and trees impacting sidewalks or curbs. Developers in Hamilton are required to compensate for the cost of replacing trees lost to development at a cost of $250 per tree. Funds are then allocated to the Tree Replacement Fund. In the past five years, an

Switlik Park

estimated 1,000 new trees have been planted in the township.

Brownfields to Greenfields is a proposed program that would establish working partnerships with state departments to turn six nominated Hamilton brownfields into greenfields. Economically, brownfields are underused resources. The remediation of brownfields will encourage economic and job growth, reduce crime, restore property values, reduce illnesses related to air emissions, reduce the risk of pest-borne infectious diseases, and restore air, soil, and water sources.

Hamilton Township has drafted an ordinance that requires all future building construction to meet **Leadership in Energy and Environmental (LEED) standards**. Still in the developmental stages, this ordinance should result in major reductions in overall building energy costs.

Environmental Issues

Known Contaminated Sites

The New Jersey Known Contaminated Sites List, compiled by the NJDEP, includes former factory sites, landfills, locations of current or former leaking underground storage tanks, sites where chemicals or wastes were once routinely discharged, and places where accidents have resulted in spills and pollution. Contamination may have affected soil, groundwater, surface water, or a combination of site conditions.

The most dangerous known contaminated sites, from a human health standpoint, can be listed on the National Priorities List (NPL), under the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLA is commonly referred to as “Superfund” because sites on the NPL are eligible for federal and state clean-up funds. Other sites may be remediated by state clean-up funds via the New Jersey Spill Compensation and Control Act. The majority of the sites are remediated by the responsible parties, as required pursuant to state and federal regulations. Responsible parties may be the current or former owners or users of the site.

In New Jersey there are more than 20,000 contaminated sites. As of August 2010, there were 103 active sites within Hamilton Township, listed in **Appendix F: Known Contaminated Sites**. These are Active Sites with confirmed contamination of the soil, groundwater, and/or surface water. Three of these sites are at private residences, two are landfills, and other sites include garages, gas stations, laundromats, a school, municipal buildings, and other locations. Additionally, there are six Pending Sites and 244 Closed Sites in the township. A Pending Site has one or more cases with confirmed contamination, no active cases, and may include closed cases. Closed Sites are those sites with remediated contamination and no active or pending cases. Some sites may have more than one remedial level due to multiple cases. See **Appendix F: Known Contaminated Sites** for complete lists. Exact addresses of private homes have been removed from the Appendix to protect resident privacy. Nonresidential sites in the township are shown on **Map 22: Known Contaminated Sites (2009)**.

The W.R. Grace Company/Zonolite Site is the only Superfund site in Hamilton Township. Located at 15 Industrial Drive, the soil at the site was contaminated with asbestos. Between 1966 and 1988, over 200,000 tons of vermiculate ore from a mine in Libby, Montana, were shipped to the W.R. Grace Company. The vermiculate was used to make products such as structural fireproofing, thermal insulation for masonry products, lightweight concrete aggregates, and horticultural vermiculite. The vermiculate ore

contained naturally occurring amphibole asbestos. When inhaled, asbestos can cause lung disease. After the plant ceased operations in 1994, some former employees have died or become sick with asbestos-related diseases.

The EPA first conducted sampling in 2000, which found elevated levels of asbestos in the soils at the site. In 2004, The EPA completed the first phase of clean-up at the facility. They removed approximately 9,200 tons of soil and shipped it to a secure landfill in Pennsylvania. In 2006, fearing asbestos may have contaminated neighboring areas, the EPA assessed the asbestos content in soil samples from public recreation areas and 22 residential properties across Hamilton, Lawrence, and Ewing townships and the City of Trenton. No asbestos was found above the level that a sophisticated lab instrument can reliably measure. Within that year, an additional 6,500 tons of contaminated soil was removed from a wetland adjacent to the facility.

Underground Storage Tanks

An Underground Storage Tank (UST) system is any one or combination of tanks including appurtenant pipes, lines, fixtures, and other related equipment that are used to contain an accumulation of hazardous substances, the volume of which is 10 percent or more beneath the surface of the earth. A hazardous material may be motor fuel, petroleum products, toxic pollutants, or other hazardous wastes or substances. As of June 2010, there are 50 active and compliant USTs in Hamilton Township. There may also be private residences in Hamilton Township that still have underground storage tanks, primarily used to hold home-heating oil. As these tanks age and rust, they often begin to leak, which becomes a serious threat to the groundwater below them. Those private residences are not publicly listed by NJDEP unless they pose a human health hazard. Underground storage tanks are not required to be removed, although removal may reduce any resulting environmental liabilities.

As of 2010, there were 34 regulated USTs that have active remediation underway, 20 of which have active and compliant underground storage tanks. There are a total of 236 regulated underground storage facilities in the municipality, including many terminated facilities. See **Appendix F: Known Contaminated Sites, Regulated Underground Storage Tank Facilities** for a list of all currently effective and active tanks in the township.

Radon

Radon is a radioactive gas that comes from the natural decay of uranium found in nearly all soils. It is invisible, odorless, and tasteless. It moves up through the ground to the air above, and into all types of homes through cracks and other holes in foundations. A build-up of radon-contaminated air within a home can pose a long-term health hazard to residents, specifically for lung cancer. The only method of detection is to conduct a test of the air within a home. Fortunately, radon testing is inexpensive. All radon test results conducted in the state are reported to NJDEP by certified companies, which perform the

tests or manufacture the test kits. This data is used to classify municipalities into a three-tier system, which identifies the potential for homes with indoor radiation problems.

NJDEP classifies municipalities into three categories according to the potential for indoor radon problems: high (Tier 1), moderate (Tier 2), and low (Tier 3). Hamilton Township is classified as a Tier 2 municipality, indicating a moderate risk of high radon levels in homes. The average indoor radon level in the United States is about 1.3 picoCuries per liter (pCi/L). At the level of 4 pCi/L, NJDEP recommends a homeowner consider steps to reduce long-term exposure to radon gas. If radon levels are high in a home, NJDEP suggests that the homeowner take the following actions: (1) prevent radon from entering the house by repairing cracks and insulation; and (2) dilute radon concentrations currently in the house by installing a radon extraction system and/or frequently ventilating indoor air.

NJDEP provides information on testing, mitigation, radon's health effects, and additional information on its website at www.njradon.org. Free information packets are available upon request. They can also be reached for radon-related questions by phone at 1-800-648-0394. All companies conducting radon testing and mitigation are certified by NJDEP and are listed on its website.

Flooding

Due to factors such as relatively low elevation, flat terrain, and an extensive stream network, many areas in Hamilton Township are susceptible to flooding. According to FEMA data, about 16 percent of Hamilton Township is located within the 100-year floodplain, shown on **Map 10: Floodplains (2008)**. See the **Floodplains** section for more information on floodplain areas in the township.

Hamilton Township experienced major flood events in August 1971, July 1975, September 1999, June 2006, and April 2007. During the 1971 flood, over 650 residential structures suffered flood damage, and numerous municipal buildings and roads were temporarily closed. In 1975, over 800 residences experienced basement and/or first floor flooding. After that flood, Hamilton began to install various flood control structures, including dams, culverts, and stream channel improvements. Existing flood control structures in the township include 10 floodwater-retarding structures, a 2.4-mile flood control concrete channel, culverts under the D & R canal, and a stormwater diversion dam at Shady Brook. In spite of these flood-control structures, Hamilton has continued to be vulnerable to flooding. During the 1999 flooding event, Cornell Heights and Whitehead were flooded, and in 2006, Lamberton Road and surrounding areas were flooded. The April 2007 flood impacted areas surrounding Pond Run, including Veterans Park and the Senior Center.

A *Multi-Jurisdictional Flood Mitigation Plan for the Non-tidal, New Jersey Section of the Delaware River Basin* was published in 2008. The Mercer County portion of the plan addresses Hamilton Township, in addition to Ewing, Hopewell, Lawrence, Pennington, and Trenton. This plan identifies impassable roads and flooded basements as major risks and impacts for Hamilton Township during flooding events. Municipal mitigation actions identified for the township include property acquisition, public education and outreach,

development of flood-threat recognition and advanced flood-warning systems, retrofitting Greenwood Avenue, and enforcement of the flood damage prevention ordinance.

The *Flood Damage Prevention Ordinance* of Hamilton Township is intended to regulate development in the floodplains in order to prevent the flooding by the Assunpink Creek, Miry Run, Pond Run, and other waterways in the township. The ordinance outlines the standards for development, site permits, and other regulatory controls. All proposed developments require permits if they are located within the floodplain and/or 25 feet from the top of the channel bank. Proposed developments within 50 feet from the top of the channel bank require permits if they contain acid-producing soils, are adjacent to Category One or trout-producing waters, or contain critical habitat (either current or historic) for threatened or endangered plant or animal species. This ordinance specifies that no building or structure can be erected, enlarged, expanded, externally altered or modified, nor can there be any paving, fill, excavation, or improvement permitted within a floodplain without site plan submittal and approval by the Planning Board or Zoning Board of Adjustments.

The municipal *Flood Damage Prevention Ordinance* prohibits the storage, dumping, or processing of various types of materials within the floodplain, including the following: solid waste, debris, or vehicles; domestic sewage or industrial waste, either solid or liquid; pesticides; materials buoyant, flammable, or explosive in times of flooding; and hazardous materials that could injure humans, plants, or animals in times of flooding. Critical facilities such as schools, firehouses, nursing homes, hospitals, pumping stations, power stations, or other life-support systems are also prohibited within the floodplain.

The dam at Van Nest Refuge

The ordinance identifies a number of conditions with which all developments and improvements located within the flood hazard area must comply in order to minimize potential flood damage. In reviewing applications for developments and variances proposed within the floodplain, the Planning Board or Zoning Board of Adjustments is to consider the following criteria:

1. The danger to life and property [due] to increased flood heights or velocity caused by encroachments
2. The danger that materials may be swept onto other lands or downstream to the injury of others
3. The proposed water supply and sanitation systems and the insulation of these systems from disease, contamination, and unsightly conditions resulting from flooding
4. The susceptibility of the proposed use to flood damage and the effects of such damage
5. The need for a location on a stream, river, or other waterway

6. The availability of alternate locations not subject to flooding
7. The duration, rate of rise, and sediment transport of floodwaters expected at the site
8. The safety of access to the property in time of flood for ordinary and emergency vehicles
9. The extent to which the hydraulic capacity of the floodway will be disrupted
10. The degree to which the proposed use serves the general public's health, safety, and welfare
11. The degree to which any aspect of the food chain or plant, animal, fish, or human life processes are affected adversely within or beyond the proposed use area
12. The degree to which the proposed activity alters natural water flow or water temperature
13. The degree to which the proposed use provides facilities for the proper handling of litter, trash, refuse, and sanitary and industrial waste
14. The degree to which archaeological or historic sites and structures are endangered, or rare species of animals or plants, high-quality wildlife inhabitants, scarce vegetation types, and other irreplaceable land types will be degraded or destroyed
15. The degree to which the natural, scenic, and aesthetic values at the proposed activity sites can be retained
16. The degree to which materials not subject to major damage by floods are firmly anchored to prevent floatation and are readily removable from the area within time available after flood warning
17. The degree to which virgin land is covered over with impermeable materials.

The burden of proof lies with the applicant to prove that the proposed development is compatible with the public safety, health, and welfare, and that development will not endanger public and private property, wildlife and fisheries, or the natural environment of the floodplain.

Related municipal ordinances include the Stormwater Control Ordinance and the Stream Buffer Conservation Zone Ordinance.

In New Jersey, floodplains are regulated by the Flood Hazard Area Control Act, which was revised in 2007. These new and more stringent standards have a zero percent net-fill requirement to all nontidal flood hazard areas in New Jersey. The new rules also protect riparian vegetation within zones of 50, 150, or 300 feet in width along each side of all surface waters. The most protective 300-foot buffer applies to Category One and certain upstream tributaries. The 150-foot buffer applies to certain trout-supporting waters, habitats of threatened or endangered species critically dependant on the watercourse to survive, or watercourses that flow through areas that contain acid-producing soil deposits. The 50-foot buffer applies to all other surface waters in the state.

Stormwater Management

In order to alleviate flooding, a comprehensive approach to stormwater management is needed. As described in **Nonpoint Sources of Pollution** in the **Surface Water Quality** section, stormwater runoff not only causes flooding, but it also degrades water quality and overall ecological health. To comply with the NJDEP Phase II Stormwater Rules (described in **Nonpoint Sources of Pollution**), Hamilton Township developed a Municipal Stormwater Management Plan in 2006. This plan outlines municipal procedures for the approval, initial monitoring, and maintenance of stormwater facilities. There are changes recommended for specific municipal ordinances to encourage nonstructural and low-impact stormwater management practices. Some, but not all, of these recommendations have been implemented on particular sites. The stormwater plan also details mitigation plans, which are required when a development is granted exemption from the municipal stormwater design and performance standards. A mitigation project could involve the retrofitting or repair of an existing municipal stormwater facility, such as a basin, inlet, or outfall.

Although stormwater is regulated through NJDEP's Municipal Stormwater Regulation Program, there are many barriers to effective implementation. The Delaware Riverkeeper Network published a report in May 2010 that outlines the inadequacies of the current municipal stormwater review system by profiling examples from Hamilton Township. This report, "New Jersey Stormwater Management Implementation: A case study of Hamilton Township, Mercer County," highlights Hamilton Township, although the overall statewide system is implicated for its shortcomings.

The Delaware Riverkeeper Network report found that in all development applications it evaluated, the reports issued by the submitting design engineers contained multiple omissions, flawed assumptions, and miscalculations, which were not identified by the township. During the municipal review process of these development applications, the stormwater reports submitted by engineers representing the developers were reviewed by the township engineer and, in some cases, by engineering consultants for the land-use board, although the shortcomings in the reports were often not exposed. According to the Delaware Riverkeeper Network report, even when stormwater management deficiencies were brought to the attention of the Hamilton Township planning and zoning boards, these reports of noncompliance were rejected in some cases by the boards. Although the NJDEP reviews stormwater projects and issues letters of approval, it has no local authority to approve or reject these projects. Rather, the local land-use authority has ultimate responsibility to ensure compliance with stormwater regulations.

A primary goal of the statewide Stormwater Management Rules is to promote the use of low-impact and *nonstructural* stormwater management practices, such as preserving open space, protecting natural systems, clustering development, reducing or disconnecting impervious coverage, and utilizing existing natural features to manage stormwater. These practices are in contrast to *structural* stormwater management facilities like basins (by far the most commonly used stormwater structure), infiltration beds, pervious pavement, and green roofs. Although the Stormwater Management Rules state that nonstructural stormwater management practices should be utilized to the maximum extent practicable, it

remains the tendency of land developers to maximize of ratable area in site plan design rather than holistically planning a site to preserve its natural elements, open space, and inherent stormwater retention functions.

The Delaware Riverkeeper Network report contains a list of 15 recommendations to improve the way that stormwater management is implemented on the township level. As land-use decisions largely lie with the Planning Board, it is recommended that the board be made aware that it has the sole jurisdiction to perform stormwater reviews, not the NJDEP. As such, it is important that board members be properly educated on the Stormwater Management Rules and that they form a relationship with the case managers of the Municipal Stormwater Regulations Program. Other recommendations relate to auditing and inspections by the NJDEP and EPA of the current permit program, penalties for stormwater permit violations, and an appeals process to be administered by NJDEP outside the court system.

Threats to Natural Vegetation

Invasive Plant Species

A significant threat to the native vegetation and ecological integrity of Hamilton Township is the spread of invasive species. Invasive species not only crowd out native species, but they also tend to diminish biodiversity, thereby creating ripple effects throughout an ecosystem. A primary characteristic of an invasive species is its rapid growth due to the lack of natural controls present in its native lands, which include herbivores, parasites, and diseases. This phenomenal growth allows invasive species to overwhelm and displace existing vegetation to form one-species stands. The spread of invasive species has directly contributed to the decline of many threatened and endangered plant species. Not all nonnative plant species prove to be invasive. In addition, a small number of native species can behave aggressively enough to be considered invasive in some circumstances.

The dietary preference of deer for native species has given invasive nonnative species an additional competitive advantage. In particular, many native spring ephemeral wildflower species have been grazed into rarity or oblivion, as have some native shrub species and tree seedlings. Nonnative species tend to be inedible for local wildlife, or provide food that is lower in nutritional value than the native plant species that they have displaced.

Many invasive species are successful due to their allelopathic properties, meaning that the plant releases toxins that inhibit the growth of other plants. Invasive species showing allelopathic properties include the tree of heaven, garlic mustard, and spotted knapweed. Some nonnative invasives may also be altering the chemistry and porosity of the soil, with long-term consequences for forest health and water quality. Such species include Japanese stiltgrass, garlic mustard, black locust, and autumn olive.

Over 200 invasive plant species have been identified in Mercer County. These are listed in **Appendix C: Plant Species in Hamilton Township - Invasive Plant Species in Mercer County, New Jersey**. Some of the more prevalent species found in Hamilton Township include Japanese knotweed, Japanese stiltgrass (also known as Nepalese browntop), English ivy, purple loosestrife, and the common reed.

Bacterial Leaf Scorch

Bacterial leaf scorch is an infectious chronic disease that causes slow decline and death of shade trees. It is caused by the bacterium *Xylella fastidiosa* and is spread by insects of the families *Cercopidae* (spittlebugs), *Cicadellidae* (leafhoppers), and *Membracidae* (treehoppers). The bacterium multiplies rapidly and clogs the tree's water-conducting tissue, disrupting water transport to roots, branches, and leaves. Symptoms include leaf browning, which begins at the leaf edges. Symptoms recur each year, and the trees slowly die over a number of years. Bacterial leaf scorch affects a range of shade tree species, including sycamore, mulberry, red maple, sugar maple, sweetgum, American elm, and a number of oaks. It is also known to affect a variety of herbaceous and woody plants, as well as some grass species.

In Hamilton Township, bacterial leaf scorch has had a devastating effect on oak trees, including those in Veterans Park. In recent years, the Environmental Commission has collaborated with the NJDEP in surveying and identifying trees infected by bacterial leaf scorch. This disease leaves many trees with dead branches that can be hazardous to people and property, necessitating early removal of the trees.

Unfortunately, there is no known preventative treatment or cure for the disease. There are some measures that can be taken to suppress symptoms or to make the trees more presentable, including pruning of symptomatic branches and mulching and irrigating during periods of little rainfall to reduce moisture stress. Another disease management strategy is to inject the trunks of infected trees with antibiotics in late May or early June. The antibiotic oxytetracycline has been shown to cause remission of symptoms, but does not provide a cure to the disease.

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Appendices

APPENDIX A

Federal and State Conservation Programs for Farmers

Several financial incentive and technical assistance programs are available to help farmers plan and use conservation practices on their farms. The United States Department of Agriculture Natural Resources Conservation Service (NRCS) has a service center office in Freehold that serves Mercer, Middlesex, and Monmouth counties. NRCS staff members are available to work with farmers to help identify their conservation goals and then craft appropriate conservation plans to meet those goals.

Numerous programs provide financial incentives to help farmers voluntarily engage in these practices. Financial incentives can include rental payments to farmers for reserved land, easement payments, and cost sharing–up to 100% for some programs–to develop and follow conservation plans.

Federal Programs

The **Conservation Reserve Program (CRP)** is offered by NRCS and administered by the Farm Service Agency. It provides technical and financial aid and gives farmers assistance in complying with federal, state, and tribal environmental laws. The program encourages farmers to convert highly erodible or environmentally sensitive cropland to vegetative cover, such as native grasses, filter strips, or riparian buffers. In exchange, farmers receive rental payments for enrolled land, as well as financial assistance for implementing and maintaining conservation practices. www.nrcs.usda.gov/programs/crp/.

The State of New Jersey partnered with the USDA to help farmers protect water quality by establishing a $100 million **Conservation Reserve Enhancement Program (CREP)**, which is the New Jersey version of the federal program**.** Under a joint agreement between the USDA and State of New Jersey, $100 million in funding has been provided for New Jersey farmers to install stream buffers in order to reduce the flow of nonpoint source pollution into the state's waterways. Types of buffers to be installed include trees, shrubs, vegetative filter strips, contour grass strips, and grass waterways. Under the program, a landowner installs and maintains approved practices through a 10- or 15-year rental contract agreement. A landowner entering the state Farmland Preservation Program or Green Acres Program also may opt for a permanent easement under the Conservation Reserve Enhancement Program. This would provide additional payment for permanent maintenance of approved conservation practices. The program will pay landowners annual rental and incentive payments for participating in the program, as well as 100

percent of the cost to establish approved practices. Additional information can be found at www.fsa.usda.gov, or by contacting the local Farm Services Agency (FSA) Office or Soil and Water Conservation District Office at www.fsa.usda.gov

Another program targeted for wetlands preservation is called the **Wetlands Reserve Program (WRP)**. WRP is a voluntary resource conservation program that provides landowners with the opportunity to receive financial incentives to restore, protect, and enhance wetlands in exchange for returning marginal land from agriculture. WRP is made possible by a reauthorization in the Food, Conservation and Energy Act of 2008, known as the Farm Bill. The program has three enrollment options: permanent easement, 30-year easement, or restoration cost-share agreement, which has a minimum 10-year commitment. Applications are accepted on a continuous basis and may be obtained and filed at any time. www.nrcs.usda.gov/programs/farmbill/2002/

The **Grassland Reserve Program (GRP)** is another conservation program that emphasizes protection of grasslands, pasturelands, and rangelands without prohibiting grazing. Participants voluntarily put limitations on the future use of their land while retaining the ability and right to conduct grazing practices, produce hay, mow or harvest for seed production, conduct fire rehabilitation, and construct firebreaks and fences. There are four enrollment options: permanent easement; 30-year easement; rental agreement, which is available in 10-, 15-, 20-, or 30-year contracts; and restoration agreement. Participants are compensated in different ways according to the enrollment option. www.nrcs.usda.gov/programs/GRP/

The **Wildlife Habitat Incentives Program (WHIP)** is another USDA voluntary program that targets landowners who want to preserve and protect fish and wildlife habitat on nonfederal lands. WHIP applicants develop a plan of operations that outlines conservation practices and implementation schedules. The New Jersey State Conservationist, in conjunction with the State Technical Committee, identifies and prioritizes plans that complement the goals and objectives of relevant fish and wildlife conservation initiative at the state, regional, and national levels. If selected, a plan forms the basis of a cost-share agreement, lasting between one to 10 years. NRCS will pay for up to 75 percent of costs of implementing conservation practices that protect fish and wildlife habitat. For beginning farmers, socially disadvantaged, or limited resource producers, NRCS will pay for up to 90 percent of costs. In New Jersey, a state plan has been developed that targets a number of priority habitat areas: pollinator habitat, grasslands habitat, disturbance-dependent habitat, bog turtle priority species habitat, wetland habitat, and Delaware Bay priority habitat. www.nj.nrcs.usda.gov/programs/whip/

The **Environmental Quality Incentives Program (EQIP)** is also a part of the reauthorized Farm Bill of 2008. EQIP is a voluntary program that focuses on conservation that promotes both agricultural production and environmental quality. The program itself offers technical and financial assistance with installation and implementation of structural and management practices on agricultural land. EQIP features a minimum contract term compared to other programs, lasting a maximum of 10 years. Landowners are eligible for incentive and cost-share payments of up to 75 percent and sometimes up to 90 percent, while still engaging in livestock or agricultural production activities. www.nrcs.usda.gov/programs/eqip

The **Conservation Stewardship Program (CSP)** is a voluntary program administered by the NRCS that replaces the Conservation Security Program. This program is intended to promote conservation and improvement of soil, water, air, energy, plant and animal life, etc., on tribal and private working lands. Working lands refer to a variety of land types, including cropland, grassland, prairie land, improved pasture, and range land. In some cases, forested lands would also be included in this category. CSP is available in 50 states, as well as the Caribbean and Pacific Basin areas, and provides equal access to funding. www.nrcs.usda.gov/programs/new_csp/csp.html

The **Farm and Ranch Lands Protection Program (FRPP)** is a voluntary land conservation program that assists farmers in keeping their lands for agricultural purposes. FRPP provides matching funds to those provided by state, tribal, local government, or nongovernment organizations, offering farm and ranch protection programs designed to purchase conservation easements. The FRPP is managed by the NRCS. Conservation easements are purchased by the state, tribal, or local entity. A participating landowner agrees not to convert his or her land to nonagricultural uses, and to develop a conservation plan for any highly erodible lands. Landowners do, however, maintain all of their rights to utilize their land for agricultural purposes.
www.nrcs.usda.gov/programs/frpp/

The federal Environmental Protection Agency (EPA) offers the **Strategic Agricultural Initiative**, an outreach program designed to demonstrate and facilitate the adoption of agricultural management practices that will enable growers to transition away from the use of high-risk pesticides. Funds are provided to projects that develop agricultural management practices that offer risk reductions to human health and the environment.
www.epa.gov/region02

The EPA also offers the **Source Reduction Assistance Program**, which prioritizes water conservation and the minimization of chemicals of concern, such as pesticides, endocrine disruptors, and fertilizers. www.epa.gov

The U.S. Fish and Wildlife offers technical and financial assistance to private landowners through the **Partners for Fish and Wildlife** Program. The owners restore wetlands, streams, and river conditions, as well as other important fish and wildlife habitat, for federal trust species. www.fws.gov/partners/

State Programs

The **Landowner Incentive Program (LIP)** is a preservation program for private landowners who wish to protect and conserve rare wildlife habitat and species. LIP is funded by the U.S. Fish and Wildlife Service and is administered by NJDEP's Division of Fish and Wildlife Endangered Nongame Species Program. Participating landowners receive both technical and financial assistance through this competitive grant program. Generally, a five-year minimum commitment is required and longer terms are preferred. A 25 percent cost-share is required of the landowner.
www.state.nj.us/dep/fgw/ensp/lip_prog.htm

The **State Agricultural Development Committee (SADC) in New Jersey** has made soil and water conservation grants available as part of the Farmland Preservation Program. The grants gives landowners up to 50 percent of the funds required for approved soil and water conservation projects. Farms are only eligible if they are already enrolled in a permanent or eight-year easement program. Soil projects can include measures to prevent or control erosion, control pollution on agricultural land, and improve water management for agricultural purposes. Projects must be completed within three years of SADC funding approval. However, under special circumstances, the grant may be renewed for an additional year. www.state.nj.us/agriculture/sadc/sadc.htm

NJDEP's 319(h) Non-point Source Pollution Control Pass-through Grant Program provides financial assistance to reduce nonpoint source pollution through riparian buffers, manufactured treatment devices, and other methods. Applicants must be a government entity or a nonprofit organization, but can partner with farmers. www.state.nj.us/dep/watershedmgt/319grant.htm

Vernal Pools in Hamilton Township

ID#	USGS Quad Name	Vernal Pool Status	X Coordinate	Y Coordinate	Old ID#
7769	Allentown NJ	Potential Vernal Habitat Location	532741.46749200000	4445308.74202000000	1178
7765	Allentown NJ	Potential Vernal Habitat Location	532740.14457300000	4445402.66929000000	1177
7761	Allentown NJ	Potential Vernal Habitat Location	532910.92449600000	4447541.53214000000	1176
7757	Allentown NJ	Potential Vernal Habitat Location	532783.92424200000	4447640.75109000000	1175
18724	Princeton NJ	Potential Vernal Habitat Location	524840.25	4457476.5	990
18740	Princeton NJ	Potential Vernal Habitat Location	525708.625	4457480.5	994
31985	Princeton NJ	Vernal Habitat Location	525392.1841	4456504.213	
31984	Princeton NJ	Vernal Habitat Location	525274.4521	4456565.564	
8254	Trenton East NJ-PA	Potential Vernal Habitat Location	530675.64411700000	4445231.95191000000	1256
8176	Trenton East NJ-PA	Potential Vernal Habitat Location	530544.00057200000	4446100.31534000000	1250
8240	Trenton East NJ-PA	Potential Vernal Habitat Location	530282.27443100000	4446117.49987000000	1255
8227	Trenton East NJ-PA	Potential Vernal Habitat Location	530366.94126700000	4446136.02075000000	1254

ID#	USGS Quad Name	Vernal Pool Status	X Coordinate	Y Coordinate	Old ID#
8189	Trenton East NJ-PA	Potential Vernal Habitat Location	530433.37823400000	4446200.26179000000	1251
8215	Trenton East NJ-PA	Potential Vernal Habitat Location	530306.08697900000	4446228.62510000000	1253
8203	Trenton East NJ-PA	Potential Vernal Habitat Location	530291.53486600000	4446265.66684000000	1252
8504	Trenton East NJ-PA	Potential Vernal Habitat Location	523980.76591000000	4446916.93941000000	1279
8118	Trenton East NJ-PA	Potential Vernal Habitat Location	530685.88349900000	4447137.54911000000	1246
8159	Trenton East NJ-PA	Potential Vernal Habitat Location	530914.74854000000	4447169.29917000000	1249
8131	Trenton East NJ-PA	Potential Vernal Habitat Location	530688.52933800000	4447171.94501000000	1247
8145	Trenton East NJ-PA	Potential Vernal Habitat Location	530765.25865800000	4447183.85128000000	1248
8523	Trenton East NJ-PA	Potential Vernal Habitat Location	524419.56476700000	4448077.49568000000	1283
8519	Trenton East NJ-PA	Potential Vernal Habitat Location	524436.90821900000	4448165.13891000000	1282
7718	Trenton East NJ-PA	Potential Vernal Habitat Location	531409.65288800000	4448433.37730000000	1166
7730	Trenton East NJ-PA	Potential Vernal Habitat Location	531324.98605200000	4448434.70022000000	1169
7722	Trenton East NJ-PA	Potential Vernal Habitat Location	531527.39270700000	4448492.90867000000	1167
7726	Trenton East NJ-PA	Potential Vernal Habitat Location	531293.23598900000	4448549.79420000000	1168
7706	Trenton East NJ-PA	Potential Vernal Habitat Location	531490.35096600000	4448572.28383000000	1163

ID#	USGS Quad Name	Vernal Pool Status	X Coordinate	Y Coordinate	Old ID#
7737	Trenton East NJ-PA	Potential Vernal Habitat Location	531442.72587100000	4448593.45054000000	1170
7710	Trenton East NJ-PA	Potential Vernal Habitat Location	531495.64264300000	4448610.64849000000	1164
7702	Trenton East NJ-PA	Potential Vernal Habitat Location	531324.98605200000	4448625.20060000000	1162
7714	Trenton East NJ-PA	Potential Vernal Habitat Location	531387.16326000000	4448660.91942000000	1165
8090	Trenton East NJ-PA	Potential Vernal Habitat Location	531242.50129300000	4448830.58006000000	1244
8076	Trenton East NJ-PA	Potential Vernal Habitat Location	527213.43814100000	4449797.45004000000	1243
8020	Trenton East NJ-PA	Potential Vernal Habitat Location	528178.59882100000	4449860.42555000000	1236
8062	Trenton East NJ-PA	Potential Vernal Habitat Location	528455.43102200000	4450502.61150000000	1242
8016	Trenton East NJ-PA	Potential Vernal Habitat Location	527403.11962900000	4451085.54563000000	1235
8048	Trenton East NJ-PA	Potential Vernal Habitat Location	526477.64428100000	4451161.51639000000	1241
8032	Trenton East NJ-PA	Potential Vernal Habitat Location	526433.98794300000	4451191.94354000000	1239
8539	Trenton East NJ-PA	Potential Vernal Habitat Location	524965.10973300000	4451223.22278000000	1287
8039	Trenton East NJ-PA	Potential Vernal Habitat Location	526461.76924900000	4451238.24571000000	1240
8543	Trenton East NJ-PA	Potential Vernal Habitat Location	524975.69308800000	4451254.97284000000	1288
8024	Trenton East NJ-PA	Potential Vernal Habitat Location	526284.84019200000	4451260.05108000000	1237

ID#	USGS Quad Name	Vernal Pool Status	X Coordinate	Y Coordinate	Old ID#
8008	Trenton East NJ-PA	Potential Vernal Habitat Location	527999.61355100000	4451312.75130000000	1233
8547	Trenton East NJ-PA	Potential Vernal Habitat Location	524624.10096400000	4451314.01474000000	1289
8028	Trenton East NJ-PA	Potential Vernal Habitat Location	526361.22738100000	4451340.11050000000	1238
8012	Trenton East NJ-PA	Potential Vernal Habitat Location	528102.80125800000	4451365.66807000000	1234
7958	Trenton East NJ-PA	Potential Vernal Habitat Location	528060.72784300000	4451476.20705000000	1221
8554	Trenton East NJ-PA	Potential Vernal Habitat Location	524566.77893100000	4451502.83481000000	1290
7954	Trenton East NJ-PA	Potential Vernal Habitat Location	528174.49890400000	4451568.81140000000	1220
8590	Trenton East NJ-PA	Potential Vernal Habitat Location	524975.13723200000	4451643.63285000000	1299
8586	Trenton East NJ-PA	Potential Vernal Habitat Location	525066.41866500000	4451667.44540000000	1298
7966	Trenton East NJ-PA	Potential Vernal Habitat Location	526494.87299100000	4451675.97808000000	1223
8578	Trenton East NJ-PA	Potential Vernal Habitat Location	525861.29402400000	4451727.61174000000	1296
8582	Trenton East NJ-PA	Potential Vernal Habitat Location	526270.34027100000	4451732.85045000000	1297
8600	Trenton East NJ-PA	Potential Vernal Habitat Location	525005.56437600000	4451777.24770000000	1300
8104	Trenton East NJ-PA	Potential Vernal Habitat Location	526396.40113700000	4451929.56848000000	1245
18874	Trenton East NJ-PA	Potential Vernal Habitat Location	530759.12484400000	4451945.16347000000	

ID#	USGS Quad Name	Vernal Pool Status	X Coordinate	Y Coordinate	Old ID#
8604	Trenton East NJ-PA	Potential Vernal Habitat Location	525168.57445300000	4451976.01616000000	1301
7962	Trenton East NJ-PA	Potential Vernal Habitat Location	526518.26241500000	4451984.35850000000	1222
8612	Trenton East NJ-PA	Potential Vernal Habitat Location	525019.66657500000	4451991.49425000000	1303
8574	Trenton East NJ-PA	Potential Vernal Habitat Location	525987.39445000000	4452030.78489000000	1295
8608	Trenton East NJ-PA	Potential Vernal Habitat Location	525223.39614900000	4452064.25481000000	1302
7974	Trenton East NJ-PA	Potential Vernal Habitat Location	526450.31685700000	4452107.30333000000	1225
7970	Trenton East NJ-PA	Potential Vernal Habitat Location	526415.92095500000	4452108.62624000000	1224
7978	Trenton East NJ-PA	Potential Vernal Habitat Location	526482.06692100000	4452116.56376000000	1226
8570	Trenton East NJ-PA	Potential Vernal Habitat Location	526095.87383400000	4452133.97259000000	1294
8566	Trenton East NJ-PA	Potential Vernal Habitat Location	526117.04054300000	4452192.18104000000	1293
8562	Trenton East NJ-PA	Potential Vernal Habitat Location	525963.25134200000	4452379.77073000000	1292
8558	Trenton East NJ-PA	Potential Vernal Habitat Location	525496.68459100000	4452689.21450000000	1291
7939	Trenton East NJ-PA	Potential Vernal Habitat Location	527305.56005600000	4452956.36527000000	1217
7943	Trenton East NJ-PA	Potential Vernal Habitat Location	527271.16415300000	4453039.70918000000	1218
7947	Trenton East NJ-PA	Potential Vernal Habitat Location	527437.85198700000	4453066.16757000000	1219

ID#	USGS Quad Name	Vernal Pool Status	X Coordinate	Y Coordinate	Old ID#
7996	Trenton East NJ-PA	Potential Vernal Habitat Location	530157.09377200000	4453708.74700000000	1230
8000	Trenton East NJ-PA	Potential Vernal Habitat Location	528824.98273000000	4453967.92961000000	1231
8620	Trenton East NJ-PA	Potential Vernal Habitat Location	523770.38218000000	4454883.57823000000	1305
8624	Trenton East NJ-PA	Potential Vernal Habitat Location	523877.53864500000	4454978.82842000000	1306
8616	Trenton East NJ-PA	Potential Vernal Habitat Location	525181.15526100000	4455002.00599000000	1304
7986	Trenton East NJ-PA	Potential Vernal Habitat Location	528617.82730700000	4455080.16583000000	1228
7990	Trenton East NJ-PA	Potential Vernal Habitat Location	529179.57865600000	4455158.01161000000	1229
31996	Trenton East NJ-PA	Vernal Habitat Location	527848.20398800000	4450872.15367000000	
8527	Trenton East NJ-PA	Vernal Habitat Location	524879.11997800000	4451232.48321000000	1284
32036	Trenton East NJ-PA	Vernal Habitat Location	524741.99784400000	4451282.38030000000	
8531	Trenton East NJ-PA	Vernal Habitat Location	524891.02625200000	4451298.62918000000	1285
8535	Trenton East NJ-PA	Vernal Habitat Location	524770.64059400000	4451368.74390000000	1286

Source: Center for Remote Sensing and Spatial Analysis (CRSS), 2008

Plant Species in Hamilton Township

Duck Island Vegetation

Common Name	Scientific Name
Trees	
American basswood	Tilia americana
American beech	Fagus grandifolia
American elm	Ulmus americana
American holly	Ilex opaca
black cherry	Prunus serotina
black locust	Robinia pseudoacacia
black walnut	Juglans nigra
box elder maple	Acer negundo
chestnut oak	Quercus prinus
cork tree	Phellodendron sp.
cottonwood	Populus deltoides
crab apple	Pyrus sp.
empress tree	Paulownia tomentosa
honey locust	Gleditsia triacanthos
hop tree	Ptelea trifoliata
pin oak	Quercus palustris
red maple	Acer rubrum
river birch	Betula nigra
sassafras	Sassafras albidum
scrub pine	Pinus virginiana
silk tree	Albizia julibrissin
silver maple	Acer saccharinum
smooth alder	Alnus serrulata

Common Name	Scientific Name
sycamore	Platanus occidentalis
tree-of-heaven	Ailanthus altissima
tulip tree	Liriodendron tulipifera
white pine	Pinus strobus
willow	Salix sp.
Shrubs	
American hazel-nut	Corylus americana
arbor-vitae	Thuja occidentalis
arrowwood viburnum	Viburnum dentatum
blackberry	Rubus sp
blackhaw viburnum	Viburnum prunifolium
bladdernut	Staphylea trifolia
buttonbush	Cephalanthus occidentalis
elaeagnus	Elaeagnus sp.
false indigo	Amorpha fruticosa
Morrow's honeysuckle	Lonicera morrowii
border privet	Ligustrum obtusifolium
privet	Ligustrum ovalifolium
red chokeberry	Aronia arbutifolia
spicebush	Lindera benzoin
staghorn sumac	Rhus typhina
swamp dogwood	Cornus amomum
sweet pepperbush	Clethra alnifolia
wineberry	Rubus phoenicolasius
Vines	
climbing false buckwheat	Polygonum scandens
climbing false hempweed	Mikania scandens
dodder	Cuscuta gronovii
flower of an hour	Hibiscus trionum
frost grape	Vitis vulpina
Japanese honeysuckle	Lonicera japonica
Japanese hops	Humulus sp.
moonseed	Menispermum canadense

Common Name	Scientific Name
poison ivy	Toxicodendron radicans
porcelain berry	Ampelopsis brevipedunculata
sweet autumn clematis	Clematis terniflora
trailing wild bean	Strophostyles helvula
trumpet creeper	Campsis radicans
Virginia creeper	Parthenocissus quinquefolia
virgin's bower	Clematis virginiana
wild yam root	Dioscorea villosa
Herbs	
(heath aster) many flowered aster	Aster ericoides
(mucronata?) (pinweed)	Lechea sp.
alsike clover	Trifolium hybridum
annual woodworm	Artemisia annua
arrow arum	Peltandra virginica
arrow-leaved tearthumb	Polygonum saggitatum
Asiatic dayflower	Commelina communis
beech drops	Epifagus virginiana
beggar ticks	Bidens frondosa
black medick	Medicago lupulina
black nightshade	Solanum nigrum
blue curls	Trichostema dichotomum
blue flag	Iris versicolor
boneset	Eupatorium perfoliatum
bouncing bet	Saponaria officinalis
broad leaved cattail	Typha latifolia
broad-leaved arrowhead	Sagittaria latifolia
bugleweed	Lycopus americanus
bulb-bearing water hemlock	Cicuta bulbifera
bull thistle	Cirsium vulgare
butter-and-eggs	Linaria vulgaris
buttonweed	Diodia teres
camphorweed	Heterotheca subaxillaris
Canada goldenrod	Solidago canadensis

Common Name	Scientific Name
Canada lily	Lilium canadense
Canada thistle	Cirsium canadense
cardinal flower	Lobelia cardinalis
carpetweed	Mollugo verticillata
celandine	Chelidonium majus
clearweed	Pilea pumila
cleavers	Galium aparine
clustered snakeroot	Sanicula gregaria
common chickweed	Stellaria media
common cinquefoil	Potentilla simplex
common clotbur	Xanthium strumarium v. canadense
common evening primrose	Oenothera biennis
common milkweed	Asclepias syriaca
common mugwort	Artemisia vulgari
common mullein	Verbascum thapsus
common plantain	Plantago major
common purslane	Portulaca oleracea
common ragweed	Ambrosia artemisiifolia
common St. Johnswort	Hypericum perforatum
daisy fleabane	Erigeron annuus
dandelion	Taraxacum officinale
ditch stonecrop	Penthorum sedoides
dotted smartweed	Polygonum punctatum
duckweed	Lemna major
dwarf St. Johnswort	Hypericum mutilum
early goldenrod	Solidago juncea
eastern joe pye weed	Eupatorium dubium
elsholtzia	Elsholtzia ciliata
enchanter's nightshade	Circaea lutetiana
English plantain	Plantago lanceolata
false nettle	Boehmeria cylindrica
false pimpernel	Lindernia dubia
field garlic	Allium vineale

Common Name	Scientific Name
forget-me-not	Myosotis scorpioides
garlic mustard	Alliaria petiolata
gerardia	Agalinis purpurea
giant ragweed	Ambrosia trifida
grass-leaved goldenrod	Euthamia graminifolia
gray goldenrod	Solidago nemoralis
great burreed	Sparganium eurycarpum
green-headed coneflower	Rudbeckia laciniata
hairy bittercress	Cardamine hirsuta
halberd-leaved tearthumb	Polygonum arifolium
heart-leaved aster	Aster cordifolius
heath aster	Aster pilosus
hog peanut	Amphicarpaea bracteata
honewort	Cryptotaenia canadensis
horseweed	Conyza canadensis
hyssop-leaved bonese	Eupatorium hyssopifolium
Indian tobacco lobelia	Lobelia inflata
jack-in-pulpit	Arisaema triphyllum
Japanese clover	Lespedeza striata
Japanese knotweed	Polygonum cuspidatum
Jerusalem artichoke	Helianthus tuberosus
jumpseed	Polygonum virginianum
kidney-leaved crowfoot	Ranunculus abortivus
kidney-leaved mud plantain	Heteranthera reniformi
lady's thumb	Polygonum persicaria
larger bur marigold	Bidens laevis
late Joe-Pye weed	Eupatorium serotinum
lesser celandine	Ranunculus ficaria
long-bristled smartweed	Polygonum caespitosum
maddog skullcap	Scutellaria lateriflora
marsh bedstraw	Galium palustre
marsh hedge-nettle	Stachys palustris
marsh skullcap	Scutellaria galericulata

Common Name	Scientific Name
Maryland figwort	Scrophularia marilandica
Mexican tea	Chenopodium ambrosioides
mild water pepper	Polygonum lapathifolium
milk purslane	Euphorbia maculata
monkey flower	Mimulus ringens
moth mullein	Verbascum blattaria
mud plantain	Heteranthera multiflora
narrow leaved cattail	Typha angustifolia
New York ironweed	Vernonia noveboracensis
Nuttall's elodea	Elodea nuttallii
one-seeded bur-cucumber	Sicyos angulatus
orache	Atriplex patula
orange touch-me-not	Impatiens capensis
Ozark tickseed sunflower	Bidens polylepis
pale Indian-plantain	Cacalia atriplicifolia
partridge pea	Chamaecrista fasiculata
perilla mint	Perilla frutescens
pickerelweed	Pontederia cordata
pigweed	Chenopodium album
pilewort	Erechtites hieracifolia
pink knotweed	Polygonum pensylvanicum
pokeweed	Phytolacca americana
poor man's pepper	poor man's pepper
prickly lettuce	Lactuca serriola
purple dead nettle	Lamium purpureum
purple loosestrife	Lythrum salicaria
purple-leaved willow herb	Epilobium coloratum
purple-stemmed aster	Aster puniceus
Queen Anne's lace	Daucus carota
rabbit foot clover	Trifolium arvense
rattle box	Crotolaria sagittalis
red clover	Trifolium pratense
rough cinquefoil	Potentilla norvegica

Common Name	Scientific Name
rough goldenrod	Solidago rugosum
rough-stemmed goldenrod	Solidago rugosa
round-headed bush clover	Lespedeza cuneata
round-leaved boneset	Eupatorium rotundifolium
seaside goldenrod	Solidago sempervirens
self-heal	Prunella vulgaris
short-fringed knapweed	Centaurea dubia
showy tick trefoil	Desmodium canadense
sicklepod	Arabis canadensis
skunk cabbage	Symplocarpus foetidus
small water plantain	Alisma subcordatum
smaller forget-me-nots	Myosotis laxa
smooth hedge-nettle	Stachys tenuifolia
sneezeweed	Helenium autumnale
southern estuarine beggar ticks	Bidens bidentoides
southern pond lily	Nuphar advena
Spanish needles	Bidens bipinnata
spatterdock	Nuphar variegata
spearscale	Atriplex hastata
spiny-leaved sow thistle	Sonchus asper
spirodela	Spirodela polyrhiza
spotted joe pye weed	Eupatorium maculatum
spotted knapweed	Centaurea maculosa
spreading dogbane	Apocynum androsaemifolium
spurge	Euphorbia presylii
starry campion	Silene stellata
swamp beggar ticks	Bidens connata
swamp rose mallow	Hibiscus moscheutos
sweet everlasting	Gnaphalium obtusifolium
sweet goldenrod	Solidago odora
tall blue lettuce	Lactuca biennis
tall boneset	Eupatorium altissimum
tall meadow rue	Thalictrum pubescens

Common Name	Scientific Name
tall rattlesnake root	Prenanthes trifoliata
tawny day lily	Hemerocallis fulva
thin-leaved sunflower	Helianthus decapetalus
three-seeded mercury	Acalypha rhomboidea
tick trefoil	Desmodium paniculatum
true Solomon's seal	Polygonatum biflorum
turtlehead	Chelone sp.
tyrol knapweed	Centaurea vochinensis
upright spurge	Euphorbia nutans
velvetleaf	Abutilon theophrasti
viper's bugloss	Echium vulgare
Virginia bugleweed	Lycopus virginicus
water arrowhead	Sagittaria subulata
water hemp	Amaranthus cannabinus
water hemp	Amaranthus tuberculatus
water parsnip	Sium suave
water purslane	Ludwigia palustris
water smartweed	Polygonum amphibium
white avens	Geum canadense
white clover	Trifolium repens
white snakeroot	Eupatorium rugosum
white sweet clover	Melilotus alba
white vervain	Verbena urticifolia
wild four-o-clock	Mirabilis nyctaginea
wild lettuce	Lactuca canadensis
wild sensitive plant	Chamaecrista nictitan
winged monkey flower	Mimulus alatus
wood nettle	Laportea canadensis
yarrow	Achillea millefolium
yellow corydalis	Corydalis flavula
yellow giant hyssop	Agastache nepetoides
yellow wood sorrel	Oxalis stricta
yerba-de-tajo	Eclipta alba

Common Name	Scientific Name
Rushes	
rush	Juncus acuminatus
soft rush	Juncus effusus
Sedges	
blunt scale bulrush	Scirpus smithii
blunt scale bulrush	Scirpus smithii
bottle-brush sedge	Carex comosa
bulrush	Scirpus polyphyllus
common three square	Scirpus pungens
false nut sedge	Cyperus lupulinus
flat sedge	Cyperus microiria
river bulrush	Scirpus fluviatilis
sallow sedge	Carex lurida
softstem bulrush	Scirpus validus
spike-rush	Eleocharis acicularis
spike-rush	Eleocharis ovata
three-way sedge	Dulichium arundinacea
tussock sedge	Carex stricta
umbrella sedge	Cyperus strigosus
wool grass bulrush	Scirpus cyperinus
yellow flat sedge	Cyperus flavescens
yellow nutsedge	Cyperus esculentus
fringed sedge	Carex crinita
hop sedge	Carex lupulina
slender flatsedge	Cyperus bipartitus
green bulrush	Scirpus atrovirens v atrovirens
Grasses	
annual bluegrass	Poa annua
barnyard grass	Echinochloa crusgalli
barnyard grass	Echinochloa muricata
bottlebrush grass	Elymus hystrix
Canada blue joint grass	Calamagrostis canadensis
crab grass	Digitaria ischaemum

Common Name	Scientific Name
crab grass	Digitaria sanquinalis
deer tongue panic grass	Panicum clandestinum
eragrostis grass	Eragrostis pectinacea
Faber's foxtail grass	Setaria faberi
fall panic grass	Panicum dichotomiflorum
giant reed grass	Phragmites australis
goose grass	Eleusine indica
green foxtail grass	Setaria viridis
Japanese stilt grass	Microstegium vimineum
leafy dropseed	Muhlenbergia frondosa
little blue stem grass	Schizachyrium scoparium
nimblewill	Muhlenbergia schreberi
old witch panic grass	Panicum capillare
poverty grass	Sporobolus vaginiflorus
purple lovegrass	Eragrostis spectabilis
purple sandgrass	Triplasis purpurea
purple top or grease grass	Tridens flavus
red top grass	Agrostis stolonifera
redtop grass	Agrostis gigantea
rice cut grass	Leersia orysoides
smooth brome grass	Bromus inermis
spade-like stem leaf	Arthraxon hispidus
stink grass	Eragrostis cilianensis
weeping lovegrass	Eragrostis curvula
white grass	Leersia virginica
wild rice	Zizania aquatica
wild rye grass	Elymus virginicus
wood reedgrass	Cinna arundinacea
yellow foxtail grass	Setaria glauca
	Agrostis pectanacia
Ferns	
cinnamon fern	Osmunda cinnamomea
grape fern	Botrychium dissectum

Common Name	Scientific Name
lady fern	Athyrium filix-femina
marginal shield fern	Dryopteris marginalis
marsh fern	Thelypteris palustris
netted chain fern	Woodwardia areolata
New York fern	Thelypteris noveboracensis
sensitive fern	Onoclea sensibilis
At Waterfront Park	
a dainty bedstraw	Galium sp.
barnyard grass	Echinochloa crusgalli
black walnut	Juglans nigra
box elder	Acer negundo
common evening primrose	Oenothera biennis
common mullein	Verbascum thapsus
empress tree	Paulownia tomentosa
Faber's foxtail	Setaria faberi
false indigo	Amorpha fruticosa
false nettle	Boehmeria cylindrica
field sandbur	Cenchrus longispinus
goose grass	Eleusine indica
hedge bind weed	Calystegia sepium
horseweed	Conyza canadensis
Japanese honeysuckle	Lonicera japonica
jimsonweed	Datura stramonium
later flowering boneset	Eupatorium serotinum
liverwort	Marchantia polymorpha
maddog skullcap	Scutellaria lateriflora
Mexican tea	Chenopodium ambrosioides
nodding knotweed	Polygonum lapathifolium
one-seeded bur-cucumber	Sicyos angulatus
pearlwort	Sagina procumbens
pokeweed	Phytolacca americana
poor man's pepper	Lepidium virginicum
purple loosestrife	Lythrum salicaria

Common Name	Scientific Name
silver maple	Acer saccharinum
smooth crab grass	Digitaria ischaemum
swamp dogwood	Cornus amomum
tree-of-heaven	Ailanthus altissima
umbrella sedge	Scirpus strigosus
upright spotted spurge	Euphorbia nutans
water milfoil	Myriophyllum sp.
water purslane	Ludwigia palustris
white snakeroot	Eupatorium rugosum
white vervain	Verbena urticifolia
wineberry	Rubus phoenicolasius
wisteria	Wisteria sp

Source: Drs. Mary and Charles Leck, http://nynjctbotany.org

Van Nest WMA Vegetation

Common Name	Scientific Name
Trees	
American basswood	Tilia americana
American beech	Fagus grandifolia
American holly	Ilex opaca
black birch	Betula lenta
black cherry	Prunus serotina
black oak	Quercus velutina
catalpa	Catalpa sp.
flowering dogwood	Cornus florida
Norway maple	Acer platanoides
Norway spruce	Picea abies
pin oak	Quercus palustris
pine	Pinus sp.
red cedar	Juniperus virginiana
red maple	Acer rubrum
red oak	Quercus rubra

Common Name	Scientific Name
river birch	Betula nigra
sassafras	Sassafras albidum
silver maple	Acer saccharinum
slippery elm	Ulmus rubra
sweetgum	Liquidambar styraciflua
tupelo	Nyssa sylvatica
white ash	Fraxinus americana
white mulberry	Morus alba
white oak	Quercus alba
white pine	Pinus strobus
willow	Salix sp.
Shrubs and sub-shrubs	
Amur honeysuckle	Lonicera mackii
autumn olive	Elaeagnus umbellata
black huckleberry	Gaylussacia baccata
blackberry	Rosa sp.
blackberry	Rubus sp.
dewberry	Rubus flagellaris
highbush blueberry	Vaccinium corymbosum
Japanese barberry	Berberis thunbergii
Morrow's honeysuckle	Lonicera morrowii
multiflora rose	Rosa multiflora
partridgeberry	Mitchella repens
smooth arrowwood viburnum	Viburnum dentatum
spice bush	Lindera benzoin
swamp dewberry	Rubus hispidus
swamp dogwood	Cornus amomum
winterberry	Ilex verticillata
Vines	
Asiatic bittersweet	Celastrus orbiculatus
fox grape	Vitis labrusca
Japanese honeysuckle	Lonicera japonica
poison ivy	Toxicodendron radicans

Common Name	Scientific Name
round leaved greenbrier	Smilax rotundifolia
sawbrier	Smilax glauca
trumpet creeper	Campsis radicans
Virginia creeper	Parthenocissus quinquefolia
Herbs	
arrow arum	Peltandra virginica
arrow-leaved tear thumb	Polygonum sagittatum
boneset	Eupatorium perfoliatum
cat's ear	Hypochaeris radicata
cespitose smartweed	Polygonum cespitosum
Chinese bush clover	Lespedeza cuneata
common mugwort	Artemisia vulgaris
common mullein	Verbascum thapsus
English plantain	Plantago lanceolata
false nettle	Boehmeria cylindrica
garlic mustard	Alliaria petiolata
giant goldenrod	Solidago canadensis var. scabra
pokeweed	Phytolacca americana
purple loosestrife	Lysimachia salicaria
swamp milkweed	Asclepias incarnata
swamp rose mallow	Hibiscus moscheutos
sweet everlasting	Gnaphalium obtusifolium
white snakeroot	Eupatorium rugosum
yarrow	Achillea millefolium
yellow wood sorrel	Oxalis sp.
Rushes	
path rush	Juncus tenuis
Sedges	
loose-flowered type sedge	Carex laxiflora type
sedge	Carex crinita
Grasses	
deer-tongue grass	Panicum clandestinum
giant reed grass	Phragmites australis

Common Name	Scientific Name
Japanese stilt grass	Microstegium vimineum
purple top grass	Tridens flavus
Virginia brome grass	Andropogon virginicus var. virginicus
wood reed grass	Cinna arundinacea
Ferns	
cinnamon fern	Osmunda cinnamomea
New York fern	Thelypteris noveboracensis
royal fern	Osmunda regalis
sensitive fern	Onoclea sensibilis

Source: Dr. Patrick L. Cooney, http://nynjctbotany.org

John A. Roebling Memorial Park Vegetation

Common Name	Scientific Name
Trees	
American holly	Ilex opaca
autumn olive	Elaeagnus umbellata
black cherry	Prunus serotina
black locust	Robinia pseudoacacia
black willow	Salix nigra
box elder maple	Acer negundo
cottonwood	Populus deltoides
empress tree	Paulownia tomentosa
pin oak	Quercus palustris
red maple	Acer rubrum
river birch	Betula nigra
silk tree	Albizia julibrissin
staghorn sumac	Rhus typhina
sweetgum	Liquidambar styraciflua
sycamore	Platanus occidentalis
tree of heaven	Ailanthus altissima
tulip tree	Liriodendron tulipifera
tupelo	Nyssa sylvatica

Common Name	Scientific Name
weeping willow	Salix babylonica
white ash	Fraxinus americana
white mulberry	Morus alba
winged sumac	Rhus copallinum
Shrubs	
bayberry	Myrica pensylvanica
butterfly bush	Buddleja davidii
common elderberry	Sambucus canadensis
multiflora rose	Rosa multiflora
smooth alder	Alnus serrulata
smooth arrowwood viburnum	Viburnum dentatum var. lucidum
swamp dogwood	Cornus amomum
winterberry holly	Ilex verticillata
Vines	
bittersweet nightshade	Solanum dulcamara
dodder	Cuscuta sp.
fox grape	Vitis labrusca
groundnut	Apios americana
Japanese honeysuckle	Lonicera japonica
poison ivy	Toxicodendron radicans
round-leaved greenbrier	Smilax rotundifolia
Virginia creeper	Parthenocissus quinquefolia
Herbs	
American water horehound	Lycopus americanus
arrow arum	Peltandra virginica
Asiatic dayflower	Commelina communis
black-eyed Susan	Rudbeckia hirta var. pulcherrima
bladderwort	Utricularia sp
broad-leaved arrowhead	Sagittaria latifolia
butter and eggs	Linaria vulgaris
Canada goldenrod	Solidago canadensis
Canada thistle	Cirsium arvense
cardinal flower	Lobelia cardinalis

Common Name	Scientific Name
cespitose smartweed	Polygonum cespitosum
Chinese bush clover	Lespedeza cuneata
clotbur	Xanthium strumarium
common evening primrose	Oenothera biennis
common milkweed	Asclepias syriaca
common mugwort	Artemisia vulgaris
common mullein	Verbascum thapsus
common plantain	Plantago major
common ragweed	Ambrosia artemisiifolia
common sneezeweed	Helenium autumnale
coontail	Ceratophyllum demersum
crisped pondweed	Potamogeton crispus
cyperus	Cyperus bipartitus
dandelion	Taraxacum officinal
devil's beggar ticks	Bidens frondosa
duckweed	Lemna sp.
English plantain	Plantago lanceolata
everlasting pea	Lathyrus latifolius
eyebane spurge	Euphorbia nutans
false nettle	Boehmeria cylindrica
false Solomon's seal	Smilacina racemosa
false water pepper	Polygonum hydropiperoides
gill over the ground	Glechoma hederacea
great blue lobelia	Lobelia siphilitica
halberd-leaved tearthumb	Polygonum arifolium
Indian hemp dogbane	Apocynum cannabinum
Japanese smartweed	Polygonum cuspidatum
late flowering boneset	Eupatorium serotinum
mud plantain	Heteranthera reniformis
mud plantain	Heteranthera multiflora
narrow-leaved cattail	Typha angustifolia
orange jewelweed	Impatiens capensis
ox-eye daisy	Chrysanthemum leucanthemum

Common Name	Scientific Name
pickerelweed	Pontederia cordata
pigweed	Chenopodium album
pilewort	Erechtites hieraciifolia
pink knotweed	Polygonum pensylvanicum
pokeweed	Phytolacca americana
purple loosestrife	Lythrum salicaria
Queen Anne's lace	Daucus carota
red clover	Trifolium pratense
round-headed bush clover	Lespedeza capitata
spatterdock	Nuphar sp.
spotted smartweed	Polygonum punctatum
swamp milkweed	Asclepias incarnata
swamp rose mallow	Hibiscus moscheutos
three-seeded mercury	Acalypha rhomboidea
tick trefoil	Desmodium sp.
water meal	Wolffia sp.
water smartweed	Polygonum amphibium
white snakeroot	Eupatorium rugosum
white vervain	Verbena officinalis
yellow wood sorrel	Oxalis stricta
Grasses	
barnyard grass	Echinochloa muricata
common reed	Phragmites australis
deer-tongue panic grass	Panicum clandestinum
goose grass	Eleusine indica
grass	Arthraxon hispidus
green foxtail grass	Setaria viridis
Japanese stilt grass	Microstegium vimineum
nodding foxtail grass	Setaria faberi
purple top grass	Tridens flavus
smooth crab grass	Digitaria ischaemum
wild rice grass	Zizania aquatica
yellow foxtail grass	Setaria glauca

Common Name	Scientific Name
Ferns	
field horsetail	Equisetum arvense
marsh fern	Thelypteris palustris
sensitive fern	Onoclea sensibilis
At the Marina	
dotted smartweed	Polygonum punctatum
Mexican tea	Chenopodium ambrosioides
New York ironweed	Vernonia noveboracensis
sneezeweed	Helenium atumnale
southern estuarine beggar ticks	Bidens bidentoides

Source: Dr. Mary Leck, http://nynjctbotany.org

Invasive Plant Species in Mercer County, New Jersey

Common Name	Scientific Name
velvetleaf	Abutilon theophrasti Medik
Japanese maple	Acer palmatum Thunb.
Norway maple	Acer platanoides L.
Sycamore maple	Acer pseudoplatanus L.
bishops goutweed	Aegopodium podagraria L.
common horse chestnut	Aesculus hippocastanum L.
corn cockle	Agrostemma githago L
colonial bentgrass	Agrostis capillaris L.
tree-of-heaven	Ailanthus altissima (P. Mill.) Swingle
chocolate vine	Akebia quinata (Houtt.) Dcne.
mimosa	Albizia julibrissin Durazz.
garlic mustard	Alliaria petiolata (Bieb.) Cavara & Grande
wild garlic	Allium vineale L.
Amur peppervine	Ampelopsis brevipedunculata (Maxim.) Trautv.
corn chamomile	Anthemis arvensis L.
sweet vernalgrass	Anthoxanthum odoratum L.
Japanese angelica tree	Aralia elata (Miq.) Seem
great burdock	Arctium lappa L.

Common Name	Scientific Name
common burdock	Arctium minus Bernh.
thymeleaf sandwort	Arenaria serpyllifolia L.
tall oatgrass	Arrhenatherum elatius (L.) Beauv. ex J.& K. Presl
mugwort	Artemisia vulgaris L.
small carpetgrass, joint-head grass	Arthraxon hispidus (Thunb.) Makino
asparagus	Asparagus officinalis L.
yellow rocket	Barbarea vulgaris Ait. f.
Mexican fireweed	Bassia scoparia (L.) A.J. Scott
Japanese barberry	Berberis thunbergii DC.
European barberry	Berberis vulgaris L
hoary alyssum	Berteroa incana (L.) DC
Indian mustard	Brassica juncea (L.) Czern
black mustard	Brassica nigra (L.) W.D.J. Koch
birdsrape mustard	Brassica rapa L.
bald brome	Bromus racemosus L.
poverty brome	Bromus sterilis L.
cheatgrass	Bromus tectorum L.
paper-mulberry	Broussonetia papyrifera (L.) L'Hér. ex Vent.
butterflybush	Buddleja davidii Franch.
corn gromwell	Buglossoides arvensis (L.) I.M. Johnston
hare's ear	Bupleurum rotundifolium n/a L.
shepherd's-purse	Capsella bursa-pastoris (L.) Medik.
narrowleaf bittercress	Cardamine impatiens L.
musk thistle	Carduus nutans L.
Chinese catalpa	Catalpa ovata G. Don
oriental bittersweet	Celastrus orbiculatus Thunb.
cornflower	Centaurea cyanus L.
brown knapweed	Centaurea jacea L.
black knapweed	Centaurea nigra L.
greater celandine	Chelidonium majus L.
chicory	Cichorium intybus L.
Canada thistle	Cirsium arvense (L.) Scop.
bull thistle	Cirsium vulgare (Savi) Ten.

Common Name	Scientific Name
sweet autumn virginsbower	Clematis terniflora DC
Asiatic dayflower	Commelina communis L.
poison-hemlock	Conium maculatum L.
field bindweed	Convolvulus arvensis L.
Kousa dogwood	Cornus kousa Hance
smooth hawksbeard	Crepis capillaris (L.) Wallr
bermudagrass	Cynodon dactylon (L.) Pers
houndstongue	Cynoglossum officinale L.
orchardgrass	Dactylis glomerata L.
jimsonweed	Datura stramonium L.
Queen Anne's lace, wild carrot	Daucus carota L.
fuzzy pride-of-Rochester	Deutzia scabra Thunb.
Deptford pink	Dianthus armeria L.
common teasel	Dipsacus fullonum L.
cutleaf teasel	Dipsacus laciniatus L.
spring whitlowgrass	Draba verna L.
Indian mock-strawberry	Duchesnea indica (Andr.) Focke
mexicantea	Dysphania ambrosioides (L.) Mosyakin & Clemants
blueweed	Echium vulgare L.
autumn-olive	Elaeagnus umbellata Thunb.
goosegrass	Eleusine indica (L.) Gaertn.
quackgrass	Elymus repens (L.) Gould
winged burning bush	Euonymus alatus (Thunb.) Sieb.
European spindletree	Euonymus europaeus L.
winter creeper	Euonymus fortunei (Turcz.) Hand.-Maz.
cypress spurge	Euphorbia cyparissias L.
petty spurge	Euphorbia peplus L.
Japanese knotweed	Fallopia japonica Sieb. & Zucc.
Sakhalin knotweed	Fallopia sachalinensis F. Schmidt ex Maxim.
fig buttercup	Ficaria verna Huds.
queen-of-the-meadow	Filipendula ulmaria (L.) Maxim.
glossy buckthorn	Frangula alnus P. Mill.
smallflower galinsoga	Galinsoga parviflora Cav.

Common Name	Scientific Name
yellow bedstraw	Galium verum L.
ground ivy	Glechoma hederacea L.
English ivy	Hedera helix L.
tawny daylily	Hemerocallis fulva (L.) L.
damesrocket	Hesperis matronalis L.
rose of Sharon	Hibiscus syriacus L.
Venice mallow	Hibiscus trionum L.
meadow hawkweed	Hieracium caespitosum Dumort.
kingdevil hawkweed	Hieracium piloselloides Vill.
common velvetgrass	Holcus lanatus L.
Japanese hop	Humulus japonicus Siebold & Zucc.
common hop	Humulus lupulus var. lupulus L.
hydrilla	Hydrilla verticillata (L. f.) Royle
Japanese holly	Ilex crenata Thunb.
red morningglory	Ipomoea coccinea L.
tall morningglory	Ipomoea purpurea (L.) Roth
yellowflag iris	Iris pseudacorus L.
prickly lettuce	Lactuca serriola L.
henbit	Lamium amplexicaule L.
spotted deadnettle	Lamium maculatum L.
purple deadnettle	Lamium purpureum L.
nipplewort	Lapsana communis L.
motherwort	Leonurus cardiaca L.
sericea lespedeza	Lespedeza cuneata (Dum.-Cours.) G. Don
Thunberg lespedeza	Lespedeza thunbergii (DC.) Nakai
oxeye daisy	Leucanthemum vulgare Lam.
border privet	Ligustrum obtusifolium Sieb. & Zucc.
European privet	Ligustrum vulgare L.
yellow toadflax	Linaria vulgaris P. Mill.
sweet alyssum	Lobularia maritima (L.) Desv.
perennial ryegrass	Lolium perenne L.
Italian ryegrass	Lolium perenne ssp. multiflorum (Lam.) Husnot
Japanese honeysuckle	Lonicera japonica Thunb.

Common Name	Scientific Name
Amur honeysuckle	Lonicera maackii (Rupr.) Herder
Morrow's honeysuckle	Lonicera morrowii Gray
Tatarian honeysuckle	Lonicera tatarica L.
dwarf honeysuckle	Lonicera xylosteum L.
birdsfoot trefoil	Lotus corniculatus L.
moneywort	Lysimachia nummularia L.
purple loosestrife	Lythrum salicaria L.
paradise apple	Malus pumila P. Mill.
toringo crab	Malus toringo (Siebold) Siebold ex de Vriese
black medic	Medicago lupulina L.
California burclover	Medicago polymorpha L.
alfalfa	Medicago sativa L.
yellow sweetclover	Melilotus officinalis (L.) Lam.
lemon balm	Melissa officinalis L.
spearmint	Mentha spicata L.
peppermint	Mentha x piperita L. (pro sp.)
Japanese stiltgrasss, Nepalese browntop	Microstegium vimineum (Trin.) A. Camus
Chinese silvergrass	Miscanthus sinensis Anderss.
white mulberry	Morus alba L.
common grape hyacinth	Muscari botryoides (L.) P. Mill.
true forget-me-not	Myosotis scorpioides L.
Eurasian watermilfoil	Myriophyllum spicatum Linnaeus
watercress	Nasturtium officinale Ait. f.
catnip	Nepeta cataria L.
Scotch thistle	Onopordum acanthium L.
star-of-Bethlehem	Ornithogalum umbellatum L.
small broomrape	Orobanche minor Smith
wild parsnip	Pastinaca sativa L.
princesstree	Paulownia tomentosa (Thunb.) Sieb. & Zucc. ex Steud.
perilla mint	Perilla frutescens (L.) Britton
Oriental lady's thumb	Persicaria longiseta (Bruijn) Kitagawa
ladysthumb	Persicaria maculosa S.F. Gray
princess-feather	Persicaria orientalis (L.) Spach

Common Name	Scientific Name
mile-a-minute weed	Persicaria perfoliata (L.) H. Gross
reed canarygrass	Phalaris arundinacea L.
canarygrass	Phalaris canariensis L.
Amur corktree	Phellodendron amurense Rupr.
Japanese corktree	Phellodendron japonicum Maxim.
timothy	Phleum pratense L.
Oriental photinia	Photinia villosa (Thunb.) DC.
common reed	Phragmites australis (Cav.) Trin. ex Steud.
Norway spruce	Picea abies (L.) Karst.
buckhorn plantain	Plantago lanceolata L.
white poplar	Populus alba L.
Lombardy poplar	Populus nigra L.
gray poplar	Populus x canescens (Ait.) Sm. (pro sp.) [alba × tremula]
curlyleaf pondweed	Potamogeton crispus L.
sweet cherry	Prunus avium (L.) L.
garden plum	Prunus domestica L.
Callery pear (Bradford pear)	Pyrus calleryana Dcne.
tall buttercup	Ranunculus acris L.
bulbous buttercup	Ranunculus bulbosus L.
creeping buttercup	Ranunculus repens L.
wild radish	Raphanus raphanistrum L.
European buckthorn	Rhamnus cathartica L.
jetbead	Rhodotypos scandens (Thunb.) Makino
bristly locust	Robinia hispida L.
yellow fieldcress	Rorippa sylvestris (L.) Bess.
dog rose	Rosa canina L.
smallflower sweetbrier	Rosa micrantha Borrer ex Sm.
multiflora rose	Rosa multiflora Thunb. ex Murr.
wine raspberry	Rubus phoenicolasius Maxim.
red sorrel	Rumex acetosella L.
curly dock	Rumex crispus L.
goat willow	Salix caprea L.
crack willow	Salix fragilis L.

Common Name	Scientific Name
purpleosier willow	Salix purpurea L.
Wisconsin weeping willow	Salix x pendulina Wenderoth [babylonica × fragilis]
bouncingbet	Saponaria officinalis L.
giant foxtail	Setaria faberi Herrm.
yellow foxtail	Setaria pumila (Poir.) Roemer & J.A. Schultes
bristly foxtail	Setaria verticillata (L.) Beauv.
meadow campion	Silene flos-cuculi (L.) Clairv.
bladder campion	Silene vulgaris (Moench) Garcke
hedge mustard	Sisymbrium officinale (L.) Scop.
bittersweet nightshade	Solanum dulcamara L.
perennial sowthistle	Sonchus arvensis L.
field sowthistle	Sonchus arvensis ssp. arvensis L.
moist sowthistle	Sonchus arvensis ssp. uliginosus (M. Bieb.) Nyman
spiny sowthistle	Sonchus asper (L.) Hill
annual sowthistle	Sonchus oleraceus L.
johnsongrass	Sorghum halepense (L.) Pers.
common chickweed	Stellaria pallida (Dumort.) Crépin
field pennycress	Thlaspi arvense L.
water-chestnut	Trapa natans L.
hop clover	Trifolium aureum Pollich
small hop clover	Trifolium dubium Sibthorp
alsike clover	Trifolium hybridum L.
red clover	Trifolium pratense L.
white clover	Trifolium repens L.
coltsfoot	Tussilago farfara L.
narrowleaf cattail	Typha angustifolia L.
moth mullein	Verbascum blattaria L.
common mullein	Verbascum thapsus L.
corn speedwell	Veronica arvensis L.
ivyleaf speedwell	Veronica hederifolia L.
thymeleaf speedwell	Veronica serpyllifolia L.
linden viburnum	Viburnum dilatatum Thunb.
Japanese snowball	Viburnum plicatum Thunb.

Common Name	Scientific Name
Siebold's arrowwood	Viburnum sieboldii Miq.
bird vetch	Vicia cracca L.
hairy vetch	Vicia villosa Roth
common periwinkle	Vinca minor L.
Japanese wisteria	Wisteria floribunda (Willd.) DC.
Chinese wisteria	Wisteria sinensis (Sims) DC.

Source: University of Georgia Center for Invasive Species and Ecosystem Health, 2010.

Rare Plant Species

Common Name	Scientific Name	Federal Status	State Status	Regional Status	G Rank	S Rank	Last Observed	Identified?
Terrestial Community-Other Classification								
Floodplain Forest	Floodplain Forest				G4	S3?	1986-07-17	
Freshwater tidal marsh complex	Freshwater Tidal Marsh Complex				G4?	S3?	198?-??-??	Y
Vascular Plant								
Agastache scrophulariifolia	Purple Giant-hyssop			HL	G4	S2	1993-09-19	Y
Asimina triloba	Pawpaw		E	LP,HL	G5	S1	2009-05-07	Y
Bidens bidentoides	Estuary Burr-marigold		E	HL	G3G4	S2	2009-05-07	Y
Cacalia atriplicifolia	Pale Indian Plantain		E	LP,HL	G4G5	S1	1986-10-02	Y
Cuscuta polygonorum	Smartweed Dodder		E	HL	G5	S2	2007-07-11	Y
Heteranthera multiflora	Bouquet Mud-plantain			HL	G4	S3	1998-09-01	Y
Myriophyllum heterophyllum	Variable-leaf Water milfoil			HL	G5	S2	1917-09	Y
Ptelea trifoliata	Wafer-ash			HL	G5T5	S1	2007-07-11	Y

Common Name	Scientific Name	Federal Status	State Status	Regional Status	G Rank	S Rank	Last Observed	Identified?
Ranunculus longirostris	Long-beak Water Buttercup		E	LP,HL	G5	S2	1917-09-01	Y
Sagittaria subulata	Awl-leaf Arrowhead			HL	G4	S2	1998-09-01	Y
Wolffiella floridana	Sword Bogmat		E	LP,HL	G5	S1	2008-05-17	Y
Zigadenus leimanthoides	Death-camus		E	LP,HL	G4Q	S1	1913-07-27	Y

Source: NJDEP Natural Heritage Database, 2009

State Status	
E	Endangered species–one whose prospects for survival within the state are in immediate danger due to one or many factors–a loss of habitat, over exploitation, predation, competition, disease. An endangered species requires immediate assistance or extinction will probably follow.

Regional Status	
LP	Indicates taxa listed by the Pinelands Commission as endangered or threatened within their legal jurisdiction. Not all species currently tracked by the Pinelands Commission are tracked by the Natural Heritage Program. A complete list of endangered and threatened Pineland species is included in the New Jersey Pinelands Comprehensive Management Plan.
HL	Indicates taxa or ecological communities protected by the Highlands Water Protection and Planning Act within the jurisdiction of the Highlands Preservation Area.

Global (G Rank) and State (S Rank) Element Rank	
G1	Critically imperiled globally because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.
G2	Imperiled globally because of rarity (six to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
G3	Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single western state, a physiographic region in the East) or because of other factors making it vulnerable to extinction throughout its range; with the number of occurrences in the range of 21 to 100.
G4	Apparently secure globally, although it may be quite rare in parts of its range, especially at the periphery.
G5	Demonstrably secure globally; although it may be quite rare in parts of its range, especially at the periphery.
S1	Critically imperiled in New Jersey because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres). Elements so ranked are

Global (G Rank) and State (S Rank) Element Rank	
	often restricted to very specialized conditions or habitats and/or restricted to an extremely small geographical area of the state. Also included are elements that were formerly more abundant, but because of habitat destruction or some other critical factor of its biology, they have been demonstrably reduced in abundance. In essence, these are elements for which, even with intensive searching, sizable additional occurrences are unlikely to be discovered.
S2	Imperiled in New Jersey because of rarity (six to 20 occurrences). Historically, many of these elements may have been more frequent but are now known from very few extant occurrences, primarily because of habitat destruction. Diligent searching may yield additional occurrences.
S3	Rare in state with 21 to 100 occurrences (plant species and ecological communities in this category have only 21 to 50 occurrences). Includes elements that are widely distributed in the state, but with small populations/acreage or elements with restricted distribution, but locally abundant. Not yet imperiled in state, but may soon be if current trends continue. Searching often yields additional occurrences.
S4	Apparently secure in state, with many occurrences.
S5	Demonstrably secure in state and essentially ineradicable under present conditions.

Animals Known or Probable in Hamilton Township

Fish

Common Name	Scientific Name	Historical Presence
Mud sunfish	Acantharchus pomotis	Native
Shortnose sturgeon	Acipenser brevirostrum	Native
Atlantic sturgeon	Acipenser oxyrhynchus	Native
Blueback herring	Alosa aestivalis	Native
Alewife	Alosa pseudoharengus	Native
American shad	Alosa sapidissima	Native
Rock bass	Amblopites rupestris	Introduced
White catfish	Ameiurus catus	Native
Black bullhead	Ameiurus melas	Introduced
Brown bullhead	Ameiurus nebulosus	Native
American eel	Anguilla rostrata	Native
Fourspine stickleback	Apeltes quadracus	Native
Pirate perch	Aphredoderus sayanus	Native
Goldfish	Carassius auratus	Introduced
Quillback	Carpiodes cyprinus	Native
White sucker	Catostomus commersonnii	Native
Grass carp	Ctenopharyngodon idella	Introduced
Satinfin shiner	Cyprinella analostana	Native
Spotfin shiner	Cyprinella spiloptera	Native
Common carp	Cyrpinus carpio	Introduced
Gizzard shad	Dorosoma cepedianum	Native
Blackbanded sunfish	Enneacanthus chaetodon	Native
Bluespotted sunfish	Enneacanthus gloriosus	Native

Common Name	Scientific Name	Historical Presence
Banded sunfish	Enneacanthus obesus	Native
Creek chubsucker	Erimyzon oblongus	Native
Redfin pickerel	Esox americanus	Native
Northern pike	Esox lucius	Introduced
Muskellunge	Esox masquinongy	Native
Chain pickerel	Esox niger	Native
Swamp darter	Etheostoma fusiforme	Native
Tessellated darter	Etheostoma olmstedi	Native
Cutlip minnow	Exoglossum maxillingua	Native
Banded killifish	Fundulus diaphanus	Native
Mummichog	Fundulus heteroclitus	Native
Threespine stickleback	Gasterosteus aculeatus	Native
Eastern silvery minnow	Hybognathus regius	Native
Channel catfish	Ictalurus punctatus	Native
Longnose gar	Lepisosteus osseus	Native
Redbreast sunfish	Lepomis auritus	Native
Green sunfish	Lepomis cyanellus	Introduced
Pumpkinseed	Lepomis gibbosus	Native
Bluegill	Lepomis macrochirus	Introduced
Common shiner	Luxilus cornutus	Native
Smallmouth bass	Micropterus dolomieu	Introduced
Largemouth bass	Micropterus salmoides	Introduced
White perch	Morone americana	Native
Striped bass	Morone saxatilis	Native
Golden shiner	Notemigonus crysoleucas	Native
Bridle shiner	Notropis bifrenatus	Native
Ironcolor shiner	Notropis chalybaeus	Native
Spottail shiner	Notropis hudsonius	Native
Swallowtail shiner	Notropis procne	Native
Tadpole madtom	Noturus gyrinus	Native
Margined madtom	Noturus insignis	Native
Rainbow smelt	Osmerus mordax	Native
Yellow perch	Perca flavescens	Native
Sea lamprey	Petromyzon marinus	Native

Common Name	Scientific Name	Historical Presence
White crappie	Pomoxis annularis	Introduced
Black crappie	Pomoxis nigromaculatus	Introduced
Blacknose dace	Rhinichthys atratulus	Native
Walleye	Sander vitreum	Introduced
Creek chub	Semotilus atromaculatus	Native
Fallfish	Semotilus corporalis	Native
Hogchoker	Trinectes maculatus	Native
Eastern mudminnow	Umbra pygmaea	Native

Source: Arndt, Rudolf G. "Annotated Checklist and Distribution of New Jersey Freshwater Fishes, with Comments on Abundance." The Bulletin [of the] New Jersey Academy of Science, V. 49, No. 1, Spring, 2004.

Birds

Common Name	Scientific Name	Possibility	Status
Ardeidae			
Least Bittern	Ixobrychus exilis	Possible	SC bm
American Bittern	Botaurus lentiginosus	Confirmed	E bm
Great Blue Heron	Ardea Herodias	Possible	SC bmw
Little Blue Heron	Egretta caerulea	Confirmed	RP bm
Green Heron	Butorides virescens	Confirmed	RP bm
Cathartidae			
Turkey Vulture	Cathartes aura	Probable	INC bmw
Anatidae			
Green Winged Teal	Anas Carolinensis	Confirmed	S bmw
Canada Goose	Branta canadensis	Confirmed	INC bmw
Wood Duck	Aix sponsa	Confirmed	RP bmw
Mallard	Anas platyrhynchos	Confirmed	INC bmw
Galdwall	Anas strepera	Confirmed	S bmw
American Wigeon	Anas americana	Confirmed	S mw
Northern Shoveler	Anas clypeata	Confirmed	S mw
Northern Pintail	Anas acuta	Confirmed	RP bmw
Ring-necked Duck	Aythya collaris	Confirmed	S mw

Common Name	Scientific Name	Possibility	Status
Pandionidae			
Osprey	Pandion haliaetus	Possible	T bm
Accipitridae			
Bald Eagle	Haliaeetus leucocephalus	Confirmed	E bmw
Northern Harrier	Circus cvaneus	Confirmed	E bmw
Sharp-shinned Hawk	Accipiter striatus	Possible	SC bmw
Cooper's Hawk	Accipiter cooperii	Confirmed	T bmw
Red-tailed Hawk	Buteo jamaicensis	Probable	INC bmw
Falconidae			
Peregrine Falcon	Flaco peregrinus	Confirmed	E bmw
American Kestrel	Falco sparverius	Confirmed	SC bmw
Odontophoridae			
Northern Bobwhite	Colinus virginianus	Probable	RP bw
Rallidae			
Virginia Rail	Rallus limicola	Possible	RP bmw
Common Moorhen	Gallinula chloropus	Possible	U bm
Charadriidae			
Killdeer	Charadrius vociferus	Confirmed	S bmw
Scolopacidae			
Spotted Sandpiper	Actitis macularius	Confirmed	S bm
American Woodcock	Scolopax minor	Possible	RP bmw
Columbidae			
Rock Dove	Columba livia	Probable	I bmw
Mourning Dove	Zenaida macroura	Confirmed	S bmw
Cuculidae			
Black-billed Cuckoo	Coccyzus erythropthalmus	Probable	RP bm
Strigidae			
Eastern Screech-Owl	Otus asio	Probable	RP bw
Great Horned Owl	Bubo virginianus	Confirmed	S bw
Long-eared Owl	Asio otus	Confirmed	T bmw
Apodidae			
Chimney Swift	Chaetura pelagica	Probable	RP bm
Cerylidae			
Belted Kingfisher	Ceryle alcyon	Possible	S bmw

Common Name	Scientific Name	Possibility	Status
Picidae			
Red-bellied Woodpecker	Melanerpes carolinus	Probable	INC bw
Downy Woodpecker	Picoides pubescens	Confirmed	S bw
Hairy Woodpecker	Picoides villosus	Probable	D bw
Northern Flicker	Colaptes auratus	Confirmed	RP bmw
Tyrannidae			
Eastern Wood-Pewee	Contopus virens	Probable	RP bm
Acadian Flycatcher	Empidonax virescens	Probable	RP bm
Willow Flycatcher	Empidonax traillii	Probable	RP bm
Eastern Phoebe	Sayornis phoebe	Probable	S bm
Great Crested Flycatcher	Myiarchus crinitus	Probable	RP bm
Eastern Kingbird	Tyrannus tyrannus	Confirmed	RP bm
Vireonidae			
White-eyed Vireo	Vireo griseus	Probable	D bm
Yellow-throated Vireo	Vireo flavifrons	Possible	RP bm
Warbling Vireo	Vireo gilvus	Probable	S bm
Red-eyed Vireo	Vireo olivaceus	Probable	S bm
Corvidae			
Blue Jay	Cyanocitta cristata	Confirmed	D bmw
American Crow	Corvus brachyrhynchos	Confirmed	S bmw
Fish Crow	Corvus ossifragus	Possible	S bmw
Hirundinidae			
Purple Martin	Progne subis	Confirmed	S bm
Tree Swallow	Tachycineta bicolor	Confirmed	INC bm
Northern Rough-winged Swallow	Stelgidopteryx serripennis	Confirmed	S bm
Bank Swallow	Riparia riparia	Possible	S bm
Cliff Swallow	Petrochelidon pyrrhonota	Confirmed	SC bm
Barn Swallow	Hirundo rustica	Confirmed	S bm
Paridae			
Carolina Chickadee	Poecile carolinensis	Confirmed	S bw
Tufted Titmouse	Baeolophus bicolor	Confirmed	INC bw
Sittidae			
White-breasted Nuthatch	Sitta carolinensis	Probable	INC bw
Troglodytidae			

Common Name	Scientific Name	Possibility	Status
Carolina Wren	Thyrothorus ludovicianus	Confirmed	INC bw
House Wren	Troglodytes aedon	Probable	S bm
Marsh Wren	Cistothorus palustris	Probable	RP bmw
Sylviidae			
Blue-gray Gnatcatcher	Polioptila caerulea	Confirmed	SC bm
Turdidae			
Veery	Catharus fuscescens	Possible	SC bm
Wood Thrush	Hylocichla mustelina	Confirmed	RP bm
American Robin	Turdus migratorius	Confirmed	S bmw
Mimidae			
Gray Catbird	Dumetella carolinensis	Confirmed	RP bmw
Northern Mockingbird	Mimus polyglottos	Confirmed	D bmw
Brown Thrasher	Toxostoma rufum	Probable	RP bmw
Sturnidae			
European Starling	Sturnus vulgaris	Confirmed	I bmw
Bombycillidae			
Cedar Waxwing	Bombycilla cedrorum	Possible	S bmw
Parula			
Northern Parula	Parula americana	Probable	SC bm
Yellow Warbler	Dendroica petechia	Confirmed	S bm
Parulidae			
American Redstart	Setophaga ruticilla	Possible	INC bm
Ovenbird	Seiurus aurocapillus	Possible	D bm
Kentucky Warbler	Oporornis formosus	Probable	SC bm
Yellow-breasted Chat	Icteria virens	Confirmed	SC bm
Black-and-white Warbler	Mniotilta varia	Confirmed	RP bm
Common Yellowthroat	Geothlypis trichas	Confirmed	D bm
Hooded Warbler	Wilsonia Citrina	Possible	S bmw
Emberizidae			
Eastern Towhee	Pipilo erythrophathalmus	Probable	RP bmw
Chipping Sparrow	Spizella passerina	Confirmed	S bmw
Field Sparrow	Spizella pallida	Probable	RP bmw
Grasshopper Sparrow	Ammodramus savannarum	Possible	T bm
Song Sparrow	Melospiza melodia	Confirmed	D bmw

Common Name	Scientific Name	Possibility	Status
Swamp Sparrow	Melospiza georgiana	Probable	D bmw
Cardinalidae			
Scarlet Tanager	Piranga olivacea	Possible	RP bm
Northern Cardinal	Cardinalis cardinalis	Confirmed	INC bw
Rose-breasted Grosbeak	Pheucticus ludovicianus	Probable	RP bm
Blue Grosbeak	Guiraca caerulea	Confirmed	INC bm
Indigo Bunting	Passerina cyanea	Confirmed	RP bm
Icteridae			
Red-winged Blackbird	Agelaius phoeniceus	Confirmed	S bmw
Eastern Meadowlark	Sturnella magna	Probable	SC bmw
Common Grackle	Quiscalus quiscalus	Confirmed	D bmw
Brown-headed Cowbird	Molothrus ater	Confirmed	S bmw
Orchard Oriole	Icterus spurius	Confirmed	S bm
Baltimore Oriole	Icterus galbula	Confirmed	RP bm
Fringillidae			
House Finch	Carpodacus mexicanus	Confirmed	S bmw
American Goldfinch	Carduelis tristis	Probable	INC bmw
Passeridae			
House Sparrow	Passer domesticus	Confirmed	I bmw
Podicipedidae			
Pie-Biled Grebe	Podilymbus podiceps	Confirmed	E bmw

Source: Walsh et al, 1999; Audubon Society, 2010; NJDEP Division of Fish & Wildlife, 2004

Status Key	
E - Endangered	RP – Regional Priority
T - Threatened	I - Introduced
S - Stable	P - Peripheral
U - Undetermined	bm – breeding/migrant
D - Decreasing	bw – breeding/winter
INC – Increasing	bmw - breeding/migrant/winter

Reptiles and Amphibians

Common Name	Scientific Name	Status
Salamanders		
Red salamander	Pseudotriton ruber	D
Spotted salamander	Ambystoma maculatum	D
Northern dusky salamander	Desmognathus f. fuscus	S
Northern two-lined salamander	Eurycea bislineata	S
Eastern newt	Notophthalmus viridescens	S
Frogs and Toads		
Green frog	Rana clamitans melanota	S
Bullfrog*	Rana catesbeiana	S
Northern spring peeper*	Pseudacris crucifer (formerly Hyla crucifer)	S
Turtles		
Common snapping turtle	Chelydra s. serpentina	S
Snakes		
Eastern garter snake	Thamnophis s. sirtalis	S
Eastern ribbon snake*	Thamnophis s. sauritus	S
Northern brown snake*	Storeria d. dekayi	S
Northern red-bellied snake	Storeria o. occipitomaculata	S
Brown snake	Storeria dekayi	S
Northern water snake	Nerodia s. sipedon	S

Source: EIS for Hamilton Solar Farm, 2010

Status Key	
E - Endangered	S - Stable
T - Threatened	U - Undetermined
D - Decreasing	I - Introduced
INC – Increasing	P - Peripheral
* actually observed	

Mammals

Common Name	Scientific Name	Status
Opossum	Didelphis marsupialis	S
Eastern Mole	Scalopus aquaticus	S
Big Brown Bat	Eptesicus fuscus	S
Little Brown Bat	Myotis lucifugus	S
Eastern Cottontail	Sylvilagus floridanus	S
Eastern Chipmunk	Tmias striatus	S
Woodchuck	Marmota monax	S
Eastern Gray Squirrel	Sciurus carolinensis	S
Beaver	Castor candensis	INC
House Mouse	Mus musculus	I
White-footed Mouse	Peromyscus leucopus	S
Voles	Microtus sp.	S
Muskrat	Ondatra zibethicus	S
Easten Coyote	Canis latrans, var.	INC
Red Fox	Vulpes vulpes	S
Raccoon	Procyon loter	S
Striped Skunk	Mephitis mephitis	S
River Otter	Lontra canadensis	S
Whitetail Deer	Odocoileus virginianus	D

Source: EIS for Hamilton Solar Farm; Friends for the Marsh, http://marsh-friends.org; Hamilton Township Environmental Commission.

Status Key	
E - Endangered	S - Stable
T - Threatened	U - Undetermined
D - Decreasing	I - Introduced
INC - Increasing	P - Peripheral

Hamilton-Trenton Marsh Wildlife

Water Life

Common Name	Scientific Name	Habitat Within Marsh
Alewife	Alosa pseudoharengus	Wetlands
Asiatic Clam	Corbiculidae*	Constructed Wetlands
Banded Killifish	Fundulus diaphanus	Constructed Wetlands
Blue crabs	Callinectes sapidus	Constructed Wetlands
Bullhead Catfish	Ictaluridae*	Constructed Wetlands
Carp	Cyprinidae*	Constructed Wetlands
Johnny Darter	Etheostoma nigrum	Wetlands
Killifish	Order:Cyprinodontiformes	Wetlands
Phytoplankton	Defined by ecological niche rather than phylogenetic or taxonomic classification	Wetlands
River Mussel	Order:Unionoida	Constructed Wetlands
Shiner	Cyprinids*	Constructed Wetlands
Shad	Clupeidae*	Wetlands
Short-nosed Sturgeon	Acipenser brevirostrum	Wetlands
Yellow Perch	Perca flavescens	Wetlands

Source: Friends for the Marsh, http://marsh-friends.org

Key	
*	Indicates Family, a taxonomic category ranking used in biological classification that is below a order level and above a genus level, and includes group(s) of species that share a common attribute

Birds

Common Name	Scientific Name	Nesting Recorded
Acadian Flycatcher	Empidonax virescens	
American Bittern	Botaurus lentiginosus	Yes
American Black Duck	Anas rubripes	Yes
American Coot	Fulica americana	Yes
American Crow	Corvus brachyrhynchos	Yes
American Goldfinch	Carduelis tristis	Yes

Common Name	Scientific Name	Nesting Recorded
American Kestrel	Falco sparverius	Yes
American Pipit	Anthus rubescens	
American Redstart	Setophaga ruticilla	Yes
American Robin	Turdus migratorius	Yes
American Tree Sparrow	Spizella arborea	
American Wigeon	Anas americana	
American Woodcock	Scolopax minor	Yes
Bald Eagle	Haliaeetus leucocephalus	Yes
Baltimore Oriole	Icterus galbula	Yes
Bank Swallow	Riparia riparia	Yes
Barn Owl	Tyto alba	
Barn Swallow	Hirundo rustica	Yes
Barred Owl	Strix varia	Yes
Bay-breasted Warbler	Dendroica castanea	
Belted Kingfisher	Megaceryle alcyon	Yes
Bicknell's Thrush	Catharus bicknelli	
Black Tern	Chlidonias niger	
Black Vulture	Coragyps atratus	
Black-and-white Warbler	Mniotilta varia	Yes
Black-bellied Plover	Pluvialis squatarola	
Black-billed Cuckoo	Coccyzus erythropthalmus	Yes
Blackburnian Warbler	Dendroica fusca	
Black-capped Chickadee	Poecile atricapillus	
Black-crowned Night-Heron	Nycticorax nycticorax	Yes
Black-necked Stilt	Himantopus mexicanus	
Blackpoll Warbler	Dendroica striata	
Black-throated Blue Warbler	Dendroica caerulescens	
Black-throated Green Warbler	Dendroica virens	
Blue Grosbeak	Passerina caerulea	Yes
Blue Jay	Cyanocitta cristata	Yes
Blue-gray Gnatcatcher	Polioptila caerulea	Yes
Blue-headed Vireo	Vireo solitarius	
Blue-winged Teal	Anas discors	Yes
Blue-winged Warbler	Vermivora cyanoptera	Yes

Common Name	Scientific Name	Nesting Recorded
Bobolink	Dolichonyx oryzivorus	
Bonaparte's Gull	Chroicocephalus philadelphia	
Brant	Branta bernicla	
Broad-winged Hawk	Buteo platypterus	Yes
Brown Creeper	Certhia americana	
Brown Thrasher	Toxostoma rufum	Yes
Brown-headed Cowbird	Molothrus ater	Yes
Bufflehead	Bucephala albeola	
Canada Goose	Branta canadensis	Yes
Canada Warbler	Wilsonia canadensis	
Canvasback	Aythya valisineria	
Cape May Warbler	Dendroica tigrina	
Carolina Chickadee	Poecile carolinensis	Yes
Carolina Wren	Thryothorus ludovicianus	Yes
Caspian Tern	Hydroprogne caspia	
Cattle Egret	Bubulcus ibis	
Cedar Waxwin	Bombycilla cedrorum	Yes
Cerulean Warbler	Dendroica cerulea	
Chestnut-sided Warbler	Dendroica pensylvanica	Yes
Chimney Swift	Chaetura pelagica	Yes
Chipping Sparrow	Spizella passerina	Yes
Cliff Swallow	Petrochelidon pyrrhonota	Yes
Common Goldeneye	Bucephala clangula	
Common Grackle	Quiscalus quiscula	Yes
Common Loon	Gavia immer	
Common Merganser	Mergus merganser	
Common Moorhen	Gallinula chloropus	Yes
Common Nighthawk	Chordeiles minor	Yes
Common raven	Corvus corax	
Common Redpoll	Carduelis flammea	
Common Snipe	Gallinago gallinago	
Common Yellowthroat	Geothlypis trichas	Yes
Connecticut Warbler	Oporornis agilis	
Cooper's Hawk	Accipiter cooperii	Yes

Common Name	Scientific Name	Nesting Recorded
Dark-eyed Junco	Junco hyemalis	
Double-crested Cormorant	Phalacrocorax auritus	
Downy Woodpecker	Picoides pubescens	Yes
Dunlin	Calidris alpina	
Eastern Bluebird	Sialia sialis	Yes
Eastern Kingbird	Tyrannus tyrannus	Yes
Eastern Meadowlark	Sturnella magna	Yes
Eastern Phoebe	Sayornis phoebe	Yes
Eastern Screech-Owl	Megascops asio	Yes
Eastern Towhee	Pipilo erythrophthalmus	Yes
Eastern Wood-Pewee	Contopus virens	Yes
Eurasian Wigeon	Anas penelope	
European Starling	Sturnus vulgaris	Yes
Evening Grosbeak	Hesperiphona vespertina	
Field Sparrow	Spizella pusilla	Yes
Fish Crow	Corvus ossifragus	Yes
Forster’s Tern	Sterna forsteri	
Fox Sparrow	Passerella iliaca	
Fulvous Whistling-Duck	Dendrocygna bicolor	
Gadwall	Anas strepera	
Glaucous Gull	Larus hyperboreus	
Glossy Ibis	Plegadis falcinellus	
Golden Eagle	Aquila chrysaetos	
Golden-crowned Kinglet	Regulus satrapa	
Golden-winged Warbler	Vermivora chrysoptera	
Gray Catbird	Dumetella carolinensis	Yes
Gray-cheeked Thrush	Catharus minimus	
Great Black-backed Gull	Larus marinus	
Great Blue Heron	Ardea herodias	Yes
Great Cormorant	Phalacrocorax carbo	
Great Crested Flycatcher	Myiarchus crinitus	Yes
Great Egret	Ardea alba	
Great Horned Owl	Bubo virginianus	Yes
Greater Scaup	Aythya marila	

Common Name	Scientific Name	Nesting Recorded
Greater Yellowlegs	Tringa melanoleuca	
Green Heron	Butorides virescens	Yes
Green-winged Teal	Anas crecca	
Hairy Woodpecker	Picoides villosus	Yes
Hermit Thrush	Catharus guttatus	
Herring Gull	Larus smithsonianus	
Hooded Merganser	Lophodytes cucullatus	
Hooded Warbler	Wilsonia citrina	
Horned Grebe	Podiceps auritus	
Horned Lark	Eremophila alpestris	
House Finch	Carpodacus mexicanus	Yes
House Sparrow	Passer domesticus	Yes
House Wren	Troglodytes aedon	Yes
Iceland Gull	Larus glaucoides	
Indigo Bunting	Passerina cyanea	Yes
Kentucky Warbler	Oporornis formosus	Yes
Killdeer	Charadrius vociferus	
King Rail	Rallus elegans	Yes
Laughing Gull	Leucophaeus atricilla	
Least Bittern	Ixobrychus exilis	Yes
Least Flycatcher	Empidonax minimus	
Least Sandpiper	Calidris minutilla	
Least Tern	Sternula antillarum	
Lesser Black-backed Gull	Larus fuscus	
Lesser Scaup	Aythya affinis	
Lesser Yellowlegs	Tringa flavipes	
Lincoln’s Sparrow	Melospiza lincolnii	
Little Blue Heron	Egretta caerulea	
Long-eared Owl	Asio otus	
Louisiana Waterthrush	Seiurus motacilla	
Magnolia Warbler	Dendroica magnolia	
Mallard	Anas platyrhynchos	Yes
Marsh Wren	Cistothorus palustris	Yes
Merlin	Falco columbarius	

Common Name	Scientific Name	Nesting Recorded
Mississippi Kite	Ictinia mississippiensis	
Mourning Dove	Zenaida macroura	Yes
Mourning Warbler	Oporornis philadelphia	
Mute Swan	Cygnus olor	Yes
Nashville Warbler	Vermivora ruficapilla	
Northern Bobwhite	Colinus virginianus	Yes
Northern Cardinal	Cardinalis cardinalis	Yes
Northern Flicker	Colaptes auratus	Yes
Northern Goshawk	Accipiter gentilis	
Northern Harrier	Circus cyaneus	
Northern Mockingbird	Mimus polyglottos	Yes
Northern Parula	Parula americana	
Northern Pintail	Anas acuta	
Northern Rough-winged Swallow	Stelgidopteryx serripennis	Yes
Northern Shoveler	Anas clypeata	
Northern Waterthrush	Seiurus noveboracensis	
Olive-sided Flycatcher	Contopus cooperi	
Orange-crowned Warbler	Vermivora celata	
Orchard Oriole	Icterus spurius	Yes
Osprey	Pandion haliaetus	Yes
Ovenbird	Seiurus aurocapilla	Yes
Palm Warbler	Dendroica palmarum	
Pectoral Sandpiper	Calidris melanotos	
Pergerine Falcon	Falco peregrinus	
Philadelphia Vireo	Vireo philadelphicus	
Pied-billed Grebe	Podilymbus podiceps	Yes
Pileated Woodpecker	Dryocopus pileatus	
Pine Siskin	Carduelis pinus	
Pine Warbler	Dendroica pinus	
Prairie Warbler	Dendroica discolor	
Prothonotary Warbler	Protonotaria citrea	Yes
Purple Finch	Carpodacus purpureus	
Purple Gallinule	Porphyrio martinica	
Purple Martin	Progne subis	Yes

Common Name	Scientific Name	Nesting Recorded
Red-bellied Woodpecker	Melanerpes carolinus	Yes
Red-breasted Merganser	Mergus serrator	
Red-breasted Nuthatch	Sitta canadensis	
Red-eyed Vireo	Vireo olivaceus	Yes
Redhead	Aythya americana	
Red-headed Woodpecker	Melanerpes erythrocephalus	Yes
Red-necked Grebe	Podiceps grisegena	
Red-shouldered Hawk	Buteo lineatus	
Red-tailed Hawk	Buteo jamaicensis	Yes
Red-winged Blackbird	Agelaius phoeniceus	Yes
Ring-billed Gull	Larus delawarensis	
Ring-necked Duck	Aythya collaris	
Ring-necked Pheasant	Phasianus colchicus	Yes
Rock Dove/Rock Pigeon	Columba livia	Yes
Rose-breasted Grosbeak	Pheucticus ludovicianus	Yes
Rough-legged Hawk	Buteo lagopus	
Ruby-crowned Kinglet	Regulus calendula	
Ruby-throated Hummingbird	Archilochus colubris	Yes
Ruddy Duck	Oxyura jamaicensis	
Rusty Blackbird	Euphagus carolinus	
Sandhill Crane	Grus canadensis	
Savannah Sparrow	Passerculus sandwichensis	
Scarlet Tanager	Piranga olivacea	Yes
Semipalmated Plover	Charadrius semipalmatus	
Semipalmated Sandpiper	Calidris pusilla	
Sharp-shinned Hawk	Accipiter striatus	
Short-billed Dowitcher	Limnodromus griseus	
Short-eared Owl	Asio flammeus	
Snow Bunting	Plectrophenax nivalis	
Snow Goose	Chen caerulescens	
Snowy Egret	Egretta thula	
Solitary Sandpiper	Tringa solitaria	
Song Sparrow	Melospiza melodia	Yes
Sora	Porzana carolina	Yes

Common Name	Scientific Name	Nesting Recorded
Spotted Sandpiper	Actitis macularius	Yes
Stilt Sandpiper	Calidris himantopus	
Swainson's Thrush	Catharus ustulatus	
Swamp Sparrow	Melospiza georgiana	Yes
Tennessee Warbler	Vermivora peregrina	
Tree Swallow	Tachycineta bicolor	Yes
Tufted Titmouse	Baeolophus bicolor	Yes
Tundra Swan	Cygnus columbianus	
Turkey Vulture	Cathartes aura	
Veery	Catharus fuscescens	Yes
Vesper Sparrow	Pooecetes gramineus	
Virginia Rail	Rallus limicola	Yes
Warbling Vireo	Vireo gilvus	Yes
Western Sandpiper	Calidris mauri	
White-breasted Nuthatch	Sitta carolinensis	Yes
White-crowned Sparrow	Zonotrichia leucophrys	
White-eyed Vireo	Vireo griseus	Yes
White-rumped Sandpiper	Calidris fuscicollis	
White-throated Sparrow	Zonotrichia albicollis	
Wild Turkey	Meleagris gallopavo	Yes
Willow Flycatcher	Empidonax traillii	Yes
Wilson's Warbler	Wilsonia pusilla	
Winter Wren	Troglodytes hiemalis	
Wood Duck	Aix sponsa	Yes
Wood Thrush	Hylocichla mustelina	Yes
Worm-eating Warbler	Helmitheros vermivorum	
Yellow Warbler	Dendroica aestiva	Yes
Yellow-bellied Flycatcher	Empidonax flaviventris	
Yellow-bellied Sapsucker	Sphyrapicus varius	
Yellow-billed Cuckoo	Coccyzus americanus	Yes
Yellow-breasted Chat	Icteria virens	Yes
Yellow-rumped Warbler	Dendroica coronata	
Yellow-throated Vireo	Vireo flavifrons	Yes
Yellow-throated Warbler	Dendroica dominica	

Source: Leck, CF, and R. Blicharz, Marsh Bird List 2010, http://marsh-friends.org

Amphibians

Common Name	Scientific Name	Habitat Within Marsh
American Toad	Bufo americanus	Constructed Wetlands
Bullfrog	Rana catesbeiana	Ponds
Fowler's Toad	Bufo fowleri	Constructed Wetlands
Green Frog	Rana clamitans	Ponds
Pickerel Frog	Rana palustris	Ponds

Source: Friends for the Marsh, http://marsh-friends.org

Reptiles

Common Name	Scientific Name	Habitat Within Marsh
Brown Snake	Colubridae*	Shrub Forest
Eastern Painted Turtle	Chrysemys picta	Ponds
Red-bellied Turtle	Pseudemys rubriventris	Ponds
Red-Eared Turtle	Trachemys scripta elegans	Ponds
Ribbon Snake	Thamnophis sauritus	Constructed Wetlands
Snapping Turtle	Chelydra serpentina	Constructed Wetlands, Ponds

Source: Friends for the Marsh, http://marsh-friends.org

Key	
*	Indicates Family, a taxonomic category ranking used in biological classification that is below a order level and above a genus level, and includes group(s) of species that share a common attribute

Mammals

Common Name	Scientific Name
Beaver	Castor candensis
Big Brown Bat	Eptesicus fuscus
Little Brown Bat	Myotis lucifugus

Common Name	Scientific Name
Eastern Chipmunk	Tamias striatus
Eastern Cottontail	Sylvilagus floridanus
Eastern Grey Squirrel	Sciurus carolinensis
Long-tailed Weasel	Mustela frenata
Meadow Jumping Mouse	Zapus hudsonius
Meadow Vole	Microtus pennsylvanicus
Voles (various species)	Microtus
Muskrat	Ondatra zibethicus
Opossum	Didelphis marsupialis
Raccoon	Procyon lotor
Red Bat	Lasiurus borealis
Red Fox	Vulpes vulpes
River Otter	Lontra canadensis
Short-tailed Shrew	Blarina brevicauda
White-footed Mouse	Peromyscus leucopus
White-tailed Deer	Odocoileus virginianus
Woodchucks	Marmota monax

Source: Friends for the Marsh, http://marsh-friends.org; Dr. Mary Leck

Butterflies

Common Name	Scientific Name
Pipevine Swallowtail	Battus philenor
Eastern Black Swallowtail	Papilio polyxenes
Tiger Swallowtail	Papilio glaucus
Spicebush Swallowtail	Papilio troilus
Cabbage White	Pieris rapae
Falcate Orange-tip	Anthocharis midea
Clouded Sulphur	Colias philodice
Orange Sulphur	Colias eurytheme
American Copper	Lycaena phlaeas
Red-banded Hairstreak	Calycopis cecrops
White M Hairstreak	Parrhasius m-album
Other Hairstreak spp.	Lycaenidae Theclinae

Common Name	Scientific Name
Eastern-tailed Blue	Cupido comyntas
Spring Azure	Celastrina ladon
Great Spangled Fritillary	Speyeria cybele
Question Mark	Polygonia interrogationis
Eastern Comma	Polygonia comma
Mourning Cloak	Nymphalis antiopa
Pearl Crescent	Phyciodes tharos
Baltimore	Euphydryas phaeton
American Painted Lady	Vanessa virginiensis
Painted Lady	Vanessa cynthia
Red Admiral	Vanessa atalanta
Buckeye	Junonia coenia
Red-spotted Purple	Limenitis arthemis
Viceroy	Limenitis archippus
Hackberry Species	Asterocampa
American Snout	Libytheana carinenta
Appalachian Eyed Brown	Satyrodes appalachia
Little Wood Satyr	Megisto cymela
Common Wood Nymph	Cercyonis pegala
Monarch	Danaus plexippus
Harvester	Feniseca tarquinius
Silver-spotted Skipper	Epargyreus clarus
Broad-winged Skipper	Poanes viator
many other species of Skippers	Hesperiidae

Source: Dr. Mary Leck

Rare Wildlife

Common Name	Scientific Name	Federal Status	State Status	G Rank	S Rank
Bald Eagle Foraging	Haliaeetus leucocephalus		E	G4	S1B/S1N
Cliff Swallow	Petrochelidon pyrrhonota		SC/SC	G5	S3B/S3N
Cooper's Hawk	Accipiter cooperii		T/S	G5	S2B/S4N
Eastern Box Turtle	Terrapene carolina carolina		SC	G5T5	S3
Eastern Meadowlark	Sturnella magna		SC/SC	G5	S3B/S3N
Eastern Pond Mussel	Ligumia nasuta		T	G4G5	S2
Fowler's Toad	Bufo woodhousii fowleri		SC	G5	S3
Grasshopper Sparrow	Ammodramus savannarum		T/SC	G5	S2B/S3N
Great Blue Heron	Ardea herodias		SC/S	G5	S3B/S4N
Shortnose Sturgeon	Acipenser brevirostrum	LE	E	G3	S1
Tidewater Mucket	Leptodea ochracea		T	G4	S2
Wood Turtle	Glyptemys insculpta		T	G4	S2

Source: NJDEP Natural Heritage Database, 2009

Key to Rare Wildlife List

Federal Status	
LE	Tax Formally listed as endangered

State Status	
T	Threatened species–may become endangered if conditions surrounding the species begin to or continue to deteriorate.
E	Endangered species–one whose prospects for survival within the state are in immediate danger due to one or many factors– a loss of habitat, over exploitation, predation, competition, disease. An endangered species requires immediate assistance or extinction will probably follow.
INC	Increasing species–a species whose population has exhibited a significant increase, beyond the normal range of its life cycle, over a long-term period.
SC	Special Concern species–applies to animal species that warrant special

State Status	
	attention because of some evidence of decline, inherent vulnerability to environmental deterioration, or habitat modification that would result in their becoming a Threatened species. This category would also be applied to species that meet the foregoing criteria and for which there is little understanding of their current population status in the state.
RP	Regional Priority species–applies to species in regional conservation plans
U	Undetermined species–a species about which there is not enough information available to determine the status.
D	Declining species–species that exhibited a continued decline in population numbers over the years.
P	Peripheral species–a species whose occurrence in New Jersey is at the extreme edge of its present natural range.
S	Stable species–a species whose population is not undergoing any long-term increase/decrease within its natural cycle.
Status for animals separated by a slash (/) indicates a dual status. First status refers to the state breeding population, and the second status refers to the migratory or winter population.	

Global (G Rank) and State (S Rank) Element Rank	
G1	Critically imperiled globally because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.
G2	Imperiled globally because of rarity (six to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
G3	Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single western state, a physiographic region in the East) or because of other factors making it vulnerable to extinction throughout its range; with the number of occurrences in the range of 21 to 100.
G4	Apparently secure globally, although it may be quite rare in parts of its range, especially at the periphery.
G5	Demonstrably secure globally, although it may be quite rare in parts of its range, especially at the periphery.
T	T Element ranks containing a "T" indicate that the infraspecific taxon is being ranked differently than the full species.
S1	Critically imperiled in New Jersey because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres). Elements so ranked are often restricted to very specialized conditions or habitats and/or restricted to an extremely small geographical area of the state. Also included are elements that were formerly more abundant, but because of habitat destruction or some other critical factor of its biology, they have been demonstrably reduced in abundance. In essence, these are elements for which, even with intensive searching, sizable additional occurrences are unlikely to be discovered.
S2	Imperiled in New Jersey because of rarity (six to 20 occurrences). Historically, many of these elements may have been more frequent but are now known from very few extant occurrences, primarily because of habitat destruction. Diligent searching may yield additional occurrences.

Global (G Rank) and State (S Rank) Element Rank	
S3	Rare in state, with 21 to 100 occurrences (plant species and ecological communities in this category have only 21 to 50 occurrences). Includes elements which are widely distributed in the state, but with small populations/acreage or elements with restricted distribution, but locally abundant. Not yet imperiled in state but may soon be if current trends continue. Searching often yields additional occurrences.
S4	Apparently secure in state, with many occurrences.
S5	Demonstrably secure in state and essentially ineradicable under present conditions.
B	Refers to the breeding population of the element in the state.
N	Refers to the nonbreeding population of the element in the state.
Note: To express uncertainty, the most likely rank is assigned and a question mark added (e.g., G2?). A range is indicated by combining two ranks (e.g., G1G2, S1S3).	

CAUTIONS AND RESTRICTIONS ON NATURAL HERITAGE DATA

The quantity and quality of data collected by the Natural Heritage Program is dependent on the research and observations of many individuals and organizations. Not all of this information is the result of comprehensive or site-specific field surveys. Some natural areas in New Jersey have never been thoroughly surveyed. As a result, new locations for plant and animal species are continuously added to the database. Since data acquisition is a dynamic, ongoing process, the Natural Heritage Program cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of New Jersey. Information supplied by the Natural Heritage Program summarizes existing data known to the program at the time of the request regarding the biological elements or locations in question. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. The attached data is provided as one source of information to assist others in the preservation of natural diversity.

This office cannot provide a letter of interpretation or a statement addressing the classification of wetlands as defined by the Freshwater Wetlands Act. Requests for such determination should be sent to the DEP Land Use Regulation Program, P.O. Box 401, Trenton, NJ 08625-0401.

The Landscape Project was developed by the Division of Fish & Wildlife, Endangered and Nongame Species Program to map critical habitat for rare animal species. Some of the rare species data in the Landscape Project is in the Natural Heritage Database, while other records were obtained from other sources. Natural Heritage Database response letters will list all species (if any) found during a search of the Landscape Project. However, any reports that are included with the response letter will only reference specific records if they are in the Natural Heritage Database. This office cannot answer any inquiries about the Landscape Project. All questions should be directed to the DEP Division of Fish and Wildlife, Endangered and Nongame Species Program, P.O. Box 400, Trenton, NJ 08625-0400.

This cautions and restrictions notice must be included whenever information provided by the Natural Heritage Database is published.

NJ Department of Environmental Protection
Division of Parks and Forestry
Natural Lands Management

APPENDIX E

Drinking Water Supply Monitoring and Quality

Monitoring Schedules of Public Community Water Supply Systems

Sample Point ID#	Analyte Group	Schedule Start Date	Schedule End Date	Required Months to Sample	Required Year to Sample	Routine Sampling Requirements
Bordentown Water Department (PWSID NJ0303001)						
DS	Total Coliform Bacteria	1/1/1991	Continuous	1/1-12/31	2010	15 Sample(s)/Month
	Disinfection Byproducts (Stage 1)	1/1/2004	Continuous	1/1-12/31	2010	1 Sample(s)/Quarter
	Iron-Manganese	1/1/2002	Continuous	1/1-12/31	2010	1 Sample(s)/Year
	Lead and Copper	1/1/2005	Continuous	6/1--9/30	2010	30 Sample(s)/per 3Y period
TP001003	Inorganics	1/1/2002	Continuous	1/1-12/31	2011	1 Sample(s)/per 3Y period
	Radiologicals	1/1/2008	Continuous	1/1-12/31	2010	1 Sample(s)/Quarter
	Secondary	1/1/2002	Continuous	1/1-12/31	2011	1 Sample(s)/per 3Y period
	VOCs Federal	1/1/2003	Continuous	1/1-12/31	2010	1 Sample(s)/Quarter
	VOCs State	1/1/2003	Continuous	1/1-12/31	2010	1 Sample(s)/Quarter
	Nitrate	1/1/2003	Continuous	1/1-12/31	2010	1 Sample(s)/Year
Trenton Water Works (PWSID NJ1111001)						
DS	Total Coliform Bacteria	1/1/2006	Continuous	1/1-12/31	2010	120 Sample(s)/Month
	Disinfection Byproducts (Stage 1)	1/1/2002	Continuous	1/1-12/31	2010	1 Sample(s)/Quarter
	Iron-	1/1/2002	Continuous	1/1-12/31	2010	5 Sample(s)/Year

Sample Point ID#	Analyte Group	Schedule Start Date	Schedule End Date	Required Months to Sample	Required Year to Sample	Routine Sampling Requirements
	Manganese					
	Lead and Copper	1/1/2003	Continuous	6/1--9/30	2011	50 Sample(s)/per 3Y period
	Water Quality	1/1/2002	Continuous	1/1-12/31	2010	20 Sample(s)/Year
IN001004	DBP Precursor	1/1/2002	Continuous	1/1-12/31	2010	Unavailable
TP001003	Inorganics	1/1/2002	Continuous	1/1-12/31	2010	1 Sample(s)/Year
	Radiologicals	1/1/2008	Continuous	1/1-12/31	2014	1 Sample(s)/per 9Y period
	Secondary	1/1/2002	Continuous	1/1-12/31	2010	1 Sample(s)/Year
	VOCs Federal	1/1/2003	Continuous	1/1-12/31	2010	1 Sample(s)/Year
	VOCs State	1/1/2003	Continuous	1/1-12/31	2010	1 Sample(s)/Year
	Turbidity	1/1/2002	Continuous	1/1-12/31	2010	Unavailable
	Nitrate	1/1/2002	Continuous	1/1-12/31	2010	1 Sample(s)/Year
	Carbon, Total Organic (TOC)	1/1/2002	Continuous	1/1-12/31	2010	Unavailable
Aqua NJ - Hamilton Square (PWSID NJ1103001)						
DS	Total Coliform Bacteria	1/1/1991	Continuous	1/1-12/31	2010	50 Sample(s)/Month
	Disinfection Byproducts (Stage 1)	04/01/2006	Continuous	1/1-12/31	2010	6 Max Sample(s)/Quarter
	Iron-Manganese	01/01/2002	Continuous	1/1-12/31	2010	1 Sample(s)/Year
	Lead and Copper	01/01/2003	Continuous	6/1--9/30	2011	30 Sample(s)/per 3Y period
TP001002	Inorganics	01/01/2008	Continuous	1/1-12/31	2011	1 Sample(s)/per 3Y period
	Radiologicals	01/01/2008	Continuous	1/1-12/31	2010	1 Sample(s)/Quarter
	Secondary	01/01/2008	Continuous	1/1-12/31	2011	1 Sample(s)/per 3Y period
	VOCs Federal	01/01/2008	Continuous	1/1-12/31	2011	1 Sample(s)/per 3Y period
	VOCs State	01/01/2008	Continuous	1/1-12/31	2011	1 Sample(s)/per 3Y period
	Nitrate	01/01/2008	Continuous	1/1-12/31	2010	1 Sample(s)/Year

Sample Point ID#	Analyte Group	Schedule Start Date	Schedule End Date	Required Months to Sample	Required Year to Sample	Routine Sampling Requirements
TP003011	Inorganics	01/01/2002	Continuous	1/1-12/31	2011	1 Sample(s)/per 3Y period
	Radiologicals	01/01/2008	Continuous	1/1-12/31	2014	1 Sample(s)/per 9Y period
	Secondary	01/01/2002	Continuous	1/1-12/31	2011	1 Sample(s)/per 3Y period
	VOCs Federal	01/01/2002	Continuous	1/1-12/31	2011	1 Sample(s)/per 3Y period
	VOCs State	01/01/2002	Continuous	1/1-12/31	2011	1 Sample(s)/per 3Y period
	Nitrate	01/01/2003	Continuous	1/1-12/31	2010	1 Sample(s)/Year
TP011032	Inorganics	01/01/2008	Continuous	1/1-12/31	2011	1 Sample(s)/per 3Y period
	Radiologicals	01/01/2008	Continuous	1/1-12/31	2010	1 Sample(s)/Quarter
	Secondary	01/01/2008	Continuous	1/1-12/31	2011	1 Sample(s)/per 3Y period
	VOCs Federal	01/01/2008	Continuous	1/1-12/31	2010	1 Sample(s)/Year
	VOCs State	01/01/2008	Continuous	1/1-12/31	2010	1 Sample(s)/Year
	Nitrate	01/01/2008	Continuous	1/1-12/31	2010	1 Sample(s)/Year

Source: NJDEP, 2010

Trenton Water Works Water Quality Report, 2010

Metals - Tested at Customers' Taps [a]							
	Units	**EPA's Action Level at 90%**	**Ideal Goal (EPA MCLG)**	**90% of 2008 Samples were less than**	**Number of Samples Exceeding Action Level**	**Violation**	**Source**
Lead	ppb	15	0	<1	0 out of 50	NO	Corrosion of household plumbing; erosion of natural deposits
Copper	ppm	1.3	1.3	0.06	0 out of 50	NO	Corrosion of household plumbing; erosion of natural deposits

Disinfection Byproducts in Tap Water [b]							
	Units	**Highest Annual Average Allowed (EPA MCL)**	**Ideal Goal (EPA MCLG)**	**Annual Average**	**Range of Values**	**Violation**	**Source**
Total Trihalomethanes (TTHMs)	ppb	80	0	73	35-121	NO	Byproduct of drinking water disinfection.
Haloacetic Acids (HAAs)	ppb	60	0	38	24-58	NO	Byproduct of drinking water disinfection.

Bacteria in Tap Water					
	Highest Level Allowed (EPA MCL)	**Ideal Goal (EPA MCLG)**	**Highest Presence as % of Monthly Samples**	**Violation**	**Source**
Total Coliform Bacteria	Presence of coliform bacteria 5% of monthly samples	0	0.60%	NO	Naturally present in the environment; their presence indicates potential contamination.
Fecal Coliform and E. Coli	A routine sample and repeat sample are total coliform positive, and if one fecal or E. coli positive	0	0	NO	Human and animal fecal waste.

Clarity Characteristics - Tested at Water Treatment Plant								
	Units	**Highest Level Allowed (EPA MCL)**	**Ideal Goal (EPA MCLG)**	**Highest Reported Level**	**Level Range**	**Average Level for the Year**	**Violation**	**Source**
Turbidity	NTU	TT= 1 95% of monthly samples must be at or below 0.3 NTU	0	0.21 100% ≤ 0.3 NTU	0.05-0.21	0.08	NO	Soil runoff; river sediment.

Inorganic Chemicals in Tap Water						
	Units	**Highest Level Allowed (EPA MCL)**	**Ideal Goal (EPA MCLG)**	**Reported Constituent Level**	**Violation**	**Source**
Barium	ppm	2	2	<0.1	NO	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits.
Fluoride c	ppm	4	2	0.78	NO	Erosion of natural deposits; water additive that promotes strong teeth; discharge from fertilizer and aluminum factories.
Nitrate (as Nitrogen)	ppm	10	10	0.51	NO	Runoff from fertilizer use; leaching of septic tanks, sewage; erosion of natural deposits.
Sodium d	ppm	50 (SMCL)	NLE	10.9	NO	Naturally present in the environment.
Sulfate d	ppm	250 (SMCL)	NLE	15.8	NO	Naturally present in the environment.
Hardness d	ppm	250 (SMCL)	NLE	88	NO	Erosion of natural deposits.

Total Chlorine Residual							
	Units	**EPA MRDL**	**MRDLG**	**12 Month Average**	**Highest Monthly Average**	**Violation**	**Source**
Total Chlorine	ppm	4.0 os CL2	4	0.79	1	NO	Additive used to control microbes.

Radioactive Constituents in Tap Water							
	Units	**Highest Level Allowed (EPA MCL)**	**Ideal Goal (EPA MCLG)**	**Highest 2006 Level**	**2006 Range**	**Violation**	**Source**
Alpha Emitters	pCi/L	15	0	2.24	0.35-2.24	NO	Erosion of natural deposits.
Combined Radium	pCi/L	5	0	1.08	0.05-1.08	NO	Erosion of natural deposits.

Source: Trenton Water Works, 2010.

Footnotes and Table Notes

Footnotes

a. Trenton Water Works was granted a reduction in frequency of sampling in accordance with 40 CFR 141.86(d)(4). 50 samples were collected and analyzed in the year 2008 as required. TWW will be required to conduct lead and copper sampling again in 2011.

b. These chemicals area regulated based upon the annual average of quarterly samples.

c. Value is taken from drinking water analysis inorganics reporting form.

d. NJDEP standard.

e. Data presented was sampled quarterly in 2006. TWW will be required to conduct sampling again in 2010.

Table Notes:

1. The NJDEP has waived requirements to test for Synthetic Organic Compounds and pesticides because surface water testing results indicate that they are not expected to occur in surface water supplies in this area.

2. The NJDEP allows Trenton Water Works to monitor for some contaminants less than once per year because the concentrations of these contaminants do not change frequently. Some of our data, though representative, are more than one year old. The data that does not represent the current sampling year: a) radionuclides are sampled every four years, b) lead and copper are sampled every three years.

Aqua Hamilton System Water Quality Report, 2009

Public Water Supply Identification Number: NJ1103001

Microbiological Contaminants: In 2009, none of the 720 monthly distribution samples tested positive for Total Coliform bacteria.

Contaminant	Year	MCL	MCLG	Range Detected	Highest Level Detected	Compliance	Typical Sources
Inorganic Contaminants							
Barium (ppm)	2009	2	2	0.012-0.11	0.11	Yes	Erosion of natural deposits
Chromium (ppm)	2009	100	100	1.2-2.3	2.3	Yes	
Nitrate (ppm)	2009	10	10	ND-4.5	4.5	Yes	Fertilizers; leaching from septic tanks, sewage; erosion of natural deposits
Fluoride (ppm)	2009	4	4	ND-4.5	0.85	Yes	Erosion of natural deposits; water additive that promotes strong teeth
Treatment Byproducts							
TTHMs [Total Trihalomethanes] (ppb)	2009	80	NA	0.5-24.9	19.3	Yes	By product of drinking water disinfection
HAAs [Haloacetic Acids] (ppb)	2009	60	NA	ND-37.9	11.4	Yes	
Radionuclides							
Gross Alpha (pCi/L)	2009	15	0	ND-9	2.8	Yes	Erosion of natural deposits
Combined Radium (pCi/L)	2009	5	0	ND-9	2	Yes	
Uranium (ppb)	2009	30	0	1.2-2.1	1.7	Yes	
Disinfectants							
Chlorine (ppm)	2009	MRDL=4	MRDLG =4	0.5-0.8	0.8	Yes	Water additive used to control microbes

Source: Aqua New Jersey, 2010.

Tap water samples were collected from homes in service area for lead and copper testing.

Contaminant	Year Sampled	Action Level	MCLG	Amount Detected (90th%tile)	Homes Above Action Level	Compliance Achieved	Typical Source
Copper (ppm)	2008	1.3	1.3	0.37	0	Yes	Corrosion of household plumbing
Lead (ppb)	2008	15	0	ND	1	Yes	

Source: Aqua New Jersey, 2009

Acronyms and Definitions	
Action Level (AL)	The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.
Maximum Containment Level (MCL)	The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology. Some levels are based on a running annual average.
Maximum Containment Level Goal (MCLG)	The level of a contaminant in drinking water below which there are no known or expected risk to health. MCLGs allow for a margin of safety.
Maximum Residual Disinfectant Level (MRDL)	The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
Maximum Residual Disinfectant Level Goal (MRDLG)	The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contamination.
NA	Not applicable.
ND	Not detected.
Nitrate	Nitrate in drinking water levels above 10 ppm is a health risk for infants of less than six months of age.
NLE	No level established
NTU	Nephelometric turbidity units (units describing how cloudy a water sample appears).
picoCuries/Liter (pCi/L)	A unit of concentration for radioactive contaminants.
ppb	A unit of concentration equal to one part per billion (equivalent to $0.01 of $10,000,000)
ppm	A unit of concentration equal to one part per million (equivalent to $0.01 of $10,000).
Secondary Maximum Contaminant Level (SMCL)	Any contaminant in drinking water which may adversely affect the taste, color, odor, or appearance of such water, or which may adversely affect the public welfare.
Treatment Technique (TT)	A required process intended to reduce the level of a contaminant in drinking water.
Turbidity	A measure of the cloudiness of the water, which is a good indicator of water quality. High turbidity can hinder the effectiveness of disinfectants.

City of Bordentown Drinking Water Quality Results, 2009

Public Water Supply Identification Number: NJ0303001

Contaminant (Unit of measurement)	Violation (Y/N)	Level Detected	Range or Sample Date	MCLG	MCL	Likely Source of Contamination
Disinfection Byproducts						
TTHMs [Total Trihalomethanes] (ppb)	No	4.52 b	3.52 - 7.01	NA	80	By-product of drinking water disinfection
HAAs [Haloacetic Acids] (ppb)	No	1.89 b	0.007 - 0.75	NA	60	
Radioactive Contaminants						
Alpha emitters (pCi/L)	No	15 a	13.52 - 16.98	0	15	Erosion of natural deposits
Combined radium (pCi/L)	No	4.04 a	3.47 - 4.61	0	5	
Inorganic Contaminants						
Barium (ppm)	No	0.0285	9/15/08 d	2	2	Discharge of drilling wastes; erosion of natural deposits
Copper (ppm)	No	0.0672	0.002 - 0.241 c, d	1.3	AL = 1.3	Corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Lead (ppb)	No	0.002	0 - 0.026 c, d	0	AL = 15	Corrosion of household plumbing systems; erosion of natural deposits
Nitrate [as Nitrogen] (ppm)	No	0.526	10/8/2009	10	10	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
Chlorine Residual						
Chlorine (ppm)	No	0.55 (average)	0.54 - 0.58	4	4	Water additive used to control microbes
Total Coliform						
Total Coliform (# of positive samples)	No	1 out of 240	0 - 1	0	1	Naturally present in the environment

Source: City of Bordentown, 2009

Footnotes

a. The reported value is a “rolling annual average” of the quarterly samples taken, rounded down per NJDEP standards.

b. The reported value is an average of samples taken quarterly.

c. Copper and lead MCLs have not yet been established for community water systems. Currently, only Action Levels (AL) of 1.3ppm for copper and 15 ppb for lead apply.

d. The State allows us to monitor for some contaminants once every three years, since the concentrations do not change frequently. The latest sample dates are shown for these contaminants.

Known Contaminated Sites in Hamilton Township

Active Known Contaminated Sites

Map ID	Name	Address	Site ID	Program Interest (PI) Number
1	1201 Rt 33 Trenton LLC	1201 Rt 33	6428	008368
2	1824 White Horse Pike Mercerville LLC	1824 Whitehorse Mercerville Rd	6479	008691
3	1930 Nottingham Way Trenton LLC	1930 Nottingham Way	15408	007347
4	20 Nami Lane	20 Nami Ln	69366	G000029621
5	245 Whitehead Road	245 Whitehead Rd	92021	129991
6	295 Services Inc	1711 S Olden Ave	6484	010390
7	AAA Trucking Corp (Former)	3630 Quakerbridge Rd	38558	003091
8	Akal Oil Corp	2340 S Broad St	16447	000071
9	American Concrete Company Former	129 295 Lamberton Rd	181455	237544
10	American Standard Inc	240 Princeton Ave	14634	015061
11	Amtico Flooring Division	1945 E State St	15828	003097
12	Antons Dry Cleaners & Laundromat	1722 Whitehorse Mercerville Rd	36546	243520
13	Aqua NJ Inc Well# 14	200 Whatley Rd	171707	231176
14	Arco Petroleum Products	1470 Lamberton Rd	66535	G000006712
15	B&E Service	86 Klockner Rd	6528	001217
16	BP Service Station 60757	1060 Rt 33	6426	007061
17	Carlton Properties	7 Black Forest Rd	185613	460026
18	Congoleum Corp	861 Sloan Ave	15649	005399
19	Coopers Cycle Ranch Inc	866 Rt 33	43787	007153
20	Delta Gas Station	2042 S Broad St	13017	006700
21	Dover Park Plaza Shopping Center	S Broad St & Sunnybrae Blvd	69524	G000030173

Map ID	Name	Address	Site ID	Program Interest (PI) Number
22	Duck Island Sanitary Landfill	1463 Lamberton Rd	66242	G000004402
23	Duck Island Terminal Inc	1463 Lamberton Rd	6518	002809
24	East State Atlantic	1679 E State St	46190	007069
25	Environmental Education Center	Wedge Dr & Westcott Ave	341955	422938
26	Evergreen Farm	1023 Yardville Allentown Rd	364735	480331
27	Exxon Store 3-0139	1201 Hamilton Ave	15409	510045
28	Exxon Store 3-0247	2142 S Broad St	13817	007357
29	Exxon Store 3-2026	3151 S Broad St	16178	008634
30	Exxon Store 3-6620	16 Edinburg Rd	46524	008668
31	ExxonMobil Oil Corp	1473 Lamberton Rd	15884	000214
32	ExxonMobil Trenton Terminal	2785 Lamberton Rd	6520	001060
33	General Electric Company	2231 E State St	15880	G000001904
34	General Felt Industries	1936 E State St	15830	018689
35	Getty 00656	2735 2737 S Broad St	45449	001722
36	Getty 56027	1296 Rt 33	6504	010382
37	Getty 56101	1870 Kuser Rd	6517	010394
38	Getty 56290	2466 S Broad St	13016	004908
39	Hamilton Gasco	2101 Rt 33	6447	006720
40	Hamilton High North School	1055 Klockner Rd	6522	014441
41	Hamilton Township DPW Ecological Facility	1360 Kuser Rd	68667	G000026186
42	Hamilton Twp Dpt of Water Pollut Ctrl	300 Hobson Ave	6532	009935
43	Hamilton Twp Public Works Yard	240 Tampa Ave	51145	015855
44	Hess Station 30218	511 Rt 33	6497	006692
45	Imo Industries/Delaval Turb Div	853 Nottingham Way	15882	013541
46	Independence Mall	2465 S Broad St	6495	031417
47	J.P Bud Company Warehouse	2600 E State St Ext	20869	024561
48	James M Blakley	1664 E State St	57970	033789
49	Ked Automotive	100 Yardville Allentown Rd	45104	012003
50	Kimmell's Car Care Center	1958 Greenwood Ave	13819	221231
51	Lakeside Auto Service LLC	3750 S Broad St	6489	007602
52	Lukoil #57326	249 Rt 33	6508	006280

Map ID	Name	Address	Site ID	Program Interest (PI) Number
53	Lukoil #57340	1070 Whitehorse Mercerville Rd	6454	003792
54	Marrazzo's Auto Service Inc	1538 S Olden Ave	15385	033854
55	Matrix Hamilton Land Development LLC	Quakerbridge Rd	341268	424378
56	Mercer Cnty Geriatrics Center	2300 Hamilton Ave	6434	027016
57	National Packaging Companies	1400 E State St	6545	001332
58	Nearpara Rubber Company	1849 E State St	66098	G000001910
59	New Penn Motor Express	107 Youngs Rd	31418	000817
60	NJ State Police Technology Center	1200 Negron Dr	61460	298915
61	NJDOT Whitehead Road Bridge	Whitehead Rd	73447	G000034162
62	Pioneer Gas Station	2101 2105 S Broad St	39209	010715
63	Princeton Circuit Boards Incorporated	3828 Quakerbridge Rd	76288	G000002933
64	PSE&G Mercer Generating Station	2512 Lamberton Rd	15887	004197
65	PSE&G Trenton Switching Station Landfill	Klockner Rd	16789	G000026549
66	Pullens Garage	3060 Quakerbridge Rd	6549	002200
67	Quickmart Gas Station	2232 S Olden Ave	18033	G000006597
68	Raritan Plated Metals	2607 E State St Ext	76144	G000001915
69	Rednor Rainear Tract	Annabelle Ave	67757	G000021918
70	Richard Stockton Service Area 6-S	New Jersey Tpke MM 58.7 S	19100	013301
71	Runaway Gas	1704 Greenwood Ave	15387	011353
72	Rylco Rubber Products	1218 Walnut Ave	6472	G000006955
73	Selmon Sunoco	2596 S Broad St	6496	011200
74	Shell Retail Station #100244	Rt 33 & George Dye Rd	6459	015181
75	Shell Service Station #138525	2231 S Olden Ave	6443	007628
76	Shell Service Station 138425	2683 Nottingham Way	6579	007603
77	Starr Transit Co Inc	2531 E State St Ext	6533	005525
78	Sterling Drug Inc	2144 E State St	13794	014078
79	Stryker Machine Products Co	2560 E State St Ext	6451	025763
80	Sun Chemical Corporation	584 Rt 130	6537	280393
81	Sunoco #0005-0112	4364 S Broad St	6492	016452

Map ID	Name	Address	Site ID	Program Interest (PI) Number
82	Tim Doherty Enterprises Inc	1406 Chambers St	6551	010714
83	Tri Star Gasco	1685 Nottingham Way	6515	011825
84	Tri State Hamilton	2409 Nottingham Way	6505	009062
85	USPS Vehicle Maintenance Facility	680 Rt 130	6507	008521
86	W R Grace & Co Construction Products Div	35 Industrial Dr	164447	004309
87	Waste Management of New Jersey Inc	208 Patterson Ave	6547	013341
88	Woodrow Wilson Service Area 6N	New Jersey Tpke MM 58.7 N	6456	013300
89	Yardville C Y O Camp	451 453 Yardville Allentown Rd	158415	490966
90	Yardville Supply Co	47 Church St	6552	000896
91	Yardville Truck Stop Gulf	646 Rt 130	13820	005559
	Trans America Delaval Inc-Delroy	121 1st Ave	20276	005159
	Anchor Thread	Main St	71022	G000009083
	Buckrun Transportation (BRT)	Lamberton Rd	229546	300440
	Dana Transport Incorporated	Lamberton Rd	69593	G000030381
	Dana Transport MVA	I-195 E & I-295	112877	150087
	Goodall Rubber Co	572 Whitehead Rd	6482	025401
	Iron Bridge Road	Iron Bridge Rd	395616	495027
	Kalex Facility (Former)	4407 S Broad St	54847	031037
	Liberty Street	Liberty St	228272	298670
	Quaker Bridge Road	Quakerbridge Rd	70040	G000031859
	Trans America Delaval Inc-Delroy	121 1st Ave	20276	005159
	Wolfpack Road	Wolfpack Rd	259671	332668

Source: NJDEP, 2010

Pending Known Contaminated Sites

Map ID	Site ID	PI Number	PI Name	Address
92	66906	G000009743	BCS Associates	1437 E State St
93	68566	G000025490	Eddie's Donut	628 Arena Dr
94	43523	006005	Mercer Contracting Co	53 Flock Rd

Map ID	Site ID	PI Number	PI Name	Address
95	43234	005034	Mercer St	Mercer St
96	6419	004466	Mr Gus's Cleaners	233 Rt 33
90	6552	002042	Yardville Supply Co	47 Church St

Source: NJDEP, 2010

Active UST Facilities with Compliant Tanks

PI Number	Facility Name	Street Address	Expiration Date
8691	1824 White Horse Pike Mercerville LLC	1824 White Horse Pk	3/31/2013
7347	1930 Nottingham Way Trenton LLC	1930 Nottingham Way	3/31/2013
8435	3217 Quakerbridge Rd Trenton LLC	3217 Quakerbridge Rd	3/31/2013
0071	Akal Oil Corp	2340 S Broad St	3/31/2013
7740	At&T Communications	1300 White Horse Hamilton Square Rd	3/31/2013
1217	B&E Service	86 Klockner Rd	3/31/2013
8890	Bob's Phillips 66	1741 Greenwood Ave	3/31/2013
7061	BP Service Station 60757	1060 Rte 33 (Nottingham Way)	3/31/2013
6699	Chambers Serv Station	1106 Chambers St	3/31/2013
7059	Chambers Street Service Station	1140 Chambers St	3/31/2013
10714	Delta	1406 Chambers St	3/31/2013
6065	First Transit Inc	175 Klockner Rd	3/31/2013
10382	Getty 56027	Yardville Hamilton Sq Rd & Rte 33	3/31/2013
4908	Getty 56290	2466 S Broad St	3/31/2013
6740	Gulf 126331	1380 S Olden Ave	3/31/2013
32649	Hamilton Bus Garage	600 Sloan Ave	3/31/2013
6720	Hamilton Gasco	2101 Rte 33	3/31/2013
9935	Hamilton Twp Dpt Of Water Pollut Ctrl	300 Hobson Ave	3/31/2013
15855	Hamilton Twp Public Works Yard	240 Tampa Ave	3/31/2013
6692	Hess Station 30218	511 Rte 33 & Shady Ln	3/31/2013
7602	Lakeside Auto Service LLC	3750 S Broad St	3/31/2013

PI Number	Facility Name	Street Address	Expiration Date
6280	Lukoil #57326	249 Rt 33	3/31/2013
3792	Lukoil #57340	1070 White Horse Mercerville Rd	3/31/2013
514097	Mercerville Gulf	2582 Whitehorse Mercerville Rd	3/31/2013
222023	New Penn Motor Express	15 Thomas J Rhodes Industrial Park	3/31/2013
7933	Picernos Yardville Fuels LLC	4495 S Broad St	3/31/2013
10715	Pioneer Service Station	2101 S Broad St	3/31/2013
285745	Pitt Ohio Express LLC	209 Whitehead Rd	3/31/2013
4197	PSE&G Mercer Generating Station	Lamberton Rd	3/31/2013
2200	Pullen's Garage	3060 Quakerbridge Rd	3/31/2013
832	Quakerbridge Shell	3732 Quaker Bridge Rd	3/31/2013
13301	Richard Stockton Service Area 6-S	NJ Tpke Mm 58.7 Service Area 6s	3/31/2013
1444	Roadrunner 4	1053 S Olden Ave	3/31/2013
2036	R&R Marketing LLC	2900 E State St Ext	3/31/2013
11353	Runaway Gas	1704 Rte 33 (Greenwood Ave)	3/31/2013
11200	Selmon Sunoco	2596 S Broad St	3/31/2013
15181	Shell Retail Station #100244	2006 Rt 33 & George Dye Rd	3/31/2013
7628	Shell Service Station #138525	2231 S Olden Ave	3/31/2013
6700	Silver Star Trading Inc	2042 S Broad St	3/31/2013
8436	S Olden Ave Trenton LLC	1511 S Olden Ave	3/31/2013
5525	Starr Transit Co Inc	2531 E State St Ext	3/31/2013
11825	Tri Star Gasco	1685 Rte 33 (Nottingham Way)	3/31/2013
9062	Tri State Hamilton	2409 Nottingham Way	3/31/2013
16899	United Parcel Service	4 Fairgrounds Rd	3/31/2013
13341	Waste Management Of New Jersey Inc	208 Patterson Ave	3/31/2013
13300	Woodrow Wilson Service Area 6n	NJ Tpke Mm 58.7 Service Area 6n	3/31/2013
30214	Yardville Gasgo	4364 S Broad St	3/31/2013
6501	Yardville Service Center Inc	4165 S Broad St	3/31/2013

PI Number	Facility Name	Street Address	Expiration Date
896	Yardville Supply Co	47 Church St	3/31/2013
5559	Yardville Truck Stop Garden State Fuel	646 Rt 130	3/31/2013

Source: NJDEP, 2010

UST Active Remediations

PI Number	PI Name	Street Address	Bureau
8691	1824 White Horse Pike Mercerville LLC	1824 White Horse Pk	BUST
7347	1930 Nottingham Way Trenton LLC	1930 Nottingham Way	BUST
71	Akal Oil Corp	2340 S Broad St	BUST
237544	American Concrete Company Former	129 295 Lamberton Rd	BUST
1217	B&E Service	86 Klockner Rd	BUST
7061	BP Service Station 60757	1060 Rte 33 (Nottingham Way)	BUST
10714	Delta	1406 Chambers St	BUST
7069	East State Atlantic	1679 E State St	BUST
214	Exxon Mobil Oil Corp	1473 Lamberton Rd	BUST
10394	Getty 56101	1870 Kuser Rd	BUST
4908	Getty 56290	2466 S Broad St	BUST
6720	Hamilton Gasco	2101 Rte 33	BUST
6692	Hess Station 30218	511 Rte 33 & Shady Ln	BUST
33789	James M Blakely	1664 E State St	BUST
12003	Ked Automotive	100 Yardville Allentown Rd	BUST
221231	Kimmell's Car Care Center	1958 Greenwood Ave	BUST
7602	Lakeside Auto Service LLC	3750 S Broad St	BUST
6280	Lukoil #57326	249 Rt 33	BUST
33854	Marrazzo's Auto Service Inc	1538 S Olden Ave	INS
10715	Pioneer Service Station	2101 S Broad St	INS
2200	Pullen’s Garage	3060 Quakerbridge Rd	BUST
13301	Richard Stockton Service Area 65	NJ Tpke Mm 58.7 Service Area 6s	BUST
11353	Runaway Gas	1704 Rte 33 (Greenwood	BUST

PI Number	PI Name	Street Address	Bureau
		Ave)	
7603	Shell Service Station 138425	2683 Nottingham Way & Whitehorse Pk	BUST
6700	Silver Star Trading Inc	2042 S Broad St	BUST
5525	Starr Transit Co Inc	2531 E State St Ext	BUST
16452	Sunoco #0005-0112	4364 S Broad St	BUST
11825	Tri Star Gasco	1685 Rte 33 (Nottingham Way)	BUST
9062	Tri State Hamilton	2409 Nottingham Way	BUST
8521	USPS Vehicle Maintenance Facility	680 Rt 130	BUST
13300	Woodrow Wilson Service Area 6n	NJ Tpke Mm 58.7 Service Area 6n	BUST
30214	Yardville Gasgo	4364 S Broad St	BUST
896	Yardville Supply Co	47 Church St	BUST
5559	Yardville Truck Stop Garden State Fuel	646 Rt 130	BUST

Source: NJDEP, 2010

Active Air Quality Permits & Emission Statements

Facilities with Active Air Quality Permits

Facility Name	Address	PI Number
295 Services Inc	1711 S. Olden Ave	A6197
A&N Cleaners	950 Rt 33	L6061
AAA Mid Atlantic	700 Horizon Dr	61217
Acadia Nursing & Rehabilitation Center	1501 Rt 33	61285
Akal Oil Co T/A US Gas	2340 S. Broad St	A9988
Allen's Auto Body	3666 Crosswicks Hamilton	G6006
Amy Garment Cleaners #82	2699 S. Broad St	L9118
AT&T	1300 Whitehorse-Hamilton Square Rd	60499
B&E Service Inc.	86 Klockner Rd	A3748
Base Ten Systems Inc	1 Electronics Dr	60228
Benton Graphics	3 Industrial Dr	60629
Biotherm/MCIA Fertilizer Plant	1600 Lamberton Rd	60341
BJ's Wholesale Club	900 Marketplace Blvd	61232
Bob's Citgo Service Station	101 Shady Ln	A6170
Bob's Phillips 66	1741 Greenwood Ave	A6251
Bond Cleaners	2052 Nottingham Way	8619
Bordentown City-White Horse Water Plant	Rt 206 & White Horse Circle	60435
BP Service Station #14637	1060 Rt 33	A6002
Bristol Myers Squibb Co. RWJ Hamilton	3 Hamilton Health PL.	61019
Buck's Hamilton Square Gulf #126328	2101 Rt 33	A6146
Care One	1660 White Horse-Hamilton Square Rd	61340
Carfaro Ornamental Iron Works	2075 East State St	60580

Facility Name	Address	PI Number
Chambers Street Riggins	1140-1144 Chambers St	A6013
Clayton Block Co. Yardville Plant	11 Martins Ln	60112
Common Cents Cleaners	1710 Kuser Rd	L9077
Congoleum Corporation	861 Sloan Ave	61055
Congoleum Corporation	1945 E. State St	60025
Consumers Oil Corporation	1473 Lamberton Rd	60029
Cumberland Farms-Rogers Auto Center #126331	1380 S. Olden Ave	A6150
Delaware Valley Box & Lumber Co.	2651 E. State St. Ext	60040
Demag Delaval Turbomachinery Corp.	853 Nottingham Way	60138
Exxon Mobile Service Station #32586	1824 Klockner Rd	32586
Foam Manufacturing Inc.	572 Whitehead Rd	61205
Fresenius Medical Care NA Hamilton	2 Hamilton Health Pl	61397
G&E Auto Body	135 Miami Ave	G6043
Geppert Brothers Inc.	240 Princeton Ave	61158
Getty Service Station #56027	1296 Rt 33	A6195
Getty Service Station #56101	1870 Kuser Rd	A6198
Getty Service Station #56290	2482 Broad St	A9720
Greenwood Cemetery Assn.	Greenwood Ave	60000
Greenwood Village Apartments	114 Washington Ct	61046
GSC Kleinfoeder Mobile Treatment System	1 AAA Dr	60796
Haldemans Dealerships	607 Highway 33	G6010
Hamilton Bus Garage	600 Sloan Ave	61013
Hamilton Cleaners	1201 White Horse-Mercerville Rd	L6060
Hamilton Gasco	2101 Rt 33	A9922
Hamilton High School East	2900 Klockner Rd	60505
Hamilton High School West	2720 Clinton Ave	60506
Hamilton Honda	655 Rt 130	61309
Hamilton Metering & Regulating Station	Beech & Exton Streets	60081
Hamilton Pet Meadow	1500 Klockner Rd	61068
Hamilton Station Park & Ride	800 Sloan Ave	61291
Hamilton Twp Bd of Ed Administration Building	90 Park Ave	60637

Facility Name	Address	PI Number
Hamilton Twp Bd of Ed Alexander School	20 Robert Frost Dr	60596
Hamilton Twp Bd of Ed Crockett Middle School	2631 Kuser Rd	60638
Hamilton Twp Bd of Ed Grice School	901 White Horse-Hamilton Square Rd	60597
Hamilton Twp Bd of Ed Kisthardt School	215 Harcourt Dr	60598
Hamilton Twp Bd of Ed Klockner School	830 Klockner Rd	60624
Hamilton Twp Bd of Ed Kuser School	70 Newkirk Ave	60599
Hamilton Twp Bd of Ed Lalor School	25 Barnt De Klyn Rd	60639
Hamilton Twp Bd of Ed Langtree School	2080 Whatley Rd	60607
Hamilton Twp Bd of Ed McGalliard School	1600 Arena Dr	60586
Hamilton Twp Bd of Ed Mercerville School	60 Regina Ave	60587
Hamilton Twp Bd of Ed Morgan School	38 Stamford Rd	60608
Hamilton Twp Bd of Ed Nottingham High School	1055 Klockner Rd	60491
Hamilton Twp Bd of Ed Reynolds School	215 Yardville Hamilton Sq	60588
Hamilton Twp Bd of Ed Robinson School	495 Gropp Ave	60600
Hamilton Twp Bd of Ed Sayen School	3333 Nottingham Way	60614
Hamilton Twp Bd of Ed Sunnybrae School	166 Elton Ave	60615
Hamilton Twp Bd of Ed Wilson School	600 E. Park Ave	60609
Hamilton Twp Bd of Ed Yardville School	450 Yardville Allentown Rd	60602
Hamilton Twp Dept of Water Pollution Control WTP	300 Hobson Ave	60168
Hamilton Twp Library	1300 White Horse Ave	60167
Hamilton Twp Bd of Ed Greenwood School	2069 Greenwood Ave	8690
Han Creighton T/A Creightons Citgo	1761 Greenwood Ave	A6162
Hess Station #30218	511 Rt 33	A6066
High Q Cleaners	334 Rt 33	L6057
Home Depot Inc. #927	750 Rt 130	61087
Joe's Hamilton Transmission Service	2161 Nottingham Way	61245
Johnson Atelier Tech Institute of Sculpture	60 Sculptors Way	60465

Facility Name	Address	PI Number
K Cleaners	233 Rt 33	L6028
K&H Automotive Inc.	12 Industrial Dr	G8932
Kuser Road Maintenance Facility	Kuser Rd	H6056
Lakeside Shell Service Station & Auto Service	3750 S. Broad St	A3852
Law & Public Safety Division Facility Management	1200 Negron Rd	61108
Linearizer Technology Inc.	3 Nami Ln	61214
Little Mike's Amoco	1625 South Broad St	A6264
Lockwood's Electric Motor Service	2239 Nottingham Way	60088
Loeffler's Gourmet Inc.	482 Whitehead Rd	60205
Lowes of Hamilton Store #1046	1000 Marketplace Blvd	61224
Lukoil Service Station #57326	249 Rt 33	A6086
Lukoil Service Station #57340	1070 White Horse-Mercerville Rd	A6034
Macki Cali Realty Corp.	2 S. Gold Dr	61262
MCI	37 Hobbs Rd	61049
Mercer County Geriatric Center	2300 Hamilton Ave	60142
Mercerville Gulf	2683 Nottingham Way	A5781
Mercerville LLC Service Station	1824 Whitehorse Rd	A6131
Mercerville Nursing Center	2240 White Horse-Mercerville Rd	61363
Monro Muffler & Break Inc.	Kuser Rd & Whitehorse Rd	61005
National Performance Packaging Co.	1400 East State St	60273
New Penn Motor Express	15 Thomas Rhodes Industrial Dr	61241
New Quality Dry Cleaners	1078 White Horse-Mercerville Rd	L6068
Neyra Industries Inc.	27 Industrial Dr	61102
NJ State Police Troop C	1200 Negron Dr	H8749
NJDOC Yardville Youth Correctional Facility	11401 Highbridge Rd	61395
NJDOT Duck Island Landfill	Rt 29	61092
Nottingham Apartments	1310 Nottingham Way	61331
Nottingham Cleaners Inc.	4445 Nottingham Way	L6034
OK Petroleum Service Station	2340 S. Broad St	A8800
Our Lady of Sorrows RC Church	3816 E. State St	60535

Facility Name	Address	PI Number
OXY USA Inc.	2232 S. Olden Ave	61004
Park Avenue Cleaners	19 E. Park Ave	L6069
Picerno's Service Station	4495 S. Broad St	A6120
Pioneer Service Station	2101-2105 S. Broad St	A9912
PMP Composites Corp.	575 Whitehead Rd	61003
Pond Run Housing	9 Lamont Ave	60165
PSE&G Trenton Switching Station Landfill	Klockner Rd	60795
PSEG Fossil LLC Mercer Generator Station	Lamberton Rd	61057
Pullen's Garage	3060 Quakerbridge Rd	A6157
QB Green Cleaners	3800 Quakerbridge Rd	L6072
Quakerbridge Service Station #3732	3732 Quakerbridge Rd	A6057
Ralph Clayton & Sons JPC Hamilton LLC	853 Nottingham Way	61323
Red Oak Manor Apartments	2300 S. Broad St	60163
Richard Stockton Service Area 6S	NJ Turnpike MM 58.7 S.	H6029
RWJ University Hospital of Hamilton	1881 White Horse-Hamilton Sq Rd	60164
S. Olden Ave. Trenton LLC Service Station	1515 S. Olden Ave	A6022
Shell Service Station #100244	Rt. 33 & George Dye Rd	A6179
Shell Service Station #138425	2683 Nottingham Way	A6023
Shell Service Station #138525	2231 S. Olden Ave	A6004
Siemens Demag Delaval Turbomachinery Inc.	840 Nottingham Way	60579
Silver Hanger Cleaners	337 Rt 33	L8729
South Broad St. Delta Service Station #126337	2042 S. Broad St	A6151
St. Raphael Roman Catholic Church & School	3500 S. Broad St	61148
Starr Transit Co.	2531 East State St	60543
Sterling Winthrop Inc.	2144 E. State St	60056
Stonite Coil Corp.	476 Rt 156	60048
SUH IL Corp.-Statis Cleaners	3100 Quakerbridge Rd	L6084
Sun Refining and Marketing CG5665	2596 S. Broad St	A6068
Sunny Brite Cleaners	Dover Park Plaza	L6042

Facility Name	Address	PI Number
The Highland Sanitary Pumping Station	S. Broad St	60549
Trenton Box Manufacturing Co.	Yardville-Hamilton Sq. Rd	60254
Trenton LCC Service Station	3217 Quakerbridge Rd	A6089
Trenton LLC Service Station	1201 Rt 33	A6005
Trenton LLC Service Station	1930 Nottingham Way	A6134
Tri State Petro-Tri State Hamilton	2409 Nottingham Way	A6060
UMIA of Hamilton Inc. @ Hamilton Point	4611 Nottingham Way	L9103
UNISYS Corp.	3705 Quakerbridge Rd	61120
United Parcel Service	4 Fairgrounds Rd	60502
United Parcel Service of America	Ward Ave. Ext	A6241
University Heights School	645 Paxson Ave	60603
UPS Vehicle Maintenance Facility	680 Rt 130	60300
Vehicle Maintenance Facility	680 Hwy 130 SB	H6049
Verizon Call Center 53AKG	600 Horizon Dr	61135
Verizon NJ Mercerville Co. #53600	2360 Nottingham Way	60447
Verizon NJ White Horse Co #53030	3101 S. Broad St	60450
Vignola Trucking & Safe Co.	160 Hewitt Ave	61305
Warner Village Apartments	1378 Nottingham Way	61160
Waste Management of NJ Inc.	208 Patterson Ave	61163
Whitehorse Gardens	60-66 White Horse Ave	60284
Wingate Apartments	Wert Ave	60287
Woodrow Wilson Service Station 6N	NJ Turnpike MM 58.7 N	H6028
Yardville Mobil Service Station	4364 S. Broad St	A6070
Yardville AMOCO Service Station-John D. Pitman	4165 S. Broad St	A6053
Yardville Garden State Fuel Service Station	646 Rt 130	A6095
Yardville Heights School	3880 Broad St	60601
Your Cleaning Village	1581 S. Olden Ave	L6073

Source: NJDEP, 2009

2009 Air Emission Statements

Consumers Oil Corporation	PI Number: 60029	1473 Lamberton Rd	
Pollutant Name	***Ozone pounds per day***	***Tons per year***	***CO pounds per day***
Ammonia			
Arsenic compounds			
Benzene			
CO	0.00	0.01	0.20
CO2			
Methane			
Nickel compounds			
NOx (Total)	0.00	0.06	
Pb			
PM-10 (Total)			
PM-2.5 (Total)			
Polycyclic organic matter			
SO2			
TSP			
VOC (Total)	3.67	0.50	

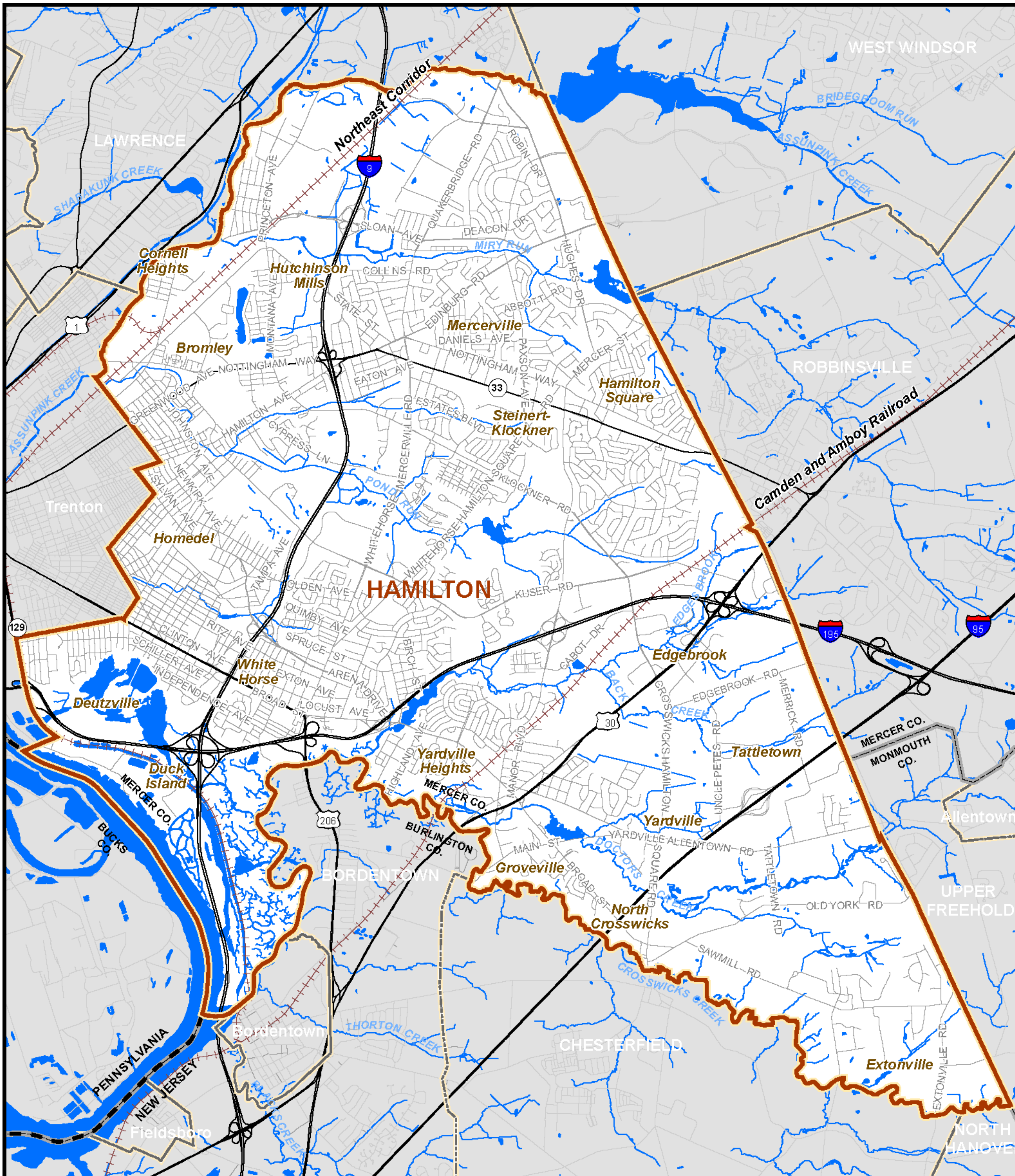
Congoleum Corp.	PI Number: 61056	1945 East State St	
Pollutant Name	***Ozone pounds per day***	***Tons per year***	***CO pounds per day***
Ammonia		0.71	
CO	22.02	2.37	27.76
CO2		3,390.00	
Methane		0.05	
NOx (Total)	26.22	2.82	
Pb		0.00	
PM-10 (Total)		22.42	
PM-2.5 (Total)		0.01	
SO2		0.00	
TSP		22.42	
VOC (Total)	84.43	8.17	

PSEG Fossil LLC Mercer Generating Station	PI Number: 61057	2512 Lamberton Rd.	
Pollutant Name	***Ozone pounds per day***	***Tons per year***	***CO pounds per day***
Acrolein		0.09	
Ammonia		1.21	
Arsenic compounds		0.01	
Benzene		0.38	
CO	941.24	53.33	766.47
CO2		1,604,710.00	
Dioxins		0.00	
Ethylene dibromide		0.00	
Ethylene dichloride			
Formaldhyde		0.09	
Hexachlorobenzene		0.00	
Hydrogen chloride		0.28	
Maganese compounds		0.06	
Mercury compounds		0.01	
Methane		15.25	
Methylene chloride (Dichloromethane)			
Nickel compounds		0.02	
NOx (Total)	8,943.50	664.23	
Pb		0.00	
PM-10 (Total)		63.57	
PM-2.5 (Total)		0.03	
Polycyclic organic matter		0.01	
Propylene dichloride			
Quinoline		0.00	
SO2		8,342.03	
TSP		23.35	
VOC (Total)	153.96	7.62	

Congoleum Corp.	PI Number: 61055	861 Sloan Ave.	
Pollutant Name	***Ozone pounds per day***	***Tons per year***	***CO pounds per day***
Ammonia		0.10	
Benzene			
Cadmium compounds			
CO	67.75	3.05	97.57
CO2	1,590.00		
Methane	0.07		
NOx (Total)	246.63	5.07	
Pb		0.00	
PM-10 (Total)		0.42	
PM-2.5 (Total)		0.00	
Polycyclic organic matter			
SO2		0.15	
TSP		0.42	
VOC (Total)	53.79	0.68	

Source: NJDEP, 2009

Maps



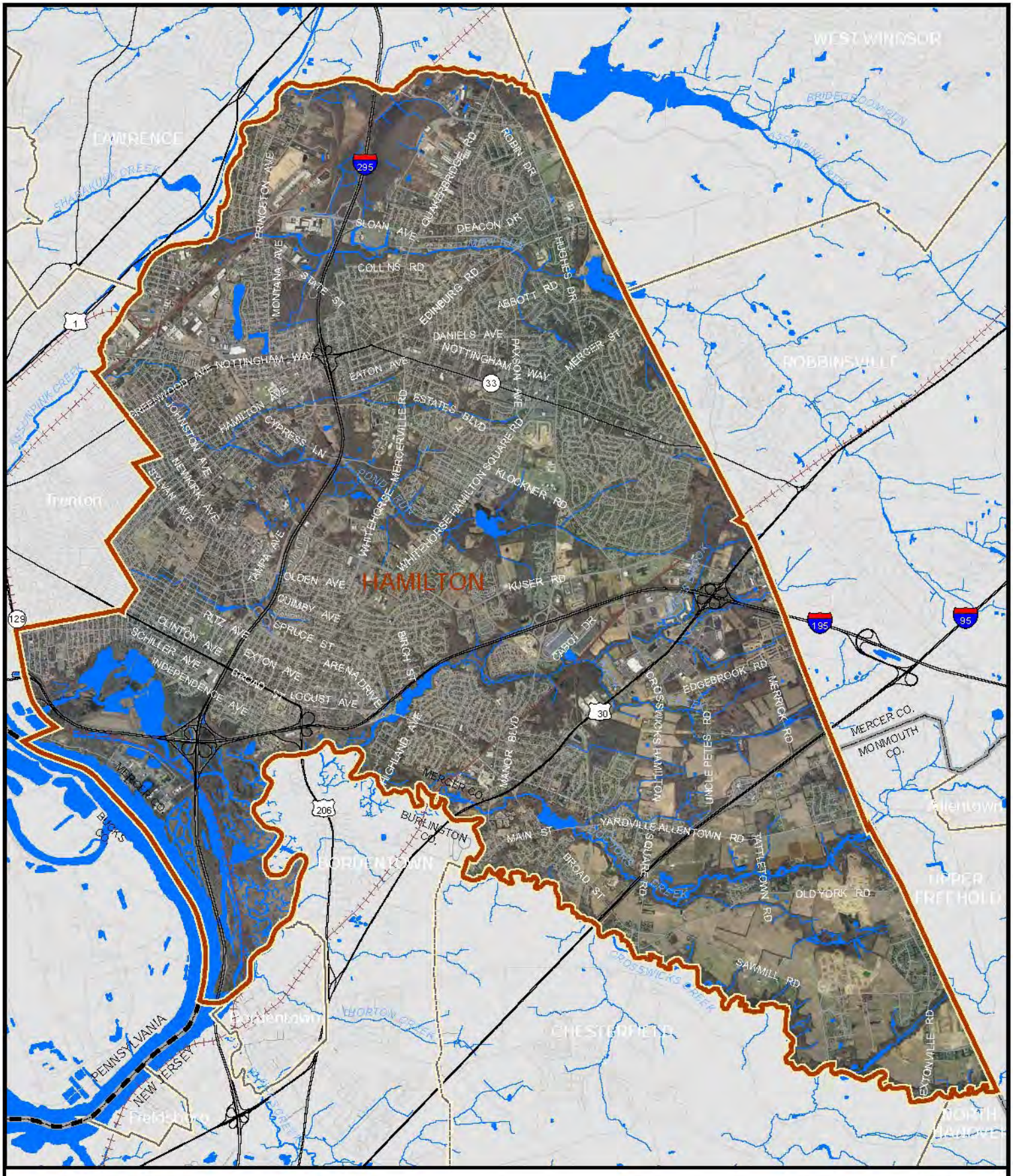
Source: NJDEP,NJDOT,DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

0 0.5 1
Miles

Map 1: Places in Hamilton Township

Hamilton
Municipality
County
State
Railroad

dvrpc



Source : NJDEP,NJDOT,DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

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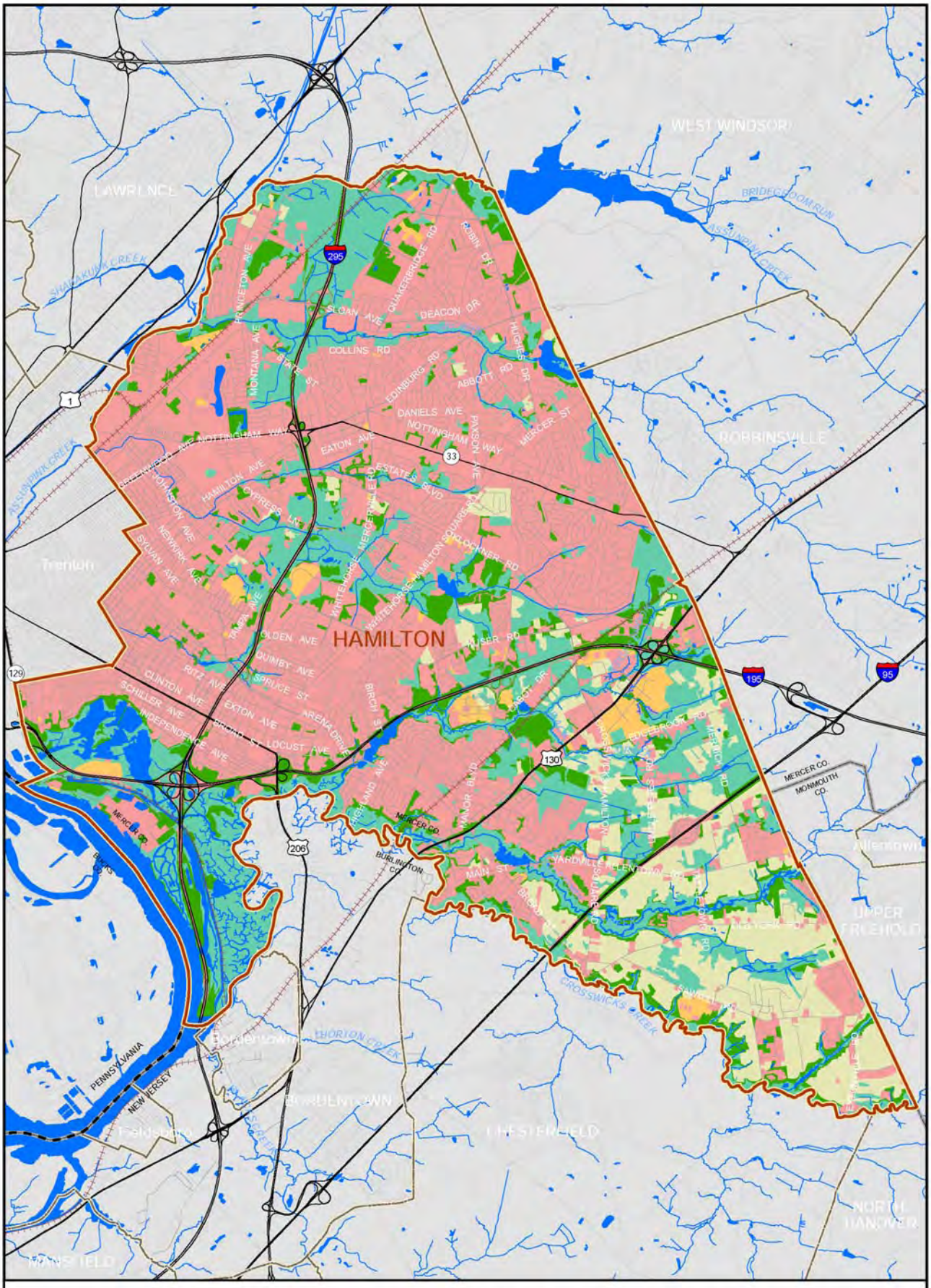
Miles

Map 2: Aerial Photo (2007)

dvrpc



Source: NJDEP, NJDOT, DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

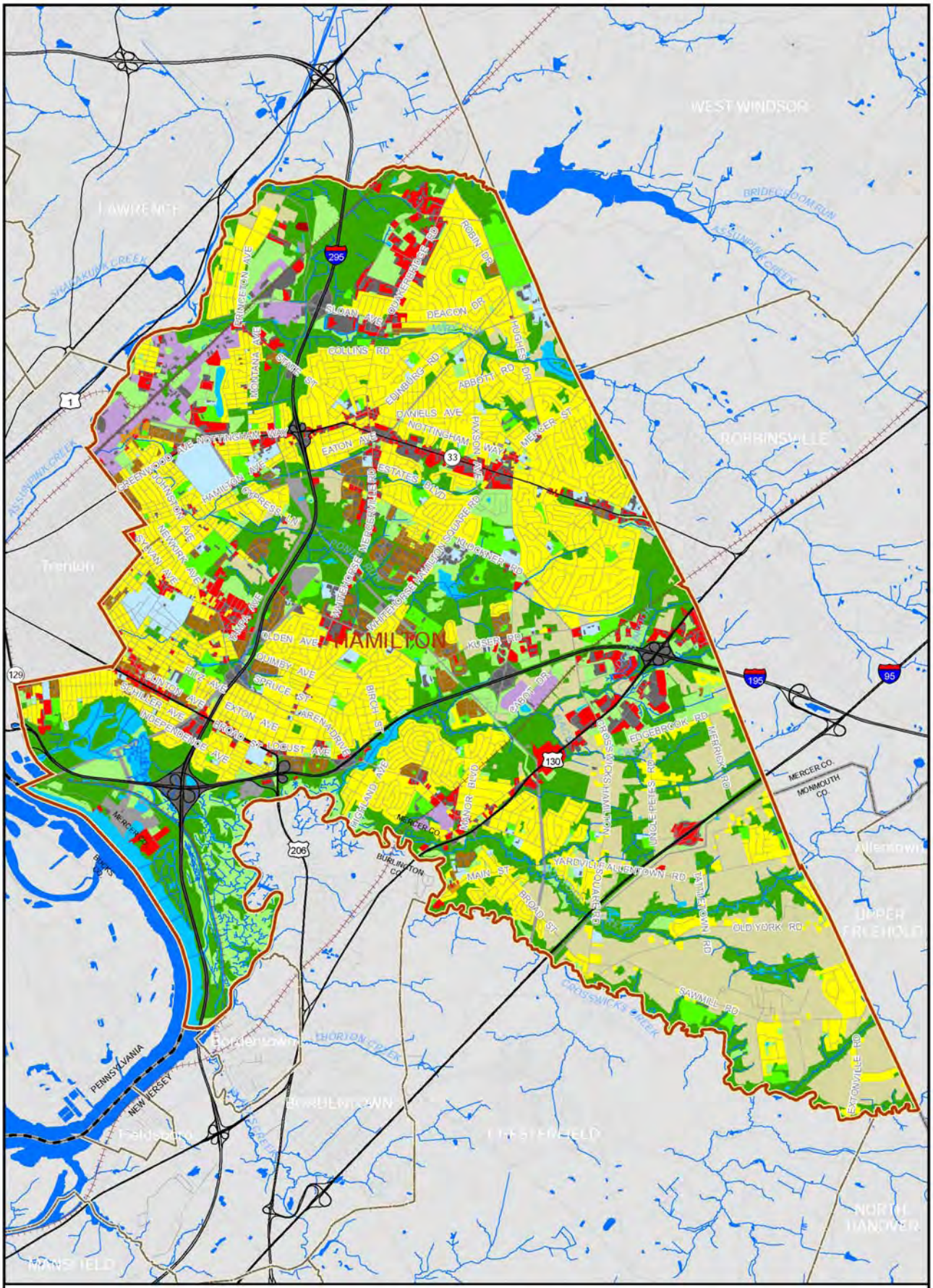
0 0.5 1 Miles

N

Map 3: NJDEP Land Cover (2007)

- Agriculture
- Barren Land
- Forest
- Developed
- Water
- Wetlands

dvrpc



Source: NJDEP,NJDOT,DVRPC.
This map was developed using New Jersey Department of Environmental Protection's Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

0 0.5 1 Miles

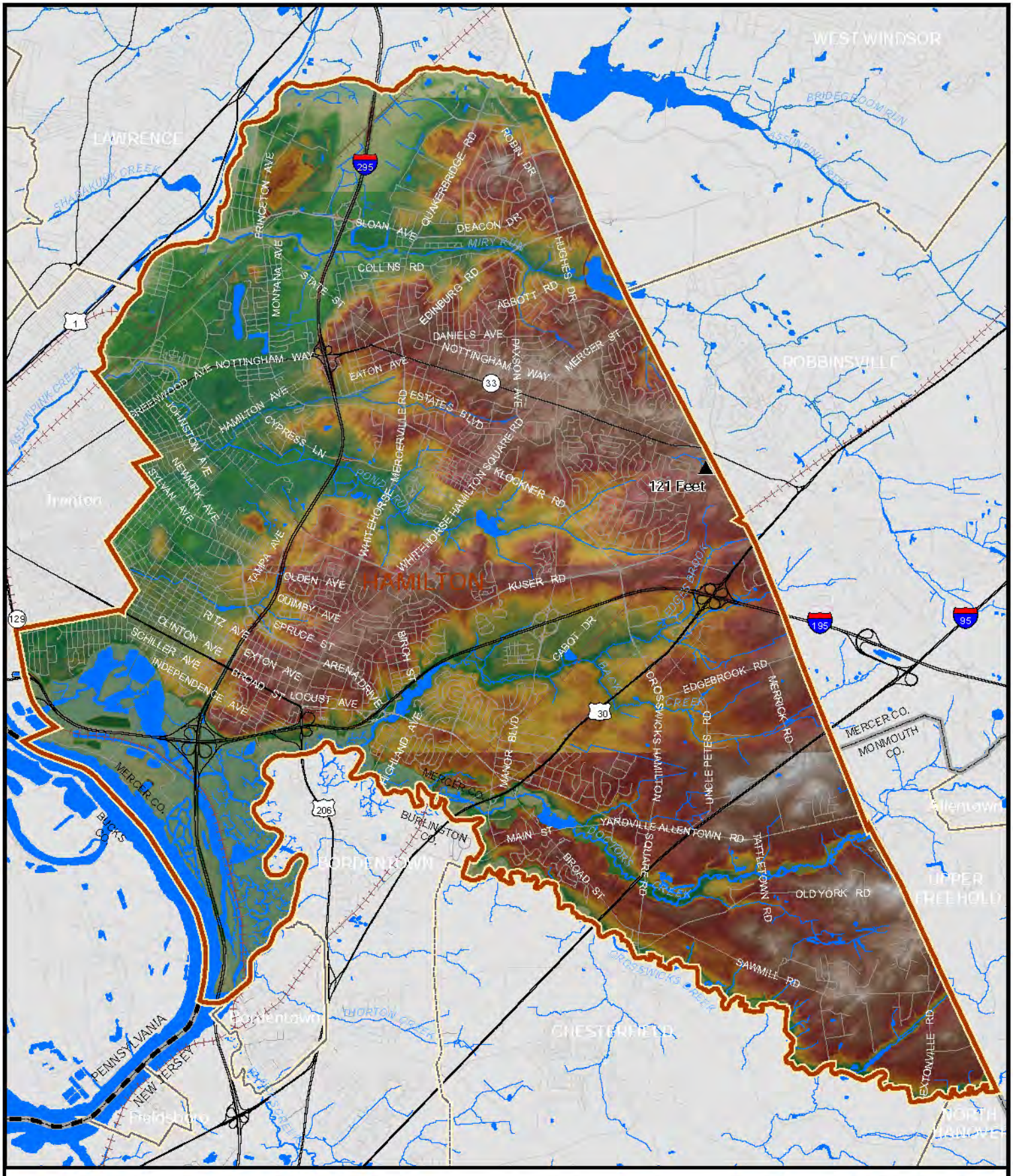
N

Map 4:DVRPC Land Use (2005)

Land Use Type

- Agriculture
- Commercial
- Community
- Light Manufacturing
- Mining
- Multi Family Home
- Parking & Transportation
- Recreation
- Row Home
- Single Family Home
- Utility
- Vacant
- Water
- Wooded

dvrpc



Source : NJDEP,NJDOT,DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

0 0.5 1 Miles

▲ High Elevation

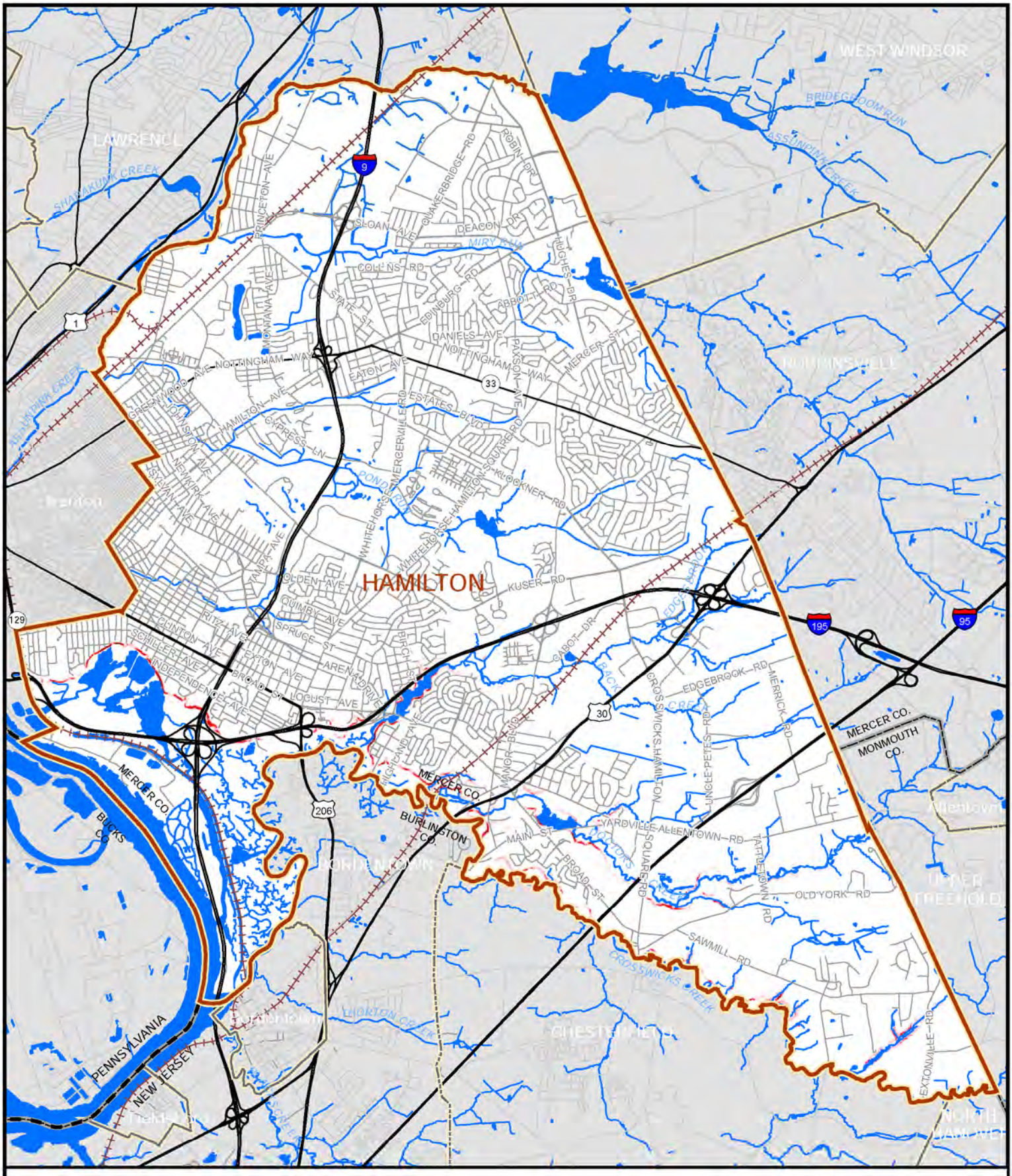
Value (Feet above sea level)

High : 121

Low : 0

Map 5: Elevation

dvrpc



Source: NJDEP, NJDOT, DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

0 0.5 1 Miles

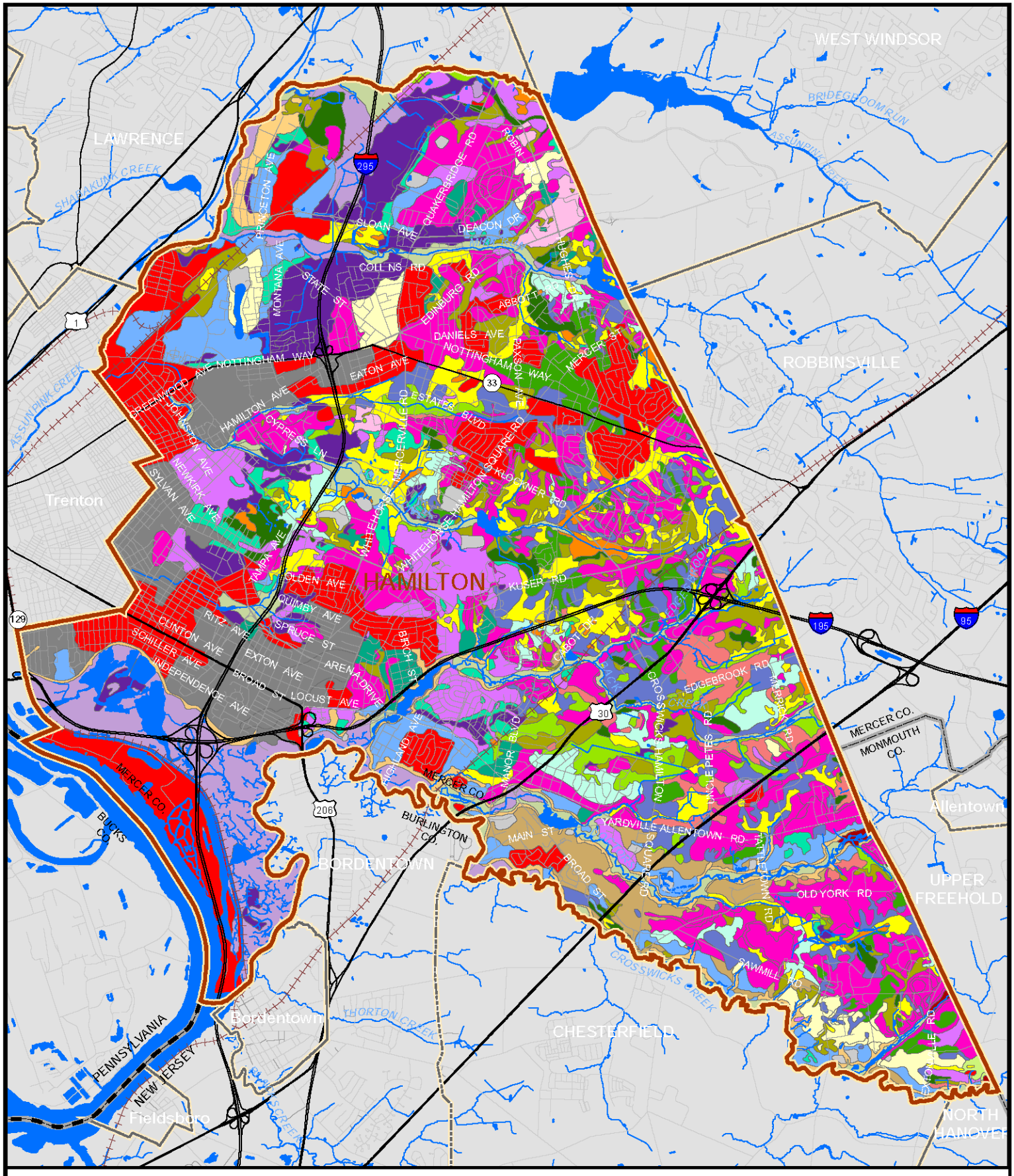
N

Map 6: Steep Slopes

Slopes

- <10%
- 10% - 14.99%
- 15% - 19.99%
- ≥ 20%

dvrpc



Source : NJDEP,NJDOT,NRCS,DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

0 0.5 1
Miles

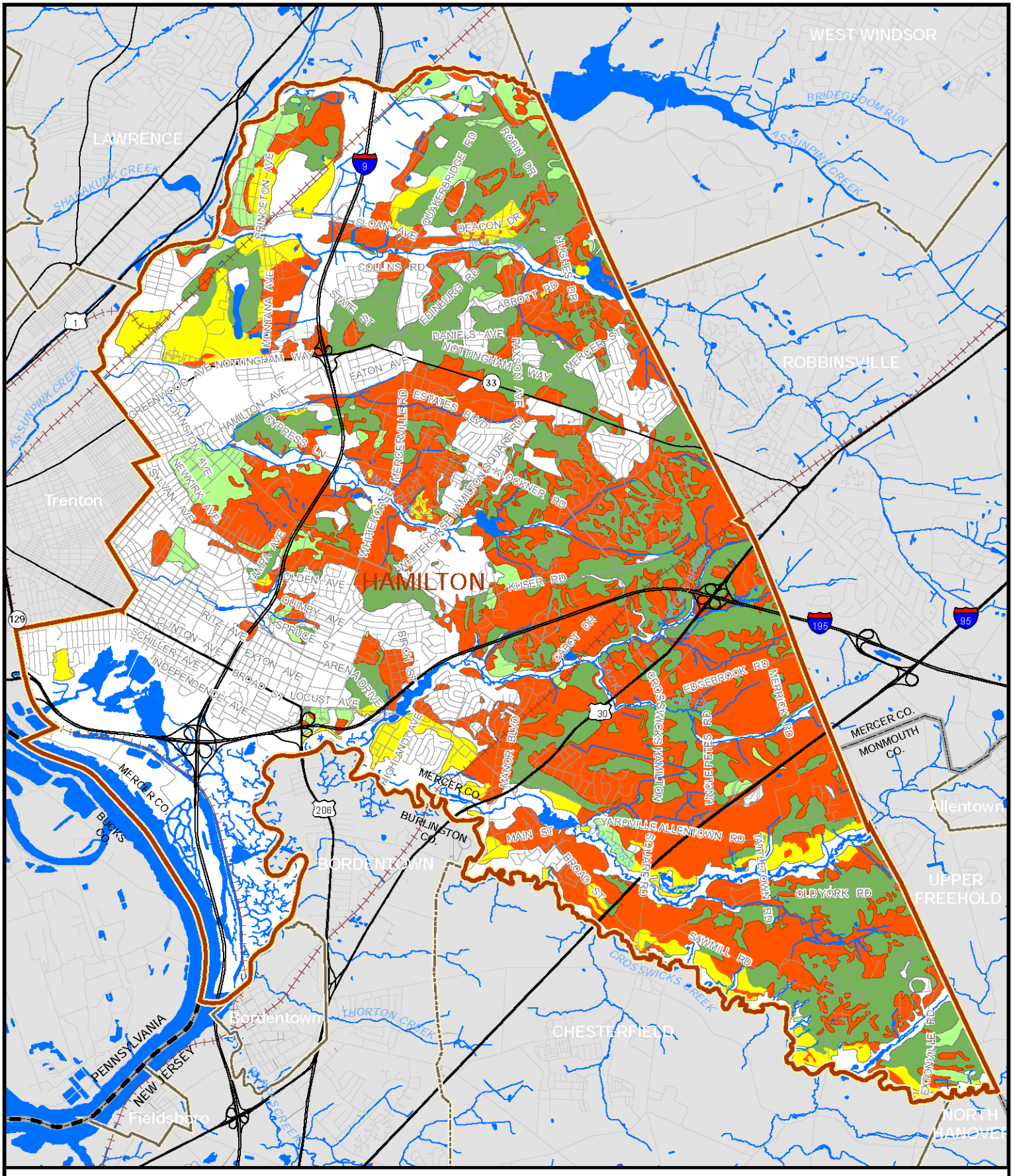
N

Soils

Aura	Fallsington	Glassboro and Woodstown	Mattapex Bertie	Sassafras	
Birdsboro	Fluvaquents	Humaquepts	Pits, Sand and Gravel	Tinton	
Collington	Fort Mott	Keyport	Plummer	Udorthents	
Downer	Freehold	Lenoir-Keyport	Portsmouth	Urban	
Elkton	Galestown	Marsh	Sandy and Silty Land	Water	
Evesboro	Galloway	Matapeake	Othello	Woodstown	

Map 7: Soils

dvrpc



Source : NJDEP,NJDOT,NRCS,DVRPC. This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

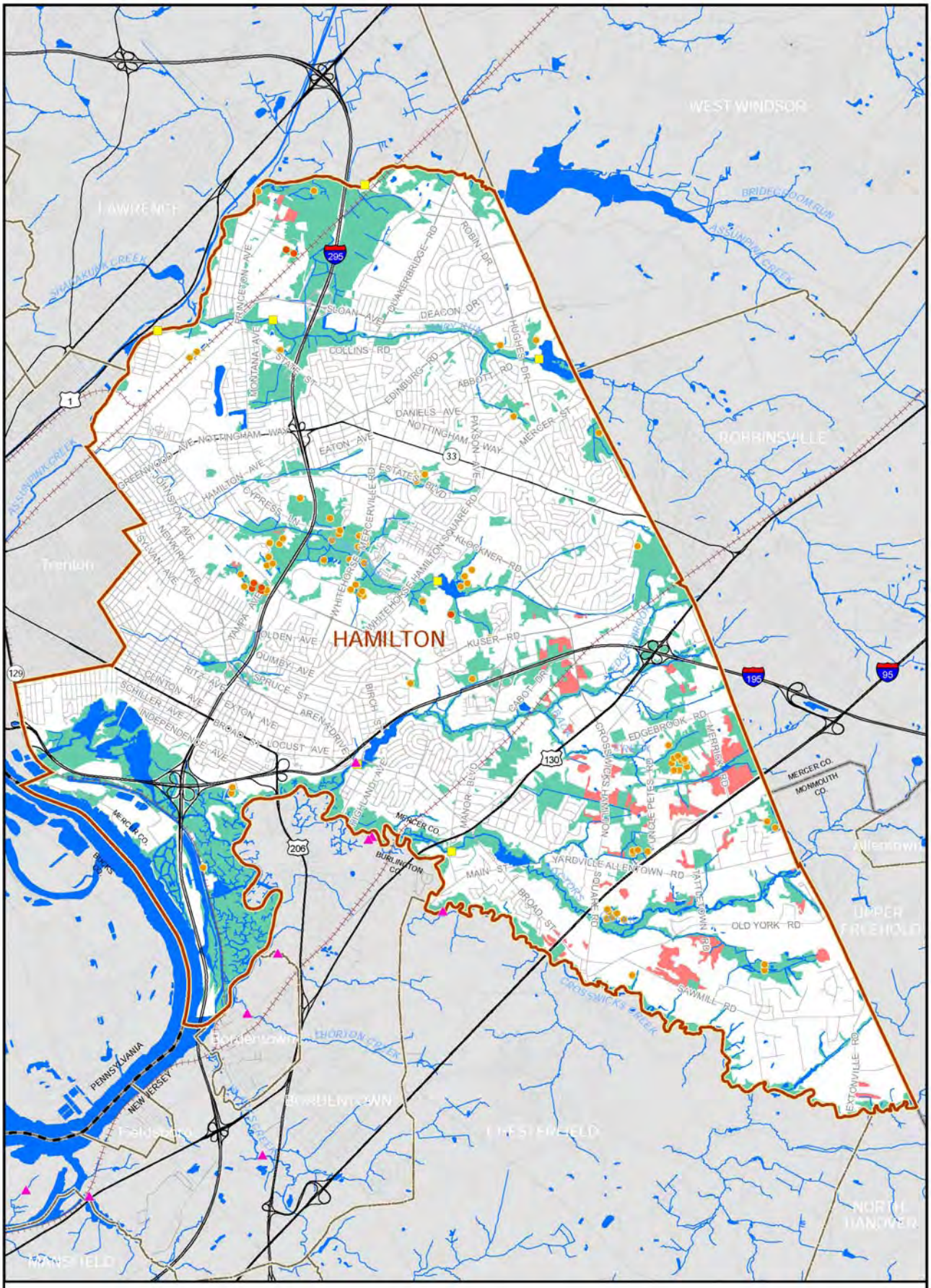
0 0.5 1 Miles

N

Map 8: Agricultural Quality of Soils

- Prime Farmland
- Farmland of Statewide Importance
- Farmland of Local Importance
- Unique Farmland
- Not Rated for Agricultural Use

dvrpc



Source: NJDEP, NJDOT, DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

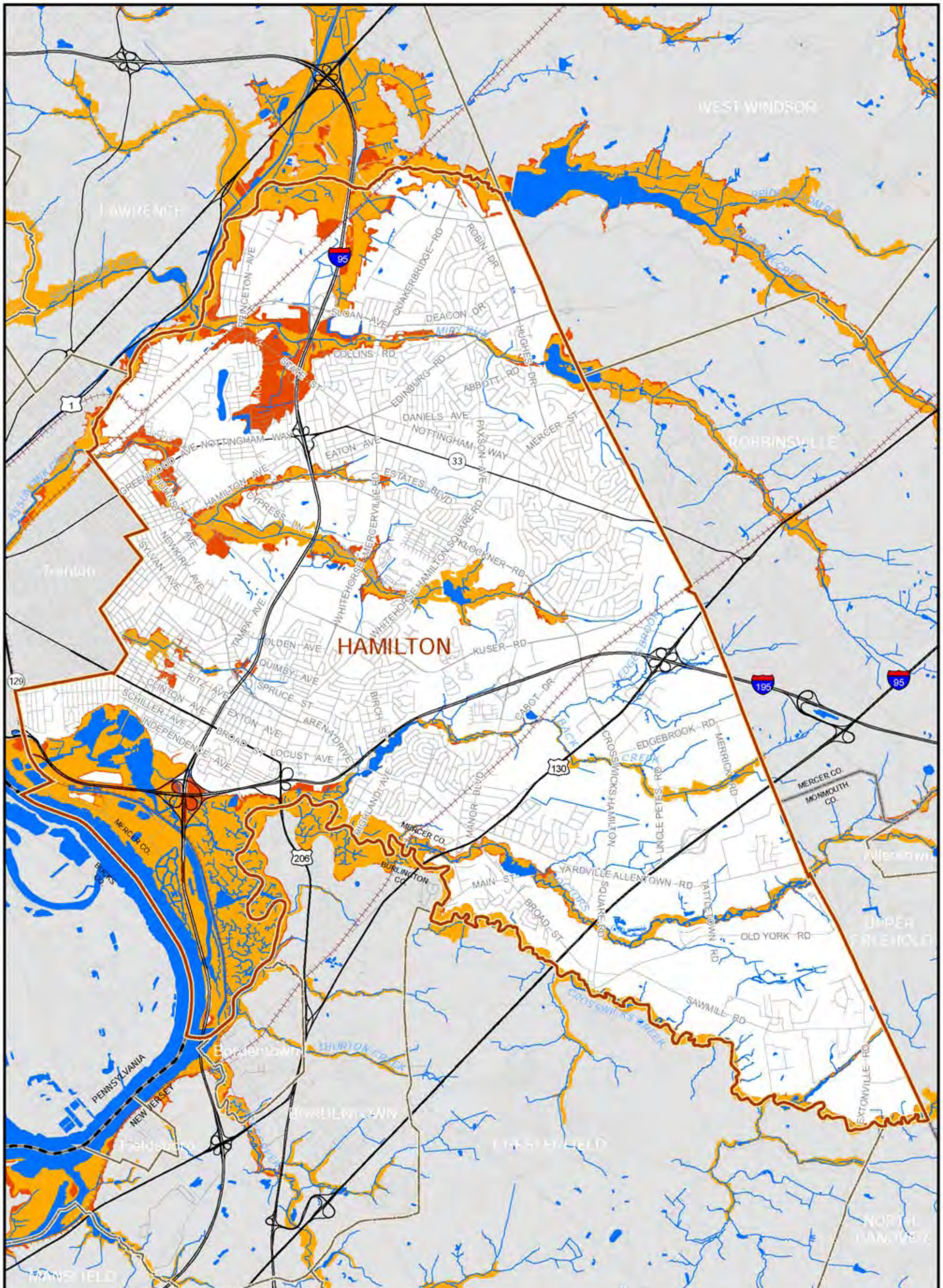
0 0.5 1 Miles

N

Map 9: Surface Water, Wetlands, and Vernal Pools

- Head of Tide
- Dam
- Vernal Pool Location
- Potential Vernal Pool
- Agricultural Wetlands
- Wetlands

dvrpc



Source: NJDEP, NJDOT, DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

0 0.5 1
Miles

N

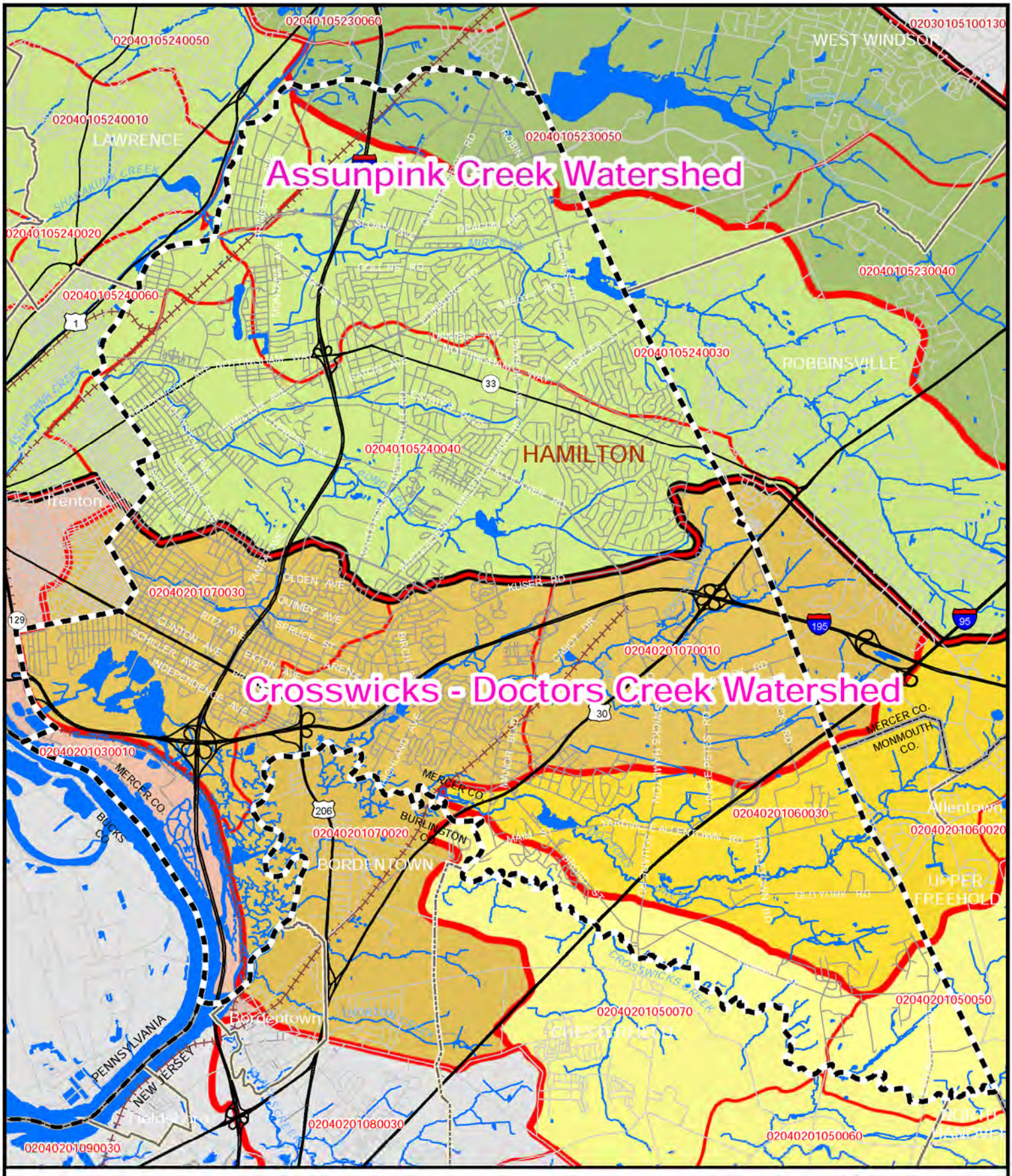
Map 10: Floodplains (2008)

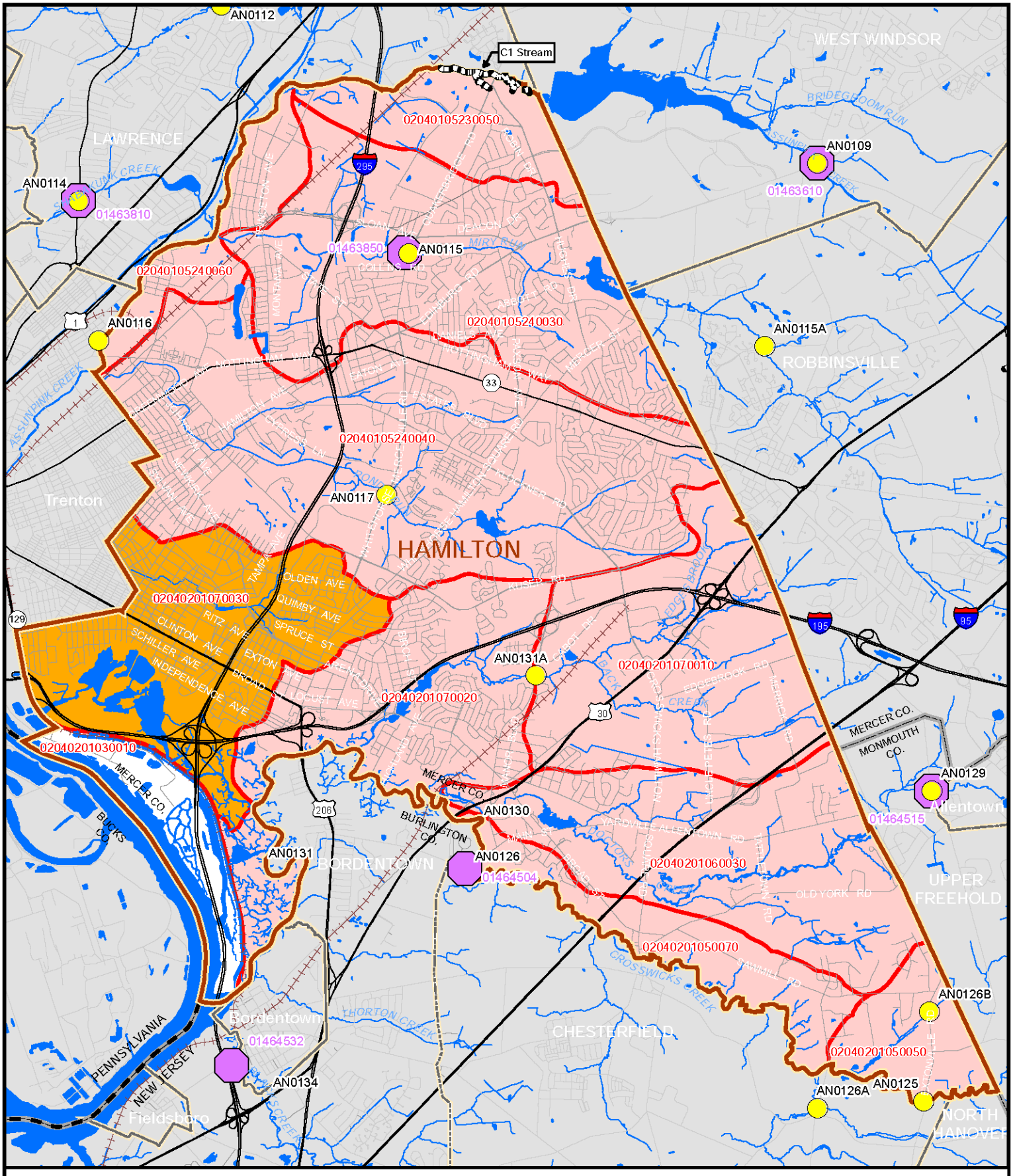
Flood Zone

100-Year Floodplain

500-Year Floodplain

dvrpc


Assunpink Creek Watershed
Crosswicks - Doctors Creek Watershed
HAMILTON
WEST WINDSOR
LAWRENCE
ROBBINSVILLE
Trenton
BORDENTOWN
Bordentown
Allentown
UPPER FREEHOLD
Chesterfield
Florence
PENNSYLVANIA
NEW JERSEY
MERCER CO.
BURLINGTON CO.
BUCKS CO.
MONMOUTH CO.
02040105230060
02040105240050
02040105240010
02040105230050
02040105240020
02040105240060
02040105230040
02040105240030
02040105240040
02040201070030
02040201070010
02040201030010
02040201070020
02040201060030
02040201060020
02040201050070
02040201050050
02040201080030
02040201090030
02040201050060
02030105100130
Source: NJDEP,NJDOT,DVRPC
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.
0 0.5 1
Miles
N
Hamilton Township
HUC 14 Subwatershed
HUC 11 Watershed
HUC 8 Watershed
02040105230, Assunpink Creek (above Shipetaukin Ck)
02040105240, Assunpink Creek (below Shipetaukin Ck)
02040201030, Duck Creek and Upper Del R to Assunpink Ck
02040201050, Crosswicks Ck (Doctors Ck to New Egypt)
02040201070, Crosswicks Ck (below Doctors Creek)
02040201060, Doctors Creek
Map 11: Watersheds
dvrpc



Map 12: Surface Water Quality (2008)

Source : NJDEP,NJDOT,DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

0 0.5 1 Miles

N

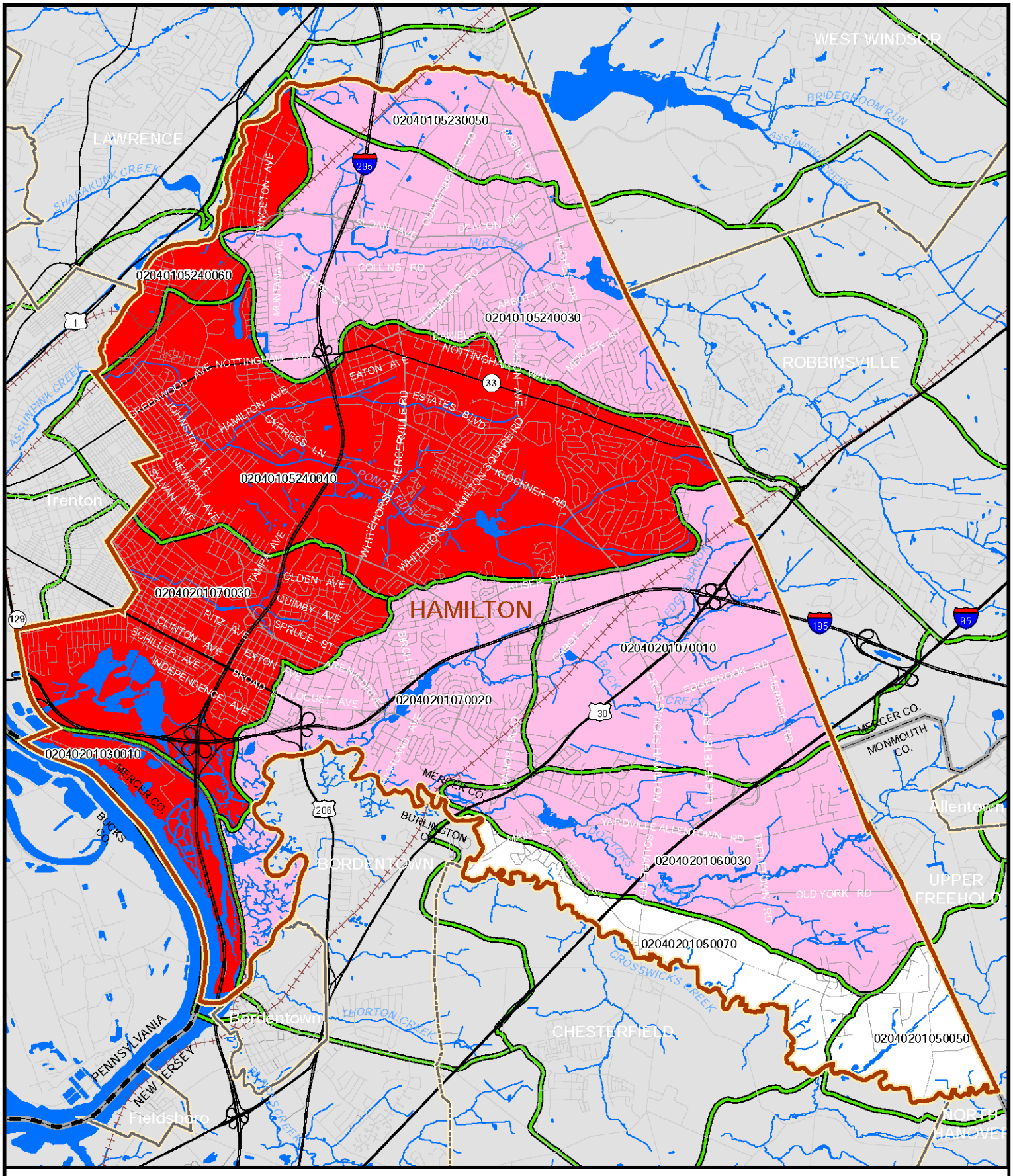
2008 Integrated Water Quality Report

General Aquatic

- Sublist 3 - Insufficient data was available to assess use attainment
- Sublist 4A - Does not attain designated use, but measures have been taken to improve water quality
- Sublist 5 - Does not attain designated use and a TMDL is necessary

- Category 1 Stream
- Subwatershed Boundary (HUC 14)
- NJDEP Ambient Biomonitoring Network (AMNET) Sampling Site
- USGS Surface Water Quality Gage (2009)

dvrpc



Source : NJDEP,NJDOT,DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

0 0.5 1 Miles

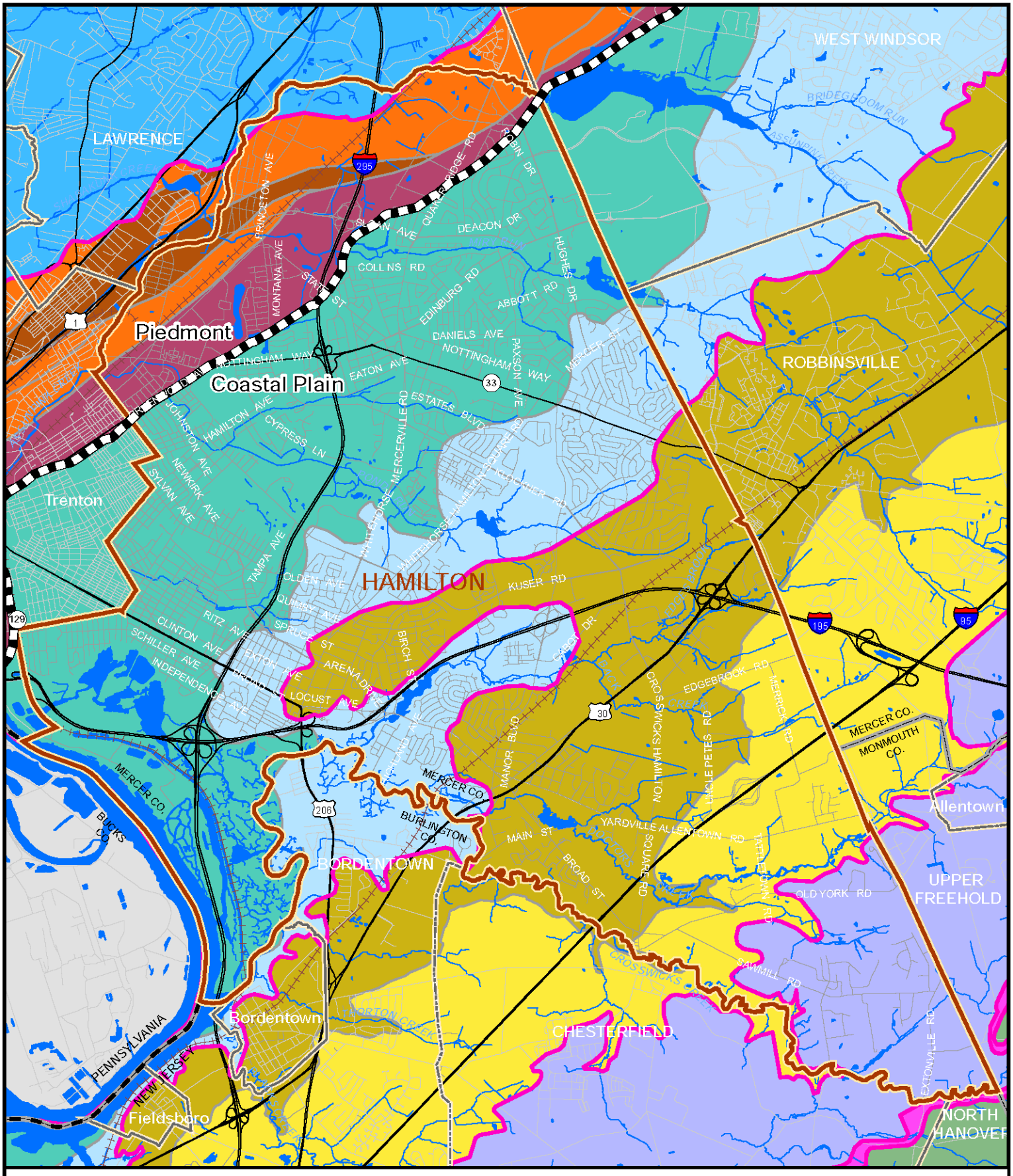
Map 13: Impervious Coverage by Subwatershed

Percent of Impervious Surfaces by Subwatershed

<10 % | 10 - 25 % | >25 %

Subwatershed Boundary (HUC14)

dvrpc



Source : NJDEP,NJDOT,DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

0 0.5 1
Miles

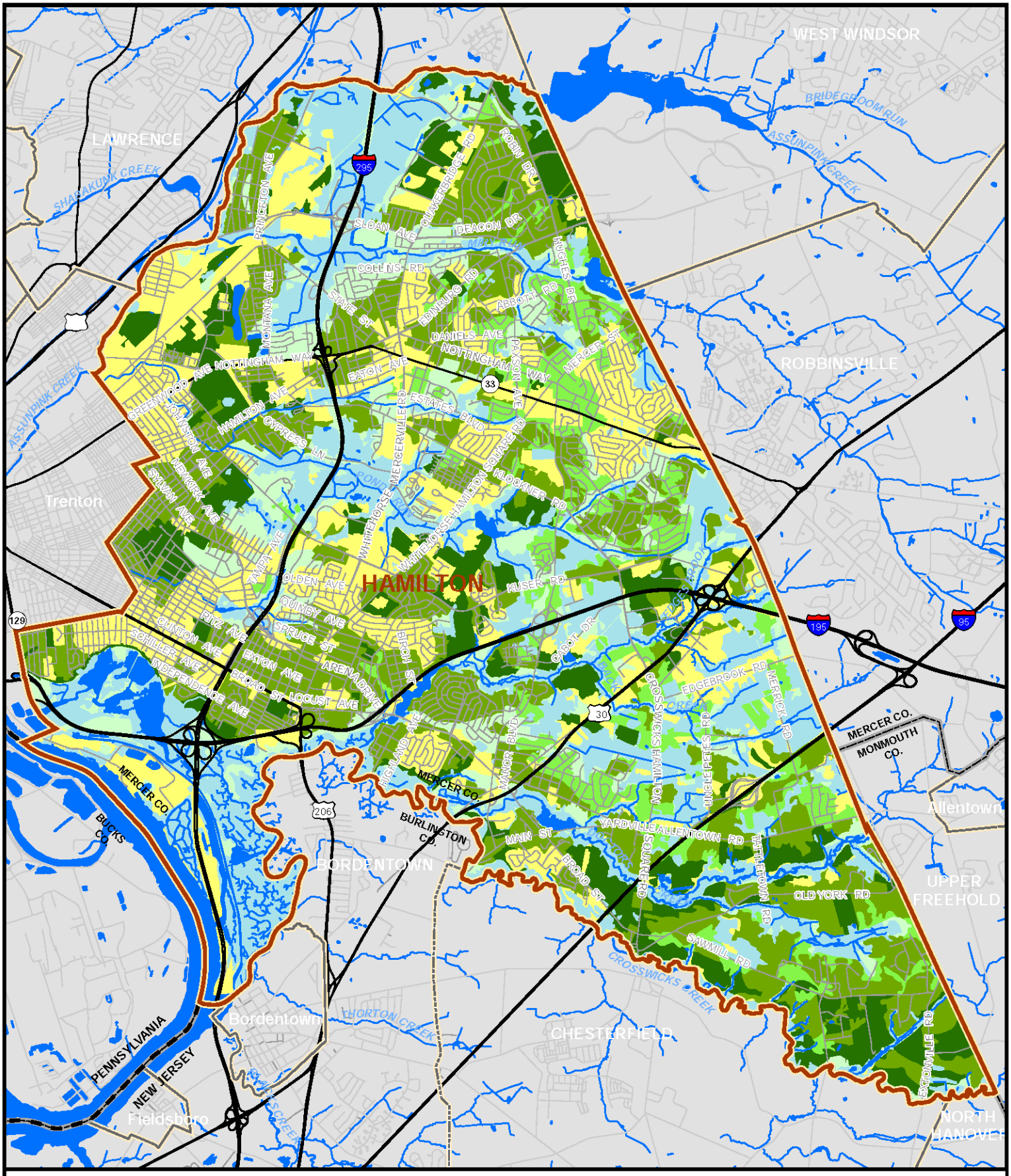
N

Bed Outcrop Formations

- Province
- Bedrock Aquifer
- Stockton Formation
- Gneiss granofels and Migmatite
- Gabbro
- Wissahickon Formation
- Potomac Formation
- Magothy Formation
- Merchantville Formation
- Woodbury Formation
- Englishtown Formation
- Marshalltown Formation
- Wenonah Formation

Map 14: Geologic Outcrops

dvrpc



Source : NJDEP,NJDOT,DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

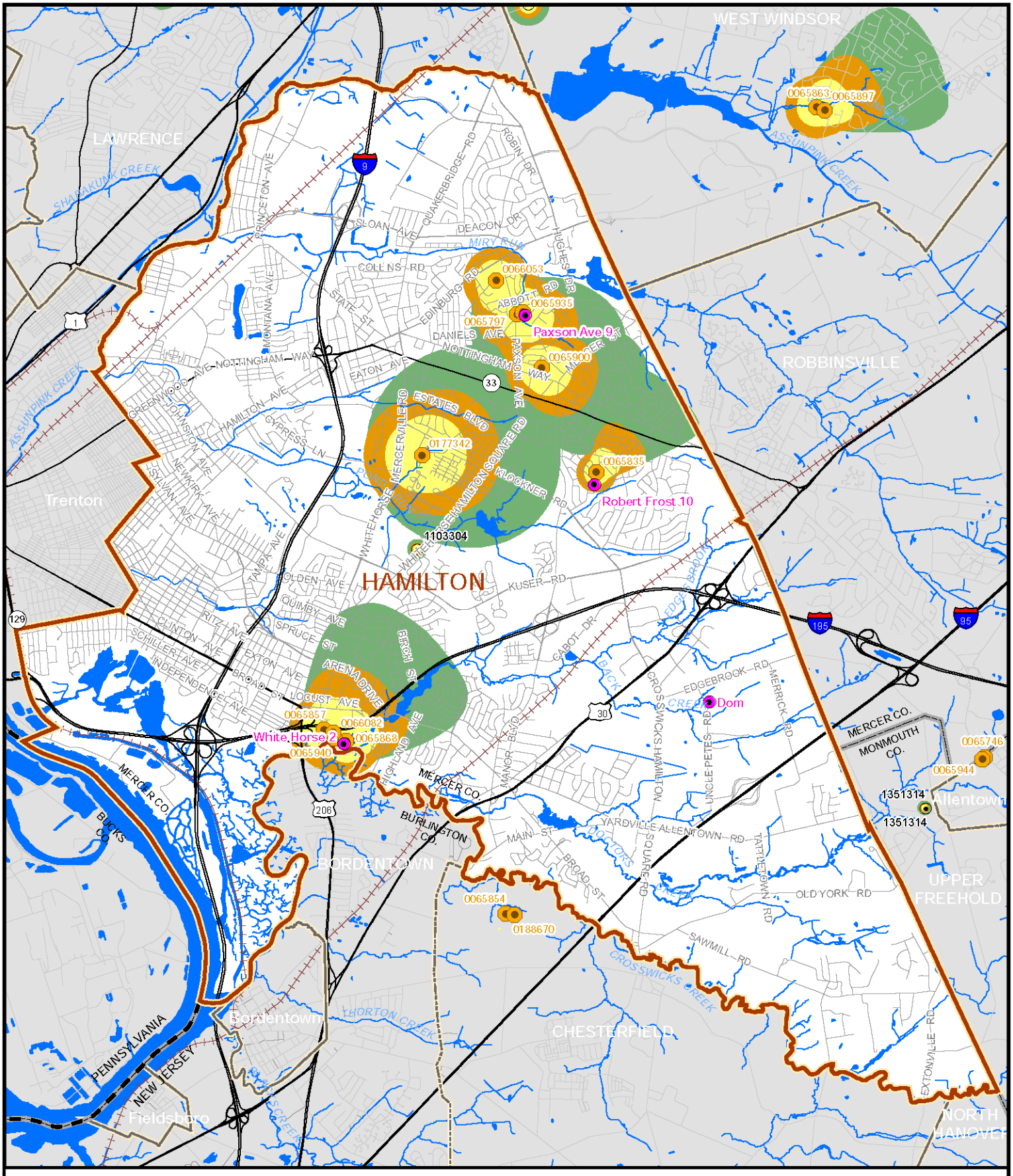
0 0.5 1 Miles

N

Map 15: Groundwater Recharge (1997)

- Wetlands and Open Waters
- Hydric Soils
- Less than 8 inches/year
- 8 to 10 inches/year
- 11 to 13 inches/year
- 14 to 16 inches/year

dvrpc



Source : NJDEP,NJDOT,DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

0 0.5 1 Miles

N

Wellhead Protection Areas

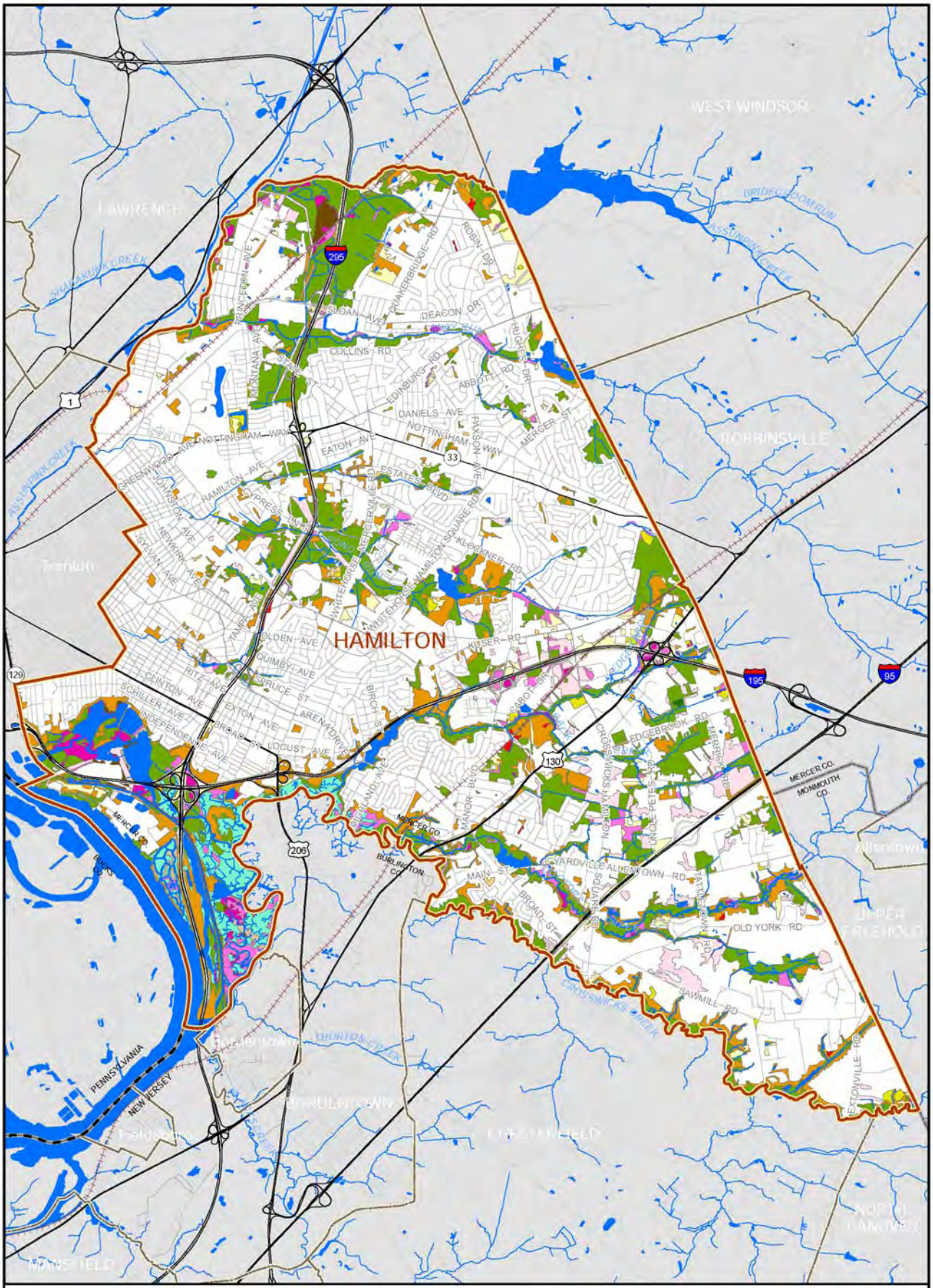
Public Community
Public Non-Community
- 2-year time of travel
- 5-year time of travel
- 12-year time of travel

- Public Non-Community Well
- Public Community Well
- Groundwater Observation Well

Private wells are not shown

Map 16: Wells

dvrpc



Source: NJDEP, NJDOT, DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

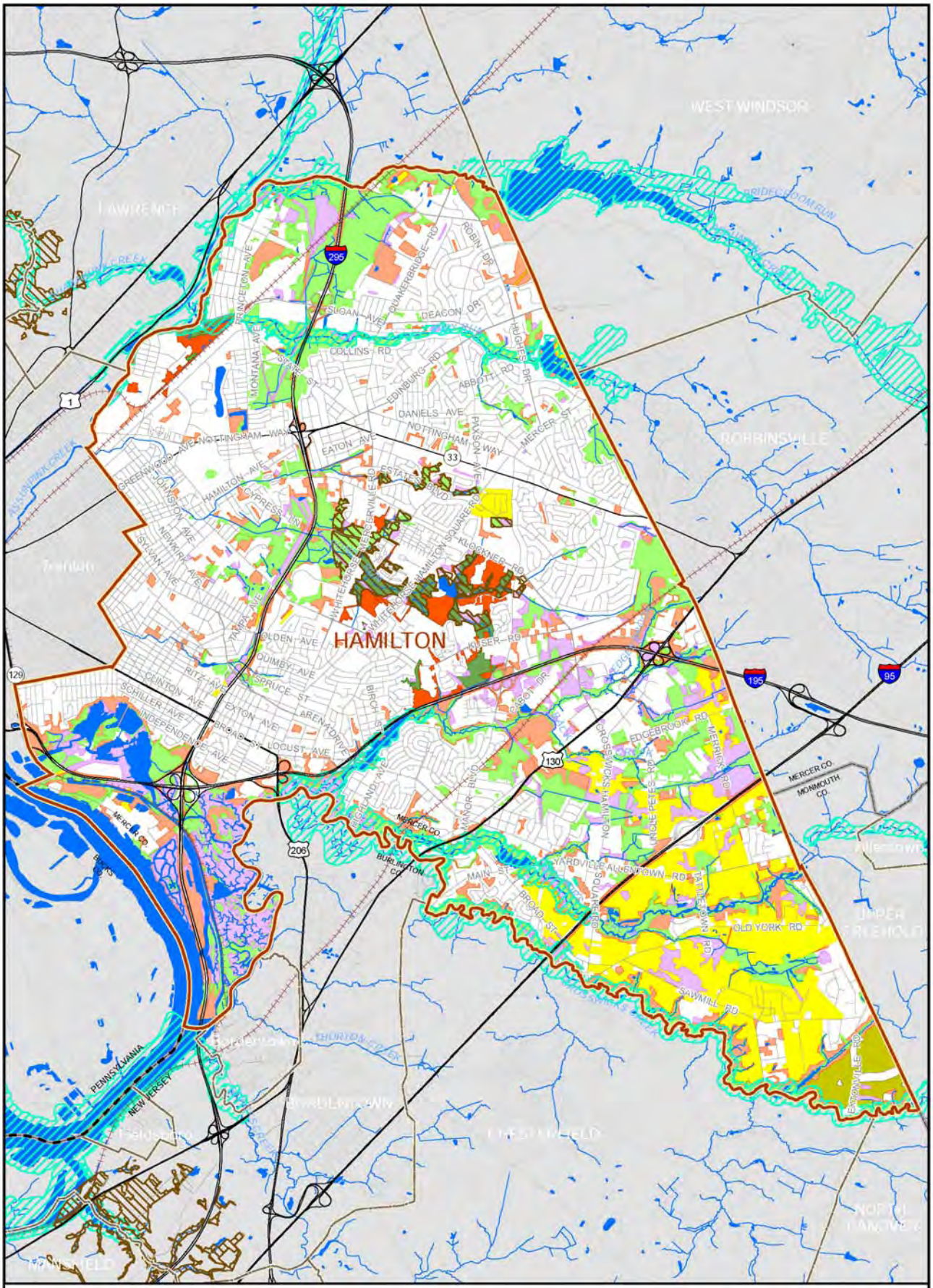
0 0.5 1 Miles

N

Brush/Shrubland
Brush/Shrubland - Oldfield
Upland Forest - Coniferous
Upland Forest - Mixed (Con. Dom.)
Upland Forest - Deciduous
Upland Forest - Mixed (Decid. Dom.)
Wetlands - Modified
Wetlands - Scrub/Shrub
Wetlands - Herbaceous
Water
Tidal Waters
Tidal Marshes - Freshwater
Wetlands - Coastal (Phragmites Dominated)
Wetlands - Phragmites Dominated
Wetlands - Wooded - Deciduous
We lands - Wooded Mixed (Decid. Dom.)
We lands - Wooded - Coniferous
All other land cover

Map 17: Natural Vegetation (2007)

dvrpc



Source: NJDEP, NJDOT, DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

0 0.5 1 Miles

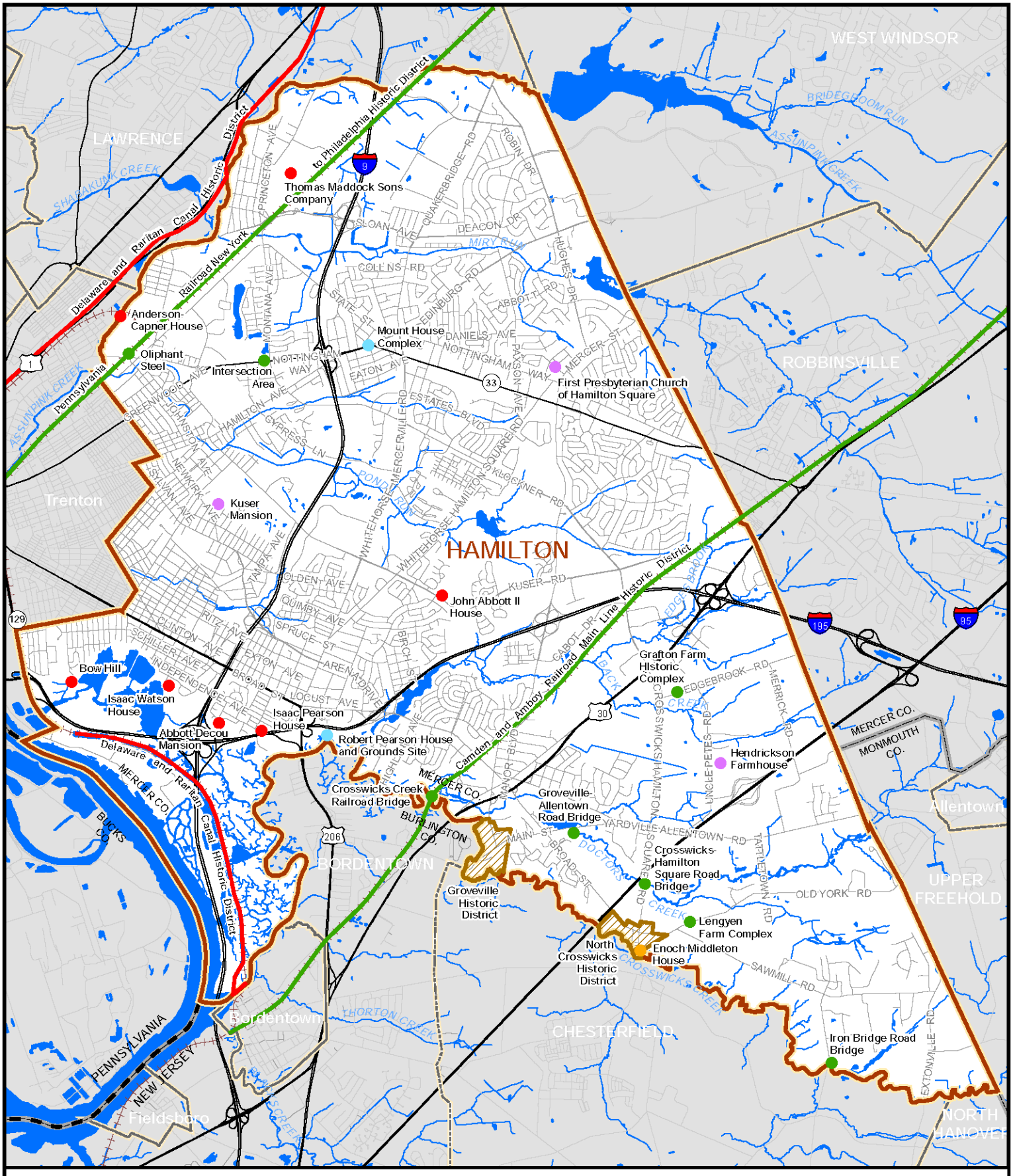
N

Map 18: Landscape Project Priority Habitats (2007)

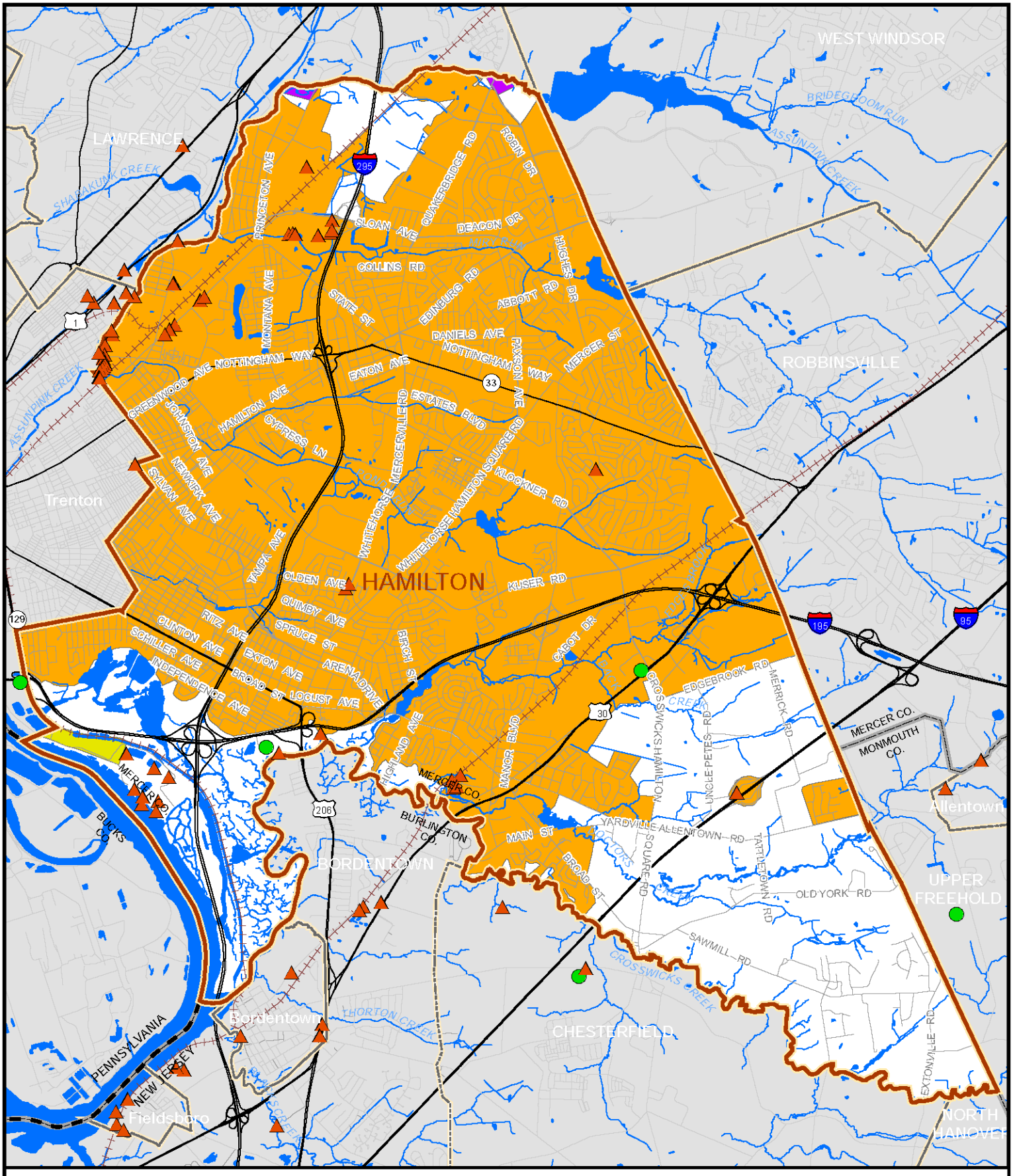
- Wood Turtle Habitat
- Bald Eagle Foraging Area

Emergent Wetlands	Forested Wetlands	Upland Forest	Grassland
Suitable	Critical	Critical	Critical
	Suitable	Suitable	Suitable

dvrpc



Map 19: Historic Resources



Source : NJDEP,NJDOT,DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

0 0.5 1 Miles

Map 20: Approved Sewer Service Area and NJPDES Permits

- NJPDES Permit for Discharge to Ground Water (2007)
- NJPDES Permit for Discharge to Surface Water (2009)

Approved Sewer Service Area
- Ewing-Lawrence SA
- Hamilton Township
- Trenton City

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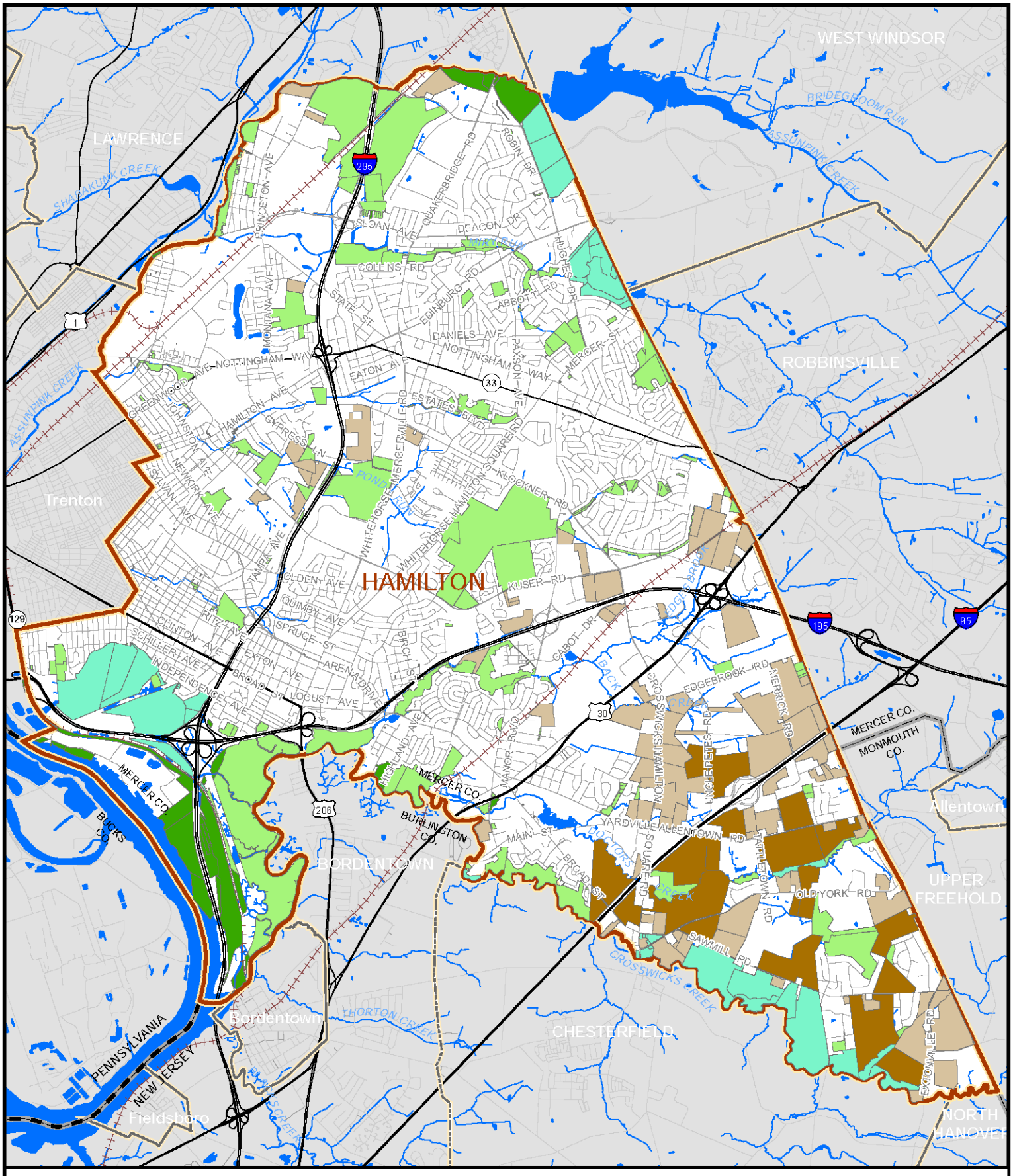

Source : NJDEP,NJDOT,DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

0 0.5 1
Miles

N

Preserved Open Space

- Municipal
- County
- State
- Farmland

Farm Assessed (Unpreserved)

Map 21: Open Space

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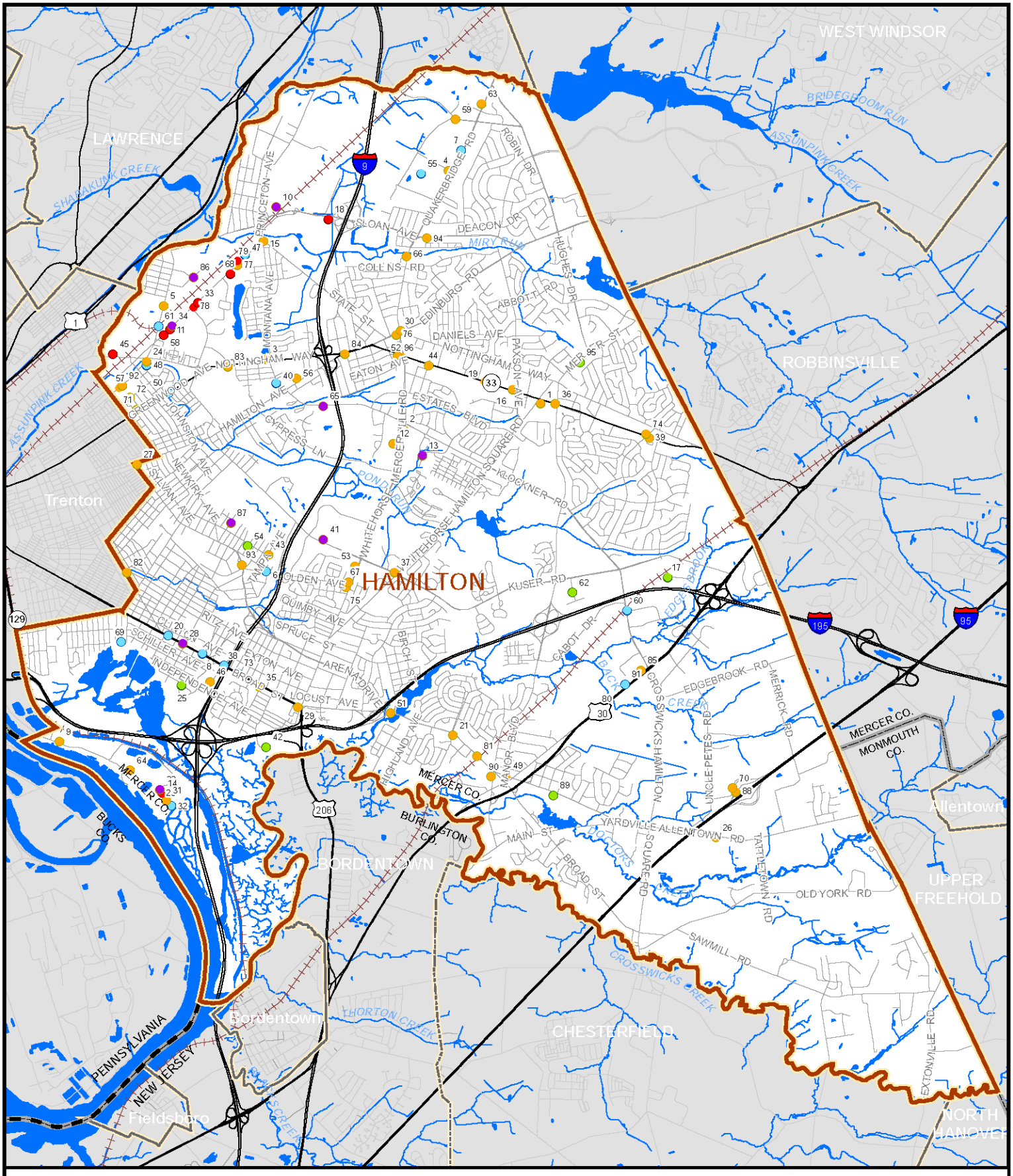

Source : NJDEP,NJDOT,DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

0 0.5 1 Miles

N

Map 22: Known Contaminated Sites (2009)

- B: Single Phase Remedial Action, Single Contamination Affecting Only Soils
- C1: No Formal Design, Source Known Potential Groundwater Contamination
- C2: Formal Design, Known Source with Groundwater Contamination
- C3: Multi-Phased Remedial Action, Unknown or Uncontrolled Discharge to Soil or Groundwater
- D: Multi-Phased Remedial Action, Multiple Source/Release to Multi-media Including Groundwater

Numbers refer to "Map ID" field in Appendix F

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Publication Title:	Hamilton Township Environmental Resource Inventory
Publication Number:	11053
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Key Words: Agriculture, air quality, aquifers, Assunpink Creek, biodiversity, biological resources, built environment, climate, conservation, Crosswicks Creek, Delaware River, development, endangered species, environmental issues, environmental resource inventory, floodplains, forests, grasslands, groundwater, habitat, land preservation, Landscape Project, master planning, Mercer County, natural resources, New Jersey, open space, population, soils, steep slopes, topography, U.S. Census, vernal pools, water quality, watersheds, wetlands.

Abstract: This publication documents the natural and community resources of Hamilton Township, Mercer County, New Jersey. The natural resource information includes descriptions, tables, and maps of: land use; soils; drinking water, aquifers, and wells; surface waters, including watersheds, streams, lakes, wetlands, and floodplains; impacts on water resources and surface water quality; impervious coverage; vegetation, including wetlands, forests, and grasslands; animal communities; threatened and endangered species; Natural Heritage Priority Sites; Landscape Project Priority Habitats; and known contaminated sites. Community resources that are briefly described include population, transportation, township utilities and services, historic sites and buildings, and protected open space. A short history of the community is also included.

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