ENVIRONMENTAL RESOURCE INVENTORY

ERI

MARCH 2012

For the Township of:

ROBBINSVILLE

Mercer County, New Jersey

by:

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

with:

The Environmental Commission of Robbinsville Township

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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.

DVRPC fully complies with Title VI of the Civil Rights Act of 1964 and related statutes and regulations in all programs and activities. DVRPC's website (www.dvrpc.org) may be translated into multiple languages. Publications and other public documents can be made available in alternative languages and formats, if requested. For more information, please call (215) 238-2871.

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Acknowledgements

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

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All photos courtesy of the Robbinsville Township Environmental Commission.

CHAPTER 1

Executive Summary

The purpose of this Environmental Resource Inventory (ERI) is to identify and describe the natural resources of Robbinsville Township.

A community's natural resources–-its soil, water, air, forests, fields, and waterways–-as well as its human and cultural history, are fundamental to its character. They are the foundation for its economic success and its quality of life. 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 by providing an objective documentation and categorization of the natural and historic resources of the town. The ERI does this by compiling maps and descriptions of ecological and natural resources (e.g., water resources, forests, soils, natural vegetation, wildlife, threatened and endangered species habitat, etc.) and anthropogenic resources (e.g., agricultural lands, parks, and historic and cultural resources). Full utilization of the ERI is achieved by incorporating it into the township's Master Plan, thereby providing an important reference document for both town planners and the general public.

Because the nature and extent of environmental resources may change with time, and because the natural resource data upon which this document is based is periodically updated and improved, the ERI is considered a "live" document, intended to be updated on a periodic basis so that it may continue to be relevant.

Robbinsville's natural resources have long shaped the lives of its inhabitants. The Lenape Indians, who inhabited the lands of Robbinsville for thousands of years before the arrival of Europeans, relied upon fish, game, and plants from the area's streams and upland forests. They also made good use of the region's rich agricultural soils. The high quality soils of the Robbinsville area also played a major role in its settlement by Europeans. Almost immediately after their arrival, Quaker and Presbyterian settlers began to clear the forest and work the land, cultivating grain, fruits, and vegetables.

In recent decades, significant areas of the township have experienced suburban growth, representing a break from its long agricultural past. According to the New Jersey Department of Environmental Protection's (NJDEP's) most recent land use/land cover survey (2007), approximately one-third of Robbinsville Township

is now classified as “developed land,” with the remaining two-thirds being classified as “undeveloped.”

Despite intense development pressure over the past 25 years, the township has been comparatively successful in preserving open space. Robbinsville voters approved an open space tax in 2005 to generate dedicated funds for land preservation. Robbinsville is focused on acquiring conservation easements on as much of the township’s remaining farmland as is practical. As of July 2009, some 3,153 acres, or 24 percent of Robbinsville’s total acreage, has been permanently preserved for open space through purchases and easements. Of this total, 541 acres are municipally owned, 252 acres are owned by the county, and 1,050 acres are owned by the state. These areas are used for parkland, natural resource conservation, watershed protection, and wildlife refuges. The township also contains 1,310 acres of preserved farms. As a consequence of continuing development pressure and land preservation activities, the amount of unprotected open space remaining in the township has continued to decline. Nevertheless, with approximately 6,500 acres of unprotected open space remaining in the township, documentation of Robbinsville’s environmental resources is a necessity, if Robbinsville is to maintain its remaining rural areas, the integrity of its natural resources, its environmental quality, and its high standard of living.

Robbinsville’s ecology (i.e., plants, animals, and their natural environment) and environmental resources (i.e., surface and groundwater resources, soils, etc.) have become increasingly stressed due to increased pressure placed upon them by continuing development. The area’s wetlands, upland forests, and grasslands provide significant habitat for a wide range of plants and animals. The ability of natural areas to help filter and eliminate urban pollution is vital to the continued health of the community and the enjoyment of its citizenry. Knowledge of the environmental resources of Robbinsville will allow its officials and citizens to make informed decisions as they strive to maintain Robbinsville’s identity and create a sustainable, healthy landscape.

Several documents and reports were utilized in preparing the Environmental Resource Inventory for Robbinsville Township, including Robbinsville Township’s Master Plan from 2000 (available at the public library, the township municipal office, and the official township website), as well as a number of reference works. These are listed at the end of this document. The maps and data relating to natural resources in Robbinsville Township are principally derived from NJDEP’s Geographic Information System mapping and from The Landscape Project produced by the Endangered and Nongame Species Program of the New Jersey Fish and Wildlife Division. This information is available on the NJDEP website, which provides access to data that may be updated in the future.

Somewhat lengthy introductions to some topics, e.g., surface water monitoring and groundwater, have been included in the ERI to give readers background on these complex topics. This detail will assist the Environmental Commission and other township officials to better understand resource attributes and interactions.

There are also references to additional data from state sources to provide insight into the types of investigations that may still need to be conducted. This ERI can assist the Environmental Commission in assessing the adequacy of development plans relative to township ordinance 142-81: Submission of Preliminary Plats and Preliminary Plans, and the content of the Environmental Impact Assessment (EIA) required therein. In addition, this ERI can be used to assess the adequacy of township ordinances relative to environmental matters.

Report Organization

The ERI is organized as follows:

- Chapter 2: Human and cultural history associated with the region in general and Robbinsville in particular
- Chapter 3: Geography and land use statistics for the township
- Chapter 4: Physiography and topography, climate, and soils
- Chapter 5: Surface water resources, including watersheds, streams, wetlands, vernal pools, and floodplains
- Chapter 6: Groundwater resources, including geology, aquifers, and drinking water supplies
- Chapter 7: Biological and ecological resources including natural vegetation, plant and animal communities, environmentally sensitive areas, and threatened and endangered species
- Chapter 8: The built environment, including population, transportation, historic resources, and open space
- Chapter 9: Environmental issues, including contaminated sites and flooding
- Chapter 10: Relevance of the ERI to township ordinances
- Chapter 11: References for further information

CHAPTER 2

Brief Township History

Colonial settlement in the Robbinsville[1] area began during the late 17th century, but the human history of the region dates back thousands of years. The earliest inhabitants of the area today known as Robbinsville were the Lenape Indians (called the “Delawares” by the English). These migratory people ranged throughout New Jersey along the banks of the Delaware River and its tributaries, leaving a legacy of stream names throughout the area. For example, Assunpink Creek, the largest waterway in Robbinsville, is Lenape for “rocky place that is watery.” Early Native American communities thrived on the area’s rich natural resources. The region’s creeks and forested uplands provided resources for hunting, fishing, pottery-making, and simple farming.

Although the Lenape Indians were the original inhabitants of the land, by the early 1700s they were almost entirely displaced by European settlers, who received land grants from the East Jersey Board of Proprietors starting around the turn of the 18th century. Quaker and Presbyterian settlers moved into the area by way of Old York Road, an early trail which today forms part of the line between Mercer and Monmouth Counties, as well as the southeast border of Robbinsville. European settlers came in search of religious freedom and to farm the generally flat and very fertile soils of Robbinsville. Numerous streams and rivers provided plentiful opportunities for mills and water transportation.

The first European to establish residence within the eventual boundaries of Robbinsville is believed to be Robert Burnet, a Scottish Quaker who received a 4,000-acre grant stretching across Robbinsville, Allentown and Upper Freehold in 1690, and who settled his tract in 1700. He was followed by Augustine Gordon, another Scottish Quaker. There were soon two main groups of settlers in the area now known as Robbinsville: a group of Presbyterian immigrants from Monmouth County, who settled along Old York Road and attended the Allentown Presbyterian Church, founded in 1720; and a group of Quakers from Nottingham in Burlington County who settled in the western portion of the township.

The Village of Allentown, to the southeast of present-day Robbinsville, developed around the mills of Nathan Allen on Doctor’s Creek. The historic mill remains a

[1]Although known as Washington Township until 2008, the ERI refers to the township as Robbinsville Township in this history section.

landmark in Allentown. Allen, son-in-law to Robert Burnet, owned what is now the Wittenborn property, but the current house is probably from a later date.

The earliest hamlets within Robbinsville began to form around this time along Old York Road; these included Sharon (now New Sharon), which included establishments such as the “Inn of the Crooked Billet” (aka Cattail Tavern) and a cider distillery; as well as Cabbagetown, now known as New Canton.

Until its demolition in 2008, the Inn of the Crooked Billet was most likely the oldest structure in Robbinsville. The Inn was privately owned for years and used as a residence. Under private ownership, the residence fell into extreme disrepair. After the owner passed away, Robbinsville purchased the property hoping to find a way to preserve it. Unable to obtain funding to save the residence, the township eventually had to declare the structure unsafe. After documenting the structure through photos, a salvage company was hired to remove and preserve any possible historic elements before the structure was demolished.

During the Revolutionary War, Robbinsville’s proximity to Trenton and Princeton (both the site of major battles during the winter of 1776--1777) ensured its contribution to the war’s history. Troops moved through the area along Trenton Road (now Robbinsville-Allentown Road) and encamped in the town during 1778.

The area that is now Robbinsville was initially the southernmost tip of Piscataway Township, established by the New Jersey legislature in 1710 to include wide swaths of central New Jersey. By 1724, Piscataway’s land south of the Raritan River became New Brunswick Township, and in 1741, the southernmost portion of New Brunswick was chartered as the Township of Windsor, which was further subdivided into East and West Windsor in 1791. After this subdivision, Robbinsville was still a part of East Windsor Township, and would remain so until 1859.[2]

While colonial settlement in present-day Robbinsville was concentrated in the township’s southern reaches, the northern portion of the town experienced significant growth after the American Revolution. In 1816, New Jersey funded a stagecoach line between New York and Philadelphia which would mostly follow present-day Route 130, and in 1818 the village of Centreville (now Windsor) was established along the line in an area known as Magrilla. More importantly, in 1830 the Camden and Amboy Railroad was granted a charter to link the Raritan and Delaware Rivers. By 1832, this line ran from Bordentown to Hightstown, and brought some of the nation’s first railroad service to Robbinsville, with stops in Robbinsville at the villages of Centreville and Newtown Station.

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[2]See http://mapmaker.rutgers.edu/MERCER_COUNTY/MercerCounty.html for an 1849 map of Mercer County showing the municipality boundaries.

Commercial service along the Camden and Amboy Railroad in 1833 spurred tremendous growth at its stations. In 1846, Centreville renamed itself Windsor so it could receive its own post office, as there was another Centreville already established in Hunterdon County. At that time, Windsor boasted a hotel, several general stores, a freight depot, and industry such as mills and a brick-making establishment.

Newtown grew as well and a post office was established there in 1844. The post office was named Robbinsville, although the town did not change its name officially. Robbinsville takes its name from George R. Robbins, a popular U.S. congressman from the area. In 1859, the area had grown large enough to constitute its own township, and the legislature established Washington Township from the southern half of East Windsor, effectively creating present-day Robbinsville.[3] Washington Township's boundaries remained the same until 1996, when a slight jag was introduced on the border with Hamilton, taking in the entirety of Mercer Mobile Home Park. The current boundary of the township is shown on **Figure 2: Robbinsville Township**.

The Robbins family farmhouse on Hillcrest Farm dates back to the early 19th century. The Robbins can trace the land back to the 1700s when the King of England indentured about 120 acres, called the Milford Tract, to Moses Robins (as the name was then spelled). The land was bought in 1818 by David Robbins and it is believed that he built the house.

The property has passed through five generations within the Robbins family, the namesake of Robbinsville. In 1850, David Robbins passed the land on to his son, Elisha, who handed it down to his son, Milnor, in 1900. Lester Robbins obtained the land in 1945. Washington Township purchased the house (one of the few surviving brick farmhouses in Mercer County) and approximately 23 acres from Dr. Lester Robbins, Jr. in July 2001. Additional funds came from the Green Acres program and Mercer County. The Delaware and Raritan Greenway was instrumental in helping the township purchase the property.

[3]See http://mapmaker.rutgers.edu/MERCER_COUNTY/MercerCounty.html for an 1872 map of Mercer County showing the municipality boundary of Washington Township and the location of both Robbinsville and Windsor.

Robbins house

Robbins house property

Washington Township, which officially changed its name to Robbinsville in 2008, remained a mostly agricultural community throughout the late 19th and early 20th century, with much of the land's original forest being cleared for cultivation. Forested areas tended to remain only in the wet marshland along streams such as the Assunpink Creek, Miry Run, Indian Run and Bear Brook.

Reaching a population of 1,294 in 1875, the township was operating six one-room schoolhouses, which operated until the Windsor and Robbinsville Schools were opened in the early years of the 20th century. One of these schools, the former Union School built in 1873, was moved to the municipal complex next to the Senior Center and is now referred to as ”the little red schoolhouse” (see photo below).

The former “Union School District #45” or “little red schoolhouse” built in 1873

During the late 19th century, the center of wheat and grain production moved to the Midwest. Farmers in Robbinsville Township largely switched to farming vegetables such as tomatoes, corn, beans, and potatoes.

During the 20th century, perhaps the most significant development in Robbinsville was the transition to a primarily automotive-based transportation system. Route 130 was widened, roads were constructed, and the Windsor rail station shuttered during this time. In 1951, the New Jersey Turnpike (NJT) was built across the farms of southern Robbinsville, although there were no interchanges in the township when it was first constructed. The turnpike was one of the first modern high-speed toll roads in the nation and was a precursor to and eventual part of President Eisenhower’s Interstate Highway System.

The rise of the automobile occurred alongside the decline of rail-based transportation. The Camden and Amboy Railroad passed into the hands of other rail companies. Although the railroad continued to carry freight in the 20th century, it has been entirely unused for decades.

Robbinsville also took part in early aviation history. Two airports built in the first half of the 20th century initially served the agricultural community (e.g., crop dusting). The airports also served the U.S. military for paratrooper training, and were also training sites for the Israeli Air force. The Trenton-Robbinsville Airport off Sharon Road continues to serve private aircraft and charter flights.

The Trenton-Robbinsville Airport serves private aircraft and charter flights.

With the end of World War II and the establishment of the automobile as a primary commuting option, Robbinsville Township began to experience suburban growth. The township began a formal planning initiative with the adoption of its first zoning ordinance in 1949 and a land subdivision ordinance in 1954. By the late 1950s and early 1960s, the township saw its first major developments with the Windswept and Hillside Terrace tracts and the Sharon Road School. However, Robbinsville Township was still far enough from major employment centers that these developments remained isolated in an agricultural landscape for many years. After the construction of I-195 and the interchange with the NJT in the 1970s, Robbinsville Township had much more direct access to New York and Philadelphia, Trenton, and the Jersey Shore.

In 1971, the township issued its first Master Plan. The state of New Jersey enacted a new municipal land use law in 1975, which empowered municipalities to plan and control development. In 1978, the township received a grant to prepare a growth management plan, which was completed in 1980.

Robbinsville Township grew rapidly during the 1980s. In 1985, the township adopted a new Master Plan that featured a long-term land use plan. The plan was amended in 1987 to better coordinate short-term plans with zoning

regulations. Between 1980 and 1990, the township grew from 3,487 residents to 5,815 residents.

Robbinsville Township addressed one aspect of its natural environment---wetlands---following the adoption of the Freshwater Wetlands Act in 1987. The township delineated its wetlands based on the presence of hydric soils, an indicator of wetland conditions, and it found that a significant area of the township fell into this category. As will be discussed in **Chapter 3**, approximately one-third of the township contains wetlands.

In 1990, in accordance with the state's municipal land use law, the township developed a Master Plan update that stressed the need for a new Master Plan to address significant changes in state and federal policy. In 1997, the township amended its master land use and transportation chapters to include a Town Center (see below). A revised Master Plan was published in 2000.

By 2000, the population of the township had grown to 10,275 residents. Between 1980 and 2000, over 4,000 new homes were built for residents attracted to the township's central location and rural lifestyle. As of 2000, almost half of all farmland in the township (approximately 6,000 of 13,000 acres) had been converted to developed use. While many of these new developments were low-density, single-family houses, a number of condominiums and townhouses were built as well, particularly in the Foxmoor development near the border with Hamilton Township.

In response to this changing landscape, planners in Robbinsville began planning for the creation of the Washington Town Center in 1985. This "neotraditional" or "new urbanist" community began construction in 2000. Washington Town Center is situated just west of the intersection of Route 33 and Route 130, by the village of Robbinsville. In addition, the township began an aggressive campaign of land preservation through the purchase of development rights of several farms in the township in an effort to preserve the rural, agricultural heritage of the community.

While these efforts have helped to guide growth and change within Robbinsville Township, they also serve to highlight the many drastic changes brought about by suburban development within the township. Whereas the Robbinsville Township of old was largely an agricultural community with local centers of commerce, large areas of the township now have suburban residential communities. Currently, the town's commercial development is located primarily along Route 130. Washington Town Center also contains "main street"-style retail. Most industry is concentrated in the planned commercial development zone near the turnpike exit and I-195.

In recognition of the significant changes in the township, and in an effort to distinguish the community from other towns with the same name (there were six Washington Townships in New Jersey), voters approved a referendum on November 6, 2007 to change the name of the municipality from Washington Township to Robbinsville Township.

Today, the newly renamed Robbinsville Township is attempting to balance its continued growth with the desire to maintain its rich history and natural beauty, while working to create a cohesive, welcoming community. While new residential and commercial growth poses many challenges and opportunities for the township, Robbinsville has initiated proactive and successful efforts to retain its agricultural heritage, natural beauty, and environmental health.

CHAPTER 3

Location, Size, and Land Use

Robbinsville is an incorporated township located in Mercer County, New Jersey. The township is bounded by six municipalities in two counties: Hamilton Township to the west, West Windsor Township to the northwest and East Windsor Township to the northeast in Mercer County; Millstone Township to the east, the Borough of Allentown to the south, and Upper Freehold Township to the south and southeast in Monmouth County. Robbinsville is located east of the City of Trenton, the county seat of Mercer County and state capital of New Jersey. The Assunpink Creek forms a small portion of the township's northern boundary, and Indian Run forms a small portion of the township's southern boundary. The township's location is depicted on **Figure 2: Robbinsville Township**.

Robbinsville Town Center is a compact, mixed-use new urbanist development.

Before January 1, 2008, Robbinsville was known as Washington Township, which had been its name since its establishment in 1859 from portions of East Windsor Township. Voters approved the change to Robbinsville on November 6, 2007. Prior to this name change, Washington Township had been one of six municipalities in the State of New Jersey with that name. Robbinsville was chosen as the new name because the area around the "town" of Robbinsville, in the western portion of the township, was by far its fastest-growing and most populous area, as well as one of its most recognizable place names.

Robbinsville occupies 13,160 acres, or 20.56 square miles, and is situated on the Inner Coastal Plain of New Jersey (see **Chapter 4: Physical Resources**). Robbinsville's land use reflects its natural setting, its agricultural past, suburban residential development that has occurred in recent decades, and the presence

of both I-195 and the NJT, which meet at Interchange 7A in the southern portion of the township (see **Figure 3: Aerial Photo (2007)**).

Over 33 percent of Robbinsville is classified as developed or "urban." Most development in Robbinsville is concentrated in the western half of the township due to its relative proximity to the regional hub of Trenton. In addition, the township is on the edge of both the Philadelphia and New York City metropolitan areas and has easy access to major highways. While most of Robbinsville's post-WWII growth has been due to suburban single-family housing, over the past decade much growth has occurred in Robbinsville Town Center. Formerly called the Washington Town Center, this compact, mixed-use new urbanist development contains over 1,000 units of housing. **Figure 4: NJDEP Land Cover (2007)** depicts Robbinsville's general land use classifications.

Robbinsville Town Center

In recent years, there has been significant commercial development in the Planned Commercial Development (PCD) zone in the southeastern area of the township bordered by the NJT, I-195, and Route 539. Commercial development along Route 130, by contrast, has been limited due to the absence of sewer service. The township has recently voted to extend sewer lines in order to promote growth in this area. Development in the vicinity of the Trenton-Robbinsville Airport, which serves the general aviation market in the Mercer County area, has also been limited due to the regulations of the Air Safety Hazard Zone. (This zone is illustrated on the township's zoning map available on the township's website).

Before extensive European settlement in the late 18th century, much of the township was covered with a mostly mixed deciduous hardwood forest consisting

of maple, oak, beech, walnut, and ash trees. As of 2007, just eight percent of Robbinsville was forested. Most of Robbinsville's original forested uplands were felled and converted to agricultural uses in the 18th and 19th centuries. About 24 percent of land in the township is dedicated to agricultural uses. The most extensive agricultural crops in Robbinsville are corn, soy beans, and landscape tree farms.

Wetlands cover 31 percent of the township, and an additional one percent is occupied by open water. Nearly all of these wetlands are freshwater palustrine,[4] encompassing wooded wetlands, swamps, marshes, bogs, and small ponds, with forested wetlands being the most prevalent of these categories. Robbinsville's wetlands are concentrated along the banks of Assunpink Creek, Miry Run, and their various tributaries. Most nonwooded wetlands within Robbinsville are modified agricultural wetlands (see the section **Chapter 5. Surface Water Resources: Wetlands**), which cover about seven percent of Robbinsville's land area.

The remaining two percent of Robbinsville's land area was classified by NJDEP as "barren land" in 2007.[5] **Figure 1** and **Table 1** show Robbinsville's land cover grouped into general categories based on the NJDEP's 2007 color infrared digital imagery. These categories are also depicted on **Figure 4: NJDEP Land Cover (2007)**.

Table 2 breaks down the 2007 general land use/land cover categories for Robbinsville Township into detailed land cover categories.

In addition, DVRPC collects its own land use data based on visual analysis of aerial photography. The most recently available data is based on aerial photography taken in 2005. DVRPC distinguishes between built environment types, while the NJDEP identifies differences in the natural environment. However, a comparison can still be instructive. As shown in **Figure 5: DVRPC Land Use (2005),** continued development is evident in the Town Center area.

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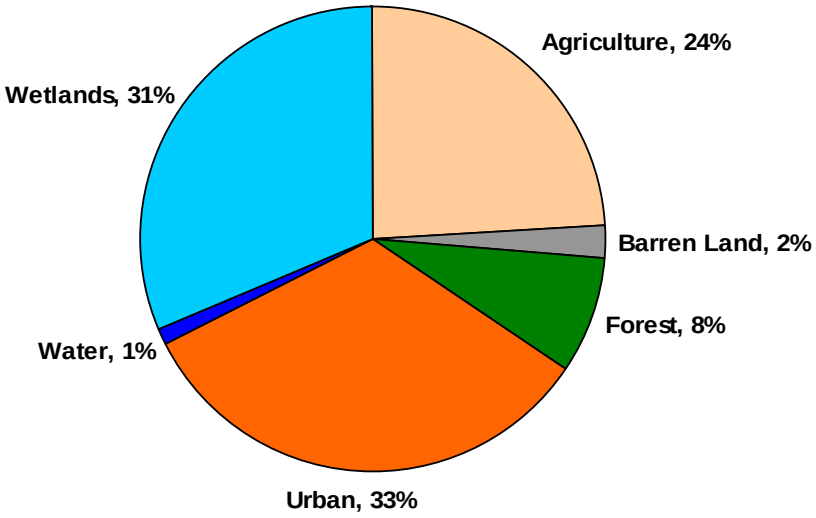
[4]Palustrine relates to a system of inland, nontidal wetlands characterized by the presence of trees, shrubs, and emergent vegetation (vegetation that is rooted below water but grows above the surface). Palustrine wetlands range from permanently saturated or flooded land (as in marshes, swamps, and lake shores) to land that is wet only seasonally (as in vernal pools).

[5]Barren lands are characterized by thin soil, sand, or rocks, and a lack of vegetative cover in a nonurban setting. Barren land is found in nature but can also result from human activities. Extraction mining operations, landfills, and other disposal sites compose the majority of human-altered barren lands.

Figure 1: Generalized Land Use in Robbinsville



Source: NJDEP 2007

Table 1: Robbinsville Township General Land Use/Land Cover Classes (2007)

General Land Use/Land Cover Class	Area (Acres)	Percent
Urban	4,369.99	33.21%
Wetlands	4,117.24	31.28%
Forest	1,062.42	8.07%
Agriculture	3,163.07	24.03%
Water	155.84	1.18%
Barren Land	291.90	2.22%
Total	**13,160.46**	**100%**

Source: NJDEP, 2007

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

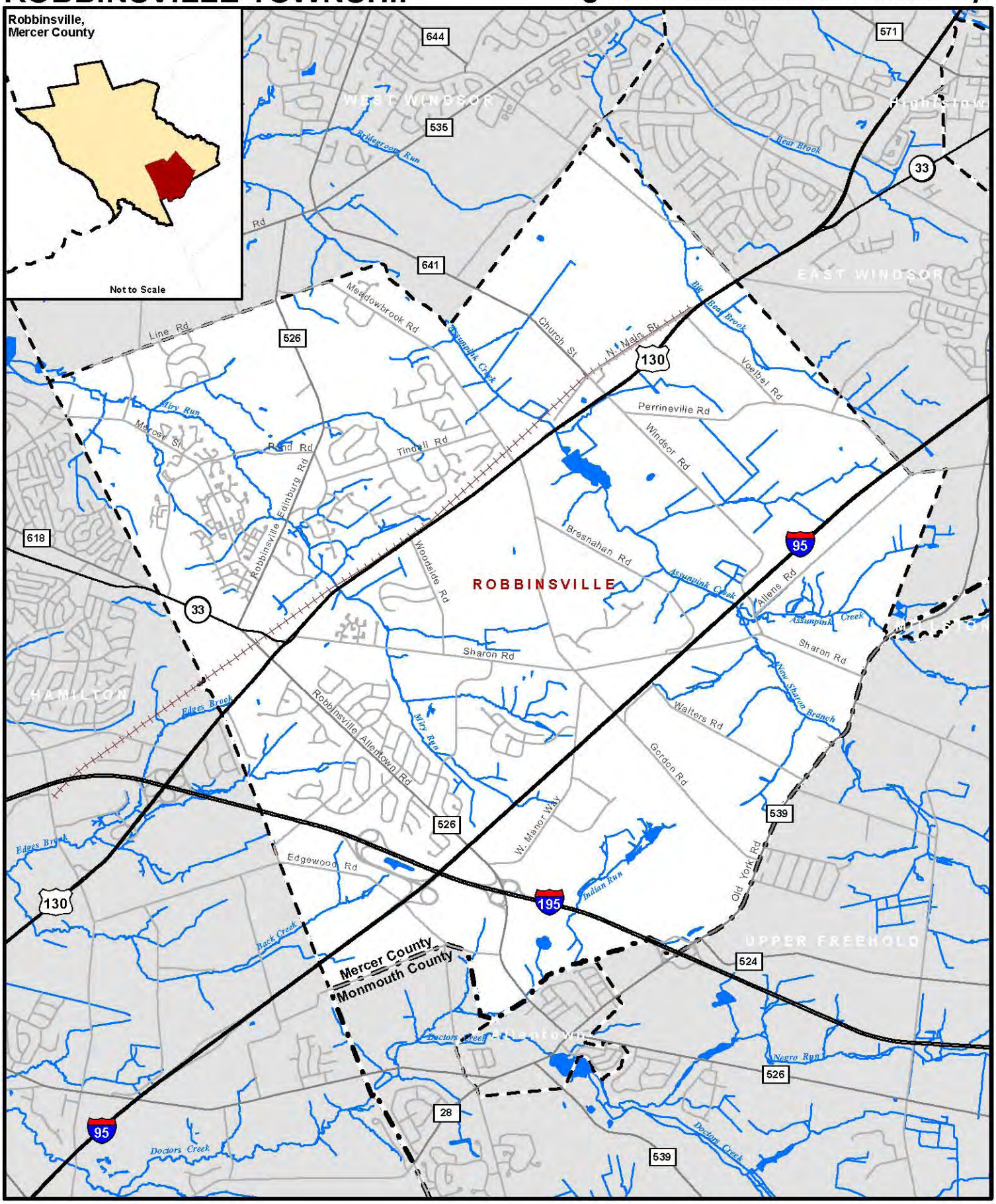
Detailed Land Use/Land Cover Class	Area (Acres)	Percent
Agriculture - Cropland and Pastureland	2,486.61	18.89%
Agriculture - Orchards/Vineyards/Nurseries/Horticultural Areas	560.10	4.26%
Agriculture - Other Agriculture	116.36	0.88%
Barren Land - Altered Lands	2.38	0.02%
Barren Land - Transitional Areas	289.53	2.20%
Forest - Coniferous Brush/Shrubland	4.53	0.03%
Forest - Coniferous Forest (10--50% Crown Closure)	7.89	0.06%
Forest - Coniferous Forest (>50% Crown Closure)	0.02	0.00%
Forest - Deciduous Brush/Shrubland	186.50	1.42%
Forest - Deciduous Forest (10--50% Crown Closure)	154.19	1.17%
Forest - Deciduous Forest (>50% Crown Closure)	361.11	2.74%
Forest - Mixed Deciduous/Coniferous Brush/Shrubland	205.00	1.56%
Forest - Mixed Forest (>50% Deciduous with 10--50% Crown Closure)	1.66	0.01%
Forest - Old Field (<25% Brush Covered)	141.52	1.08%
Urban - Athletic Fields (Schools)	63.66	0.48%
Urban - Cemeteries	35.40	0.27%
Urban - Commercial/Services	214.03	1.63%
Urban - Industrial	347.00	2.64%
Urban - Industrial and Commercial Complexes	15.41	0.12%
Urban - Major Roadway	200.02	1.52%
Urban - Mixed Transportation Corridor Overlap Area	0.18	0.00%
Urban - Mixed Urban or Built-Up Land	2.34	0.02%
Urban - Other Urban or Built-Up Land	572.40	4.35%
Urban - Railroads	22.17	0.17%
Urban - Recreational Land	239.73	1.82%
Urban - Residential, High Density, or Multiple Dwelling	304.72	2.32%
Urban - Residential, Rural, Single Unit	824.03	6.26%
Urban - Residential, Single Unit, Low Density	1,101.88	8.37%
Urban - Residential, Single Unit, Medium Density	146.12	1.11%
Urban - Stormwater Basin	153.03	1.16%
Urban - Transportation/Communication/Utilities	88.28	0.67%
Urban - Upland Rights-of-Way Developed	7.15	0.05%

Detailed Land Use/Land Cover Class	Area (Acres)	Percent
Urban - Upland Rights-of-Way Undeveloped	32.43	0.25%
Water - Artificial Lakes	113.96	0.87%
Water - Bridge Over Water	0.29	0.00%
Water - Natural Lakes	22.30	0.17%
Water - Streams and Canals	19.28	0.15%
Wetlands - Agricultural Wetlands (Modified)	893.97	6.79%
Wetlands - Deciduous Scrub/Shrub Wetlands	218.99	1.66%
Wetlands - Deciduous Wooded Wetlands	2,706.12	20.56%
Wetlands - Disturbed Wetlands (Modified)	28.34	0.22%
Wetlands - Former Agricultural Wetland (Becoming Shrubby, Not Built Up)	29.56	0.22%
Wetlands - Herbaceous Wetlands	93.25	0.71%
Wetlands - Managed Wetland in Built-Up, Maintained Rec Area	4.32	0.03%
Wetlands - Managed Wetland in Maintained Lawn Greenspace	39.58	0.30%
Wetlands - Mixed Scrub/Shrub Wetlands (Coniferous Dom.)	9.74	0.07%
Wetlands - Mixed Scrub/Shrub Wetlands (Deciduous Dom.)	62.09	0.47%
Wetlands - Mixed Wooded Wetlands (Deciduous Dom.)	0.68	0.01%
Wetlands - Phragmites Dominate Interior Wetlands	6.14	0.05%
Wetlands - Wetland Rights-of-Way	24.47	0.19%
Total	**13,160.46**	**100.00%**

Source: NJDEP, 2007

ROBBINSVILLE TOWNSHIP

Figure 2: Robbinsville Township



Sources: 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.

Municipal Boundary
County Boundary
Stream
Lake

N

0.5 0.25 0 0.5
Miles

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ROBBINSVILLE TOWNSHIP

Figure 3: Aerial Photo (2007/2010)

Sources : 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.

Robbinsville Township

Municipal Boundary

County Boundary

N

0.5 0.25 0 0.5

Miles

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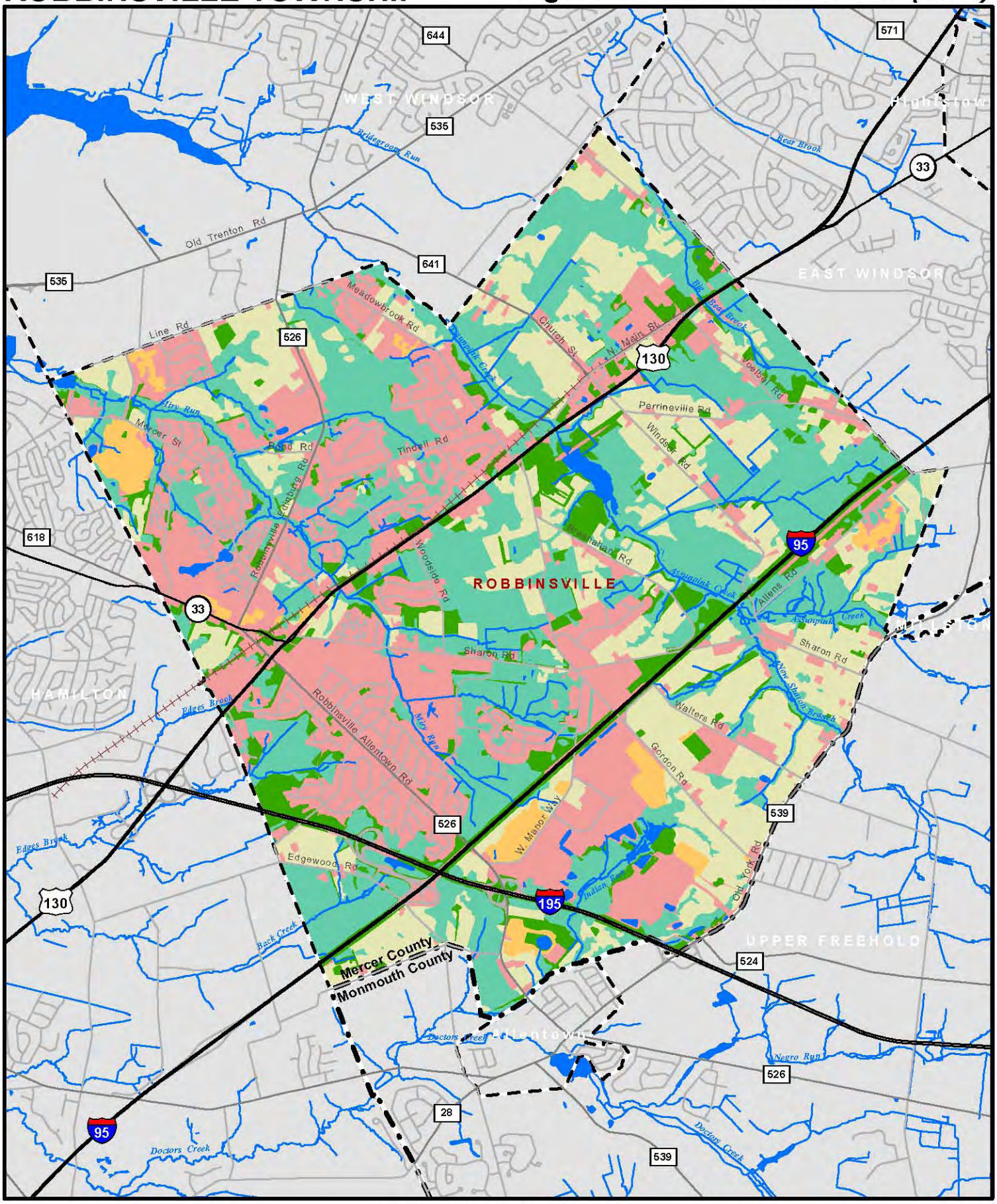
ROBBINSVILLE TOWNSHIP

Figure 4: NJDEP Land Cover (2007)



Land Cover Categories

Agriculture	Forest	Water
Barren Land	Developed	Wetlands

Sources: 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.

N

0.5 0.25 0 0.5
Miles

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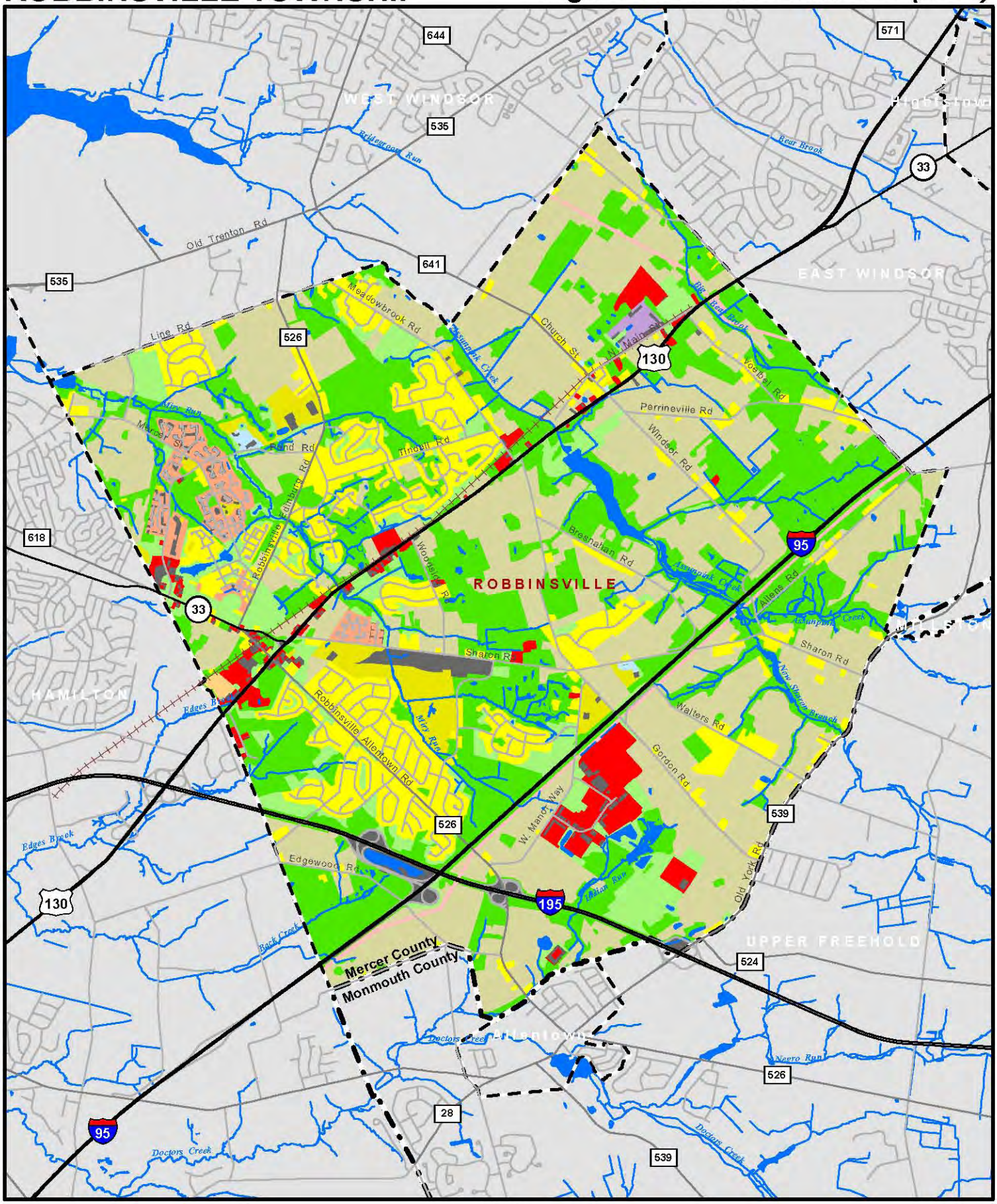
ROBBINSVILLE TOWNSHIP

Figure 5: DVPRC Land Use (2005)



Sources: 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.

Land Use Type

- Agriculture
- Commercial
- Community
- Light Manufacturing
- Residential: MobileHome
- Residential: Multi-Family
- Residential: Single-Family
- Parking & Transportation
- Recreation
- Utility
- Vacant
- Water
- Wooded

N

0.5 0.25 0 0.5

Miles

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CHAPTER 4

Physical Resources

This chapter presents a description of the physical resources of geography, geology, hydrology, and climate within the region and the township in particular. The relationship among these resources is an important consideration with respect to land use planning.

The township's geographic and geologic setting provides the basis for its land forms (i.e., topography) and natural resources (i.e., soil, surface water, wetlands, flora, and fauna). Topography and soils in turn affect the suitability of the land for agriculture, natural vegetation, and use for residential, commercial, or industrial purposes.

The township's hydrology, i.e., its surface water and groundwater, is closely related to its geology, topography, soils, and climate.

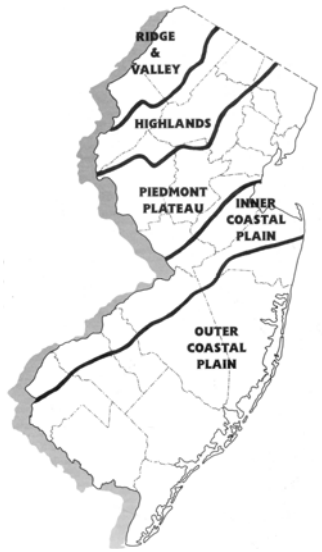
Physical Geography and Geology

Physical geography (also called Physiography) is the study of a location in relation to its geology and hydrology. The geology forms the foundation of the region in terms of the rocks and sediments present, and the hydrology or water cycle (including climate, surface water, and groundwater) causes erosion of the land surface into hills and valleys, where the valleys or low points are the location of the primary surface water features (streams and wetlands) and where groundwater and surface water generally interact. This section discusses the regional physiographic setting and the geology and topography of the township. Hydrology and the water cycle are discussed in detail in a following section.

Physiographic Setting

New Jersey is characterized by four physiographic provinces. These provinces are the Ridge and Valley Province, the Highlands Province, the Piedmont Plateau Province, and the Coastal Plain Province, illustrated in **Figure 6**. The Coastal Plain Province is further subdivided into the Inner Coastal Plain and the Outer Coastal Plain. The terrain of the four provinces is very diverse, with the rocky, hilly terrain of the Northern provinces at one extreme and sandy, flat terrain of the coast at the other.

Figure 6: The Physiographic Regions of New Jersey



Source: NJDEP

Robbinsville is located entirely within the Inner Coastal Plain, a few miles below the fall line, a drop in land level that separates the Inner Coastal Plain from the Piedmont Plateau. This line separates areas with considerable differences in geology, topography, and hydrology owing mostly to the fact that consolidated rock dominates the near-surface geology of the Piedmont Plateau and unconsolidated sediment (sand, silt, and clay deposits) dominate the near-surface geology of the coastal plain. The coastal plain represents the erosional outwash plain from bedrock highlands (former mountains) to the west

The fall line runs nearly parallel with U.S. Route 1 from Trenton to New York City and has numerous waterfalls marking its course. It is a boundary between older consolidated rock in areas to the north and younger, less consolidated rock—mostly gravel and sand—in the south. U.S. Route 1 runs to the north and west of Robbinsville, marking the boundary between the Piedmont Plateau and the Inner Coastal Plain.

The Inner Coastal Plain

The Atlantic Coastal Plain landscape extends from Massachusetts to Texas and is divided into Inner and Outer sections. In New Jersey, the Inner Coastal Plain is made up of interbedded sand, gravel, silt, and clay deposits originating from the breakdown of Appalachian and Catskill sedimentary, metamorphic, and igneous rocks. These deposits were reworked by periodic ocean inundation as the ocean shoreline advanced and receded over geologic time. As a result, the terrestrial deposits are interbedded with layers formed by oceanic (marine) deposition. The Inner Coastal Plain layers date from the Cretaceous Period, 135 to 65 million years ago. Generally, soils of the Inner Coastal Plain are quite fertile and the topography of the area is flat and low-lying.

Geology

As discussed in the previous section, the township's geology is associated with alluvial and marine erosional and depositional processes. This results in thick sequences of unconsolidated lithology consisting of granular sediments (gravel, sand, silt) and clay underlying the township. The lithology was generally deposited between 80 and 100 million years ago, and is the result of erosion of mountains from the west and encroachment of the ocean from the east. As shown in **Table 3** and **Figure 22**, and discussed in more detail in **Chapter 6**, the groundwater resource below most of the township is generally of poor quality because the sediments are so fine (silt and clay) that they will not readily conduct water.

Table 3: Subsurface Geologic Formations

Formation Name	Physiographic Province	Age	Composition	Groundwater Capacity
Potomac	Central and Southern - Coastal Plain Sediments	Upper Cretaceous: Lower Cenomanian	Primary: clay or mud Secondary: silt Tertiary: sand	Good (aquifer)
Magothy	Central and Southern - Coastal Plain Sediments	Upper Cretaceous: Middle and Lower Santonian	Primary: sand Secondary: clay or mud Tertiary: gravel	Good (aquifer)
Merchantville	Central and Southern - Coastal Plain Sediments	Upper Cretaceous: Lower Campanian	Primary: sand Secondary: clay or mud Tertiary: silt	Poor (aquitard)
Woodbury	Central and Southern - Coastal Plain Sediments	Upper Cretaceous: Lower Campanian	Primary: clay or mud Secondary: silt Tertiary: sand	Poor (aquitard)
Englishtown	Central and Southern - Coastal Plain Sediments	Upper Cretaceous: Lower Campanian	Primary: sand Secondary: clay or mud	Good (aquifer)

Source: USGS

The surficial materials associated with the township soils are the unconsolidated glacial, river, wetland, windblown, and hill slope sediments that overlie Coastal Plain formations, and which are the parent material for agronomic soils. **Table 4** and **Figure 7** provide the surface geology description.

Table 4: Surface Geology

Abbreviation	Geologic Name	Geologic Age	Lithology
Tp	Pennsauken Formation	Pliocene	Sand, clayey sand, pebble gravel, minor silt, clay, and cobble gravel; yellow, reddish yellow, white. Sand typically includes weathered feldspar. Locally iron-cemented. As much as 140 feet thick.
Qwcp	Weathered Coastal Plain Formations	Chiefly Pleistocene, Locally Miocene and Pliocene	Exposed sand and clay of Coastal Plain bedrock formations. Includes thin, patchy alluvium and colluvium, and pebbles left from erosion of surficial deposits.
Qtl	Lower Stream Terrace Deposits	Late Pleistocene, Late Wisconsinan	Sand, pebble gravel, minor silt and cobble gravel; reddish brown, yellowish brown, reddish yellow. As much as 30 feet thick.
Qal	Alluvium	Holocene and Late Pleistocene	Sand, gravel, silt, minor clay and peat; reddish brown, yellowish brown, brown, gray. As much as 20 feet thick.

Source: NJDEP

Topography and Surface Landscapes

Robbinsville Township is an average-sized municipality in Mercer County, with 13,160 acres. The landscape of Robbinsville is generally flat to gently sloping, typical of areas on the Coastal Plain. Robbinsville contains many wetlands scattered throughout the township, most of which are located along Assunpink Creek, Miry Run, Indian Run, and their tributaries (see **Chapter 5** for a detailed discussion on surface water hydrology).

The landscape in the eastern portion of the township contains mostly agricultural land and forest (primarily wooded wetlands), while the western half near Hamilton Township contains a higher density of developed lands. See **Figure 5: DVPRC Land Use (2005)**. The average elevation in Robbinsville is 112 feet above mean sea level (MSL). The highest elevation is about 155 feet near the center of the township, and the lowest elevation, which is around 60 feet, is found in the southern edge of the township on the banks of Indian Run.

Upland forest is found in small patches throughout the township, as shown on **Figure 25: Natural Vegetation (2007)**. Upland areas of the Inner Coastal Plain are characterized by rich soils that once supported deciduous forests of oak,

maple, beech, hickory, walnut, and ash trees. Most of Robbinsville's original upland forests have long since been converted to agricultural or developed uses.

Steep Slopes

Slope is measured as the percentage of vertical rise to horizontal distance. Robbinsville is generally flat with occasional gentle slopes; the vast majority of the township has slopes of five percent or less. However, steeper slopes do exist in the township. The steepest natural slopes (15 percent or greater) are found along the southeastern banks of Miry Run and Assunpink Creek. In addition, several man-made steep slopes occur where local roads cross the NJT. The 2000 Master Plan recommends that slopes above 10 percent should be left in their natural state, so as to prevent soil erosion and degradation of nearby water bodies. Robbinsville's zoning code prohibits the creation during development of slopes greater than 10 percent. The township code defines steep slopes as any land with a grade above 15 percent, and requires these "environmentally critical areas" to be set aside as open space during the development process.

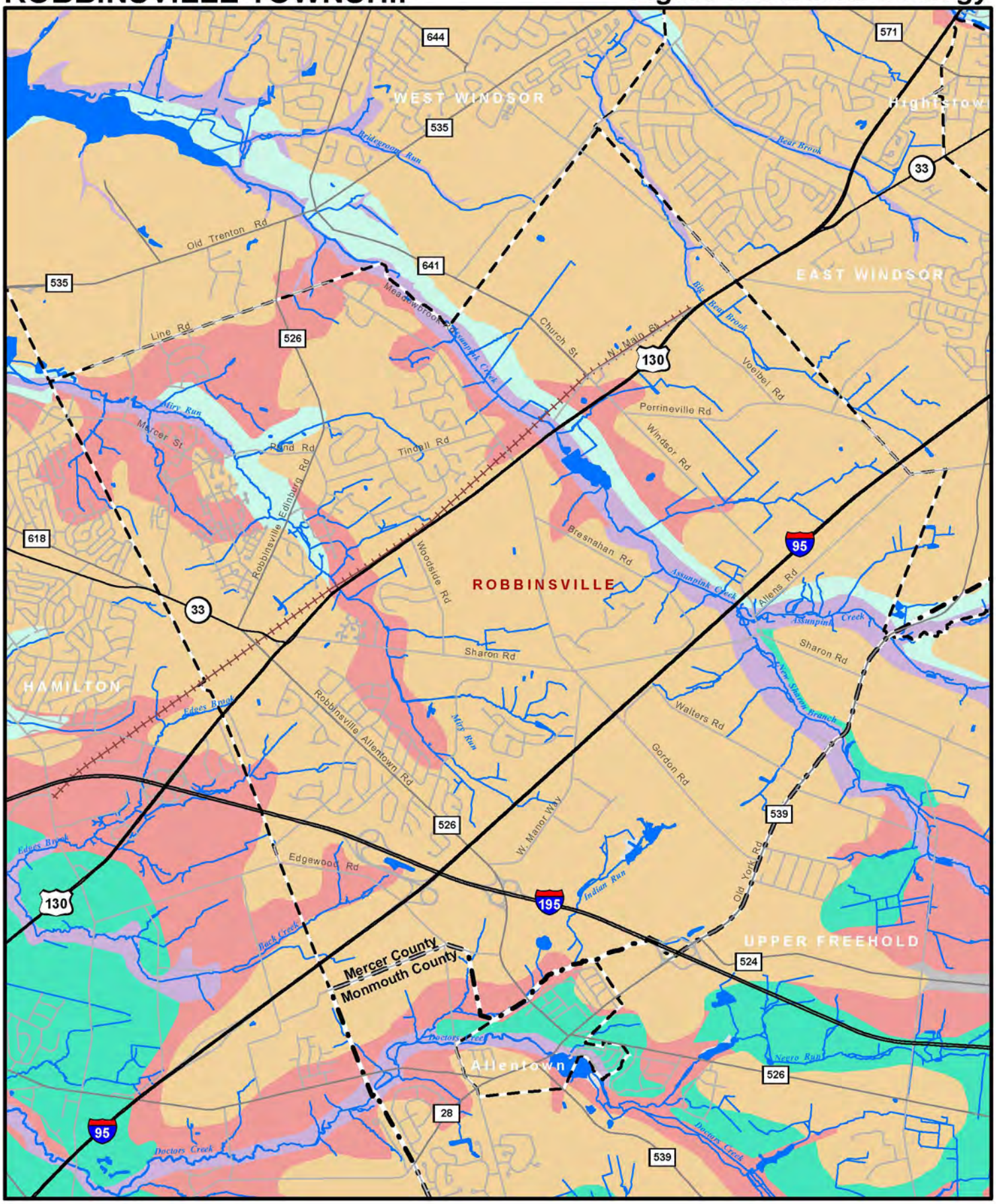
In general, Robbinsville's steeper slopes are well vegetated, although farm fields and residential properties may extend to the edge of the plateau. In some locations, development has occurred on the edge of steep slopes. In these instances, it is important that natural buffers and other stormwater best management practices are used to separate the slope from development to prevent runoff from eroding the slope.

Development of steep slope areas is inadvisable because it can result in soil instability, erosion, increased stormwater runoff, flooding, and sedimentation of the stream below. This results in degradation of water quality, habitat destruction, and potential damage to property. Erosion on steep slopes is especially prevalent where excessive tree removal has taken place**.**

Some of Robbinsville's healthiest forests and oldest trees are found along steep slopes. Robbinsville's steep slopes are depicted on **Figure 8: Steep Slopes.**

ROBBINSVILLE TOWNSHIP

Figure 7: Surficial Geology



Sources : 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.

- Qal - Alluvium
- Qtl - Lower Stream Terrace Deposits
- Qtu - Upper Stream Terrace Deposits
- Qwcp - Weathered Coastal Plain Formations
- Tg - Upland Gravel
- Tp - Pensauken Formation

N

0.4 0.2 0 0.4
Miles

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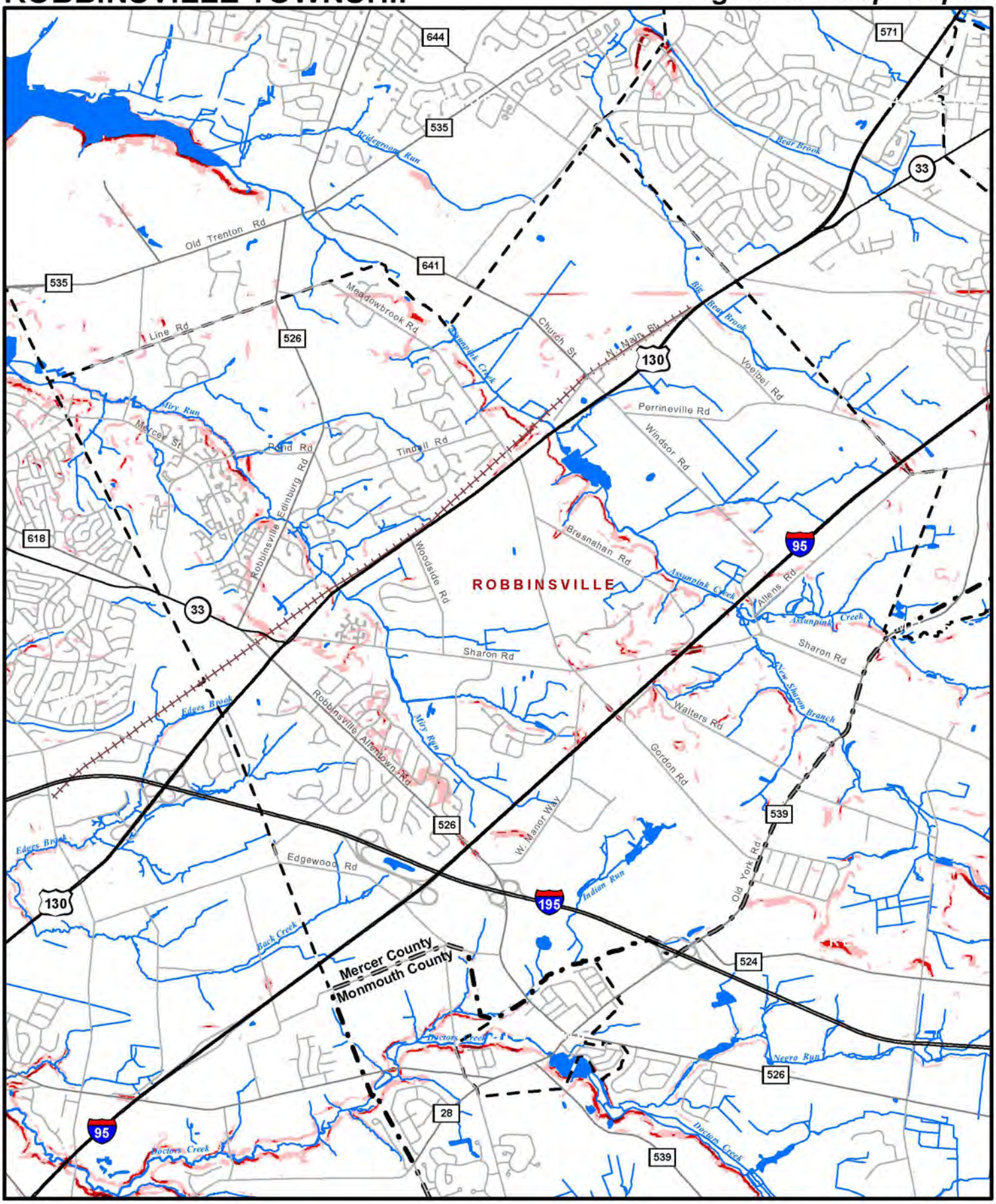
ROBBINSVILLE TOWNSHIP

Figure 8: Steep Slopes



Sources : 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.

Steep Slopes

- Slope <= 5%
- Slope = 5.01% - 10%
- Slope = 10.01% - 15%
- Slope > 15%

N

0.5 0.25 0 0.5

Miles

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Soils

Knowledge of local soils is fundamental to understanding a place's environment. A region's soil defines what vegetation is possible, thereby influencing agricultural uses. It also determines how land can be developed for other purposes. High quality soils are a valuable environmental resource, not only because of their high agricultural productivity, but also because they are a nonrenewable resource. If the soil is lost to erosion, it cannot be replenished on a human time scale**.** In addition, soils most suitable for agricultural purposes are also often among the most desirable for development.

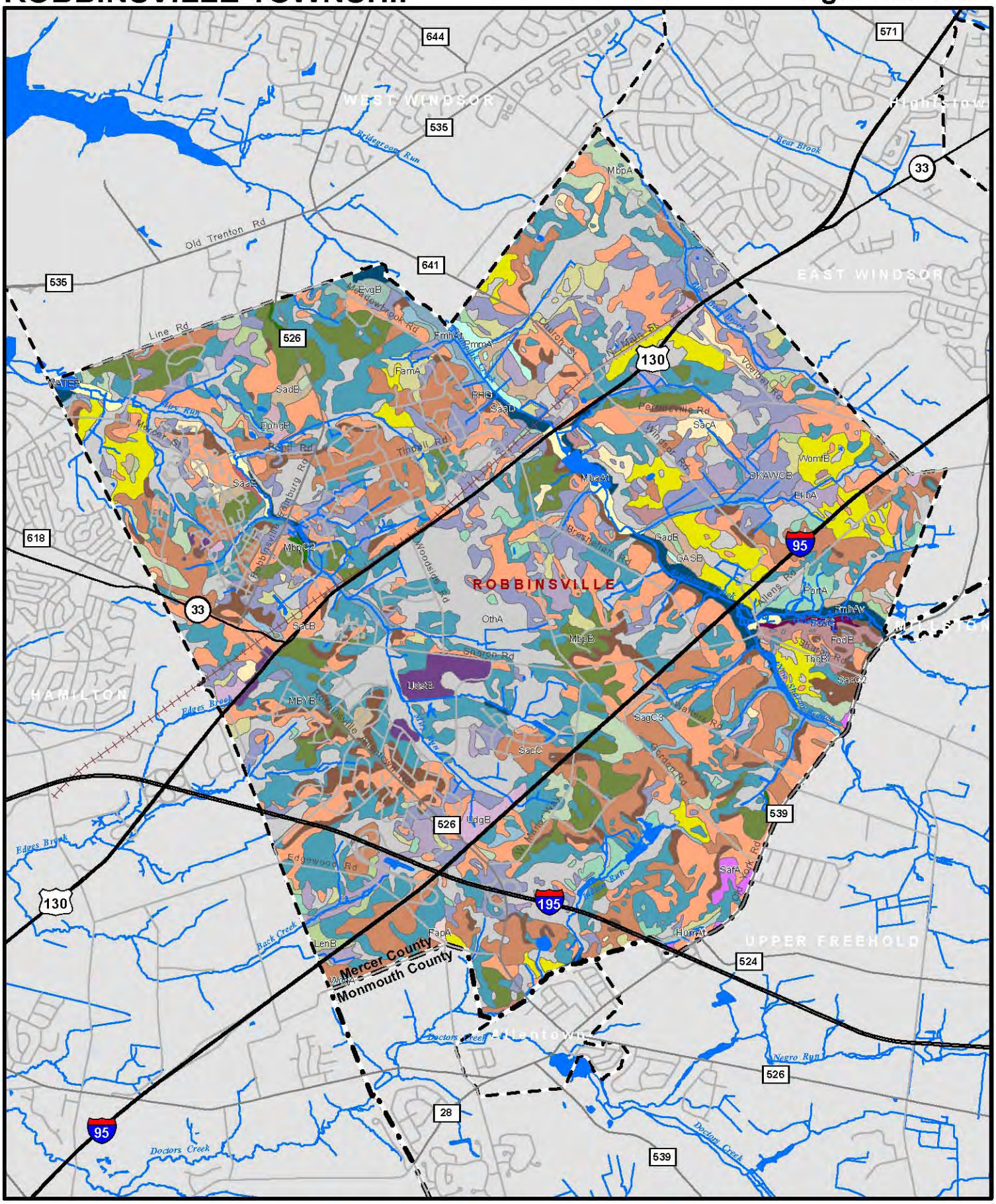
Robbinsville's soil types are predominantly those characteristic of the Inner Coastal Plain. Soils of the Inner Coastal Plain range from sand to clay and were formed from materials that were deposited in water. The thickness of the deposits ranges from several feet to hundreds of feet. The township's soils consist of 25 series types and 36 variations within those series, as identified by the US Department of Agriculture's Natural Resource Conservation Service. These are listed in **Table 6: Robbinsville Township Soils** and shown on **Figure 9: Soils**.

Soil Quality Classification

State and national agricultural agencies classify farmland soils into several categories: Prime Farmland Soils, Soils of Statewide Importance, Soils of Local Importance, Unique Farmland Soils, and Other Soils (soils not suitable for agricultural use). Each category of farmland soil is explained below. See **Table 5: Agricultural Values for Robbinsville Township Soils** for the percentage and acreage of soil in each category. Locations of soil categories are shown on **Figure 10: Agricultural Quality of Soils**. However, many areas that are identified as having agricultural suitability are developed and unavailable for agricultural purposes.

ROBBINSVILLE TOWNSHIP

Figure 9: Soils



Sources : NJDEP, NJDOT, DVRPC, NRCS. 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.

DohgB	FmhAv	HumAt	MbpC2	SaaE	SafA	WogA
EkbA	FodB	LenB	OthA	SacA	SagC3	WomfB
EvgB	FodC	MBYB	PHG	SacB	ThgB	
FamA	GASB	MbaAt	PmmA	SacC	UdgB	
FapA	GKAWOB	MbpA	PortA	SacC2	UdstB	
FmhAt	GadB	MbpB	SaaD	SadB	WATER	

N

0.5 0.25 0 0.5

Miles

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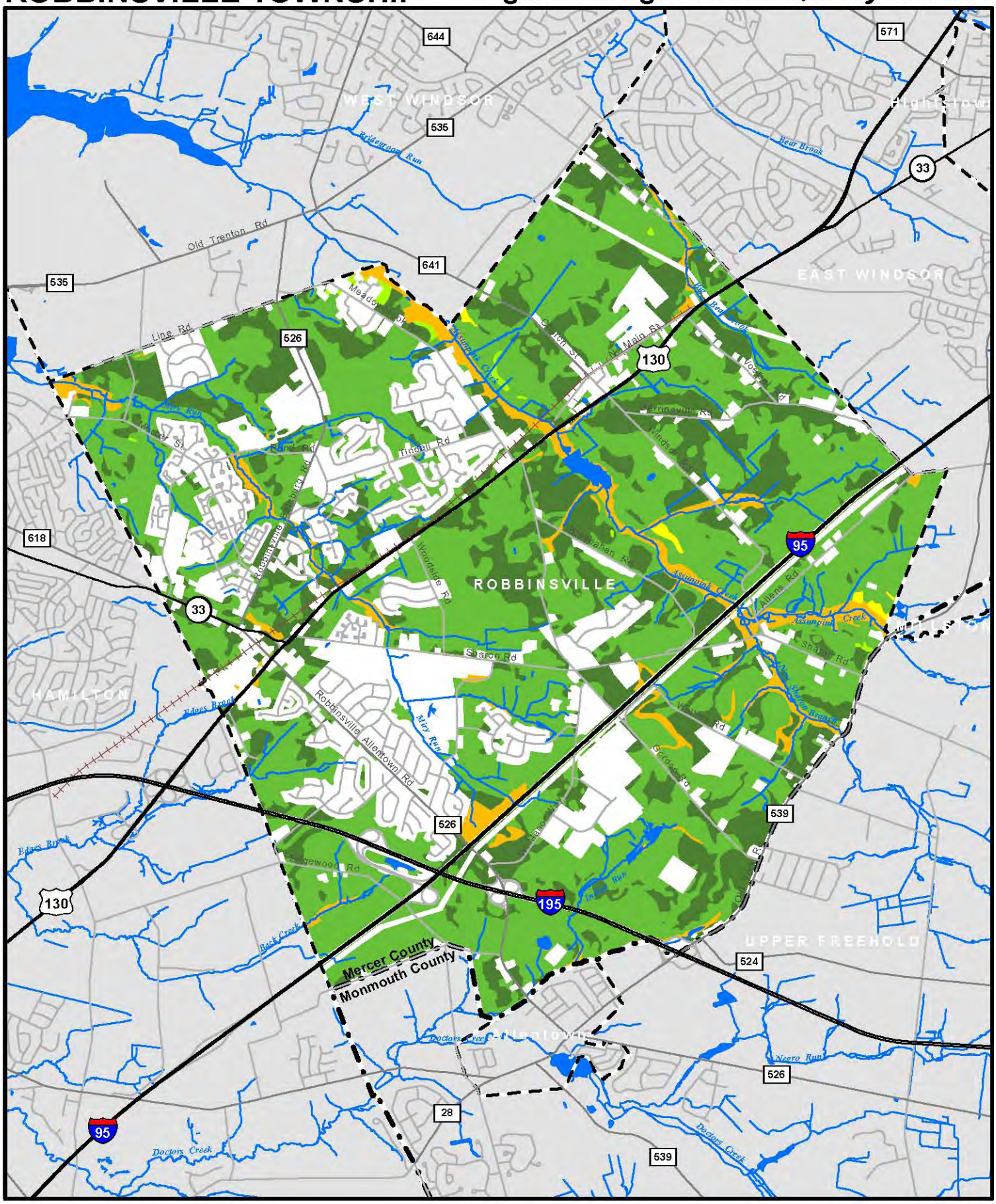
ROBBINSVILLE TOWNSHIP

Figure 10: Agricultural Quality of Soils



Sources: NJDEP, NJDOT, DVRPC, NRCS. 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.

Soil Designation

- 2005 Developed Land
- Prime Farmland
- Farmland of Statewide Importance
- Farmland of Local Importance
- Unique Farmland
- Not Rated for Agricultural Use

N

0.5 0.25 0 0.5

Miles

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Table 5: Agricultural Values for Robbinsville Soils

Designation	Type	Acres	Percent
P-1	Prime Farmland	4,230.68	32.15%
S-1	Farmland of Statewide Importance	8,011.78	60.89%
L-1	Farmland of Local Importance	49.32	0.37%
U-1	Unique Farmland	23.29	0.18%
N/A	Other Soils *(wet soils, steep slopes, disturbed land, etc.).*	842.17	6.40%
Total		**13,157.23**	**100.0%**

Source: NJ Important Farmlands Inventory, USDA Natural Resources Conservation Service, 2004

Prime Farmland Soils

Over 32 percent of the soils in the township are considered Prime Farmlands (P-1). Prime Farmlands include all those soils in Land Capability Class I and selected soils from land Capability Class II. Prime Farmlands are lands that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. They 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.

Soils of Statewide Importance

Almost 61 percent of Robbinsville's soils are classified as 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 with favorable conditions. Under such favorable conditions, these yields may be as high as Prime Farmland yields.

Criteria for establishing Soils of Statewide Importance are determined by state agencies. In New Jersey, soils with a Land Capability Class of II or III that do not meet Prime Farmland criteria are rated as Soils of Statewide Importance.

Soils of Local Importance

An additional 0.37 percent of the township's soils are classified as Soils of Local Importance (L-1). Soils of Local Importance include those soils that are not of prime or statewide importance, but can support the production of high value food, fiber, and horticultural crops (fruits and vegetables) such as tomatoes, sweet corn, blueberries, strawberries, cranberries, peaches, and nursery crops.

Unique Farmland Soils

Just 0.18 percent of the soils in the township are considered Unique Farmlands (U-1). Certain soil qualities, locations, growing seasons, and moisture supplies allow Unique Farmland to support specialized crops when properly managed. The USDA outlines specific Unique Farmland criteria that support a particular food or fiber crop, including temperature, humidity, 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 crop and have an adequate moisture supply for that crop.

Other Soils

An additional 6.4 percent of Robbinsville's soils are classified as Other Soils. These soils are not considered suitable for farming due to a number of different constraints, including water saturation, soil composition, human disturbance, or slope. The largest subset of these soils in Robbinsville is Fluvaquents. Fluvaquents exist along river banks and consist of recent alluvial deposits that are frequently flooded. This category also includes Udorthents, which are soils that are heavily manipulated by development, compaction, or other human interaction and are therefore unsuitable for agriculture.

Acid Soils

All the geologic units that underlie the township are classified as having the potential to produce acid (sulfate) soils. Thus, the map of potentially acid-producing soils is the same as that for bedrock geology (see **Figure 22: Geologic Outcrops**).

Soil pH is the measure of the pH of soil water, which depends on the hydrogen ion (H+) activity in solution. Soils become naturally acidic for three major reasons: rainfall and leaching, acidic parent material, and decay of organic matter that produces hydrogen ions. The development of acid-sulfate soils occurs when sulfide minerals, such as pyrite and/or elemental sulfur in reduced sulfidic sediments, oxidize upon air exposure through drainage or earth-moving operations. This classification is intended to provide federal and state agencies as well as the general public with fundamental geologic information on potential acid-producing (sulfate) sediments for use in natural resource planning and environmental analyses.

Hydric Soils

Over 57 percent of the soils in Robbinsville Township are considered hydric soils. Hydric soils, as defined by the National Technical Committee of Hydric Soils, are soils that formed under conditions of saturation, flooding, or ponding long enough

during the growing season to develop anaerobic conditions in their subsurface. They support the development of hydrophytic vegetation. Hydric soils have unique soil properties that distinguish them from nonhydric soils. They are an important element of wetland areas and naturally support wetland vegetation. If a soil is classified as "hydric," land use may be restricted due to the relationship of hydric soils to wetlands and wetland preservation. More detailed descriptions of Robbinsville's wetland areas are found in Chapter 5, **Surface Water Resources: Wetlands** and **Agricultural Wetlands**, and in Chapter 7, **Biological Resources: Wetlands**. Wetland areas are strictly regulated under state law. All landowners must be cognizant of wetland areas because the NJDEP rules allow for penalties in the event of intrusion into any wetlands without proper authority.

Soil Series

Several soil series appear more frequently in Robbinsville than others and are briefly described as follows. The soil types are listed in alphabetical order in the following text and tables. See **Table 6: Robbinsville Township Soils** for additional information.

Fluvaquents

Just fewer than three percent of the soils in Robbinsville are Fluvaquents. These soils are found alongside streams and rivers in floodplain areas, and are formed from recent (Holocene-era) alluvial deposits. They are normally deep and very poorly drained, with nearly level slopes from 0--3 percent. Their permeability is slow, and runoff is slow to nonexistent,[6] with many Fluvaquents exhibiting ponding. Because they are so young and frequently flooded, they have not developed a differentiated soil profile and, in addition, are unsuitable for agriculture. Fluvaquents support deciduous and coniferous forest, in addition to other wetlands vegetation.

Glassboro and Woodstown

The association[7] of Glassboro and Woodstown soils occupies 8.4 percent of Robbinsville land. Glassboro soils are very deep, poorly drained, and consist of

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[6]Permeability refers to the ability of water to flow through the soil from the ground surface through to the underlying layers of unconsolidated materials and bedrock. Draining refers to the ability of water to dissipate after it permeates through the soil to the underlying layers of unconsolidated materials and bedrock. Water can dissipate by flowing into cracks and fissures in the bedrock, by draining into unconsolidated gravel layers beneath the soil, or by flowing out into streams and lakes. A soil may have any combination of permeability and draining characteristics.

[7]For an explanation of the difference between soil associations and complexes (e.g., Woodstown-Fallsington), see http://www.soilinfo.psu.edu/index.cgi?index.html.

sandy loam formed from marine deposits. Their permeability is moderate and runoff is slow to moderate. They occur on flat lands with a slope of under five percent, and have a high water table, presenting serious constraints to development. They have historically supported oak, beech, poplar, and pitch pine forests; and most Woodstown soils are currently cultivated with corn, soybeans, small grains, hay, and pasture. These are considered Prime Soils or Soils of Statewide Importance, but cultivation can be hampered by wetness.

Woodstown soils have a similar profile to Glassboro soils, but usually occur in areas of higher elevation, and may also be formed from alluvial deposits. These soils occur on terraces along large streams and in beds of gravel, and their slope can range from flat to steeply sloping. The water table is lower than in the Glassboro series, easing constraints to development.

Matapeake

Of Robbinsville's soils, 6.8 percent are in the Matapeake series. These soils tend to be very deep and well drained, with slopes ranging from 0--10 percent. They have moderate to moderately slow permeability and moderate surface runoff. These soils were formed in a silty mantle and are underlain by sandy and gravelly material. Oaks dominate the native vegetation and some cutover areas have loblolly, Virginia, or shortleaf pine. Almost all Matapeake soil was once cultivated. Today, commonly grown crops include corn, soybeans, and small grains. The soil is considered Prime Farmland and offers few constraints to development.

Mattapex and Bertie

The Mattapex and Bertie soils association comprises 16.2 percent of the soils in Robbinsville Township. These very deep soils consist of a fine silt loam surface layer, which overlays a coarse substratum, often of marine origin. They mainly occur in flat areas, depressions, and terraces with level slopes, but can also be found in upland areas. Their permeability is moderate and their runoff can range from low to high. The soil has a high water table, presenting moderate to serious constraints to development. Native vegetation consists mainly of loblolly pine and hardwoods such as sweetgum, red maple, and various oaks. When cultivated, crops include corn, soybeans, and small grains. The soil is strongly acidic at all layers, requiring lime for effective cultivation. It is considered a Soil of Statewide Importance.

Othello

The Othello series accounts for 19.5 percent of Robbinsville's soils; it is the second most abundant series in the township. This very deep type of soil consists of a fine silt loam surface layer and silty clay loam subsurface underlain by sand and gravel. They generally occur in upland interfluves, lowlands, marine

terraces, and depressions on slopes of 0--5 percent. Their permeability is moderate and runoff is slow. The soil has a high water table, presenting serious constraints to development. Vegetation that grows on this soil includes wetland hardwoods such as sweetgum, red maple, and wetland oaks. Some pines may grow in wooded areas. These soils have mostly been cleared for corn and soybeans, and are considered Soils of Statewide Importance.

Sassafras

The most abundant soil series in Robbinsville Township is the Sassafras series. Over 31 percent of Robbinsville is made up of Sassafras soils, which can be found on any terrain from sandy flats to gently sloping uplands. These soils are deep, well drained, and moderately coarse in texture. Permeability is moderate to moderately rapid. Slopes can range from nearly level to very steep. These soils can support vegetation consisting of mixed oaks and scattered pines. They are considered Prime soils and Farmland of Statewide Importance depending on slope, and present few constraints to development. Sassafras soils are easy to work, have a low natural fertility, and respond to fertilization.

Woodstown-Fallsington

Almost four percent of soils in Robbinsville are in the Woodstown-Fallsington series. Woodstown soils are very deep, moderately well drained, and consist of sandy loam formed from old marine and alluvial sediments. These soils occur on terraces along large streams and in beds of gravel. Their permeability is moderate and runoff is slow to moderate. The soil has a high water table, presenting serious constraints to some development. They have historically supported oak, beech, poplar, and pitch pine forests; and most Woodstown soils are currently cultivated with corn, soybeans, small grains, hay, and pasture. These are considered Prime Soils or Soils of Statewide Importance, but cultivation can be hampered by wetness.

Fallsington soils have a similar profile to Woodstown soils, but usually occur in areas of lower elevation, and the water table is even higher than in the Woodstown series, occasionally reaching the surface; development is seriously constrained. Cultivation may require proper drainage techniques.

Table 6: Robbinsville Township Soils

Soil Type	Description	Designation	Acres	% of Total Land Area
DohgB	Downer fine sandy loam, gravelly clay loam substratum, 0 to 5 percent	P-1	20.4	0.16%
EkbA	Elkton silt loam, 0 to 2 percent slopes	S-1	255.1	1.94%
EvgB	Evesboro loamy sand, 0 to 5 percent slopes	L-1	49.3	0.37%
FamA	Fallsington sandy loam, 0 to 2 percent slopes	S-1	234.4	1.78%
FapA	Fallsington loam, 0 to 2 percent slopes	S-1	22.6	0.17%
FmhAt	Fluvaquents, loamy, 0 to 3 percent slopes, frequently flooded	N/A	183.6	1.40%
FmhAv	Fluvaquents, 0 to 3 percent slopes, very frequently flooded	N/A	195.2	1.48%
FodB	Fort Mott loamy sand, 0 to 5 percent slopes	S-1	86.1	0.65%
FodC	Fort Mott loamy sand, 5 to 10 percent slopes	N/A	16.2	0.12%
GadB	Galestown loamy sand, 0 to 5 percent slopes	U-1	23.3	0.18%
GASB	Galloway variant soils, 0 to 5 percent slopes	S-1	74.8	0.57%
GKAWOB	Glassboro and Woodstown sandy loams, 0 to 5 percent slopes	P-1	1,106.10	8.41%
HumAt	Humaquepts, 0 to 3 percent slopes, frequently flooded	N/A	19.6	0.15%
LenB	Lenoir-Keyport silt loams, 0 to 5 percent slopes	S-1	72.7	0.55%
MbaAt	Marsh, fresh water, 0 to 2 percent slopes, frequently flooded	N/A	88.9	0.68%
MbpA	Matapeake loam, 0 to 2 percent slopes	P-1	242.4	1.84%
MbpB	Matapeake loam, 2 to 5 percent slopes	P-1	640.7	4.87%
MbpC2	Matapeake loam, 5 to 10 percent slopes, eroded	S-1	14.8	0.11%
MBYB	Mattapex and Bertie loams, 0 to 5 percent slopes	S-1	2,128.7	16.18%
OthA	Othello silt loam, 0 to 2 percent slopes	S-1	2,569.2	19.53%

Soil Type	Description	Designation	Acres	% of Total Land Area
PHG	Pits, sand and gravel	N/A	1.0738	0.01%
PmmA	Plummer sandy loam, 0 to 2 percent slopes	S-1	41.8436	0.32%
PortA	Portsmouth variant silt loam, 0 to 2 percent slopes	S-1	166.1051	1.26%
SaaD	Sandy and silty land, strongly sloping	N/A	1.2724	0.01%
SaaE	Sandy and silty land, steep	N/A	5.9572	0.05%
SacA	Sassafras sandy loam, 0 to 2 percent slopes	P-1	131.9	1.00%
SacB	Sassafras sandy loam, 2 to 5 percent slopes	P-1	1,983.8	15.08%
SacC	Sassafras sandy loam, 5 to 10 percent slopes	S-1	1,353.0	10.28%
SacC2	Sassafras sandy loam, 5 to 10 percent slopes, eroded	S-1	468.2	3.56%
SadB	Sassafras gravelly sandy loam, 2 to 5 percent slopes	P-1	64.6	0.49%
SafA	Sassafras loam, 0 to 2 percent slopes	P-1	34.0	0.26%
SagC3	Sassafras sandy clay loam, 5 to 10 percent slopes, severely eroded	N/A	98.9	0.75%
ThgB	Tinton loamy sand, 0 to 5 percent slopes	S-1	1.8	0.01%
UdgB	Udorthents, gravelly substratum, 0 to 8 percent slopes	N/A	76.4	0.58%
UdstB	Udorthents, stratified substratum, 0 to 8 percent slopes	N/A	107.7	0.82%
WATER	Water	N/A	47.5	0.36%
WogA	Woodstown loam, 0 to 2 percent slopes	P-1	6.6	0.05%
WomfB	Woodstown-Fallsington sandy loams, 0 to 5 percent slopes	S-1	522.3	3.97%
TOTAL			**13,157.23**	**100.00%**

Source: USDA Natural Resources Conservation Service (NRCS) 2004

Explanation of Designations	
P-1	Prime Farmland Soils
S-1	Soils of Statewide Importance
L-1	Farmland of Local Importance
U-1	Unique Farmland Soils
NR	Not Rated for Agricultural Use *(wet soils, pits, steep slopes, disturbed and developed land, etc.)*

Soil and Development

Soil characteristics can severely restrict the use of sites for construction and development. **Table 7: Soil Limitations for Development** records the soils and their possible limitations for building foundations.

In addition, every soil in Robbinsville is rated as “severely limited” for on-site septic systems and sewage lagoons. Septic systems require soils that have a low water table (below five feet), and slow permeability to allow for proper drainage of wastewater. Virtually all of the soils in Robbinsville are affected by rapid permeability, a high water table, and/or other limitations such as filtration capacity and organic matter content. **Figure 11: Approved Sewer Service Area and NJPDES Permits** shows the areas within Robbinsville that have been approved for sewer service. Areas not approved for sewer service (and areas *approved*, but not yet *served* by sewers) must be served by septic systems.

The twin limitations of Robbinsville’s limited sewer service capacity and soils with low septic capability have had an enormous impact on the location and character of the township’s residential development. As mentioned in the 2007 re-examination to the (then-) Washington Township Master Plan, the township had aimed to preserve farmland and forestall suburban sprawl through the use of cluster and village developments. However, the lack of sewer service in certain areas rendered such developments impractical, leading to a number of large-lot subdivisions such as the one along Gordon Road in the center of the township.

High water tables due to poorly drained soils and/or perched conditions, five feet or less from the surface, also create a potential for erosion, wet basements, alteration of plant life, and early frost for agricultural crops.

In addition to limitations based on soil permeability, another important consideration specific to the township is the presence of acid-sulfate soils, which must be managed during earth-moving activity so as not to adversely impact surface water quality. Acid soils are discussed in the **Soils** section above.

Table 7: Soil Limitations for Development

Soil Type	Description	Acres	Development Capability			
			Building without Basement	Building with Basement	Small Commercial	Specific Limitations
DohgB	Downer fine sandy loam, gravelly clay loam substratum, 0 to 5 percent	20.4143	A	A	A	N/A
EkbA	Elkton silt loam, 0 to 2 percent slopes	255.1179	C	C	C	1,5
EvgB	Evesboro loamy sand, 0 to 5 percent slopes	49.3159	A	A	A	N/A
FamA	Fallsington sandy loam, 0 to 2 percent slopes	234.4250	C	C	C	1
FapA	Fallsington loam, 0 to 2 percent slopes	22.6486	C	C	C	1
FmhAt	Fluvaquents, loamy, 0 to 3 percent slopes, frequently flooded	183.5813	C	C	C	1,2,3,5
FmhAv	Fluvaquents, 0 to 3 percent slopes, very frequently flooded	195.1656	C	C	C	1,2,5
FodB	Fort Mott loamy sand, 0 to 5 percent slopes	86.1029	A	A	A	N/A
FodC	Fort Mott loamy sand, 5 to 10 percent slopes	16.1854	B	B	C	4
GadB	Galestown loamy sand, 0 to 5 percent slopes	23.2873	A	A	A	N/A
GASB	Galloway variant soils, 0 to 5 percent slopes	74.8082	B	C	B	1
GKAWOB	Glassboro and Woodstown sandy loams, 0 to 5 percent slopes	1106.1011	C	C	C	1
HumAt	Humaquepts, 0 to 3 percent slopes, frequently flooded	19.5884	C	C	C	1,2,3,5
LenB	Lenoir-Keyport silt loams, 0 to 5 percent slopes	72.6824	B	C	C	1,5
MbaAt	Marsh, fresh water, 0 to 2 percent slopes, frequently flooded	88.8502	N/A	N/A	N/A	N/A
MbpA	Matapeake loam, 0 to 2 percent slopes	242.4265	A	A	A	N/A
MbpB	Matapeake loam, 2 to 5 percent slopes	640.7052	A	A	A	N/A
MbpC2	Matapeake loam, 5 to 10 percent slopes, eroded	14.8153	B	B	C	4
MBYB	Mattapex and Bertie loams, 0 to 5 percent slopes	2128.7022	B	C	B	1

Soil Type	Description	Acres	Development Capability			
			Building without Basement	Building with Basement	Small Commercial	Specific Limitations
OthA	Othello silt loam, 0 to 2 percent slopes	2569.2250	C	C	C	1
PHG	Pits, sand and gravel	1.0738	N/A	N/A	N/A	N/A
PmmA	Plummer sandy loam, 0 to 2 percent slopes	41.8436	C	C	C	1
PortA	Portsmouth variant silt loam, 0 to 2 percent slopes	166.1051	C	C	C	1
SaaD	Sandy and silty land, strongly sloping	1.2724	B	B	C	4
SaaE	Sandy and silty land, steep	5.9572	C	C	C	4
SacA	Sassafras sandy loam, 0 to 2 percent slopes	131.9298	A	A	A	N/A
SacB	Sassafras sandy loam, 2 to 5 percent slopes	1983.8365	A	A	A	N/A
SacC	Sassafras sandy loam, 5 to 10 percent slopes	1353.0483	A	A	B	4
SacC2	Sassafras sandy loam, 5 to 10 percent slopes, eroded	468.2064	B	B	C	4
SadB	Sassafras gravelly sandy loam, 2 to 5 percent slopes	64.6353	A	A	A	N/A
SafA	Sassafras loam, 0 to 2 percent slopes	34.0213	A	A	A	N/A
SagC3	Sassafras sandy clay loam, 5 to 10 percent slopes, severely eroded	98.8920	B	B	C	4
ThgB	Tinton loamy sand, 0 to 5 percent slopes	1.7558	A	A	A	N/A
UdgB	Udorthents, gravelly substratum, 0 to 8 percent slopes	76.4213	A	A	A	N/A
UdstB	Udorthents, stratified substratum, 0 to 8 percent slopes	107.6647	A	A	A	N/A
WATER	Water	47.5198	N/A	N/A	N/A	N/A
WogA	Woodstown loam, 0 to 2 percent slopes	6.6073	A	B	A	1
WomfB	Woodstown-Fallsington sandy loams, 0 to 5 percent slopes	522.2886	C	C	C	1

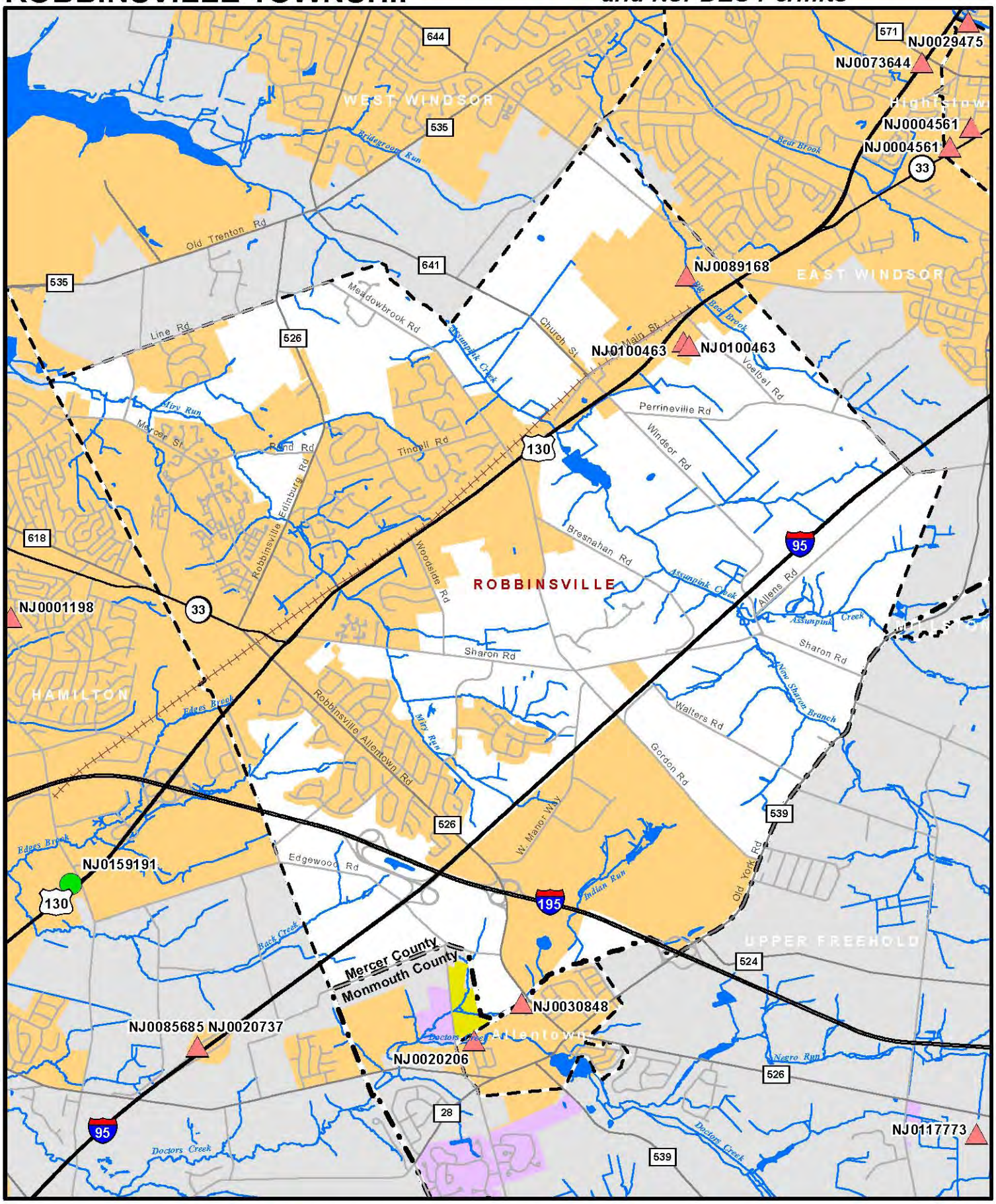
Source: Soil Survey of Mercer County, NJ, NRCS

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 limitation, 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.
N/A	Limitations are not rated or listed.

Key to Specific Limitations	
1	Depth to Saturated Zone (i.e., high water table)
2	Flooding
3	Ponding
4	Steep Slope
5	Shrink-Swell Potential

ROBBINSVILLE TOWNSHIP

Figure 11: Approved Sewer Service Area and NJPDES Permits



Sources : 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.

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

Approved Sewer Service Area (2008)

Type of Wastewater Disposal

- Ground Water Discharge (through Individual NJPDES Permitted Facility)
- Surface Water Discharge
- Non-Discharge

N

0.5 0.25 0 0.5

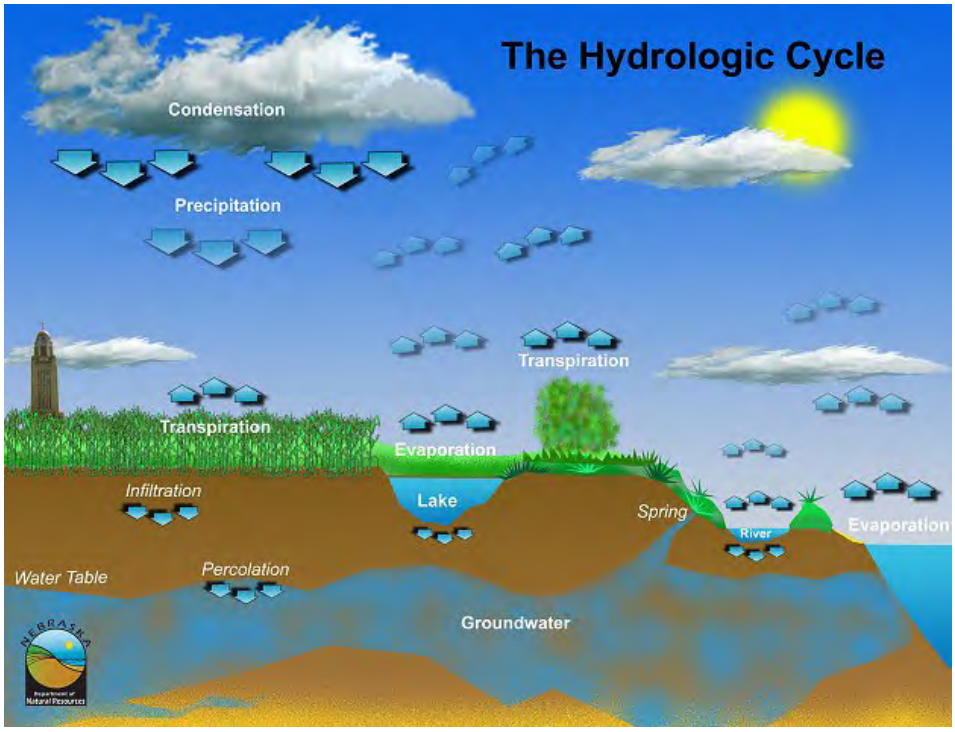
Miles

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

Hydrology

Hydrology is the study of the water cycle. **Figure 12** provides an illustration of how water cycles through the environment. This depicts how water at the land surface evaporates and plants transpire (called transpiration), and this water vapor condenses into clouds. Clouds in turn form precipitation that either runs off to support surface water bodies and wetlands or infiltrates to support groundwater reservoirs. Groundwater is generally connected to surface water features. Hydrology is dependent on climate (precipitation), topography (slope of the land that channels surface water runoff), and geology (soil permeability that affects how water infiltrates and migrates underground).

Figure 12: The Hydrologic Cycle



Source: Nebraska Department of Natural Resources

Climate

Due to its mid-latitude location roughly halfway between the North Pole and the equator, New Jersey's climate is extremely variable. The state's temperate, continental climate is influenced by airstreams that vary from hot and humid to dry and cold. From May through September, New Jersey is dominated by moist, tropical air that originates in the Gulf of Mexico and is swept in by prevailing winds from the southwest. In winter, winds generally prevail from the northwest, bringing cold, polar air masses from subarctic Canada.

New Jersey is divided into five climate zones: North, Central, Southwest, Pine Barrens, and Coastal climate zones. Robbinsville lies within the Central climate zone, which stretches from New York Harbor to the great bend of the Delaware River near Trenton. This region contains many urban areas, such as Trenton, whose paved surfaces and buildings affect local temperatures by retaining more heat. Known as the "heat Island effect," this causes nighttime temperatures to generally be warmer than surrounding rural areas.

Climate also varies within the physiographic provinces. Robbinsville lies within the Inner Coastal Plain, several miles southeast of the Piedmont Province. The soils in the Inner Coastal Plain are sandier and exhibit stronger radiational cooling after sunset than Piedmont soils. However, the Inner Coastal Plain is generally warmer in the autumn and winter and cooler in the spring and summer due to maritime influences (coinciding with ocean water temperatures). However, these effects are not as pronounced as those on the Outer Coastal Plain, found to the southeast of Robbinsville.

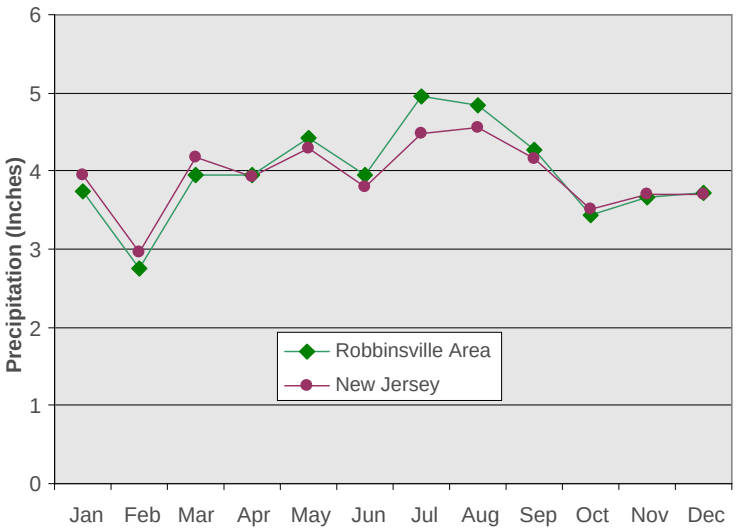
The National Climate Data Center (NCDC) of the National Oceanic and Atmospheric Administration (NOAA) operates 13 cooperative stations in Mercer County. Data from seven of these stations is available online from the NCDC website: www.ncdc.noaa.gov. There are five weather stations located near Robbinsville. Three of these—one in Ewing Township, one in West Windsor, and one in Hamilton—are operated by the NJDEP. The Mercer County Airport in Trenton is operated by the Automated Surface Observing Systems (ASOS) network, a joint effort of the National Weather Service, the Federal Aviation Administration and the Department of Defense. The fifth station is a State Climatologist station in Hightstown.

The region's annual mean temperature as recorded by the State Climatologist station is 52.6°F, which is identical to the statewide mean temperature. This average accounts for the records of the past 110 years. The 10-year trend, however, shows a mean annual temperature of 53.5°F, which may reflect the rise in average global temperatures due to anthropogenic greenhouse gas emissions. Average temperatures are 74.1°F in July and 30.1°F in January. In the summer, temperatures in Robbinsville rarely exceed 100°F. In winter, the temperature rarely falls below 10°F for extended periods. Record temperatures for the region are a high of 102°F and a low of −12°F.

Precipitation and Storm Events

According to data obtained from the National Oceanic and Atmospheric Administration, the normal annual average precipitation for the Robbinsville area from 1971 to 2000 is 47.68 inches.[8] This figure is nearly identical to the statewide annual average of 47.87 inches. Actual annual precipitation can vary considerably, from as little as 30 inches in dry years to 60 inches in wet years.[9] As shown in **Figure 13**, monthly averages for the area show that precipitation is generally well distributed throughout the year. However, rainfall tends to be a bit heavier in the summer months. On average, the area receives the most precipitation in July, 4.96 inches, and the least precipitation in February, 2.75 inches.

Figure 13: Average Monthly Precipitation, 1971 – 2000



Source: NOAA, 2009

A great deal of precipitation runs off to the surface water (streams and ponds) and wetlands. High intensity rain events can cause flash flooding along waterways in Robbinsville. In Mercer County, there are approximately 33 thunderstorms per year. While the effects of global climate change are not yet entirely clear, data suggests that storms are becoming more intense, thereby increasing flooding hazards. Vegetated stream buffers and stream corridor protection are valuable strategies for protecting against the detrimental environmental and physical effects of flooding**.**

[8]Figures are from the weather station nearest to Robbinsville, in Hightstown, NJ.
[9]Office of the New Jersey State Climatologist http://climate.rutgers.edu/stateclim/.

Snowfall typically occurs in New Jersey when moist air from the south converges with cold air from the north. Average annual snowfall in Mercer County is 22.6 inches. In Robbinsville, snowfall may occur from mid-November to early April, but is most likely to occur from mid-December to mid-March.

Severe storm events, including thunderstorms, tropical storms, hurricanes, blizzards, ice storms, hail storms, and tornadoes, all occur in Mercer County. Severe storms can often result in flooding. During the past several decades, Robbinsville has experienced numerous severe flooding events, such as those of August 1971, June 1996, September 1999, and April 2007. As development continues in Robbinsville and its neighboring communities, flooding events are expected to become more frequent due to an increase in impervious surface cover. For more information on storm events and flooding threats, see Chapter 9, **Environmental Issues: Flooding**.

Growing Seasons

According to the U.S. Department of Agriculture (USDA), Robbinsville lies within Plant Hardiness Zone 6b. Zone 6b encompasses areas where annual minimum temperatures are typically between −5°F and 0°F. The USDA continues to use the 1990 plant hardiness zones, although several other groups, including the Arbor Day Foundation, have reclassified areas based on recent 10-year weather trends, which indicate a general rise in temperature. The 2006 Arbor Day Foundation Plant Hardiness Zone Map shows Robbinsville within Zone 7a. Zone 7a is somewhat warmer, with average annual minimum temperatures ranging between 5°F and 10°F.

The average growing season in Robbinsville is about 173 days. The first frost usually occurs in mid-October and the last frost occurs toward the end of April. Temperatures in the winter are usually not low enough to keep the soils frozen for the entire winter season. Robbinsville's growing season is well suited for agriculture.

Climate Change

Climatologists estimate that over the course of the 20th century, average global temperatures have risen by 1°F, and are expected to rise between 2.5 to 10.4°F by 2100. The Office of the New Jersey State Climatologist has recorded temperatures in the state since 1895, and results have corroborated this general warming trend, making the impacts of climate change an important issue for New Jersey communities.

While continuing warming is expected, estimating the impact of climate change on local weather patterns and precipitation is a complicated process with numerous variables and uncertainties. Generally speaking, climate change is expected to increase weather extremes in the mid-Atlantic region. Wet periods will become wetter, and dry periods will become drier. Such changes in

precipitation patterns, along with continued warming, will impact hydrology, agriculture, and the composition of natural vegetation in Robbinsville. A warmer climate will likely lead to the infiltration of existing hardwood forests by southern species, such as Southern Yellow Pine. At the same time, more severe and prolonged periods of drought may limit the types of vegetation certain areas can support, potentially causing forests to give way to savannahs or grasslands.

The state of New Jersey has undertaken a number of initiatives towards combating climate change. In 2000, the state joined the Regional Greenhouse Gas Initiative (RGGI), a consortium of 10 New England and mid-Atlantic states that have instituted a mandatory CO_2 cap-and-trade system for power utilities. The NJ Board of Utilities has also instituted one of the most aggressive Renewable Portfolio Standards in the country. The standards will require power utilities to obtain 20 percent of their power from renewable sources by 2020.

In October 2008, New Jersey released a new Energy Master Plan that calls for dramatic increases in energy efficiency leading to major reductions in energy use by 2020, and establishes a goal of achieving 30 percent of electric power from renewable sources by 2020. In July 2007, New Jersey's Global Warming Response Act (GWRA) was signed into law by Governor Corzine. The GWRA is one of the most aggressive greenhouse gas emissions control laws in the world. It calls for a statewide reduction in greenhouse gas emissions to 1990 levels by 2020, and a reduction to 80 percent below 2006 levels by 2050. Additionally, the GWRA charges the NJDEP with developing recommendations, including additional legislation, to enable the State to meet the established greenhouse gas emissions reduction goals.

Initiatives to reduce greenhouse gas emissions have also been occurring at the regional level. In 2007, DVRPC began an effort to ultimately reduce emissions associated with climate change. The first major milestone in this process was the preparation of a regional greenhouse gas emissions inventory, published in March 2009. In addition to calculating aggregate regional emissions for the nine-county Philadelphia metropolitan area (including Mercer County), the inventory allocated emissions to each of the region's nine counties and 353 municipalities. The allocation portion of the inventory will enable municipalities to establish a baseline for greenhouse gas reduction efforts undertaken at the municipal level. More detailed information on greenhouse gas emissions in Robbinsville and the surrounding area can be found in **Chapter 8. The Built Environment: Energy**.

Sustainability Initiatives

Associated with the State's Energy Master Plan, there are several sustainability initiatives that can be implemented by municipalities and residents.

The Community Partners Initiative offers communities a forum to participate in statewide clean energy campaigns to educate and help enroll residents, businesses, and municipalities in New Jersey's clean energy programs and take

advantage of valuable technical assistance and financial incentives. Community Partners receive support in their efforts to set clean energy goals, develop outreach plans, and educate residents about the economic and environmental benefits of clean energy and simple climate change solutions.

Robbinsville could also pursue a Sustainable Jersey Certification under the Sustainable Jersey Certification Program (www.sustainablejersey.com). The certification program is for municipalities in New Jersey that want to go green, control costs and save money, and take steps to sustain their quality of life over the long term.

Air Quality

Air quality is one of the most difficult environmental resources to measure because its sources are diffuse and regional in nature. Sources of air pollution include industry, cars, trucks and buses, fires, and dust. Air pollutants can travel extremely far from their source. For example, the burning of coal in the Midwest to generate electricity sends pollutants like sulfur, nitrogen, and particulate matter all the way to the East Coast. Locally produced sources of air pollution are caused by daily traffic and industrial activities in New Jersey.

Increasing public awareness regarding air pollution led to the passage of a number of state and federal laws, including the original Clean Air Act of 1963 and a much stronger Clean Air Act of 1970 (CAA). In 1990, the CAA was amended and expanded by Congress to include a market approach to reducing air pollution by allowing certain companies to buy and sell emission "allowances," or "credits." The 1990 CAA also required transportation projects receiving federal funding to conform to state air quality goals. The 1990 act also revised the way air toxins were regulated, increasing the number of regulated toxic air pollutants from 7 to 187.

Criteria Pollutants

Ground level ozone is formed when volatile organic compounds (VOC) and **nitrogen oxides** 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, or 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_2) is a colorless, odorless gas that is formed when carbon in 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. 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.

In 1970, the USEPA was formed to enforce the CAA. In New Jersey, the USEPA allows NJDEP to enforce the CAA because the state agency developed more stringent air standards and created a state implementation plan (see NJAC 7:27).

The CAA identified six *criteria* pollutants–-ozone, particulate matter, sulfur dioxide, nitrogen oxides, carbon monoxide, and lead–-which are destructive to human health, and the built and natural environment. The EPA, and when enabled, NJDEP, set National Ambient Air Quality Standards (NAAQSs) for these pollutants. There are two kinds of NAAQSs: the primary standard is based on human health effects, while the secondary standard is based on environmental and property damage.

Between 1970 and 2007, total emissions of the six criteria air pollutants decreased by more than 50 percent. The industrial sector reduced its toxic air emissions by 70 percent during this time period. Stricter emission 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.

Under the CAA, the EPA limits the amount of other air pollutants and toxins that are emitted by point sources, such as chemical plants, industrial factories, power plants, and steel mills. The NJDEP Air Quality Permitting Program issues permits for stationary sources of air pollution, such as power plants, oil refineries, dry cleaners, food processing centers, and manufacturing plants, and regulates and monitors their emissions. Currently, 12 such sites hold air quality permits in Robbinsville.

Criteria Pollutants
continued

Nitrogen oxides are a group of highly reactive gases which 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 refined from oil is combusted. SO_2 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.

The 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), total suspended particulate matter (TSP), respirable particulate matter (PM_{10} and $PM_{2.5}$), lead (Pb), volatile organic compounds (VOC), nitrogen oxides, and 38 other toxic air pollutants. Currently, one facility operating within Robbinsville, Webtech Inc. on North Gold Drive, falls under these requirements.

The NJDEP's Bureau of Air Monitoring maintains a network of 43 continuous monitoring stations across the state, many of which are clustered in the New York metropolitan area. These stations continually monitor some or all of the following criteria pollutants–-carbon monoxide, nitrogen oxides, ozone, sulfur

dioxide, and particulate matter-–as well as smoke shade and meteorological data. In addition, 25 manual monitoring stations operate around the state, providing supplemental data to the 43 continuous monitoring stations. The nearest continuous monitoring stations to Robbinsville are located at Rider University in Lawrence Township and in Burlington Township, Burlington County. In addition, there is a manual monitoring station in Trenton that measures particulate matter.

Nitrogen Oxides

The primary and secondary NAAQS for nitrogen dioxide are both an annual average of 0.053 ppm. The New Jersey standards are the same, although they are measured on any 12-month period, not just the calendar year. According to the 2006 Air Quality Report, the Rider University station recorded an annual average of 0.012 ppm of nitrogen dioxide and 0.009 ppm of nitrogen oxides, well within the standard of 0.053 ppm.

Ground-Level Ozone

The amount of ozone has decreased greatly in New Jersey since the 1980s, and one-hour concentrations have not exceeded 0.200 ppm since 1988. For ground-level ozone (O_3), there are two NAAQSs: (1) a one-hour concentration of 0.12 ppm, and (2) an eight-hour average concentration of 0.075 ppm. These are the same for both primary and secondary effects. In 2006, the Rider University station exceeded the one-hour maximum concentration of 0.12 ppm on one day when one-hour ground-level ozone was measured at 0.126 ppm. Three of the 14 sites in New Jersey that measure ground-level ozone exceeded the one-hour standard in 2006. The Rider University station had six days in 2006 that exceeded the eight-hour standard of 0.075 ppm. In 2006, all 14 sites in the state had at least three days that exceeded the eight-hour standard.

Sulfur Dioxide

There are three NAAQS for sulfur dioxide: (1) a yearly average of 0.030 ppm for primary effects; (2) a 24-hour average of 0.140 ppm that cannot be exceeded more than once in a calendar year, also for primary effects; and (3) a three-hour average of 0.5 ppm that also cannot be exceeded more than once in a calendar year for secondary effects. New Jersey's standards are slightly different in that they use a rolling year unit instead of a calendar year. The yearly average level of sulfur dioxide at the Burlington station in 2006 was 0.003 ppm, the maximum 24-hour average was 0.020 ppm, and the maximum three-hour average was 0.026 ppm. These levels are well below the state and national standards, and below state averages as well.

Particulate Matter

For fine particulate matter ($PM_{2.5}$), there are two NAAQSs: (1) an annual average of 15 micrograms per cubic meter ($\mu g/m^3$) for secondary effects, and (2) a 24-hour average of 65 $\mu g/m^3$ for primary effects. Particulate matter is measured at the Trenton station, and in 2006 the station recorded an annual average of 12.2 $\mu g/m^3$ and a 24-hour maximum of 38.8 $\mu g/m^3$.

Air Quality Index

The EPA created the Air Quality Index (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, ranging from "Good" to "Hazardous" **(see Table 8).**

The daily score is based on whatever the highest individual pollutant score is reported. For example, if ozone scored 150 and particulate matter scored 100, the daily AQI would be 150–-Unhealthy for Sensitive Groups. The index is used to measure overall air quality by counting the number of days per year when the AQI of each region exceeds 100.

New Jersey is subdivided into nine regions that report their respective AQI. Robbinsville Township is located in Region 5, which covers Mercer and Burlington counties. Region 5 contains two AQI monitoring stations located at Rider University (Lawrence Township) and Burlington City. The AQI for Region 5 is based on all five of the criteria pollutants highlighted above: carbon monoxide, nitrogen dioxide, ozone, particulates, and sulfur dioxide. In 2005, Region 5 reported 321 good days, 37 moderate days, seven days that were unhealthy for sensitive groups, and no unhealthy, very unhealthy, or hazardous days.

Table 8: Air Quality Index

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

Additional Monitoring

Acidic deposition continues to be a major problem. Acidic deposition is caused by emissions of sulfates (SOx) and nitrates (Nox) from coal-burning power plants, motor vehicles, and other industrial sources. These pollutants catalyze with water in the atmosphere to form sulfuric acid and nitric acid, and fall to the ground in the form of “acid rain.” Acidic deposition can leach valuable nutrients from the soils, such as calcium and magnesium (which help neutralize acidity), and can damage both aquatic and terrestrial ecosystems. In addition, the calcium-leaching action of acidic deposition has been known to imperil infrastructure. While environmental regulations have led to a long-term decrease in sulfate, nitrate, and nutrient emissions, the lowered buffering capacity of soils and water bodies has resulted in acid levels remaining higher than normal. Moreover, monitoring conducted by NJDEP at Washington Crossing State Park in nearby Hopewell Township shows that rain with a pH of 4.47, approximately 10 times more acidic than natural rainfall, continues to fall in this region.

Air Quality Ordinance

Township Ordinance 142-81 B (26) (b) [4] states the requirements for air quality impact assessment associated with the submission of preliminary plats and preliminary plans. This ordinance requires the applicant to describe the source, quantity, and nature of materials to be emitted from any furnace or other device in which coal, oil, gasoline, diesel fuel, kerosene, wood or other combustible material will be burned or if any other source of air pollutants, including automobiles attracted by the facility, will be present on the site during or after construction. If a state or federal air emission permit is required, a copy of the permit and all resource data submitted with the application for the permit shall accompany the environmental assessment.

CHAPTER 5

Surface Water Resources

Watersheds

A watershed is all the land that drains to a particular waterway such as a river, stream, lake, or wetland. The boundaries of a watershed are defined by the high points in the terrain such as hills or ridges. A watershed includes not only the water body or waterway itself, but also the entire land area that drains to it. Large watersheds are made up of smaller ones, down to the catchment level of a local site. So, for example, the Delaware River watershed is made up of many smaller watersheds, such as the Assunpink Creek watershed. The Assunpink Creek watershed, in turn, is formed of several subwatersheds, consisting of the land that drains to a major tributary or branch of Assunpink Creek, such as Miry Run. These subwatersheds can be further subdivided into smaller ones. Miry Run itself has various branches, each fed by its surrounding land, with smaller and smaller subdivisions possible, down to the catchment level. Watersheds are natural ecological units, where soil, water, air, plants, and animals interact in a complex relationship.

As illustrated in **Figure 14: Watersheds**, most of Robbinsville's land drains to the Delaware River by way of Assunpink Creek and its tributary, Miry Run. In addition, the southern portion of Robbinsville drains to the Delaware River by way of tributaries to Crosswicks and Doctors creeks. A small portion of Robbinsville, in the northwestern corner, drains instead to the Raritan River by way of Big Bear Brook, a tributary of the Millstone River.

Hydrologic Unit Codes

The Hydrologic Unit Code (HUC) is a numerical identification code given to every drainage system in the United States by the U.S. Geological Survey. Hydrologic Unit Codes begin with a number representing the largest drainage area. For example, the first level divides the entire country into 21 major drainage areas. From there, numbers are added as the defined area becomes smaller. The numbers to the right represent the most local watershed. HUC-11 codes are 11-digit numbers applied to a drainage area that is approximately 40 square miles in size. Because HUC-11 watersheds need to be nearly uniform in size, the watersheds of some streams and rivers will be divided into multiple watersheds for classification purposes. Robbinsville falls into five HUC-11 watersheds—

Assunpink Creek (above Shipetaukin Creek[10]), Assunpink Creek (below Shipetaukin Creek), Doctors Creek, Crosswicks Creek (below Doctors Creek), and the Millstone River (below and including Carnegie Lake). HUC-11 watersheds are further subdivided into HUC-14 subwatersheds, with the identification number for each one having 14 digits. There are 10 HUC-14 watersheds in Robbinsville, listed in **Table 9: Watersheds and Subwatersheds in Robbinsville** and shown on **Figure 14: Watersheds.**

Assunpink Creek Watershed (above and below Shipetaukin Creek)

The majority of Robbinsville is drained by the Assunpink Creek, which begins in the forested wetlands of Roosevelt Borough, Monmouth County, and travels west through the Assunpink Wildlife Management Area and rolling farmland until it is joined by the Shipetauken Creek. This area makes up the Assunpink Creek Watershed above the Shipetauken Creek. The Assunpink Creek watershed below the Shipetauken Creek is characterized by urban and suburban land through which the Assunpink Creek continues to flow southwest until it eventually drains into the Delaware River in the city of Trenton. Forty-three percent of Robbinsville Township, or 8.78 square miles, is drained by the Assunpink Creek. The main waterways in this area are the Assunpink Creek itself and the New Sharon Branch. Lying in the northern and eastern portions of the township, this watershed is home to the Assunpink Creek Wildlife Management Area and the Village of Windsor, as well as significant tracts of farmland and scattered residential development.

The portion of Robbinsville, which is drained by Miry Run and its associated tributaries, is part of the Assunpink Creek Watershed below Shipetaukin Creek. Miry Run begins within the township and flows northwest until it joins the Assunpink several miles west of Robbinsville, in Hamilton Township. Thirty-four percent of Robbinsville, or 6.40 square miles, is within this watershed, and most of Robbinsville's developed land lies within this area, including the Robbinsville Town Center, the Trenton-Robbinsville Airport, and the Miry Run Golf Course.

Doctors Creek Watershed

The Doctors Creek Watershed is the third largest watershed in Robbinsville, covering 1,317 acres, or 10 percent, of the township. This area is drained by Indian Run and its tributaries. Indian Run is a small tributary of Doctors Creek which begins in a wetland area in the southern portion of Robbinsville. It forms part of the border between Robbinsville and the borough of Allentown, and joins Doctors Creek roughly half a mile outside of Robbinsville, in Upper Freehold Township. While Doctors Creek is itself part of the greater Crosswicks Creek

[10]Shipetauken Creek is a stream located in Lawrence Township, Mercer County.

watershed (see below), the area drained by Doctors Creek is a separate HUC-11 unit for accounting purposes. In Robbinsville, this watershed is largely covered with wetlands, agriculture, and recently, highway-oriented warehouse development off of West Manor Way.

Crosswicks Creek Watershed

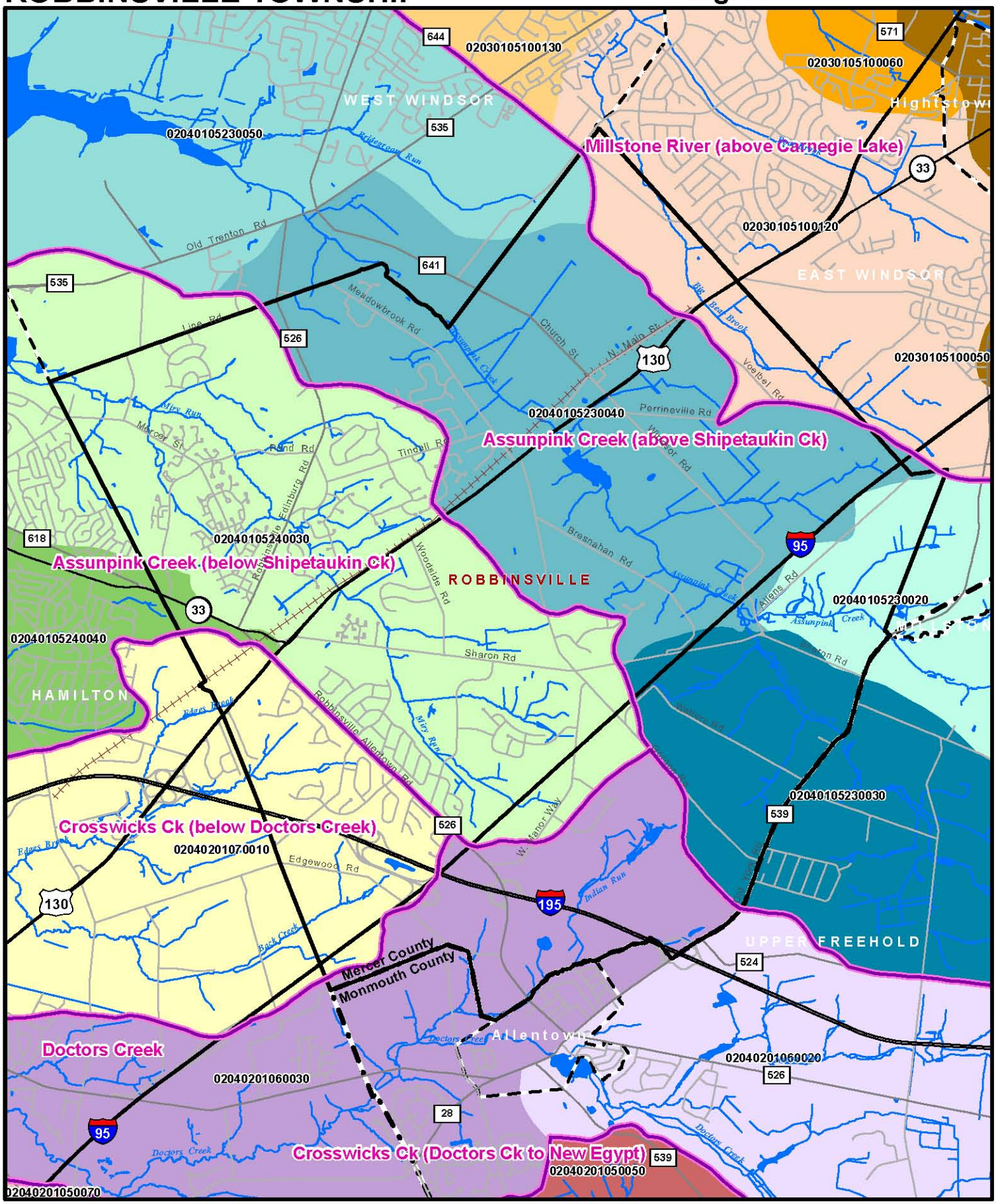
Almost nine percent, or 1.8 square miles, of Robbinsville lies within the Crosswicks Creek watershed. Crosswicks Creek forms the southern border of Mercer County, flowing into the Delaware River. Two of its tributaries, Edges Brook and Back Creek, have their headwaters in the southwestern portion of Robbinsville. This watershed is largely covered with suburban development, forested land, and highways (Interchange 7A, between I-195 and the NJT, lies within this watershed).

Millstone River Watershed

The Millstone River Watershed is the only watershed in Robbinsville Township that drains into the Raritan River, and is also the watershed that drains the smallest portion of Robbinsville, 4.9 percent, or roughly one square mile of township land. Big Bear Brook, in the northeastern corner of the township, is the main tributary that drains Robbinsville in this watershed. Since the Millstone River flows through the Delaware and Raritan Canal State Park, this portion of the township is within the “review zone” of the Delaware and Raritan Canal Commission – a state agency that reviews and regulates development affecting the Canal State Park. All water courses that enter the park’s boundaries are subject to the commission’s relevant regulations on stream corridors, impervious cover, stormwater management, and other influences on the environment. Rules adopted by the Delaware and Raritan Canal Commission in June 2009 require a vegetated 300-foot buffer for the D&R Canal itself, and all water courses flowing into the canal. More information about the review zone can be found at the D&R Canal Commission website (www.dandrcanal.com/drcc/index.html).

ROBBINSVILLE TOWNSHIP

Figure 14: Watersheds



Sources : 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.

Robbinsville Boundary
HUC/Watershed
Stream
Lake

N

0.5 0.25 0 0.5
Miles

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Table 9: Watersheds and Subwatersheds in Robbinsville

Watershed Name (HUC 11 Number)	Subwatershed Name	HUC14	Acreage within Robbinsville	Percent of Robbinsville Land
Assunpink Creek (above Shipetaukin Creek) (020401005230)			5,619.37	42.70%
	Assunpink Creek (Shipetaukin to Trenton Road)	02040105230050	82.78	0.63%
	Assunpink Creek (Trenton Rd. to New Sharon Branch)	02040105230040	3,917.68	29.77%
	Assunpink Creek (New Sharon Branch to and including Lake)	02040105230020	524.49	3.99%
	New Sharon Branch (Assunpink Creek)	02040105230030	1,094.41	8.32%
Assunpink Creek (below Shipetaukin Creek) (020401005240)			4,418.74	33.58%
	Miry Run (Assunpink Creek)	02040105240030	4,321.41	32.84%
	Pond Run	02040105240040	97.33	0.74%
Crosswicks Creek (below Doctors Creek) (02040201070)			1,160.95	8.82%
	Back Creek (above Yardville-Hamilton Square Road)	02040201070010	1,160.95	8.82%
Doctors Creek (02040201060)			1,317.43	10.01%
	Doctors Creek (below Allentown)	02040201060030	1,315.07	9.99%
	Doctors Creek (Allentown to 74d28m40s)	02040201060020	2.36	0.02%
Millstone River (above Carnegie Lake) (02030105100)			643.97	4.89%
	Bear Brook (above Trenton Road)	02030105100120	643.97	4.89%
Total			**13,160.46**	**100.00%**

Source: NJDEP, 2006

Streams

In Robbinsville, there are a total of 50.33 stream miles flowing across the land, 38.93 of which are first- or second-order, or “headwater,” streams. That is, they are the initial sections of stream channels with no contributing tributaries (first-order streams), or they are stream channels formed from only one branching section of tributaries above them (second-order streams). The headwaters are where a stream is “born,” and actually begins to flow. **Table 10: Robbinsville Streams** below records the length of streams in Robbinsville by stream order.

Headwaters are of particular importance because they tend to contain a high diversity of aquatic species and their condition affects the water quality found downstream. They drain only a small area of land, usually no larger than one square mile (640 acres). 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. Base flow is the portion of stream flow that comes from groundwater seepage, not surface water runoff. This makes them subject to greater

temperature fluctuations, especially when forested buffers on their banks are removed. They are also easily silted over 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 of their small base flows. 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.

Robbinsville's named streams include Assunpink Creek, Miry Run, Indian Run, New Sharon Branch, Big Bear Brook, Edges Brook, and Back Creek. While none of these waterways are contained entirely within Robbinsville, Edges Brook, Back Creek, Indian Run, and Miry Run all have their headwaters within the township, and the New Sharon Branch joins the Assunpink Creek in Robbinsville (see **Table 10** for stream order classifications). The Assunpink Creek and Miry Run are monitored for biological life, nutrients, chemicals, and other parameters, while several other streams that flow through Robbinsville are monitored for biological life only. See **Surface Water Quality** for more information on NJDEP's stream monitoring programs.

Lakes and Ponds

There are numerous unnamed ponds and water impoundments in Robbinsville, the vast majority of them less than an acre in size. The township's only named water body is Indian Lake, a small impoundment along Indian Run on the southern border of the township. The largest water body is an unnamed artificial lake of 22.7 acres along Assunpink Creek, just south of the Village of Windsor in the Assunpink Creek Wildlife Management Area (WMA) (see photo below). Other notable lakes and ponds include a series of lakes at the headwaters of Indian Run, and a pair of recently constructed artificial lakes in Robbinsville Town Center. The lakes in the town center are not represented in NJDEP's 2007 land cover data. See **Figure 15: Surface Water, Wetlands, and Vernal Pools.**

View of the unnamed artificial lake behind the dam on Assunpink Creek

Table 10: Robbinsville Streams

Stream Order	Length (Meters)	Length (Miles)
First (smallest)	44,818.98	27.85
Second	17,829.41	11.08
Third	8,643.92	5.37
Fourth	4,146.65	2.58
Fifth	5,565.22	3.46
Total	**81,004.19**	**50.33**

Source: NJDEP

Wetlands

Wetlands support unique communities that serve as natural filters and as incubators for many beneficial species. The term “wetland” is applied to areas where the soil is inundated or saturated at a frequency and duration great enough to support vegetation suited for life in saturated soils. The source of water for a wetland can be surface water such as an estuary, river, stream, or lake edge, or groundwater that intersects with a depression in land surface. Under normal conditions, wetlands are those areas that support a prevalence of defined wetland plants on a wetland soil. Wetland soils, which are also known as

hydric soils, are areas where the land is saturated for at least seven consecutive days during the growing season. While wetlands almost always require the presence of hydric soils, hydric soils are not always necessarily wetlands. By definition, wetlands require the presence of both wetlands vegetation and hydric soils. There are also special wetland categories to denote saturated areas that do not support naturally occurring wetlands vegetation, typically due to human activities such as agriculture.

New Jersey protects freshwater (interior) wetlands under the New Jersey Freshwater Wetlands Protection Act Rules: *N.J.A.C. A 7:7A*. This law also protects transitional areas, or "buffers," around freshwater wetlands. The transitional area is between 75 and 150 feet around a freshwater wetland of "exceptional resource value," which is defined as one that either discharges into trout-supporting waters or has been documented as habitat for a threatened or endangered species. The transitional area is between 25 and 50 feet around all other freshwater wetlands.

The New Jersey freshwater wetland maps provide guidance on where wetlands are found in New Jersey, but they are not the final word. Only an official determination from NJDEP, called a "letter of interpretation" (LOI) can determine for sure if there are freshwater wetlands on a property. An LOI verifies the presence, absence, or boundaries of freshwater wetlands and transition areas on a site. Activities permitted to occur within wetlands are very limited and permits are required for most of them. Violations of the wetland regulations will result in penalties determined by NJDEP. Additional information on wetlands rules and permits is available through NJDEP and on their website under "land use." See **Sources of Information**.

All of Robbinsville's wetlands are freshwater. The location of these wetlands is based on NJDEP's land use/land cover mapping. See **Figure 4: NJDEP Land Cover (2007)**. As mentioned above, these land cover maps are not determinative; only an official "letter of interpretation" from NJDEP can verify the existence and location of freshwater wetlands. Total wetland acreage in the township, based on NJDEP's land use/land cover data, is 4,301 acres, of which 3,058 feature natural wetlands vegetation. Of Robbinsville's naturally vegetated wetlands, 2,734 acres are classified as forested wetlands, 96 acres are herbaceous wetlands, and 228 acres are scrub/shrub wetlands. See **Figure 15: Surface Water, Wetlands, and Vernal Pools**. More information on Robbinsville's naturally vegetated wetland areas is found in the **Biological Resources: Wetlands** section.

Robbinsville also contains 1,243 acres of pre-existing or "former" wetlands that have been subsequently altered by human activities. These areas will collectively be referred to as *modified* wetlands in this document.[11] Robbinsville's modified

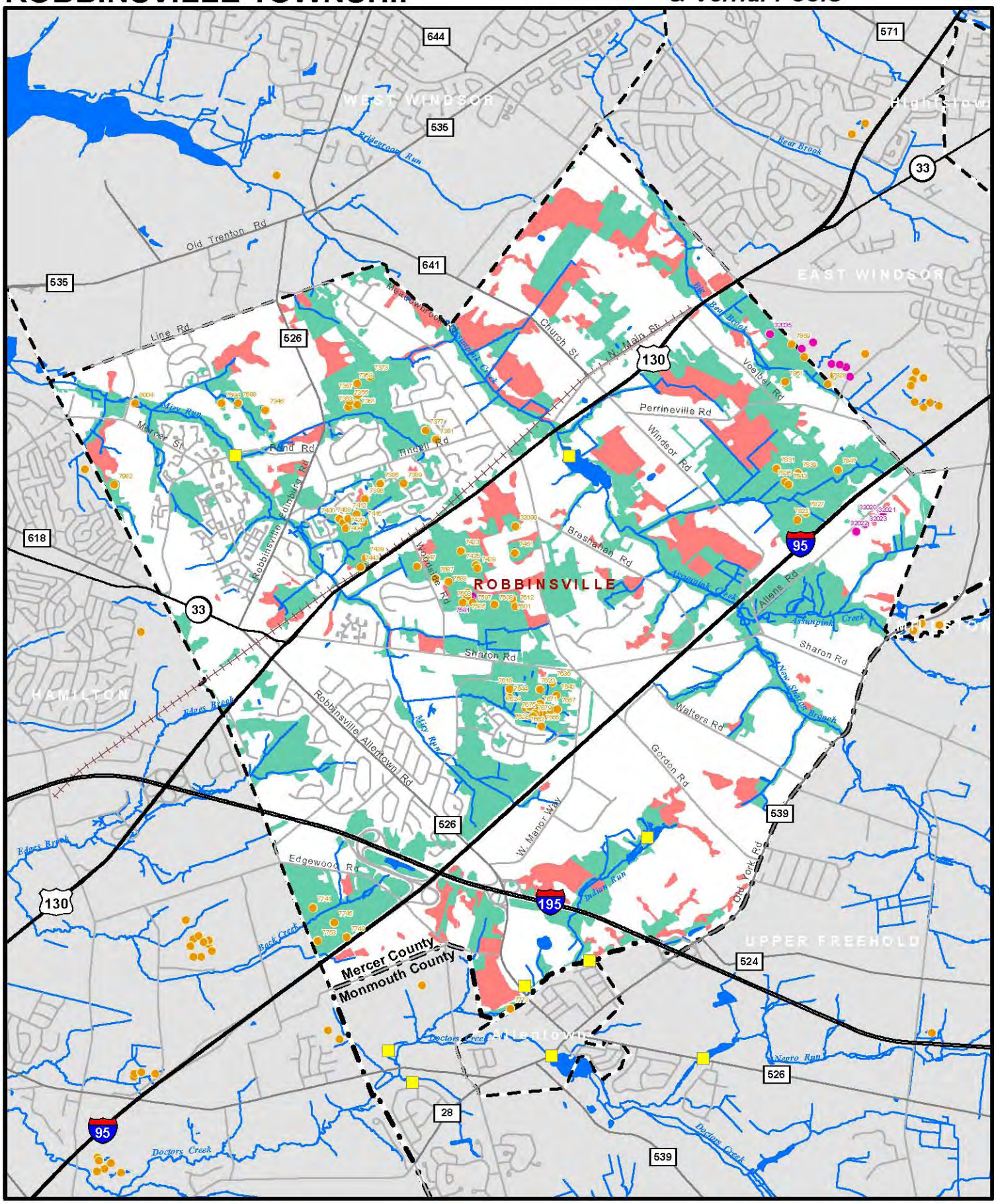
[11]Like interior wetlands, Robbinsville Township's modified wetlands are also nontidal.

wetlands include agricultural wetlands, former agricultural wetlands, disturbed wetlands, and wetlands that occur in maintained green spaces such as lawns, golf courses, and stormwater swales. Modified wetlands differ from nonmodified wetlands in that they no longer support the typical natural wetlands vegetation found in analogous unaltered natural areas. However, they do show obvious signs of soil saturation and exist in areas shown to have hydric soils on U.S. Soil Conservation Service soil surveys. Robbinsville's modified wetlands fall into the following categories: 1,133 acres of agricultural wetlands, 58 acres of disturbed wetlands, 20 acres of wetland rights-of-way, and 32 acres of wetlands found in maintained greenspace, recreational areas, or lawn.

The NJDEP Landscape Project maps wetlands habitat for threatened and endangered species. Both natural and modified wetlands are included in the Landscape Project. Robbinsville is home to the western portion of the Assunpink Wildlife Management Area, which contains a significant portion of the township's wetland areas.

ROBBINSVILLE TOWNSHIP

Figure 15: Surface Water, Wetlands & Vernal Pools



Sources : 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.

- Dam
- Potential Vernal Pool
- Vernal Pool
- Agricultural Wetlands
- Wetlands
- Stream
- Lake

N

0.5 0.25 0 0.5
Miles

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Agricultural Wetlands

Agricultural wetlands occupy 1,064 acres of Robbinsville Township. These "quasi-wetlands" are found scattered all across Robbinsville, especially in the more agricultural eastern and southern portions of the township. Agricultural wetlands are modified former wetland areas currently under cultivation. These areas still exhibit evidence of soil saturation in aerial infrared photos, but they no longer support natural wetlands vegetation. Agricultural wetlands are the second most common type of wetlands in Robbinsville, after deciduous wooded wetlands, as classified by the Anderson Land Use Classification System. See **Figure 15: Surface Water, Wetlands, and Vernal Pools**.

Agricultural wetlands were often drained by a technique called "tile drainage." 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; the existence of tile drainage strongly indicates a natural wetland hydrology. Drainage systems can be quite long-lived and require only the periodic maintenance of drainage ditches and outlets.

While tile drains have allowed more land to become farmable, they also tend to convey nitrogen from the fields into local streams more efficiently than is desired, which can have negative effects on stream health. Because little mapping exists identifying the location of tile lines, municipal, county, and state boards rarely address their existence as part of development approval processes. Yet, tile systems can pose health concerns when land is developed into residential or commercial uses, especially where septic systems are concerned. If a septic system leach field is installed near an unknown existing tile drainage system, discharge may seep into the tile line and directly into the local waterway. Lawn and agricultural chemicals carried through field drains are also a threat to water quality and wildlife and habitat.

As long as agricultural wetland areas remain in agricultural use, they are exempt from New Jersey Freshwater Wetlands Rules *N.J.A.C. 7:7A*. However, if an agricultural area is removed from agricultural production for more than five years, any wetlands located within that area lose their exempt status. Also, according to *N.J.A.C. 7:7A-2.8(B) 2*, "the exemptions apply only as long as the area is used for the exempted activity." Therefore, if the area is used for anything other than farming, the exemption no longer applies.

The Natural Resource Conservation Service sponsors the Wetlands Reserve Program, a voluntary program that offers landowners an opportunity to receive payments for restoring and protecting wetlands on their property, including agricultural wetlands. Restoring agricultural wetlands requires 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 eligible lands through permanent easements, 30-year easements, or restoration cost-share agreements. See **Appendix B** for more information on federal and state conservation programs for landowners.

Vernal Pools

Vernal pools are confined depressions, either natural or man-made, which hold water for at least two consecutive months out of the year and are devoid of breeding fish populations. Vernal pools come in an array of forms: isolated depressions within upland forests, seasonally flooded meadows, floodplain swamps, abandoned gravel pits or quarries, and even derelict swimming pools. However, no matter what the structure or genesis of the pool is, all vernal pools either dry out completely or draw down to very shallow levels unsuitable for sustaining fish. Vernal pools are critical sites for certain rare species of frogs and salamanders, called obligate breeders. The term “obligate breeder” refers to species that can only reproduce in vernal pools, because the pool’s impermanence prevents residence by predators, such as fish, that would consume the eggs and young. Vernal pools also provide habitat for amphibians and reptiles that may breed in them but not exclusively (facultative breeders), or may use the pools at some point in their life cycles.

Vernal pools are so intermittent, and often so small, 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 obligate amphibian species.[12]

In an effort to boost the effectiveness of the 1987 wetland protection regulations, which allowed the filling of isolated wetlands up to one acre in size (including vernal pools), the New Jersey Division of Fish and Wildlife began the Vernal Pool Survey project in 2001 to identify, map, and certify vernal pools throughout the state. Once a vernal pool is certified, regulations require that a 75-foot buffer be maintained around the pool. NJDEP’s Division of Land Use Regulation oversees this designation and restricts development around vernal pools by denying construction permits. To be certified, vernal pools must: (1) occur in a confined basin depression without a permanently flowing outlet; (2) provide documented habitat for obligate or facultative vernal pool herptile species; (3) maintain

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[12]Calhoun, A.J.K., and M.W. Klemens. *Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States*. MCA Technical Paper Series: No. 5, Metropolitan Conservation Alliance, Wildlife Conservation Society. Bronx, NY, 2002. pp. 2--5.

ponded water for at least two continuous months between March and September of a normal rainfall year; and (4) be free of fish populations throughout the year, or dry up at some time during a normal rainfall year.

The state has identified 77 *possible* vernal pools in Robbinsville (see **Figure 15: Surface Water, Wetlands, and Vernal Pools**). This does not mean that 77 pools are actually present in Robbinsville. This information is recorded in NJDEP's current geographic dataset. The actual number of pools could be much larger or smaller. Of the 77 pools identified by NJDEP, seven have been confirmed and certified. Determining the actual number of pools, and certifying pools, requires investigation in the field. Citizens, local governments, and non-profit groups can survey pools and submit documentation to NJDEP to have pools certified. The NJDEP's Division of Fish and Wildlife provides detailed guidance on what documentation is needed to certify a vernal pool at: www.state.nj.us/dep/fgw/ensp/vernalpool.htm.

Municipalities can provide additional protection for vernal pools by instituting restrictive zoning or negotiating conservation easements on the land surrounding vernal pools.

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). The probability of flooding is computed based on historical river flows and flood events. At least 10 years of data is required to calculate flood probabilities. This number represents a moving average and can be periodically recalculated to account for changes in flood trends in an area.

Although the terms "flood hazard area" and "100-year floodplain" denote similar concepts, the 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 the 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.

Figure 16: Parts of a Flood Hazard Area

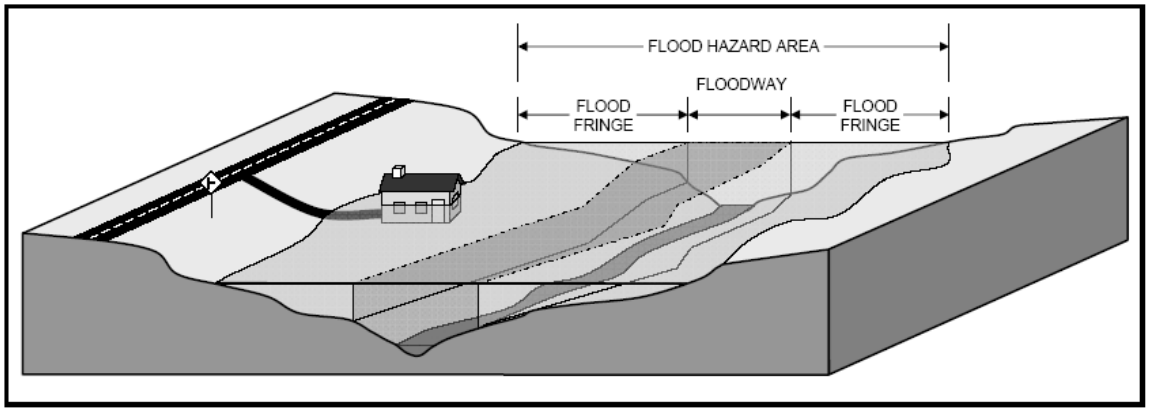


FIGURE A: THE FLOOD HAZARD AREA IS COMPRISED OF THE FLOODWAY AND FLOOD FRINGE

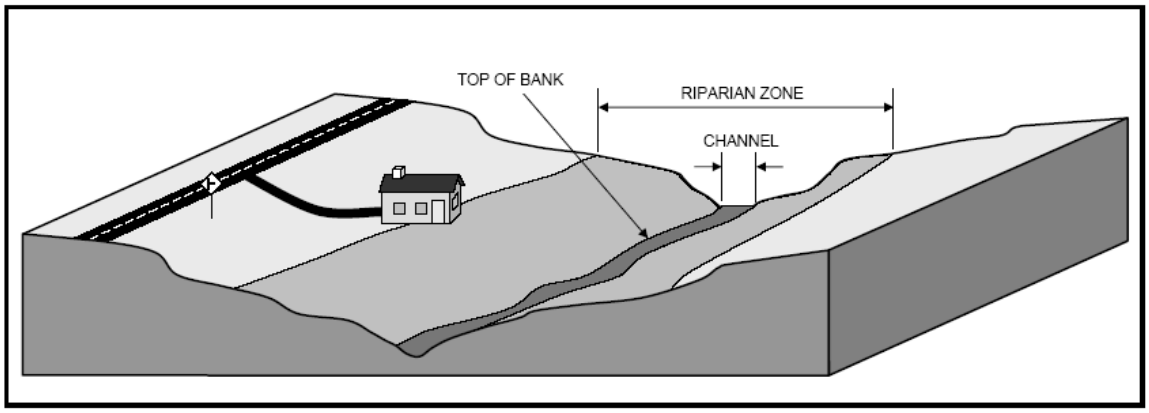


FIGURE B: THE RIPARIAN ZONE IS COMPRISED OF THE CHANNEL AND LAND WITHIN 50, 150 OR 300 FEET OF THE CHANNEL

Source: N.J.A.C. 7:13

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. The NJDEP adopted a new Flood Hazard Control Act on November 5, 2007. In an effort to streamline the existing regulations and further improve water quality in New Jersey's waters, the redrafted Flood Hazard Control Act imposes additional requirements on property owners in the flood management area. The areas of the floodplain regulated by this law are depicted above in **Figure 16**. Some of the changes to previous regulations are outlined below.

Changes to Flood Hazard Area Control Act (2007)

- Provides greater flexibility in flood hazard area analysis; allows for the use of a greater variety of FEMA maps and calculation techniques than previous regulation.
- Introduces the concept of "riparian zone" which includes the stream, its banks and the land and vegetation within a certain distance of all regulated waters. These areas will require flood management permits for a wider variety of uses than the previous regulation.
  - *Riparian zone extends 300 feet from all Category One waters and their upstream tributaries within the same HUC-14 watershed*
  - *Riparian zone extends 150 feet from all trout producing and maintaining streams and their headwaters as well as from areas that support endangered or threatened species*
  - *All other waters will maintain a 50 foot buffer*
- Improves overall flood mitigation by instituting a "zero net loss" criteria for flood storage area statewide.
  - *No more than 20 percent of the flood storage area onsite may be removed and there must not be any net loss in flood storage area in on- and off-site locations combined.*
  - *Flood storage compensation must be made within the same contiguous flood hazard area.*
- Streamlines the permitting process for activities identified to have minimal impacts.
  - *Introduces Permits by Rule*
  - *Introduces General Permits*
  - *Allows for permit transferral with property sale*

Full text of the revised Flood Hazard Area Control rules and other additional information on floodplain activities is available from NJDEP and from its website under "Land Use." See **Sources of Information**.

Robbinsville's floodplains are depicted in this study (see **Figure 17: Flood Hazard Areas**) using digitized coverage of the Federal Emergency Management Agency's (FEMA's) Flood Insurance Rate Maps (FIRMs). These maps were initially produced in paper form as part of the 1978 Flood Insurance Study for Washington Township. The boundaries of the 100-year and 500-year floodplains shown on the FIRMs were digitized by NJDEP in 1996. These files indicate that 675.7 acres or 5.13 percent of the township's land area falls within the 100-year floodplain. An additional 142.5 acres, or 1.03 percent of the township, falls within the 500-year floodplain. Presumably, NJDEP's flood hazard area would be slightly larger than the 100-year floodplain[13] (see **Table 11: Flood Hazard Area Acreage**).

[13]Site plan and subdivision applications require detailed engineering studies that depict the boundaries of the flood hazard area, as defined by New Jersey, on a large scale.

Table 11: Flood Hazard Area Acreage

Flood Plain	Area (Acres)	% of Robbinsville in Flood Plain
100 Year Flood Plain	675.70	5.1343%
500 Year Flood Plain	142.46	1.0295%
Total Flood Plain Area	**818.17**	**6.2169%**

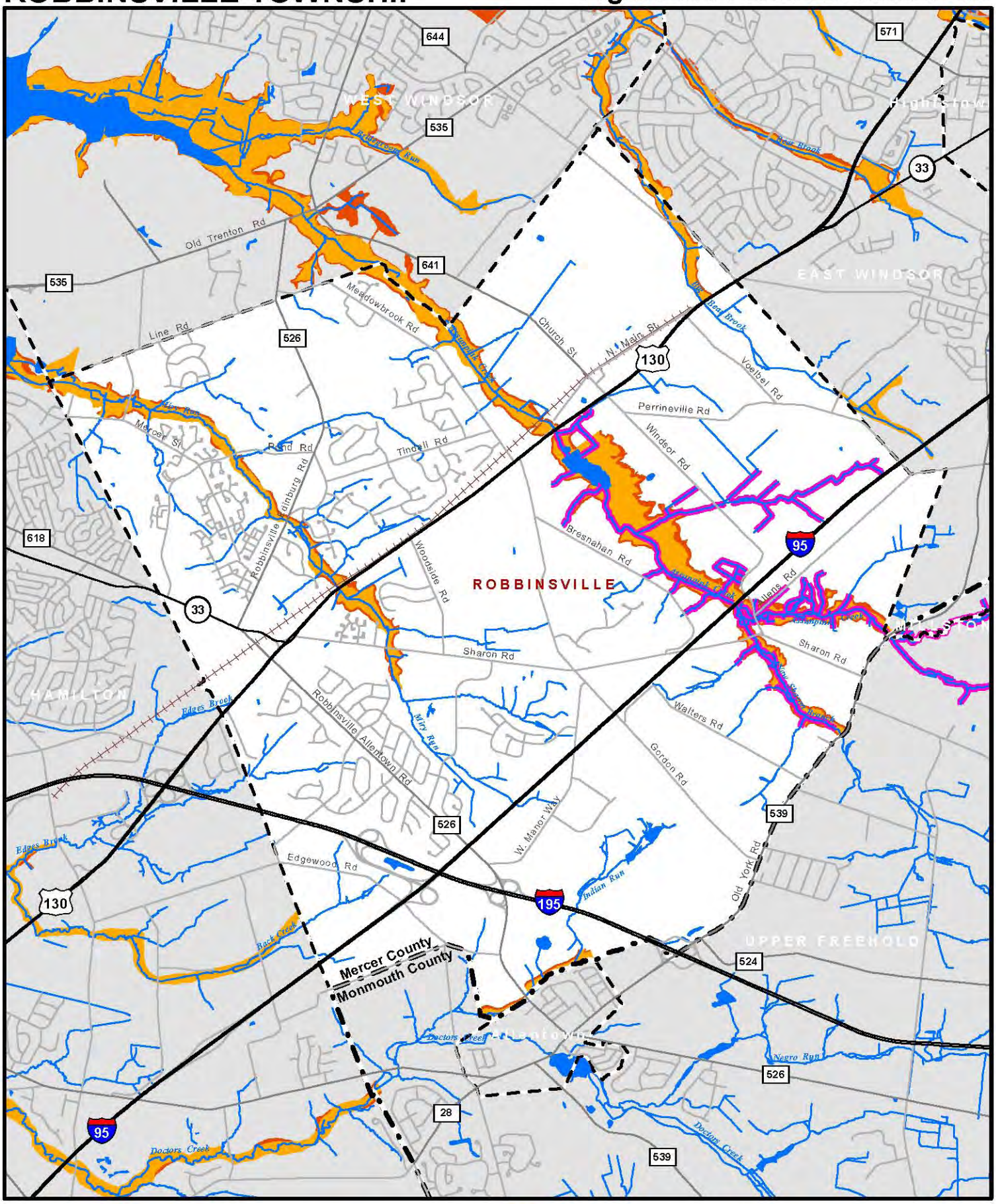
Source: FEMA

The NJDEP and FEMA are currently in the process of creating updated Digital Flood Insurance Rate Maps (DFIRMs). This effort entails a complete remapping of the floodplain using Light Detection and Ranging (LIDAR) technology. However, there are no plans to redelineate floodplains in Robbinsville Township. Most of the efforts in Mercer County have focused on the Delaware River, which has experienced several severe flooding events during the last few years. While there are no plans to update the maps for Robbinsville, municipalities may request a review from FEMA.

Robbinsville's largest floodplain area is located along the banks of Assunpink Creek, and its tributary the New Sharon Branch. This area is also extensively occupied by forests and wetlands, including the Assunpink Creek Wildlife Management Area. Another notable floodplain is found along the northern section of Miry Run. Here, the floodplain itself has remained wetlands, but suburban development now extends to the edge of the floodplain boundary on its southern banks. Smaller floodplain areas are found along Big Bear Brook and Indian Run (see **Figure 17: Flood Hazard Areas**).

ROBBINSVILLE TOWNSHIP

Figure 17: Flood Hazard Areas



Sources : NJDEP, NJDOT, DVRPC, FEMA. 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.

Stream
Lake
Category 1 Stream
100-Year Floodplain
500-Year Floodplain

N

0.5 0.25 0 0.5
Miles

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

Surface Water Quality

Surface water quality standards are established by federal and state governments to ensure that water is suitable for its intended use. The Federal Clean Water Act (P.L. 95-217) requires that, wherever possible, water quality standards provide water suitable for fish, shellfish, and wildlife to thrive and reproduce, and for people to swim and boat.

All water bodies in New Jersey are classified by the 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). Fresh water bodies (FW1 and FW2) are further broken down into trout-producing (TP), trout-maintaining (TM), or non-trout waters (NT). The water quality for each of these groups must be able to support designated uses that are assigned to each water body classification (see *Surface Water Quality Standards N.J.A.C 7:9B-1.12*).

In addition to the classification above, the NJDEP has three tiers of surface water quality protection. The most protective tier is for Outstanding National Resource Waters (ONRW), which includes all surface waters classified as FW1 and PL. The NJDEP cannot approve any activity that might alter existing water quality in these waters. Robbinsville does not contain any ONRW (FW1 or PL) streams.

The second tier of protection is Category One (C1). C1 waters are designated through rulemaking for protection from measurable changes in water quality because of their exceptional ecological significance, exceptional water supply significance, exceptional recreational value, and/or exceptional fisheries. The water quality, aesthetic value, and ecological integrity of C1 waters should be protected and maintained.

Waters not designated as ONRW or C1 are designated as Category 2 (C2) waters. Similar to C1, existing water quality should be maintained in C2 waters. However, lowering of water quality is authorized to accommodate necessary and important social and economic development.

Robbinsville's Stream Designations and C1 Buffers

Within Robbinsville, Assunpink Creek and Miry Run are classified as FW2–NT, which means that they are freshwater, non trout-producing, non trout-maintaining waters.[14] Assunpink Creek up to its intersection with Route 130 (i.e., upstream of Route 130 and within the Assunpink Creek WMA) is further designated as a C1

[14]Despite the classification, it is possible for trout to be present in non-trout producing or non trout-maintaining waters.

water (see **Table 12: Water Quality Classifications of Streams in Robbinsville**).

Robbinsville's remaining streams are not specifically classified in New Jersey's Surface Water Quality Standards (*N.J.A.C. 7:9B*). Instead, these streams are assigned the same classification as the downstream water body into which they flow (i.e., into streams of which they are a tributary). For example, New Sharon Branch has C1 status since it flows into Assunpink Creek within the WMA, itself a C1 stream. In addition, Robbinsville contains several tributaries, such as Big Bear Brook and Indian Run, which are not classified, but assigned the same classification as larger streams into which they flow. All of these streams are FW2-NT waters.

Table 12: Water Quality Classifications of Streams in Robbinsville

Stream	Classification
Assunpink Creek (upstream of Route 130; within Assunpink Creek WMA)	FW2-NT(C1)
Assunpink Creek (downstream of Route 130; not within Assunpink Creek WMA)	FW2-NT
Miry Run	FW2-NT
New Sharon Branch *(via Assunpink Creek)*	FW2-NT(C1)
Indian Run *(via Doctors Creek)*	FW2-NT
Edges Brook *(via Crosswicks Creek)*	FW2-NT
Back Creek *(via Crosswicks Creek)*	FW2-NT
Big Bear Brook *(via Bear Brook)*	FW2-NT

Source: NJDEP, Surface Water Quality Standards, N.J.A.C. 7:9B

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/boating); (3) industrial and agricultural water supply; (4) public potable water supply after conventional filtration and disinfection; and (5) any other reasonable uses.

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

In addition to the water quality criteria outlined above, special land use requirements apply to C1 waters through regulations administered by the NJDEP. A 300-foot, or "C1," buffer is required by the Stormwater Management (NJAC 7:8) and the Flood Hazard Area Control Act (NJAC 7:13) rules. The Stormwater Management rules state that a 300-foot buffer or Special Water Resource Protection Area (SWRPA) is required for all development that results in a ¼ acre or more increase in impervious surface or one acre or more of total disturbance that is adjacent to a C1 waterway. These rules are available at: www.state.nj.us/dep/rules.

The Flood Hazard Area Control Act rules require a 300-foot buffer, or "Riparian Zone (RZ)," or vegetated buffer, adjacent to C1 waters. In most cases, the SWRPA and RZ will overlap. The standards protecting vegetation in the RZ and SWRPA do not apply where vegetation did not exist at the time of the establishment of rules or designation of a stream as C1. For more information on riparian buffers, see **Surface Water Quality: Stream Buffers**.

New Jersey's Integrated Water Quality Monitoring and Assessment Report

The Federal Clean Water Act mandates that states submit biennial reports to the USEPA describing the quality of their waters. States must submit two reports: the *Water Quality Inventory Report* or "305(b) Report," documenting the status of principal waters in terms of overall water quality and support of designated uses, and a list of water bodies that are not attaining water quality standards-–the "303(d) List." States must also prioritize 303(d)-listed water bodies 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.

In 2002, 2004, 2006, and again in 2008, the NJDEP integrated the 303(d) List and the 305(b) Report into a single report according to USEPA's guidance. The draft *2008 Integrated Water Quality Monitoring and Assessment Report*, released in August 2008, places the state's waters on one of five "sublists." Sublists 1 and 2 contain waters that are attaining standards. Sublist 3 contains waters for which there is insufficient data to determine their status. Sublist 4 contains waters that do not attain water quality standards, but that meet one of the following three conditions: (1) a TMDL has been completed for the pollutant causing non-attainment; (2) other enforceable pollution control requirements are reasonably expected to result in conformance with the applicable water quality standards; or (3) nonattainment is caused by something other than a pollutant. Sublist 5 contains waters that do not attain their designated use and for which a TMDL is required. Sublist 5 is equivalent to the 303(d) List. See section on **Total Maximum Daily Loads** for additional information.

The NJDEP uses a methodology that reports the attainment of water quality standards required for achieving designated uses on a subwatershed basis,

rather than placing water quality monitoring stations and their associated stream segments on a sublist for an individual parameter. The NJDEP identifies the designated uses applicable to each HUC-14 watershed (assessment unit) and assesses that status of use attainment for each applicable designated use. Designated uses include:

- Aquatic life (general)
- Aquatic life (trout)
- Recreation
- Drinking water supply
- Industrial water supply
- Agricultural water supply
- Shellfish harvesting
- Fish consumption

The assessment unit was then placed on the appropriate sublist for each use. (Note: not all designated uses are applicable for all HUC-14 watersheds.)

The NJDEP based the assessment of entire HUC-14 watersheds on the results of one or more monitoring site(s) within the watershed. The results from monitoring site(s) located within the HUC-14 subwatershed were extrapolated to represent all the waters within the entire HUC boundary. In practice, the HUC-14 approach provides a more conservative assessment since any impairment of any water body (stream, river, etc.) in a given HUC-14 watershed will result in that entire watershed being listed as impaired for that use/parameter. In addition, where a HUC-14 watershed contains waters of different classification, the more stringent classification was used to assess impairment and that impairment was then applied to the entire watershed. Because of the extent of extrapolation required for this approach, the NJDEP will perform more detailed testing to determine the actual cause, source, and extent of impairment in the HUC-14 watershed before developing a TMDL or taking other regulatory action to address the impairment.

See **Table 13: Integrated Water Quality Monitoring and Assessment Report, 2008** for the status of each of Robbinsville's HUC-14 watersheds. The designated uses "Aquatic Life (Trout)" and "Shellfish Harvesting" are not applicable for any of the HUC-14 watersheds/assessment units in Robbinsville, and are therefore not included in **Table 13**. Although the Assunpink Creek is stocked with trout, it is not classified as producing or maintaining trout.

As shown in **Table 13**, an assessment unit may be listed on one or more sublists (i.e., on Sublist 2 for drinking water, Sublist 3 for aquatic life, etc.). Only if all uses for an individual HUC-14 are assessed and attained, can the assessment unit be placed on Sublist 1. In order to determine whether or not an assessment unit

supports a designated use, NJDEP identified a suite of parameters that serve as the minimum dataset associated with each designated use.

Table 13: Integrated Water Quality Monitoring and Assessment Report, 2008

Assessment Unit ID	Assessment Unit Name	Sublist					
		Aquatic Life General	Recreation	Drinking Water Supply	Agricultural Water Supply	Industrial Water Supply	Fish Consumption
02040105230050	Assunpink Creek (Shipetaukin to Trenton Road)	5	2	5	2	2	5
02040105230040	Assunpink Creek (Trenton Road to New Sharon Branch)	5	5	5	2	2	5
02040105230020	Assunpink Creek (New Sharon Branch to and including Lake)	5	3	2	3	3	5
02040105230030	New Sharon Branch (Assunpink Creek)	5	2	2	2	2	5
02040105240030	Miry Run (Assunpink Creek)	5	4A	2	2	2	3
02040105240040	Pond Run	5	4A	2	2	2	3
02040201070010	Back Creek (above Yardville-Hamilton Square Road)	5	3	2	2	2	3
02040201060030	Doctors Creek (below Allentown)	5	4A	2	2	2	3
02040201060020	Doctors Creek (Allentown to 74d28m40s)	5	4A	2	2	2	3
02030105100120	Bear Brook (above Trenton Road)	5	5	5	2	2	3

Source: NJDEP, 2008

Key to Integrated Report Sublists

Sublist	Placement Conditions
Sublist 1	The designated use is assessed and attained AND all other designated uses in the assessment unit area assessed and attained. (Fish consumption use is not factored into this determination based on EPA guidance.)
Sublist 2	The designated use is assessed and attained BUT one or more designated uses in the assessment unit are not attained and/or there is insufficient data to make a determination.
Sublist 3	Insufficient data is available to determine if the designated use is attained.
Sublist 4	The designated use is not attained or is threatened; however, development of a TMDL is not required for one of the following reasons: 4A: A TMDL has been completed for the pollutant causing nonattainment; 4B: Other enforceable pollution control requirements are reasonably expected to result in the conformance with the applicable water quality standard(s) in the near future and the designated use will be attained through these means; or 4C; Nonattainment is caused by something other than a pollutant.
Sublist 5	The designated use is not attained or is threatened by a pollutant or pollutants and a TMDL is required.

If one or more designated uses are assessed as “nonattainment” (Sublist 5) the pollutant(s) or impairment causing the non-attainment status is identified on the “303(d) List of Impaired Waters with Priority Ranking.” When the pollutant causing nonattainment is unknown, the pollutant is listed as “pollutant unknown” or “toxic unknown.” The ranking refers to the priority given a specific assessment unit when determining the schedule for a TMDL. **Table 14: 303(d) List of Impaired Waters with Priority Ranking, 2008** lists the nonattaining assessment units and their pollutants/impairments in Robbinsville Township.

In 2008, all of Robbinsville’s subwatersheds were identified on the 303(d). Among the subwatersheds listed in the 303(d) list, the most common pollutant was mercury, which was present in all four Assunpink Creek subwatersheds; in addition, five watersheds had unknown parameters that caused nonattainment (one identified as a toxic substance). Other common pollutants in Robbinsville waters include arsenic and phosphorous (three subwatersheds each), and fecal coliform (two subwatersheds). Other parameters leading to impairments include low levels of dissolved oxygen and high levels of total suspended solids.

Arsenic is a toxic metalloid formerly used as a component in pesticides and for treating wood. In addition to industrial pollution, water bodies can accumulate arsenic from natural sources, as some rocks have naturally high levels of the element. Ingesting or breathing arsenic can cause irritation of the lungs, “corns” or “warts” in the skin, and high levels of arsenic exposure are fatal. Arsenic accumulates in the tissues of fish and shellfish, though mostly as a component of the less-toxic organic compound arsenobetaine. Arsenic contamination primarily affects a water body’s attainment level for use as drinking water.

Trace amounts of mercury are found in the human body, although consuming it in large doses can be toxic. The consumption of mercury can affect the immune system, alter genetic and enzyme systems, and damage the nervous system. Mercury bioaccumulates, meaning it accumulates in the body and is not easily broken down. Atmospheric deposition is the main source of mercury in the environment.

Fecal coliform are bacteria present in the digestive systems of humans and animals and are an indicator of the presence of fecal material. Domestic sewage overflow, agricultural runoff, or other nonpoint sources of human and animal waste (including those from pets and waterfowl) can cause fecal coliform contamination in water bodies. Potential health risks for individuals exposed to fecal coliform include ear infections, dysentery, typhoid fever, viral and bacterial gastroenteritis, and hepatitis A.

Table 14: 303(d) List of Impaired Waters with Priority Ranking, 2008

Assessment Unit ID	Assessment Unity Name	Parameters	Ranking
02040105230050	Assunpink Creek (Shipetaukin to Trenton Road)	Arsenic	Medium
		Cause Unknown	Low
		Mercury	Medium
02040105230040	Assunpink Creek (Trenton Road to New Sharon Branch)	Arsenic	Medium
		Cause Unknown	Low
		Fecal Coliform (E. Coli)	Medium
		Mercury	Medium
02040105230020	Assunpink Creek (New Sharon Branch to and including Lake)	Cause Unknown	Low
		Mercury	Medium
02040105230030	New Sharon Branch (Assunpink Creek)	Mercury	Medium
		Phosphorous	Medium
02040105240030	Miry Run (Assunpink Creek)	Dissolved Oxygen	Medium
02040105240040	Pond Run	Total Suspended Solids	Low
		Turbidity	Low
02040201070010	Back Creek (above Yardville-Hamilton Square Road)	Phosphorous	Medium
02040201060030	Doctors Creek (below Allentown)	Phosphorous	Medium
02040201060020	Doctors Creek (Allentown to 74d28m40s)	Cause Unknown	Medium
02030105100120	Bear Brook (above Trenton Road)	Arsenic	Medium
		Fecal Coliform (E. Coli)	Medium
		Unknown Toxic	Low

Source: NJDEP Water Monitoring and Standards, 2008

Phosphorus exists naturally at low levels within the environment, although excess phosphorus can lead to harmful algae blooms, which can produce “dead zones” where no aquatic life can survive. Typical causes of phosphorus pollution include overfertilization 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 stream bank erosion occurring during floods can transport high quantities of phosphorous into the water system.

Dissolved oxygen (DO) refers to the level of elemental oxygen found dissolved within the water body. Fish breathe DO through their gills, and low levels of dissolved oxygen thus impair aquatic life, especially trout, which require high oxygen levels. Oxygen depletion can be caused by blooms of phytoplankton, pond turnover, or application of herbicide.

Total suspended solids (TSS) are solid particles that are not dissolved in the water body, including silt, plankton, and industrial pollutants. Total suspended solids are measured by passing water through a filter and weighing the residue. A similar measure is turbidity, which also is a measure of solids, but is measured by judging the clarity of the water, and is therefore more dependent on the optical characteristics of the solids. Total suspended solid pollution can come from erosion, agricultural runoff, algae, and wastewater runoff. High levels of solids prevent light from reaching aquatic life, lead to warmer water with lower oxygen content, and can suffocate larvae and fish gills.

Water Quality Monitoring Networks

The determination of whether or not water quality is sufficient to meet an assessment unit’s designated use(s) is based on testing results from various water quality monitoring networks. Across the state, NJDEP primarily relies on two water quality monitoring networks: the Ambient Surface Water Monitoring Network (ASWMN) and the Ambient Biomonitoring Network (AMNET). The NJDEP runs the ASMN network in cooperation with the U.S. Geological Survey (USGS). This network contains 215 stations that monitor for nutrients (i.e., phosphorous and nitrogen), bacteria, dissolved oxygen, metals, sediments, chemical, and other parameters. AMNET, which is administered solely by NJDEP, evaluates the health of aquatic life as a biological indicator of water quality. This network includes 820 monitoring stations located throughout the state. Each station is sampled once every five years. The first round of sampling for all stations took place between 1992 and 1996 and a second round occurred between 1997 and 2001. A third round of sampling took place between 2002 and

2006, and the fourth round of sampling is currently ongoing. The location of nearby ASMN and AMNET stations are depicted on **Figure 18: Water Quality.**[15]

Ambient Surface Water Monitoring Network

There are no sites in Robbinsville Township that are part of the USGS/NJDEP Ambient Surface Water Monitoring network (ASMN). However, there are two nearby sites that test the quality of waters downstream from Robbinsville. Hamilton Township is home to a station on Miry Run where it crosses Rt. 533, and Lawrence Township is home to an Assunpink Creek station near the village of Clarksville. These sites are tested for dissolved oxygen, pH, ammonia, nitrogen, phosphorous, metals, and a wide range of organic and inorganic chemicals.

Ambient Biomonitoring Network

There are seven AMNET sites that assess aquatic life within Robbinsville's streams (four of these locations are located beyond Robbinsville's boundaries). The NJDEP completed sampling each of the seven AMNET sites in three rounds; the fourth round of sampling is currently ongoing. Each AMNET site was tested for only one water quality parameter – the diversity of aquatic life. In testing this water quality parameter, the NJDEP samples streams for benthic (bottom-dwelling) macroinvertebrates (insects, clams, mussels, snails, worms, and crustaceans that are large enough to be seen by the naked eye). Macroinvertebrates are studied because they are good indicator species: if pollution impacts a stream, their populations are adversely affected, and require a significant amount of time to recover. Whereas chemical tests measure water quality on a given day, the presence or absence of macroinvertebrates is affected by water quality over a longer time period preceding the testing day. The NJDEP determines the number and diversity of aquatic organisms present. Water bodies are rated on the number of different species of organisms present as well as the number of individuals within those populations.

Up until 2007, all AMNET assessments were reported using the statewide New Jersey Impairment Score (NJIS), which incorporated five metrics into a 30-point scale corresponding to nonimpairment, moderate impairment, and severe impairment. Following reassessment in 2007, the state was divided into three regions, each with its own revised index: High Gradient (above the Fall Line), Coastal Plain (below the Fall Line), and Pinelands (within or less than 5 km from the Pinelands National Reserve). These revised indices allowed for a more accurate assessment of biological conditions, and expanded the classifications from three to four ratings: Excellent, Good, Fair, and Poor. All of the streams

[15]Note that this map does not show all of the seven AMNET stations detailed in **Table 13**, some stations downstream from Robbinsville, while relevant to judging the water quality in township streams, are located outside of the view area in **Figure 18**.

within Robbinsville were assessed according to the Coastal Plain Macroinvertebrate Index (CPMI), which remains a 30-point scale, but has finer gradations than the old NJIS system. Due to the methodological changes, average scores are much lower in the new system: for example, the “moderately impaired” NJIS score, ranging from 9 to 21 is considered roughly equivalent to the “fair” CPMI score, ranging from 6 to 10. Round 1 and 2 data are only available as NJIS scores, Round 3 data is available in both the old and new system, and Round 4 data is reported entirely using the new system (see Table 15).

In Round 1 sampling:

Only three of the seven stations testing Robbinsville waters were in place for the first round of sampling. The Rt. 535 Assunpink Creek station (AN0109) was rated as “unimpaired,” while the Miry Run at Rt. 535 (AN0115) and Bear Brook (AN0383) stations were rated as “moderately impaired.” Moderate impairment means that stream habitat has been degraded and fewer than normal numbers of macroinvertebrate fauna are present. However, these waters are more biodiverse than severely impaired waters, which have a relative abundance of pollution-tolerant species and a lack of more sensitive types of invertebrates.

In Round 2 sampling:

All of the sites attained a “moderately impaired” level, including the four new sites: Assunpink Creek at Windsor Road (AN0109A), New Sharon Branch (AN0109B), Miry Run at Pond Road (AN0115A), and Back Creek (AN0131A). The Miry Run at Rt. 535 site (AN0115) was the only site to improve biodiversity (but still within the confines of “moderate impairment,” while the Assunpink Creek at Rt. 535 site (AN0109) declined strongly, from “unimpaired” to the worst possible “moderately impaired” ranking. Possible explanations for this decrease in biodiversity include the timing of the samples, late summer during low water periods, and increased development within Robbinsville and the surrounding area.

In Round 3 sampling:

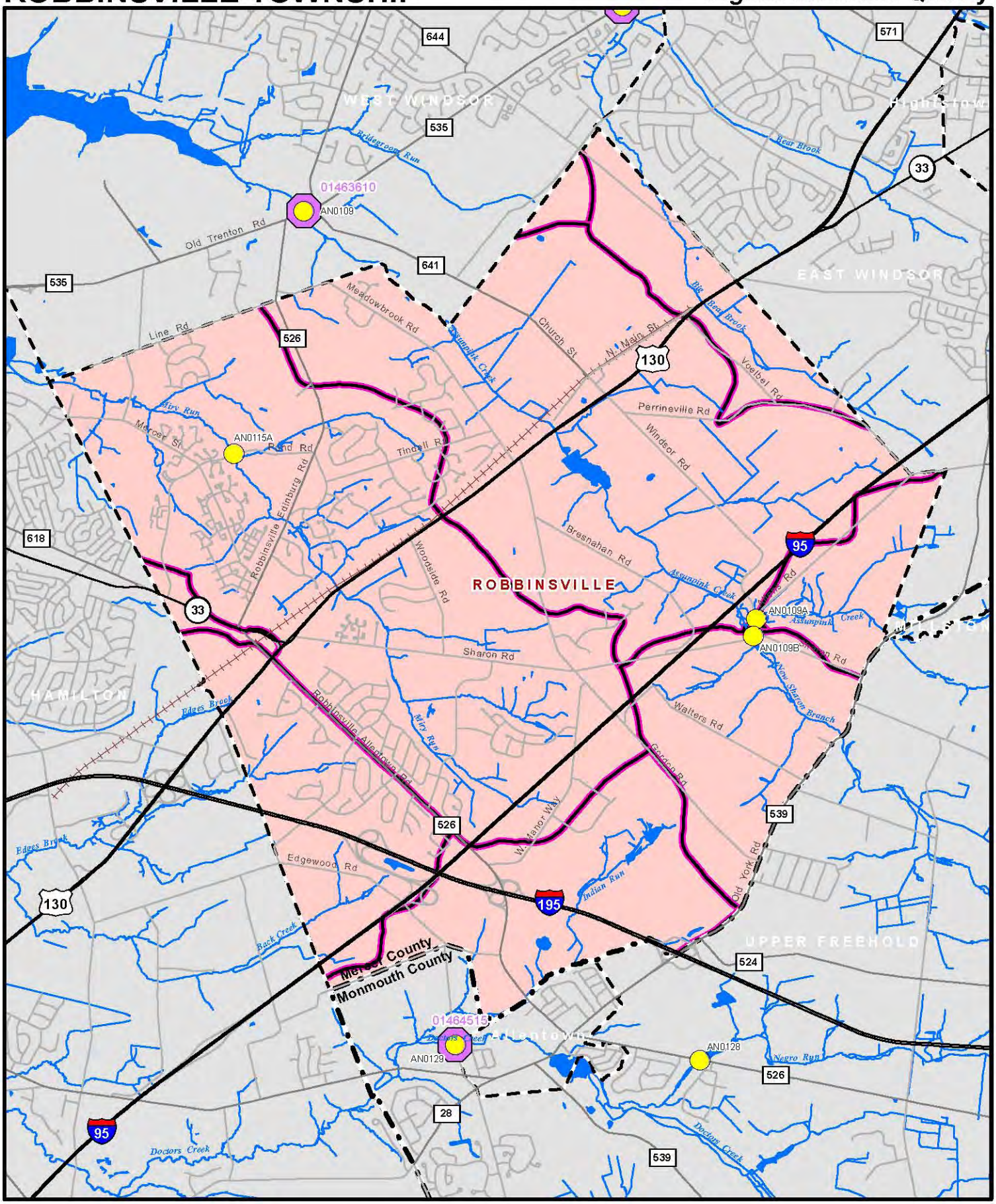
According to the NJIS criteria, all testing sites were ranked “moderately impaired,” and except for the Assunpink Creek at Rt. 535 site (AN0109), all the sites remained at a constant biodiversity or degraded further. According to the new CPMI index, this moderate impairment translated into a “fair” assessment for Miry Run at Pond Road (AN0115A), Assunpink Creek at Rt. 535, and Bear Brook (AN0383). A “fair” assessment means that the stream exhibits moderate changes in ecosystem function and moderate to major impairment in the biological community, with a marked diminishment of sensitive taxa and some evidence of physiological stress. However, the other four sites were rated as “poor,” indicating a major loss of ecosystem function and extreme changes in the biological community. Technically, the NJDEP does not consider a translation between “moderate impairment” and “poor” to be a change in assessment.

In Round 4 sampling:

Round 4 results have been released for the Upper Delaware; this drainage basin includes only the Assunpink Creek and Miry Run stations. Unlike the previous two transitions, most streams in Robbinsville improved in biodiversity, with only the New Sharon Branch (AN0109B) site declining, from “fair” to “poor.” The Assunpink Creek at Windsor Road (AN0109A) and Miry Run at Rt. 535 (AN0115) sites rebounded from “poor” to “fair,” while the Assunpink Creek at Rt. 535 site (AN0109) improved from “fair” to “good.” Streams with a “good” assessment have some biotic impairments (as compared to “excellent” streams), especially with regard to rare native species and genera, but ecosystem functions are fully maintained. Data for sites in the Lower Delaware (AN0131A) and Raritan (AN0383) basins have not yet been released.

ROBBINSVILLE TOWNSHIP

Figure 18: Water Quality



Sources: 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.

- Subwatershed Boundary (HUC 14)
- NJDEP Ambient Biomonitoring Network (AMNET) Sampling Site
- USGS Surface Water Quality Guage (2009)

2008 Integrated Water Quality Report
General Aquatic

- Sublist 5 - Does not attain designated use and a TMDL is necessary

N

0.5 0.25 0 0.5
Miles

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

Table 15: AMNET Sampling Locations for Robbinsville Waterways

Station Name / Water body	Site ID	Rd. 1 NJIS	Rd. 2 NJIS	Rd. 3 NJIS	Rd. 3 CPMI	Rd. 4 CPMI
Assunpink Creek at Windsor Road	AN0109A	N/A	12	9	2	8
New Sharon Branch at Sharon Road	AN0109B	N/A	15	12	6	4
Miry Run at Pond Road	AN0115A	N/A	18	12	6	8
Assunpink Ck. at Rt. 535 (West Windsor Twp.)	AN0109	24	9	12	8	12
Miry Run at Rt. 535 (Hamilton Twp.)	AN0115	12	15	12	4	6
Back Creek at Yardville-H Square Rd. (Hamilton Twp.)	AN0131A	N/A	18	15*	4	No Data
Bear Bk. at Old Trenton Road (West Windsor Twp.)	AN0383	15	12	12	8	No Data

Source: NJDEP, 2010

AMNET Score Key

NJ Impairment Score (NJIS)	Biological Assessment
0--6	Severely Impaired
9--21	Moderately Impaired
24--30	Nonimpaired

Coastal Plain Macroinvertebrate Index (CPMI))	Biological Assessment
0--4	Poor
6--10	Fair
12--20	Good
22--30	Excellent

Other Water Quality Monitoring

In addition to the various networks used by the NJDEP, local groups often assess, monitor, and document water quality. Since 1992, volunteers of the Stony Brook Millstone Watershed Association have been performing this task throughout the Millstone Watershed through the StreamWatch program. StreamWatch focuses on measuring the health of local water quality through visual, biological, and chemical observations. StreamWatch data better enables the association to assess the impacts of pollution on local streams and determine actions necessary to protect and improve water quality for everyone. However, StreamWatch data is not utilized by the NJDEP for the state's Water Quality Monitoring and Assessment Report.

Approximately four years ago, the NJDEP reevaluated their standards for accepting volunteer water quality monitoring data. Organizations conducting volunteer water quality monitoring, such as the Stony Brook Millstone Watershed Association, may contact the NJDEP's Bureau of Water Quality Standards and Assessment and complete a "Quality Assurance Project Plan" to have their data accepted by the NJDEP for official use.

While a portion of Robbinsville lies within the Stony Brook Millstone Watershed, none of the current StreamWatch stations are located near Robbinsville. However, it is possible that the program may be expanded in the future. For more information, visit the Stony Brook Millstone Watershed Association website at www.thewatershed.org/.

The Stony Brook Millstone Watershed Association is not the only local watershed group whose area of concern includes Robbinsville. The Crosswicks Creek-Doctors Creek Watershed Association, which was incorporated in 2008, includes roughly 18 percent of Robbinsville in the southern portion of the township. While they have not yet implemented a program of surface water monitoring, they have been steadily expanding their activities over the past few years, and may do so in the future. Previously, the Assunpink Creek Watershed Association had also worked to protect natural resources within the Assunpink Creek watershed, but this organization disbanded.

Fish Consumption Advisories

Certain fish may contain toxic chemicals, such as PCBs, dioxins, or mercury, which accumulate in water and aquatic life. Chemical contaminants, such as dioxin and PCBs, are classified by the USEPA 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, the NJDEP has been catching fish at numerous sampling stations throughout the state and

testing for contaminant levels and adopting advisories to guide residents on safe consumption practices.

The consumption advisories for fish caught in general freshwater in the state are listed in the Table 16. Within Robbinsville Township, there is an additional fish consumption advisory for largemouth bass in Assunpink Creek, which supersedes the general advisories.

Table 16: Fish Consumption Advisories

Species	General Population	High-Risk Individuals
	Eat No More Than:	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(4)		One Meal Per Week
Assunpink Creek (Mercer/Monmouth Counties)		
Largemouth Bass	No Restrictions	One meal Per Week

Source: NJDEP, 2009

Total Maximum Daily Loads

For impaired waters (waters on Sublist 5), the state is required by the EPA to establish a TMDL. A TMDL quantifies the amount of a pollutant a water body 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 the sources of pollutants and the percentage reductions of each pollutant that must be achieved to attain water quality standards. These sources can be point sources, such as sewage treatment plants, or nonpoint sources, such as runoff from various types of residential, commercial, or agricultural lands.

There are nine HUC 14 watersheds in Robbinsville that are listed on Sublist 5. These are listed in **Table 14**. As of August 2008, none of these subwatersheds were scheduled to receive TMDL reports by the end of 2010 as per NJDEP's "two-year TMDL schedule."

In general, implementation of a TMDL relies on actions mandated by the Municipal Stormwater Management Program, including the ordinances required

to be adopted by municipalities under that permit (see **Stormwater Runoff** below for details of the statewide basic requirements of this program). It also depends on voluntary improvements to land and runoff management in agricultural areas. A list of USDA and New Jersey programs that provide funding and technical assistance on relevant projects for farm landowners is included in **Appendix B: Federal and State Conservation Programs for Farmers and Landowners**.

Causes of Water Quality Impairments

Stormwater Runoff

Stormwater runoff and other nonpoint source pollution (pollution coming from a wide variety of sources rather than from a single point such as a discharge pipe) have the most detrimental effect on the water quality and channel health of streams in Robbinsville. These sources are also the most difficult to identify and remediate because they are diffuse, widespread, and cumulative in their effect. Most nonpoint source pollution in Robbinsville is known to derive from stormwater drainage off paved surfaces such as streets and parking lots, commercial/industrial areas, residential sites (with and without detention basins), lawns, and from agricultural fields that lack adequate vegetative buffers. Some of this runoff comes to the waterways from similar sources in upstream townships, and some of it derives from Robbinsville land uses. However, since many of Robbinsville's waterways have their headwaters within Robbinsville, much of the stormwater runoff within Robbinsville's streams is likely to come from within the township.

Some examples of nonpoint source pollutants contained in stormwater runoff include the following: excess fertilizers, herbicides, and insecticides from residential lawn areas and agricultural lands; oil, grease, rubber, and toxic chemicals from automobiles and improper disposal of household wastes; acid rain and mercury from fossil fuel-fired energy production; sediment from improperly managed construction sites, crop and forest lands, and eroding streambanks; salt from streets treated during winter precipitation events; nutrients from yard waste left to decompose on the street; and bacteria and nutrients from livestock, geese, pet wastes, and faulty septic systems.

In March 2003, the NJDEP issued a new Stormwater Management Rule, as required by the USEPA's Phase II Stormwater Management Program for Municipal Separate Stormwater Sewer Systems (MS4). The rule lays out guidance and requirements for management of and education about stormwater at the local level. It applies to all towns in New Jersey, all county road departments, and all public institutional facilities on large sites (such as hospitals and colleges). Beginning in 2004, each municipality was required to obtain a New Jersey Pollution Discharge Elimination System (NJPDES) general permit for the stormwater system, and its discharges within its borders, which is considered to be owned and "operated" by the township.

Under the 2004 NJPDES permit, a town must meet certain specific requirements in planning, ordinance adoption, education, and management of township facilities and investigation of parts of the stormwater system. Fulfillment of these statewide basic requirements was scheduled to occur by 2009. The current stormwater rules were set to expire in 2009, but have been extended another year, while new rules are developed. Municipalities are classified as either Tier A or Tier B under the stormwater rules. Tier A municipalities are communities with higher population levels and densities, or are along the Atlantic Coast. Tier A municipalities, such as Robbinsville, have more stringent requirements than Tier B municipalities.

Robbinsville addressed each of these requirements with their 2005 Stormwater Management Plan, which adopted the performance standards set out in N.J.A.C. 7:8-5, and mandated a revision of the township development regulations. All municipalities, including Robbinsville, may adopt more restrictive stormwater requirements than those required by the State of New Jersey, which sets minimum requirements. For example, Robbinsville included a section on mitigation requirements for developments granted a variance from the stipulated performance standards that states: *the only form of acceptable mitigation shall be the perpetual preservation of land from future development.* Robbinsville could consider restricting stormwater degradation even further by adopting stricter standards for the “major development” threshold that triggers the stormwater ordinance; currently “major development” only applies to developments that disturb over one acre of land.

On the following page is a brief set of guidelines for municipal stormwater managers to ensure compliance with N.J.A.C. 7:8.

Stormwater Management Statewide Basic Requirements
Towns, Highway Agencies, and Institutions

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% 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 is currently being 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, non-point 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.
    - Distribute information annually regarding proper identification, handling, and disposal of wastes including pet waste and litter.

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 de-icing material storage, fueling operations, vehicle maintenance, and housekeeping operations.

Source: NJDEP

Impervious Coverage

The volume of runoff that is carried to a stream also impacts 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% 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. These factors are directly related to the proportion of a subwatershed covered in

impervious surfaces. When impervious cover reaches 25% to 30% within a subwatershed, streams often become severely degraded.[16]

While Robbinsville's watersheds generally have less impervious surface cover than other areas within Mercer County, many portions of Robbinsville exceed the 10 percent threshold for subwatershed impairment. The Miry Run and Pond Run subwatersheds, covering the more developed western portion of the township, experience the highest stress. See **Table 17: Acreage of Impervious Surface in Robbinsville's Subwatersheds**, **Figure 19: Impervious Surfaces**, and **Figure 20: Impervious Percent of Watersheds**. Note that the percentage of impervious surface by subwatershed applies to the entire subwatershed, not just the area within Robbinsville. For example, there is very little impervious surface within Robbinsville's portion of the Bear Brook watershed, but the portion of Bear Brook within East and West Windsor are significantly more developed. Conversely, virtually all the impervious surface found on the portion of the Assunpink watershed from Trenton Road to the New Sharon Branch is within Robbinsville's borders.

Agricultural Runoff

With 29 percent of Robbinsville's land use dedicated to farming, agriculture-specific nonpoint source pollution becomes a significant issue. According to the EPA, agricultural runoff is the leading contributor of nonpoint source pollution to rivers and lakes in the United States, the third leading contributor of pollution to estuaries, and a significant contributor to groundwater and wetland pollution. Agricultural runoff can carry sediment, nutrients, pathogens, pesticides, and salts into water bodies.

Programs such as the Environmental Quality Incentive Program (EQIP), administered by the NRCS of the USDA, encourage the "due care" management of agricultural lands, promoting proper levels of fertilizer and pesticide applications to farmland. These programs fund up to 75 percent of the costs of eligible conservation practices. They are all programs in which individual landowners volunteer to take part. A list of USDA and New Jersey programs that provide funding and technical assistance on relevant projects for farmers is included in **Appendix B: Federal and State Conservation Programs for Farmers and Landowners**.

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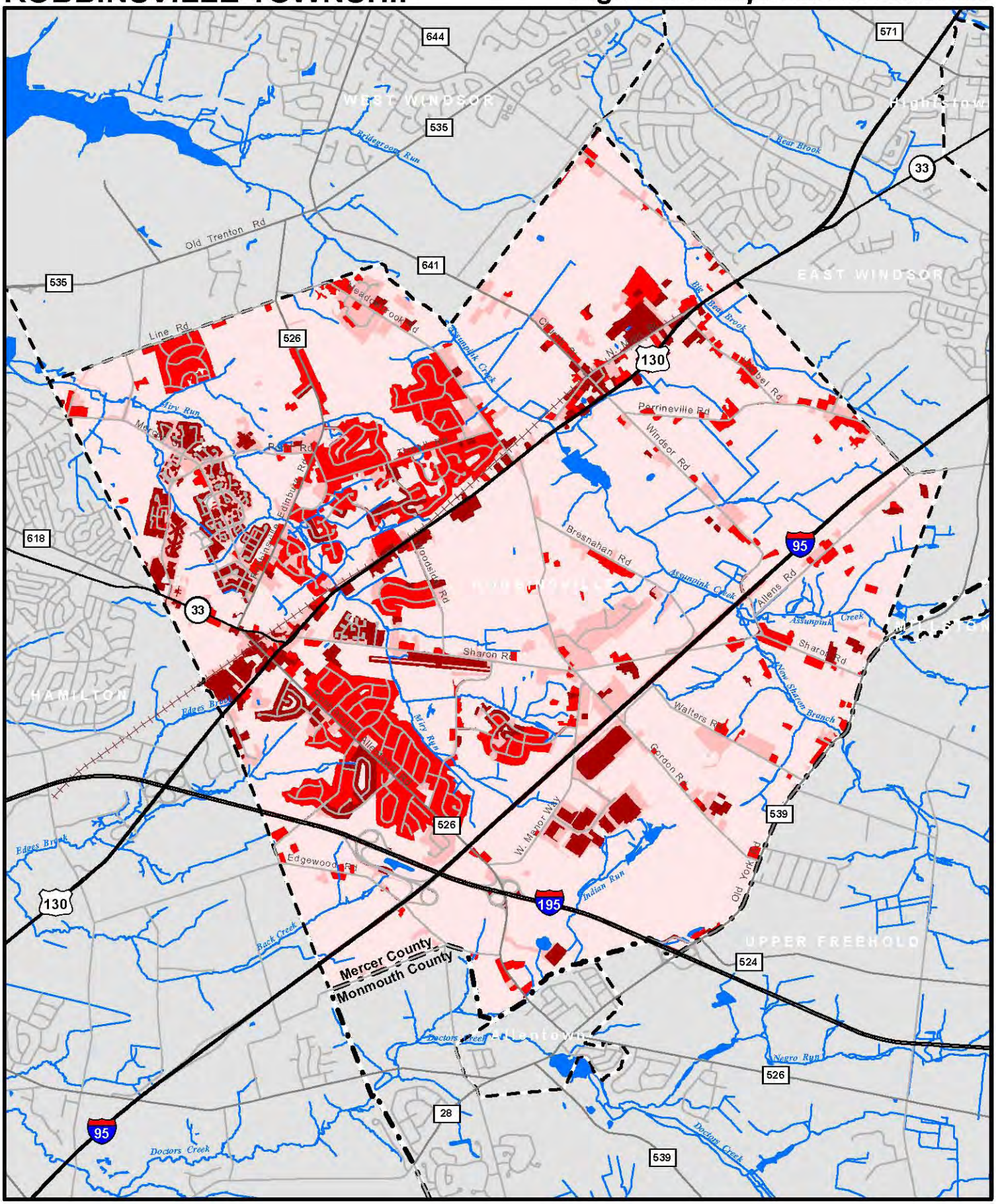
[16]Center for Watershed Protection**.** *Rapid Watershed Planning Handbook: A Comprehensive Guide for Managing Urbanizing Watersheds*. Produced for the USEPA, Office of Wetlands, Oceans and Watersheds. Ellicott City, MD: Center for Watershed Protection, Inc., 1998, pp. 1.21–1.25.

ROBBINSVILLE TOWNSHIP

Figure 19: Impervious Surfaces



Sources: 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.

Percent of Impervious Surfaces

- Less than 5%
- 5% - 10%
- 11% - 25%
- Greater than 25%

N

0.5 0.25 0 0.5
Miles

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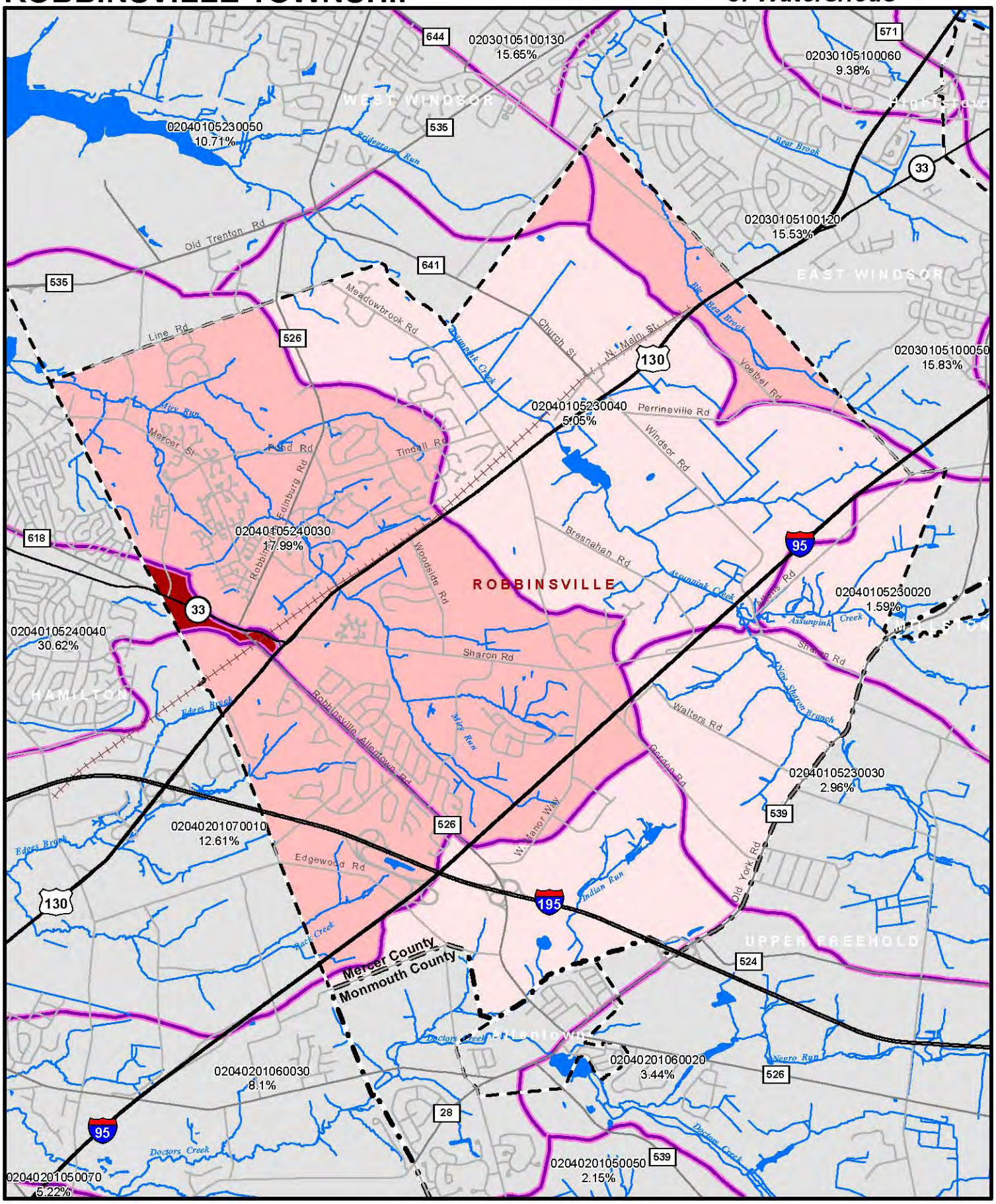
ROBBINSVILLE TOWNSHIP

Figure 20: Impervious Percent of Watersheds



Sources: 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.

Percent of Impervious Surfaces by Subwatershed

1% - 10%	Low
11% - 20%	Medium
> 20%	High
Subwatershed Boundary (HUC 14)	

N

0.5 0.25 0 0.5
Miles

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Table 17: Acreage of Impervious Surface in Robbinsville's Subwatersheds

HUC14	Subwatershed Name	Acres	Impervious Surfaces Acres	% Impervious
02040105230050	Assunpink Creek (Shipetaukin to Trenton Road)	7,635.18	817.40	10.71%
02040105230040	Assunpink Creek (Trenton Road to New Sharon Branch)	4,524.29	28.59	5.05%
02040105230020	Assunpink Creek (New Sharon Branch to and including Lake)	3,653.27	58.08	1.59%
02040105230030	New Sharon Branch (Assunpink Creek)	4,271.08	126.45	2.96%
02040105240030	Miry Run (Assunpink Creek)	7,906.85	1,422.24	17.99%
02040105240040	Pond Run	6,401.18	1,960.28	30.62%
02040201070010	Back Creek (above Yardville-H Sq. Road)	4,168.18	525.76	12.61%
02040201060030	Doctors Creek (below Allentown)	7,788.84	268.26	3.44%
02040201060020	Doctors Creek (Allentown to 74d28m40s)	5,592.74	453.06	8.10%
02030105100120	Bear Brook (above Trenton Road)	4,155.07	645.26	15.53%

Source: NJDEP, DVRPC

Inadequate Stream Buffers

A stream buffer is the region immediately adjacent to 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 for wildlife to move between larger forested habitat areas. This greenway can be utilized for passive recreation by residents as well, through trails, bikeways, and access points to the water for fishing and canoe/kayak launching.

The importance of a healthy, intact buffer zone (also referred to as a “riparian corridor”) has been well documented scientifically over the past 20 years, especially for headwater streams. The 2007 revisions to the New Jersey Flood Plain Management Regulations outlined in a previous section directly affect stream buffer requirements. As previously mentioned, the new regulations require the establishment of a 300-foot riparian corridor on all C1 waters, a 150-foot corridor along trout-producing waters and other select high-value waterways and 50-foot buffers on all other nontidal waters. In Robbinsville, the 300-foot requirement applies to the stretch of Assunpink Creek and New Sharon Branch within the Assunpink Creek WMA. These buffers are intended to reduce the direct and indirect impacts of flooding, to improve wildlife habitat, and offer potential passive recreational use such as walking trails. In addition, municipalities may adopt their own stream corridor buffer ordinances to provide enhanced protection to its streams and stream banks.

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.

Restoration of stream buffers on agricultural lands is supported by various programs, such as the Conservation Reserve Program (CRP), administered by USDA’s Farm Services Agency (FSA) and the NJDA. This program compensates farming landowners for the loss of their land being converted to a buffer or other habitat. It also funds or directly creates new buffers where they are absent. See **Appendix B: Federal and State Conservation Programs for Farmers and Landowners**.

Point Sources of Pollution

Point sources of pollution, which come from a single source or "point," such as an industrial pipe or sewage 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 and “nonpoint source” pollution, but only required states to regulate point sources until recently.

The NJDEP, through the Division of Water Quality and the Bureau of Point Source Permitting, administers the NJPDES program (*N.J.A.C. 7:14A*). Under NJPDES, any facility discharging domestic or industrial wastewater directly into

surface or groundwater 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. Permits are available and required for surface water, groundwater, stormwater, combined sewer overflow, and residual discharges. The NJDEP enforces the terms of NJPDES permits by visiting discharging facilities and conducting water quality, biological, and toxicological analyses and thermal impact and cooling water assessments.

Under the Open Public Records Act (OPRA) of 2002, a list of active NJPDES permits is available. As of December 1, 2008, four NJPDES permits were issued to individual facilities in Robbinsville. Any expansion of the use or location of these facilities would necessitate a new application to NJDEP. These are shown in **Table 18: Robbinsville Township NJPDES Permits** and on **Figure 11: Approved Sewer Service Area and NJPDES Permits**.

Since the adoption of the Federal Clean Water Act in 1972 and the implementation of NJPDES in subsequent years, water pollution from point sources has decreased drastically. However, as development has continued to spread throughout New Jersey, nonpoint source pollution has increased substantially in recent decades. NJDEP's new Stormwater Management Rules, described above, focus on reducing and controlling nonpoint sources of water pollution.

Table 18: Robbinsville Township NJPDES Permits

NJPDES Permit Number	Facility Name	Start Date	Expiration Date	Description	NJPDES Category	Street Address
NJG0136981	Mercer Corporate Park	6/1/2003	5/31/2008	Ground Water General Permit	T1	Route 526/ Corporate Park Dr.
NJG0142093	TAH Industries	6/1/2007	5/31/2012	Basic Industrial Stormwater GP	5G2	8 Applegate Drive
NJG0149004	Washington Twp*	9/1/2005	2/28/2009	Tier A Municipal Stormwater GP	R9	1117 Route 130
NJG0159921	Webtech Inc.	6/1/2007	5/31/2012	Basic Industrial Stormwater GP	5G2	108 North Gold Dr.

Source: NJDEP, NJPDES Active Permit List

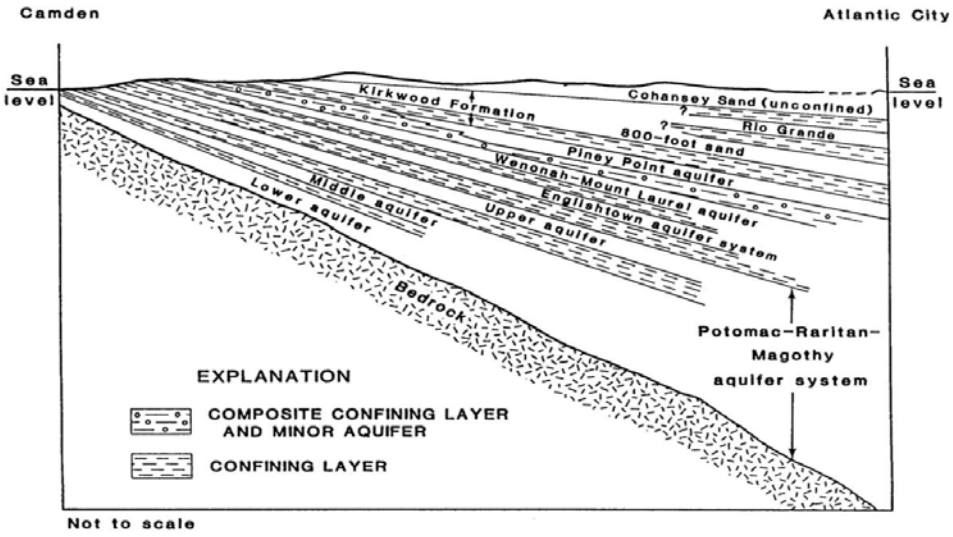
CHAPTER 6

Groundwater

Aquifers and Geological Formations

Principal aquifers in New Jersey are classified into two groups, Coastal Plain aquifers south of the Fall Line, and non-Coastal Plain aquifers north of the Fall Line. As discussed in **Chapter 4**, Robbinsville Township lies to the southeast of the Fall Line, which is the boundary between the Piedmont Plateau and the Atlantic Coastal Plain physiographic provinces. 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 saturated gravel and sand layers, with their large pore spaces, are the aquifers from which water is drawn. The silt and clay layers, which impede the movement of water, are called confining beds.

Figure 21: Aquifers of Southern New Jersey



Source: USGS

A cross-section across southern New Jersey from west to east would show that the layers are not horizontal but tilt downward toward the southeast, getting deeper as they cross the state toward the Atlantic Ocean (see **Figure 21**). Because of this tilting, each layer formation emerges on the land surface in a sequential manner. The deepest formations emerge on the surface near the

Delaware River. Where a formation emerges is its “outcrop” area. The Potomac-Raritan-Magothy (PRM) formation, the deepest and most abundant aquifer, is a major water source for Inner Coastal Plain communities such as Robbinsville. Other smaller aquifers on top of the PRM are the Englishtown and the Wenonah-Mount Laurel. The large Kirkwood-Cohansey formation, which overlies these older formations, begins east of the inner/outer coastal plain divide and does not outcrop in Robbinsville.

Potomac-Raritan-Magothy Aquifer System (PRM)

The PRM is the primary source of drinking water for Robbinsville residents and businesses. This multiple aquifer system 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 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 (60 to 150 million years ago) (see also **Chapter 4** discussion on geology).

In southern New Jersey, three aquifers have been distinguished within the PRM system-–designated as lower, middle, and upper, divided by two confining units or layers between the three water-bearing strata. The aquifers themselves are largely made up of sands and gravels, locally interbedded with silt and clay. The lower aquifer sits on the bedrock surface. Confining beds between the aquifers are composed primarily of very fine-grained silt and clay sediments that are less permeable, and thus reduce the movement of water between the aquifers. They also help to slow the entry of any contaminants on the surface down into the groundwater.

The PRM is the primary source of drinking water to New Jersey residents from Robbinsville and Hamilton southwest along the Delaware River to Salem County, and into the state of Delaware. Because of such high usage, PRM aquifer water levels have declined. The water level drop became so serious that the NJDEP established the Water Supply Critical Area #2 in 1986. All water supply companies within Critical Area #2 were given annual limits on water withdrawals from the PRM. Usage from the PRM was cut back by over 20 percent and no increases in pumping were allowed. Piping of treated Delaware River water filled the gap in much of the region.

While Robbinsville and neighboring Hamilton Township (where the public wells serving Robbinsville are located) are outside the Critical Area, there is concern that additional pumping from the aquifer in the borderline areas will necessitate the expansion of the Critical Area boundaries, a change which would directly impact Robbinsville’s water supply. In addition, the upper and middle PRM aquifers have exhibited problems with salinity levels, especially for wells closest

to the Delaware River where pumpage has increased the amount of slightly saline water drawn into the aquifers from the river.

The PRM outcrops in the northwestern corner of Robbinsville Township and extends to the Delaware River (south of Robbinsville) and the fall line (north of Robbinsville). However, the water drawn from the PRM for use by Robbinsville residents is largely taken from outside the township. Because an outcrop is the area where the aquifer emerges on the land surface, preventing contamination of the land in outcrop areas is extremely important in order to maintain a safe drinking water supply. See **Figure 22: Geologic Outcrops** for a depiction of these land areas.

Merchantville-Woodbury Confining Unit

Overlying the upper aquifer of the PRM system, the Merchantville-Woodbury confining bed is the oldest confining unit in the New Jersey Coastal Plain. It is composed of two subunits, both dating from the Late Cretaceous Period. The younger Woodbury Clay is a thick, massive layer of clayey silt, which overlies the Merchantville Formation, a bed of glauconite.[17] The Merchantville-Woodbury unit is a large, effective confining unit that can reach a thickness of over 450 feet; it is approximately 100 feet thick where it outcrops in Robbinsville. The vast majority of Robbinsville lies within this confining unit, forcing the town to look beyond its borders for its municipal water needs.

Englishtown Aquifer System

The Englishtown Formation, of the late Cretaceous age (65 to 100 million years ago), outcrops in the Inner Coastal Plain in an irregular band that extends from Raritan Bay to the Delaware River, adjacent to Salem County. Above the Merchantville-Woodbury confining unit, it outcrops in the southeastern portion of Robbinsville. Where the Englishtown Formation is exposed, the primary components are fine-to-medium grained sands. In parts of Burlington, Camden, Gloucester, and Salem counties, the aquifer is commonly less than 40 feet thick. In Monmouth and Ocean counties, this aquifer is a significant water source. In Robbinsville, the Englishtown Formation outcrops along the southeastern edge of the township.

[17]Glauconite is a marine deposit rich in potassium.

Drinking Water Supply

Most of Robbinsville Township, including the developed neighborhoods in the western area of the township, as well as the village of Windsor, purchases its drinking water from the Central Division of Aqua New Jersey, part of Aqua America. The Central Division draws all of its water from groundwater sources, including 13 wells in the Potomac-Raritan-Magothy aquifer system and the unconfined Vincentown aquifer. Specifically, Robbinsville draws its water from a set of six wells located in the Hamilton Square neighborhood of Hamilton Township. This complex serves 49,000 residents of Hamilton and Robbinsville. None of Robbinsville's public water supply comes from surface water.

The Robbinsville area's public community water supply wells are shown on **Figure 23: Public Water Supply Wells**. A public community water supply well is a well that has at least 15 service connections used by year-round residents, or regularly serves at least 25 year-round residents. An example of a public community water supply well is a municipal system that services multiple single-family, residential homes. Due to Robbinsville's location on the impermeable Merchantville-Woodbury confining unit and reliance on neighboring Hamilton Township for its public water supply, there are no public community water supply wells within the township. However, as shown on **Figure 23**, there are several nearby wells both north and south of the township, including two wells in the borough of Allentown along the township's border. The six wells providing water to Robbinsville are mostly out of view in **Figure 23**, though one can be seen on the extreme western edge of the map.

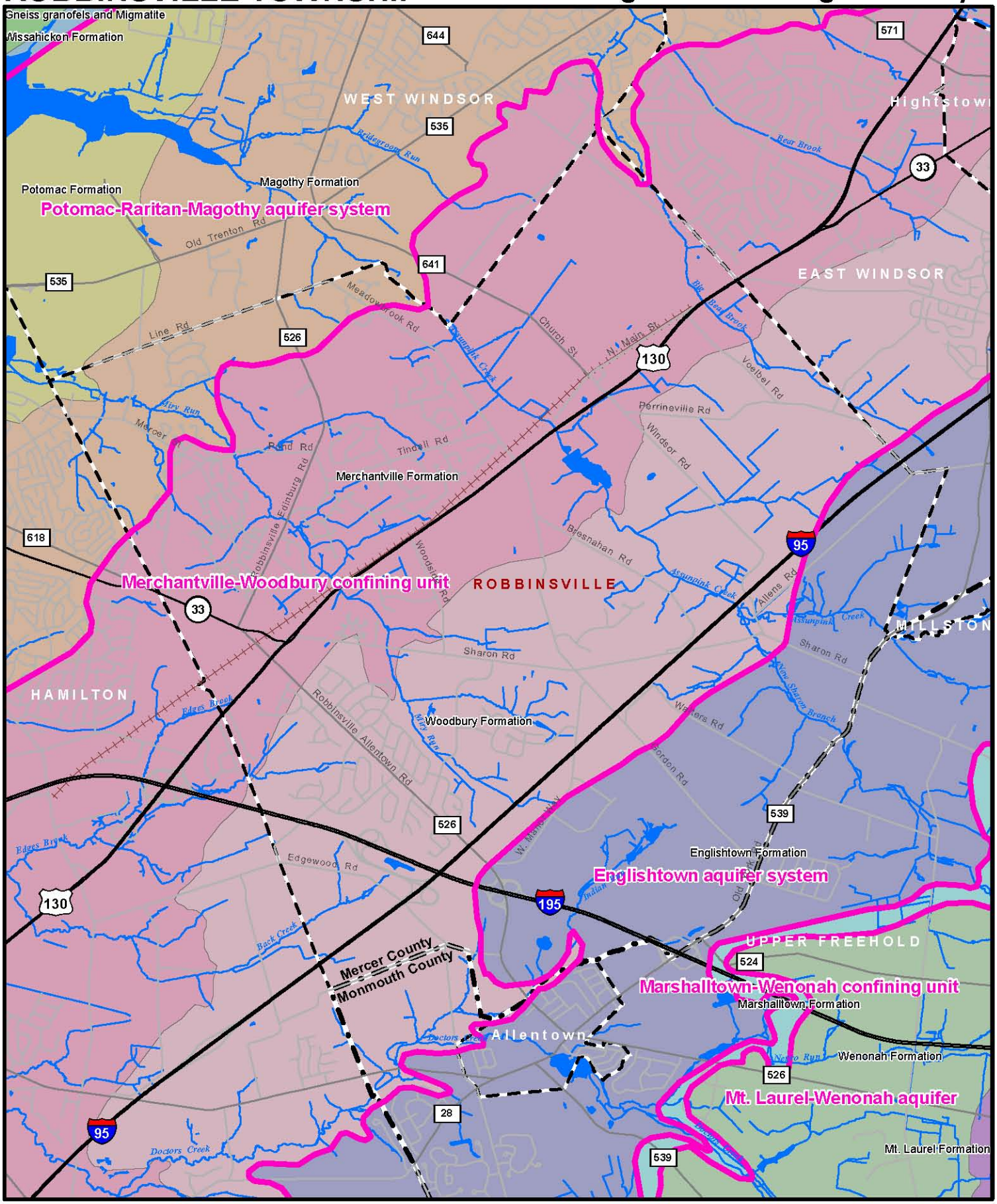
There are also several public *noncommunity* water supply wells near Robbinsville Township, as shown on **Figure 23: Public Water Supply Wells**. A public noncommunity water supply well is a public water supply well used by institutions and businesses, as opposed to year-round residents, for at least 60 days of the year. These can include wells serving schools, factories, office buildings, rest stops, restaurants, and motels. The public noncommunity water supply wells surrounding Robbinsville tap into the Potomac-Raritan Magothy and Englishtown aquifers, and may affect water levels within the township depending on the depth of the well and the water extraction rate.

Pursuant to the 2004 Safe Drinking Water Act, the NJDEP requires that all public wells (community and noncommunity) undergo regular monitoring for various pollutants and health hazards, including natural contaminants (e.g., salt, metal, and radiological compounds) and anthropogenic contaminants (e.g., industrial solvents and nitrates).[18]

[18]To avoid the impact from anthropogenic effects, water supply wells are typically installed at significant depths so that water is not drawn from shallower depths that may be impacted by surface discharges.

ROBBINSVILLE TOWNSHIP

Figure 22: Geologic Outcrops



Sources : 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.

Bed Outcrop Formations

- Englishtown
- Gneiss granofels and Migmatite
- Magothy
- Marshalltown
- Merchantville
- Mt. Laurel
- Potomac
- Wenonah
- Wissahickon
- Woodbury
- Aquifer

N

0.5 0.25 0 0.5
Miles

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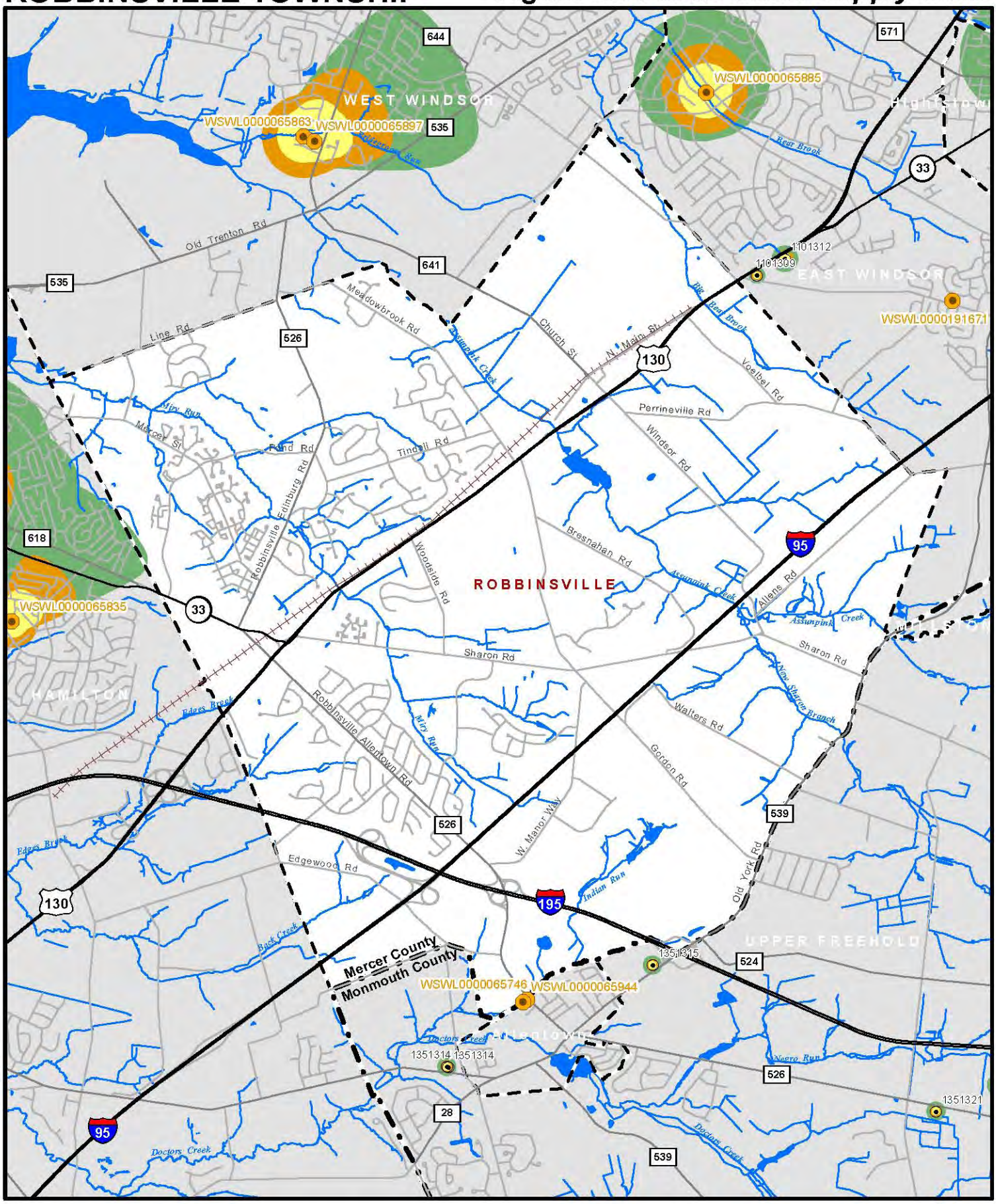
ROBBINSVILLE TOWNSHIP

Figure 23: Public Water Supply Wells



Sources : 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.

- Public Non-Community Well
- Public Community Well

Wellhead Protection Areas
Public Community, 2006
Public Non-Community, 2004
- 2-year time of travel
- 5-year time of travel
- 12-year time of travel

N

0.5 0.25 0 0.5
Miles

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Most private wells in Robbinsville (for domestic water and irrigation supply) probably draw from the Englishtown Formation, but because there is no comprehensive inventory of private wells available to municipalities, it is difficult to know for sure. Permits for private wells are held by the Mercer County Health Department, but there are many gaps in the records due to various factors, including well age. The 2002 Private Well Testing Act requires state-certified laboratory water testing in order to sell a residential property. Such testing will not identify what aquifers are being drawn upon by private wells, but will eventually provide better documentation of the quality of drinking water from private wells in an area. See **Appendix A: Private Well Testing Act** for more information. In addition, the Crosswicks Creek-Doctors Creek Watershed Association has announced plans to possibly begin a water well testing service. Currently, they are conducting a survey to determine interest and feasibility, and to raise awareness of the benefits such a program could provide. See www.ccdcgreenway. org/index.html for more details.

Wellhead Protection Areas and Water Supply Wells

Preventing contamination in areas where aquifers (water-bearing formations of rock) intersect the land surface is extremely important in order to maintain a safe drinking water supply. To protect these aquifer outcrop areas, the NJDEP established the Well Head Protection Program Plan in 1991. The program delineates Well Head Protection Areas (WHPAs) around public community water supply wells. A WHPA is the area from which a well draws its water within a specified time frame. A WHPA consists of three tiers based on time of travel to the well: Tier 1 (two years), Tier 2 (five years), and Tier 3 (12 years). Calculation of the tier boundaries is based on findings of how long specified contaminants can survive in groundwater, how much time would be required to undertake specific remedies, and the likelihood of natural dilution over distance. The tiers are shown as rings around a well, with the groundwater direction of travel factored in to create plume-like shapes. 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 owners or municipalities, in relation to the tier locations. Protection of land and restrictions on activities within wellhead 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 in wellhead areas. In addition to the NJDEP, a township such as Robbinsville could also require wellhead protection through municipal ordinances. Such action could further minimize the risk of drinking water contamination. While there are no public wells within Robbinsville, there are several nearby wells in neighboring townships, and the

12-year WHPA of Aqua America's Hamilton Square wells does reach the Robbinsville township line, as shown on **Figure 23**.

Groundwater Recharge

Recharge of groundwater is an important issue because of Robbinsville's dependence on aquifers for drinking water supply and agricultural use. The amount of rainwater that actually enters an aquifer and reaches the saturated zone to become groundwater is a function of many factors, including the nature and structure of the aquifer itself, climatic conditions, and the nature of the soil, land use, and the vegetation of an area.

The New Jersey Geological Survey (NJGS) has developed a methodology for evaluating land areas for their ability to transmit water to the subsurface, using precipitation records, soil surveys, and land use/land cover data. The NJDEP has used this methodology to map the groundwater recharge *potential* of land areas throughout the state. Recharge is equivalent to the amount of precipitation per year that *could* reach the water table in an area with a particular combination of soils and land use. It is expressed as inches per year.

It should be noted that the NJGS methodology is limited. The NJGS has stated that this method only evaluates groundwater recharge potential, not aquifer recharge, and should be considered accordingly. Groundwater recharge potential is not the same as aquifer recharge, which the NJGS has defined as the recharge rate for those geological formations that yield economically significant quantities of water to wells.

In Robbinsville, lands with the highest potential recharge rates (between 11 and 18 inches per year) are mostly concentrated in the southeastern portion of the township, a rural, agricultural area mainly underlain by the permeable Englishtown aquifer. Other high recharge rates are found scattered throughout the township, mostly on agricultural land. Often, areas with high recharge rates are composed at the surface of alluvial sediments, such as those found in the highly permeable Sassafras soil series. Large areas of Robbinsville, however, have little or no groundwater recharge. These areas are largely coterminous with Robbinsville's many wetlands, but also include areas such as the Trenton-Robbinsville Airport which are covered with impervious surface. As Robbinsville continues to urbanize, new development in areas such as Town Center and the office/warehouse district along Manor Way will experience a sharp drop in their groundwater recharge potential. See **Figure 24: Groundwater Recharge**.

In general, on high recharge lands, large amounts of paving and high impervious cover will have the most detrimental impact, although they are also usually the places that are most suitable for building because they feature well-drained soils. 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

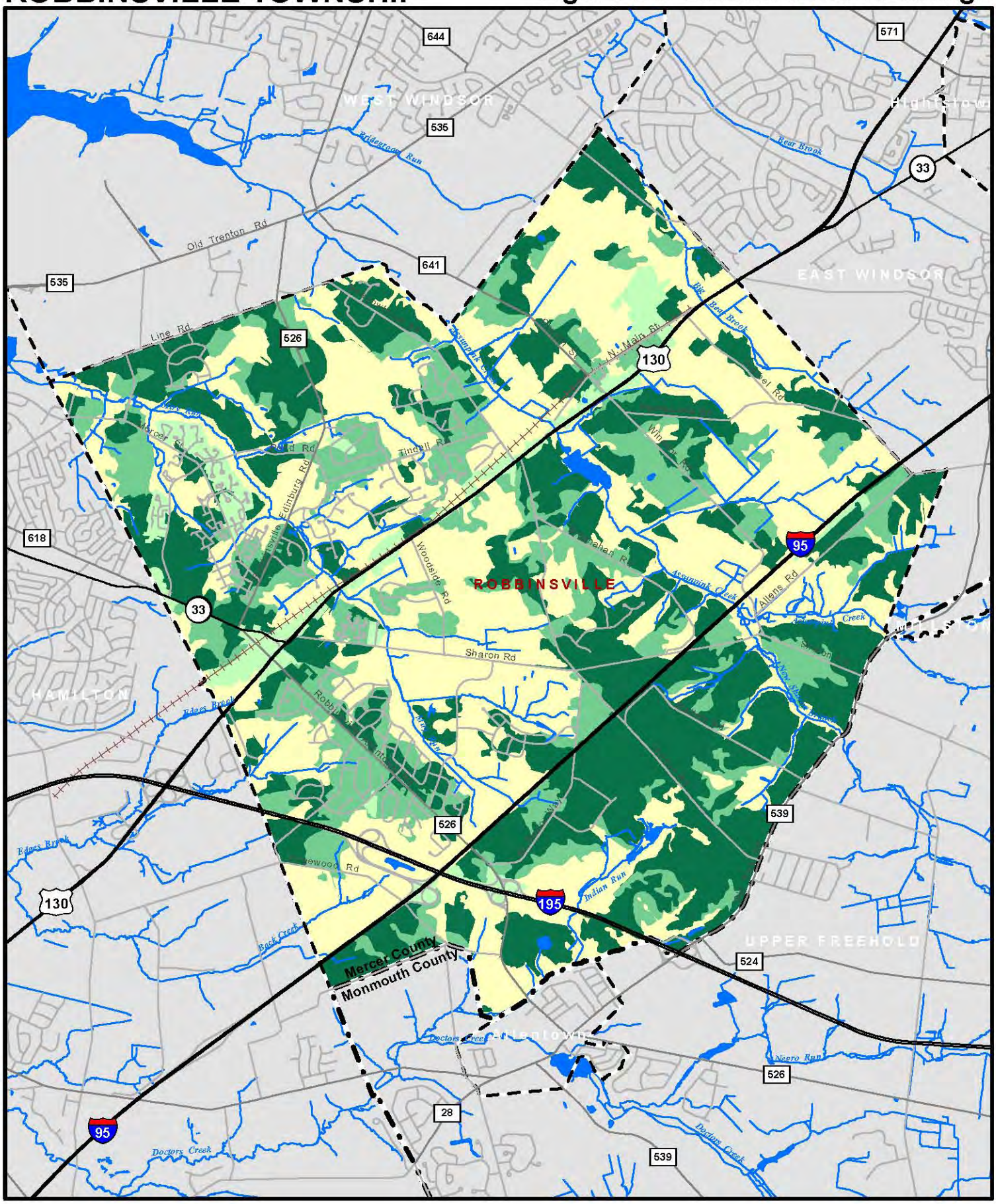
acres are often needed for proper nitrate dilution from septic systems in areas having 10 or more inches per year of groundwater recharge.

While the surest way to protect groundwater recharge is to leave land undeveloped, there are ways in which urbanized areas can preserve groundwater and stormwater standards. Best Management Practices (BMPs), such as green streets, tree trenches, bioswales, rain gardens, naturalized yard areas, rain barrel use, and porous pavement can be used with great success to capture, treat, and infiltrate precipitation in developed areas from all but the most significant storm events. Also referred to as “urban green infrastructure,” these techniques are utilized in more densely developed communities to cost-effectively manage stormwater and protect drinking water supplies. Urban green infrastructure not only improves water quality and reduces flooding, it improves the “spatial quality” of built-up areas, making them more desirable places to live work and play.[19]

[19]Tarnay, Stella. “Green Neighborhoods.” *Urban Land* May 2005: 63--68.

ROBBINSVILLE TOWNSHIP

Figure 24: Groundwater Recharge



Sources : 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.

Inches per Year

0 - 1	7 - 10
2 - 6	11 - 18

N

0.5 0.25 0 0.5

Miles

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CHAPTER 7

Biological Resources

When a community protects wildlife and habitat, it is also protecting biodiversity, which is important for the health and productivity of the ecosystem and its inhabitants, including humans. Biodiversity refers to the variety of genetic material within a particular 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 the chances of survival for individual species, as well as the biological communities they are a part of, as the environment changes. A diversity of plant and animal species is also necessary to maintain healthy human environments, agricultural productivity, and ecosystem health. Lower organisms, many of which are not well known, contribute to nutrient cycling, decomposition of organic matter, soil rehabilitation, pest and disease regulation, pollination or water filtering. Once biodiversity declines, it is extremely hard for an ecosystem to recover or replace species.

Scientists have discovered and named somewhere between 1.5 and 1.8 million plant and animal species. Far more species, possibly 10 to 20 times the number of known species, are unknown to science. Alarmingly, this great diversity of species is now diminishing at an unprecedented rate. Researchers generally agree that the extinction rate is now catastrophically high; somewhere between 1,000 and 10,000 times the rate before human beings began to exert significant pressure on the environment. Given these trends, and barring significant increases in conservation efforts, approximately one-half of the world's species will be gone by the end of this century.[20]

While the decline of biodiversity is indeed a global problem, conservation needs to occur on both global and local levels if it is to succeed. Robbinsville contains numerous types of natural habitats, all of which are important for maintaining biodiversity. Forested wetlands are the most common natural ecosystem type in Robbinsville. Upland forests, which were once the most common type of natural habitat in Robbinsville, are scattered throughout the township in small patches where land is dry, undeveloped, and uncultivated. The following sections will identify and describe in more detail the plant and animal communities that inhabit these unique ecosystems within Robbinsville Township.

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[20]Wilson, Edward O. *The Future of Life*. New York: Vintage Books, 2002. pp. 14, 99--102.

Natural Vegetation

A region's vegetation is dependent on many factors, the most important of which are climate and soils. Robbinsville's climate is temperate and rainfall averages almost 48 inches per year. A majority of Robbinsville's soils are generally well-drained, supporting a large diversity of trees and several agricultural crops. However, Robbinsville also contains a substantial amount of poorly drained soils, which exhibit ponding and hydric characteristics, and which sustain wetland plants. For a detailed description of Robbinsville's soils, see Chapter 4, *Soils.*

Robbinsville's natural vegetation types, along with human-influenced types of land cover, have been tabulated and mapped by the 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 USGS. See **Figure 25: Natural Vegetation (2007)** and **Table 19: Robbinsville Natural Vegetation**.

Table 19: Robbinsville Natural Vegetation

Type of Vegetation	Acres	Percentage of Total Land
Brush/Shrubland	396.02	9.18%
Brush/Shrubland - Oldfield	141.52	3.28%
Upland Forest - Coniferous	7.91	0.18%
Upland Forest - Deciduous	515.30	11.94%
Upland Forest - Mixed (Deciduous Dom.)	1.66	0.04%
Water	155.54	3.60%
Wetlands - Herbacious	93.25	2.16%
Wetlands - Phragmites Dominated	6.14	0.14%
Wetlands - Scrub/Shrub	290.82	6.74%
Wetlands - Wooded - Deciduous	2,706.80	62.73%
Total	**4,314.96**	**100.00%**

Source: NJDEP, 2007

Wetlands

Wetlands are defined as areas that are inundated or saturated by surface or groundwaters at a frequency to support vegetation suited for life in saturated soils (i.e., wetlands vegetation). New Jersey's wetlands are located around numerous interior stream systems, and along coastal rivers and bays. The NJDEP, which employs USGS guidelines, classifies wetlands with naturally occurring vegetation into two major categories: (1) *tidal wetlands*, which are wetlands associated with tidal portions of the Delaware River system and waterways draining into the Atlantic Ocean; and (2) interior wetlands, which are wetlands found in nontidal lowlands associated with waterways, and isolated wetlands surrounded by uplands. All of Robbinsville's wetlands are interior wetlands. The NJDEP also identifies modified wetlands, which are former wetland areas that have been altered by human activities and no longer support typical natural wetlands vegetation, but which do show signs of soil saturation on aerial infrared surveys.

Wetlands are a critical ecological resource, supporting both terrestrial and aquatic animals and boasting biological productivities far greater than those found on dry land. Wetlands play a vital role in maintaining water quality by cleaning surface and groundwaters. The ecological importance of wetlands, however, has not always been appreciated. For over three centuries, people have 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.

The location and type of vegetation are key features for classifying wetlands. Most wetlands in Robbinsville are found in association with the major streams and their tributaries. Freshwater, deciduous wooded wetlands, particularly along Assunpink Creek and Miry Run, are the dominant category of wetlands in the township. These wetlands are "palustrine" wetlands (stream-associated versus "lacustrine" or lake-associated) and are usually covered with deciduous trees or shrubs, although some evergreen trees or shrubs may be present. Shrubs are also the dominant plants where wetlands are recovering from past impacts. See **Figure 15: Surface Water, Wetlands, and Vernal Pools**.

Interior wetlands provide high-quality animal and plant habitat, purify Robbinsville's surface and groundwater, and create picturesque landscapes that add immeasurably to the quality of life for local residents. Robbinsville has three major types of interior wetlands: (1) wooded wetlands dominated by deciduous trees; (2) herbaceous wetlands; and (3) scrub/shrub wetlands. See **Figure 25: Natural Vegetation (2007)**.

The vast majority of Robbinsville's wetlands are deciduous wooded wetlands, which occupy about 2,706 acres (over 20 percent of the township) and support mixed hardwoods that flourish in lowlands and frequently saturated soils, such as

green ash, box elder, pin oak, and swamp white oak. All of the creeks in the township and their tributaries support some wooded wetlands, and pockets of wooded wetlands are found in Robbinsville even far away from streams. Closely associated with deciduous wooded wetlands are scrub/shrub wetlands, occupying about 290 acres. Scrub/shrub wetlands often make up transitional areas between deciduous wooded wetlands and other land cover types. Typical native shrub species in lowlands are buttonbush, swamp rose, elderberry, arrowwood Viburnum, winterberry, and silky dogwood, with sweet pepperbush and swamp azalea making rare appearances. Multiflora rose is the most common invasive exotic shrub in floodplains. The largest pocket of scrub/shrub wetlands is found along Assunpink Creek south of the large unnamed artificial lake.

Herbaceous wetlands (i.e., marshes) occupy approximately 93 acres. These wetlands generally occur along lake edges, in open floodplains and in former agricultural fields. Herbaceous wetlands are found in close proximity to scrub/shrub and wooded wetlands along many streams in Robbinsville, with the highest concentration of herbaceous wetlands along Miry Run. Herbaceous wetland plants include tussock sedge, arrow arum, yellow pond lily, tearthumb, wild rice, broadleaf cattail, and invasive species like reed canary grass, purple loosestrife, and the common reed (Phragmites).

In addition to natural wetlands, Robbinsville contains extensive swaths of modified and managed wetlands, which no longer support the typical natural wetlands vegetation found in analogous unaltered natural areas. Over seven percent of Robbinsville's land area is in modified wetlands, with agricultural wetlands being the most common use, at 894 acres. While agricultural wetlands are not natural vegetation, they can function as habitat for many animal species that are adapted to herbaceous wetlands. For more information, see **Natural Resources: Modified Wetlands** and **Figure 15: Surface Water, Wetlands, and Vernal Pools**.

Upland Forests

Upland areas are those locations without water at or near the soil surface. Most of Robbinsville's original upland forests have been cleared and converted to farms or residential or commercial development. Nearly all old growth forests were harvested for lumber during colonial times. Today's upland forests are second or third growth and tend to be located near stream corridors, or are patchy woodlands on less agriculturally suitable soils. Approximately 1,062 acres, or eight percent, of Robbinsville's land area is upland forest. See **Figure 25: Natural Vegetation (2007)** and **Table 19: Robbinsville Natural Vegetation**.

The vast majority of Robbinsville's upland forest is deciduous forest (702 acres). The composition of Robbinsville's upland deciduous forests is largely one of mixed oaks—black, red, pin, and white oaks—joined by other hardwoods such as birch (primarily in the form of river birch, which is found along streambanks),

maple, beech, hickory, ash, locust, tulip poplar, and sweetgum. The understory contains species such as flowering dogwood, black cherry, ironwood, American holly, and sassafras. Vines, such as wild grapes, Virginia creeper, poison ivy, and greenbriar, as well as the exotic invasives Japanese honeysuckle and Asiatic bittersweet, are common. Exotic species like multiflora rose, Chinese privet, winged Euonymus, Asian photinia, and honeysuckle often dominate the shrub layer, though native spicebush and *Viburnum*s are common in places.

Coniferous forests cover about 12 acres and mixed forests cover about 207 acres of Robbinsville. These forests are mostly made up of successional, or pioneer, species like Virginia pine, scrub pine, and pitch pine, which will eventually be overgrown by dominant deciduous trees, such as oak, ash, and hickory. There are an additional 142 acres of “old field” forests, which are forests grown on former fields that contain less than 25 percent brush.

Grasslands and Agricultural Lands

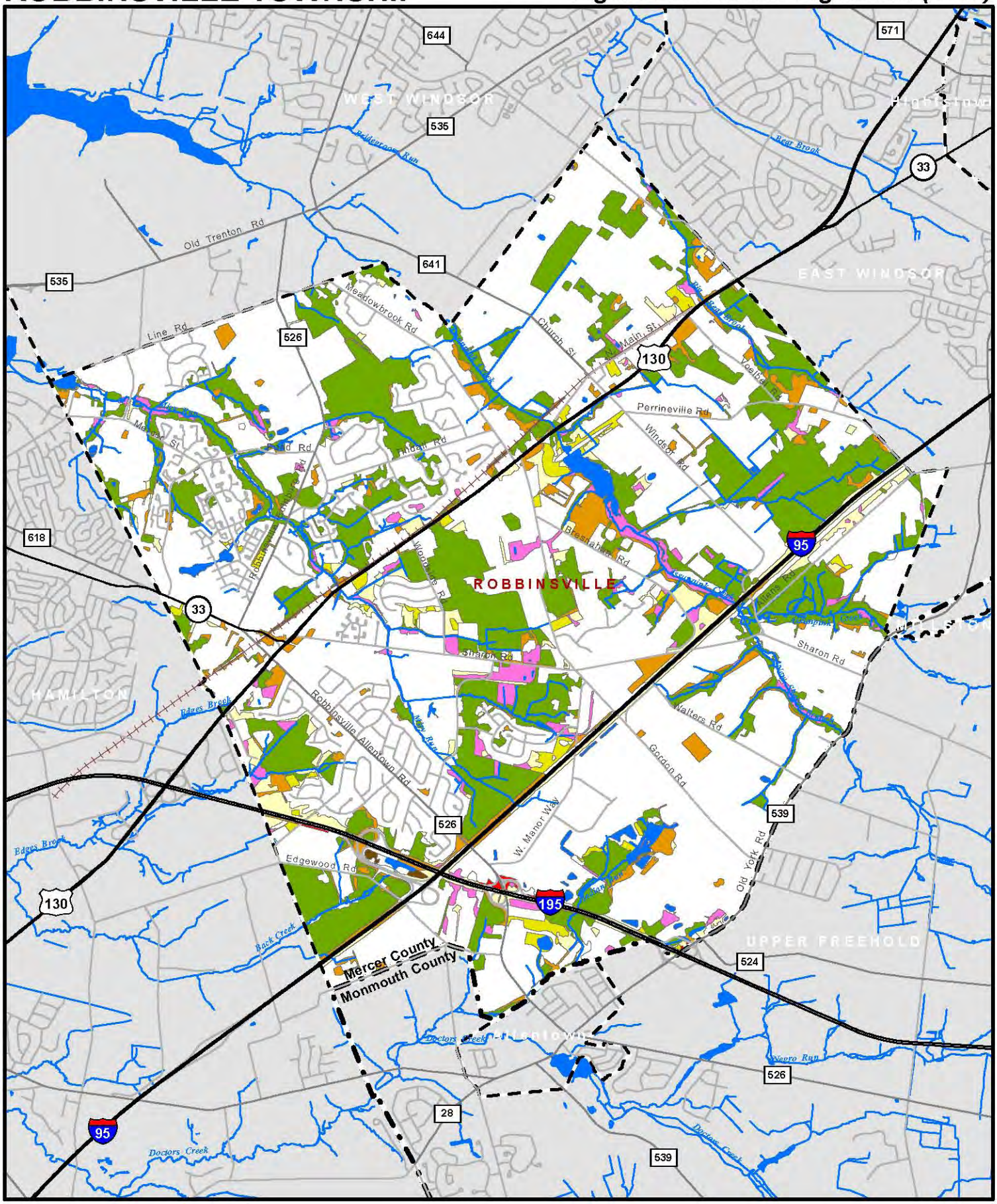
Grasslands are considered to be one of the most endangered ecosystems globally. They are threatened by human development, new agricultural technology, grazing, desertification, soil erosion, and invasive species. Grasslands are important because they provide habitat for specialized species such as grassland birds and shade-intolerant herbaceous plants. Many species of increasingly rare grassland birds require large contiguous patches of grassland for successful breeding and roosting.

The 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 3 to 20 years after which woody plants take over. This habitat is visible especially along wood edges, roadsides, and in landscapes where mowing is infrequent, but where woody plants are not yet the dominant vegetation. To be sustained, grasslands must be mowed every one or two years.

In Robbinsville, almost 292 acres, or about two percent of the land cover, is classified as brushland or shrubland. Brushland and shrubland are generally found adjacent to residential, commercial, and industrial developments. **See Figure 25: Natural Vegetation (2007)**. Active agricultural cropland and pastureland is considered suitable “grassland” habitat for species that forage or nest on open land. However, it is not considered to be natural vegetation. Agricultural cropland and pastureland cover 2,487 acres of Robbinsville’s area.

ROBBINSVILLE TOWNSHIP

Figure 25: Natural Vegetation (2007)



Sources : 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.

Vegetation

- Brush/Shrubland
- Brush/Shrubland - Oldfield
- Upland Forest - Coniferous
- Upland Forest - Mixed (Con. Dom.)
- Upland Forest - Deciduous
- Upland Forest - Mixed (Decid. Dom.)
- Water
- Wetlands - Scrub/Shrub
- Wetlands - Herbaceous
- Wetlands - Phragmites Dominated
- Wetlands - Wooded - Deciduous
- All other land cover

N

0.5 0.25 0 0.5

Miles

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Landscape Project Priority Habitats

The Landscape Project is a proactive, ecosystem-level approach for the long-term protection of imperiled species and their important habitats in New Jersey. The project began in 1994 by the N.J. Division of Fish Wildlife's Endangered and Nongame Species Program (ENSP). Its goal: to protect New Jersey's biological diversity by maintaining and enhancing imperiled wildlife populations within healthy, functioning ecosystems. While the Landscape Project aims to identify, delineate, and ultimately protect critical habitat for all New Jersey wildlife, the project is an informational tool and does not have its own regulatory program or rules. However, several state regulatory programs, which contain specific provisions for the protection of habitats determined to be critical to endangered and threatened wildlife, make explicit reference to the information contained in the Landscape Project. These regulatory programs – including the Freshwater Wetlands Protection Act Rules, the Flood Hazard Area Control Act Rules, and the Water Quality Management Planning Rules – should be consulted directly to determine the ways in which they utilize Landscape Project data.

The Landscape Project focuses on large land areas called "landscape regions," which are ecologically similar areas with regard to their plant and animal communities. Using an extensive database that combines imperiled and priority species location information with land-use/land-cover data, the Endangered and Nongame Species Program has identified and mapped areas of critical importance for imperiled species within each landscape region.

Landscape Project critical habitat maps were developed to provide users with peer-reviewed, scientifically sound information. Critical habitat maps were designed for use by anyone, but especially those individuals and agencies who have the responsibility for making land-use decisions, i.e., municipal and county planners and local planning boards, state agencies, natural resource and lands managers, the general public, etc.

Critical area maps can be integrated with planning and protection programs at every level of government – state, county, and municipal – and can provide the basis for proactive planning, zoning, and land acquisition projects. Most importantly, the critical information contained in the Landscape Project should be used for planning purposes before any actions, such as proposed development, resource extraction (such as timber harvests), or conservation measures, occur. Proper planning with accurate, legally and scientifically sound information will result in less conflict. Less time will be wasted, and less money spent, attempting to resolve endangered and threatened species issues.

The Landscape Project categorizes 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 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* in New Jersey or are habitat deemed suitable for species that are included 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."

The Landscape Project identifies both critical and suitable habitat in Robbinsville Township. It is important to preserve both suitable and critical habitats in order to maintain the diversity of species that still exist in the township and to improve the likelihood of survival for endangered and threatened species. See **Figure 26: Landscape Project Priority Habitat (2007)** and **Table 20: Landscape Project Designations for Robbinsville Township**.

Table 20: Landscape Project Designations for Robbinsville Township

Category	Rank	Area (Acres)	% of Total Habitat	% of All Land
Emergent Wetlands	Critical Habitat (3)	23.90	0.26%	0.18%
	Suitable Habitat (2)	1,257.08	13.87%	9.55%
	Suitable Habitat (1)	62.72	0.69%	0.48%
	Subtotal	**1,343.69**	**14.82%**	**10.21%**
Forested Wetlands	Suitable Habitat (2)	2,895.80	31.94%	22.00%
	Suitable Habitat (1)	65.91	0.73%	0.50%
	Subtotal	**2,961.71**	**32.67%**	**22.50%**
Upland Forest	Suitable Habitat (2)	1,076.05	11.87%	8.18%
	Subtotal	**1,076.05**	**11.87%**	**8.18%**
Grassland	Critical Habitat (4)	1,027.56	11.33%	7.81%
	Critical Habitat (3)	30.54	0.34%	0.23%
	Suitable Habitat (2)	2,504.71	27.63%	19.03%
	Suitable Habitat (1)	121.56	1.34%	0.92%
	Subtotal	**3,684.37**	**40.64%**	**28.00%**
Total Habitat		**9,065.83**	**100.00%**	**68.89%**
Total Robbinsville Land		**13,160.46**		**100.00%**

Source: NJDEP, 2008

Rank	Description
5	Area contains one or more occurrences of at least one wildlife species listed as endangered or threatened on the federal list of endangered and threatened species.
4	Area contains one or more occurrences of at least one state endangered species.
3	Area contains one or more occurrences of at least one state threatened species.
2	Area contains one or more occurrences of species considered to be species of special concern.
1	Area meets habitat-specific suitability requirements such as minimum size criteria for endangered, threatened, or priority wildlife species, but does not intersect with any confirmed occurrences of such species.

Source: NJDEP

Landscape Project Data on Wetland Habitat

The Landscape Project divides wetland habitats into two types—forested and emergent wetlands. Emergent wetlands are marshy areas characterized by low-growing shrubs and herbaceous plants in standing water. In addition, most modified wetlands, especially agricultural wetlands, are a habitat for similar species and are therefore classified as emergent wetlands by the Landscape Project. About 1,344 acres in Robbinsville are identified as priority emergent wetlands habitat. The vast majority of these lands are ranked as suitable, but one 24-acre patch of agricultural emergent wetlands at the headwaters of Indian Run is classified as “critical.” Animals that can be found in Robbinsville’s wetland habitats include endangered turtles, rare fish, mollusks, crustaceans, and insects. Emergent wetlands are also important habitats for migratory waterfowl and passerines (small perching birds) such as migrating flycatchers and warblers.

Forested wetlands are Robbinsville’s second most common priority habitat type, occupying 2,962 acres, all of which are ranked as suitable. Forested wetlands support species such as migratory and nesting warblers, many of which are a species of special concern. They can also be home to various rare amphibians (frogs and salamanders).

Landscape Project Data on Upland Forest Habitat

The least common habitat type in Robbinsville is upland forest. The Landscape Project ranked 1,076 acres as suitable habitat, and did not identify any critical upland forest habitat in Robbinsville. These areas are located in scattered patches either overlooking the south bank of Assunpink Creek or alongside the major highways of I-195, the NJT, and US Route 130.

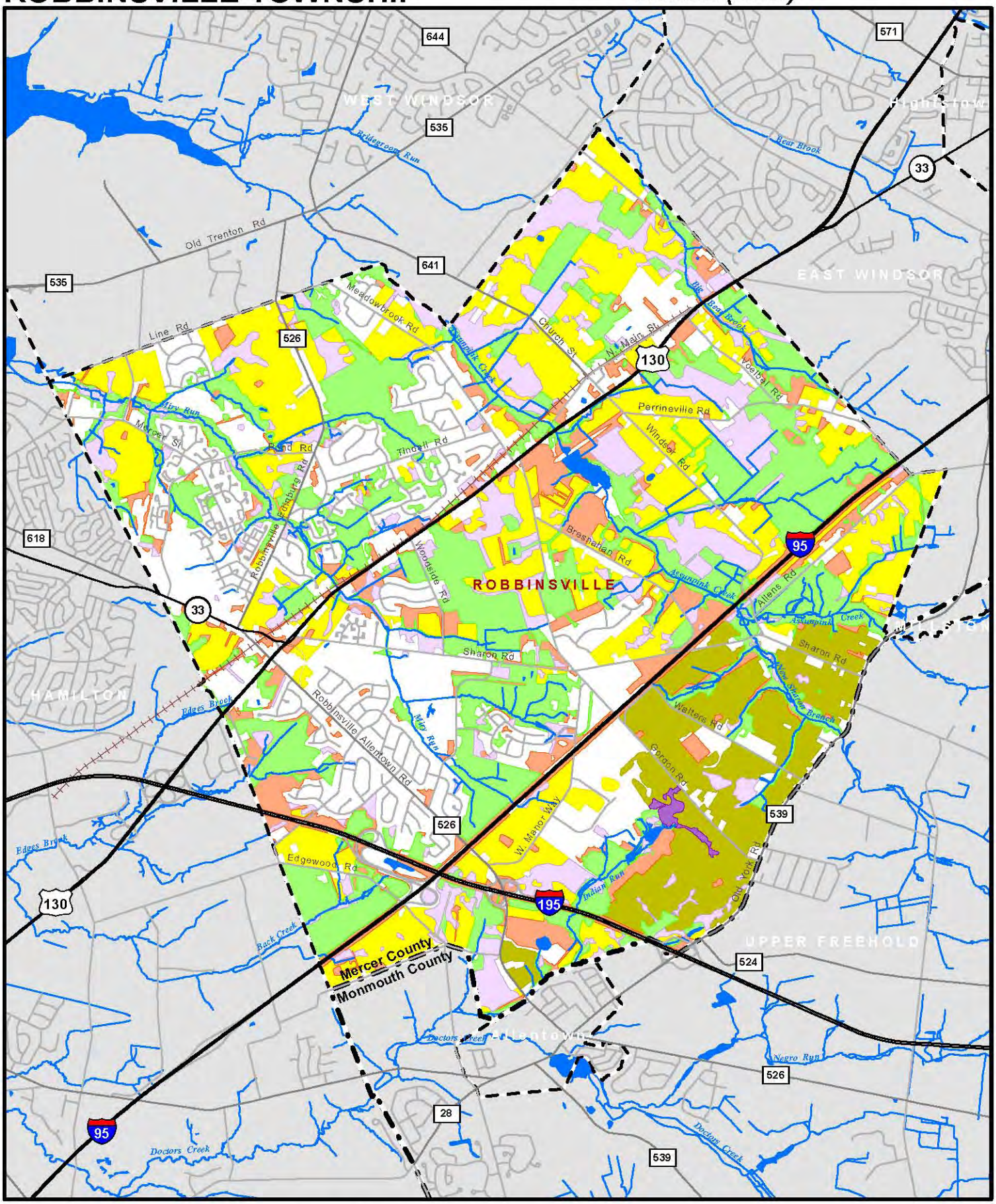
Landscape Project Data on Grassland-Dependent Species Habitat

The Landscape Project designates 28 percent of the township as either “suitable” or “critical” grassland-dependent species habitat. Over 2,600 acres, or 20 percent, of the township is classified as suitable grassland habitat, and 1,058 acres, or eight percent, is classified as “critical” habitat. The critical grassland habitat is concentrated in the southeastern portion of the township in the area bordered by Assunpink Creek, the NJT, and I-195. Suitable grassland habitat is found everywhere in the township, especially in the north and east where agriculture remains the primary land use. Grassland-dependent species are the most threatened group of species in New Jersey, primarily because the most common form of grassland habitat—agricultural fields—is the most threatened habitat in the state due to development pressure and rising land values. Changes in agricultural practices have also had a profound impact on these species where such habitat does exist.

Nearly all of Robbinsville’s agricultural land is designated as “critical” or “suitable” grassland habitat for one or more of the following reasons: (1) migrating birds cannot visually distinguish cropland from grassland; (2) cropland turns into grassland when it is fallow for one year or more; (3) some crops like alfalfa and soybeans provide suitable nesting habitat for several bird species such as sparrows; (4) all or most endangered and threatened birds are area-sensitive, requiring large ranges that include agricultural “grasslands”; and (5) agricultural land provides important disturbance buffers, separating humans and domestic predatory animals like dogs and cats from rare and endangered bird species.

ROBBINSVILLE TOWNSHIP

Figure 26: Landscape Project Priority Habitat (2007)



Sources: 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.

Emergent Wetlands
- Critical Habitat
- Suitable Habitat

Forested Wetlands
- Suitable Habitat

Upland Forest
- Suitable Habitat

Grasslands
- Critical Habitat
- Suitable Habitat

N

0.5 0.25 0 0.5
Miles

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Animal Communities

Currently, no comprehensive inventory of the different animal species within New Jersey, Mercer County, or Robbinsville Township exists. However, there are records of sightings, biological studies of range, and assessments of endangered and threatened status that can be used to identify and describe known and possible animal communities in Robbinsville.

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. Though they are the most abundant and diverse animal life forms, they are not generally well recognized and their fundamental role in sustaining natural systems is often not fully appreciated.

Invertebrates consist of insects (beetles, butterflies, moths, ants, dragonflies, termites, bees, flies wasps, and others), arachnids (spiders, ticks, and mites), crustaceans (crayfish, 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. Aquatic or otherwise water-dependent invertebrates often suffer first from environmental degradation due to the large impact that human activity has on water bodies. Among aquatic macroinvertebrates, benthic (bottom-dwelling) macroinvertebrate communities provide a basis for ecological monitoring and are relatively simple to collect from shallow stream bottoms. Monitoring the presence of macroinvertebrates reveals the effect of pollutants over a long period of time. The AMNET surveys streams for macroinvertebrate communities, which are an indicator of water quality, as discussed in the **Surface Water Quality** section of this document.

Threatened and Endangered Invertebrates

There are nine invertebrate species listed as endangered (two beetle species, four butterfly species, and three mussel species) and eight invertebrate species listed as threatened (three butterfly species and five mussel species) in the state of New Jersey. According to the Natural Heritage Database, one of these species can be found in Robbinsville: the threatened triangle floater, a freshwater mussel. At one time, freshwater mussels were abundant in the streams of Robbinsville as well as in the rest of New Jersey and served as a major food source for native peoples. Unfortunately, due to destruction of suitable aquatic habitats by dams and pollution, the native mussel population has sharply declined. Of those species on the New Jersey Endangered and Threatened list, one, the dwarf

wedge-mussel, which has not been found in Robbinsville, is listed as endangered under the Federal Endangered Species Act.

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. Birds that nest in Robbinsville are known, but migrants that depend on Robbinsville's wetlands and 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 over 500 mammal species in New Jersey, of which only nine are listed as endangered and none are listed as threatened by the state of New Jersey. Six of these listed species are whales and of the three land-based species, none are known to exist within the borders of Robbinsville. Some common mammals found in Robbinsville include cottontail rabbits, eastern gray squirrels, skunks, white-tailed deer, opossums, and raccoons. Sightings of foxes and black bears also occur with some frequency in Robbinsville. In fact, the Sharon Road Elementary School provides families with information on how to handle interactions between humans (especially children) and black bears.

Deer Management in New Jersey

Management of white-tailed deer is an issue throughout New Jersey. While many residents prize the presence of mammalian life, mammals often come into conflict with humans in suburban areas. Indeed, the argument over whether New Jersey has too many, just enough, or not enough deer often causes controversy, On the one hand, there is inherent value in New Jersey's deer population: deer are a beloved symbol of wildlife; a visible subject for wildlife education and research; a part of recreational activities like wildlife watching and hunting; and a food source for carnivores and humans. On the other hand, deer overpopulation has caused widespread destruction of habitat in New Jersey, and conflicts often arise when humans and deer compete for the same space. According to the USDA, deer cause more damage to agricultural crops than any other vertebrate wildlife species and farmers in densely human-populated areas appear to be the most affected. An overabundance of deer can devastate the understory of forests through overgrazing, destroying the growth of seedlings and young trees, and eliminating many species of wildflowers. The preference of deer for native plant species has shifted the balance in forest understories towards a small number of invasive species that the deer tend not to eat, greatly reducing biodiversity and limiting the variety and seasonal availability of food for other wildlife. In addition, deer also aid the spread of Lyme's Disease. Finally, as most motorists are well

aware, collisions between deer and automobiles frequently cause serious damage, sometimes resulting in injury to humans and death to the deer.

Controlling deer numbers has become difficult in New Jersey for numerous reasons, including: (1) hunters have less access to land inhabited by deer; (2) some communities have passed ordinances prohibiting hunting; (3) public and private groups establish deer refuges; (4) suburban housing patterns provide year-round food for deer and prevent hunting; and (5) some public and private groups oppose deer hunting. Furthermore, predators that previously served to keep deep populations in balance were long ago extirpated from the state.

To minimize the negative impacts described, the New Jersey Agricultural Experiment Station recommends both lethal and nonlethal deer management options for community-based deer management programs. For example, municipalities can extend the hunting season, issue depredation permits to private landowners, engage in sharpshooting, and employ traps and euthanasia to reduce deer numbers. Alternatively, communities and private landowners can choose to apply more costly, nonlethal deer management strategies, such as installing reflectors and reducing speed limits on rural roads to decrease deer-vehicle collisions, modifying habitat by planting bad-tasting plants on commercial and residential properties, using taste-based and odor-based repellents, employing traps, and by using birth control and translocation techniques. While current deer problems should be addressed, it is important to note that New Jersey's white-tailed deer population has remained relatively stable throughout the state over the past decade and that a partial reason for the perceived upswing in conflicts between deer and humans is the result of suburban expansion.

N.J. Department of Environmental Protection Freshwater Fish Advisories

Fishing provides enjoyable and relaxing recreation and many people like to eat the fish they catch. Fish are an excellent source of protein, minerals and vitamins, are low in fat and cholesterol, and play an important role in maintaining a healthy, well-balanced diet.

However, certain fish may contain toxic chemicals, such as polychlorinated biphenyls (PCBs), dioxins, or mercury, which accumulate in water and aquatic life. Chemical contaminants such as dioxin and PCBs are classified by the U.S. Environmental Protection Agency as probably 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 catches fish at numerous sampling stations throughout the state and tests for contaminant levels, adopting advisories to guide residents on safe consumption practices.

NJDEP issued a fish advisory for the following species of fish in Mercer County: largemouth bass, smallmouth bass, striped bass, chain pickerel, yellow bullhead, sunfish, brown bullhead, American eel, striped bass, channel catfish, white catfish, common carp, walleye, and bluegill sunfish (April, 2010). Recreational fishermen and women should regularly check for local fish advisories on NJDEP's Division of Science, Research and Technology web site: www.nj.gov/dep/dsr/njmainfish.htm

US EPA General Consumption Guidelines:

- If possible, eat smaller amounts of several different types of fish rather than a large amount of one type that may be high in contaminants. Consume species of fish that have lower levels of contaminants, such as fluke or flounder.
- Smaller fish of a species will usually have lower chemical levels than larger fish in the same location because contaminants tend to build up in the fish over time. It is advisable to eat smaller fish (of legal size) more often than larger fish

Fish

When European settlers arrived in present-day Mercer County, they encountered Native Americans who regularly fished along the inland streams and gathered mussels in the Delaware River. Due to the unintended consequences of urban development, industrial advancement, and mechanized agriculture, the amount and diversity of aquatic life has decreased dramatically throughout most of New Jersey.

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 water bodies, and conducts research and management surveys. The Bureau currently stocks the Assunpink upstream of Route 130 with trout. Based on survey data supplied by the Bureau, as well as local observation, Robbinsville's freshwater streams may contain the following fish: redbreasted sunfish, blue gill sunfish, green sunfish, white sucker, chain pickerel, pumpkinseed, eastern mudminnow, common shiner, golden shiner, creek chub, small madtom catfish, largemouth bass, trout, tessellated darter, white crappie, and the American eel.

Birds

There are between 350 and 500 species of birds in New Jersey, which is an exceptional number given the state's small size. Centrally located along the Atlantic flyway, where the Inner Coastal Plain meets the Piedmont, the Robbinsville area is an important stopover and nesting place for a wide range of passerines and waterfowl. The Assunpink Creek WMA is especially important, not only as a "rest stop" for migratory birds, but also as habitat for year-round and breeding species.

Common birds in Robbinsville are ducks, geese, swallows, jays, robins, grackles, warblers, wrens, sparrows, and some hawks. The state-endangered Vesper

sparrow has been sighted in the township during spring migration, and the state-threatened grasshopper sparrow, savannah sparrow, and upland sandpiper have also been sighted in Robbinsville.

Important Bird Areas

The Important Bird Area (IBA) Program began as an international initiative for saving bird and wildlife habitat. In North America, the IBA Program is carried out by chapters of the Audubon Society in 46 states. The state IBA Programs have succeeded in protecting tens of thousands of acres of bird habitat and raised public awareness about habitat protection. Robbinsville is home to a portion of one IBA, the Assunpink Creek WMA. In New Jersey, the New Jersey Audubon Society, in cooperation with the New Jersey ENSP and the National Audubon Society, runs the Important Bird and Birding Area (IBBA) program. This program identifies not only IBAs, but also areas important for bird-watching.

In New Jersey, for a site to qualify as an IBA, it must meet at least one of four primary criteria. These criteria include: the presence of species of conservation concern; the presence of "regional responsibility species"; the capacity to hold "significant congregations" of one or more bird species; and the presence of exceptionally high numbers of birds during migration relative to the surrounding areas. Robbinsville is partially home to one IBA, the Assunpink WMA. While most of the Assunpink WMA resides in Monmouth County, the westernmost portion of the WMA is in Robbinsville. This 8,088-acre IBA runs from the headwaters of the Assunpink Creek and New Sharon Branch in the southeast to Route 130 in the northwest. The habitat of this IBA consists mostly of scrub-shrub and forest areas. The Assunpink IBA is home to the state-endangered Vesper Sparrow during spring migration, the wintering long-eared owl (a state threatened species), and numerous other breeding and nonbreeding species, including significant concentrations of waterfowl. For a list of birds noted in the 2004 Assunpink WMA Site Report, see **Appendix E: Significant Birds of the Assunpink WMA**. Note: this is not a complete list of all birds that have been sighted within the Assunpink WMA. Species that are apparently or demonstrably secure throughout the state are not listed in the site report. Only state-listed species of conservation concern, regional responsibility species, and recognized waterfowl species were listed in the 2004 Site Report.

Resident Canada Goose Populations

The state of New Jersey now has a "resident" Canada goose population of approximately 100,000 birds that no longer migrate to more southern locales, and may double in size in the next 5 to 10 years. While geese are a valuable 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 can elevate coliform bacteria to unhealthy levels, polluting surface waters and 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 potentially injure humans.

However, 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. Like all waterfowl, Canada Geese are protected by the Migratory Bird Treaty Act. Therefore, a management program may require the USDA's approval. Management techniques include: planting shrubby vegetation around streams, lakes, and ponds to block waterfowl access, discouraging humans from feeding geese, and fertility reduction techniques such as egg addling or removal.

Common Reptiles and Amphibians

Reptiles can be quite elusive when surveys attempt to document them. Amphibians of some types are abundant, such as bullfrogs. Other species are rare because they depend on vernal pools, as was discussed in the **Surface Water Resources: Vernal Pools** section of this document. In Robbinsville, the eastern box turtle, spotted turtle, and Fowler's toad–-all species of special concern-–have been sighted in the last several years. The term "species of special concern" applies to species that warrant special attention because of some evidence of decline, inherent vulnerability to environmental deterioration, or habitat modification that would result in their becoming a threatened species.

Threatened and Endangered Vertebrates

According to the Natural Heritage Database and the Landscape Project, 11 rare vertebrate species have been sighted in Robbinsville over the course of the past several years. Brief descriptions of several of these species and their preferred habitat, provided by the New Jersey Division of Fish and Wildlife, follow.

The **bald eagle** (*Haliaeetus leucocephalus*) is an endangered species in New Jersey. Their seven- to eight-foot wingspan, full white heads, and dark brown plumage make the adult bald eagle easily identifiable. Their habitat consists of areas of forest near the Delaware River and its tributaries. Bald eagles choose the largest and tallest trees in a forest to set up their nests. They also prefer these trees to be in close proximity to water. This allows the bald eagle to forage for fish from their nest. The bald eagle population was depleted in New Jersey through habitat destruction, shootings, intentional poisons, and especially the application of DDT, a pesticide that was widely used in post-World War II New Jersey to control the mosquito population. This chemical accumulated in the bodies of the bald eagle, which caused the eggshells of fledgling bald eagles to crack easily during the incubation period. By 1970, only one bald eagle nest remained in the state. As a direct result, the bald eagle was listed as endangered under New Jersey's Endangered Species Act in 1974. New Jersey's bald eagle population has improved since the federal government placed a ban on DDT in 1972. In 2010, the New Jersey Endangered and Nongame Species Program recorded 82 bald eagle nests as active in the state. Robbinsville is not known to be home to a bald eagle nest, but the areas on and around Miry Run and

Federal Endangered Species Act*

An "endangered" species is in danger of extinction throughout all or a significant portion of its range.

A "threatened" species is one that is likely to become endangered in the near future.

New Jersey Endangered Species Act**

An "endangered" species is in danger of immediate extinction within the state due to one of several factors: loss or degradation of habitat, over-exploitation, predation, competition, disease, or environmental pollution.

A "threatened" species is one that may become endangered if environment conditions continue to deteriorate. It is vulnerable due to one of several factors: small population size, restricted range, narrow habitat affinities, or significant population decline.

A species of "special concern" is one that warrants special attention because of the evidence of population decline, environmental deterioration, or habitat modification that would result in becoming threatened. Special concern status also extends to species whose population size is unknown or unstudied.

* Definitions adapted from U.S. Fish and Wildlife Service, "Listing a Species and Threatened or Endangered: Section 4 of the Endangered Species Act." Washington, DC: February 2001.
** Definitions adapted from N.J. Division of Fish, Game, and Wildlife, Endangered and Non-game Species Program, "Status Definition." Trenton, NJ: April 2002.

Assunpink Creek in the northern portion of the township are recognized foraging sites for the bald eagle.

The Habitat Project provides a bald eagle foraging habitat GIS layer in its database. Eagle foraging habitat is defined as the amount of habitat required to support a nesting pair of eagles throughout the year, as breeding bald eagles are year-round residents in New Jersey.

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 can be identified by their tall domelike shells and coloration, which ranges from spots of yellow, orange, or olive on a dark brown background. Even though eastern box turtles can live in many different habitats, they are mostly terrestrial. However, box turtles enjoy soaking themselves in water or mud during the summer. Continued residential development has limited the habitats available to the eastern box turtle and reduced their number over the years.

The **spotted turtle** (*Clemmys guttata*) is listed as a species of special concern in New Jersey. This small turtle (three to five inches long) can be found all over the state and lives in wetland areas, thriving in both emergent marshes and bogs, as well as wooded wetlands. They can be identified by their smooth shells and round yellow or orange spots. Adults have more spots than juveniles. Spotted turtles enjoy basking in the sun, and burrow in the mud when threatened or disturbed.

The **Fowler's toad** (*Bufo woodhousii fowleri*) is a species of special concern in New Jersey. It is a small (two- to three-inch) toad that can be identified by its brown/dark brown colorations, multiple warts, and the light line running down its

spine. Fowler's toads inhabit sandy locations and vernal pools, primarily in the southern portion of the state. In Robbinsville, the health of the species is linked to the health of the few remaining vernal pools. While they will also breed in ditches and at the shallow edges of lakes and ponds, these vernal pools are favored breeding grounds of the toad.

The **grasshopper sparrow** (*Ammodramus savannarum*) is a threatened species in New Jersey. Grasshopper sparrows are small, stocky birds, with brown, buff-streaked feathers. The grasshopper sparrow prefers open habitats, such as grasslands, pastures and hayfields, old fields, and upland meadows. This species prefers to nest in areas containing clumped grasses such as poverty grass and broom-sedge, as they provide ample cover and foraging areas. The grasshopper sparrow increased in range and numbers during the agricultural boom of the late 1800s and early 1900s, but expanding suburban development in the 1950s and 1960s led to loss of habitat, and their population declined. In 1979, the bird was listed as threatened on the state list, and is currently threatened or endangered in several Northeastern states.

The **savannah sparrow** (*Passerculus sandwichensis*) is a threatened species in New Jersey. Savannah sparrows are small, brown-and-white birds whose habitat is concentrated on the northern Atlantic coast; New Jersey is at the southern edge of their range. The savannah sparrow prefers open habitats, such as pastures and hayfields, grasslands, and fallow meadows; they have also been known to nest in coastal habitats such as saltwater marshes. While they are relatively tolerant of a range of vegetative habitats, from coastal dunes to early woody growth, the decline in traditional agriculture since the 1950s has led to a decrease in the habitat for both breeding and wintering savannah sparrows within New Jersey. The state of New Jersey listed the savannah sparrow as threatened in 1979, and as of the late 1990s, there were up to an estimated 50 breeding pairs within the state.

The **vesper sparrow** (*Pooecetes gramineus*) is an endangered species in New Jersey. Formerly known as the "bay-winged bunting," the vesper sparrow is a grayish-brown, stocky bird with a short tail, and is known for singing during the evening and well into the night. The vesper sparrow prefers open habitats, such as cultivated fields, grasslands, old fields, and pastures. This species will, ideally, nest in an old field or fence-row adjacent to a cultivated area. Nests are found in herbaceous land cover that provides protection from predators and humans. The vesper sparrow was once a common summer bird in New Jersey. Due to their dependence on habitats created by farming, vesper sparrow populations started to decline in the 1950s as farm fields were replaced by residential development. In 1979, the bird was listed as threatened on the state list, and upgraded to endangered in 1984. It is also listed as endangered in Connecticut and Rhode Island, threatened in Massachusetts, and of special concern in New York. In Robbinsville, the vesper sparrow has been observed mainly during spring migration.

The **upland sandpiper** (*Bartramia longicauda*) is an endangered species in New Jersey. Upland sandpipers are slender brown shorebirds of dry inland fields with thin necks, long tails, varied brown colorations, and long yellow legs. The bill of the upland sandpiper is short and straight with a slight curve at the tip. The upland sandpiper inhabits grasslands, fallow fields, and meadows that are often associated with pastures, farms, or airports. Pastures that receive light to moderate levels of grazing offer quality habitat for upland sandpipers. Hayfields and small farms also provide habitats; however, large monocultures of row crops are of limited value because of heavy mechanical and chemical activity. Airports also provide habitat for the upland sandpiper, especially in southern New Jersey. During the 19th century, the upland sandpiper populations grew rapidly as agricultural fields expanded production in southern New Jersey. However, by the turn of the 20th century, the upland sandpiper was on the verge of extinction in New Jersey, caused by overhunting. Recovery throughout the first half of the 20th century was followed by the development of modern monoculture farming in the second half, which has caused substantial habitat loss and has exacerbated the quick decline in the sandpiper population. As a result, the state of New Jersey placed the upland sandpiper on its threatened species list in 1979, and in 1984 downgraded its status to endangered. While the upland sandpiper is only considered a species of management concern at the national level, it is “critically imperiled” within New Jersey and much of the Northeast.

See **Appendix C** for a list of **State Endangered and Threatened Species**.

See **Table 21** for a list of **Rare Animal Species and Natural Communities Presently Recorded in the NJ Natural Heritage Database for Robbinsville Township.**

See **Table 22** for a list of **Rare Plant Species and Natural Communities Presently Recorded in the NJ Natural Heritage Database for Robbinsville Township**.

Table 21: Rare Animal Species and Natural Communities Presently Recorded in the NJ Natural Heritage Database for Robbinsville Township

Common Name	Scientific Name	State Status	State Rank
Vertebrates			
Bald eagle (foraging)	*Haliaeetus leucocephalus*	Threatened	S3B
Eastern box turtle	*Terrapene carolina carolina*	Special Concern	S3
Fowler's toad	*Bufo woodhousii fowleri*	Special Concern	S3
Grasshopper sparrow	*Ammodramus savannarum*	Threatened/Special Concern	S2B, S4N
Great blue heron	*Ardea Herodias*	Special Concern/Stable	S3B, S4N
Least flycatcher	*Empidonax minimus*	Stable	S3B
Savannah sparrow	*Passerculus sandwichensis*	Threatened	S2B, S4N
Spotted turtle	*Clemmys guttata*	Special Concern	S3
Upland sandpiper	*Bartramia longicauda*	Endangered	S1B, S1N
Vesper sparrow	*Pooecetes gramineus*	Endangered	S1B, S2N
Wood thrush	*Hylocichla mustelina*	Special Concern/Stable	S3B
Invertebrates			
Triangle floater	*Alasmidonta undulata*	Threatened	S3

Source: NJDEP, 2009

Table 22: Rare Plant Species and Natural Communities Presently Recorded in the NJ Natural Heritage Database for Robbinsville Township

Common Name	Scientific Name	State Status	State Rank
Death-camus	*Zigademus leimanthoides*	Endangered	S1

Source: NJDEP, 2009

State Rank	
S1	Critically Imperiled in New Jersey (>5 occurrences)
S2	Imperiled in New Jersey (6--20 occurrences)
S3	Rare in state (21--100 occurrences)
S4	Apparently secure in state
B	Refers to in-state breeding population
N	Refers to nonbreeding population

Natural Heritage Database and Natural Heritage Priority Sites

Natural Heritage Priority (NHP) sites are areas designated by the New Jersey Division of Parks and Forestry's Office of Natural Lands Management as exemplary natural communities within the state that are critically important habitats for rare species. Preserving these areas is a top priority for efforts to conserve biological diversity in New Jersey. There are 410 NHP sites in the state of New Jersey, although none of these are located in Robbinsville.

The NHP designations are based on the records of the Natural Heritage Database, which lists documented sightings of endangered and threatened species. Information on particular sites may also be provided by the Nature Conservancy or by the NJDEP Endangered and Nongame Species Program, and especially through the latter agency's Landscape Project.

It is important to note that the Natural Heritage Database lists primarily sightings that have been submitted to it, along with some ecological community data. It incorporates both historically and recently documented sightings. Areas without sightings may never have been surveyed. Conversely, land use in areas with sightings may have changed considerably over recent years, and the species once found there may be gone. Local surveys to update the database and regular consultation of records before any development is approved are two measures that would help to increase threatened and endangered species' protections. See "Cautions and Restrictions on Natural Heritage Data," located in **Appendix D**.

Designation as a 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 or nonprofit groups to preserve the land permanently.

CHAPTER 8

The Built Environment

Population

The 1990 census listed the population of Robbinsville as 5,815 people. By 2000, the population had grown to 10,275. This 76.7 percent increase in 10 years was the 11th most rapid growth rate among the Philadelphia metropolitan area's 353 municipalities during the 1990s. The population of Robbinsville nearly tripled in size between 1980 and 2000. This increase was the fourth highest among municipalities in the Philadelphia metropolitan area.

The population of Robbinsville continued to grow in the first decade of the new millennium. In 2010, the U.S. Census estimated that Robbinsville had a total population of 13,642, a 33 percent increase from 2000. Over three-fourths of the population of Robbinsville categorized themselves as White (not Hispanic or Latino) in 2010 (see **Table 23**). About 13 percent were Asian, four percent were Hispanic or Latino, three percent were Black or African American, one percent was multi-racial, and less than one percent identified as other races.

Table 23: Robbinsville Population by Race, 2010

Race or Ethnicity	Population	Percent
White	10,708	78.49%
Asian	1,728	12.67%
Hispanic or Latino	564	4.13%
Black or African American	407	2.98%
Two or More Races	197	1.44%
Some Other Race	26	0.19%
American Indian and Alaska Native	12	0.09%
Native Hawaiian and Other Pacific Islander	0	0.00%
Total	**13,642**	**100.00%**

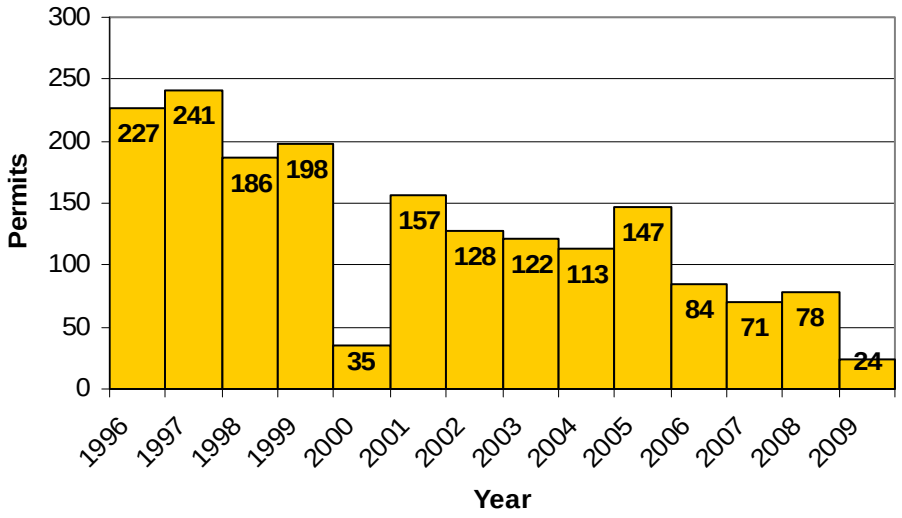
Source: US Census Bureau, 2010

Housing

In the 2010 U.S. Census, Robbinsville had a total of 5,277 housing units, of which 96 percent were occupied and just 4 percent were vacant. This is a 27 percent increase in the number of housing units since 2000, when there were 4,163 units. The construction of the Robbinsville Town Center has contributed to a large percent of this increase.

The trends in residential construction can be seen in **Figure 27,** which shows the number of housing permits issued each year from 1996 to 2009. The pace of construction has declined greatly since the 1980s and 1990s. There has been a steep drop in the number of permits issued since the economic recession that began in 2008.

Figure 27: Robbinsville Housing Permits, 1996 – 2009



Source: US Census Bureau, 2011

Transportation

Robbinsville has a strategic location in the mid-Atlantic region. It is approximately an hour away from both New York City and Philadelphia, and several major road corridors pass through the township. The NJT, which bisects the township, runs directly to New York and near Philadelphia, while I-195 runs east-west and provides access to Trenton and the Jersey Shore. The NJT and I-195 meet at Exchange 7A within the township. In addition, NJ Route 33 and U.S. Highway 130 are the other main thoroughfare(s) through Robbinsville. They join together in the western portion of the township near Town Center and run northeast as one road into East Windsor Township.

County roads within the township include: Robbinsville-Edinburg Road, Robbinsville-Allentown Road (both CR 526) and Old York Road (CR 539 and

briefly CR 524). These routes provide access and connections within Robbinsville and Mercer County and reflect the region's land use and distribution of historic centers of activity. Smaller roads in the township are a mixture of old rural lanes, residential streets, and newer subdivision thoroughfares.

Commuters in Robbinsville also benefit from the nearby Amtrak and New Jersey Transit lines connecting New York City with Trenton and Philadelphia. Robbinsville commuters connect to these rail routes via stations at Hamilton, Princeton Junction, and Trenton. The Amtrak train line is part of the Northeast Corridor route that connects Washington D.C. to Boston, while the New Jersey Transit line serves local stations from Trenton to New York City with connections to other major transit networks including SEPTA and the MTA. Additionally, Robbinsville is served by one NJ Transit bus line, which connects Town Center and the Foxmoor Shopping Center to points in Hamilton, Trenton, and Princeton.

Robbinsville, along with much of Mercer County, experiences congestion during rush hours. The Route 130 corridor is most affected, as well as Route 33, which connects Robbinsville with employment, retail, and transit in Hamilton and Trenton. The congested nature of Route 33 has slowed commercial growth in Town Center, which is slated for mixed-use development along Route 33. The New Jersey Department of Transportation (NJDOT) has for years planned to construct a bypass around the Town Center portion of Route 33, increasing connectivity to points west and transforming the existing Route 33 into a local, pedestrian-friendly road. However, funding issues have delayed the construction of this road. In 2006, DVRPC conducted a Route 33 Corridor Study recommending an alternative bypass design, which would reduce congestion in the area and increase the capacity of Washington Road, a collector road serving retail areas and the Foxmoor development.

Historic Resources

Protection and preservation of historic structures, lands, and views are of high importance to Robbinsville residents. The township boasts numerous 18th and 19th century structures, including merchant homes, storefronts, and churches, many of which are located in the Village of Windsor Historic District; Robbinsville's only listing on the National and State Registers of Historic Places. The Windsor Historic District is located around Main Street, Church Street, and School Drive. Originally known as Centerville, Windsor grew up around the Camden and Amboy rail line in the early 19th century, and remains largely unchanged today, with some of its structures dating back 200 years. A second site, the 18th-century Georgian-style Hutchinson House, was previously on the National Register, but was destroyed by arson in 1974. Delisted the next year, its former site is now home to Pond Road Middle School.

Robbinsville also contain three locally designated historic districts. These include the Village of Windsor mentioned above, and the hamlets of New Sharon and

New Canton (both small agricultural settlements on the border with Upper Freehold Township). These historic districts contain numerous structures that represent important periods in Robbinsville's past.

Numerous additional sites and one railroad historic district were issued State Historic Preservation Office (SHPO) opinions, which review a site's eligibility for inclusion on the State Register of Historic Places.[21] In addition, one site, the Mount House Complex, has been issued a Determination of Eligibility (DOE), formally declaring the site's eligibility for listing on the National Register, while the Imlay-Busby Farm has been issued a Certificate of Eligibility (COE) from the New Jersey State Historic Preservation Office. A COE satisfies a prerequisite to apply for funds from the New Jersey Historic Trust, as well as several county preservation funding programs.

The 2000 Master Plan also includes an inventory of Robbinsville's historic resources. Many of these resources relate specifically to the preservation of Robbinsville's heritage as a working agricultural community, including farmhouses, hedgerows, vistas, and tree stands. See **Table 24: Sites Listed on the National & State Registers, Locally Designated Historic Districts, and Sites with SHPO Opinions** and **Figure 28: Historic Resources** for more information.

There are various mechanisms to enhance historic preservation at the federal, state, and local levels. At the federal level, placing sites and districts on the National Register of Historic Places affords them added protection in the planning of federally assisted projects, and makes properties eligible for certain tax benefits and grant programs. It does not, however, prevent properties from being altered or demolished. 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). In Robbinsville, the Village of Windsor and the hamlets of New Sharon and New Canton are protected by the Historic Zone Overlay District. Robbinsville's Historic Preservation Subcommittee meets monthly or on an as-needed basis to review applications for exterior modifications, development, or demolitions within the three township-designated historic districts.

Municipal Protection of Historic Resources

The National Park Service and the New Jersey SHPO jointly administer the Certified Local Governments (CLG) program, which provides technical

[21]Filing an Environmental Impact Statement (EIS) usually prompts the issuance of a SHPO opinion. The use of federal funding for a project often triggers the requirement to perform an EIS, which may result in NJDEP recognizing possible threats to certain historic sites and identifying those sites as eligible for listing in the State Register of Historic Places.

assistance and funding for community-based preservation efforts. While Robbinsville is not a CLG; five municipalities in Mercer County do participate in the CLG program: Princeton Borough and Township, Lawrence Township, Ewing Township, and Hamilton Township. To participate, a municipality 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 a community were to become a CLG, it would be eligible to draw on an exclusive pool of matching federal and state funds for program implementation and rehabilitation work consistent with historic preservation standards.

There are also federal incentives to individuals, organizations, or firms who own historic properties and are interested in historic preservation. 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.

The Friends and Historical Society of Robbinsville Township is a private, nonprofit organization devoted to preserving the heritage of the township. Founded in 1998, the stated mission of the society is “to forge a partnership that is concerned with the preservation of a quality of life we share and value in Robbinsville Township.”

Table 24: Sites Listed on the National and State Registers, Locally Designated Historic Districts, and Sites with SHPO Opinions

State ID	Name	Address/Location	Historic Listing(s)
1812	Village of Windsor Historic District	Main Street and Church Street; School Drive	NR, 4/10/1992; SR, 8/15/1998; Local District
	New Canton Historic Village Overlay		Local District
	New Sharon Historic Village Overlay		Local District
4453	Brown-Gordon-Mahon House Site		SHPO Opinion, 8/31/1987
2970	Camden and Amboy Railroad Main Line Historic District	Extends through 31 municipalities in four counties	SHPO Opinion, 7/12/1991
4455	Cole House Site		SHPO Opinion, 8/31/1987
4451	Cubberly-Combs Farmstead	8 Sharon Road	SHPO Opinion, 8/31/1987
4454	Hammell-Hullick Farmstead [Site]		SHPO Opinion, 8/31/1987

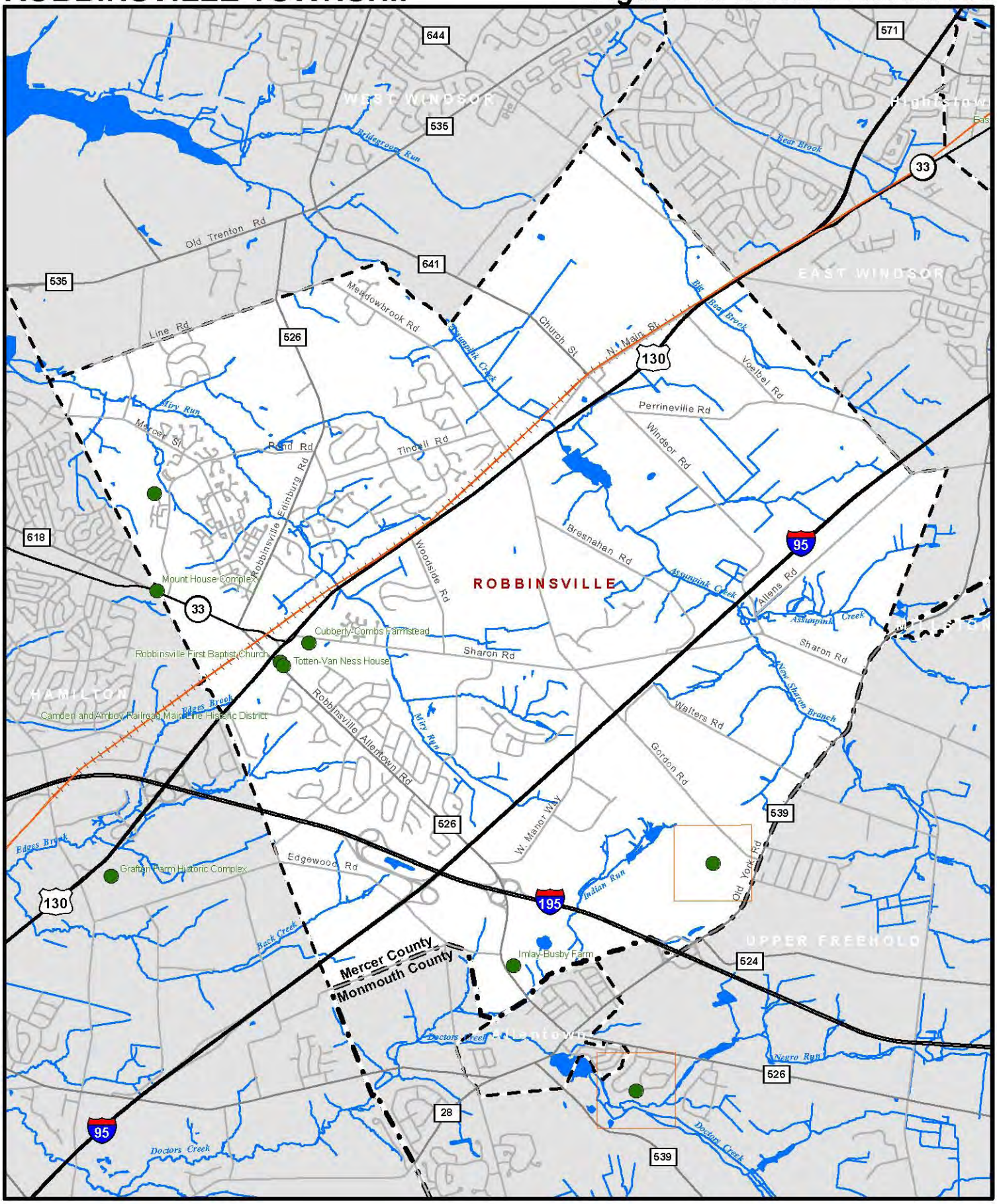
State ID	Name	Address/Location	Historic Listing(s)
4242	John Henry House Site		SHPO Opinion, 1/26/2004
1810	Hutchinson House Historic Archaeological Site	Pond Road Middle School	SHPO Opinion, 4/12/1976
4599	Imlay-Busby Farm	824 Robbinsville-Allentown Road	COE: 5/10/2006
4448	Melrose Diner	U.S. Route 130	SHPO Opinion, 8/31/1987
1666	Mount House Complex	Nottingham Way and NJ Route 33	SHPO Opinion, 2/20/1980; DOE: 7/17/1980
4450	Robbinsville First Baptist Church	22 Robbinsville-Allentown Road	SHPO Opinion, 8/31/1987
4970	Robbins House	245 Windsor Road	SHPO Opinion, 3/30/2010
4449	Totten-Van Ness House	24 Robbinsville-Allentown Road	SHPO Opinion, 8/31/1987
4452	Willkens-Silver-Mitchell Farmstead	482 U.S. Route 130	SHPO Opinion, 8/31/1987
1813	Windswept Prehistoric Site		SHPO Opinion, 4/12/1976

Sources: NJDEP Historic Preservation Office, 2010, and Washington Township Master Plan, 2000

Historic Listing Designations	
NR	This site is listed on the National Register of Historic Places.
SR	This site is listed on the New Jersey Register of Historic Places (State Register).
DOE	This site has been issued a Determination of Eligibility by the National Park Service, formally certifying its eligibility for listing on the National Register.
COE	This site has been issued a Certification of Eligibility by the New Jersey State Historic Preservation Office, satisfying a prerequisite to apply for preservation funding from the New Jersey Historic Trust, as well as many county programs.
SHPO Opinion	This site has been issued an opinion of eligibility by the State Historic Preservation Office.
Local District	This site is not on any state or federal list, but was noted in the 2000 Washington Township (now Robbinsville) Master Plan as a historic district of local importance.

ROBBINSVILLE TOWNSHIP

Figure 28: Historic Resources



Sources: NJDEP, NJDOT, DVRPC, NJHPO.
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.

- Historic Site
- Historic District or Property

N

0.5 0.25 0 0.5
Miles

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Township Facilities, Utilities, and Services

Drinking Water

Public drinking water in Robbinsville Township is supplied by the Central Division of Aqua New Jersey, part of Aqua America (formerly known as Consumers NJ Water Co.). Aqua New Jersey serves most of Robbinsville, and procures all of its water from groundwater sources, in particular several wells in neighboring Hamilton Township which tap into the Potomac-Raritan-Magothy system. For a more detailed discussion of groundwaters see Chapter 6, **Groundwater**.

Private wells also provide drinking water to a small but unknown number of township residents. Many private wells predate modern testing and documentation requirements, and therefore, records on them are largely incomplete. Public drinking water wells in the Robbinsville vicinity are depicted on **Figure 23: Public Water Supply Wells**. **17** also shows wellhead protection areas surrounding public wells. Wellhead protection areas are those areas that are critical for the maintenance of groundwater quality. Groundwater can be contaminated by a number of chemical sources including fuel storage tanks, salt from roads, overuse of fertilizers, or pesticides. Wellhead protection areas are established by the NJDEP and represent the horizontal extent of groundwater captured at two-, five-, and 12-year periods of time for confined wells. These areas are subject to additional water quality assessment and protection by the local water purveyors and the NJDEP. It is within Robbinsville's authority to create additional wellhead protection through the adoption of appropriate ordinances.

Sewer

Sewer service for Robbinsville residents is provided by the Hamilton Township Department of Water Pollution Control, which operates a treatment plant at 300 Hobson Avenue that discharges into Crosswicks Creek. The plant, which serves over 92,000 residents, has a capacity of 20 million gallons per day (mgd), with an NJPDES limit of 16 mgd and an average flow of 9.9 mgd. As of 2000, Robbinsville was guaranteed a reserve capacity of 2.5 mgd, and was far from reaching that limit, as it exhibited an average flow of 0.9 mgd and had a committed flow (which included pending development) of 1.4 mgd.

Robbinsville has utilized Hamilton Township's system since the completion of the collection system in 1981, fulfilling a 1976 agreement to give Robbinsville sewer service for the first time. Operations within Robbinsville were for many years the responsibility of the Washington Township Municipal Utilities Authority; however, that agency was dissolved pursuant to a September 2007 ordinance, and the township's nine pump stations have been controlled by Hamilton since October 2008. The sewer service area, which was first amended in 1991 and again in

1994 and 1997, is shown on **Figure 11: Approved Sewer Service Area and NJDPES Permits**.

The sewer service area shown on **Figure 11** indicates where sewerage is authorized, although some parcels in the area may not yet actually have service. In fact, the 2000 Master Plan noted the presence of several proposed developments that would require an extension of the sewer infrastructure. The vast majority of Robbinsville's existing developed and urbanized land has sewer service.

Extension of the authorized sewer service area within Robbinsville requires approval of the township, Mercer County, and the NJEPA. Extensions are officially adopted as part of the Mercer County Water Quality Management Plan.

Trash/Recycling

For many years, Robbinsville engaged with a private contractor to provide garbage collection services to residents in the township. However, following a pilot program in Robbinsville Town Center, the township switched to providing "in-house" trash services via the Department of Public Works on June 1, 2009. Trash collection occurs once a week. White goods (appliances) are picked up by request once a month, and Robbinsville also maintains a drop-off location for automotive waste such as used motor oil and tires.

A recycling service is also provided by the township, with pick-ups currently every other Wednesday. Materials recycled include glass, plastics, metal, paper, and cardboard. The township also collects grass, brush, and leaves (but not logs or stumps) at specified times of the year, and provides free mulch for its residents courtesy of Hamilton Township. The NJDEP has set strict limitations on the placement of leaves on streets through its stormwater rules.

Energy

The primary energy sources in Robbinsville for residential and business uses are natural gas and electricity. Electricity in Robbinsville is provided by PSE&G and Jersey Central Power and Light; PSE&G services the western half of the township, while JCP&L services the eastern half. Natural gas is provided entirely by PSE&G. In addition, commercially provided fuel oil is used for home heating in houses that do not have gas heat.

The state of New Jersey released an Energy Master Plan in 2008. The plan has goals of reducing energy consumption by 20 percent by 2020, and deriving 30 percent of electric energy from Class 1 renewable resources by 2020. The New Jersey Clean Energy Program (www.njcleanenergy.com) provides details of this plan, and provides educational and energy reduction programs to facilitate township participation in the plan.

In 2009, the DVRPC released the Regional Greenhouse Gas (GHG) Emissions Inventory (www.dvrpc.org/ planning/climate/Inventory.htm). The report inventoried emissions in the form of metric tons of CO_2 equivalency units ($MTCO_2E$) for 352 municipalities located within DVRPC's nine-county region, including Robbinsville Township. The report reveals that Robbinsville has a higher-than-average level of per capita emissions when compared to Mercer County as a whole, with each resident contributing the equivalent of nearly 17 metric tons of CO_2 to the atmosphere per year. **Table 25** summarizes the GHG emissions for Mercer County municipalities.

Table 25: Mercer County Greenhouse Gas Emissions by Municipality (2005)

Municipality	Total Emissions (MTCO2E)	Percent County Total	Population 2007	Per Capita (MTCO2E)
East Windsor Twp	325,512	6.4%	26,686	12.2
Ewing Twp	661,833	13.0%	36,536	18.1
Hamilton Twp	1,140,863	22.3%	90,365	12.6
Hightstown Twp	61,100	1.2%	5,271	11.6
Hopewell Borough	16,899	0.3%	2,000	8.5
Hopewell Twp	360,477	7.1%	17,823	20.2
Lawrence Twp	573,923	11.2%	31,863	18.0
Pennington Borough	21,519	0.4%	2,668	8.1
Princeton Borough	136,398	2.7%	13,517	10.1
Princeton Twp	350,403	6.9%	17,490	20.0
Trenton City	812,942	15.9%	82,804	9.8
Robbinsville Twp	**199,089**	**3.9%**	**11,979**	**16.6**
West Windsor Twp	447,578	8.8%	26,447	16.9
Mercer County Total	**5,108,536**	**100.0%**	**365,449**	**14.0**

Source: DVRPC, 2009

The report examined GHG emissions from stationary energy consumption (heating one's home or lighting schools, for example), mobile energy consumption (transportation-related emissions), and nonenergy-related emissions (agricultural methane, land cover change, etc.). Eighty-four percent of the region's total GHG emissions were allocated to the municipal level by DVRPC. Stationary energy consumption accounts for the bulk of the township's emissions (61.9 percent), and is split between residential and commercial sources. Mobile energy consumption accounts for 26.8 percent of emissions, and the remaining GHG emissions, 10.7 percent of the total, come from nonenergy-related activities. **Table 26** provides a detailed breakdown of Robbinsville's GHG emissions by source.

Table 26: Robbinsville Greenhouse Gas Emissions by Source

Category	Emissions Source	Total Emissions (MTCO2)	Percent Township Total	Per Capita (MTCO2)
Stationary Energy	Residential	60,339	30.20%	5.0
	Commercial	63,294	31.68%	5.3
	Subtotal	**123,633**	**61.88%**	**10.3**
Mobile Energy	**Subtotal**	**53,505**	**26.78%**	**4.4**
Nonenergy	Agriculture	936	0.47%	0.1
	Landfill	4,409	2.21%	0.4
	Wastewater	1,455	0.72%	0.1
	Industrial Processes	4,125	2.01%	0.3
	Fugitive Methane	2,923	1.46%	0.2
	LULUCF	8,103	4.01%	0.7
	Subtotal	**21,462**	**10.74%**	**1.8**
Total Emissions		**199,809**	**100.00%**	**16.6**

Source: DVRPC (2010)

Robbinsville has a higher than average rate of per capita emissions within the county due primarily to its suburban residential patterns, predominance of single family homes, and heavy reliance on automobiles for commuting. Robbinsville also has an unusually high LULUCF, which stands for land use, land use change, and forestry operations. Four percent of Robbinsville's greenhouse gas emissions come from this category, the highest such percentage in Mercer County. LULUCF measures the net carbon sequestration and emissions resulting from the planting or removal of forests, urban trees, and other plant material. Trees are especially effective natural carbon sinks, taking in atmospheric CO_2 through transpiration and converting it to biomass. Areas that undergo forest growth due to succession from abandoned agricultural fields or concerted tree-planting efforts experience a net decline in atmospheric carbon due to this category. In Robbinsville, however, forest areas continue to be cleared to make way for suburban development, releasing the carbon sequestered in the removed trees and increasing the township's greenhouse gas burden.

Education

The Robbinsville School District has two public elementary schools: Windsor Elementary School, built in 1909 in the Village of Windsor, and Sharon Elementary School, which was built in 1958 along Sharon Road and has since undergone several expansions. The vast majority of students attend Sharon; Windsor School is only home to several kindergarten classes. Some kindergarteners and all students in grades 1 through 3 attend the Sharon Road School. Students in grades 4 through 8 attend Pond Road Middle School (built in 1997), and students in grades 9 through 12 attend Robbinsville High School, which was first opened in 2005 to accommodate the burgeoning school-age population of the township. Previously, students had attended Lawrence High School as part of a sending-receiving relationship. Robbinsville's rapid population growth over the last three decades has led to a dramatic expansion in the need for school facilities, which has been partially addressed with the recent construction of Pond Road Middle School and Robbinsville High School. Sharon Elementary School (which serves the majority of the township) has been particularly affected, and many classes currently take place in temporary modular units.

In addition, Robbinsville is home to a public library, which is operated as a branch location of the Mercer County library system. The library is located within the municipal complex on Robbinsville-Allentown Road.

State Planning Areas and Designated Centers

The New Jersey Office of Smart Growth, which was renamed the Office of Planning Advocacy in 2010, produces a State Development and Redevelopment Plan (SDRP), which provides a vision for the state's future development. Last published in 2001, the SDRP has been under revision for the past several years. Much of this time has been spent going through a process of "cross-acceptance" with local governments. A new draft final version of the SDRP has been available to the public since 2010. The draft final plan contains nine major goals, which are further expounded upon as 20 statewide policies.

The SDRP delineates a number of planning areas, each with its own goals, objectives, policies, and strategies. The planning area descriptions reflect varying levels of development, infrastructure capacity, and presence of natural resources. Robbinsville Township has three planning areas: PA2- Suburban Planning Area; PA4- Rural Planning Area; PA-4B Rural Environmentally Sensitive Planning Area. In addition, Robbinsville's state- and county-owned open space is classified on the State Map as Parks and Natural Areas. In Robbinsville, the Suburban Planning Area is largely coterminous with the Sewer Service Area boundary, and the Rural Environmentally Sensitive area consists of land that drains into the area of the Assunpink Creek WMA. See **Figure 29: State Planning Areas** for more information.

One of the major goals of the SDRP is to promote “center-based development” as a means to curb sprawl, protect the environment, create a sense of place, and provide for mixed-income housing. To that end, the Office of Smart Growth identifies and provides technical assistance for five levels of center-based development, in order of descending size and intensity of use: Urban Centers, Regional Centers, Towns, Villages, and Hamlets. Robbinsville (at that time Washington) Town Center was granted official Town Center designation in 1998, and covers not just the official Town Center development, but other nearby housing, retail, and community facilities as well, including the Foxmoor condos and the municipal complex.

Parks, Open Space, and Recreation

Parks and Open Space

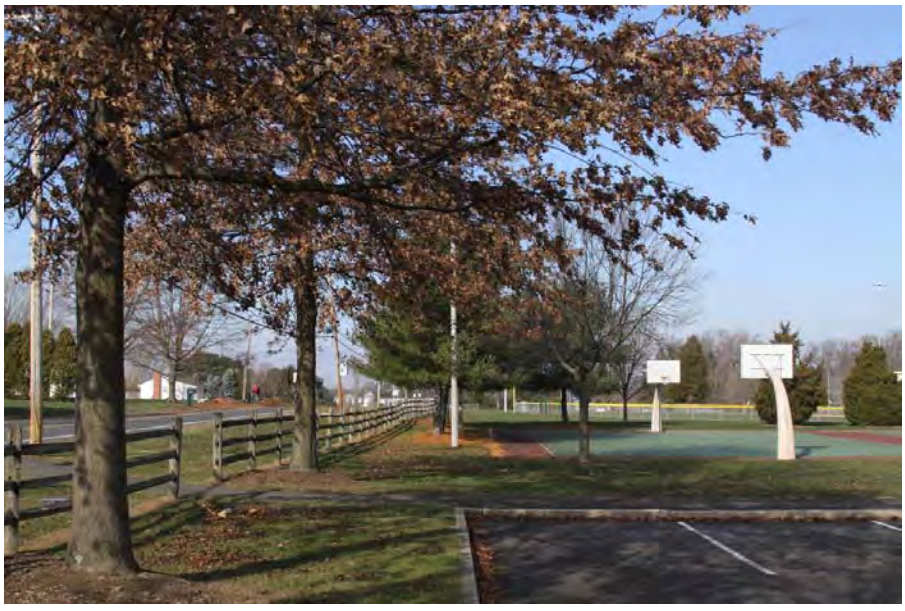
Robbinsville is home to a growing park system which provides a variety of active and passive recreational opportunities for area residents. Active recreation includes activities such as soccer, baseball, volleyball, a skate/roller park, and frisbee. Facilities such as jungle gyms, swing sets, tennis courts, and sports fields are typically required for active recreational pursuits. Passive recreation encompasses most other park activities including walking, fishing, birdwatching, bike riding, and picnicking. Typically, these activities can take place in natural open space settings. In total, Robbinsville contains over 1,800 acres of public parkland and natural open space available for active and passive recreation. See **Figure 30: Protected Open Space**.

Robbinsville’s municipal park system consists of Tantum Park, Community Park, Municipal Park, Meadowbrook Park, and a system of small “pocket” parks found throughout Town Center. The busiest municipal facility (especially during Little League season) is William Tantum Park on Meadowbrook Road. This 36-acre site features baseball fields, tennis courts, lighted basketball courts, a batting cage, a playground, picnic area, and a nature trail. Another major park is Community Park at the corner of Gordon and Sharon Roads; it is home to a walking path, playground, and soccer fields. Municipal Park, at the corner of CR 130 and Robbinsville-Allentown Road, also features active recreation in the form of basketball and volleyball courts and a skateboard park. This area adjoins a complex of municipal buildings including the Police Department, Public Library (a branch of the Mercer County system), Municipal Building, and a Senior Center.

Newer facilities include Meadowbrook Park and the open space found throughout Town Center. Meadowbrook Park, on Meadowbrook Road, opened in 2009 and is home to football and practice fields. The Town Center open areas are largely reserved for passive recreation, but also include such amenities as playgrounds and a dog run. The largest park in Town Center was built around the two new

artificial lakes, which are periodically stocked for fishing and are overlooked by a gazebo.

Assunpink Creek along the trail in William Tantum Park.



Community Park

Skate park at the Municipal complex.

Robbinsville's municipal parks are not the only active recreational facilities within the township. Each of Robbinsville's four schools has various athletic fields on their grounds, and several residential developments have privately maintained open space and recreational facilities for the benefit of residents in that development. In addition, Robbinsville is home to a golf course, the 160-acre Miry Run County Club. While the Miry Run CC is privately owned and maintained, they have partnered with the Robbinsville Township Department of Recreation to provide golf lessons during the spring and summer months.

Town Center open space and artificial lake.

Lands owned by Mercer County and the state of New Jersey offer additional passive recreation opportunities within Robbinsville. Mercer County administers approximately 252 acres of land in Robbinsville. Most Mercer County land is along or near Miry Run in the northwest of the township; this area is in two large parcels (Dam Site 21 and Hutchinson) along Miry Run and is preserved for flood control and wildlife habitat. Another large parcel, the Washington Greenbelt, is located along the border between Robbinsville and Hamilton. As mentioned previously, the state of New Jersey administers Robbinsville's 898 acres of the Assunpink Creek Wildlife Management Area, which in addition to providing invaluable plant and animal habitat, offers passive recreational opportunities such as hiking, fishing, and bird-watching. Including extensions to the Assunpink WMA and a couple other small parcels, 1,049 acres of Robbinsville, or nearly eight percent of the township, is state-owned.

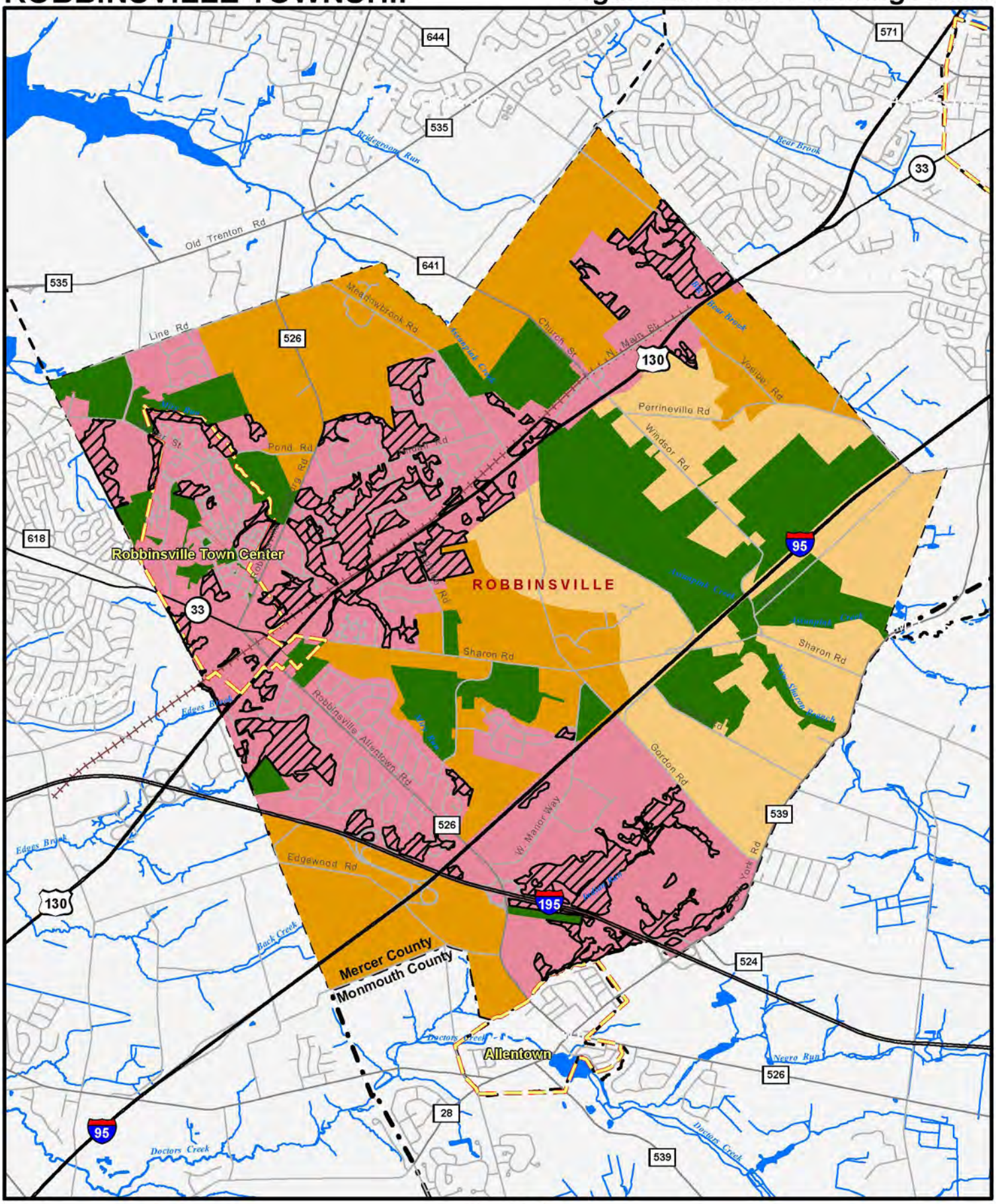
The 2000 Washington Township Master Plan included a parks and recreation element that divided municipal facilities into "community," "neighborhood," and "mini" parks. According to this classification, Tantum and Community Park (which was constructed in 1998) were classified as "community" facilities, and Municipal Park was classified as a "neighborhood" facility. The township's previous deficit of "mini" parks was addressed via the public open space built into Town Center. The recent dedication of Meadowbrook Park continues Robbinsville's pattern of park construction in response to the township's growing youth population. Municipal parkland within Robbinsville now totals 541 acres.

Open Space and Farmland Preservation

In addition to its parks and natural open space areas, preservation of Robbinsville's farmland is important to township residents. Robbinsville has aggressively pursued a program of farmland preservation in order to maintain the rural character of much of the township. Preserved farmland maintains visual amenities such as unbroken vistas, scenic woods, and key natural areas surrounding historic properties. It has a role to play in preserving water quality and biological diversity, providing habitat to grassland birds and ensuring the ground maintains enough pervious surface to safeguard against frequent flooding and stream degradation. Finally, there is an economic rationale, as agriculture has long been a major industry in Robbinsville, and unlike residential development, farms pay more in local taxes than they require in municipal services.

ROBBINSVILLE TOWNSHIP

Figure 29: State Planning Areas



Sources : NJDEP, NJDOT, DVRPC, NJ Dept of Community Affairs - Office of Smart Growth
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.

Critical Environmental Sites
Center Boundary

Planning Areas
- Metropolitan
- Suburban
- Rural
- Rural Environmentally Sensitive
- Park or Natural Area

N

0.4 0.2 0 0.4
Miles

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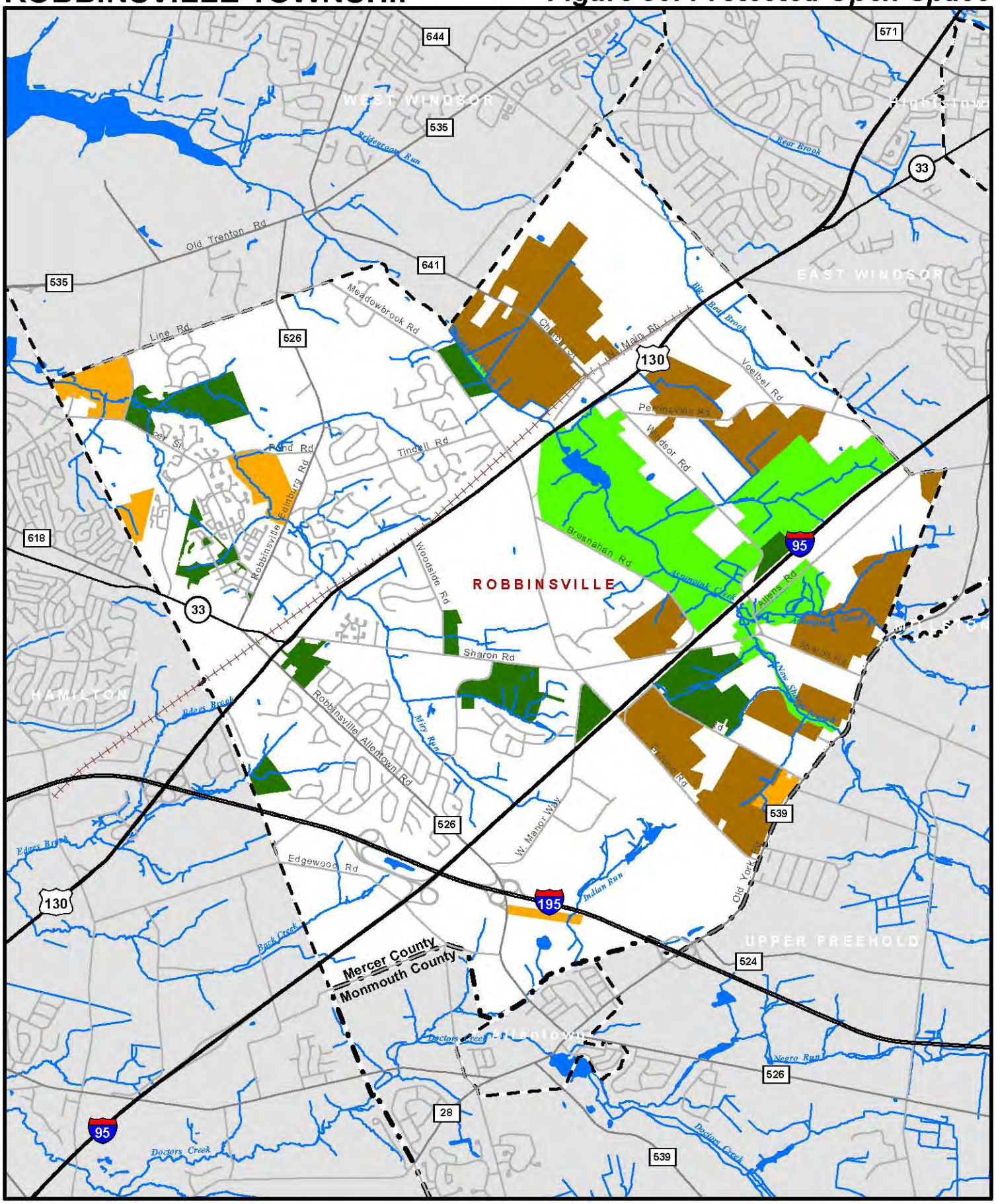
ROBBINSVILLE TOWNSHIP

Figure 30: Protected Open Space



Sources: NJDEP, NJDOT, DVRPC, Mercer Co.
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.

State
County
Municipal
Preserved Farmland

N

0.5 0.25 0 0.5
Miles

DELAWARE VALLEY
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Open space preservation in Robbinsville is funded in part through an open space tax of 5 cents per 100 dollars of assessed value. These funds add to the 3-cent Mercer County tax which raises about $9.3 million per year for county-wide projects. The main groups that work to acquire and protect open space and farmland within Robbinsville are the Robbinsville Environmental Commission and the Robbinsville Open Space Committee. The Robbinsville Environmental Commission is charged with the protection and stewardship of Robbinsville's natural areas. The Environmental Commission meets monthly and is currently instrumental in forming environmental policy at the township level. The Open Space Committee was formed in 2005, and serves in a purely advisory capacity to the mayor and town council.

One important state program that has played a significant role in providing funding to acquire (natural) open space is the New Jersey Green Acres Program. The New Jersey Green Acres Program, created in 1961, aims to partner with townships and counties to acquire and preserve open space in New Jersey. The program's goal is to create a system of interconnected open spaces to protect and enhance the natural environment of New Jersey for historic, scenic, and recreational purposes and for public enjoyment. Since 1961, over $1.5 billion has been used to acquire land and develop parks. In 1998, the Garden State Preservation Trust Act was signed into law, with the intention of providing a stable source of funding for open space, farmland, and historic preservation. Funds allocated in the 1998 authorization were exhausted by 2007. In November of that year, New Jersey voters approved a one-year extension of the fund, and in November 2008, voters approved a new $400 million reauthorization, which will maintain the program until these funds are exhausted. While the Garden State Preservation Trust Fund has remained a popular and important program in New Jersey, a dedicated revenue source that could provide long-term stability has yet to be created.

The Farmland Preservation and Open Space portions of the 2000 Master Plan targeted virtually all of the township's remaining farms as preservation targets. Since then, many of these farms have been either preserved or developed. By the end of 2009, approximately one-quarter, or 1,310 acres, of Robbinsville's farmland has been deed-restricted or otherwise permanently preserved for agricultural purposes (see **Figure 30: Protected Open Space**).

Currently, preserved open space (both farmland and natural areas) in Robbinsville is concentrated in the eastern half of the township. In addition, there is preserved open space along the northern edge of the township, bordering West Windsor (which has preserved most of the land on its southern border, creating a continuous buffer of farmland and park land between the two communities).

Further acquisition of open space remains important to the township. Despite the township's commitment to farmland preservation, a significant amount of open space has been lost in the past 10 years; from 2000 to 2005 alone, the amount of township acreage involved in agriculture dropped from 5,562 acres to 4,890

acres. Throughout the township, there has been pressure to convert open land, especially farmland, into residential subdivisions. Preservation of naturally vegetated lands is necessary along streams to protect riparian buffers and wildlife habitat, and to provide an opportunity for greenways and trails.

Trail and Greenway Plans

Robbinsville currently does not have a comprehensive system of trails; there is currently one small trail within the confines of Tantum Park, along the banks of the Assunpink Creek. However, the township does contain several resources that could be used to construct a township-wide system of trails with regional connections. Establishing a system of trails has long been a goal of planners and citizens within the area, as trail-based activities such as walking, jogging, and cycling are consistently the most popular outdoor recreational activities among adults. As a supplement to parkland and preserved farmland, greenways and trails are an important part of any township's open space resources, providing riparian buffers for surface water health, corridors for wildlife travel, and recreational opportunities such as hiking and biking. In addition, trails can provide essential connections between nodes of activity for people using alternative, nonmotorized forms of transportation.

DVRPC's 2000 plan, "Closing the Missing Link on the Assunpink Greenway," highlighted the need for establishing a greenway along the Assunpink Creek downstream of Robbinsville, on the border of Hamilton and Lawrence townships. This study noted that much of the Assunpink within Robbinsville was protected by the Assunpink WMA, and the township was actively engaged in trying to preserve the land in-between the Assunpink WMA and Mercer County Park in West Windsor Township. While some of this land has been preserved (including Tantum Park and the new Meadowbrook Park), there has since been additional development along Meadowbrook Road, constraining the possibility for a trail in that vicinity.

In addition, the township is home to an inactive United Jersey Railroad line (historically known as the Camden and Amboy Railroad). This line runs parallel to Route 130 and connects Windsor and Robbinsville. It was originally constructed in 1831 as one of the first railroads in the nation. Originally running from Bordentown to Hightstown, the section north from Windsor to Hightstown was officially abandoned in 1965, and the tracks were removed. In 1975, New Jersey issued a State Historic Preservation Opinion acknowledging that the site, which has not carried rail traffic for many years, is eligible for listing on the National Register of Historic Places.

The 2000 Master Plan identified this corridor as a potential rails-to-trails project, which would link several Robbinsville neighborhoods, other potential trails, and nearby communities in Hamilton and Bordentown. Foremost among these proposed trails would be paths along the Assunpink and Miry Run, taking advantage of their current riparian buffer. However, in 2006, Conrail applied to

the Surface Transportation Board to officially abandon five miles of the Camden and Amboy right-of-way, nearly all within Robbinsville. This abandonment could have adverse affects on efforts to construct this trail, due to the land reverting back to the control of adjacent private landowners. As of 2008, the legal status of this Camden and Amboy right-of-way remained unsettled; however, in 2009, some rails were removed during the recent reconstruction of the interchange between Routes 33 and 130.

The Crosswicks Creek-Doctors Creek Watershed Association has prepared a Greenway Plan for the entire Crosswicks Creek-Doctors Creek watershed, released in 2004. This plan proposed a comprehensive series of greenways, trails, and land preservation efforts throughout the watershed. In Robbinsville, the primary component of this trail system would be a path connecting Community Park to the borough of Allentown, following the riparian buffer of Indian Run and extending eventually to Walnford Park in Upper Freehold Township. This trail would necessitate crossing I-195; preferably via a newly constructed footbridge. The Crosswicks Creek-Doctors Creek Watershed Association also completed a Feasibility Study in 2007 for a trail that would connect Doctors Creek and Assunpink Creek. In Robbinsville, this path would follow the Assunpink Creek within the WMA, terminating at Route 130 with a potential connection to other trail systems.

Impact of Nonnative and Invasive Species on Natural Areas

In addition to development pressures, Robbinsville's natural areas face ongoing and emerging threats to a natural ecological balance. Nonnative and invasive species, predator exclusion, fire suppression, and altered hydrology all present challenges to maintaining the balance of Robbinsville's natural areas.

Useful Definitions

A **Native (indigenous)** species occurs in a particular region, ecosystem, and habitat without direct or indirect human actions. Species native to North America are generally recognized as those occurring on the continent prior to European settlement.

Nonnative (alien, exotic, foreign, introduced, and nonindigenous) organisms are those that occur artificially in locations beyond their known historical natural ranges. Nonnative can refer to species brought in from other continents, regions, ecosystems, and even other habitats. Not all nonnative plant species become invasive.

An **Invasive plant** displays rapid growth and spread, allowing it to establish itself over large areas. Free from the vast and complex array of natural controls

present in their native lands, including herbivores, parasites, and diseases, invasive plants may experience rapid and unrestricted growth in new environments. Their phenomenal growth allows them to overwhelm and displace existing vegetation and form dense one-species stands. In addition, a small number of native species, such as cattails, can behave aggressively enough to be considered invasive in some circumstances.

The Impact of Nonnative Species

In particular, nonnative invasive species pose a significant threat to the Robbinsville's natural resources. A growing portion of Robbinsville's natural vegetation is made up of nonnative, invasive species. Unhindered by naturally occurring diseases, pests, or predators that keep native plant species in balance, some invasive plants can quickly spread and take over large areas while displacing the native plants, insects, and animals. Invasive species not only crowd out native species, they also tend to diminish biodiversity, thereby creating ripple effects throughout an ecosystem, causing both ecological and economic losses.

Nonnative species tend to be inedible for wildlife, or provide food which is lower in nutritional value than the native plant species that they have displaced. Domination of large expanses by nonnative species, therefore, represents a considerable shrinkage in quality habitat for wildlife, even though the land they occupy may be preserved in a legal sense. Some nonnative invasives, such as Japanese stiltgrass and garlic mustard, may be altering the chemistry and porosity of the soil, with long-term consequences for forest health and water quality.

The problem is exacerbated by sprawling development and garden and landscape companies who promote nonnative, deer-resistant plants to homeowners. Much time, effort, and money is spent battling invasive plants where they occur in parks, waterways, and the numerous agricultural lands and forests found in Robbinsville.

Invasive Shrubs

Multiflora rose (*Rosa multiflora*) is the most prevalent nonnative invasive shrub, growing densely in floodplains and uplands. Other common invasives are privet (Ligustrum), honeysuckle (Lonicera), barberry (Berberis vulgaris), and winged euonymus (Euonymus alatus). A relatively new invasive shrub that has become established in Robbinsville but has yet to spread across New Jersey is Asian Photinia (Photinia villosa).

Invasive Grasses

Japanese stiltgrass (*Microstegium vimineum*) is a prevalent invasive exotic species in Robbinsville. An annual grass, it dominates the forest floor and even displaces perennial lawn grasses in low-lying backyards. Phragmites (*Phragmites australis*) and reed canary grass (*Phalaris arundinacea*) frequently invade marshy areas. Carpgrass (*Arthraxon hispidus)* is another increasingly common nonnative, similar in appearance to stiltgrass.

Invasive Vines

Oriental bittersweet (*Celastrus orbiculatus*) and Japanese honeysuckle (*Loniceria japonica*) are common in wooded areas. Porcelain berry (*Ampelopsis brevipedunculata 'Elegans'*) is very aggressive along forest edges, particularly along the canal. Asian wisteria (*Wisteria floribunda*) grows in isolated patches. Unlike most native vines, nonnative vines are apt to strangle and overtop trees, causing them eventually to topple.

Invasive Herbaceous Species

Garlic mustard (*Alliaria petiolata)* is the most widespread invasive wildflower. Lesser celandine (*Ranunculus ficaria*) carpets floodplains in the spring in many areas, growing so densely that other species are excluded. Japanese knotweed (*Fallopia japonica*) grows densely along streambanks. Purple loosestrife (*Lythrum salicaria)* spreads along streambanks and in wet meadows.

Asian Tiger Mosquito

In addition to plants, Robbinsville is also affected by nonnative insect and animal species. The Asian Tiger Mosquito (*Aedes albopictus*) recently arrived in Mercer County and is believed to have spread to the Western Hemisphere as a result of the international trade in used tires. It was first found in the United States in 1985 and is now present in more than 30 states.

Unlike most native mosquito species, the Asian Tiger Mosquito is most active in the afternoon. It breeds in artificial containers such as tires, flower pots, cans, rain gutters, and many other artificial water-holding containers. Because the tiger mosquito does best in residential areas where shade and water-holding containers are common, many urban and suburban communities that experienced little mosquito annoyance in the past are now infested by tiger mosquitoes. Since this mosquito is active in the daytime, not just after dawn and just before dusk as most indigenous mosquito species, it is a likely culprit if people or pets are being bitten in the daytime. Most mosquito spraying done at night will have little effect on tiger mosquitoes. Daytime spraying may be a violation of label directions if foraging bees are present on blossoms in the application area. Laboratory studies have found the tiger mosquito to be an

efficient vector of many viral disease agents, including yellow fever, West Nile virus, St. Louis encephalitis, and LaCrosse encephalitis.

Control of tiger mosquitoes by conventional methods in the United States has proven to be difficult. The impact of several predators and parasites as biological control agents of larvae has been investigated, but in general, these agents have not yet proven to be highly effective in regulating the number of mosquitoes.

The most promising predators of tiger mosquito larvae are mosquito fish (*Gambusia spp.*) and cannibal mosquitoes (*Toxorhynchitus spp.*). Fish are very effective when stocked in cisterns, water barrels, and ornamental ponds, but the small size and impermanence of many tiger mosquito breeding sites limit the use of fish.

The most effective method of controlling tiger mosquitoes is reducing or eliminating breeding spots, which are never far from where people are being bitten, since the tiger mosquito is a weak flyer with only about a 200-yard lifetime flying radius. Draining or removal of water-holding containers, even on a localized basis, will produce remarkable long-term reductions in mosquito annoyance.

Future Threats to Open Space and Natural Areas

Some of the more prominent emerging invasives that have yet to become established in Robbinsville but that could have an ecological, economic, and/or quality-of-life impact in coming years include plants like mile-a-minute, insects like the Emerald Ash Borer (EAB) and Asian Longhorned Beetle (ALB), and fish species such as the snakehead. To aid in monitoring and quick response, it is important that Robbinsville residents and municipalities be familiar with these species.

More information about these and other invasive species can be found at: Mid-Atlantic Exotic Pest Plant Council (www.ma-eppc.org) – both new and established invasive plants; Central Jersey Invasive Species Strike Team (cjisst.org) – focuses on emerging invasive plant threats; and Animal and Plant Health Inspection Service (www.aphis.usda.gov), which is leading the effort to combat invasive insects like the ALB and EAB.

Environmental Issues

Known Contaminated Sites

As of January 2010, the NJDEP reported 550 “active” sites with confirmed contamination and in Mercer County. There are 32 of these sites are located in Robbinsville Township. See **Table 27: Active Known Contaminated Sites in Robbinsville** and also **Figure 31: Known Contaminated Sites (2012)**.

CERLCA, Superfund and The NPL

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), commonly referred to as Superfund and managed by the Environmental Protection Agency (EPA). CERCLA initially taxed petroleum and chemical companies over a period of five years, collecting $1.6 billion. This revenue was then put into the Hazardous Substances Superfund, a trust dedicated to the clean up of uncontrolled or abandoned hazardous waste sites.

CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites, provided for liability of persons responsible for releases of hazardous waste at these sites and established a trust fund to provide for cleanup when no responsible party could be identified.

CERCLA authorizes two kinds of response actions: short term removals, where actions may be taken to address releases or threatened releases requiring prompt response, and long term remedial response actions that permanently and significantly reduce the dangers associated with releases of threats of hazardous substances that are serious, but not immediately life threatening. These actions can be conducted only at sites listed on the EPA’s National Priorities List (NPL).

The NPL is a list of the worst hazardous waste sites that have been identified by the EPA. Any site on the NPL is eligible for cleanup using Superfund money. Sites not currently listed on the NPL are not eligible for Superfund money for site remediation. Information regarding sites currently on or eligible for the NPL can be found using the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS).

The NJDEP Known Contaminated Sites List 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. The most recently available lists of sites are available on the NJDEP Site Remediation Program website.

Contamination may have affected soil, groundwater, surface water, or a combination of site conditions. The most dangerous sites, from a human health standpoint, can be listed on the National Priorities List (NPL), which makes them eligible for federal clean-up funds under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), commonly known as Superfund (see box at left). Other sites are handled by state or individual programs, or through private funds.

The EPA has evaluated 19 superfund or potential superfund sites in Mercer County, one of which is in Robbinsville. However, this site, Phelps Petroleum, was never officially

placed on the NPL. Following a time-critical removal of hazardous material (likely related to the production of fertilizers) from September 1994 to February 1995, the site was declared stabilized, and a federal search for potentially responsible parties (PRP) revealed no such PRPs as of 1998. No more action has been taken on the Phelps Petroleum site since 1998 by the EPA. This information was retrieved using the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS).

The NJDEP maintains its own statewide grading system for contaminated sites, which has five levels: B, C1, C2, C3, and D. Sites evaluated as level “B” are the least contaminated and are the easiest to remediate. Sites assigned to the “D” category pose the most serious threats to the environment and require the most complex remedial actions.

The following section provides more detailed descriptions of some of Robbinsville’s C3- and D-level sites, which are those with the most serious and complex levels of contamination.

Sites at the C3 remedial level face a multiphase remedial action with high complexity and a high potential for serious environmental contamination. These sites possess multiple contaminants, some at high concentrations with unknown sources that continue to impact soils, groundwater, and possibly surface waters and potable surface water resources. Direct contact with contaminated soil is considered dangerous. Sites categorized with the “D” remedial level face all of the challenges inherent to the “C3” remedial level. However, these sites face the additional challenges of multiple sources of contamination and/or multiple releases of contamination (including groundwater). Often, D-level sites can be designated as federal “Superfund Sites,” although this is not the case with the two D-level sites in Robbinsville’s – Fina Oil & Chemical Company and Lesco Incorporated.

ROBBINSVILLE TOWNSHIP

Figure 31: Known Contaminated Sites (2009)

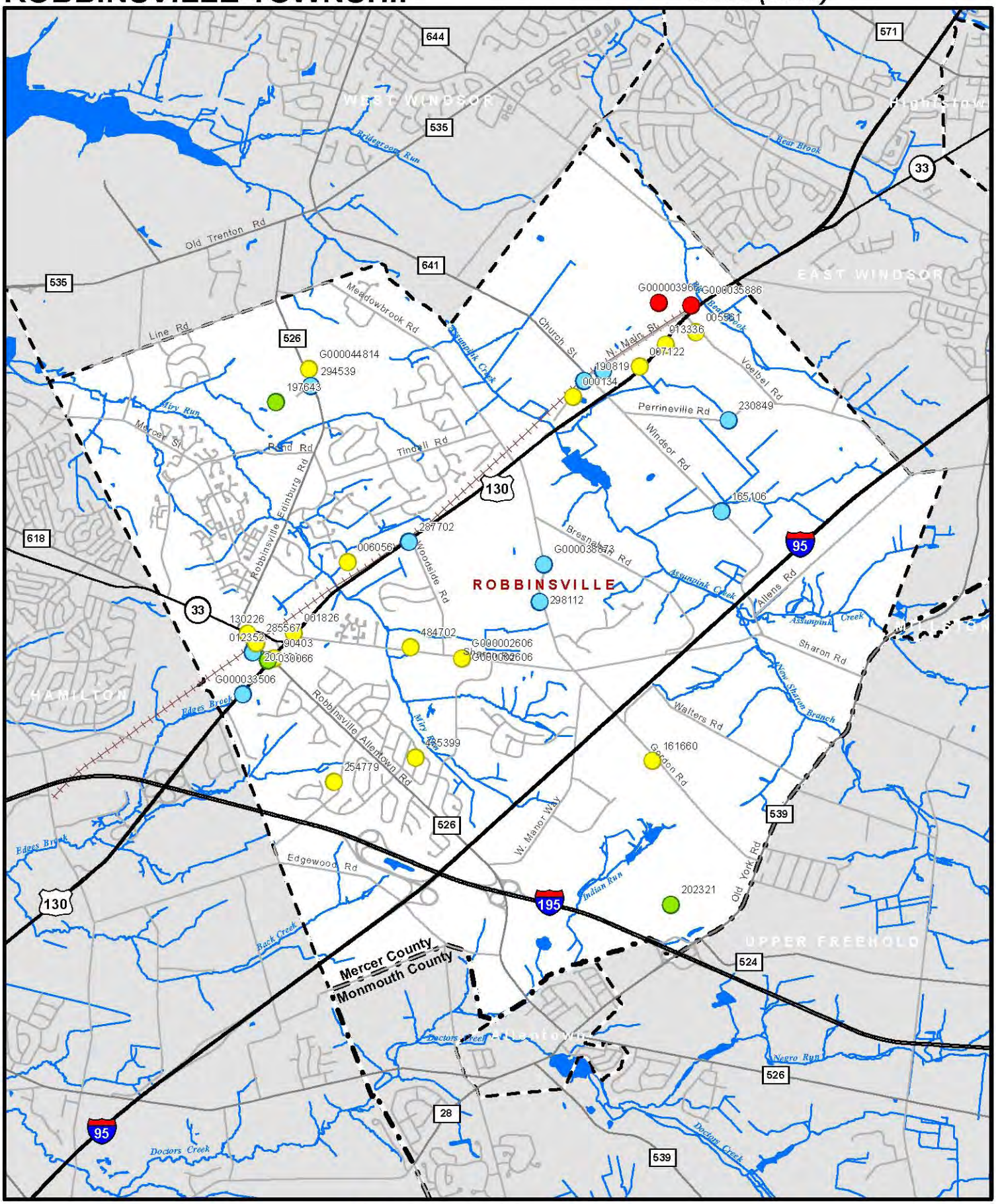

Table 27: Active Known Contaminated Sites in Robbinsville

Name	Address	PI Number	Lead Agency	Remedial Level
14 Applegate Court	14 Applegate Ct	161660	BFO-S	C2
16 School Drive	16 School Drive	555754	BFO-S	C1
APCO Washington Twp	1389-1391 Rt 130 N	013336	BSCM	C2
Fina Oil & Chemical Company	Main Street	G000003966	BNCM	D
International Process Plants	108 N Main Street	285567	BFO-S	C2
K Hovnanian Development	Rt 33 & Railroad Avenue	203359	BFO-S	B
Lesco Incorporated	120 Main Street N	G000035886	BNCM	D
Matrix 7A Land Development Venture	Old York Road & Rt 195	202321	BFO-S	B
Miller Chemical Pratt Gabriel Division	122 Sharon Road	G000002606	BNCM	C2
NJDOT Washington Twp Maintenance Yard	Rt 130 & Voelbel Road	012352	BSCM	C1
Robbinsville Valero	1122 Rt 130	0001826	BUST	C2
Russerts Deli	35--37 Robbinsville Allentown Road	090403	BSCM	C2
Sovereign Bank Corporation	2371 Rt 33	130226	BOMM	C2
Windsor Diesel-Gas	1299 Rt 130 N	006056	BSCM	C2
Windsor Fuel King Gulf	1372 Rt 130 S	007122	BSCM	C2
Windsor Service Garden State Fuel	Rt 130 & Main St	005561	BSCM	C2
Woodside Pub	1179 Rt 130	287702	BFO-S	C1

Source: NJDEP Site Remediation Program, 2012

Lead Agencies and Contact Information

Acronym	Bureau	Telephone Number	Responsibilities
BFO-S	Bureau of Field Operations - Southern	(609) 584-4150	Oversees sites moderate in remedial complexity in southern NJ counties
BNCM	Bureau of Northern Case Management	(609) 777-0899	Oversees complex remedial activities that are conducted by responsible parties
BISR	Bureau of Industrial Site Remediation	(609) 777-0899	Oversees remedial activities conducted in accordance with New Jersey's Industrial Site Recovery Act
BOMM	Bureau of Operation, Maintenance, and Management	(609) 984-2990	Oversees the long-term operations and maintenance of remedial actions
BSCM/BUST	Bureau of Southern Case Management (formerly BUST)	(609) 292-8761	Oversees environmental clean-ups at sites subject to the Underground Storage of Hazardous Substances Act
INS	Initial Notice Section (now BCAIN)	(609) 292-2943	Assigns sites to the appropriate bureau within the Site Remediation Program

Explanation of Remedial Levels

Remedial Level	Explanation of Site Complexity
B	A single phase remedial action with a single contaminant affecting only the soil.
C1	Remediation does not require a formal design. The source of the contamination is known or has been identified. There is a potential for groundwater contamination.
C2	Remediation requires a formal design. The source of the contamination is known OR the release has caused groundwater contamination.
C3	A multi-phased remediation action. Where the source of the contamination is either unknown or there is an uncontrolled discharge to soil and/or groundwater.
D	A multi-phased remediation with multiple sources/releases to multiple media including groundwater.

Underground Storage Tanks (USTs)

There are a number of businesses in Robbinsville that still have underground storage tanks. These tanks are commonly used to store fuel oil, or in the case of service stations, gasoline or diesel fuel. Corrosion and leakage of USTs can become a serious threat to the groundwater and soil surrounding them. In 1998, the NJDEP required all existing operational tanks to be closed, replaced, or upgraded to meet new safety standards. The NJDEP's Bureau of Underground Storage Tanks (BUST) regulates these replaced and upgraded tanks, requiring that they be registered, permitted, and monitored for leaks at regular intervals. Tanks used for home heating oil, or any heating oil tank under 2,000 gallons, are exempt from these regulations. **Table 28** provides a list of all USTs registered with NJDEP in Robbinsville. Tanks that have created known soil and/or water contamination due to current or past leaks may also be listed on the Known Contaminated Sites List. Detailed information on each of the listed USTs below, such as tank contents, can be found on the NJDEP UST website at: www.nj.gov/dep/srp/bust/bust.htm.

Table 28: Currently Regulated Underground Storage Tanks in Robbinsville

PI Number	PI Name	Street Address
001826	EZ Auto Service Inc.	1122 Rte. 130 South
005561	Windsor Service Station	Rte. 130 & Voelbel Road
006056	Windsor Diesel-Gas	1299 Rte. 130 North
007122	Windsor Fuel King Gulf	1372 Rte. 130 South
013336	Apco Washington Township	1389 –1391 Rte. 130 North
189388	Delta Auto Service Center	1118 Rte. 130

Source: NJDEP

Groundwater Contamination

Four sites in Robbinsville have documented groundwater contamination from various sources. These sites are restricted by a **Classification Exception Area (CEA)** designation. A CEA can be established for a contaminated site's aquifer if state drinking water quality standards are not or will not be met due to: (1) natural groundwater quality; (2) discharges from a NJPDES permitted site; or (3) pollution caused by human activity, sometimes associated with a pollution remedy conducted under a NJDEP administrative consent order, within a contaminated site.

A CEA designation suspends aquifer use in the affected areas until state drinking water standards are met. It is not a groundwater remedy; it is an institutional control established in conjunction with an approved remedy. The NJDEP may revise or establish a CEA at any time to more accurately reflect the groundwater conditions using revised data. If possible, NJDEP or the entity responsible for the remediation or monitoring of the site (known as the Responsible Party) estimates the duration the CEA will remain in effect. Often, a responsible party applying for a NJPDES permit or submitting a remediation plan for a contaminated site will also submit a CEA designation application, called a CEA fact sheet detailing the aquifer contamination. See **Table 29: Classification Exception Areas in Robbinsville.**

A **Currently Known Extent (CKE)** Area is a geographically defined area within which the local groundwater resources are known to be contaminated because the water quality does not meet drinking water and groundwater quality standards for specific contaminants. There is one designated CKE area in Robbinsville: the Sharon Road/Miller Chemical area, which encompasses much of the Trenton-Robbinsville Airport and the adjoining Miry Run Country Club, as well as surrounding residential development. The Sharon Road/Miller Chemical CKE has tested positive for mixed pesticides.

Information about the dangers of different types of pollutants found in aquifers or wells can be found at the Environmental Defense Scorecard website: www.scorecard.org.

Table 29: Classification Exception Areas in Robbinsville

PI Number	Name	Address	Start Date	Duration	Depth (feet)	Type of Contamination
130226	Sovereign Bank Corp.	2371 Rt. 33	12/21/06	Indeterminate	60	Naphthalene, Lead, Tentatively Identified Compounds (TICs), Ethylbenzene, Methylene chloride, Xylene, Bis(2-Ethylhexyl)Phthalate, Phenathlene
G000003966	Fina Oil & Chemical Co.	Main St.	9/18/02	25 years	24	Benzene, Ethylbenzene, Styrene
090403	Russert's Deli	35-37 Robbinsville Allentown Rd.	3/10/03	Indeterminate	50	Benzene, Naphthalene, Lead, Tentatively Identified Compounds (TICs), Xylenes
G000002606	Miller Chemical & Fertilizer Co.	122 Sharon Rd.	5/23/03	Indeterminate	30	Xylene, Pesticides[22]

Source: NJDEP

Radon

Radon is a radioactive gas that comes from the natural decay of uranium found in nearly all soils. 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-contamination within a home can pose a long-term health hazard to residents, specifically for lung cancer. It is invisible, odorless, and tasteless; the only method of detection is to conduct a radon test of the air within a home. Fortunately, radon testing is inexpensive. If radon levels are high in a home, the NJDEP suggests 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 through installing ventilation systems.

The NJDEP classifies townships into three categories as to the risk of having high radon levels. Tier 1 is the highest level. Robbinsville Township is listed as a Tier 2 municipality with a moderate risk of having high radon levels in homes. The level at which homeowners should take immediate action is 4.0 picocuries per liter of air. While state law does not require radon testing before a real estate transaction, the NJDEP recommends that a contingency clause be included in a

[22]Pesticides identified at Miller Chemical and Fertilizer Corp.: Aldrin, Alpha-BHC, Beta-BHC, Chlordane, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Dieldrin, Endrin, Gamma-BHC, Heptachlor, Heptachlor Epoxide, Methoxychlor.

sale contract allowing the buyer to have the home tested for radon and fixing the home if an elevated level of radon gas is discovered. State law (N.J.A.C. 26:2D-73) does require, at the time of a real estate transaction, that the seller provide the buyer with a copy of the results of any radon testing if such testing was conducted during tenure.

Radon kits are available for sale to Robbinsville residents to measure the level of radon in residents' homes. These kits are sold by the West Windsor Township Health Department, which provides public health services to Robbinsville residents through a shared services agreement. The Health Department also has free literature available regarding radon testing and remediation.

Flooding

Robbinsville, like many of its surrounding communities, is susceptible to significant flooding from storm events, especially along Miry Run and Assunpink Creek. However, the lower amount of impervious surface cover within Robbinsville as contrasted with most of Mercer County means that such events tend to be less severe and frequent than in neighboring communities to the north and west. In flooding events some roadways, such as County Route 130 and Sharon Road, may temporarily become impassable due to rising floodwaters. Flooding also has the potential to damage homes and structures.

Some recent flooding events within the area include those of April 2007, when consistent heavy rain flooded many streams and rivers throughout southern New Jersey. Other major recent flooding events include the heavy storms of June 12, 1996 and Hurricane Floyd, which hit Robbinsville on September 17, 1999. Record rainfall amounts between seven and eight inches fell on the area during that event causing severe flooding throughout Mercer, Somerset, and Middlesex counties.

Additional conversion of Robbinsville's remaining agricultural and natural lands into developed uses will likely increase the frequency and severity of flooding events. A lasting solution to preventing an increase in the likelihood of future flooding problems in Robbinsville and neighboring communities will require preserving, maintaining, and restoring wetlands, woodlands, and naturally functioning floodplains, and maximizing infiltration through the use of stormwater best management practices (BMPs). Reforestation, the planting of vegetated riparian buffers, and the creation of greenways along water bodies all help to restore the ability of floodplains to capture, store, and retain floodwaters and keep people and structures out of harm's way during flooding events.

Impervious surfaces, such as asphalt, increase flooding problems because they do not allow water to percolate into the ground. On an impervious surface, water is forced to travel downhill until it can find a place to sink into soil or enter a water body. This runoff is greatest during a storm or a major snow melt. As the amount

of impervious surface increases in a watershed, runoff increases in quantity, velocity, temperature, and pollution levels. New developments create large amounts of impervious surface through construction of roads, sidewalks, parking lots, driveways, rooftops, and compacted soil. A municipality can lessen these effects by reducing the amount of impervious surface within its jurisdiction and by implementing stormwater BMPs, which maximize stormwater infiltration in the built environment, thereby preventing unnecessary runoff and flooding. Most importantly, development should be kept out of floodplains to the greatest degree possible so floods can occur (as they naturally do) with few impacts to people and property.

Other Environmental Concerns

Toxic Releases

Robbinsville has one facility listed on the USEPA annual Toxics Release Inventory (TRI), Webtech Inc. at 108 North Gold Drive. In 2008 (the most recent data available), 850 pounds of toxic chemicals were accidently released into the environment by this facility over several events. Most of these releases were point source air emissions of methyl isobutyl ketone and toluene. A small amount of lead-containing compounds were also released by this facility via off-site disposal.

Of regional note, the Mercer Generating Station in neighboring Hamilton Township released over three and a half million pounds of toxic chemicals (mostly hydrochloric acid, sulfuric acid, and hydrogen fluoride), the second-most toxic release of any facility within New Jersey.

Historical Use of Pesticides

New Jersey is one of the first states in the nation to address issues relating to toxic pesticide residuals, such as dichloro-diphenyl-trichloroethane (better known as DDT), arsenic, and lead that remain in the soil from past agricultural operations. In 1996, the NJDEP convened a task force to study the extent of the historic pesticide problem in New Jersey and to develop strategies for protecting human health. The task force's findings were issued in an April 1999 report (see *Sources*). The task force examined 18 agricultural sites throughout New Jersey, including one 60-acre field crops site in Robbinsville Township. While negligible levels of organochloride (DDT and related chemicals) pesticides were found, one sample taken at the site exceeded the clean-up threshold of 20 ppm for arsenic.

It is estimated that five percent of the state's land area is impacted by residues from arsenical pesticides alone. The primary human health concern of residual contamination is the ingestion of contaminated soil. Therefore, small children

who may ingest soil are at the greatest health risk. This issue may affect residents of homes and subdivisions built on former cropland and orchards. Homeowners can take precautions such as maintaining grass coverage and washing hands and toys after playing in exposed soil. Some developers may be willing to address this problem by testing and removing the existing topsoil and bringing in clean topsoil before construction commences. In addition, many soils have naturally occurring high levels of arsenic due to their bedrock geology; these soils are presumed to pose similar health risks.

To reduce possible detrimental effects from pesticide use, Robbinsville could consider having all of its public properties become “Pesticide Free Zones” and require that Integrated Pest Management be used in as many locations as possible. All New Jersey schools are currently required to use Integrated Pest Management techniques, and this represents an important step in protecting human health and the environment.

Conclusion

The resources documented in this environmental resource inventory—natural resources, water resources, and biological resources—as well as historic and cultural resources, are key contributors to the character and quality of the Robbinsville community. Documentation of these resources provides a foundation for their care, protection, and enhancement for the benefit of current and future Robbinsville residents. Accomplishing this task will require further planning and policy-making. Fortunately, local officials and community residents have a wide variety of tools at their disposal for this purpose, including municipal land use tools, natural resource protection ordinances, and land preservation techniques. Perhaps most importantly, Robbinsville has numerous organizations that are actively educating Robbinsville residents on the need for, and benefits of, environmental resource protection.

CHAPTER 10

ERI Relative to Township Ordinance and NJ Municipal Land Use Law

Establishment of the Environmental Commission

One purpose for the ERI is to provide the township's Environmental Commission a reference guide by which to perform its responsibilities as defined in the township ordinance. The roles and responsibilities of the Environmental Commission are defined in Ordinance 2006-2:

13.3A: There is hereby created an Environmental Commission known as the "Washington Township Environmental Commission" for the protection, development, or use of the natural resources, including water resources, located within the territorial limits of the township, pursuant to N.J.S.A 40:56A-1.

13.3C: Powers. The Commission shall have, but not be limited to, the following powers:

- Conducting research into the use and possible use of the open land areas of the Township.
- Coordinating the activities of unofficial bodies organized for similar purposes, where applicable.
- Advertising, preparing, printing, and distributing books, maps, charts, plans, and pamphlets which in its judgment it deems necessary for its purposes.
- Keeping an index of all open areas publicly or privately owned, including open marshlands, swamps, and other wetlands, in order to obtain information on the proper use of such areas.
- Promoting the conservation and development of the natural resources of the Township.
- Recommending to the Planning Board plans and programs for inclusion in a municipal master plan and the development and use of such areas.

13.3E: The Commission shall have power to study and make recommendations concerning open space preservation, water resources management, air pollution

control, solid waste management, noise control, soil and landscape protection, environmental appearance, marine resources, and protection of flora and fauna.

Municipal Land Use Law

The Municipal Land Use Law (N.J.S.A. 40:55D) is the legislative foundation of Planning Boards and Zoning Boards of Adjustment in the state of New Jersey. It defines the powers and responsibilities of boards and is essential to their functions and decisions.

40:55D-2: Purpose of the act

It is the intent and purpose of this act:

- To encourage municipal action to guide the appropriate use or development of all lands in this State, in a manner which will promote the public health, safety, morals, and general welfare;
- To secure safety from fire, flood, panic, and other natural and man-made disasters;
- To provide adequate light, air, and open space;
- To ensure that the development of individual municipalities does not conflict with the development and general welfare of neighboring municipalities, the county, and the State as a whole;
- To promote the establishment of appropriate population densities and concentrations that will contribute to the well-being of persons, neighborhoods, communities and regions, and preservation of the environment;
- To encourage the appropriate and efficient expenditure of public funds by the coordination of public development with land use policies;
- To provide sufficient space in appropriate locations for a variety of agricultural, residential, recreational, commercial, and industrial uses and open space, both public and private, according to their respective environmental requirements in order to meet the needs of all New Jersey citizens;
- To encourage the location and design of transportation routes which will promote the free flow of traffic while discouraging location of such facilities and routes which result in congestion or blight;
- To promote a desirable visual environment through creative development techniques and good civic design and arrangement;

- To promote the conservation of historic sites and districts, open space, energy resources, and valuable natural resources in the State and to prevent urban sprawl and degradation of the environment through improper use of land;
- To encourage planned unit developments which incorporate the best features of design and relate the type, design, and layout of residential, commercial, industrial, and recreational development to the particular site;
- To encourage senior citizen community housing construction;
- To encourage coordination of the various public and private procedures and activities shaping land development with a view of lessening the cost of such development and to the more efficient use of land;
- To promote utilization of renewable energy resources; and
- To promote the maximum practicable recovery and recycling of recyclable materials from municipal solid waste through the use of planning practices designed to incorporate the State Recycling Plan goals and to complement municipal recycling programs.

40:55D-27: Citizens advisory committee; environmental commission

a. After the appointment of a planning board, the mayor may appoint one or more persons as a citizens' advisory committee to assist or collaborate with the planning board in its duties, but such person or persons shall have no power to vote or take other action required of the board. Such person or persons shall serve at the pleasure of the mayor.

b. Whenever the environmental commission has prepared and submitted to the planning board and the board of adjustment an index of the natural resources of the municipality, the planning board or the board of adjustment shall make available to the environmental commission an informational copy of every application for development submitted to either board. Failure of the planning board or board of adjustment to make such informational copy available to the environmental commission shall not invalidate any hearing or proceeding.

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Appendices

APPENDIX A

Private Well Testing Act

The Private Well Testing Act (PWTA) (N.J.S.A. 58:12A-26 et seq.), passed in 2002 and administered by NJDEP, requires that well water be tested for contaminants when properties served by certain types of drinking water wells are sold or leased. The law does not prohibit the sale of property if the water fails one or more drinking water test standards. Rather, the fundamental goal of the PWTA is to ensure that purchasers and lessees of properties served by private potable wells are fully aware of the quality of the untreated drinking water sources prior to sale or lease. The state law allows the buyer and seller to determine which party will pay for the test, as well as what actions, if any, need to be taken if test results indicate a contaminant is present in the water above an applicable standard. However, individual county health rules may mandate that certain actions are required in order for a real estate transaction to be finalized.

Volatile Organic Compounds Regulated by NJDEP

Benzene
Carbon Tetrachloride
meta-Dichlorobenzene
ortho-Dichlorobenzene
para-Dichlorobenzene
1, 1-Dichloroethane
1, 2-Dichloroethane
1, 1-Dichloroethylene
cis – 1, 2-Dichloroethylene
trans – 1, 2-Dichloroethylene
1, 2-Dichloropropane
Ethylbenzene
Methyl tertiary butyl ether
Methylene Chloride
Monochlorobenzene
Naphthalene
Styrene
1, 1, 2, 2-Tetrachloroethane
Tetrachloroethylene
Toluene
1, 2, 4-Trichlorobenzene
1, 1, 1-Trichloroethane
1, 2, 2-Trichloroethane
Trichloroethylene
Vinyl Chloride
Xylenes (Total)

The PWTA program requires that water be tested for primary contaminants (health-based) and secondary parameters (aesthetic characteristics). Primary contaminants are contaminants that may cause a potential health risk if consumed on a regular basis above the established maximum contaminant level (MCL). New Jersey regulates 18 primary contaminants, five more than federal EPA requirements. Primary contaminants include bacteriological (fecal coliform and E. coli), VOCs, inorganics (arsenic, lead, mercury, and nitrates), and radiological (radium decay) substances. A certified laboratory must collect a water sample at a point before the water goes through any treatment. This

sample represents the condition of the groundwater in the aquifer, which may be different from water out of a kitchen faucet. Property owners may choose to also have the tapwater tested to assure that filters or treatments are working effectively.

The PWTA program requires tests for three naturally occurring secondary parameters: pH, iron, and manganese. Secondary drinking water standards address aesthetics such as corrosivity, taste, and color, and testing for these parameters determines if water is suitable for laundering, plumbing, and showering. For example, due to the nature of soils and geology in southern New Jersey, the groundwaters tend to be acidic (pH below 7), while groundwaters in the northern part are neutral (pH=7) to basic (pH above 7). If the pH is too low (less than 6.5) water has a bitter metallic taste, and causes corrosion of pipes and fixtures. If the pH is too high (greater than 8.5) the water has a slippery feel, it tastes like soda, and deposits can form on plumbing fixtures.

Test results are reported by the lab to the person who requested the testing, to the NJDEP, and to the local health authority. Suspicious or unexpected results are neither confirmed nor verified by the NJDEP. Local health authorities will investigate suspect results, if necessary.

In February 2004, the NJDEP released an online report summarizing the initial well test results reported to the agency during the PWTA program's first six months (September 2002 to March 2003). Results for 5,179 wells are included, which represent approximately one percent of private wells used as potable water supplies in New Jersey. The compilation of water test results is organized by county and municipality but does not include the names of specific property owners, their addresses, or well locations, because releasing that information is prohibited by law. About 92 percent of the 5,179 wells passed all the required (health-based) standards, with the exception of lead. Of the eight percent (417 wells) of wells sampled that exceeded the maximum contaminant level for primary contaminants, the most common reason for failure statewide was nitrate (inorganics), followed by fecal coliform (bacteriological), and VOCs. Nitrates are found in groundwater due to a number of factors, including natural deposits, runoff from fertilizer, leaching from septic tanks, and from sewage pipes.

More wells in northern New Jersey were found to have fecal coliform or E. coli bacteria than in southern New Jersey. The northern/southern difference is probably due to the different geology in these regions. Northern New Jersey is characterized by limestone subject to solution cavities, fractured bedrock, or gravel water-bearing zones, while the southern part of the state is composed mainly of coastal plain sand and gravel, which appears to provide better protection of groundwater from fecal contaminants.

The test results for Mercer County and Robbinsville Township are summarized in the table below. The NJDEP's initial report indicates the presence of several drinking water contaminants, including mercury, gross alpha (radium), 1,2,3-

Trichloropropane, and 1,2-Dichloropropane, in the county's groundwater. However, none of the three wells tested in Robbinsville exceeded the MCL for any parameter.

Summary of PWTA Test Results for Robbinsville and Mercer County (September 2002-–March 2003)

Geographic Area	# Wells Sampled	# Wells over MCL**	Fecal / E.coli	Nitrate	Arsenic	Mercury	Any VOC*** over the MCL
Robbinsville Twp	3	0	0	0	0	NR*	0
Mercer County	**131**	**16**	**2**	**1**	**8**	**NR***	**5**

Source: NJDEP, Division of Science, Research, and Technology (DSRT), 2003

*NR – Not required to sample

**MCL – Maximum contaminant level, set as the limit of a particular substance allowable to achieve a water quality standard

**VOC – volatile organic compound

APPENDIX B

Federal and State Conservation Programs For Farmers and Landowners

There are several financial and economic incentive programs and technical assistance to help farmers plan and use conservation practices on their farms. The USDA NRCS has a FSA office in Freehold, Monmouth County, which serves Mercer County. The 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 percent for some programs, to develop and follow conservation plans.

The **Conservation Reserve Program (CRP)** is offered by NRCS and administered by the FSA. 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. The program's website address is: www.nrcs.usda.gov/programs/crp/

The state of New Jersey partnered with the USDA to help farmers protect water quality by establishing a **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 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 may also 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 contact the local FSA Office or Soil and Water Conservation District Office.

Another program designed to conserve natural resources is called the **Wetlands Reserve Program (WRP)**. The WRP is a voluntary resource conservation program that provides landowners the opportunity to receive financial incentive to restore, protect, and enhance wetlands in exchange for returning marginal land from agriculture. The WRP is made possible by a reauthorization in the Food, Conservation and Energy Act of 2008, known as the 2008 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 applications may be obtained and filed at any time. Please see the website for more details: www.nrcs.usda.gov/programs/wrp/

The **Grassland Reserve Program (GRP)** is another conservation program authorized by the 2008 Farm Bill. The GRP is a voluntary program that protects 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; 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. For more information and application procedures, visit the GRP website: www.nrcs.usda.gov/programs/grp/

The **Wildlife Habitat Incentives Program (WHIP)** is another voluntary USDA program that targets landowners who want to preserve and protect fish and wildlife habitat on nonfederal lands. WHIP applicants develop a plan of operations outline conservation practices and implementation schedules. The NJ 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 1 to 10 years. The 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. For more information and application procedures, visit the NJ WHIP website: www.nj.nrcs.usda.gov/programs/whip/

The **Environmental Quality Incentives Program (EQIP)** is also a part of the reauthorized 2008 Farm Bill. The 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. The 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. For more information, please visit the website: 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 rangeland. In some cases, forested lands would also be included in this category. The CSP is available in 50 states, as well as the Caribbean and Pacific Basin areas, and provides equal access to funding. For more information please visit the website: 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 to keep their lands for agricultural purposes. The 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. The participating landowner agrees not to convert their 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. For more information about FRPP, please visit the website: www.nrcs.usda.gov/programs/frpp/

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. For more information, contact the local Soil Conservation District or the State Agricultural Development Committee at (609)

984-2504 or visit the website: www.state.nj.us/agriculture/sadc/sadc.htm for additional details.

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. While the LIP is seeking funding for additional habitat protection projects, it may be another year before grants are available. To learn more about the program in general visit the website: www.state.nj.us/dep/fgw/ensp/lip_prog.htm.

State Endangered and Threatened Species

Birds			
Endangered		**Threatened**	
American Bittern	*Botaurus lentiginosos*	Bobolink	*Dolichonyx oryzivorus* BR
Eagle, bald	*Haliaeetus leucocephalus* BR **	Eagle, bald	*Haliaeetus leucocephalus* NB **
Falcon, peregrine	*Falco peregrinus*	Hawk, Cooper's	*Accipiter cooperii*
Goshawk, northern	*Accipiter gentilis* BR	Hawk, red-shouldered	*Buteo lineatus* NB
Grebe, pied-billed	*Podilymbus podiceps**	Night-heron, black-crowned	*Nycticorax nycticorax* BR
Harrier, northern	*Circus cyaneus* BR	Night-heron, yellow-crowned	*Nyctanassa violaceus*
Hawk, red-shouldered	*Buteo lineatus* BR	Knot, red	*Calidris canutus* BR
Owl, short-eared	*Asio flammeus* BR	Osprey	*Pandion haliaetus* BR
Plover, piping	*Charadrius melodus***	Owl, barred	*Strix varia*
Sandpiper, upland	*Batramia longicauda*	Owl, long-eared	*Asio otus*
Shrike, loggerhead	*Lanius ludovicianus*	Rail, black	*Laterallus jamaicensis*
Skimmer, black	*Rynchops niger* BR	Skimmer, black	*Rynchops niger* NB
Sparrow, Henslow's	*Ammodramus henslowii*	Sparrow, grasshopper	*Ammodramus savannarum* BR
Sparrow, vesper	*Pooecetes gramineus* BR	Sparrow, Savannah	*Passerculus sandwichensis* BR
Tern, least	*Sterna antillarum*	Sparrow, vesper	*Pooecetes gramineus* NB
Tern, roseate	*Sterna dougallii***	Woodpecker, red-headed	*Melanerpes erythrocephalus*
Wren, sedge	*Cistothorus platensis*		
Reptiles			
Endangered		**Threatened**	
Rattlesnake, timber	*Crotalus h. horridus*	Snake, northern pine	*Pituophis m. melanoleucus*
Snake, corn	*Elaphe g. guttata*	Turtle, Atlantic green	*Chelonia mydas***
Snake, queen	*Regina septemvittata*	Turtle, wood	*Clemmys insculpta*
Turtle, bog	*Clemmys muhlenbergii***		
Atlantic hawksbill	*Eretmochelys imbricata***		
Atlantic leatherback	*Dermochelys coriacea***		
Atlantic loggerhead	*Caretta caretta***		
Atlantic Ridley	*Lepidochelys kempi***		

Amphibians			
Endangered		**Threatened**	
Salamander, blue-spotted	*Ambystoma laterale*	Salamander, eastern mud	*Pseudotriton montanus*
Salamander, eastern tiger	*Ambystoma tigrinum*	Salamander, long-tailed	*Eurycea longicauda*
Treefrog, southern gray	*Hyla chrysocelis*	Treefrog, pine barrens	*Hyla andersonii*
Invertebrates			
Endangered		**Threatened**	
Beetle, American burying	*Nicrophorus mericanus***	Elfin, frosted (butterfly)	*Callophrys irus*
Beetle, northeastern beach tiger	*Cincindela d. dorsalis***	Floater, triangle (mussel)	*Alasmidonta undulata*
Copper, bronze	*Lycaena hyllus*	Fritillary, silver-bordered (butterfly)	*Bolaria selene myrina*
Floater, brook (mussel)	*Alasmidonta varicosa*	Lampmussel, eastern (mussel)	*Lampsilis radiata*
Floater, green (mussel)	*Lasmigona subviridis*	Lampmussel, yellow (mussel)	*Lampsilis cariosa*
Satyr, Mitchell's (butterfly)	*Neonympha m. mitchellii***	Mucket, tidewater (mussel)	*Leptodea ochracea*
Skipper, arogos (butterfly)	*Atrytone arogos arogos*	Pondmussel, eastern (mussel)	*Ligumia nasuta*
Skipper, Appalachian grizzled (butterfly)	*Pyrgus wyandot*	White, checkered (butterfly)	*Pontia protodice*
Wedgemussel, dwarf	*Alasmidonta heterodon***		
Mammals			
Endangered			
Bat, Indiana	*Myotis sodalis***		
Bobcat	*Lynx rufus*		
Whale, black right	*Balaena glacialis***		
Whale, blue	*Balaenoptera musculus***		
Whale, fin	*Balaenoptera physalus***		
Whale, humpback	*Megaptera novaeangliae***		
Whale, sei	*Balaenoptera borealis***		
Whale, sperm	*Physeter macrocephalus***		
Woodrat, Allegheny	*Neotoma floridana magister*		
Fishes			
Endangered			
Sturgeon, shortnose	*Acipenser brevirostrum***		

Source: NJDEP, Division of Fish and Wildlife

**Also on the Federal Endangered and Threatened list

BR – Breeding population only

NB – Nonbreeding population only

Natural Heritage Program Disclaimer

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

Significant Birds of the Assunpink WMA

Common Name	Seasonal/Daily	Season	# Observed	Confirmed Criteria
Wild Turkey	S	breeding	n/a	D3
Northern Bobwhite	S	breeding	200	D3
Ruddy Duck	S	non-breeding	25	D4ii
Ring-necked Duck	S	non-breeding	75	D4ii
Lesser Scaup	S	non-breeding	200	D4ii
Common Merganser	S	non-breeding	n/a	D4ii
Northern Flicker	S	breeding	n/a	D3
Black-billed Cuckoo	S	breeding	4	D3
Long-eared Owl	S	non-breeding	n/a	D1
American Woodcock	S	breeding	2	D3
Bald Eagle	S	non-breeding	2	n/a
Cooper's Hawk	S	breeding	12	n/a
Pied-billed Grebe	S	non-breeding	n/a	D1
Eastern Wood-Pewee	S	breeding	n/a	D3
Great Crested Flycatcher	S	breeding	n/a	D3
Yellow-throated Vireo	S	breeding	n/a	D3
Blue Jay	S	breeding	n/a	D3
Wood Thrush	S	breeding	n/a	D3
Gray Catbird	S	breeding	n/a	D3
Brown Thrasher	S	breeding	n/a	D3
Carolina Chickadee	S	breeding	n/a	D3
Tufted Titmouse	S	breeding	n/a	D3
Field Sparrow	S	breeding	n/a	D3
Vesper Sparrow	S	breeding	2	D1
Eastern Towhee	S	breeding	n/a	D3
Black-and-white Warbler	S	breeding	n/a	D3
Worm-eating Warbler	S	breeding	n/a	D3
Kentucky Warbler	S	breeding	n/a	D3
Scarlet Tanager	S	breeding	n/a	D3
Rose-breasted Grosbeak	S	breeding	n/a	D3
Baltimore Oriole	S	breeding	n/a	D3
Common Grackle	S	breeding	n/a	D3

Source: NJ Audubon Society, 2004

Key
D1 - State Species of Conservation Concern
D3 - Species in rare/unique habitat
D4ii - Waterfowl (state-defined)

Abstract Page

Publication Title:	Environmental Resources Inventory for the Township of Robbinsville
Publication Number:	10071
Date Published:	March 2012
Geographic Area:	Robbinsville Township, Mercer County
Key Words	Agriculture, air quality, aquifers, Assunpink Creek, biodiversity, biological resources, built environment, climate, conservation, development, endangered species, environmental issues, environmental resource inventory, floodplains, forests, geology, grasslands, groundwater, habitat, land preservation, Landscape Project, master planning, Mercer County, natural resources, New Jersey, open space, population, Robbinsville Township, soils, steep slopes, streams, topography, U.S. Census, vernal pools, water quality, watersheds, wetlands.
Abstract	This publication documents the natural and community resources of Robbinsville 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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