ENVIRONMENTAL RESOURCE INVENTORY

for the BOROUGH of

WOODSTOWN

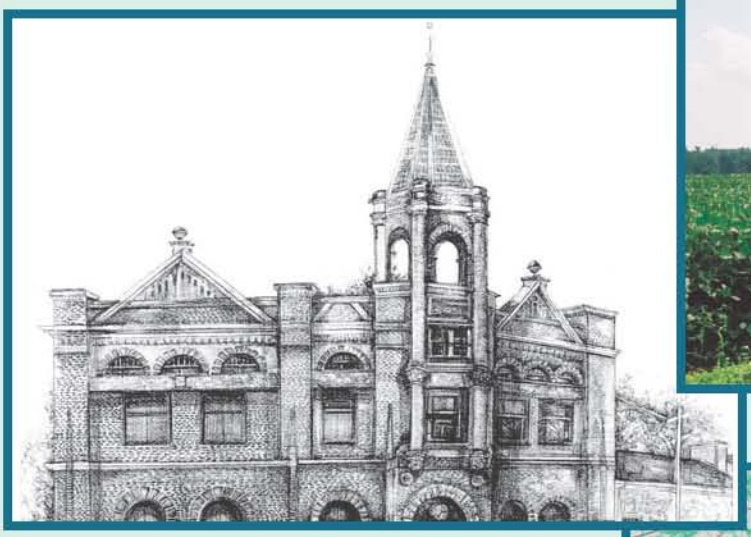
SALEM COUNTY, NEW JERSEY

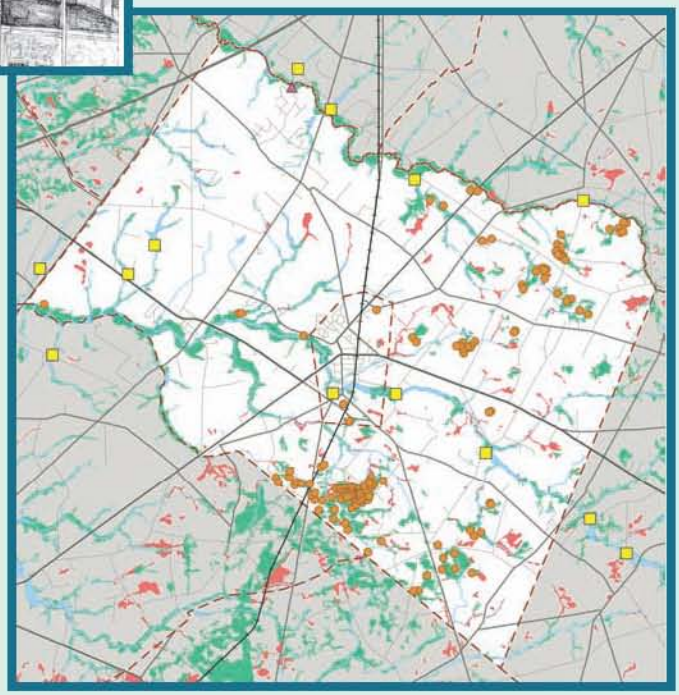
&

for the TOWNSHIP of

PILESGROVE

SALEM COUNTY, NEW JERSEY





prepared by:

Delaware Valley
Regional Planning
Commission

with:

The Joint Environmental
Commission of Woodstown Borough
& Pilesgrove Township

SEPTEMBER 2005

Created in 1965, the Delaware Valley Regional Planning Commission (DVRPC) is an interstate, intercounty and intercity agency that provides continuing, comprehensive and coordinated planning to shape a vision for the future growth of the Delaware Valley region. The region includes Bucks, Chester, Delaware, and Montgomery counties, as well as the City of Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester and Mercer counties in New Jersey. DVRPC provides technical assistance and services; conducts high priority studies that respond to the requests and demands of member state and local governments; fosters cooperation among various constituents to forge a consensus on diverse regional issues; determines and meets the needs of the private sector; and practices public outreach efforts to promote two-way communication and public awareness of regional issues and the Commission.

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

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Cover Image 1: *Farmers and Merchants Bank (ink drawing)*	Source: Carolyn G. Mortimer
Cover Image 2: *Farm in Pilesgrove Township*	Source: DVRPC
Cover Image 3: *Map – Surface Water, Wetlands and Vernal Pools*	Source: DVRPC

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- The Association of New Jersey Environmental Commissions (ANJEC) Smart Growth Assistance Grant Program, funded by the Geraldine R. Dodge Foundation.
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Borough Council, Borough of Woodstown
Richard Pfeffer, Mayor
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Dawn Rapa, Councilwoman

Township Committee, Township of Pilesgrove
Ernest A. Brickford, Mayor
Bruce Lee Bobbitt, Committeeman
Edward J. Kille, Committeeman

The impetus for the creation of this document, and its guidance and review, came from the Woodstown-Pilesgrove Joint Environmental Commission.

The Woodstown-Pilesgrove Joint Environmental Commission

Bob Breisch (Pilesgrove)
Patricia DuBois, Chairperson (Pilesgrove)
John Hall (Woodstown)
Robert Howell (Pilesgrove)
Jean Jack, Secretary (Woodstown)
Francis Rapa (Woodstown)
John Ronafalvy (Pilesgrove)
David Smith (Woodstown)
Dr. William Stoms, Jr. (Pilesgrove)
Thomas Turpin (Woodstown)
Ransom Willard, Vice Chairperson (Woodstown)

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Patty Elkis, AICP, PP – Manager, Office of Environmental Planning
Suzanne McCarthy – Senior Environmental Planner
Kimberly Korejko –GIS Analyst
Alison Hastings – Environmental Planner
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INTRODUCTION

The purpose of an Environmental Resource Inventory is to identify and describe the natural resources of a community. A community's natural resources – its soil, water, air, forests, fields, and waterways – are fundamental to its character. 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.

Woodstown Borough and Pilesgrove Township's natural resources have long shaped the lives of their inhabitants. The Native Americans, who inhabited Salem County for more than 10,000 years before the arrival of Europeans, relied upon fish and game from the area's streams and extensive upland forests. Native American villages also made good use of the region's rich agricultural soils, farming indigenous corn, tomatoes and peaches. The high-quality soils of Pilesgrove Township played a major role in the development of European settlements. Almost immediately after their arrival, the first Swedish and English settlers began to clear the forest and work the land, raising grain, fruits and vegetables.

While the natural resources of the township have been the primary factor shaping the lives of Woodstown's and Pilesgrove's residents for thousands of years, in the past decade the growth of suburban development has brought a new challenge to the area. As population and residential development in Pilesgrove increase, documentation of its natural resources has become a necessity, especially if it is to support the residents of the future. Resources such as surface and ground water will become increasingly important to Pilesgrove's population, its sister community Woodstown, and other neighboring communities. Pilesgrove's wetlands, forests, and grasslands, which provide significant habitat for a wide variety of plants and animals, will be vital to the continued health of the town and the enjoyment of its citizenry. Detailed knowledge of these resources will empower Woodstown and Pilesgrove's citizens to make informed decisions as they struggle to balance the pressures of growth with conservation. In so doing, Woodstown and Pilesgrove residents can maintain and shape their community's identity and the sense of place it provides.

Preparing an Environmental Resource Inventory requires gathering all the existing information that can be found about a township's resources, and presenting it in a form that is useful to a broad audience. The Inventory reflects a particular moment in time, and it is assumed that it will be updated as new data becomes available.

Several documents and reports were utilized in preparing the *Environmental Resource Inventory for Woodstown Borough and Pilesgrove Township*, including Woodstown Borough's *Master Plan* and Pilesgrove Township's *Master Plan*. Additionally, Pilesgrove Township's original *Environmental Resource Inventory*, completed in 1993 by township resident Russell Licciardello, was also consulted. These reports and a number of reference works are listed at the end of this document. The maps and data relating to the natural resources of both communities are derived from the New Jersey Department of Environmental Protection's (NJDEP's) Geographic Information System mapping, from *The Landscape Project* produced by the

Endangered and Nongame Species Program of the New Jersey Fish and Wildlife Division, and from mapping data compiled and prepared by the Delaware Valley Regional Planning Commission (DVRPC).

BRIEF HISTORY

In June of 1675, while still in England, Thomas Pyle purchased 10,000 acres of land from the Quaker John Fenwick in what is now known as Woodstown and Pilesgrove. Pyle (also spelled Pile) increased his land holdings to 84,000 acres, naming his land Pile's Grove. This land was mentioned in a 1701 deed and included present-day Pittsgrove and Upper Pittsgrove townships. Pilesgrove's current boundaries were established in 1769 when Pittsgrove (including today's Upper Pittsgrove) separated. Woodstown was formed by referendum in 1882, but it wasn't until March of 1925 that the New Jersey Legislature confirmed the incorporation.

The first permanent European settlers in the area were English Quakers, led by John Fenwick in November of 1675. Fenwick founded Salem County, intending it to be a democratic colony based on Quaker beliefs, and actually planned several towns.

The earliest settlement in the Woodstown-Pilesgrove area was started by Benjamin Acton, an earlier settler, who built a gristmill on the Salem River and named it Mill Brook in 1695. Acton's millpond still exists and is now known as Memorial Lake. Jeremiah Wood and his son Jachonias, tanners and shoemakers, settled at Mill Brook in 1735 and bought about 1,500 acres in Pilesgrove Township, consisting of much of the land between Mill Brook and Pilesgrove. In 1785, the Society of Friends built a meetinghouse a mile north of Acton's settlement. Houses were built around the mill and the meetinghouse until eventually the two settlements – Mill Brook and Pilesgrove – grew together and became known as Woodstown.

Source: DVRPC

Woodstown Friends Meeting House, North Main Street

The first known reference to Woodstown is in the *Pennsylvania Gazette* on April 10, 1766, in which Jachonias Wood advertised a horse for stud and identified himself as living in "Wood's Town, Salem County." Both Jeremiah and Jachonias's houses still stand. Jeremiah's is at 45 Lotus Avenue overlooking Memorial Lake, and Jachonias's is at 110 South Main Street. The post-Revolutionary War recession and competition from another tanner dealt severe blows to Jechonias's business. Jachonias left Woodstown in 1801 after his business suffered from the post-Revolutionary War recession and competition from another tanner. In 1882, when the Borough of Woodstown incorporated, William H. Reed, the newly elected mayor, lived in Jachonias's house.

Woodstown became so populous and commercially successful that in 1819 a political movement was initiated to relocate the county seat from the City of Salem to Woodstown, which is almost at the geographic center of Salem County. The movement failed and Salem City remains the county seat.

Before Woodstown incorporated into a separate government, Pilesgrove Township was composed of several small communities. Blessington, the Sharp family plantation west of Woodstown, was occupied by British soldiers during the American Revolution. Fenwick, formerly known as Bushtown, along with Cedarville and Portertown (present-day Mannington Township) was the location of a summer encampment of African-American churchgoers in the month of June. Richmanville (Richmantown) contained several commercial establishments, a general store, blacksmith shop, sawmill, felling mill, and foundry. A fairly well-known community was Yorketown, settled in 1865 and the location of an African-American Methodist Church, as well as a hotel, post office, and railroad depot-telegraph office. Baileytown, Duel's Corners, and Eldridge's Hill are other settlements in Pilesgrove Township.

In 1865, local businessman Edward Bilderback Humphreys opened a department store in the center of Woodstown, now the corner of North Main Street and East Avenue, predating John Wanamaker's store in Philadelphia by ten years. In 1885, Humphreys built the Opera House for the performance of plays and presentations by speakers on the Chautauqua circuit. The grand building continues in use today, housing a law office and an accounting firm.

In about 1883, the West Jersey Railroad expanded to connect Philadelphia to Salem City, traveling through Woodstown. The railroad station was located on Route 40 and Grant Street, the current site of Woodstown Farm Supply. Woodstown became a destination for area farmers bringing their goods to market and stocking up on manufactured supplies. During the presidential election of 1912, candidate Woodrow Wilson and President William Howard Taft stopped to speak at the station in Woodstown. Sharptown was also considered a site for the railroad depot. It never developed to the degree that Woodstown did.

The Woodstown Public High School, located on U.S. Route 40, was built in 1915. At the time, locals complained that the building was not close to town, but eventually residential development reached the high school. President Warren G. Harding visited Woodstown during his presidency (1921-23), to dedicate the new federal highway, U.S. Route 40, now known as Harding Highway in his honor. He delivered a speech from the steps of Woodstown High School.

On September 1, 1940, a major storm deluged Salem County with ten inches of rain falling in five hours. Nine county bridges in Aldine, Alloway, Daretown, Harrisonville, and Woodstown were washed out during the storm and two lives were lost. When all nine bridges were rebuilt in 1941, a dedication was held at the bridge on South Main Street in Woodstown; a plaque commemorates the dedication.

Most of Woodstown and Pilesgrove's houses were built in the 19th and early 20th centuries. The Bassett House on Bailey Street was a station on the Underground Railroad. Many of the old homes in Woodstown, especially on Bowen Avenue, East Avenue, West Avenue, North Main Street, and South Main Street have well-maintained barns that once housed horses and carriages. Today, the barns have been converted to garages and most are in good condition.

Source: DVRPC

Woodstown, today, is a mix of historical homes on shady streets, small businesses, and new residential development

When Woodstown High School was built in 1915-16, residents complained that the building was too far out of town. By 1935, residential development had reached the school. Woodstown's first housing developments – duplexes in Woodstown Manor and custom single-family homes in Harris Acres – were built west of North Main Street in the 1950s. Construction in Harris Acres continued into the 1960s. During the 1970s and 1980s, individual homes were built on land to the west and south of the Manor. In the 1970s, Hillcrest Apartments were built with additional buildings added in the 1980s. Between 2000 and 2003, Candlelight Village, a golf course community of approximately 80 single-family homes, was built on the remnants of Cream

Valley Dairy, the borough's last dairy farm. In 2004, construction commenced on High Bridge, an age-restricted development in the northwest corner of the borough.

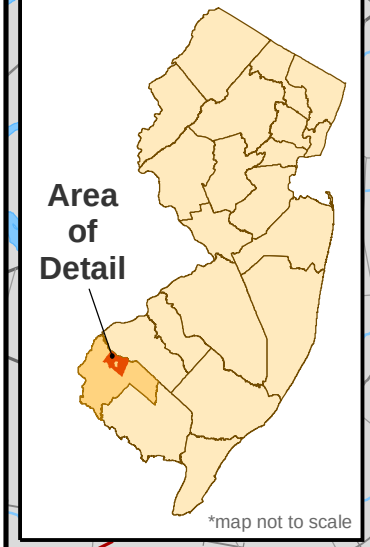
The first and largest development in Pilesgrove Township is Laurel Hills, built over several decades in the late 1950s through the 1980s with the addition of Laurel Hills II. Further west along the Oldmans Creek is the more recent the Woods at Laurel Hills, built in 2003. Smaller developments adjacent to the Woods at Laurel Hills include Auburn Farms (1990s), Westwood Knolls (1990s) and Kingswood Acres (1970s). Other notable residential development includes: Catalpa Crest on Marlton Road; Eldridge's Hill Estate on Point Airy Road; and several smaller subdivisions on Whig Lane, Avis Mill and Lincoln roads. Recently, development began on an age-restricted community known as Friends Village, an expansion of the Friends Nursing Home and Assisted Living complex. The borough will extend water and sewer service into the township to serve Friends Village.

In spite of rapid pace of residential development, Pilesgrove's landscape continues to be dominated by forms of agriculture that were part of its early history – vegetables, fruits, and grains – but the once-prevalent dairy farms are few. The Borough of Woodstown retains its appealing 19th century building stock and remains the historic center. The area's major stream corridor, the Salem River, and other waterways nourish fertile soils for farming and suitable land for building. Many times these industrious activities compete for the same land.

Starting in the last decade, Pilesgrove Township has taken steps to recognize the importance of its farmland. Numerous farmers have enrolled their farms in state and county preservation programs. In 2003, Pilesgrove residents voted for a referendum to create a fund dedicated to creating and maintaining open space in the township. In recent years, the Borough of Woodstown has experienced an unusual amount of growth for an older settlement. Woodstown lost nearly all of its agricultural land and open space to residential development between 2000 and 2005.

A few new development projects in Pilesgrove are planned for land adjacent to Woodstown. While this is a thoughtful strategy to center new development around existing infrastructure, Woodstown is losing much of its open space and needs to plan for park and recreation amenities for its own growing population and the growing population in its sister community, Pilesgrove.

Pilesgrove Township



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

Map 1A: Pilesgrove Township

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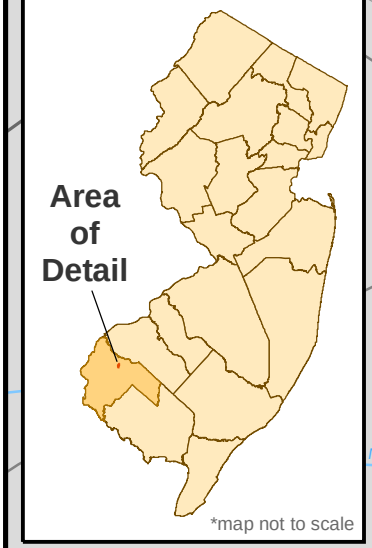
Woodstown Borough



Source : NJDEP,NJDOT,DVRPC.
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Map 1B: Woodstown Borough

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WOODSTOWN BOROUGH & PILESGROVE TOWNSHIP
LOCATION, SIZE, & LAND USE

Pilesgrove, an incorporated township, and Woodstown, an incorporated borough, are located in northern Salem County, New Jersey. The township is bounded by two Gloucester County municipalities and five Salem County municipalities: Woolwich and South Harrison Township to the north in Gloucester County, Upper Pittsgrove Township to the east, Alloway and Mannington townships to the south, and Carneys Point and Oldmans townships to the west and northwest. Oldmans Creek forms Pilesgrove Township's northern border and separates Gloucester and Salem counties. The Salem River forms part of Pilesgrove's southwestern border with Mannington Township. See **Map 1A: Pilesgrove Township** and **Map 1B: Woodstown Borough**.

Figure 1: Woodstown Borough and Pilesgrove Township's location

Woodstown Borough occupies 1,036 acres or 1.62 square miles and Pilesgrove Township occupies 22,395 acres or 35 square miles. Both lie on the coastal plain of New Jersey. Pilesgrove's land use reflects its natural setting and its long agricultural past. Most of the township remains rural and employed in agriculture today, but a suburban housing boom reached Pilesgrove in the 1990s and continues to increase. Suburban residential development is concentrated primarily west of County Route 605 in the township, most of which is adjacent to Oldmans Creek or Woodstown Borough. During the 1990s, Pilesgrove's population grew by 673 residents, a 21 percent increase.

Woodstown is representative of a 19th century commercial center, which supported its agricultural hinterlands and linked to other commercial centers of varying size from Salem City in the south to Camden City in the north. Much of Woodstown's building stock (about 44 percent) is from the 19th and early 20th centuries. Some parts of Woodstown were built during the successive waves of suburban residential development that occurred after World War II. Since Woodstown is surrounded by Pilesgrove and is considerably denser, the borough's population has remained stable over the last decade. During the 1990s, Woodstown's population decreased by 18 residents, less than 1 percent of a reduction.

Before European settlement, as much as 90 percent of the township and borough were covered with a mostly mixed deciduous hardwood forest consisting of oak, birch, ash, beech, hickory, walnut and maple trees. Although large portions of that expansive forest are now gone, more than 11 percent of Pilesgrove Township and 4 percent of Woodstown Borough remain forested. Given the good soils in Pilesgrove, it is not surprising that as of 1997, 67 percent of the township's land area was dedicated to agricultural uses. In Woodstown, developed land, which

includes residential, commercial, industrial, and civic land uses to name a few, occupy almost 58 percent of the borough.

Table 1 and *Table 3* show Woodstown and Pilesgrove's land uses grouped into general categories based on the New Jersey Department of Environmental Protection's (NJDEP's) 1995/97 color infrared digital imagery updated with NJDEP's 2002 color aerial photography.[1] *Table 2* and *Table 4* break down the 1995/97 general land use categories into detailed land cover categories.[2] See also **Map 2: Pilesgrove NJDEP Land Cover (1995/1997) Updated to 2002** and **Map 3: Woodstown NJDEP Land Cover (1995/1997) Updated to 2002**.

Table 1: Woodstown Borough General Land Cover Classes (1995/97) Updated to 2002

General Land Classes	Acres	Percent
Developed	691.98	66.8%
Agriculture	170.23	16.4%
Wetlands	92.33	8.9%
Forest	58.81	5.7%
Water	22.98	2.2%
TOTAL	**1,036.33**	**100%**

Source: NJDEP, Bureau of Geographic Information System, DVRPC

Source: DVRPC

Downtown Woodstown, North Main Street

[1] The 1995/97 land cover dataset is NJDEP's most up-to-date comprehensive land use information. Updates to the general categories, based on NJDEP's 2002 color aerial photography, were performed by DVRPC in 2004.
[2] The land cover information in Table 2 is not updated to 2002.

Pilesgrove Township

Map 2A:
Pilesgrove Aerial (2002)

OLDMANS
WOOLWICH
SOUTH HARRISON
ELK
CARNEYS POINT
PILESGROVE
Woodstown
MANNINGTON
UPPER PITTSGROVE
ALLOWAY

Oldmans Creek
Raineys Run
Swedesboro Rd
Porches Millpond
New Jersey Turnpike
Two Penny Run
Pointers Auburn Rd
Auburn-Woodstown Rd
Sharptown-Auburn Rd
Kings Hwy
Marl Run
Harrisonville Lake
Featherbed Ln
Point Airy Rd
Auburn Rd
Woodstown
Ferridges Hill Rd
Lincoln Rd
Indian Run
Stewart Rd
Lake Rd
Whig Lane Rd
Kelly Pond
Salem River
Marlton St
Nicholas Run
Memorial Lake
East Lake
Chestnut Run
Harding Highway
Harrisonville
Mill Rd
Major Run
County Home Rd
Old Salem Rd
Avis Millpond
Beagle Club Rd
Yorktown Rd
Woodstown-Daretown Road
Nicholas Run
Slabtown Lake
Culliers Run
Mannington Creek
Swedes Run
Alloway - Woodstown Rd
Alloway Creek

646 551 668 605 694 538 77 45 617 628 40 636 602 660 581 631 620 678 540 619 648 603 615 604 672

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

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Woodstown Borough

Source : NJDEP,NJDOT,DVRPC, NJOIT. 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.

Map 2B: Woodstown Aerial (2002)

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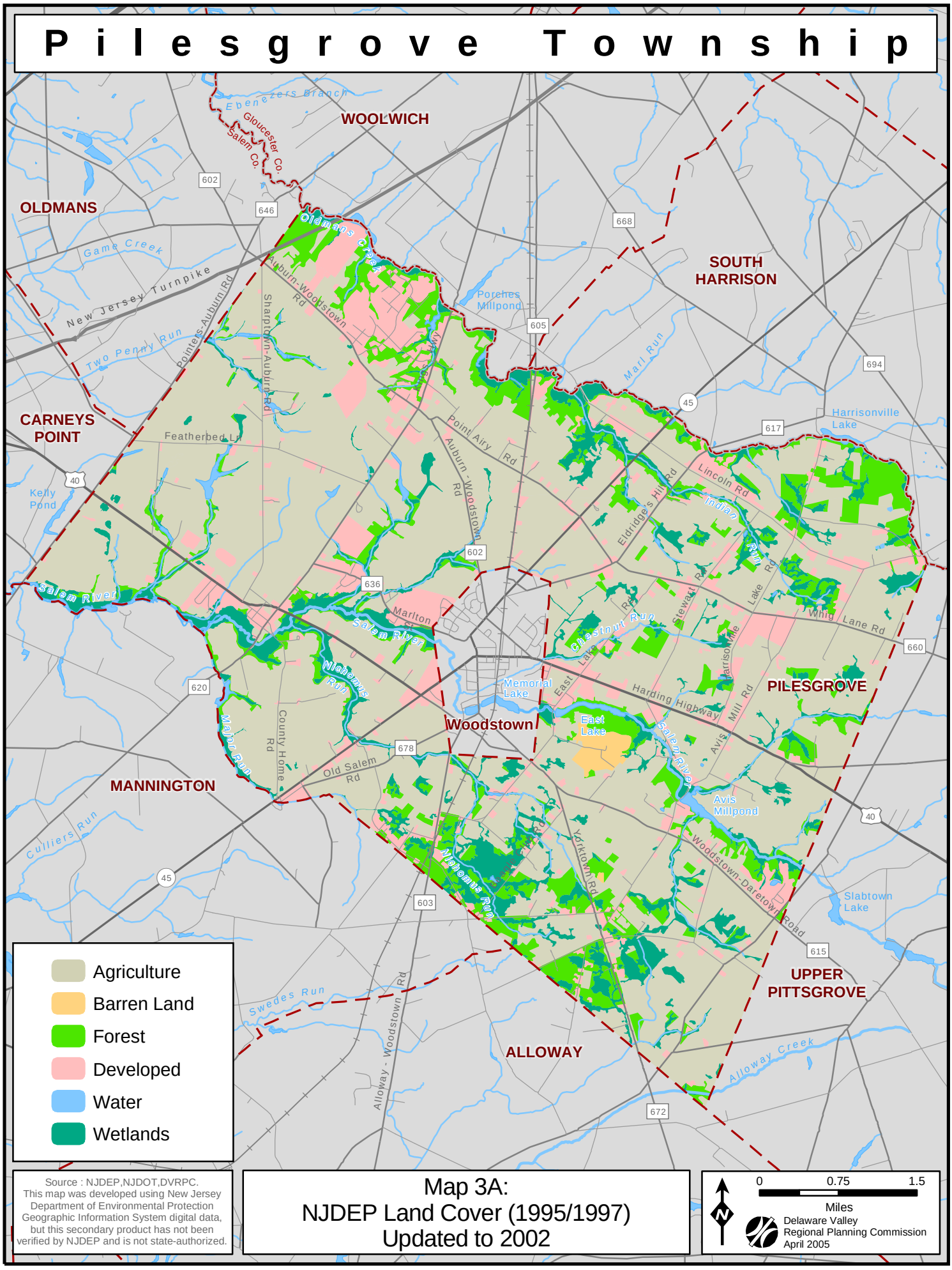
Pilesgrove Township



Source : NJDEP,NJDOT,DVRPC.
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Map 3A:
NJDEP Land Cover (1995/1997)
Updated to 2002

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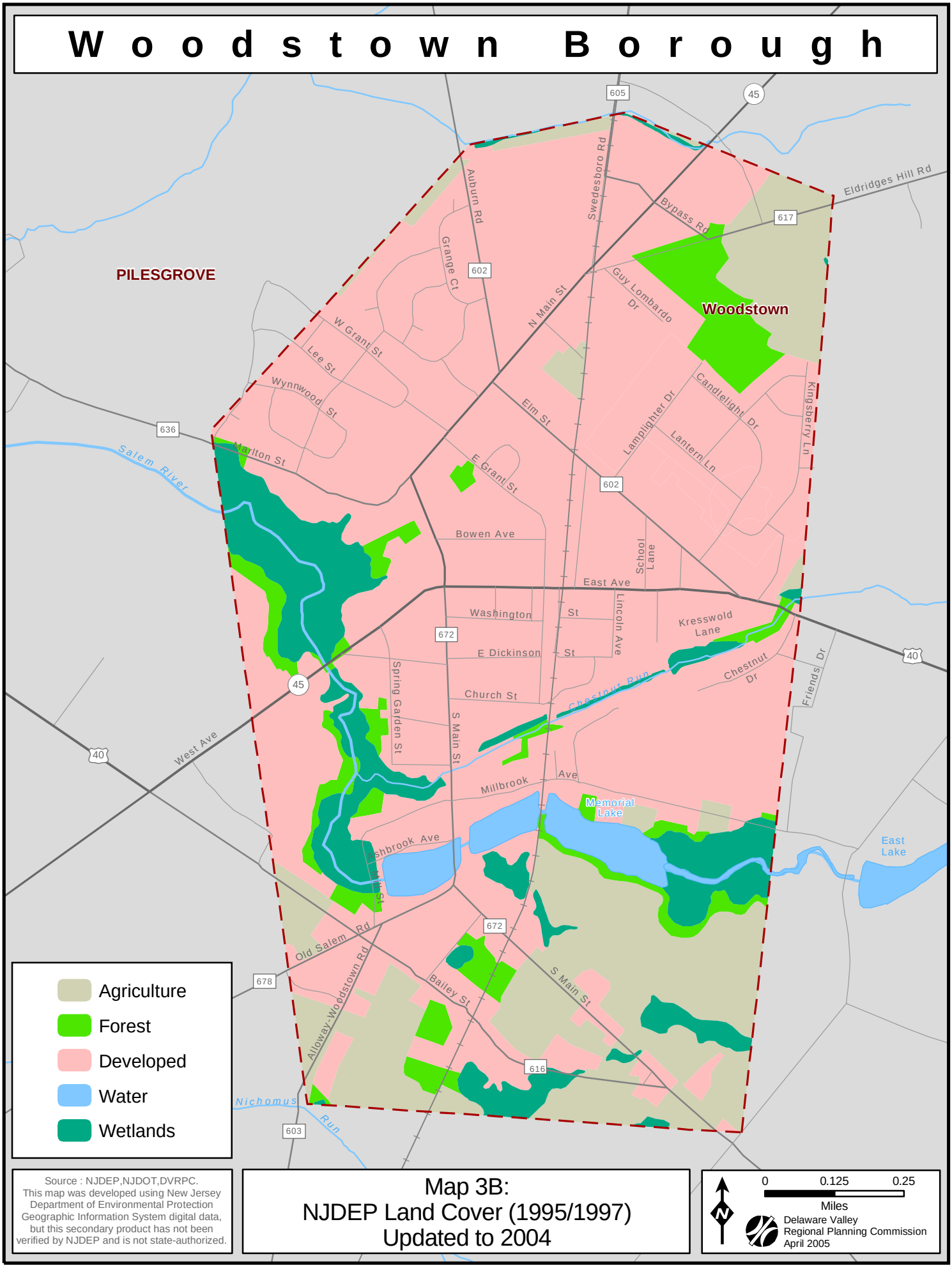
Woodstown Borough



Source : NJDEP,NJDOT,DVRPC.
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Map 3B:
NJDEP Land Cover (1995/1997)
Updated to 2004

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Regional Planning Commission
April 2005

Table 2: Woodstown Borough Detailed Land Cover (1995/97)

Land Use Categories	Acres	Percent
Athletic fields (schools)	30.62	3.0%
Brush/shrubland (coniferous)	1.62	0.2%
Commercial/services	56.49	5.5%
Cropland and pastureland	267.41	25.8%
Deciduous forest	38.92	3.8%
Industrial	38.29	3.7%
Lakes (artificial)	21.75	2.1%
Military reservations	4.16	0.4%
Modified wetlands (agricultural wetlands)	11.61	1.1%
Modified wetlands (managed wetland in maintained lawn greenspace)	4.41	0.4%
Old field	0.20	0.0%
Other agriculture	4.48	0.4%
Other urban or built-up land	72.24	7.0%
Recreational land	5.92	0.6%
Residential (high density, multiple dwelling)	11.45	1.1%
Residential (low density, single unit)	60.09	5.8%
Residential (medium density, single unit)	258.18	24.9%
Residential (rural, single unit)	57.49	5.5%
Streams and canals	1.23	0.1%
Transportation, communications, utilities	7.41	0.7%
Wetlands (deciduous scrub/shrub wetlands)	5.85	0.6%
Wetlands (deciduous wooded wetlands)	69.60	6.7%
Wetlands (herbaceous)	6.61	0.6%
Total	**1,036.33**	**100.0%**

Source: NJDEP, Bureau of Geographic Information System

Table 3: Pilesgrove Township General Land Cover Classes (1995/97) Updated to 2002

General Land Classes	Acres	Percent
Agriculture	14,914.48	66.6%
Development	2,467.02	11.0%
Wetlands	2,371.02	10.6%
Forest	2,350.27	10.5%
Water	177.37	0.8%
Barren land	114.35	0.5%
TOTAL	**22,394.51**	**100%**

Source: NJDEP, Bureau of Geographic Information System, DVRPC

Table 4: Pilesgrove Township Detailed Land Cover (1995/97)

Land Use Categories	Acres	Percent
Athletic fields (schools)	2.25	0.01%
Brush/shrubland (coniferous)	107.03	0.48%
Brush/shrubland (deciduous)	101.59	0.45%
Brush/shrubland (mixed deciduous/coniferous)	149.09	0.67%
Commercial/services	72.40	0.32%
Confined feeding operations	5.73	0.03%
Coniferous forest	41.31	0.18%
Cropland and pastureland	14,375.85	64.19%
Deciduous forest	1,808.46	8.08%
Extractive mining	3.30	0.01%
Industrial	23.24	0.10%
Lakes (artificial)	136.40	0.61%
Lakes (natural)	6.55	0.03%
Mixed forest (coniferous dominated)	41.86	0.19%
Mixed forest (deciduous dominated)	29.89	0.13%
Modified wetlands (agricultural wetlands)	439.19	1.96%
Modified wetlands (disturbed)	21.11	0.09%
Modified wetlands (former agricultural wetland, becoming shrubby, not built-up)	17.09	0.08%
Modified wetlands (managed wetland in maintained lawn greenspace)	3.07	0.01%
Modified wetlands (managed wetland in maintained rec area)	2.49	0.01%
Modified wetlands (wetland right-of-way)	4.21	0.02%
Old field	267.65	1.20%
Orchards, vineyards, nurseries, horticultural areas	80.10	0.36%
Other agriculture	524.47	2.34%
Other urban or built-up land	231.53	1.03%
Plantation	1.11	0.00%
Recreational land	220.90	0.99%
Residential (high density, multiple dwelling)	4.54	0.02%
Residential (low density, single unit)	163.33	0.73%
Residential (medium density, single unit)	34.99	0.16%
Residential (rural, single unit)	1,483.49	6.62%
Streams and canals	2.95	0.01%
Tidal rivers, inland bays, and other tidal waters	31.48	0.14%
Transitional areas	12.24	0.05%
Transportation, communications, utilities	51.87	0.23%
Undifferentiated barren lands	1.89	0.01%
Wetlands (coniferous wooded wetlands)	5.91	0.03%
Wetlands (deciduous scrub/shrub wetlands)	264.17	1.18%

Land Use Categories	Acres	Percent
Wetlands (deciduous wooded wetlands)	1,444.60	6.45%
Wetlands (freshwater tidal marshes)	34.26	0.15%
Wetlands (herbaceous)	130.74	0.58%
Wetlands (mixed forested wetlands, deciduous dominated)	10.18	0.05%
Total	**22,394.51**	**100.00%**

Source: NJDEP, Bureau of Geographic Information System

Source: DVRPC

A horse farm in Pilesgrove

NATURAL RESOURCES

PHYSIOGRAPHY

Physiography is the study of a location in relation to its underlying geology. New Jersey is characterized by four physiographic provinces. The rocky terrain of the Appalachian Province is at one extreme and the sands of the coast are at the other. Woodstown Borough and Pilesgrove Township are located in the Atlantic Coastal Plain, the southernmost of these four provinces in New Jersey.

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 and clay. Deposits originating in the breakdown of Appalachian and Catskill sedimentary, metamorphic, and igneous rocks are interbedded with layers formed by oceanic (marine) deposition, which occurred as the ocean shoreline advanced and receded over geologic time. The Inner Plain layers date from the Cretaceous Period, 135 to 65 million years ago. Generally, soils of the Inner Coastal Plain are quite fertile.

Figure 2. The Physiographic Regions of New Jersey

The Outer Coastal Plain was formed more recently than the Inner Coastal Plain. It was laid down by the ocean and developed during the mid-to-late part of the Cenozoic Period, 65 million years ago to the present. Outer Coastal Plain soils are sandier and less fertile than those of the Inner Plain and do not hold water as well.

In the general vicinity of the dividing line between the two segments of the Coastal Plain is a belt of low hills, which runs northeast and southwest through the southern half of New Jersey. These hills are the youngest of the Cretaceous formations and are largely made up of sand and marl formations. The hills taper to fairly low elevations in Gloucester County but are visible in the Mullica Hill area. The Inner Coastal Plain lies to the west of the band of hills and the Outer Coastal Plain lies to the east.

Woodstown Borough and Pilesgrove Township are nearly bisected by the boundary between the Inner and Outer coastal plains, with rocks dating from both the Cretaceous and Cenozoic periods outcropping in the township. Although portions of Pilesgrove are in the Outer Coastal Plain, most of the township's soils are generally regarded as agriculturally productive. This is because the drop in soil fertility between the Inner and Outer coastal plains is not immediate, but changes gradually moving from west to east across the Outer Coastal Plain. While most of Pilesgrove has good agricultural soils, the soils several miles to the east become considerably sandier as the landscape transitions into the Pine Barrens.

TOPOGRAPHY AND SURFACE LANDSCAPES

Pilesgrove Township, with Woodstown at its center, has a largely upland character and abundant high-quality agricultural soils. Compared with municipalities closer to the Delaware River, the township contains relatively limited wetlands. Most of these occur adjacent to the major streams that flow across the township on their way to the Delaware River. The valleys of the Salem River and Nichomus Run and their tributaries, bisect Pilesgrove's gently rolling upland. The highest elevations in the township approach 160 feet above sea level near Mount Pleasant (also referred to as Mount Misery). The creek valleys are as low as a few feet above sea level at the confluence of the Salem River and Nichomus Run in Sharptown. The land rises up to a large plateau 150 feet above sea level just east of Eldridge Hill. Eldridge Hill is not the highest point in the township, peaking at 120 feet above sea level, but it is the most prominent and visible point because it is in the form of a knoll, clearly defining its quick rise in elevation from 70 feet to 120 feet.

The upland area is characterized by rich soils that once supported extensive beech-oak forests. Today, Pilesgrove's upland forests are dominated by oak trees and, to a lesser degree, beech, maple and birch trees. Along the river valleys are freshwater tidal marshes and wet forests of sweet gum and red maple. The streams are relatively flat, as in all of southern New Jersey, with bottoms composed of mud, sand or small rocks and pebbles. The agricultural areas of Pilesgrove are mostly dominated by row crops, such as corn and soybeans, as well as fruit orchards, which are concentrated in the southeastern corner of the township.

SOILS

Soil is the foundation for all land uses. A region's soil defines what vegetation is possible, influencing agricultural uses. It also determines how land can be developed for other purposes. Soil is also a natural resource that cannot be replenished on the human time scale.

Woodstown Borough and Pilesgrove Township soils consist of 24 series types and 48 variations within those series as identified by the U.S. Department of Agriculture's Natural Resources Conservation Service. These are listed in **Table 7: Woodstown Soils** and **Table 8: Pilesgrove Soils** and shown on **Map 4: Pilesgrove Soils** and **Map 6: Woodstown Soils**.

The most abundant of all soils in both Woodstown and Pilesgrove's soils are those classified as Prime Farmland. About 63 percent (655 acres) of Woodstown's soils and 53 percent (11,905 acres) of Pilesgrove's soils are considered Prime Farmlands (P-1). Prime Farmlands are lands that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. They can sustain high yields of crops when managed with correct farming methods. Prime Farmlands are not excessively erodible or saturated with water for long periods of time and do not flood frequently. Agriculture remains the dominant landscape in Pilesgrove.

More than 24 percent (5,561 acres) of Pilesgrove's soils and almost 8 percent (82 acres) of Woodstown'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 under favorable conditions. Nearly 4 percent (783 acres) of Pilesgrove's soils are classified as Unique Farmland (U-1), which can support specialized crops such as cranberries, blueberries, peaches, grapes, or asparagus. The great majority of Pilesgrove's soils, 81 percent, are rich, arable, and valuable soils. See **Table 5: Agricultural Values for Woodstown Soils** and **Table 6: Agricultural Values for Pilesgrove Soils** for the acreage of each of these categories of farmland.

Table 5: Agricultural Values for Woodstown Soils

Designation	Type	Acres	Percent
P-1	Prime Farmland	655.6	63.3%
S-1	Statewide Importance	84.1	8.1%
N/A	Soils not classified for farmland use: wet soils, pits, steep slopes, made land, etc.	276.0	26.6%
Water	Water	20.5	2.0%
Totals		1,036.3	100.0%

Source: NJ Farmlands Inventory, NJ Natural Resources Conservation Service

Table 6: Agricultural Values for Pilesgrove Soils

Designation	Type	Acres	Percent
P-1	Prime Farmland	11,833.8	52.8%
S-1	Statewide Importance	5,578.9	24.9%
U-1	Unique Farmland	785.4	3.5%
N/A	Soils not classified for farmland use: wet soils, pits, steep slopes, made land, etc.	4,044.3	18.1%
Water	Water	152.1	0.7%
Totals		22,394.4	100.0%

Source: NJ Farmlands Inventory, NJ Natural Resources Conservation Service

Hydric Soils

More than 54 percent of Woodstown's soils and 37 percent of Pilesgrove's soils 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 its subsurface and support the development of hydrophytic vegetation. Hydric soils have unique soil properties that distinguish them from non-

hydric soils; they are an important element to 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 Woodstown and Pilesgrove's wetland areas are found in the *Natural Resources* section, under "Wetlands" and "Agricultural Wetlands," page 45, and the *Biological Resources* section, under "Wetlands," page 74.

Soil Series

Several soil series appear more frequently in Woodstown-Pilesgrove than others, and are briefly described as follows according to the Salem County Soil Survey and NCRS Soil database.

Alloway Series

The Alloway soil series, previously named the Keyport series, accounts for about 14 percent of all soils in the combined Woodstown and Pilesgrove area (247 acres in Woodstown and 2,987 acres in Pilesgrove). This soil series consists of very deep, moderately well drained soils on uplands. These soils formed in Coastal Plain sediments. Typically, Alloway soils can be found in the form of cultivated silt loams. The permeability of Alloway soils can range from slow to very slow. Most Alloway soils have been cleared for farming or general crops, hay, and pasture. However, the natural vegetation that still exists consists mostly of red, white, and black oaks, beech, hickory, Virginia pine, and yellow poplar. The water table for the Alloway series is between 1.5 and 4.0 feet deep.

Alloway soils are classified Prime Farmland or of Statewide Importance depending on slope. (Capability Units II, III and IV depending on slope and other variables)

Sharptown Series

The Sharptown soil series makes up 14 percent of all soils in Woodstown and Pilesgrove (128 acres in Woodstown and 3,274 acres in Pilesgrove). Sharptown soils are very deep, moderately well drained soils. These soils were formed from silty eolian deposits that were underlain by loamy marine sediments that contain glauconite. Typically, Sharptown soils can be found in the form of silt loam on a smooth 1 percent slope, used as pasture. The permeability of Sharptown soils can range from moderate in the subsoil to moderately slow in

Capability Units

I – Soils have few limitations that restrict their use.

II – Soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

III – Soils have severe limitations that reduce the choice of plants, require very careful management, or both.

IV – Soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

V – Soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, woodland, or wildlife habitat.

VI – Soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture, woodland, or wildlife habitat.

VII – Soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture, woodland, or wildlife habitat.

VIII – Soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, water supply, or to aesthetic purposes.

Pilesgrove Township

Map 4: Pilesgrove Soils

OLDMANS
WOOLWICH
SOUTH HARRISON
ELK
CARNEYS POINT
PILESGROVE
Woodstown
UPPER PITTSGROVE
ALLOWAY

New Jersey Turnpike
Oldmans Creek
Game Creek
Two Penny Run
Pointers Auburn Rd
Auburn-Woodstown Rd
Sharptown Auburn Rd
Kings Hwy
Porches Millpond
Marl Run
Harrisonville Lake
Featherbed Ln
Point Airy Rd
Auburn Rd
Woodstown Rd
Elmtree Rd
Lincoln Rd
Indian Run
Stewart Rd
Chestnut Run
Harding Highway
Salem River
Kelly Pond
Marlton St
Nichomus Run
Major Run
County Home Rd
Old Salem Rd
Beagle Club Rd
Memorial Lake
East Lake
Avis Millpond
Slabtown Lake
Alloway Creek
Alloway - Woodstown Rd
Gloucester Co
Salem Co

Soil Type

AdkB	Adelphia sandy loam, 2% to 5% slopes		KeoC	Keyport loam, 5% to 10% slopes
AhmB	Alloway sandy loam, 2% to 5% slopes		MakAt	Manahawkin muck, 0% to 1% slopes, frequently flooded
AhpB	Alloway loam, 2% to 5% slopes		MasB	Marlton silt loam, 2% to 5% slopes
AhpC	Alloway loam, 5% to 10% slopes		MasC	Marlton silt loam, 5% to 10% slopes
AhrA	Alloway silt loam, 0% to 2% slopes		MbrA	Matapeake silt loam, 0% to 2% slopes
AhrB	Alloway silt loam, 2% to 5% slopes		MbrB	Matapeake silt loam, 2% to 5% slopes
AucB	Aura loamy sand, 0% to 5% slopes		MbrC	Matapeake silt loam, 5% to 10% slopes
AugB	Aura sandy loam, 2% to 5% slopes		MbuA	Mattapex silt loam, 0% to 2% slopes
AugC	Aura sandy loam, 5% to 10% slopes		MbuB	Mattapex silt loam, 2% to 5% slopes
AuhB	Aura gravelly sandy loam, 2% to 5% slopes		MbxB	Mattapex-Urban land complex, 0% to 5% slopes
AupB	Aura loam, 2% to 5% slopes		MutA	Muttontown sandy loam, 0% to 2% slopes
ChsAt	Chicone silt loam, 0% to 1% slopes, frequently flooded		OTKA	Othello and Fallsington soils, 0% to 2% slopes
ChtA	Chillum silt loam, 0% to 2% slopes		OTMA	Othello, Fallsington, and Trussum soils, 0% to 2% slopes
ChtB	Chillum silt loam, 2% to 5% slopes		PEEAR	Pedricktown, Askecksy, and Mullica soils, 0% to 2% slopes, rarely flooded
DocB	Downer loamy sand, 0% to 5% slopes		PHG	Pits, sand and gravel
DocC	Downer loamy sand, 5% to 10% slopes		SacB	Sassafras sandy loam, 2% to 5% slopes
DoeB	Downer sandy loam, 2% to 5% slopes		SacC	Sassafras sandy loam, 5% to 10% slopes
DopB	Downer-Galestown complex, 0% to 5% slopes		ShnA	Sharptown silt loam, 0% to 2% slopes
EveC	Evesboro sand, 5% to 10% slopes		ShnB	Sharptown silt loam, 2% to 5% slopes
FodB	Fort Mott loamy sand, 0% to 5% slopes		SwtB	Swedesboro loamy sand, 0% to 5% percent slopes
GabB	Galestown sand, 0% to 5% slopes		SwtC	Swedesboro loamy sand, 5% to 10% slopes
GamB	Galloway loamy sand, 0% to 5% slopes		UR	Urban land
HbmB	Hammonton loamy sand, 0% to 5% slopes		WATER	Water
HboA	Hammonton sandy loam, 0% to 2% slopes		WoeA	Woodstown sandy loam, 0% to 2% slopes
HbrB	Hammonton-Urban land complex, 0% to 2% slopes			

Source : 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.

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April 2005

Woodstown & Pilesgrove

Map 5:
Agricultural Quality of Soils

Soil Designation

- P1 - Prime Farmland
- S1 - Farmland of Statewide Importance
- U1 - Unique Farmland
- NA - Not Rated for Agricultural Use

Source : 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.

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WOOLWICH
OLDMANS
SOUTH HARRISON
ELK
CARNEYS POINT
PILESGROVE
Woodstown
MANNINGTON
UPPER PITTSGROVE
ALLOWAY
New Jersey Turnpike
Pointers-Auburn Rd
Auburn-Woodstown Rd
Sharptown-Auburn Rd
Kings Hwy
Porches Millpond
Marl Run
Two Penny Run
Featherbed Ln
Point Airy Rd
Auburn Woodstown Rd
Eldridge's Hill Rd
Lincoln Rd
Indian Run
Harrisonville Lake
Gloucester Co.
Salem Co.
Kelly Pond
Salem River
Marlton St
Chestnut Run
Stewart Rd
Harrisonville Lake Rd
Whig Lane Rd
Nichomus Run
Memorial Lake
East Lake
Harding Highway
Avis Mill Rd
Major Run
County Home Rd
Old Salem Rd
Beagle Club Rd
Yorktown Rd
Woodstown-Daretown Rd
Avis Millpond
Slabtown Lake
Culliers Run
Swedes Run
Alloway - Woodstown Rd
Alloway Creek
646
668
551
605
694
538
77
45
628
40
617
602
636
660
620
631
581
678
619
648
540
603
615
672
604

the underlying material. Most Sharptown soils have been used for cultivating corn, soybeans, small grains, and pasture. The Sharptown series supports natural vegetation consisting of mixed hardwoods such as oaks, sweet gum, red maple, and holly. Sharptown soils have relatively slow soil permeability to a depth of 60 inches, a high available water capacity, a low shrink/swell potential, and are not subject to annual flooding or ponding – all attributes that are ideal for agriculture (specifically crop cultivation) and building. These soils are classified as Prime Farmland. (Capability Units II)

Othello Series

The Othello series soils comprise over 10 percent of all soils found in Woodstown and Pilesgrove (84 acres in Woodstown and 2,404 acres in Pilesgrove). Othello soils, located extensively along the western side of Salem County, are very deep, poorly drained soils. Typically, Othello soils can be found in the form of cultivated silt loams. The permeability of the Othello series can be classified as moderately slow and, consequently, have a high water-holding capacity. These soils can be visually identified by their silt loam texture and gray color. Though Othello soils have a high organic matter content and a moderate level of natural fertility, many types of plant species do not fare well. The water table is less than 1 foot deep. Plant roots cannot extend beyond the 30-inch mantle and frost is severe. Othello soils support natural vegetation consisting mostly of wetland oak and sweetgum.

Source: DVRPC

Natural area found at Pratt's Azalea Garden

Othello soils suffer from severe limitations for residential, commercial and agricultural uses. These limitations are due in part to the wetness and slow permeability, which causes wet cellars, failures in septic systems and periodic flooding. Othello soils are wet in the springtime when crops are planted and are also usually wet in the fall when harvesting occurs. Much of Othello acreage is idle or woodland. However, with adequate drainage some is used to grow hay, corn, soybeans or used for pasture. Othello soils are very suitable for ponds – irrigation, recreation, or wildlife habitat. Othello soils are classified as Farmland of Statewide Importance. (Capability Unit III)

Swedesboro Series

Swedesboro soils comprise 9 percent all soils in the combined Woodstown-Pilesgrove area (36 acres in Woodstown and 2,027 acres in Pilesgrove). These soils are very deep, well drained with rapid permeability within a depth of 60 inches. Swedesboro soils have low water capacity and they shrink/swell. These soils do not experience annual flooding or ponding. While this soil series is classified as Prime Farmland (depending on slope), Swedesboro soils are not ideal for crop cultivation because of low water capacity; the water table is six feet deep. These soils may be very productive farmland soils if managed with irrigation. In the Woodstown-Pilesgrove

area, these soils are used for growing vegetables, fruit, specialty crops, corn, and soybeans. (Capability Units II and III depending on slope)

Chillum Series

Chillum soils make up 7 percent of all soils in Woodstown and Pilesgrove (39 acres in Woodstown and 1,563 acres in Pilesgrove). Chillum soils, which occur chiefly on uplands, are well drained, gently sloping, and silty in the upper 30 inches. The Chillum series can be most commonly found in a woodland area in a silt loam form. The permeability of Chillum soils is moderate in the subsoil and ranges from moderately slow to moderate in underlying material. Chillum soils have a high water-holding capacity combined with moderately slow permeability, as well as moderate natural fertility and organic-matter content. These soils support natural vegetation consisting of hardwood trees, primarily oaks. In Salem County, most of the Chillum soils acreage has been cleared and is used for potatoes, corn, hay, pasture or high-value vegetables. Furthermore, many areas of Chillum soils are used for urban development.

Source: DVRPC

Level land cleared for corn in Pilesgrove. An old silo is in the background.

Soils of this series are well suited for recreational uses with no limitation, and residential or commercial uses with slight limitation, due to the modest permeability of the substratum layer and issues of waste disposal from septic tanks. Chillum soils are found with Mattapex and Othello soils, which are also formed of silty components. Chillum soils are classified as Prime Farmland. (Capability Units I and II depending on slope)

Chicone Series

Chicone soils comprise a total of 6 percent of Woodstown and Pilesgrove's soils (97 acres in Woodstown and 1,369 acres in Pilesgrove). These soils were formed by loamy fluvial sediments underlain by highly decomposed organic material. The Chicone soil series consists of very deep, very poorly drained soils. They are most commonly found as a mucky silt loam, with a smooth, flat slope in a wooded floodplain. The soil permeability is moderate in the mineral material, and moderately rapid to rapid in the organic deposits. Most Chicone soils are not cultivated for agriculture. They are mainly found as wetland wildlife habitat. These soils support red maple, sweet gum, American holly, water oak, sweetbay and arrowwood with an understory of greenbriar, ferns, and mosses. The water table in the Chicone series is half a foot to a foot deep. (Capability Units V)

Sassafras Series

Sassafras soils comprise 6 percent of all soils found in the Woodstown-Pilesgrove area (127 acres in Woodstown and 1,272 acres in Pilesgrove). Sassafras soils are found in association with Woodstown, Dragston, Matapeake, Mattapex, Downer, Aura Galestown, and Klej soils. Sassafras soils, primarily found in the northwestern and eastern parts of Salem County, are

composed of marine and alluvial coastal plain sediments. They appear as small, gently undulating hills and are characterized as well drained with a loamy subsoil over a substratum layer. Sassafras soils are used mainly for agricultural cultivation, especially truck crops, fruits, vegetables, pastures, and woodlands. The permeability of Sassafras soils is moderate to moderately slow. The Sassafras series can support a natural vegetation of mixed upland hardwoods that are interspersed with some shortleaf and Virginia pine.

Sassafras soils appearing as gentle slopes have very few, if any, limitations for residential, commercial or recreational uses. However, moderately sloping and strongly sloping Sassafras soils are prone to erosion. Sassafras soils with steep slopes have severely limited uses. Sassafras soils are classified as Prime Farmland and of Statewide Importance depending on slope and variation. (Capability Units I, II, III, and IV depending on slope and variation)

Downer-Galestown Series

The Downer-Galestown complex soil series makes up over 5 percent of all soils in the Woodstown-Pilesgrove area, all of which (1,210 acres) occurs in Pilesgrove Township. The Downer soils are well drained with a slow to moderate rate of permeability, and no incidence of annual flooding or ponding. Downer soils have moderate water capacity and a low shrink/swell potential. Downer sandy loam is classified as Prime Farmland while Downer loamy sand is classified as a Soil of Statewide Importance, meaning these soils are moderately to highly suitable for cultivated crops. (Capability Units II)

The Galestown soils are excessively drained with rapid permeability, low shrink/swell potential, and low water capacity less than 60 inches in depth. The seasonal high water table is usually found 72 inches below the surface. Like Downer soils, Galestown exhibits no annual flooding or ponding and its water table is found more than 6 feet below the surface. Galestown soils are classified as Unique Farmland. Asparagus and tomatoes are commonly grown on Galestown soils with irrigation. (Capability Units III)

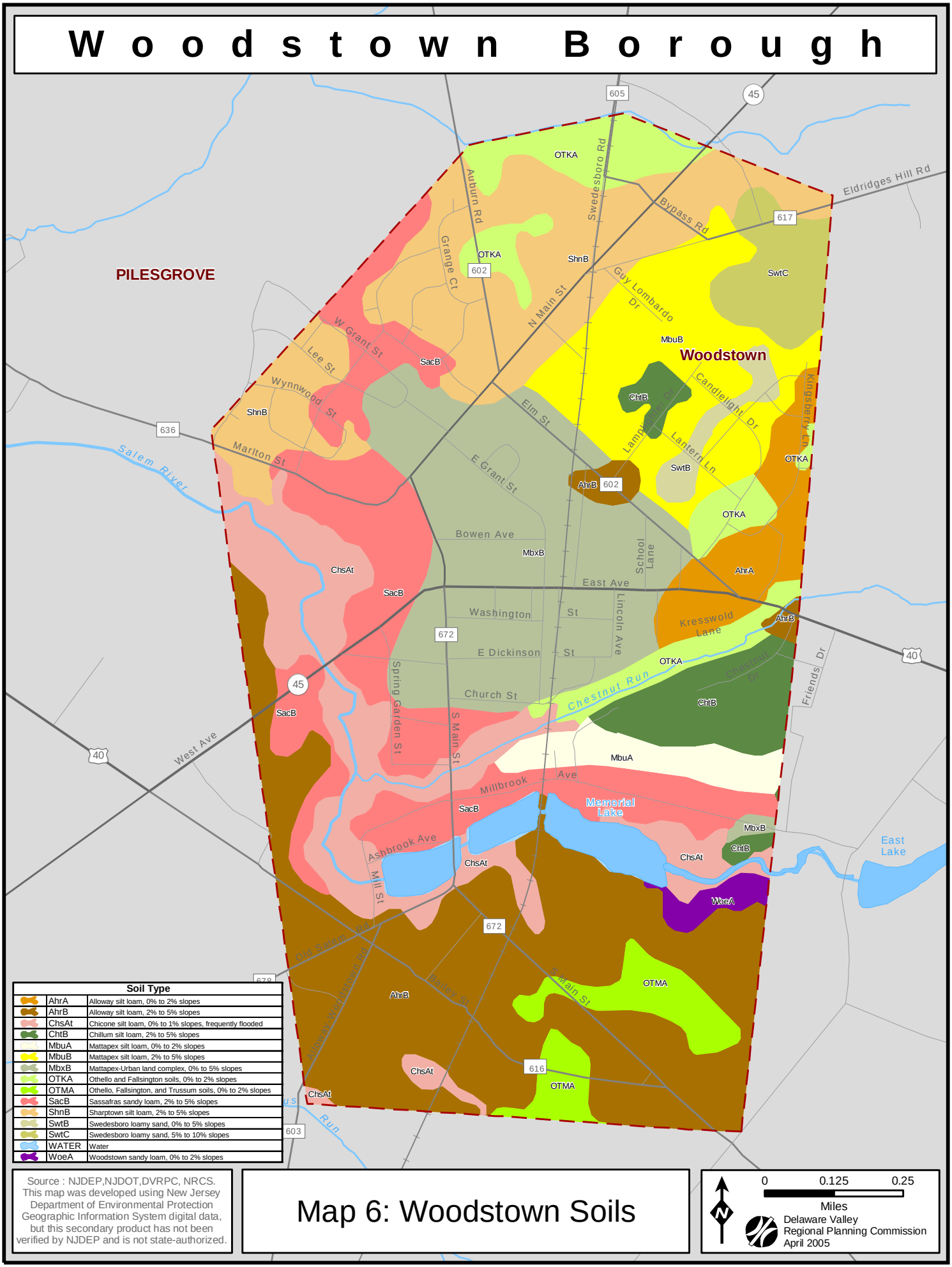
Fort Mott Series

The Fort Mott soil series makes up over 5 percent of all soils in the Woodstown-Pilesgrove area, all of which (1,136 acres) occurs in Pilesgrove Township. Fort Mott soils are well drained and tend to appear on moderate slopes, on broad plains or terraces, and along streams. They are extensively found along the Delaware River. The permeability of these soils range from moderate to moderately rapid. Fort Mott soils are most commonly used for growing field crops, vegetables, flowers, and some tree fruits. Fort Mott soils are Soils of Statewide Importance. (Capability Units III and IV depending on slope)

Marlton Series

Marlton soils make up over 4 percent of Woodstown-Pilesgrove soils (993 acres all of which occur in Pilesgrove) and are generally well drained and found on gentle slopes or adjacent to streams. These soils are moderately fertile and high in potassium, although that nutrient is not readily available for plants. Marlton is closely associated with Freehold, Collington, Colemantown, and Kresson soils and they are commonly referred to as marl and greensand. The richest and most abundant deposits of marl lie in New Jersey's coastal plain, extending from Monmouth County southward to Salem County. This area of land is recognized as

Woodstown Borough



Soil Type		
	AhrA	Alloway silt loam, 0% to 2% slopes
	AhrB	Alloway silt loam, 2% to 5% slopes
	ChsAt	Chicone silt loam, 0% to 1% slopes, frequently flooded
	ChtB	Chillum silt loam, 2% to 5% slopes
	MbuA	Mattapex silt loam, 0% to 2% slopes
	MbuB	Mattapex silt loam, 2% to 5% slopes
	MbxB	Mattapex-Urban land complex, 0% to 5% slopes
	OTKA	Othello and Fallsington soils, 0% to 2% slopes
	OTMA	Othello, Fallsington, and Trussum soils, 0% to 2% slopes
	SacB	Sassafras sandy loam, 2% to 5% slopes
	ShnB	Sharptown silt loam, 2% to 5% slopes
	SwtB	Swedesboro loamy sand, 0% to 5% slopes
	SwtC	Swedesboro loamy sand, 5% to 10% slopes
	WATER	Water
	WoeA	Woodstown sandy loam, 0% to 2% slopes

Source : 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.

Map 6: Woodstown Soils

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having prized agricultural value since colonial times. From the early 19th century into the 20th century, Marlton, and other marl soils rich in potassium and magnesium, were used as a natural fertilizer on lime-deficient soils. Today, marl is used as a water softener.

Marlton soils have a high water-holding capacity, moderate fertility, and moderate organic matter content, which support hardwood forests consisting of oak, hickory, ash, and yellow poplar. Red cedar often appears on idle fields. Though Marlton soils are not easily farmed due to inadequate moisture content, these soils are classified as Prime Farmland and Soils of Statewide Importance if effectively managed, and are well suited for crops, hay, and pasture. (Capability Units II, III, IV, and VI depending on slope)

Table 7: Woodstown Borough Soils

Soil Code	Soil Description	Acres	Percentage of all Acres	Designation
AhrA	Alloway (formerly Keyport) silt loam, 0 to 2 percent slopes	33.3	3.2%	N/A
AhrB	Alloway (formerly Keyport) silt loam, 2 to 5 percent slopes	213.7	20.6%	P-1
ChsAt	Chicone silt loam, 0 to 1 percent slopes, frequently flooded	98.6	9.5%	P-1
ChtB	Chillum silt loam, 2 to 5 percent slopes	38.8	3.7%	P-1
MbuA	Mattapex silt loam, 0 to 2 percent slopes	20.5	2.0%	P-1
MbuB	Mattapex silt loam, 2 to 5 percent slopes	77.5	7.5%	N/A
MbxB	Mattapex-Urban land complex, 0 to 5 percent slopes	151.0	14.6%	P-1
OTKA	Othello and Fallsington soils, 0 to 2 percent slopes	55.7	5.4%	P-1
OTMA	Othello, Fallsington, and Trussum soils, 0 to 2 percent slopes	28.4	2.7%	S-1
SacB	Sassafras sandy loam, 2 to 5 percent slopes	127.1	12.3%	P-1
ShnB	Sharptown silt loam, 2 to 5 percent slopes	128.1	12.4%	P-1
SwtB	Swedesboro loamy sand, 0 to 5 percent slopes	9.5	0.9%	P-1
SwtC	Swedesboro loamy sand, 5 to 10 percent slopes	26.4	2.5%	P-1
WATER	Water	20.5	2.0%	WATER
WoeA	Woodstown sandy loam, 0 to 2 percent slopes	7.1	0.7%	P-1
Total		**1,036.0**	**100.0%**	
Total Farmland Acreage		**737.3**	**71.4%**	
Total Non-Farmland Acreage		**298.7**	**28.6%**	

Source: USDA-Natural Resources Conservation Service (2002)

Table 8: Pilesgrove Township Soils

Soil Code	Soil Description	Acres	Percentage of all Acres	Designation
AdkB	Adelphia sandy loam, 2 to 5 percent slopes	5.95	0.0%	P-1
AhmB	Alloway (formerly Keyport) sandy loam, 2 to 5 percent slopes	126.64	0.6%	P-1
AhpB	Alloway (formerly Keyport) loam, 2 to 5 percent slopes	1,400.78	6.3%	P-1
AhpC	Alloway (formerly Keyport) loam, 5 to 10 percent slopes	295.00	1.3%	S-1
AhrA	Alloway (formerly Keyport) silt loam, 0 to 2 percent slopes	395.28	1.8%	P-1
AhrB	Alloway (formerly Keyport) silt loam, 2 to 5 percent slopes	763.05	3.4%	P-1
AucB	Aura loamy sand, 0 to 5 percent slopes	43.77	0.2%	P-1
AugB	Aura sandy loam, 2 to 5 percent slopes	50.74	0.2%	P-1
AugC	Aura sandy loam, 5 to 10 percent slopes	104.37	0.5%	S-1
AuhB	Aura gravelly sandy loam, 2 to 5 percent slopes	55.31	0.2%	P-1
AupB	Aura loam, 2 to 5 percent slopes	128.97	0.6%	P-1
ChsAt	Chicone silt loam, 0 to 1 percent slopes, frequently flooded	1,368.90	6.1%	N/A
ChtA	Chillum silt loam, 0 to 2 percent slopes	1.12	0.0%	P-1
ChtB	Chillum silt loam, 2 to 5 percent slopes	1,561.91	7.0%	P-1
DocB	Downer loamy sand, 0 to 5 percent slopes	41.98	0.2%	S-1
DocC	Downer loamy sand, 5 to 10 percent slopes	69.32	0.3%	S-1
DoeB	Downer sandy loam, 2 to 5 percent slopes	39.51	0.2%	P-1
DopB	Downer-Galestown complex, 0 to 5 percent slopes	1,209.89	5.4%	N/A
EveC	Evesboro sand, 5 to 10 percent slopes	52.53	0.2%	N/A
FodB	Fort Mott loamy sand, 0 to 5 percent slopes	1,135.82	5.1%	S-1
GabB	Galestown sand, 0 to 5 percent slopes	630.89	2.8%	U-1
GamB	Galloway loamy sand, 0 to 5 percent slopes	23.81	0.1%	N/A
HbmB	Hammonton loamy sand, 0 to 5 percent slopes	215.34	1.0%	S-1
HboA	Hammonton sandy loam, 0 to 2 percent slopes	21.45	0.1%	P-1
HbrB	Hammonton-Urban land complex, 0 to 2 percent slopes	35.31	0.2%	N/A
KeoC	Keyport loam, 5 to 10 percent slopes	24.29	0.1%	S-1
MakAt	Manahawkin muck, 0 to 1 percent slopes, frequently flooded	154.48	0.7%	U-1
MasB	Marlton silt loam, 2 to 5 percent slopes	303.94	1.4%	P-1
MasC	Marlton silt loam, 5 to 10 percent slopes	689.49	3.1%	S-1
MbrA	Matapeake silt loam, 0 to 2 percent slopes	51.32	0.2%	P-1
MbrB	Matapeake silt loam, 2 to 5 percent slopes	15.67	0.1%	P-1
MbrC	Matapeake silt loam, 5 to 10 percent slopes	261.12	1.2%	S-1
MbuA	Mattapex silt loam, 0 to 2 percent slopes	116.57	0.5%	P-1
MbuB	Mattapex silt loam, 2 to 5 percent slopes	460.54	2.1%	P-1
MbxB	Mattapex-Urban land complex, 0 to 5 percent slopes	0.47	0.0%	N/A

Soil Code	Soil Description	Acres	Percentage of all Acres	Designation
MutA	Muttontown sandy loam, 0 to 2 percent slopes	339.43	1.5%	N/A
OTKA	Othello and Fallsington soils, 0 to 2 percent slopes	1,514.12	6.8%	S-1
OTMA	Othello, Fallsington, and Trussum soils, 0 to 2 percent slopes	889.80	4.0%	S-1
PEEAR	Pedricktown, Askecksy, and Mullica soils, 0 to 2 percent slopes, rarely flooded	361.36	1.6%	N/A
PHG	Pits, sand and gravel	4.70	0.0%	N/A
SacB	Sassafras sandy loam, 2 to 5 percent slopes	933.66	4.2%	P-1
SacC	Sassafras sandy loam, 5 to 10 percent slopes	338.23	1.5%	S-1
ShnA	Sharptown silt loam, 0 to 2 percent slopes	724.70	3.2%	P-1
ShnB	Sharptown silt loam, 2 to 5 percent slopes	2,549.65	11.4%	P-1
SwtB	Swedesboro loamy sand, 0 to 5 percent slopes	1,452.67	6.5%	P-1
SwtC	Swedesboro loamy sand, 5 to 10 percent slopes	574.50	2.6%	N/A
UR	Urban land	73.38	0.3%	N/A
WATER	Water	152.10	0.7%	WATER
WoeA	Woodstown sandy loam, 0 to 2 percent slopes	630.58	2.8%	P-1
Total		**22,394.37**	**100.0%**	
Total Farmland Acreage		**18,198.0**	**81.3%**	
Total Non-Farmland Acreage		**4,196.4**	**18.7%**	

Source: USDA-Natural Resources Conservation Service (2002)

***Explanation of Designations**

P–1	Prime Farmland
S–1	Statewide Importance
U–1	Unique Farmland
NA	Land not appropriate for farming, e.g. eroded, very steep slopes, pits, permanently wet soils, water, etc.
Unknown	No information is available from New Jersey NRCS or Salem County Soil Conservation District. Not enough information is available to dismiss the soil for agricultural use.

Soil characteristics can severely restrict the use of sites for construction and development. **Table 9: Soil Limitations for Development** records the soils and their possible limitations for building foundations and septic systems. As indicated in the table, the borough and township have some soils that are severely limited for onsite septic systems. Septic systems require soils that have a low water table (within five feet or more below the surface) and high permeability to allow for proper drainage of wastewater. Soils with high water tables (five feet or less from the surface) create a potential for erosion, wet basements, and low permeability, often allowing wastewater to collect near the surface. This table is a summary of a report on building suitability available from the NRCS 2005 geodatabase for Salem County soils. It is included here as a general guide and is not intended to eliminate the need for site analysis.

Table 9: Soil Limitations for Development

Soil Description	Soil Code	Acres	Building without Basement	Building with Basement	Septic Systems
Adelphia sandy loam, 2 to 5 percent slopes	AdkB	5.9	B	C	C
Alloway (formerly Keyport) sandy loam, 2 to 5 percent slopes	AhmB	126.6	B	C	C
Alloway (formerly Keyport) loam, 2 to 5 percent slopes	AhpB	1,400.8	B	C	C
Alloway (formerly Keyport) loam, 5 to 10 percent slopes	AhpC	295.0	B	C	C
Alloway (formerly Keyport) silt loam, 0 to 2 percent slopes	AhrA	428.6	B	C	C
Alloway (formerly Keyport) silt loam, 2 to 5 percent slopes	AhrB	976.8	B	C	C
Aura loamy sand, 0 to 5 percent slopes	AucB	43.8	A	A	C
Aura sandy loam, 2 to 5 percent slopes	AugB	50.7	A	A	C
Aura sandy loam, 5 to 10 percent slopes	AugC	104.4	A	A	C
Aura gravelly sandy loam, 2 to 5 percent slopes	AuhB	55.3	A	A	C
Aura loam, 2 to 5 percent slopes	AupB	129.0	A	A	C
Chicone silt loam, 0 to 1 percent slopes, frequently flooded	ChsAt	1,467.5	C	C	C
Chillum silt loam, 0 to 2 percent slopes	ChtA	1.1	A	A	A
Chillum silt loam, 2 to 5 percent slopes	ChtB	1,600.7	A	A	A
Downer loamy sand, 0 to 5 percent slopes	DocB	42.0	A	A	A
Downer loamy sand, 5 to 10 percent slopes	DocC	69.3	A	A	A
Downer sandy loam, 2 to 5 percent slopes	DoeB	39.5	A	A	A
Downer-Galestown complex, 0 to 5 percent slopes	DopB	1,209.9	A	A	A
Evesboro sand, 5 to 10 percent slopes	EveC	52.5	A	A	A
Fort Mott loamy sand, 0 to 5 percent slopes	FodB	1,135.8	A	A	A
Galestown sand, 0 to 5 percent slopes	GabB	630.9	A	A	A
Galloway loamy sand, 0 to 5 percent slopes	GamB	23.8	B	C	C
Hammonton loamy sand, 0 to 5 percent slopes	HbmB	215.3	B	C	C
Hammonton sandy loam, 0 to 2 percent slopes	HboA	21.4	B	C	C
Hammonton-Urban land complex, 0 to 2 percent slopes	HbrB	35.3	B	C	C
Keyport loam, 5 to 10 percent slopes	KeoC	24.3	B	C	C
Manahawkin muck, 0 to 1 percent slopes, frequently flooded	MakAt	154.5	C	C	C
Marlton silt loam, 2 to 5 percent slopes	MasB	303.9	B	B	C
Marlton silt loam, 5 to 10 percent slopes	MasC	689.5	B	B	C
Matapeake silt loam, 0 to 2 percent slopes	MbrA	51.3	A	A	A
Matapeake silt loam, 2 to 5 percent slopes	MbrB	15.7	A	A	A
Matapeake silt loam, 5 to 10 percent slopes	MbrC	261.1	A	A	A
Mattapex silt loam, 0 to 2 percent slopes	MbuA	137.1	B	C	C
Mattapex silt loam, 2 to 5 percent slopes	MbuB	538.0	B	C	C
Mattapex-Urban land complex, 0 to 5 percent slopes	MbxB	151.5	B	C	C
Muttontown sandy loam, 0 to 2 percent slopes	MutA	339.4	B	C	C

Soil Description	Soil Code	Acres	Building without Basement	Building with Basement	Septic Systems
Othello and Fallsington soils, 0 to 2 percent slopes	OtkA	1,569.8	C	C	C
Othello, Fallsington, and Trussum soils, 0 to 2 percent slopes	OtmA	918.2	C	C	C
Pedricktown, Askecksy, and Mullica soils, 0 to 2 percent slopes, rarely flooded	PEEAR	361.4	C	C	C
Pits, sand and gravel	PHG	4.7	A	A	C
Sassafras sandy loam, 2 to 5 percent slopes	SacB	1,060.8	A	A	A
Sassafras sandy loam, 5 to 10 percent slopes	SacC	338.2	A	A	A
Sharptown silt loam, 0 to 2 percent slopes	ShnA	724.7	B	C	C
Sharptown silt loam, 2 to 5 percent slopes	ShnB	2,677.8	B	C	C
Swedesboro loamy sand, 0 to 5 percent slopes	SwtB	1,462.2	A	A	A
Swedesboro loamy sand, 5 to 10 percent slopes	SwtC	600.9	A	A	A
Urban land	UR	73.4	n/a	n/a	n/a
Water	WATER	172.6	n/a	n/a	n/a
Woodstown sandy loam, 0 to 2 percent slopes	WoeA	637.7	A	C	B
Total Acres		**23,430.6**			

Key to Land Use Implications	
A = Slight.	Little or no limitation(s) or easily corrected by use of normal equipment and design techniques.
B = Moderate.	Presence of some limitation, which normally can be overcome by careful design and management at somewhat greater cost.
C = Severe.	Limitations that, normally, cannot be overcome without exceptional, complex, or costly measures.

Source: US Department of Agriculture, Natural Resource Conservation Service

CLIMATE

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

A number of weather and climate observation stations are located in Woodstown and Pilesgrove. The National Climate Data Center (NCDC) of the National Oceanic and Atmospheric Administration (NOAA) operated three cooperative stations in the Woodstown area between 1948 and early 2004. Data from these stations is available online from the NCDC website: www.ncdc.noaa.gov. AWS Convergence Technologies in cooperation with the Woodstown Regional School District operates a weather station at the Mary S. Shoemaker Elementary School. Real-time weather data is available online at the school district website

(www.woodstown.org), although archived data is not available. The Office of the State Climatologist at Rutgers University operates a climate and weather station at the Woodstown State Police Barracks as part of its SafetyNet weather network. Again, while current data from this station is available online, archived data is not. Between 1901 and 2000, New Jersey's climatological office sponsored ten weather-reporting stations in Woodstown, usually operated by a farmer or other local resident. The New Jersey Turnpike Authority operates a series of weather and climate stations, including one on the Oldmans Creek near the Pilesgrove-Woolwich border.

Climate also varies within distinctive climate zones found throughout the state, including: the ridges and valleys, the highlands, the central piedmont plateau; the inner coastal plain, and the outer coastal plain. Registering some of the highest average daily and evening temperatures, Woodstown and Pilesgrove in the inner coastal plain are, overall, in the warmest part of New Jersey.

Source: DVRPC

Woodstown and Pilesgrove have a mild climate, allowing for crops and natural vegetation to flourish throughout most of the year.

Woodstown and Pilesgrove have mild climates, especially compared to other parts of southern New Jersey. Woodstown and Pilesgrove's proximity to the Delaware Bay creates a moderating effect. The area's soils retain the day's warmth into the night while Pinelands' soils (in the outer coastal plain) are sandy and exhibit a strong radiational cooling after sunset. Evening temperatures can be as much as 20 degrees lower and frost occurs in the Pinelands more often than in the inner coastal plain. Conversely, the outer coastal plain is generally warmer in the autumn and winter and cooler in the spring and summer (coinciding with ocean water temperatures) than that of Woodstown and Pilesgrove.

The average annual mean temperature for Woodstown is 55.2ºF. This compares with a statewide mean temperature of 52.3ºF. Of 36 stations throughout the state, only two – the Atlantic City Marina (55.3ºF) and Belleplain (54.3ºF) in Cape May County – had higher annual average mean temperatures. The lowest annual mean temperature is 46.3ºF at High Point, Sussex County.

With the lone exception of Newark, which is significantly impacted by the urban heat island effect, Woodstown has the highest "cooling degree day" normal in New Jersey at 1,106, notably higher than the statewide average of 807 "cooling degree days." "Cooling degree days" are the number of degrees the average daily temperature is above 65ºF.

The Woodstown-Pilesgrove mean temperature for July is 76.9ºF, surpassed only by Newark (77.2ºF), which, again, suffers from the urban heat island effect. The monthly mean temperature for January in Woodstown-Pilesgrove is 32.9ºF, exceeded only by three southern, coastal stations - Atlantic City Marina (35.2ºF), Belleplain (33.2ºF), and Cape May Point (34.3ºF).

Extreme temperatures recorded at Woodstown and Pilesgrove between 1948 and 2000 are a low of -13ºF on January 22, 1984 and a high of 103ºF on July 3, 1966.

Precipitation and Storm Events

The southwestern climate zone in the inner coastal plain generally receives less precipitation than other parts of New Jersey. The normal average annual precipitation for Woodstown (1971 through 2000) is 45.76 inches compared to a statewide normal annual precipitation of 47.87 inches. This may be explained by Woodstown's southern location, further away from the Great Lakes-St. Lawrence storm track than other parts of New Jersey. Additionally, Woodstown's location, approximately 60 miles inland, is less susceptible to heavy rains associated with coastal storms.

Snowfall typically occurs in New Jersey when moist air from the south converges with cold air from the north. In Woodstown and Pilesgrove, snowfall may occur from mid-November to early April, but is most likely to occur from mid-December to mid-March. The snowiest season on record was the winter of 1995-96, when 52.5 inches of snow fell on Woodstown, including 19 inches between January 7 and 8.

Severe storm events, including thunderstorms, tropical storms, blizzards, ice storms, hail storms and tornadoes, all occur in Salem County. Tornadoes are infrequent and in modern history, only hurricanes passing offshore of New Jersey or the remnants of hurricanes have impacted the State. Nevertheless, some of these have been severe. For example, on September 16th 1999, Hurricane Floyd was downgraded to a tropical storm as it passed ten miles east of Atlantic City. Floyd caused torrential rains, high winds, flooding, and widespread devastation across New Jersey. Woodstown received 7.96 inches of rain.

While not climate-related, earthquakes are another natural hazard that warrants a brief discussion. Five earthquakes have occurred with epicenters located in Salem County and are listed below:

- November 15, 1939 – 3.4 magnitude centered east of Elmer on the Upper Pittsgrove/Franklin border
- February 28, 1973 – 3.5 magnitude centered east of Deepwater, Carneys Point Township
- July 10, 1973 – 2.6 magnitude centered south of Auburn, Oldmans Township
- October 23, 1990 – 2.9 magnitude centered north of Hancocks Bridge in Elsinboro Township and
- March 25, 1998 – 1.9 magnitude centered at Artificial Island, Lower Alloways Creek Township.

Growing Seasons

Woodstown and Pilesgrove are within U.S. Department of Agriculture (USDA) Plant Hardiness Zone 7, the area where annual minimum temperatures are typically between 0ºF and 5ºF. In New Jersey, all of Salem County, adjacent portions of Cumberland and Gloucester counties, and areas along the Atlantic coastline are designated Zone 7, the warmest USDA Plant Hardiness Zone in New Jersey. The plant-growing season (the time period during which temperatures average above 42ºF) at Woodstown is approximately 250 days in duration, from March 15 to November 25. This is only about five days shorter than that of the southern Cape May peninsula, and is about a month longer than the vegetative growing season in northwestern New Jersey.

Source: DVRPC

Farmland in Pilesgrove

Woodstown and Pilesgrove's agricultural growing season is approximately six months, or 180 days, from mid-April to mid-October. This is the period between the last spring frost and first autumn frost. However, harvesting of grain crops typically continues throughout November, and winter crops such as broccoli, cauliflower, and cabbage are grown until the first hard freeze, usually in early January. The frost-free growing season in Woodstown and Pilesgrove is about 60 days longer than in northern New Jersey, where frosts may end in May and begin in September.

SURFACE WATER RESOURCES

All of Woodstown and Pilesgrove's land drains to the Delaware River. All of Woodstown and much of Pilesgrove's land surface drains by way of the Salem River. A large portion of Pilesgrove – the northern and northeastern sectors – drains to Oldmans Creek, which forms the township's border with Woolwich and South Harrison townships as well as the border between Gloucester and Salem counties. The southeastern corner of Pilesgrove Township drains to an unnamed tributary in the Alloway Creek system. A small stretch, about one-quarter of a mile, of Alloway Creek also crosses through Pilesgrove Township, on its way to Mannington Township from Upper Pittsgrove Township.

Watersheds

A watershed is all the land that drains to a particular waterway such as a river, stream, lake, or wetland. A watershed's boundaries are defined by the high points in the terrain, such as hills and ridges. 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 Salem River watershed. The Salem River watershed, in turn, is formed of several subwatersheds, consisting of the land that drains to a major tributary or branch of the creek, such as the Nichomus Run watershed. These subwatersheds can be further subdivided into smaller ones, each surrounding the smaller tributaries that flow to the larger channel, and so on down to the catchment level. Watersheds are natural ecological units, where soil, water, air, plants, and animals interact in a complex relationship. Pilesgrove Township contains four HUC -11[3] watersheds – the Oldmans Creek, Salem River (above Route 540), Salem River (below Route 540) and the Alloway Creek watersheds. Woodstown Borough is contained within only one HUC-11 watershed – the Salem River (above Route 540) watershed. Because the Salem River watershed is so large, NJDEP has separated the watershed into two areas and given them separate HUC-11 numbers.

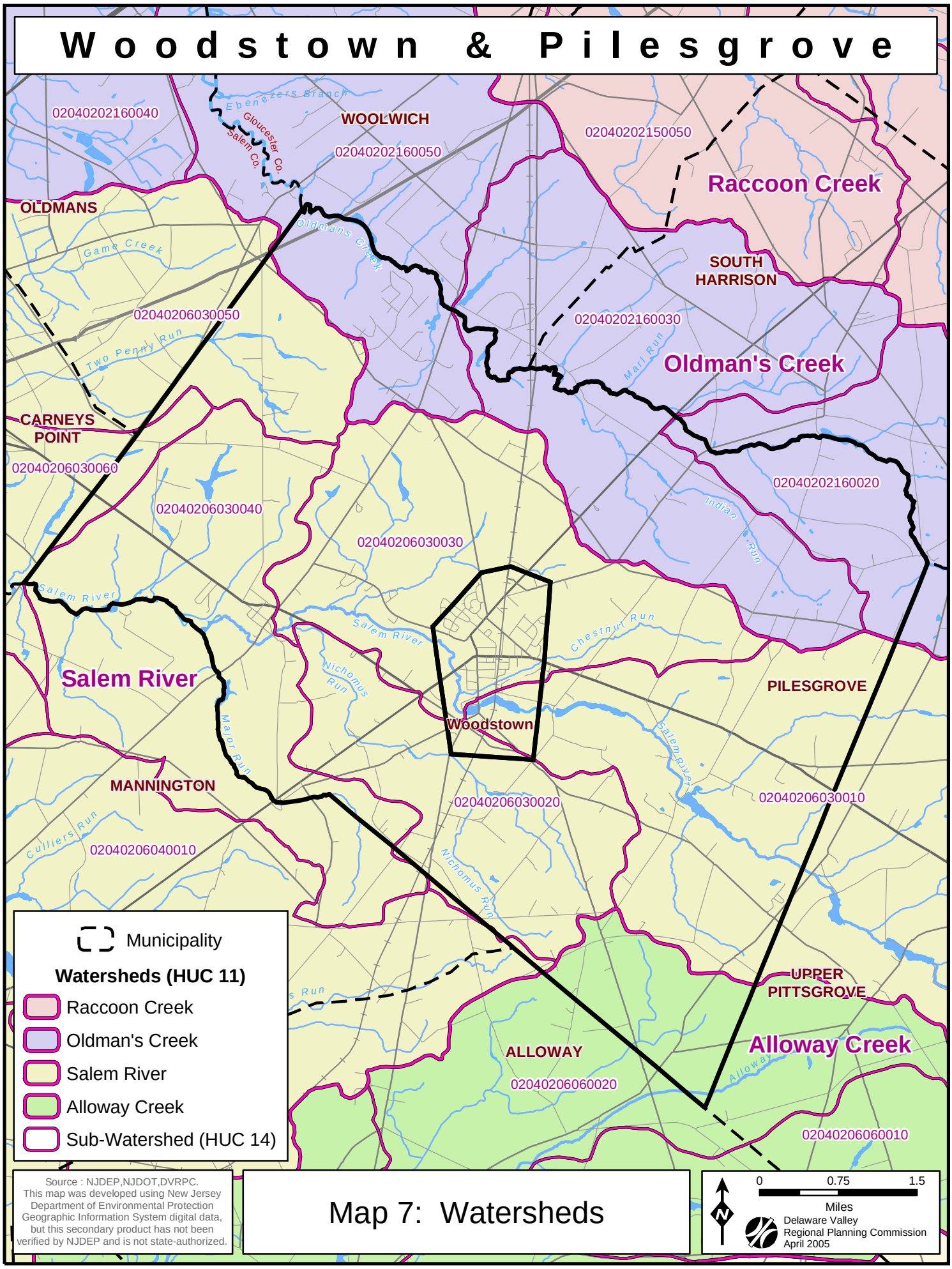
The percentage of each municipality's land that is within these watersheds is listed in the following table. See also **Map 7: Watersheds**, **Map 8A: Pilesgrove Surface Water, Wetlands and Vernal Pools**, and **Map 8B: Woodstown Surface Water, Wetlands, and Vernal Pools.**

Table 10: Watersheds in Woodstown & Pilesgrove

Watershed	USGS Watershed Code (HUC 11 Number)	Stream Classification	Acreage within Municipality	% of Municipal Land	Subwatersheds (HUC 14 Numbers) within Municipality
Woodstown					
Salem River	02040206030	FW2-NT/SE1	1,036	100%	02040206030050 02040206030060 02040206030040 02040206030030 02040206030020 02040206030010
Pilesgrove					
Oldmans Creek	02040202160	FW2–NT/SE1	5,260	23.5%	02040202160050 02040202160030 02040202160020
Salem River	02040206030 02040206040	FW2-NT/SE1	16,000	71.4	02040206030050 02040206030060 02040206030040 02040206030030 02040206030020 02040206030010 02040206040010
Alloway Creek	02040206060	FW2-NT/SE1	1,135	5.1%	02040206060020

Source: NJDEP, Bureau of Geographic Information Systems

[3] "HUC" stands for Hydrological Unit Code, which is a numerical identification number given to every drainage system in the United States by the US Geological Survey. HUC-11 codes are the 11-digit numbers applied to a part of a drainage area that is approximately 40 square miles in size. HUC-11 areas are further subdivided into HUC-14 subwatersheds, with the identification number for each one having 14 digits.


Woodstown & Pilesgrove
02040202160040
Ebenezers Branch
Gloucester Co.
Salem Co.
WOOLWICH
02040202160050
02040202150050
Raccoon Creek
OLDMANS
Game Creek
Oldmans Creek
SOUTH HARRISON
02040206030050
Two Penny Run
02040202160030
Marl Run
Oldman's Creek
CARNEYS POINT
02040206030060
02040202160020
02040206030040
Indian Run
02040206030030
Salem River
Salem River
Chestnut Run
Salem River
Nichomus Run
PILESGROVE
Woodstown
Major Run
MANNINGTON
02040206030020
02040206030010
Salem River
Culliers Run
02040206040010
Nichomus Run
UPPER PITTSGROVE
ALLOWAY
Alloway Creek
Alloway
02040206060020
02040206060010
Municipality
Watersheds (HUC 11)
Raccoon Creek
Oldman's Creek
Salem River
Alloway Creek
Sub-Watershed (HUC 14)
Source : NJDEP,NJDOT,DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.
Map 7: Watersheds
N
0
0.75
1.5
Miles
Delaware Valley Regional Planning Commission
April 2005

Oldmans Creek Watershed

Oldmans Creek drains an area of 44 square miles, of which 8.22 square miles are within Pilesgrove Township. Its main channel is 20 miles long and forms half of the boundary between Gloucester and Salem counties. The creek is tidal up to a point along the boundary between Pilesgrove and Woolwich townships, where Rainey's Run (in Woolwich) joins the main channel from the north. The headwaters of Oldmans Creek's main channel lie in Elk Township in Gloucester County and in Upper Pittsgrove Township in Salem County. The creek flows northwestward to Pilesgrove Township, with South Harrison and Woolwich on its north side, and then between Logan Township (Gloucester County) and Oldmans Township (Salem County), before emptying into the Delaware River.

Lenape Indians, known as the Kagkakaini Sakins, named the creek the "Mosackas," the meaning of which is unknown. "Oldmans Creek" is a variation of "Aldermans Creek," a name given to the waterway by the Dutch. The creek was the site of many sawmills and gristmills during the 18th and 19th centuries. Two of Oldmans Creek's major impoundments – Harrisonville Lake and Porches Mill Pond (now drained) – lie along or adjacent to Pilesgrove's borders in South Harrison and Woolwich townships, respectively.

The largest tributary to the Oldmans Creek's main channel within Pilesgrove is Indian Run, which has its headwaters east of Harrisonville Lake Road and north of Whig Lane Road. Other large tributaries are Kettle Run in Upper Pittsgrove, Marl Run and Lincoln Stream in South Harrison; Porches' Creek, Ebenezer's Branch, and Indian Branch, all in Woolwich; Beaver Creek in Oldmans Township; and Tide Branch in Logan.

Along the Pilesgrove reaches, the Oldmans corridor is a moderately steep ravine with narrow wetlands along both sides for most of its length. Much of the forested uplands in Pilesgrove have been cleared for farmland or for residential development (consisting of Laurel Hills, Laurel Hills II, and the Woods at Laurel Hills), but a ribbon of forested and emergent wetlands remains immediately adjacent to the creek. Pilesgrove also has about 34 acres of tidal marshes intact at its most northern tip, near the creek's head of tide. Large portions of Oldmans and Logan Township remain wetlands, as part of the Pedricktown Marsh, which is one of the premier bird areas in the state of New Jersey, an important stopover site for migratory waterfowl, and an eco-tourist attraction for many bird watchers from throughout the region. The water quality of Oldmans Creek was very high until about ten years ago when it began to deteriorate as

development in the watershed increased. This is a major concern because of the potential effects on the tidal marsh and on the very important habitat it provides.

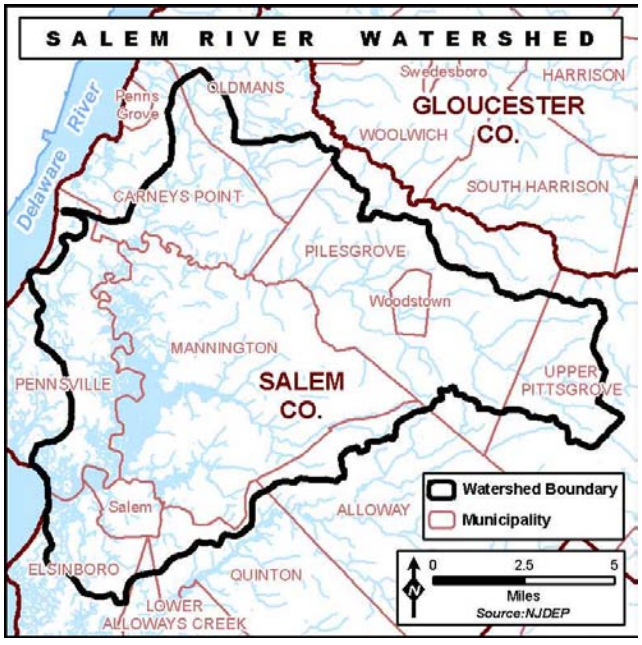
Salem River Watershed

The Salem River watershed drains an area of 117 square miles, covering about one-third of Salem County, making it the largest watershed within the county. Twenty-five square miles of Pilesgrove (71 percent of the township's total land area) and 1.6 square miles of Woodstown (the borough's entire land area) drain to the Salem River. Thirteen of the county's fifteen municipalities are wholly or partially within this watershed; and about 55,000 of the county's 67,500 residents live within this watershed.

Source: DVRPC

East Lake, a large impoundment on the Salem River

Salem River flows 32 miles west from the area of Pole Tavern in Upper Pittsgrove Township, through Pilesgrove, to an extensive marshland in Carneys Point Township. From there a cut channel runs to the Delaware River just below Deepwater. However, the river's main channel turns south to become part of the large Mannington Meadow body of shallow water, which is also fed by smaller streams coming in from the east. Just above the City of Salem, the river turns west and flows into the Delaware River just below the Supawna Meadows National Wildlife Refuge. Much of the lower portions of the river and its tributaries are tidal. A large part of Salem River, approximately 22 miles, remains navigable and is managed by the U.S. Army Corps of Engineers.



The largest tributary to Salem River within Woodstown is the Chestnut Run, which has its headwaters in Pilesgrove, west of Harrisonville Lake Road. In Pilesgrove, large tributaries on the south side of the river include Nichomus Run and Major Run, which starts in Mannington Township and forms part of the border between Pilesgrove and Mannington. Other large tributaries, downstream from Pilesgrove, are Swedes Run-Mannington Creek and Fenwick Creek, both in Mannington Township, and

Pilesgrove Township

Map 8A: Surface Water, Wetlands and Vernal Pools

OLDMANS
WOOLWICH
SOUTH HARRISON
ELK
CARNEYS POINT
Woodstown
PILESGROVE
MANNINGTON
UPPER PITTSGROVE
ALLOWAY

Oldmans Creek
New Jersey Turnpike
Two Penny Run
Pointers Auburn Rd
Auburn-Woodstown Rd
Sharptown-Auburn Rd
Kings Hwy
Porches Millpond
Mark Run
Harrisonville Lake
Featherbed Ln
Point Airy Rd
Auburn - Woodstown Rd
Eldridge's Hill Rd
Lincoln Rd
Indian Run
Kelly Pond
Salem River
Marlton St
Nicholas Run
Memorial Lake
East Lake
Chestnut Run
Stewart Rd
Harrisonville Lake Rd
Whig Lane Rd
Harding Highway
Mill Rd
Avis Millpond
Gloucester Co.
Salem Co.
Major Run
County Home Rd
Old Salem Rd
Culliers Run
Yorkow Run
Woodstown-Daretown Road
Slaptown Lake
Manington Creek
Swedes Run
Alloway - Woodstown Rd
Alloway Creek

213, 212, 2737, 2738, 2739, 2740, 2736, 2675, 2676-2680, 2673, 2674, 2717-2722, 2723, 2727, 2725, 2724, 2729, 2726, 2728, 2730, 2689, 2690, 2744, 2748, 2732, 2733, 2709-2712, 2763-2767, 2713, 2734, 1422, 210, 211, 2761, 2768, 2746, 2762, 2742, 2741, 4933, 4935, 4934, 2756, 493202, 2755, 2757-2760, 2086, 2192, 2087 & 2090-2092, 2062, 4941, 2174, 2175, 2077-2084, 2088-2089, 2111-2112, 2747-2757, 2953, 4948-4954 & 13326, 2950, 4937, 4938, 2517, 2518, 2506, 2508, 2507, 2511, 2516, 2515, 2513, 2509, 2510, 2511, 12344, 2512

Vernal Pool Location
Dam
Head of Tide
Wetlands
Agricultural Wetlands

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

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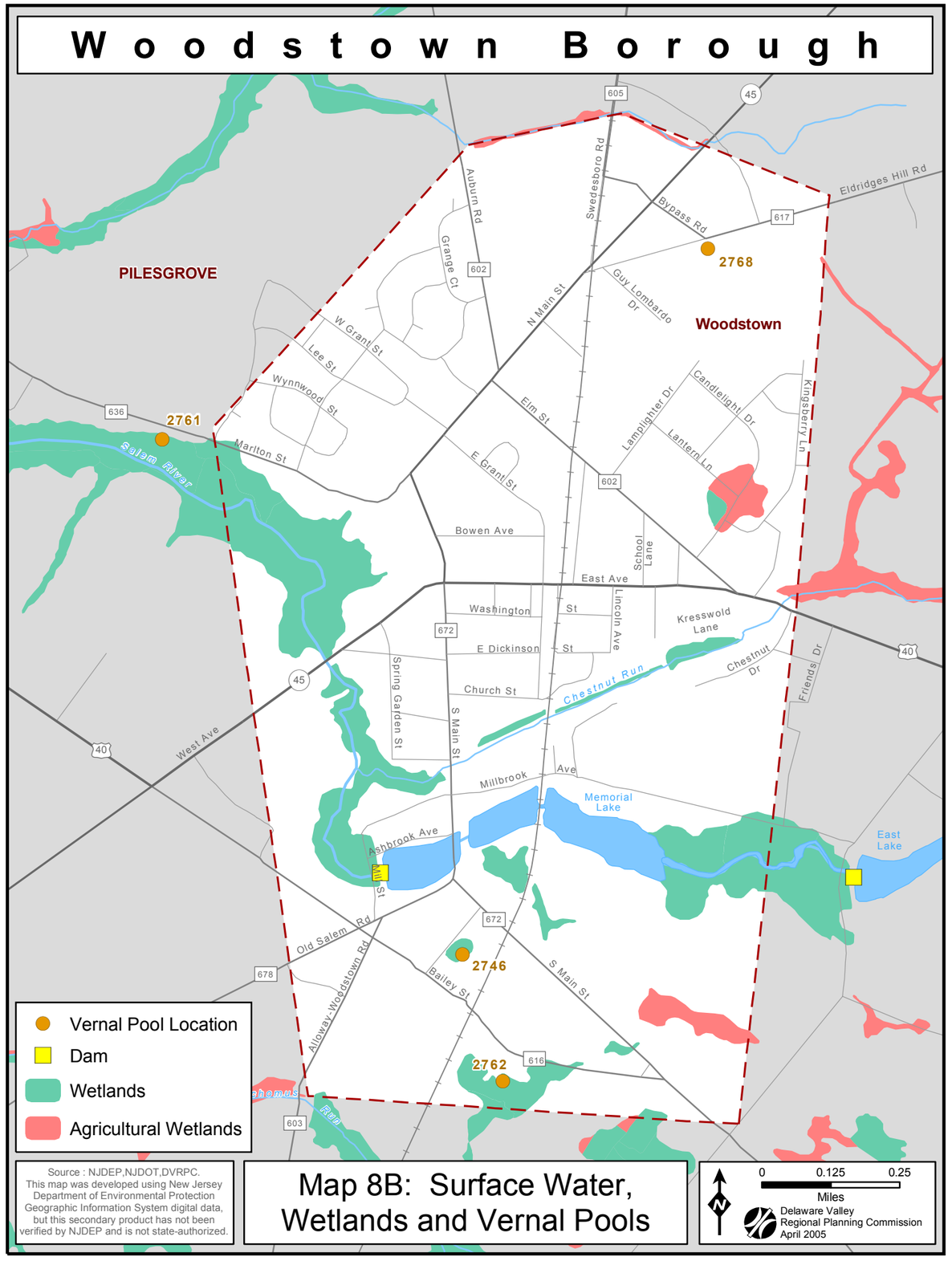
Miles
Delaware Valley Regional Planning Commission
April 2005


Woodstown Borough
PILESGROVE
Woodstown
2768
2761
2746
2762
Salem River
Chestnut Run
Auburn Rd
Swedesboro Rd
Bypass Rd
Eldridges Hill Rd
Grange Ct
W Grant St
Lee St
Wynnwood St
N Main St
Guy Lombardo Dr
Marlton St
E Grant St
Elm St
Lamplighter Dr
Candlelight Dr
Lantern Ln
Kingsberry Ln
Bowen Ave
School Lane
East Ave
Washington St
Lincoln Ave
Kresswold Lane
E Dickinson St
Chestnut Dr
Church St
Spring Garden St
S Main St
Friends Dr
West Ave
Millbrook Ave
Memorial Lake
East Lake
Ashbrook Ave
Mill St
Old Salem Rd
Alloway-Woodstown Rd
Bailey St
S Main St
605
45
617
602
636
672
678
616
603
40
Vernal Pool Location
Dam
Wetlands
Agricultural Wetlands
Source : NJDEP,NJDOT,DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.
Map 8B: Surface Water, Wetlands and Vernal Pools
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Miles
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Game Creek in Oldmans Township. Two Penny Run is a large tributary that connects to Game Creek and flows across Oldmans and Carneys Point townships, but which starts in the northwestern section of Pilesgrove.

The Salem River, on its western stretches in Pilesgrove, is surrounded by wetlands. Between Slabtown Lake in Upper Pittsgrove and Memorial Lake in Woodstown, the river is protected by moderate patches of upland forests, brushland, and wetlands to the south. Most of the vegetated buffer along its north side was removed for agricultural use.

The Salem River watershed provides critical habitat for many rare, threatened, and endangered species, due to its extensive freshwater and tidal wetlands and marshes. Several wildlife management areas have been established by the state along the river and around the Mannington meadow, in addition to the very large federal Supawna Meadows National Wildlife Refuge near its mouth. Four of these state wildlife management areas are located in Pilesgrove Township. Additionally, the National Parks Service has designated 17 miles of the Salem River as part of the "Wild and Scenic River" system, based on its remarkable scenic and recreational opportunities as well as outstanding habitat for fish and wildlife.

Alloway Creek Watershed

Alloway Creek, named after a Lenni Lenape leader, Alloes, drains an area of 75 square miles, of which a small portion ─1.88 square miles ─ is within Pilesgrove Township. The creek's main channel is 24 miles long and it rises (starts) in Upper Pittsgrove Township near Pilesgrove's border before crossing the most southerly tip of Pilesgrove on its way to the southwest. A large unnamed tributary to the creek originates in Pilesgrove Township. From Pilesgrove, the Alloway flows across Alloway, Quinton, and Lower Alloways Creek townships before emptying into the Delaware River just north of Mad Horse Creek Wildlife Management Area.

Alloway Creek is tidal up to an artificial impoundment at Alloway Lake in Alloway Township, which is the largest lake in Salem County. Alloway Creek supports freshwater forested wetlands throughout its southwestward course to the Delaware, and extensive tidal marshes and meadow estuary near the Delaware River.

The Alloway Creek watershed is primarily rural. Most of its wetland habitat is still intact, although the watershed is experiencing incremental loss of upland buffers as development increases in Salem County. In Pilesgrove, upland forest surrounds Alloway Creek, but the

forested buffer along the unnamed tributary was removed so the land could be used for agriculture.

Streams

There are a total of about three stream miles flowing across Woodstown Borough and about 64 stream miles crossing Pilesgrove Township. Of these, 1.5 miles in Woodstown, and 49 miles in Pilesgrove are first order or second order (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 11: Woodstown Borough and Pilesgrove Township Streams

Stream Order	Miles
First Order streams (smallest)	34.67
Second Order streams	15.79
Third Order streams	16.29
Total Stream Miles	66.75

Source: NJDEP, Bureau of Geographic Information Systems

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

Approximately 1.5 miles of the Oldmans Creek are tidal within Pilesgrove. Tidal flows bring Delaware River water into the streams twice a day. Tidal flows both help and hinder maintenance of good water quality in affected streams. The flood (incoming) tide carries leaves and nutrients that are beneficial to aquatic organisms, but it also limits the regular flushing out of silt and pollutant-laden waters coming from upstream. Silt deposition within a stream tends to increase during flood tides, although deposition is also a function of stream shape, the presence of specific flow barriers, and the quantity of silt (the load) being carried by the stream. See **Map 8A: Pilesgrove Surface Water, Wetlands, and Vernal Pools** and **Map 8B: Woodstown Surface Water, Wetlands, and Vernal Pools**.

Lakes and Ponds

There are three named waterbodies and numerous other small ponds and water impoundments in Woodstown Borough and Pilesgrove Township. Woodstown's only named waterbody is Memorial Lake and Pilesgrove's two named waterbodies are East Lake and Avis Mill Pond. Additionally, Pilesgrove borders Harrisonville Lake, which lies mostly in South Harrison Township. Kelly Pond in Carneys Point Township and Slabtown Lake in Upper Pittsgrove Township are also very close to Pilesgrove's borders. These open bodies are all permanent waters. All three waterbodies were created by impounding the Salem River and were originally created in the 18th and 19th centuries to power gristmills or sawmills. There are also several unnamed waterbodies along the main stems and tributaries of the Oldmans Creek, Two Penny Run, and Salem River in Pilesgrove. Farmers needing irrigation or drinking water sources for livestock created most of these impoundments. All of these lakes are classified as artificial waterbodies by NJDEP. Naturally occurring lakes do not exist in southern New Jersey.

Source: DVRPC

Memorial Lake, Woodstown

There are a total of approximately 156 acres of waterbodies within Woodstown and Pilesgrove. Avis Mill Pond, at 26.1 acres, is the largest. Avis Mill Pond is owned by Salem County and was the site of Camp Crocket, a former YMCA camp that is no longer in use. Memorial Lake, which falls completely within Woodstown, is 21.8 acres and is owned by the Borough of Woodstown. East Lake is the smallest named waterbody at 20.4 acres and is privately owned. The remaining lakes in the township are also privately owned. All large, publicly held waterbodies are used by the general public for passive recreational activities, such as fishing and bird watching. See **Map 8A: Pilesgrove Surface Water, Wetlands, and Vernal Pools** and **Map 8B: Woodstown Surface Water, Wetlands, and Vernal Pools**.

Wetlands

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

can be either saline or freshwater. There are also special wetland categories to denote saturated areas that have been altered by human activities. For legal definitions of wetlands, please see ANJEC's publication *Freshwater Wetlands Protection in New Jersey*.

New Jersey protects freshwater (interior) wetlands under the New Jersey Freshwater Wetlands Protection Act Rules: N.J.A.C. A 7:7A. The law also protects transition areas or "buffers" around freshwater wetlands. The New Jersey freshwater wetlands maps provide guidance on where wetlands are found in New Jersey, but they are not the final word. Only an official determination from DEP, called a "letter of interpretation," 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. Additional information on wetlands rules and permits is available through NJDEP and on its website under "land use." See *Sources of Information, page 107*.

All of Pilesgrove and Woodstown's wetlands are freshwater. Natural wetlands of all types total 1,991 acres within both municipalities, of which 1,547 acres are forested wetlands, 410 acres are low-growing emergent, scrub/shrub or herbaceous wetlands, and 34 acres are tidal wetlands, occurring only in Pilesgrove Township. These tidal wetlands are located along Oldmans Creek up to the head of tide, which is halfway between the NJ Turnpike and King's Highway. See **Map 8A: Pilesgrove Surface Water, Wetlands, and Vernal Pools** and **Map 8B: Woodstown Surface Water, Wetlands, and Vernal Pools**.

Woodstown and Pilesgrove also include 558 acres of wetland areas that have been altered by human activities and no longer support typical wetland vegetation, or are not vegetated at all. These modified wetland areas do, however, show obvious signs of soil saturation and exist in areas shown to have hydric soils on US Soil Conservation Service soil surveys. Modified wetlands fall into categories defined by the *Anderson Land Use Classification* system, as follows: there are 50 acres of disturbed wetlands, 451 acres of agricultural wetlands, 44 acres of former agricultural wetlands, 10 acres of wetlands found in maintained greenspace or lawn, and about four acres of wetlands used as a right-of-way, within both municipalities. A more detailed description of all of Woodstown and Pilesgrove's wetland areas is found in the *Biological Resources* section, under "Wetlands," page 74.

Agricultural Wetlands

Agricultural wetlands occupy 12 acres of Woodstown Borough and 439 acres of Pilesgrove Township. These "quasi-wetlands" are found scattered as small sites throughout the borough and township and bordering natural wetlands, irrigation ponds, or streams. Agricultural wetlands are lands under cultivation that are modified former wetland areas. These areas still exhibit evidence of soil saturation in aerial infrared photo surveys, but they do not support natural wetland vegetation. See **Map 8A: Pilesgrove Surface Water, Wetlands, and Vernal Pools** and **Map 8B: Woodstown Surface Water, Wetlands, and Vernal Pools**.

As long as agricultural wetland areas remain in agricultural use, they are exempt from New Jersey's 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 Resources Conservation Service sponsors the Wetlands Reserve Program (www.nrcs.usda.gov/programs/wrp), 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.

Vernal Pools

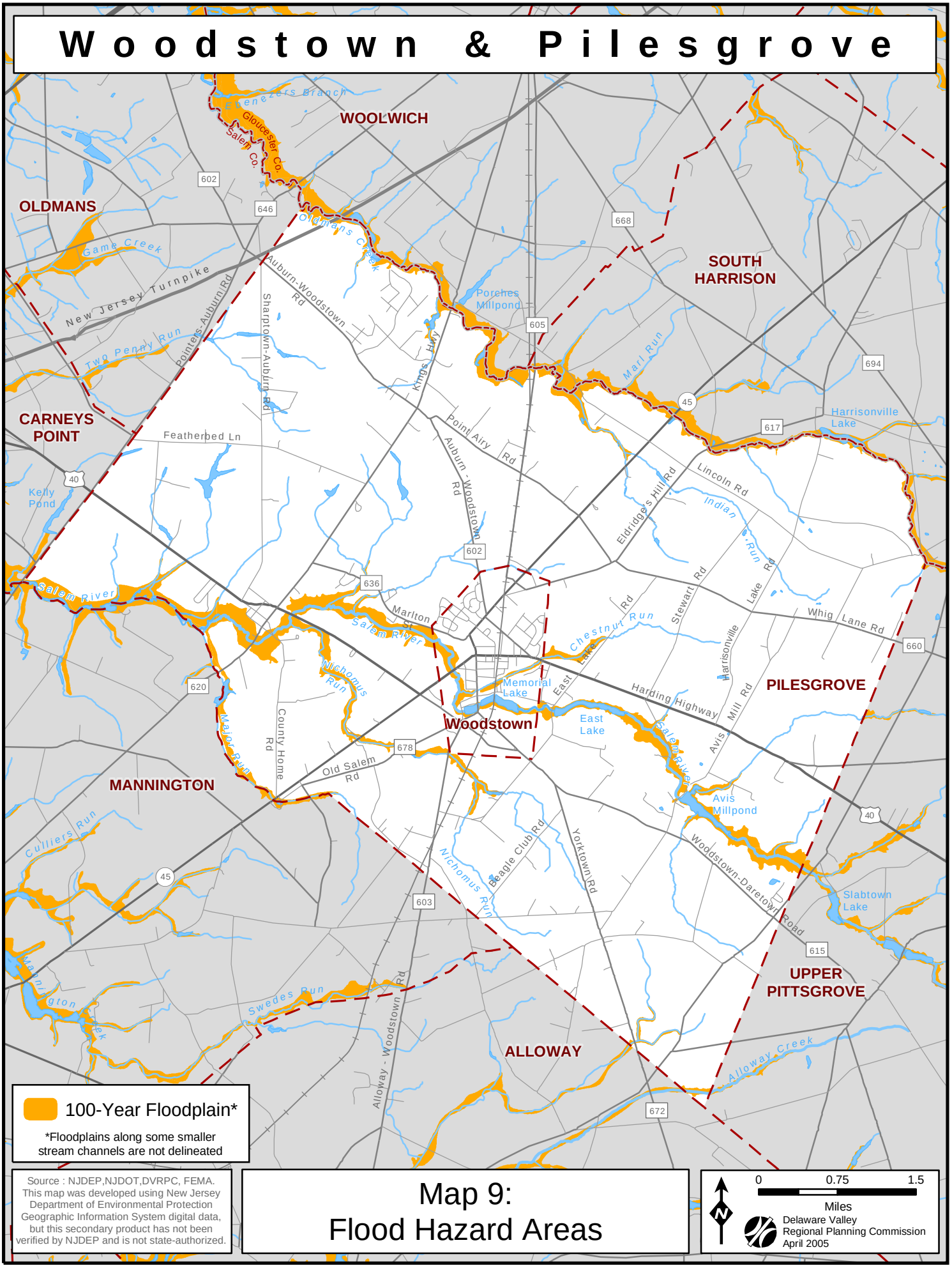
Vernal pools are bodies of water that appear following snow melt and during spring rains, but which disappear or are dry during the rest of the year. They are highly important sites for certain rare species of frogs and salamanders, called obligate breeders. Obligate breeders will only breed in vernal pools, because the pool's impermanence prevents residence by predators who 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 that their existence as wetlands has frequently not been recognized. Consequently, many of them have disappeared from the landscape, or have been substantially damaged. This, in turn, is a principal cause of the decline of their obligate amphibian species.

The New Jersey Division of Fish and Wildlife has been conducting a Vernal Pool Survey project since 2001, to identify, map, and certify vernal ponds throughout the state. Once a vernal pond is certified, regulations require that a 75-foot buffer be maintained around the pond. NJDEP's Division of Land Use Regulation oversees this designation and restricts development around vernal ponds by denying construction permits. Local municipalities can provide additional protection by instituting restrictive zoning or negotiating conservation easements on the land surrounding the pond.

The state has identified an outstanding number of vernal pools within Woodstown and Pilesgrove – three within Woodstown and 131 within Pilesgrove. Surveys of each pool are planned to determine what species are present and, indeed, if the pool is still in existence as a natural habitat. As of May 2004, 20 sites were surveyed and *confirmed* as vernal pools, and one site was surveyed and *certified* as a vernal pool, all within Pilesgrove Township. One hundred and thirteen are not yet surveyed. A certified vernal pool is defined as one that occurs in a confined basin without a permanently flowing outlet, has habitat documented for one obligate or

Woodstown & Pilesgrove



100-Year Floodplain*

*Floodplains along some smaller stream channels are not delineated

Source : 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.

Map 9: Flood Hazard Areas

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Miles

Delaware Valley Regional Planning Commission

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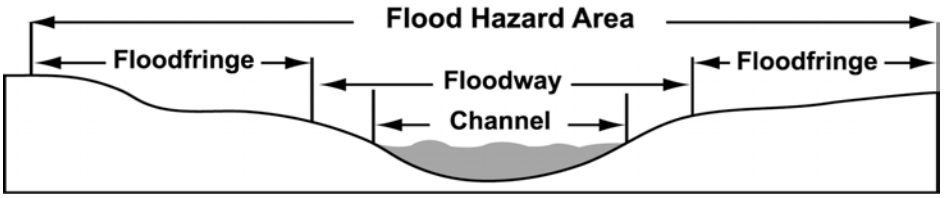
two facultative herptile species, maintains ponded water for at least two continuous months between March and September, and is free of fish populations throughout the year. See **Map 8A: Pilesgrove Surface Water, Wetlands, and Vernal Pools** and **Map 8B: Woodstown Surface Water, Wetlands, and Vernal 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 1 percent chance of occurring in any given year).

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



Source: The Streams of Washington Township

Figure 3: Parts of a Flood Hazard Area

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

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

NJDEP. Additional information on floodplain activities is available from NJDEP and from its website under "Land use." See *Sources of Information, page 107*.

New Jersey's flood hazard area maps are not available in digital form. Consequently, it is only possible to approximate the spatial extent of the flood hazard area in Woodstown and Pilesgrove by using the Federal Emergency Management Agency's (FEMA's) 100-year floodplain maps. FEMA's maps show that 664 acres or 6.5 percent of the township's land area falls within the 100-year floodplain. Presumably, the flood hazard area would be slightly larger.[4] Woodstown's floodplain areas are located along Salem River and Chestnut Branch and the south edge of Memorial Lake. Pilesgrove's floodplain areas are located along the main branches of Oldmans Creek, Salem River, Major Run and Nichomus Run. Smaller streams may periodically flood, but the Federal Emergency Management Agency and NJDEP have not delineated these floodplains because the risk to property and human health is usually minor. See **Map 9: Flood Hazard Areas**.

Table 12: Flood Hazard Area Acreage

Category	Acres
Woodstown	
100-year floodplain	104
Pilesgrove	
100-year floodplain	1,240

Source: Federal Emergency Management Agency (FEMA)

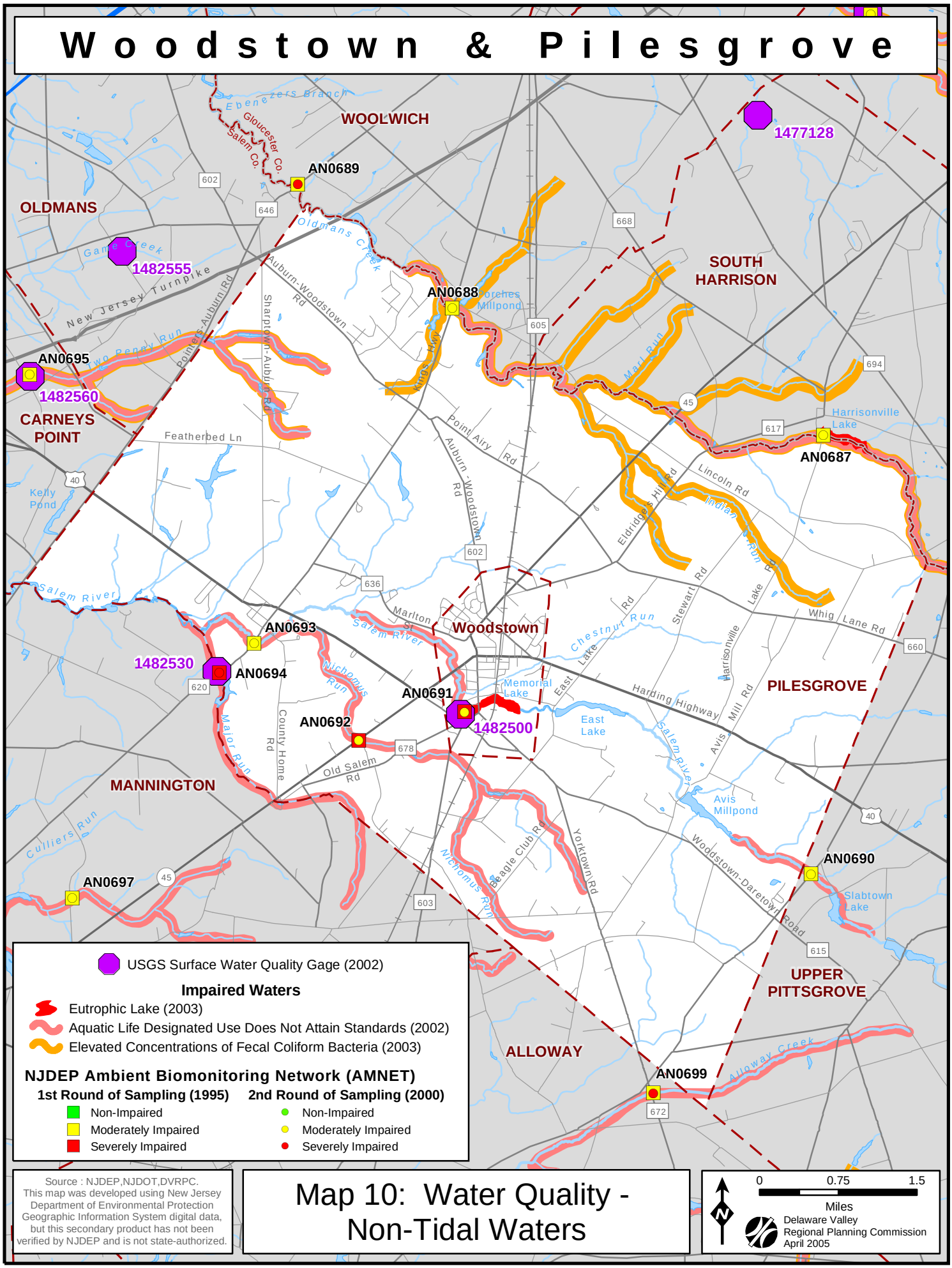
Surface Water Quality

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

All three of the major rivers flowing through Woodstown and Pilesgrove are classified as FW2–NT/SE, which means that they are both freshwater and estuarine streams that are not trout

[4] Site plan and subdivision applications require detailed engineering studies that depict the boundaries of the flood hazard area at a large scale.


Woodstown & Pilesgrove
WOOLWICH
OLDMANS
CARNEYS POINT
MANNINGTON
SOUTH HARRISON
PILESGROVE
UPPER PITTSGROVE
ALLOWAY
Woodstown
AN0687
AN0688
AN0689
AN0690
AN0691
AN0692
AN0693
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AN0695
AN0697
AN0699
1477128
1482500
1482530
1482555
1482560
Ebenezers Branch
Gloucester Co.
Salem Co.
Oldmans Creek
Game Creek
New Jersey Turnpike
Two Penny Run
Poimers-Auburn Rd
Auburn-Woodstown Rd
Sharptown-Auburn Rd
Featherbed Ln
Kelly Pond
Salem River
Kings Hwy
Orchies Millpond
Mary Run
Point Airy Rd
Eldridges Hill Rd
Lincoln Rd
Indian Run Rd
Harrisonville Lake
Marlton St
Chestnut Run
Stewart Rd
Whig Lane Rd
Harrisonville Lake
Memorial Lake
East Lake
Harding Highway
Mill Rd
Avis
Avis Millpond
Salem River
Nichomus Run
Major Run
County Home Rd
Old Salem Rd
Culliers Run
Beagle Club Rd
Yorktown Rd
Woodstown-Daretown Road
Slabtown Lake
Alloway Creek
602
646
668
605
694
45
617
40
636
602
660
620
678
603
672
615
USGS Surface Water Quality Gage (2002)
Impaired Waters
Eutrophic Lake (2003)
Aquatic Life Designated Use Does Not Attain Standards (2002)
Elevated Concentrations of Fecal Coliform Bacteria (2003)
NJDEP Ambient Biomonitoring Network (AMNET)
1st Round of Sampling (1995)
Non-Impaired
Moderately Impaired
Severely Impaired
2nd Round of Sampling (2000)
Non-Impaired
Moderately Impaired
Severely Impaired
Source : NJDEP,NJDOT,DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.
Map 10: Water Quality - Non-Tidal Waters
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Delaware Valley Regional Planning Commission
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producing or trout maintaining. Oldmans Creek, Salem River, and Alloway Creek are freshwater from their headwaters to a location downstream past the head of tide. From these points seaward, the rivers are estuarine water. The remaining tributary streams are FW2-NT waters.

See *Table 13: Water Quality Classifications of Streams in Woodstown Borough and Pilesgrove Township*. According to NJDEP rules, FW2-NT waters must provide for (1) the maintenance, migration and propagation of the natural and established biota; (2) primary and secondary contact recreation (i.e., swimming and fishing); (3) industrial and agricultural water supply; (4) public potable water supply after conventional filtration and disinfection; and (5) any other reasonable uses.

Table 13: Water Quality Classifications of Streams in Woodstown & Pilesgrove

Streams	Classification
Oldmans Creek	FW 2 – NT/SE1
Salem River	FW 2 – NT/SE1
Alloway Creek	FW 2 – NT/SE1

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

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

NJDEP operates two water quality monitoring networks. In cooperation with US Geological Survey (USGS), it runs the Ambient Surface Water Monitoring Network (ASWM). This network contains 115 stations that monitor for nutrients (i.e., phosphorous and nitrogen), bacteria, dissolved oxygen, metals, sediments, chemicals, and other parameters.

The second water quality monitoring system is the Ambient Biomonitoring Network (AMNET), which is administered solely by NJDEP. It evaluates the health of aquatic life as a biological indicator of water quality.[5] 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.

Woodstown Borough and Pilesgrove Township Stream Water Quality

The USGS/NJDEP Ambient Surface Water Monitoring (ASWM) network operates a site in Woodstown and another site in Pilesgrove at which chemical monitoring is conducted. There is a similar site in Carneys Point Township along Two Penny Run, downstream from its Pilesgrove headwaters. These sites are tested for dissolved oxygen, pH, ammonia, nitrogen, phosphorous, metals, and a wide range of organic and inorganic chemicals. The sites were sampled 12 times between November 2000 and August 2002. The results of these samples are summarized in

[5] More specifically, AMNET monitors the diversity of communities of small bottom-dwelling aquatic organisms.

Table 14: New Jersey ASWM Sampling Locations for Woodstown Borough and Pilesgrove Township and the station location is depicted on **Map 10: Water Quality – Nontidal Waters**.

There are seven AMNET sites that assess aquatic life within Woodstown (one site) and Pilesgrove (six sites), and an additional two sites in other townships that are upstream of the township and borough. There is also one site that is immediately downstream of Pilesgrove's and Woodstown's waters. NJDEP sampled each of these AMNET sites in July 1995 and again in July 2000. Each AMNET site was tested for only one water quality parameter ─ the diversity of the aquatic communities at that site. Specifically, the benthic (bottom-dwelling) macroinvertebrates (insects, worms, mollusks, and crustaceans that are large enough to be seen by the naked eye) are collected. The number and types of species present are directly related to water quality. More sensitive species disappear first, followed by moderately sensitive species, as the pollution level increases. As these species "drop out," the diversity of the community drops as well.

In the 1995 (first round) sampling:
Two of the seven sites in Woodstown and Pilesgrove had impairment scores that put them into the range of "severely impaired" for aquatic life support (both in Pilesgrove). Five sites were ranked as "moderately impaired" (one in Woodstown and four in Pilesgrove). The two upstream sites were also moderately impaired, as was the site downstream on Penny Run.

In the 2000 (second round) sampling:
Of the two severely impaired sites in Pilesgrove, one scored slightly higher but still in the impaired range and the other scored high enough to move into the moderately impaired range. Three of the previously moderately impaired sites scored essentially at the same level of moderate impairment (both in Pilesgrove). However, one site in Pilesgrove and the site in Woodstown both declined in score. Their year-2000 scores were within the severely impaired range. The upstream sites in Upper Pittsgrove (Salem River) and Upper Pittsgrove-South Harrison townships (Oldmans Creek) and the downstream site on Two Penny Run all remained moderately impaired. These ten AMNET stations are listed in *Table 15: New Jersey AMNET Sampling Locations for Woodstown and Pilesgrove Waterways* and are depicted on **Map 10: Water Quality – Nontidal Waters**.

New Jersey's Integrated Water Quality Monitoring and Assessment Report

The Federal Clean Water Act under Section 303(d) requires states to identify "Impaired Waters" where specific designated uses are not fully supported. Accordingly, in 2002 and again in 2004, NJDEP compiled the *Integrated Water Quality Monitoring and Assessment Report* (www.state.nj.us/dep/wmm/sgwqt), which included as Sublist "4" and Sublist "5" those waters that are determined to be impaired. Other lists in the report included waterways that are attaining standards (sublist "1") or where additional data is needed to determine their status (sublists "2" and "3").

The ASWM station on Salem River in Woodstown is listed on sublists 4 and 5 as impaired for two parameters: phosphorous and fecal coliform, respectively. The ASWM station on Major

Run in Pilesgrove is listed on Sublist 5 for one parameter: phosphorous. Both stations are on Sublist 1 (fully attaining or nonimpaired) for temperature, dissolved oxygen, pH, nitrate, dissolved solids, total suspended solids and ammonia. The Penny Run station shows impairments for fecal coliform and phosphorus. There is insufficient data for parameters such as dissolved oxygen, pH, temperature, nitrate, and total suspended solids, which places it on Sublist 3. It is on the attaining list (Sublist 1) for dissolved solids and unionized ammonia.

Although all seven AMNET stations in Woodstown and Pilesgrove were severely or moderately impaired for aquatic life, only three of these stations were placed on Sublist 5 in the *2004 Integrated List of Waterbodies*. The remaining stations were placed on Sublist 3 either because testing was discontinued at that site or because NJDEP determined that there was "insufficient data" to either list them as impaired or nonimpaired with any certainty. The Salem River upstream site was also placed on Sublist 5 as impaired, but the Oldmans Creek upstream site and the Two Penny Run downstream site were placed on Sublist 3 due to insufficient data.

NJDEP, in a study of lakes done in the early 1990s, classified Memorial Lake as a eutrophic lake, meaning that the lake has an excessive amount of plant nutrients (primarily phosphorus, nitrogen and carbon), resulting in large and sometimes smelly growth of algae. Such algal blooms rob oxygen from the water, decreasing the use of the habitat for fish and sometimes causing fish kills. Runoff from agricultural fields, feed lots, fertilized lawns, and golf courses are some possible sources of excessive amounts of nutrients found in the state's waterbodies. See the following section for a detailed discussion on causes of water quality impairments.

Knowing the actual condition of streams and stream banks, and planning for their improvement, requires fuller surveys and more frequent monitoring than the state can provide. The state only monitors main channels and only does biological assessments on a five-year cycle. Stream surveys by local organizations are much needed, along with regular monitoring of water quality on all of a community's waterways.

Table 14: New Jersey ASWM Sampling Locations for Woodstown & Pilesgrove Waterways

Site ID	Station Name/Waterbody	Municipality	Parameters Tested	Sampling Dates	Data Source	2004 Impairment Status
01482500	Salem River at Woodstown	Woodstown	Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	11/00 - 8/02	NJDEP/USGS Data	Attaining
01482500	Salem River at Woodstown	Woodstown	Fecal Coliform	11/00 - 8/02	NJDEP/USGS Data	Impaired
01482500	Salem River at Woodstown	Woodstown	Phosphorus	11/00 - 8/02	NJDEP/USGS Data	Impaired
01482530	Major Run at Sharptown	Pilesgrove	Temperature, Dissolved Oxygen, pH, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	11/00 - 8/02	NJDEP/USGS Data	Attaining
01482530	Major Run at Sharptown	Pilesgrove	Phosphorus , Fecal Coliform	11/00 - 8/02	NJDEP/USGS Data	Impaired

Site ID	Station Name/Waterbody	Municipality	Parameters Tested	Sampling Dates	Data Source	2004 Impairment Status
01482560	Two Penny Run near Danzer's Corner	Carneys Point	Dissolved Solids, Unionized Ammonia	11/00 - 8/02	NJDEP/USGS Data	Attaining
01482560	Two Penny Run near Danzer's Corner	Carneys Point	Dissolved Oxygen, pH, Temperature, Nitrate, Total Suspended Solids	11/00 - 8/02	NJDEP/USGS Data	Insufficient Data
01482560	Two Penny Run near Danzer's Corner	Carneys Point	Fecal Coliform	11/00 - 8/02	NJDEP/USGS Data	Impaired
01482560	Two Penny Run near Danzer's Corner	Carneys Point	Phosphorus	11/00 - 8/02	NJDEP/USGS Data	Impaired

Source: NJDEP, Bureau of Freshwater and Biological Monitoring

Table 15: New Jersey AMNET Sampling Locations for Woodstown & Pilesgrove Waterways

Site ID	Station Name/Waterbody	Municipality	Parameters Tested	1995 NJ Impairment Score	2000 NJ Impairment Score	2004 Impairment Status
AN0686	Oldmans Creek at Swedesboro-Monroeville Road	South Harrison	Benthic Macroinvertebrates	12	18	Insufficient Data
AN0687	Oldmans Creek at Lake Road	South Harrison	Benthic Macroinvertebrates	21	18	Insufficient Data
AN0688	Oldmans Creek at Kings Highway	Woolwich	Benthic Macroinvertebrates	12	18	Discontinued Testing
AN0689/ EWQ0689	Oldmans Creek at Pointers-Auburn Road	Woolwich	Benthic Macroinvertebrates	6	12	Impaired
AN0690	Salem River at Commissioners Road (Rt. 581)	Upper Pittsgrove	Benthic Macroinvertebrates	12	9	Impaired
AN0691	Salem River at Mill St	Woodstown	Benthic Macroinvertebrates	15	6	Insufficient Data
AN0692	Nichomus Run at Rt. 45	Pilesgrove	Benthic Macroinvertebrates	15	6	Insufficient Data
AN0693	Salem River at Kings Hwy	Pilesgrove	Benthic Macroinvertebrates	12	12	Impaired
AN0694	Major Run at Pointers-Sharptown Road	Pilesgrove	Benthic Macroinvertebrates	0	6	Impaired
AN0695	Two Penny Run at E. Quillytown	Carneys Point	Benthic Macroinvertebrates	15	15	Insufficient Data

Source: NJDEP, Bureau of Freshwater and Biological Monitoring

NJ Impairment Score	Biological Assessment
0-6	Severely Impaired
9-21	Moderately Impaired
24-30	Non-impaired

In summary, the following waters in and around Woodstown and Pilesgrove are impaired as follows:

For phosphorus only:

- Two Penny Run near Danzer's Corner in Carneys Point Township

For phosphorus and fecal coliform:

- Salem River at Woodstown
- Major Run at Sharptown, Pilesgrove Township

For aquatic life:

- Oldmans Creek from Swedesboro-Monroeville Road upstream, in South Harrison and Upper Pittsgrove townships
- Oldmans Creek from Swedesboro-Monroeville Road downstream to Harrisonville Lake Road in Pilesgrove and South Harrison townships
- Oldmans Creek from Harrisonville Lake to Kings Highway to the head of tide at the confluence of Porches Run and the main channel, Pilesgrove and Woolwich. Below that point the creek is tidal and not included on lists of impairments although the AMNET scores for the station downstream at Pointers-Auburn Road suggests that an impairment may exist
- The headwaters of Two Penny Run to the AMNET monitoring station below Featherbed Lane in Carneys Point Township
- Nichomus Run at County Road 620
- Salem River at Commissioners Road to Slabtown Lake, Upper Pittsgrove Township
- Salem River from Slabtown Lake in Upper Pittsgrove Township to Avis Mill Pond in Pilesgrove
- Salem River from Memorial Lake through Woodstown to the confluence with the first unnamed tributary coming in from the north
- Nichomus Run for its full length
- Major run for its full length

From lake studies and both ASWM and AMNET sampling:

- Salem River at Memorial Lake

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 largest effect on the water quality and channel health of streams in Woodstown and Pilesgrove. 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 the Salem River watershed is known to derive from stormwater drainage off paved surfaces such as streets, commercial/industrial areas, and residential sites (with and without detention basins), 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 Pilesgrove and Woodstown land uses. Specifically, the agricultural land uses in Pilesgrove may contribute significant fertilizer runoff to the area's streams while Woodstown's impervious surfaces may contribute stormwater runoff pollution.

In March 2003 the NJDEP issued a new Stormwater Management Rule, as required by the US Environmental Protection Agency'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, every municipality was required to obtain a New Jersey Pollution Discharge Elimination System (NJPDES) general permit for the stormwater system, and its discharges, within municipal borders. The stormwater system is "owned and operated" by the municipality.

Under the 2004 NJPDES permit, a town must meet certain specific requirements in planning, ordinance adoption, and education about stormwater. Fulfillment of these Statewide Basic Requirements is scheduled to occur over the course of five years.

See **Figure 4** on page 58 for details of the Statewide Basic Requirements of this program for municipalities such as Woodstown and Pilesgrove.

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 percent or more within a subwatershed are directly linked to increased stormwater runoff, enlargement of stream channels, increased stream bank erosion, lower dry weather flows, higher stream temperatures, lower water quality, and declines in aquatic wildlife diversity. When impervious cover reaches 25 percent to 30 percent, streams can become severely degraded.

Impervious cover is of greater significance in Woodstown Borough, with its denser level of buildings, than it is in Pilesgrove. *Table 16: Impervious Coverage in Woodstown Borough* shows the amount of various percentages of impervious cover in the borough.

Table 16: Impervious Coverage in Woodstown Borough

Percent of Impervious Coverage	Land Area in Acres
0 to 10%	553.72
11 to 15%	42.69
16 to 20%	31.39
21 to 25%	35.72
26 to 30%	199.83
31 to 100%	172.97
Total Woodstown Acreage	1,036.33

Source: NJDEP

Stormwater Management Statewide Basic Requirements
Tier B* Towns (Woodstown and Pilesgrove)

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, nonpoint source pollution, and stewardship) annually to residents and businesses and conduct a yearly "event" (such as a booth with these messages at a community day).
    - Have all municipal storm drain inlets labeled with some type of "don't dump" message.
    - Distribute information annually regarding fertilizer/pesticide application, storage, disposal, and landscaping alternatives.
    - Distribute information annually regarding proper identification, handling, and disposal of wastes including pet waste and litter.

* Tier B municipalities are communities with lower population levels and densities. They have fewer stormwater requirements imposed on them. See the NJDEP Stormwater website for a list of Tier A and B towns and other information on the Stormwater Rules.

Figure 4: Stormwater Management Basic Requirements

Inadequate Stream Buffers

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

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

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

Point Sources of Pollution

Point sources of pollution, which come from a single source or "point" such as an industrial pipe discharge, are regulated by NJDEP through the New Jersey Pollution Discharge Elimination System (NJPDES). New Jersey created NJPDES in response to the Federal Clean Water Act of 1972, which mandated that each state develop water quality standards and regulate the amount of

pollution entering water bodies. The Act classified all water pollution into one of two categories: "point source" pollution and "nonpoint source" pollution (coming from many diffuse sources, such as through stormwater), but only required states to regulate point sources until recently.

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 water or groundwater (usually through a septic system) must apply for and obtain a permit for discharging. Rather than creating individually tailored permits for every facility, the Division of Water Quality uses scientific standards to create and issue general permits for different categories of dischargers. NJDEP enforces the terms of NJPDES permits by visiting discharging facilities and requiring facilities to conduct water quality, biological, and toxicological analyses, and thermal impact and cooling water assessments periodically.

Under the Open Public Records Act (OPRA) of 2002, a list of active NJPDES permits is available. As of September 30, 2004, nine NJPDES permits were issued to eight individual facilities in Woodstown and Pilesgrove. These are shown in **Table 17: Woodstown & Pilesgrove NJPDES Permits** below.

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 previously, focus on reducing and controlling nonpoint sources of water pollution.

Table 17: Woodstown & Pilesgrove NJPDES Permits

NJPDES Permit #	Facility Name	Effective Start Date	Expiration Date	Discharge Category Description	Street Address
Woodstown					
NJ0004308	Waddington-Richman, INC	7/1/98	6/30/03	Industrial Wastewater	849 RT 40
NJ0022250	Woodstown Wastewater Treatment Plant	11/1/01	10/31/06	Sanitary Wastewater	90 West Ave
NJ0100218	Waddington-Richman, INC	5/1/04	4/30/09	Discharge to Groundwater	849 RT 40
NJG0112313	South Jersey Transportation Co.	6/1/02	5/31/07	Basic Industrial Stormwater	1176 US RT 40
NJG0148385	Borough of Woodstown	4/1/04	2/28/09	Tier B Municipal Stormwater	25 West Ave
Pilesgrove					
NJG0130915	Coastal Service Station #7224	1/1/04	11/30/08	Groundwater Petro Prod Cleanup	RT 40 & East Lake Road
NJG0136221	Four Season Campground	6/1/03	5/31/08	Sanitary Subsurface Disposal	158 Woodstown-Daretown Road
NJG0152714	Pilesgrove Township	4/1/04	2/28/09	Tier B Municipal Stormwater	1180 RT 40

Source: NJDEP

Total Maximum Daily Loads

For impaired waters (waters on Sublist 5), the state is required to establish total maximum daily loads (TMDLs). A TMDL quantifies the amount of a pollutant a waterbody can assimilate (its loading capacity) without violating water quality standards. A TMDL's purpose is to initiate a management approach or restoration plan based on identifying the sources of a pollutant and determining the percent reductions of the pollutant that must be achieved by each source of the pollutant. These sources can be point sources such as sewage treatment plants or non-point sources such as runoff from various types of residential, commercial, or agricultural lands.

As of September 2003, TMDLs for phosphorus were established for Memorial Lake in Woodstown and for Harrisonville Lake along Oldmans Creek in Pilesgrove Township. Both TMDLs established the percentage reductions in total phosphorus from nonpoint and stormwater sources that are necessary in order to achieve water quality standards for this nutrient. (There were no point sources of phosphorus.) The percentage reductions were calculated, in part, from the percentages of various land uses in the lake watersheds (the "lakesheds").

The lakeshed for Memorial Lake includes all the land on the eastern side of Pilesgrove that drains to the Salem River, and about 1/3 of Woodstown's land. The lakeshed for Harrisonville Lake includes land in the northeast corner of Pilesgrove that drains to the two-mile stretch of Oldmans running between Pilesgrove's border with Upper Pittsgrove and Harrisonville Lake.

Also in September 2003, TMDLs for fecal coliform were approved for three stream segments in Woodstown and Pilesgrove:

- Salem River at Woodstown. This segment includes the entire length of the Salem River as it runs through Pilesgrove and Woodstown.
- Two Penny Run at Danceys Corner and Courses Landing. This segment includes the headwaters of Two Penny Run that are located in Pilesgrove.
- Oldmans Creek at Jessups Mill and at Porches Mill. This segment includes all of Oldmans Creek, including the tributary, Indian Run, that flows through Pilesgrove Township.

In May 2005 a TMDL for fecal coliform was proposed for Major Run, the tributary to the Salem River that forms the border between Pilesgrove and Mannington townships.

In June 2005, a TMDL for phosphorus was proposed for the portion of Oldmans Creek downstream of Harrisonville Lake, in Pilesgrove Township. The watershed for this TMDL is equivalent to the entire Oldmans Creek watershed in Pilesgrove Township because the Harrisonville Lake phosphorus TMDL is considered to be part of this TMDL.

See **Appendix A** for details of the TMDLs.

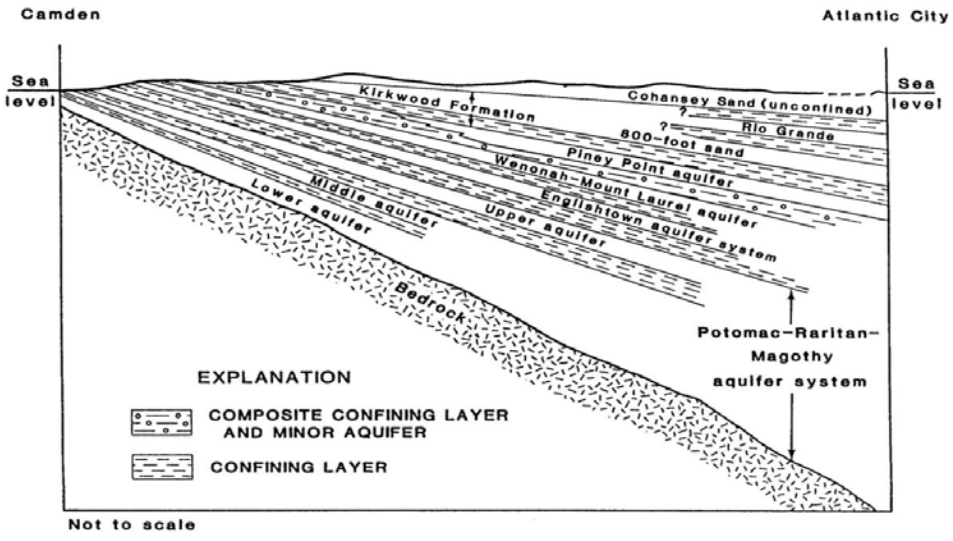
Implementation of the TMDLs will involve substantial reductions in the amount of these pollutants from each known source. Some further analysis is necessary to determine sources more precisely, in the case of the fecal coliform impairments. However, in general, implementation relies on actions mandated by the Municipal Stormwater Management program,

including the ordinances required to be adopted by both municipalities under that permit, and on voluntary improvements to land and runoff management in agricultural areas. A list of U.S. Department of Agriculture and New Jersey programs that provide funding and technical assistance on relevant projects for farm landowners in included in **Appendix C: Federal and State Conservation Programs for Farmers**.

GROUNDWATER

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.

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. 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. Other smaller aquifers on top of the PRM are the Englishtown, the Mt. Laurel – Wenonah, and the Kirkwood-Cohansey. The Kirkwood-Cohansey is a formation composed of two thick layers, the Kirkwood (lower) and the Cohansey (upper), that overlie the older formations. It begins east of the inner/outer coastal plain divide. Because Pilesgrove Township is situated on the coastal plain divide, the township contains a large area of the Kirkwood-Cohansey aquifer outcrop area. The westernmost point of the Kirkwood-Cohansey aquifer outcrop is in neighboring Oldmans Township.



Source: US Geological Survey

Figure 5: Aquifers of Southern New Jersey along a line from Camden to Atlantic City

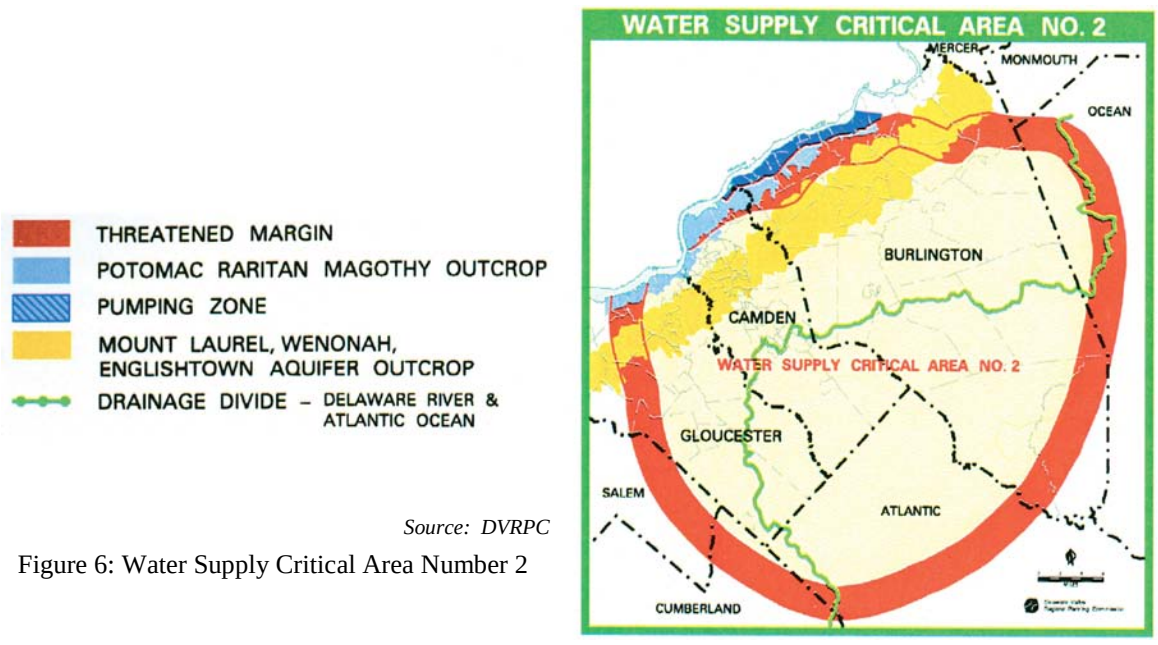
Aquifers

Several aquifers underlie parts of Woodstown Borough and Pilesgrove Township. Four major aquifers – Potomac-Raritan-Magothy (PRM), Englishtown, Wenonah-Mount Laurel, and the Kirkwood-Cohansey – provide public and private drinking water for Woodstown and Pilesgrove residents.

Potomac-Raritan-Magothy Aquifer System (PRM)

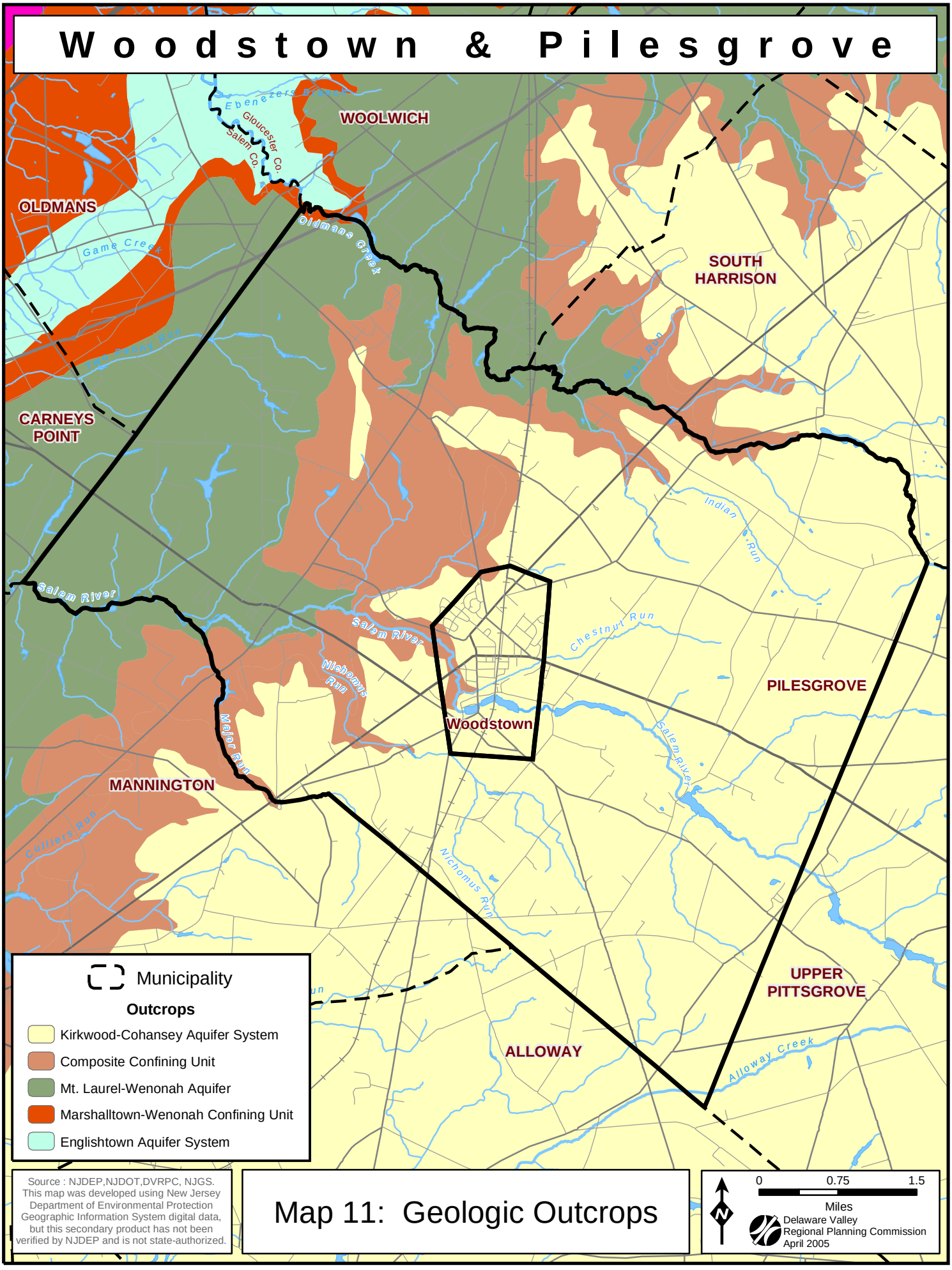
The Potomac-Raritan-Magothy (PRM) is the principal geological formation underlying Woodstown and Pilesgrove and the primary source of drinking water for public wells, as well as for many private wells. This multiple aquifer system is actually a large series of formations that have been combined and described 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 of like kind and size laid down by both an advancing and retreating sea across southern New Jersey and by deposits of material that came from the breakdown and erosion of the Appalachian and Catskill mountains beginning in the Cretaceous Period (60 to 150 million years ago).

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.



Source: DVRPC

Figure 6: Water Supply Critical Area Number 2


Woodstown & Pilesgrove
WOOLWICH
OLDMANS
SOUTH HARRISON
CARNEYS POINT
PILESGROVE
Woodstown
MANNINGTON
UPPER PITTSGROVE
ALLOWAY
Ebenezers Branch
Gloucester Co.
Salem Co.
Oldmans Creek
Game Creek
Mad Horse Run
Indian Run
Salem River
Chestnut Run
Nichomus Run
Major Run
Cullers Run
Alloway Creek
Municipality
Outcrops
Kirkwood-Cohansey Aquifer System
Composite Confining Unit
Mt. Laurel-Wenonah Aquifer
Marshalltown-Wenonah Confining Unit
Englishtown Aquifer System
Source : NJDEP,NJDOT,DVRPC, NJGS. 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.
Map 11: Geologic Outcrops
0
0.75
1.5
Miles
Delaware Valley Regional Planning Commission
April 2005

The PRM is the primary source of drinking water to New Jersey residents from Burlington to Salem counties, as well as to communities in Delaware. Because of such high usage, PRM aquifer water levels have declined. The water shortage became so serious that the New Jersey Department of Environmental Protection established Water Supply Critical Area #2 in 1986. All water supply companies within Critical Area #2 were given annual limits on water withdrawals in 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. Neither Woodstown nor Pilesgrove are within the boundary of the Critical Area, but parts of Pilesgrove adjoin the threatened margin.

There is increased concern that additional pumping from the aquifer in the borderline areas will necessitate the expansion of the Critical Area boundaries. Thus, water supply companies in Gloucester and Salem counties have and will continue to have difficulty getting approvals from the New Jersey Department of Environmental Protection for any additional water allocations from the PRM.

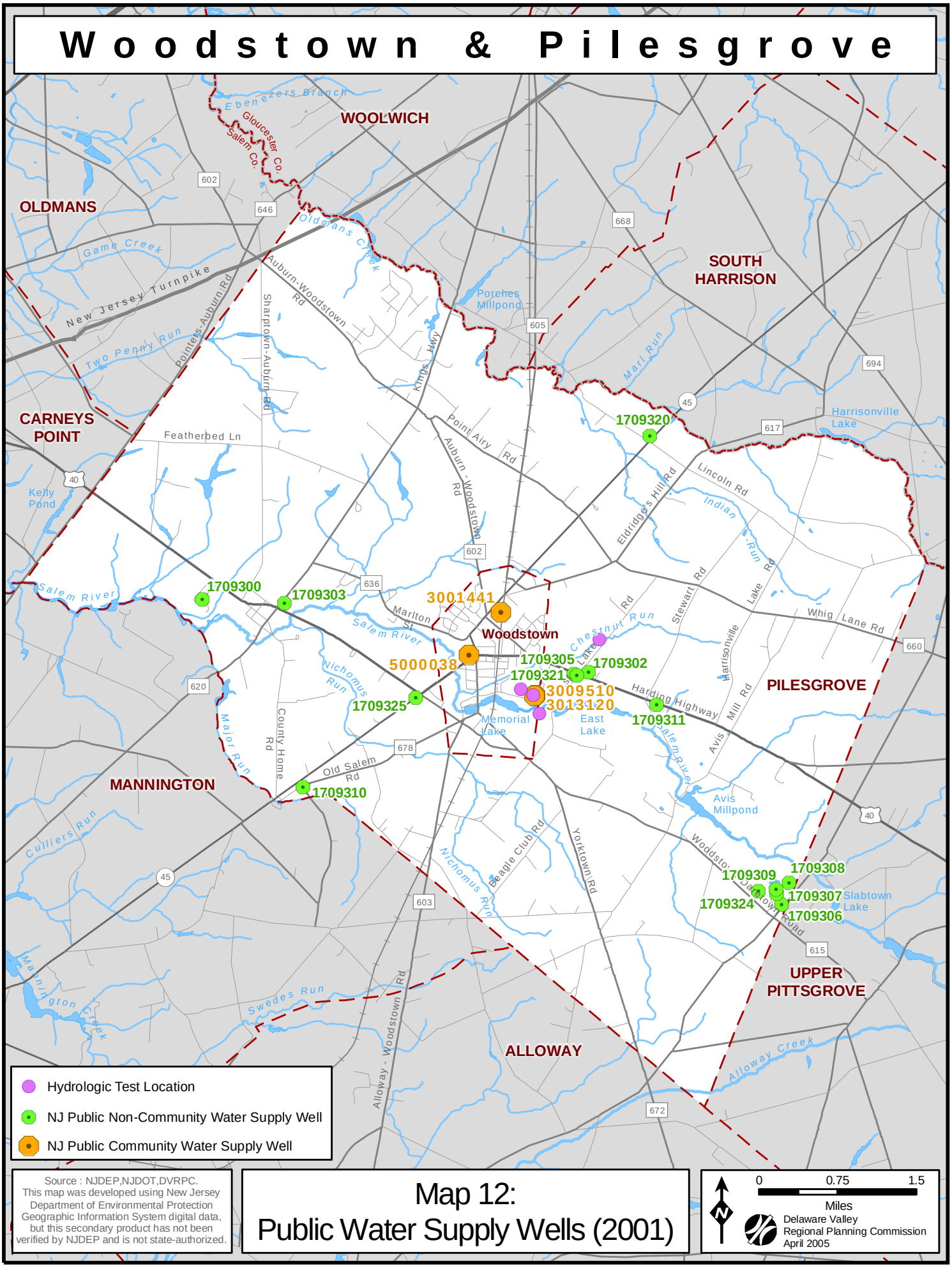
In Gloucester and Salem counties, use of the lower PRM aquifer for drinking water is limited due to high chloride concentrations (salt water intrusion). This is thought to be very ancient seawater within the lower aquifer, resulting from movement from the southeastern side, which is in contact with ocean water. Whatever the cause, most of the lower aquifer is not usable as a drinking supply. There are also problems with salinity levels in the upper and middle PRM aquifers, especially for wells closest to the Delaware River where pumpage has increased the amount of slightly saline water from the river to be drawn into the aquifers. In Woodstown, three public water supply wells were tested by the USGS and found to have elevated chloride levels. In 2004, the Woodstown Borough Council proposed a program to provide in-home, reverse-osmosis water treatment systems to residents who are medically required to reduce sodium intake in their diet. This program was withdrawn because NJDEP indicated that the measure was not strong enough to mitigate the health risk. Whatever the cause of saltwater intrusion, use of the lower aquifer for drinking supply is problematic in many areas.

The PRM does not outcrop in Woodstown Borough or Pilesgrove Township; rather it outcrops under and immediately beside the Delaware River in New Jersey and Pennsylvania. River water actually enters and recharges the upper and middle PRM aquifers. 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 **Map 11: Geologic Outcrops** for a depiction of these land areas.

Englishtown Aquifer System and Wenonah-Mount Laurel Aquifer System

Some private wells in Pilesgrove may draw from the Englishtown aquifer system, with its top and base being approximately 130 feet and 180 feet below sea level, respectively (as reported by USGS Test Well 33-158). Other private wells draw from the Wenonah-Mount Laurel aquifer system, with its top and base being approximately 25 feet and 100 feet below sea level, respectively (as reported by USGS Test Well 33-158).


Woodstown & Pilesgrove
WOOLWICH
OLDMANS
SOUTH HARRISON
CARNEYS POINT
PILESGROVE
MANNINGTON
ALLOWAY
UPPER PITTSGROVE
Woodstown
1709320
1709300
1709303
3001441
5000038
1709305
1709302
1709321
3009510
3013120
1709325
1709311
1709310
1709309
1709308
1709307
1709324
1709306
Hydrologic Test Location
NJ Public Non-Community Water Supply Well
NJ Public Community Water Supply Well
Source : NJDEP,NJDOT,DVRPC.
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.
Map 12:
Public Water Supply Wells (2001)
0 0.75 1.5
Miles
Delaware Valley Regional Planning Commission
April 2005

The Englishtown Formation, of late Cretaceous age, outcrops in the Inner Coastal Plain in an irregular band that extends from Raritan Bay to the Delaware River in Salem County. 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. According to several USGS test wells, the Englishtown aquifer system is only 130 feet below the land surface and 30 feet thick in western parts of Pilesgrove Township. In eastern portions of Pilesgrove, the top of the Englishtown aquifer is about 190 feet below the land surface and is 50 feet thick. It is not a major source of water in Salem County due to its thinness and greater proportion of fine-grained sediments, resulting in lower yields. More productive aquifers lie above and below it.

The Wenonah-Mount Laurel aquifer is composed of the Wenonah Formation and the Mount Laurel Sand, both of late Cretaceous age (130 to 150 million years ago). It is thickest in Burlington, Camden, Gloucester, and Salem counties, reaching 100 to 120 feet in width. In Pilesgrove, it is about 80 feet thick and outcrops in the western portion of the township.

Kirkwood-Cohansey Aquifer System

The Kirkwood-Cohansey aquifer system is considered one of the largest sources of groundwater in New Jersey. The Kirkwood Formation, along coastal areas, appears as thick clay beds, with inter-bedded zones of sand and gravel. The Cohansey Sand, also of Miocene age, is coarser grained than the underlying Kirkwood Formation. It contains minor amounts of pebbly sand and inter-bedded clay. Some local clay beds within the Cohansey Sand are relatively thick.

The surficial nature of the Kirkwood-Cohansey makes it vulnerable to contamination from various land uses. The Kirkwood-Cohansey has a large outcrop area in Woodstown and Pilesgrove; nearly all of Woodstown and about 60 percent of Pilesgrove are within the outcrop area. Industrial chemicals, agricultural chemicals used for crop production and residential landscaping, pesticides, and products of septic tank effluent have all been found in water from the aquifer. Where possible, care must be taken to prevent contamination on the land surface because it can so easily enter the groundwater of this unconfined aquifer (lacking protective clay layers above it). In addition, it is important to site wells to avoid proximity to deleterious land use and contamination. In Pilesgrove, some farmers have wells tapping the Kirkwood-Cohansey.

PRIVATE DRINKING WELLS

Private wells, supplying potable water, are not routinely monitored like public community water systems (public water) and public non-community wells. Beginning in 2002, the State of New Jersey, under the Private Well Testing Act, required that well water be tested for contaminants when properties are sold or leased. Prior to 2002, each county health department mandated what parameters were to be tested for real estate transactions.

See **Appendix B: Private Well Testing Act** for more information about private wells and drinking water in Salem County.

Water Supply Wells

There are three active (and one inactive) public water supply wells at three sites in Woodstown Borough, as listed in *Table 18: Public Water Supply Wells,* below. These public water supply wells also serve small parts of Pilesgrove Township adjacent to the borough.

Three pump from the PRM and one from the Wenonah-Mount Laurel aquifer. The Woodstown Water Department is planning to install a fifth well, which would pump from the Wenonah-Mount Laurel, to improve and maintain potable water quality. All public wells in the area are shown on **Map 12: Water Supply Wells**.

Table 18: Public Water Supply Wells

Well ID #	Original Owner	Aquifer	Depth to Top of Well (feet)	Depth to Bottom of Well (feet)
30-01441	Woodstown Water Dept	Lower PRM	692	712
30-09510	Woodstown Water Dept	Lower PRM	100	144
30-13120	Woodstown Water Dept	Wenonah-Mount Laurel	NJDEP data missing	
50-00038	Woodstown Water Dept	Lower PRM	670	705

Source: NJDEP

Public non-community wells are another part of a public water system. There are two types of non-community water systems, transient and non-transient, referring to the type of populations who utilizes them. A non-transient water system serves at least 25 of the same people daily at a minimum of 6 months per year. Non-transient non-community water systems serve places like schools, factories, and office parks. A transient non-community water system serves at least 25 people each day, but the population changes each day, such as at rest stops gas stations, and restaurants. All public non-community wells are located in Pilesgrove Township. See *Table 19: Public Non-Community Wells* below.

Table 19: Public Non-Community Wells

Well ID #	Original Owner	Well Depth	Well Type
1709300	Cowtown Auctioneers	160	Transient
1709302	Woodlanes	160	Transient
1709303	Richman Ice Cream Company	450	Transient
1709305	Wagon Wheel	160	Transient
1709306	Four Season's Campground	160	Non-Transient
1709307	Four Season's Campground	160	Non-Transient
1709308	Four Season's Campground	160	Non-Transient
1709309	Four Season's Campground	160	Non-Transient
1709310	County of Salem Road Department	160	Non-Transient
1709311	Bethany Christian Academy	160	Non-Transient
1709320	Woodstown Pre-School Academy	105	Non-Transient
1709321	Mr. D's Tavern and Package Goods	160	Transient
1709324	Four Season's Campground	160	Non-Transient
1709325	Eckerd Store No. 761	160	Transient

Source: NJDEP

Groundwater Recharge

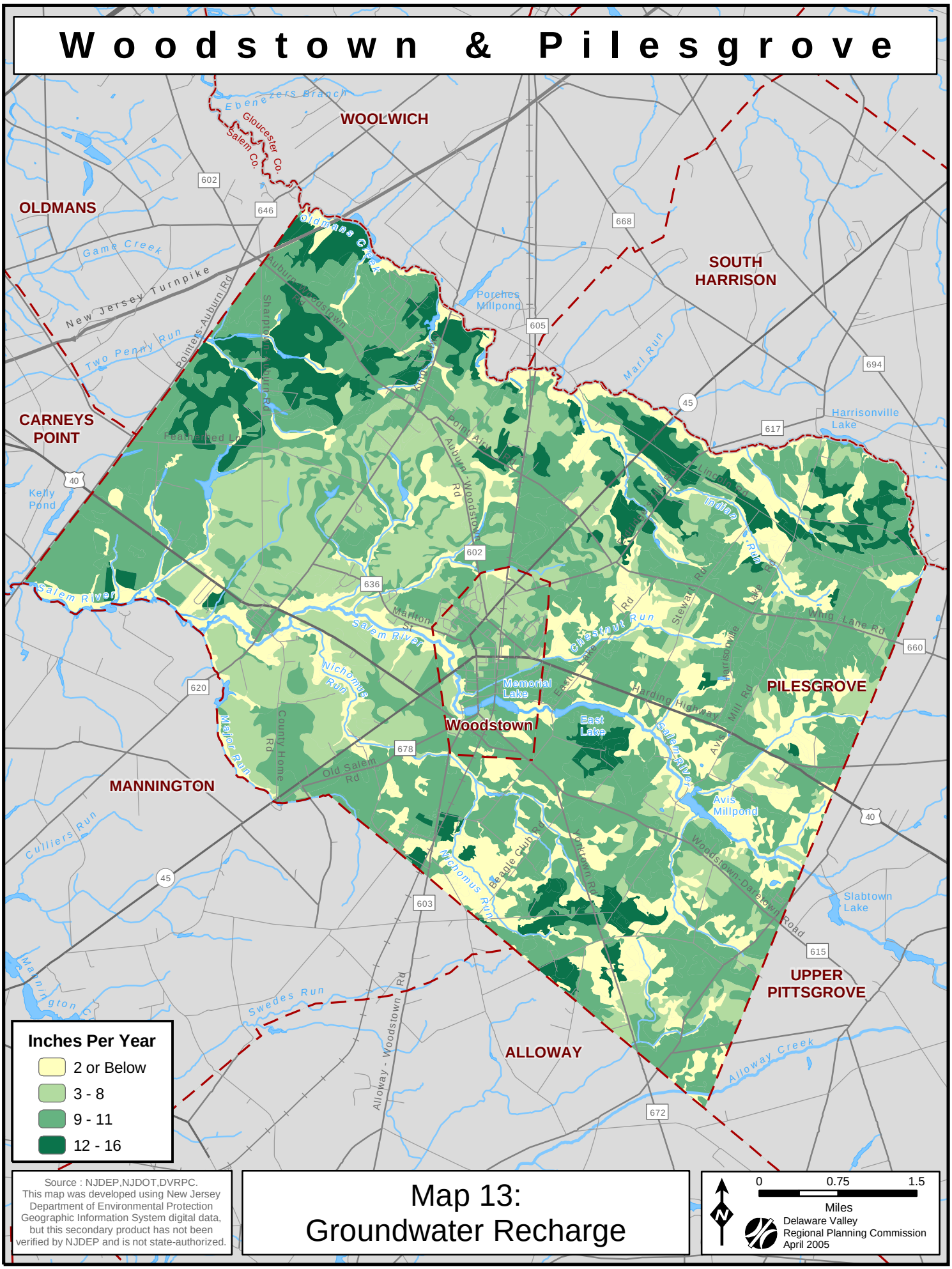
Recharge of groundwater is an important issue in southern New Jersey because of the dependence on aquifers for drinking water supply and agricultural use. The amount of rainwater that actually enters an aquifer and reaches the saturated zone to become groundwater is a function of many factors, including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

The New Jersey Geological Survey 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. NJDEP has used this methodology to map and rank land areas throughout the state as to groundwater recharge potential. Recharge is measured as the amount of precipitation that will reach the water table in one year.

In Pilesgrove, lands with recharge greater than 12 inches per year, the highest in the township, are found in scattered patches, with the largest areas near Two Penny Run's branches, along Oldmans Creek and its tributaries, and at the eastern tip of Nichomus Run. Woodstown has no land with recharge greater than 12 inches a year. More than 53 percent (551 acres) of Woodstown Borough's land and 50 percent (10,963 acres) of Pilesgrove Township's land recharges 9 to 11 inches of groundwater a year. These high recharge areas are uniformly found on land lying between stream channels. See **Map 13: Groundwater Recharge**.

In general, on these high recharge lands, large amounts of paving and high impervious cover has the most detrimental impact, although they are also usually the places that are most suitable for building because they are on 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 ten or more inches per year of groundwater recharge.

Woodstown & Pilesgrove



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

Map 13: Groundwater Recharge

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BIOLOGICAL RESOURCES

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

Woodstown Borough and Pilesgrove Township contain numerous types of habitats, all of which are important for maintaining biodiversity. Upland Forests, which are the most abundant type of natural habitat in Pilesgrove, occur where land is dry and undeveloped. Woodstown's most abundant type of natural habitat is forested wetlands. Along Woodstown and Pilesgrove's stream corridors and lakeshores, wetlands support plants that require constantly saturated soils, and within and around waterbodies are submerged communities, which require persistent standing water. The following sections will identify and describe in more detail the plant and animal communities that inhabit these unique ecosystems within Woodstown and Pilesgrove.

NATURAL VEGETATION

A region's vegetation is dependent on many factors, the most important of which are climate and soils. Woodstown and Pilesgrove share a cool, temperate climate with rainfall averaging 42 to 44 inches per year. See the *Climate* section on page 33 for a detailed description of Woodstown and Pilesgrove's variable climate. The majority of Woodstown and Pilesgrove's soils are generally well-drained soils, supporting a large diversity of trees and crops. The area also has a substantial amount of poorly drained soils that exhibit ponding and sustain wetland plants. See the *Soils* section on page 20 for a detailed description of Woodstown and Pilesgrove's soils.

Woodstown and Pilesgrove's natural vegetation types, along with human-influenced types of land cover, have been tabulated and mapped by NJDEP's 1995/97 land cover analysis. This data, based on infrared aerial photography, is the most recent available. The designation of a particular land cover as a vegetation type is based on definitions provided by the Anderson Land Use Classification System, created by the U.S. Geologic Survey. See **Map 14A & Map 14B: Natural Vegetation (1995/97**).

Table 20: Woodstown Borough Natural Vegetation

Type of Vegetation	Acres	% of Total Land Area
Deciduous Forest	39.22	3.78%
Brushland/Shrubland (old fields)	0.2	0.02%
Artificial Lakes	21.75	2.10%
Streams and Canals	1.23	0.12%
Wetlands (deciduous wooded wetlands)	69.6	6.72%
Wetlands (mixed wooded wetlands)	16.89	1.63%
Wetlands (deciduous scrub/shrub wetlands)	5.85	0.56%
Wetlands (coniferous scrub/shrub wetlands)	0.91	0.09%
Wetlands (mixed scrub/shrub wetlands)	1.32	0.13%
Wetlands (herbaceous wetlands)	6.61	0.64%
Modified Wetlands (agricultural wetlands)	11.61	1.12%
Modified Wetlands (disturbed wetlands)	28.55	2.75%
Modified Wetlands (former agricultural wetlands)	26.9	2.60%
Modified Wetlands (managed wetland in maintained greenspace)	4.41	0.43%
Total Vegetation Land Cover	**235.05**	**22.68%**

Source: NJDEP (1995/97 Land Cover)

Table 21: Pilesgrove Township Natural Vegetation

Type of Vegetation	Acres	% of Total Land Area
Deciduous Forest	1,808.46	8.08%
Coniferous Forest	41.31	0.18%
Mixed Forest (>50% deciduous)	29.89	0.13%
Mixed Forest (>50% coniferous)	41.85	0.19%
Brushland/Shrubland	357.71	1.60%
Brushland/Shrubland (old fields)	267.65	1.20%
Lakes	142.95	2.80%
Tidal Waters	31.48	0.14%
Streams	2.95	0.01%
Wetlands (deciduous wooded wetlands)	1,444.60	6.45%
Wetlands (coniferous wooded wetlands)	5.91	0.03%
Wetlands (mixed wooded wetlands)	10.18	0.05%
Wetlands (deciduous scrub/shrub wetlands)	264.17	1.18%
Wetlands (herbaceous wetlands)	130.74	0.58%
Wetlands (freshwater tidal marshes)	34.26	0.15%
Modified Wetlands (agricultural wetlands)	439.19	1.96%
Modified Wetlands (disturbed wetlands)	21.11	0.09%
Modified Wetlands (former agricultural wetlands)	17.09	0.08%
Modified Wetlands (rights-of-way)	4.21	0.02%
Modified Wetlands (managed wetland in maintained greenspace or recreation area)	5.57	0.02%
Total Vegetation Land Cover	**5,101.28**	**24.94%**

Source: NJDEP (1995/97 Land Cover)

Pilesgrove Township

Map 14A: Natural Vegetation (1995/1997)

WOOLWICH
OLDMANS
CARNEYS POINT
SOUTH HARRISON
ELK
PILESGROVE
Woodstown
MANNINGTON
ALLOWAY
UPPER PITTSGROVE

Municipality

Vegetation

- Brush/Shrubland
- Brush/Shrubland - Oldfield
- Tidal Marshes - Freshwater
- Upland Forest - Coniferous
- Upland Forest - Mixed (Conif. dom.)
- Upland Forest - Deciduous
- Upland Forest - Mixed (Decid. dom.)
- Lakes and Streams
- Wetlands - Modified
- Wetlands - Scrub/Shrub
- Wetlands - Herbaceous
- Wetlands - Wooded - Deciduous
- Wetlands - Wooded - Coniferous
- Wetlands - Wooded Mixed (Deciduous Dominated)
- All Other Land Cover

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

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Wetlands

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 ground waters. The ecological importance of wetlands, however, has not always been appreciated. For over three centuries people drained, dredged, filled and leveled wetlands to make room for development and agriculture. Although the pace of wetland destruction has slowed markedly in the past three decades, human activities have destroyed approximately 115 million of the original 221 million acres of wetlands in the United States since the beginning of European settlement.

Nearly all wetlands in Woodstown Borough and Pilesgrove Township are found in association with major streams and their tributaries. Wetlands are dominant along the township's major waterways: Oldmans Creek, Salem River, and Nichomus Run. Wetlands provide high-quality animal and plant habitat, purify surface and groundwaters, and create picturesque landscapes that add immeasurably to the quality of life for area residents. According to the Anderson Land Use Classification System, Woodstown and Pilesgrove both have four major types of wetlands: (1) wooded wetlands dominated by deciduous trees, (2) wooded wetlands dominated by coniferous trees, (3) scrub/shrub wetlands dominated by deciduous woody plants, and (4) herbaceous wetlands. Woodstown also exhibits two additional types: (1) scrub/shrub wetlands with mixed coniferous and deciduous woody plants, and (2) scrub/shrub wetlands dominated by coniferous woody plants. Pilesgrove contains one additional type: freshwater tidal wetlands.

Source: DVRPC

The cardinal flower is a wetlands plant found around lakes and along streams in Woodstown and Pilesgrove

Common throughout Woodstown and Pilesgrove are deciduous wooded wetlands (sometimes referred to as forested wetlands). Deciduous wooded wetlands occupy about 1,444 acres of Pilesgrove and 70 acres of Woodstown and support mixed hardwoods that flourish in low elevations. Some common trees in the area's deciduous wooded wetlands are red maple, black tupelo, ash, black willow, American beech, swamp white oak, willow oak, southern red oak, and sweetgum.

Closely associated with deciduous wooded wetlands are scrub/shrub wetlands, occupying 7 acres of Woodstown and 264 acres of Pilesgrove, which is about 1 percent of the total borough and township land area. These wetlands are generally composed of young, medium-height, primarily deciduous, and, in a few places, coniferous woody plants. Woodstown and Pilesgrove's scrub/shrub wetlands are composed of young saplings of red maple, black ash, blackgum, and sweetgum, and dominated by shrub species like silky dogwood, red-osier dogwood, gray dogwood, mimosa, southern arrowhead, and hazel alder.

Large swaths of deciduous wooded and scrub/shrub wetlands are found along Salem River west of Woodstown, along Nichomus Run near Beagle Club Road, in a significant complex between the Alloway Township border and Yorktown Road, and along Indian Run, a tributary to Oldmans Creek, west of Route 45. In some areas, fragile wetlands are surrounded and protected by upland forests, but most areas of wetlands are adjacent to large agricultural operations.

In Woodstown and Pilesgrove, herbaceous wetlands are rare, occupying only 137 acres of combined land area. Herbaceous wetlands generally occur along lake edges, open floodplains, and former agricultural wetland fields. Herbaceous wetlands are found at the edge of large farm ponds near Featherbed Lane, at the confluence of the Salem River and Nichomus Run, and in scattered patches along wide bends of Salem River, Nichomus Run, Two Penny Run, and other unnamed tributaries. Herbaceous wetland plants include Jack-in-the-pulpit, jewelweed, ferns, rice cutgrass, reed canary grass, pond lily, tearthumb, arrow-leafed tearthumb, broadleaf cattail, and the common reed (*Phragmites*).

Modified wetlands are areas that have been altered by human activities and do not support natural wetland vegetation, but which do show signs of soil saturation on aerial infrared surveys. Modified wetlands encompass agricultural wetlands, former agricultural wetlands, disturbed wetlands and wetlands that occur in maintained greenspaces such as open lawns, golf courses, and storm water swales. In total, modified wetlands occupy just 71 acres or 8 percent of Woodstown's land area and 487 acres or less than 1 percent of Pilesgrove's land area.

Upland Forests

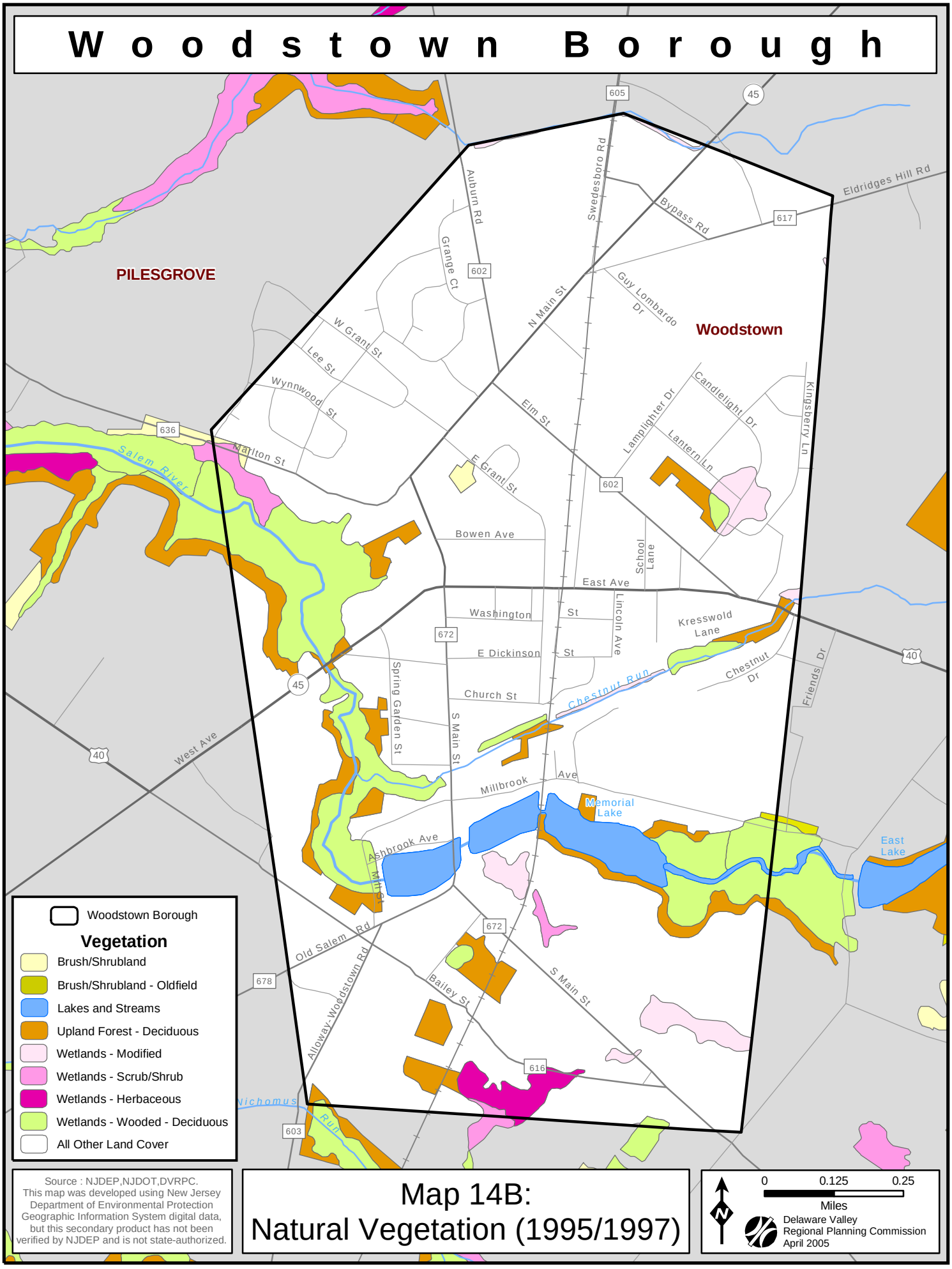
Upland areas are those locations without water at or near the soil surface. More than eight percent of Pilesgrove and nearly four percent of Woodstown are composed of upland forests. Most of the area's original upland forests have been cleared and converted to farms or residential or commercial development. Nearly all old growth forests were cleared for farmland during colonial times. The remaining upland forests are second, or third growth and tend to be located near stream corridors or are patchy woodlands on less desirable soils associated with large farms.

Source: DVRPC

A tulip poplar tree, commonly found in Woodstown and Pilesgrove's forests

Upland forests are the second most abundant land cover type in Pilesgrove and the fourth most abundant land cover type in Woodstown after developed land, agriculture, and wetlands. Approximately 2,548 acres of Pilesgrove is upland forest, of which the great majority is deciduous forest. The composition of Pilesgrove's upland deciduous forests is largely one of

Woodstown Borough



Woodstown Borough

Vegetation

- Brush/Shrubland
- Brush/Shrubland - Oldfield
- Lakes and Streams
- Upland Forest - Deciduous
- Wetlands - Modified
- Wetlands - Scrub/Shrub
- Wetlands - Herbaceous
- Wetlands - Wooded - Deciduous
- All Other Land Cover

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

Map 14B: Natural Vegetation (1995/1997)

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mixed oaks – black, red, chestnut, and willow oaks – joined by other hardwoods such as American beech, hickory and sweetgum. The understory is dominated by flowering dogwood, American holly, greenbriar, and sassafras. Vines, such as Virginia creeper, wild grapes, Japanese honeysuckle, and poison ivy, are common. Spicebush, arrowwood, and black haw are common shrubs in moister locations.

Coniferous trees occur on about 41 acres of Pilesgrove. These forests are mostly made up of successional, or pioneer, plants – like Virginia pine, scrub pine, and pitch pine – which will eventually be overgrown by dominant deciduous trees, such as ash, birch, oak, and hickory.

Grasslands and Agricultural Lands

NJDEP defines grassland habitat as brushland, shrubland or old fields that were cleared or disturbed at one time and then abandoned. Following abandonment, old fields are overgrown by perennial herbs and grasses. These pioneer plants remain the dominant species for 3 to 20 years time. Later, woody plants take over. This habitat is visible especially along wood edges, roadsides, and in landscapes where mowing is infrequent and where woody plants are not yet the dominant vegetation.

According to 1995/1997 NJDEP land cover data, nearly 3 percent of Pilesgrove's land cover and less than two-tenths of an acre of Woodstown's land cover consist of brushland, shrubland or old fields. However, in the last decade, sections of Woodstown's farmland have become idle and transitioned to old fields and brushland – land suitable for grassland and brushland species habitat. About 20 to 30 acres of Woodstown, located in the upper northeast portion of the borough, is an old agricultural field that is transitioning to brushland.

Source: DVRPC

Agricultural lands in Pilesgrove provide high quality habitat for grassland species – especially migrating birds

In Pilesgrove, brushland is generally found adjacent to residential, commercial and industrial development, while old fields occur more often near agricultural or wetland areas. In addition to brushland and old fields, active agricultural cropland and pastureland is considered suitable "grassland" habitat for wildlife. Agricultural cropland and pastureland is the single most abundant type of vegetative land cover in Pilesgrove Township, covering about 65 percent, or 14,735 acres, of the township's land area in 1997.

LANDSCAPE PROJECT PRIORITY HABITATS

The Landscape Project, developed by the Endangered and Nongame Species Program of the NJDEP Division of Fish & Wildlife, documents the value of various types of habitats within New Jersey. It categorizes these habitats into one of five groups according to their importance (five being the highest). Categories three through five include habitats throughout the state that possess two exceptional conditions: (1) a documented occurrence of one or more species on either the federal or the state threatened and endangered species lists, and (2) a sufficient amount of habitat type to sustain these species. These habitats are collectively known as "critical habitat." Categories one and two include habitats that either have a documented occurrence of a *species of special concern* 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 Woodstown Borough and Pilesgrove Township. It is important to preserve both levels of habitat in order to maintain the diversity of species that still exists in the area. The rankings in Woodstown and Pilesgrove are primarily the result of habitat being either critical or suitable for rare bird species such as the bald eagle, bobolink, savannah sparrow, and vesper sparrow or for endangered reptiles and amphibians such as the bog turtle. See **Map 15: Landscape Project Habitat Priorities**.

Table 22: Landscape Project Habitat Rankings – Acreage in Woodstown & Pilesgrove

Category	Rank	ACRES	% of Total Habitat	% of All Land
Emergent Wetlands	Critical Habitat (5)	37.49	0.2%	0.2%
	Suitable Habitat (1)	606.14	3.0%	2.6%
Forested Wetlands	Critical Habitat (5)	212.03	1.1%	0.9%
	Suitable Habitat (1)	1,587.44	7.9%	6.8%
Upland Forest	Suitable Habitat (1)	2,830.89	14.0%	12.1%
				0.0%
Grassland	Critical Habitat (5)	0.49	0.0%	0.0%
	Critical Habitat (4)	4,597.59	22.8%	19.6%
	Suitable Habitat (1)	10,283.54	51.0%	43.9%
Total Habitat		**20,155.61**	**100.0%**	**86.0%**
Total Woodstown & Pilesgrove Land		**23,430.85**		**100.0%**

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. About 37 acres in Pilesgrove are identified as priority emergent wetlands

Woodstown & Pilesgrove

Map 15: Landscape Project Habitat Priorities (2004)

OLDMANS
WOOLWICH
SOUTH HARRISON
ELK
CARNEYS POINT
MANNINGTON
PILESGROVE
UPPER PITTSGROVE
ALLOWAY
Woodstown

Sharptown
Salem River Floodplain
Major Run
Nichomus Run

Game Creek
Two Penny Run
Marl Run
Indian Run
Chestnut Run
Salem River
Nichomus Run
Major Run
Swedes Run
Alloway Creek
Gloucester Co.
Salem Co.

Municipality

Natural Heritage Priority Site

Developed Land

Emergent Wetlands Conservation Priority
- Critical Habitat
- Suitable Habitat

Forested Wetlands Conservation Priority
- Critical Habitat
- Suitable Habitat

Grasslands Conservation Priority
- Critical Habitat
- Suitable Habitat

Upland Forest Conservation Priority
- Suitable Habitat

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

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habitat and are ranked at the critical level. Over 606 acres in Woodstown and Pilesgrove are ranked at the suitable level. Animal species that can be found in these wetland habitats include endangered turtles, rare fish, mollusks, crustaceans, and insects. Emergent wetlands are also important habitats for migratory waterfowl and passerines (smaller perching birds) such as migrating flycatchers and thrushes.

Woodstown and Pilesgrove's forested wetlands are the third most common Landscape Project habitat type, occupying 1,799 acres, of which 212 acres are ranked as critical. Forested wetland habitat in both Woodstown and Pilesgrove is located along most stretches of the Salem River. Pilesgrove has significant patches of forested wetlands designated as suitable habitat along the Oldmans Creek to the north and Nichomus Run to the south. Forested wetlands support species such as migratory and nesting warblers, many of which are species of special concern. They can also be home to various rare amphibians (frogs and salamanders).

Landscape Project Data on Upland Forest Habitat

The Landscape Project ranks more than 12 percent of Woodstown and Pilesgrove's total land cover as suitable upland forest habitat. Suitable upland forest habitat can be found in the northeastern part of the township, adjoining South Harrison. This is possible habitat for bald eagle nesting and hunting.

Landscape Project Data on Grassland Habitat

The Landscape Project designates nearly all of Pilesgrove Township's remaining land (65 percent) and significant portions of Woodstown Borough (23 percent) as suitable or critical grassland habitat. Approximately 4,598 acres of Pilesgrove's farmland are ranked as critical grassland-species habitat. These areas are found scattered throughout the entire township. Critical grassland habitat occupies almost 5,000 acres on the northwest side of Pilesgrove. In addition, there are pockets of suitable grassland-species habitat in the southwestern part of Pilesgrove below Route 40, in the northeastern corner of Woodstown adjoining agricultural land near Chestnut Run (a tributary of the Salem River), and in the southeastern part of both Woodstown and Pilesgrove between Woodstown-Daretown Road and Yorktown Road. Grassland-dependent species (mostly birds) are the most threatened group of species in New Jersey, primarily because the most common form of habitat used by these species, agricultural fields, is the most threatened habitat in the state due to development pressure and rising land values.

Nearly all of Woodstown and Pilesgrove's agricultural land is designated as critical or suitable grassland habitat, whether under cultivation or not, for some 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 some birds, especially for sparrows; and (4) all or most of Endangered and Threatened birds are area-sensitive, requiring large ranges that include agricultural grasslands. The Landscape Project includes this land in its assessment because agricultural lands provide important disturbance buffers between rare and endangered wildlife species and humans and widespread predatory animals like dogs and cats.

Examples of grassland-dependent species that use grassland habitat for nesting or feeding include the grasshopper sparrow, vesper sparrow, and some species of butterflies and moths. Woodstown and Pilesgrove's designated grasslands provide habitat for these species and others such as the savannah sparrow and the bobolink that rely on agricultural lands, as well as for bog turtles that breed in wet areas found in agricultural fields.

ANIMAL COMMUNITIES

Although no comprehensive inventory of the different animal species within New Jersey, Salem County, Woodstown Borough, or Pilesgrove Township exists, there are records of sightings, biological studies of range, environmental impact assessments, and evaluations of endangered and threatened status. Using federal, state, scientific, and nonprofit sources, it is possible to identify and describe known and possible animals of Woodstown and Pilesgrove.

Invertebrates

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

Macroinvertebrates are invertebrates that are visible to the naked eye but smaller than 50 millimeters. Benthic (bottom dwelling) macroinvertebrate communities provide a basis for ecological monitoring and are relatively simple to collect from shallow stream bottoms. These communities consist largely of the juvenile stages of many insects, such as dragonflies and mayflies, as well as mollusks, crustaceans, and worms. Monitoring for diverse assemblages of macroinvertebrates reveals the effect of pollutants over a long period of time. The Ambient Biomonitoring Network (AMNET) surveys streams for macroinvertebrate communities, which indicate certain levels of water quality, as was discussed in the Surface Water Quality section of this document (page 50).

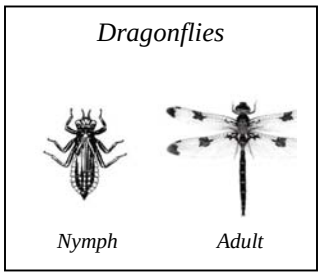


Figure 7: The Dragonfly Nymph – a Common Macroinvertebrate found in southern New Jersey's waterways

There are nine endangered invertebrate species (two beetle species, four butterfly species, and three mussel species) and eight threatened invertebrate species (three butterfly species and five mussel species) in the State of New Jersey. Of particular interest are freshwater mussels. At one time freshwater mussels were abundant in the streams of the area and were a major food source for native peoples. Parts of Oldmans Creek and the Salem River provided suitable mussel habitat. Unfortunately, due to destruction of suitable aquatic habitats by dams and pollution, the native mussel population has sharply declined, although they are still present in the creek and river. Of those species on the New Jersey Endangered and Threatened list, one, the dwarf wedgemussel, 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 Woodstown and Pilesgrove are known, but migrants that depend on the borough and township's wet forests as stopover sites in which to rest and feed are not as thoroughly inventoried.

Mammals

Mammals appear to be abundant because they tend to be larger and live in habitats also ideal for human development. There are over 80 mammal species in New Jersey, of which nine are listed as endangered and none are listed as threatened by the state. Some common mammals found in Woodstown and Pilesgrove include cottontail rabbits, eastern gray squirrels, skunks, little brown bats, raccoons, and white-tailed deer.

Management of white-tailed deer is an issue in New Jersey. While many residents prize the presence of mammalian life, deer often come into conflict with humans in suburban areas. According to the US Department of Agriculture, deer cause more damage to agricultural crops than any other vertebrate wildlife species. Farmers in densely human-populated areas appear to be the most affected. Additionally, deer can devastate the understory of forests through overgrazing, destroying the growth of seedlings and young trees. Finally, as most motorists are aware, collisions between deer and automobiles frequently result in serious damage.

Controlling deer numbers has become increasingly difficult in New Jersey, primarily because suburban landscaping provides year-round food which supports population growth, and because the principal method of culling the population – hunting – is not feasible in suburban environments.

To minimize human-deer conflicts, 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 nonlethal, although more costly, 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, and employing traps and translocation techniques.

Birds

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

Common birds in Woodstown Borough, Pilesgrove Township, and Salem County are geese, ducks, owls, woodpeckers, swallows, crows, grackles, robins, starlings, cardinals, finches, sparrows, and vultures. The upland sandpiper and vesper sparrow (endangered bird species), the savannah sparrow (threatened bird species), and other rare and endangered species have been sighted in the township. According to the Landscape Project, Pilesgrove contains suitable habitat for a variety of predatory birds including hawks, falcons, and eagles.

Another common bird is the snow goose. Huge flocks of snow geese are found in Pilesgrove in the winter, feeding in the stubble of farm fields. Although snow geese have been known to cause damage to wetlands during feeding in New Jersey, this does not appear to be a problem in Woodstown or Pilesgrove. Canada geese, on the other hand, are known to cause property and environmental damage in the area. The State of New Jersey has a "resident" Canada goose population of approximately 100,000 birds that no longer migrate to more southern locales, and may double 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, closing lakes to swimming. Goose droppings limit human use of grassy areas in parks, and because geese can be quite aggressive during the nesting season, they can also injure humans.

Removing geese or preventing them from residing in park areas is a difficult task. Because geese move freely, the most effective management solutions are best conducted at the community level. Canada geese are protected by Migratory Bird Treaty Act. Therefore a management program may require the US Department of Agriculture's approval and permits. Management techniques include planting shrubby vegetation around streams, lakes, and ponds to block waterfowl access; discouraging humans from feeding geese; and removing geese eggs and replacing with decoys.

Common Reptiles and Amphibians

Reptiles can be quite elusive when surveys attempt to document them. Some species, such as the endangered bog turtle, have been well documented in Pilesgrove. Amphibians of some types are abundant, such as bullfrogs. Other species are rare because they depend on vernal ponds, as was discussed in the Surface

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, and 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 Salem County: American eel, Striped bass, Hybrid striped bass, Channel catfish, White catfish, Bluegill sunfish, Brown bullhead, Largemouth bass, Common carp, Black crappie, Chain pickerel, Pumpkinseed sunfish, and Yellow perch. Recreational fishermen and women should regularly check for local fish advisories on NJDEP's Division of Science, Research and Technology web site: http://www.state.nj.us/dep/dsr/njmainfish.htm.

Waters – Vernal Pools section of this document *(page 47).* In Pilesgrove and Woodstown, the eastern box turtle, a species of special concern, has also been sighted.

Fishes

When European settlers arrived in present-day Salem County, they encountered Native Americans who regularly fished along the inland streams and gathered shellfish 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 waterbodies, and conducts research and management surveys. Based on survey data supplied by the bureau, Woodstown and Pilesgrove's freshwater streams may contain the following fish: sunfish, blue gill, shiner, pumpkinseed, eastern mudminnow, common carp, largemouth bass, perch, darter, catfish, and the American eel. Another 12 fish species are documented for Woodstown and Pilesgrove in the "Annotated Checklist and Distribution of New Jersey Freshwater Fishes…" by Rudolf G. Arndt. See *Sources of Information* on page 107.

Endangered Vertebrates

According to the Natural Heritage Database and the Landscape Project, a significant number of rare wildlife has been sighted in Woodstown Borough and Pilesgrove Township over the course of the past 100 years. A pair of nesting bald eagles was spotted in Woodstown and Pilesgrove in late 2004. The Natural Heritage Database confirmed their presence in the township, as of June 2005. In the summer of 2005, a bald eagle fledgling was born. The bald eagles are often seen foraging along the Salem River corridor and especially around Memorial Lake in Woodstown. Brief descriptions, provided by the New Jersey Fish and Wildlife Service, of a few other endangered species and their preferred habitat follow.

The bog turtle (*Clemmys muhlenbergii*) is an endangered species in many eastern states, including New Jersey, and is listed as

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 Nongame Species Program, "Status Definition." Trenton, NJ: April 2002.

threatened on the federal list. It is the smallest native turtle in the United States. Bog turtles lay their eggs in stream banks and cover them with vegetation for protection. These turtles are one of the most difficult animals to find, as they are rare, elusive, and often dwelling on swamp bottoms where they bury themselves in several inches of mud to escape predators. Suitable habitats are dwindling as wetlands are destroyed for human settlement or by pollution. The greatest numbers of bog turtles in the nation are found in the wetland areas of agricultural lands in northwestern and southwestern New Jersey.

The upland sandpiper (*Bartramia longicauda*) is an endangered species in many eastern states, including New Jersey, New Hampshire, Massachusetts, Connecticut and Maryland. Upland sandpipers migrate in winter to warmer climates in South America and thus use New Jersey's fallow farm fields for stopovers en route. The bird species prefers grasslands, fallow agricultural fields, and pastureland that contain a mix of tall and short grasses and provide foraging habitat. The upland sandpiper population boomed in the 1800s, as agriculture was the dominant land use, but declined to the verge of extinction in the early 1900s, nearly wiped out by commercial hunters. Since the 1950s, upland sandpiper populations have continued to decline due to habitat loss, as agricultural land is replaced by suburban development. Despite federal protection under the Migratory Nongame Species Act, state listing as endangered, and national and local environmental groups' research interest, the upland sandpiper shows no signs of population recovery in the eastern United States although it is stable in other parts of the world.

The vesper sparrow (*Pooecetes gramineus*) is an endangered species in New Jersey. 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 the spring of 2004, environmental consultants Herpetological Associates (HA) observed three New Jersey State listed endangered and threatened plant and wildlife species in Pilesgrove Township. HA recorded Cooper's hawk call near a swampy floodplain along Salem River. Several grasshopper sparrows were observed in agricultural fields. An extensive population of Greek valerian, a flowering plant, was found in a wetland area along Salem River. Additionally, numerous bobolinks, a rare species, were observed on agricultural land. These recent sightings were recently added to the Natural Heritage Database recordings for Pilesgrove Township.

See **Appendix D** for a list of *Vertebrate Fauna of Woodstown Borough and Pilesgrove Township*.
See **Appendix E** for a list of *Flora of Woodstown Borough and Pilesgrove Township.*
See **Appendix F** for a list of *State Endangered and Threatened Species*.
See **Appendix G** for a list of *Rare Plant and Animal Species and Natural Communities Presently Recorded in the NJ Natural Heritage Database for Woodstown Borough and Pilesgrove Township*.

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 habitat for rare species. Preserving these areas is a top priority for efforts to conserve biological diversity in New Jersey.

Designation as a Natural Heritage Priority 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.

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.

Pilesgrove Township has within its borders 4 of only 410 NHP sites in New Jersey: (1) the **Majors Run NHP Site**, (2) the **Nichomus Run NHP Site**, (3) the **Salem River Floodplain NHP Site**, and (4) the **Sharptown NHP Site**. The **Majors Run NHP Site** is located along Major Run, a tributary of the Salem River, which forms a partial border with Mannington Township. The site's delineation extends along Major Run from Pointers-Swedesboro Road (CR 620) and Bridgeton Pike. It is a rich wooded ravine, containing habitat for one critically imperiled plant species in New Jersey. A critically imperiled plant is a plant species that is extremely rare, with five or fewer occurrences, individual plants, or acres, in the entire state. The **Majors Run NHP Site** has a biodiversity rating of B5, meaning the area is of general biodiversity interest.

The **Nichomus Run NHP Site** is a wooded area in a swampy floodplain along a large stretch of Nichomus Run, a tributary of the Salem River. The site contains the confluence of Nichomus Run and the Salem River. The surrounding agricultural fields protect the site's wooded wetlands. The site contains a state-listed rare species and is the historical location for a globally rare species. It has a biodiversity rating of B4, meaning the area is of moderate significance either because it is a possible site of a globally rare species or a state-imperiled species was documented on the site.

The **Salem River Floodplain NHP Site** is a floodplain forest underlain by very flat clayey sand. A high diversity of native wildflowers covers the floor of the forest in the spring. The site is bounded by development – Sharptown to the west, Marlton Heights to the north, and residential development to the east. Salem River's confluence with Nichomus Run is the southeastern boundary. The Natural Heritage Database recommends a buffer around the site to preserve the river's hydrology and water quality. The site contains a state-listed endangered species, possibly the American lotus. It has a biodiversity rating of B4, meaning the area is of moderate

significance either because it is a possible site of a globally rare species or a state-imperiled species was documented on the site. The Natural Heritage Database suggests the site's biodiversity rating be increased if forest fieldwork reveals the forest to be of exceptional diversity in tree species.

The **Sharptown NHP Site** is a large area of farmland employed mostly in hay or pastureland and periodically lying fallow. Its boundaries are the Sharptown-Auburn Road to the west, Two-Penny Run to the north, Kings Highway to the east, and Robinson Road to the south. The site contains a state-listed endangered bird species and three state-listed threatened bird species. Local ornithologists often observe various grassland bird species on this site. The area is well known to and visited by bird watchers from throughout the state and region. It has a biodiversity rating of B4, meaning the area is of moderate significance either because it is a possible site of a globally rare species or a state-imperiled species was documented on the site. See **Map 15: Landscape Project Habitat Priorities** for the location of the NHP sites.

The Natural Heritage Database also lists for Woodstown and Pilesgrove several species of threatened and endangered plants and animals, or rare natural communities that have been found in other parts of the borough and township. The sighting records for the plants (only) are shown on topographic maps. These indicate where the sightings occurred, although the map information is deliberately nonspecific. The principal locations with the most rare plant or community records are wide areas along the Salem and Oldmans wetland corridors. The Natural Heritage Database's individual records of animals have been incorporated into the Landscape Project, but plant listings are not a basis for modeling.

It is important to note that the Natural Heritage Database lists primarily those 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.

Source: DVRPC

Pasture land in the Sharptown NHP Site

THE BUILT ENVIRONMENT

POPULATION

The 1990 US Census listed a population of 3,154 residents for Woodstown Borough and 3,250 residents for Pilesgrove Township. By the 2000 Census, Woodstown's population decreased by one-half of 1 percent to 3,136 residents. Pilesgrove's population grew by 21 percent to 3,923 residents.

The majority of Woodstown and Pilesgrove's populations live in single-family homes. In Pilesgrove, housing developments of varying age and size are scattered along county roads and homes built on single lots sit adjacent to active farms. One large housing development, Laurel Hills built during the 1960s and 1970s, lies near Oldmans Creek in the northwestern portion of the township. Other newer subdivisions include Auburn Farms, Westwood Knolls, Eldridge Estates, and the Woods at Laurel Hills (under construction August 2004). According to US Census data, Pilesgrove experienced an explosive residential housing boom between 1970 and 2000, as more than 56 percent of all single-family homes were built. This trend has recently increased. The Pilesgrove Planning Board approved an additional 138 single-family homes in major subdivisions between 2000 and 2004 and continues to have applications coming in for review.

Source: DVRPC
A residential street in Woodstown

In Woodstown, single-family homes are organized in a moderately dense grid pattern. Woodstown's streets range from busy Main Street and Route 45 to narrow and quiet residential streets like Ashbrook Avenue and newer roads like Wynwood Street in The Manor development. About 60 percent of Woodstown's housing units are owner-occupied. Of that, 60 percent of single-family homes were built prior to 1950, probably between 1945 and 1950 during the post-World War II suburban boom. Woodstown also had a similar amount of growth – 236 of the borough's owner-occupied homes (30 percent) were built between 1950 and 1970.

Only 31 owner-occupied homes (4 percent) were built from 1990 to 2000, which would suggest that the borough had reached "build-out;" except that a large amount of the borough, over 40 percent, was open space or farmland according to 1997 NJDEP data. The Woodstown Planning Board approved an additional 85 single-family homes between 2000 and 2004. Newer housing developments, such as The Meadows at High Bridge, Candlelight Village and Hillcrest I and II, were built in the late 1990s or early 21st century, further increasing Woodstown's population. New development is slated for land to the south of Memorial Lake. The Friends Nursing/Assisted Living Complex, sometimes referred to as the Friends Village

development, is to be built in Pilesgrove, adjacent to the borough, and accessed by East Avenue (U.S. Route 40). The Friends Village will be served by borough water and sewer infrastructure and represents the collaboration between borough and township planning boards.

According to the 2000 Census, 25 percent (776 residents) of Woodstown's population and nearly 24 percent (934 residents) of Pilesgrove's population are under the age of 18. Of those Woodstown and Pilesgrove residents under 18 years of age, approximately 1,500 (650 residents from Woodstown and 850 residents from Pilesgrove) are children between the ages of 5 and 18. This age group represents those residents who are most physically active in the community and most likely to use public recreational facilities.

TRANSPORTATION

Woodstown Borough and Pilesgrove Township are relatively accessible compared to much of rural southern New Jersey. County roads may once have been dirt paths created by Native Americans, which then became rural farming roads, and now serve as major traffic thoroughfares in the township. Woodstown's early economic development was a function of its accessible transportation routes, which utilized several significant modes to transport food products, shifting from 19th century rail lines to the 20th century's modern highways.

Source: DVRPC

A rural road in Pilesgrove

The modern transportation corridors that serve Pilesgrove have also fostered much of its past and current state of development. In 1951 the state completed the New Jersey Turnpike. About three-quarters of a mile of the roadway crosses into Pilesgrove Township, traveling on a slightly east-west axis from Woolwich Township to Oldmans Township. The NJ Turnpike serves as a significant transportation artery for the entire region. Woodstown and Pilesgrove are between the two most southern exits, exit 1 in Deepwater (Salem County) and exit 2 in Woolwich Township (Gloucester County). Although not in Woodstown or Pilesgrove, State Route 55, constructed between 1965 and 1989, increases accessibility to Salem County with an exit (39) to U.S. Route 40. It has dramatically increased the speed with which Woodstown and Pilesgrove residents can access the more built-up sections of the Philadelphia metropolitan region and southern shore points.

State Route 45 (known as Bridgeton Pike in Gloucester County and Woodstown Road in Salem County) is also a significant northeast-southwest road, bisecting Woodstown's developed areas and Pilesgrove's farmlands and connecting those cities historically central to agriculture and commerce in the agrarian counties, including Woodbury, Mantua, Woodstown, and the City of Salem.

U.S. Route 40 (Harding Highway) is the main (and often congested) thoroughfare in Pilesgrove Township. The Harding Highway commemorates President Warren G. Harding, elected the 29th president in 1920, who died after only a month in office. In 1927, Route 40 was completed and was one of the first transcontinental highways (second only to the Lincoln Memorial Highway), and extended from Atlantic City, New Jersey to San Francisco, California. In 1951, the Delaware Memorial Bridge opened, replacing a ferry service, which enabled easy travel between Delaware and New Jersey. In 1951, Route 40 was connected to the New Jersey Turnpike in Deepwater, providing easy access between Pennsylvania, New Jersey, and Delaware. In the 1950s, Woodstown Borough was an important stop for early regional commuters and interstate vacationers. The Woodstown Diner opened on Route 40 in the early 1950s to take advantage of the daily traffic.

County roads within Pilesgrove Township include routes 602, 603, 605, 615, 617, 620, 636, 660, 672, and 678. County roads 602, 603, 605, 615, 636, and 678 converge at several key intersections in Woodstown. These roads provide access and connections within the borough, township, and county and are remnants of past land uses that connected farming centers of activity. Smaller roads in the township are a mixture of old rural lanes and newer subdivision thoroughfares.

U.S. Route 40 Traffic Congestion

While the Harding Highway spurred some economic development in Woodstown during the 1950s, U.S. Route 40 carries heavy shore-bound traffic through the small borough all year round. Route 40 is the only major arterial highway directly connecting metropolitan DC to the Jersey Shore. In addition to the shore traffic, Route 40 is a major shipping route for trucks traveling to Salem and Cumberland county communities.

Traffic counts conducted by the New Jersey Department of Transportation (NJDOT) illustrate that traffic volume is steadily increasing to nearly unmanageable levels on Route 40. For example, average daily traffic volume measured between East Lake Road and Fox/Stewart roads in Pilesgrove increased from 10,940 vehicles in 1998 to 13,370 vehicles in 2003. Traffic counts at several Route 40 locations between Baily Street and Main Street in Woodstown measured an increase from 12,250 vehicles in 1997 to 16,030 vehicles in 2001.

Woodstown and Pilesgrove residents experience three major impacts resulting from the overstressed thoroughfare: noise pollution, air pollution, and traffic congestion. In support of mitigating the noise problem, the Woodstown Borough, in 2002, passed an ordinance prohibiting the use of “Jake brakes,” loud automated braking systems often used by tractor-trailers as the vehicles enter a reduced speed limit zone.

To reduce traffic congestion, NJDOT issued the South Jersey Highway Improvement Plan in the 1980s. Potential long-term solutions included the construction of a new highway between the Delaware Memorial Bridge and N.J. Route 55 (located in Cumberland County). Other options included a Southeast Extension of the NJ Turnpike that could be a limited-access toll highway

through Salem County. Another proposal called for creating a new alternate highway, dubbed NJ Route 60, which would closely follow the Salem County Route 640 through rural southern Salem County. NJDOT promoted a more feasible, short-term solution – the Woodstown Bypass, which was to be completed in 1989. This project was not widely embraced by Woodstown and Pilesgrove officials, possibly due to concerns that downtown businesses would suffer economic losses. No proposals for the Woodstown Bypass were developed beyond preliminary phases.

In the late 1990s, the South Jersey Transportation Planning Organization revisited the ideas of building NJ Route 60, as Cumberland County officials have repeatedly called for a new highway to bring economic development to that county. Salem County officials stated their steadfast opposition to any new highway running through Salem County, as it would bring unwanted residential and commercial development, thereby undermining the county's rural character and agricultural industry.

HISTORIC RESOURCES

Source: DVRPC
Seven Stars Tavern in Pilesgrove, listed on the National and State Register of Historic Places

Protection and preservation of historic structures, lands, and views is of high importance to Woodstown Borough and Pilesgrove Township's residents. Woodstown has two sites – James and Mary Lawson House and the Joseph Shinn House – on the National and State Registers of Historic Places. Two additional sites were issued a State Historic Preservation Office (SHPO) Opinion, which determines if sites are eligible for inclusion on the State Register of Historic Places.[6] Pilesgrove Township also has two sites – the Zaccheus Dunn House and the Seven Stars Tavern – on the National and State Registers of Historic Places. Two additional sites were issued a Certification of Eligibility (COE)[7] and one site was issued a SHPO Opinion. There are many more sites that have the potential to be listed as local, state or national landmarks, but have not yet been nominated by local citizens or identified by government employees for such a designation. The township boasts numerous 18th and 19th century structures, including large farmsteads and charming storefronts. Most of

[6] Filing an Environmental Impact Statement (EIS) usually prompts the issuance of a SHPO Opinion. Private individuals, companies, organizations, or governments that use federal funding are often required to file an EIS, which may result in the NJDEP recognizing possible threats to certain historic sites and identifying those sites as eligible for listing on the State Register of Historic Places.

[7] A Certification of Eligibility (COE) is issued by a New Jersey State Historic Preservation Officer. For properties not already listed on the New Jersey Register of Historic Places, a COE satisfies a prerequisite to apply for funds from the New Jersey Historic Trust, as well as several county preservation funding programs.

these historic structures are in Woodstown, but others are scattered throughout Pilesgrove in Sharptown and Eldridge's Hill.

See *Table 23: Sites listed on the National & State Registers of Historic Places* for significant historical sites in Woodstown and Pilesgrove. See **Appendix H** for a list of *Woodstown & Pilesgrove's Historic and Cemeteries Inventory* detailing the locations of other sites possibly eligible for nomination to the national and state registers.

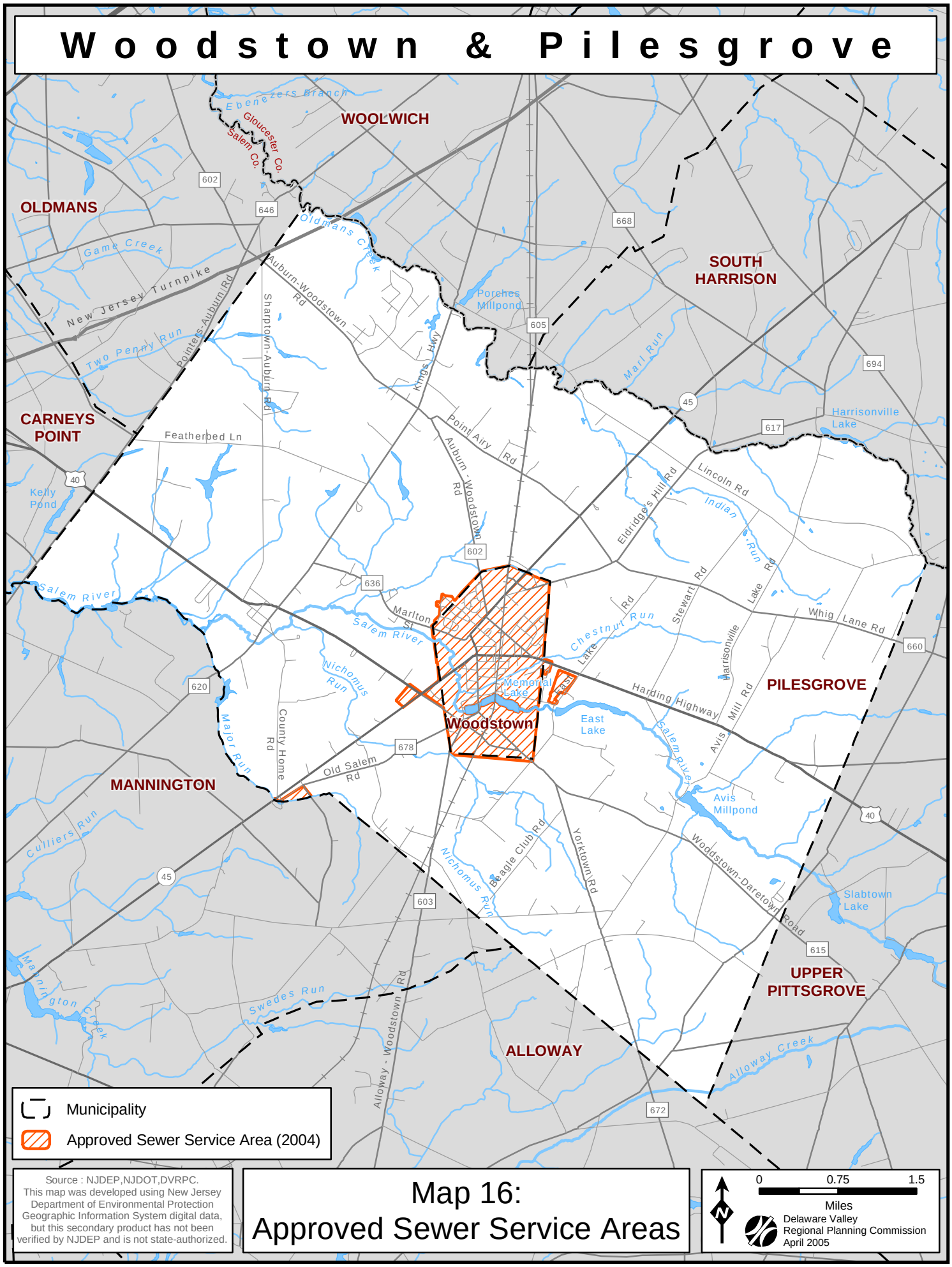
Table 23: Sites Listed on the National & State Registers of Historic Places in Woodstown & Pilesgrove

Name	Location	Register	State ID#
Woodstown			
James and Mary Lawson House	209 North Main Street	National & State	3794
Joseph Shinn House	68 North Main Street	National & State	2454
South Woodstown Historic District	No boundary information available	State Historic Preservation Office Opinion	Opinion Number 2455
Woodstown Town Center Commercial Historic District	Includes structures on South Main Street, North Main Street at East Avenue, and West Avenue	State Historic Preservation Office Opinion	Opinion Number 366
Pilesgrove			
Charles Engel Allen House	947 U.S. Route 40	Certification of Eligibility	288
Samuel and Anne Bassett House	29 Fox Road	Certification of Eligibility	47
Champneys-Reed House	Old Salem Road	State Historic Preservation Office Opinion	Opinion Number 2444
Zaccheus Dunn House	East Lake Road (near Woodstown-Alloway Road)	National & State	2453
Seven Stars Tavern	Sharptown-Swedesboro Road and Woodstown-Auburn Road	National & State	3440

Source: New Jersey State Historic Preservation Office, August 2004

The Pilesgrove-Woodstown Historical Society serves both the township and borough and collects and holds information on the community's historic resources. The Woodstown Historic Preservation Commission oversees the Woodstown Historic District, which was established by the borough council in 1986 and amended in 2003. The Historic District includes parcels facing North Main Street, from Auburn Street on the north to Marlton Street and Bowen Avenue on the south. To support and sustain the historical, cultural, architectural, and social heritage of Woodstown Borough, the Historic Preservation Commission regulates façade and structural changes to buildings within the historic district and advises property owners on those buildings' architectural and historical significance. According to borough code Chapter 67, Article X, property owners who intend to alter the façade of buildings within the Historic District or buildings listed as historic sites are required to submit for a formal review by the Historic Commission, which then presents a report to the zoning officer. The Historic District ordinance does not regulate painting, paint colors or landscaping of properties within the district.

Woodstown & Pilesgrove



Woodstown and Pilesgrove have numerous other historic and cultural assets not protected by a Historic District Ordinance.

The National Park Service and the New Jersey SHPO jointly administer the Certified Local Governments (CLG) program, which provides technical assistance and funding for community-based preservation efforts. As of October 2003, no municipalities in Salem County are CLGs. 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.

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

UTILITIES AND SERVICES

Drinking Water

Residences in Woodstown Borough and a small part of Pilesgrove Township, specifically the Friends Village assisted living and nursing home complex along U.S. Route 40, are supplied with public drinking water by the Woodstown Water Department. Drinking water is derived primarily from public supply wells drilled into the lower PRM, Englishtown, and Wenonah-Mount Laurel aquifers (see **Aquifers**, page 63), but is supplemented with water purchased from South Jersey Water Supply. The Pilesgrove Town Center, a commercial center located at the intersection of routes 40 and 45, is served by its own water tower.

The great majority of Pilesgrove Township residents live in less developed areas and maintain private wells and septic systems. Neither the borough nor township has any plans to connect these residences to public sewer and water. As mentioned above, township land adjacent to the borough along U.S. Route 40 is proposed for relatively dense development of senior housing and may be served by the Woodstown Water Department.

The drinking-water wells owned and operated by Woodstown Water Department are listed in *Table 18* on *page 68*. **Map 12: Public Water Supply Wells and Non-Community Wells** on

page 66 shows their locations. These wells account for 100 percent of Woodstown's public drinking water supply. Currently, the Woodstown Water Department serves approximately 3,200 people (100 percent of the population) with public drinking water.

Sewer

As with public water, sewer service is provided to all of Woodstown Borough, and will be provided to the Friends Village complex in Pilesgrove Township. All public sewage treatment is provided through the Woodstown Department of Public Works at its Woodstown Sewerage Authority Treatment Facility, located on West Avenue, which discharges to the Salem River. In the early 1990s, NJDEP initiated a building moratorium in Woodstown while the treatment facility underwent major upgrades to provide 400 new sewer connections for anticipated residential development. The upgrades also included extending sewer lines to the Salem County Correctional Facility in Mannington Township. Soon after the moratorium was lifted by NJDEP, the Woodstown Planning Board approved the Candlelight Village subdivision, located in the northeast portion of the borough.

The Pilesgrove Town Center provides primary sewage treatment on site, after which its sewage is sent to the Woodstown Sewerage Authority Treatment Facility for secondary and tertiary treatment. The Woodstown Sewer Department serves approximately 3,200 people.

Each municipality has its own public works department that oversees the maintenance of municipal-owned properties and municipal streets and roads. In Woodstown, the public works department also operates the water department and the wastewater treatment plant.

See **Map 16: Approved Sewer Service Areas** for the location of the currently approved sewer service area.

Municipal Services

Trash and Recycling

Woodstown is one of 46 communities in New Jersey with a Pay-As-You-Throw (PAYT) waste collection system. However, it uses a pay-per-bag pricing system, whereby residents purchase special orange trash bags to defray the cost of waste removal and disposal services. Recyclables are picked up once every two weeks free-of-cost. Pilesgrove provides no waste collection services and has no local purpose tax for waste collection. Residents must contract for their own waste removal or bring their household waste and recyclable materials to the Pilesgrove Township Recycling Convenience Center.

Pilesgrove Township

Map 17A:
Existing Open Space
(2004 Parcel Data)

OLDMANS
WOOLWICH
SOUTH HARRISON
ELK
CARNEYS POINT
PILESGROVE
Woodstown
MANNINGTON
UPPER PITTSGROVE
ALLOWAY

- Municipal Property
- County Property
- State Property
- Municipal Preserved Open Space
- County Preserved Open Space
- State Preserved Open Space
- NJ Turnpike Authority
- Church or Cemetery Property
- Farm-Assessed Property
- Farm (Preserved)
- School Property
- Vacant Land
- Developed Land

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

0 0.75 1.5
Miles
Delaware Valley Regional Planning Commission
April 2005

Education

Woodstown and Pilesgrove have a regional school district educating approximately 1,700 students each year. The school district maintains three schools – Mary S. Shoemaker Elementary School, Woodstown Middle School, and Woodstown High School – all within Woodstown Borough. Mary S. Shoemaker educates more than 500 children in grades pre-Kindergarten through 4. Woodstown Middle School educates 486 children in grades 5 through 8. After finishing at the middle school, Woodstown and Pilesgrove schoolchildren attend Woodstown High School, along with students from Alloway, Oldmans, and Upper Pittsgrove townships. Woodstown High School serves 691 students. In September of 2005, citizens in the Woodstown-Pilesgrove Regional School District will review a multimillion-dollar referendum to finance a new high school, renovate the Mary Shoemaker School, and reconfigure the existing high school as a middle school.

Parks and Recreation

Because of Woodstown and Pilesgrove's collective history, interdependent economies, joint school district, and cooperative residents, their parks and recreation facilities are also shared amenities.

The **Marlton Recreation Area** is one example of Woodstown and Pilesgrove's cooperation in providing services to their larger community. The 65-acre recreation complex was purchased in the 1980s with help from the Frank Stewart Trust. Pilesgrove Township owns the parkland and the Pilesgrove-Woodstown Recreation Association manages its day-to-day operations. The park is financially supported by borough and township budget appropriations and private donations. Its recreation amenities include baseball, softball, soccer and football fields, a walking path with fitness stations, two playgrounds, a concessions stand, and a pavilion for community events and picnics.

Source: DVRPC

A playground at the Marlton Recreation Area in Pilesgrove

Woodstown owns and maintains 47 acres that include the 21-acre Memorial Lake and natural land areas along the Salem River. While much of this land remains in its natural state, the centerpiece is **Memorial Lake Park**, a developed park featuring a walking path and a fishing pier.

Woodstown and Pilesgrove completed a five-mile network of roadway bicycle paths connecting schools, residential neighborhoods, businesses, and recreational facilities in 2002. The paths link the Marlton Recreation Area, Woodstown's business district, Town and Country Golf Course in Pilesgrove, the Woodstown High School, and the Mary Shoemaker Elementary School, as well as the residential subdivisions of Auburn Farms, Candlelight Village, Westwood Knolls, Woodstown Manor, and Marlton Heights.

In 1992, Salem County purchased Camp Crocket, which lies along the southern shore of Avis Mill Pond on the Salem River. The **Camp Crocket County Park**, once named Camp Carney and owned by the YMCA, has playground facilities and areas for group picnics.

Source: DVRPC
Avis Mill Pond from Camp Crocket County Park

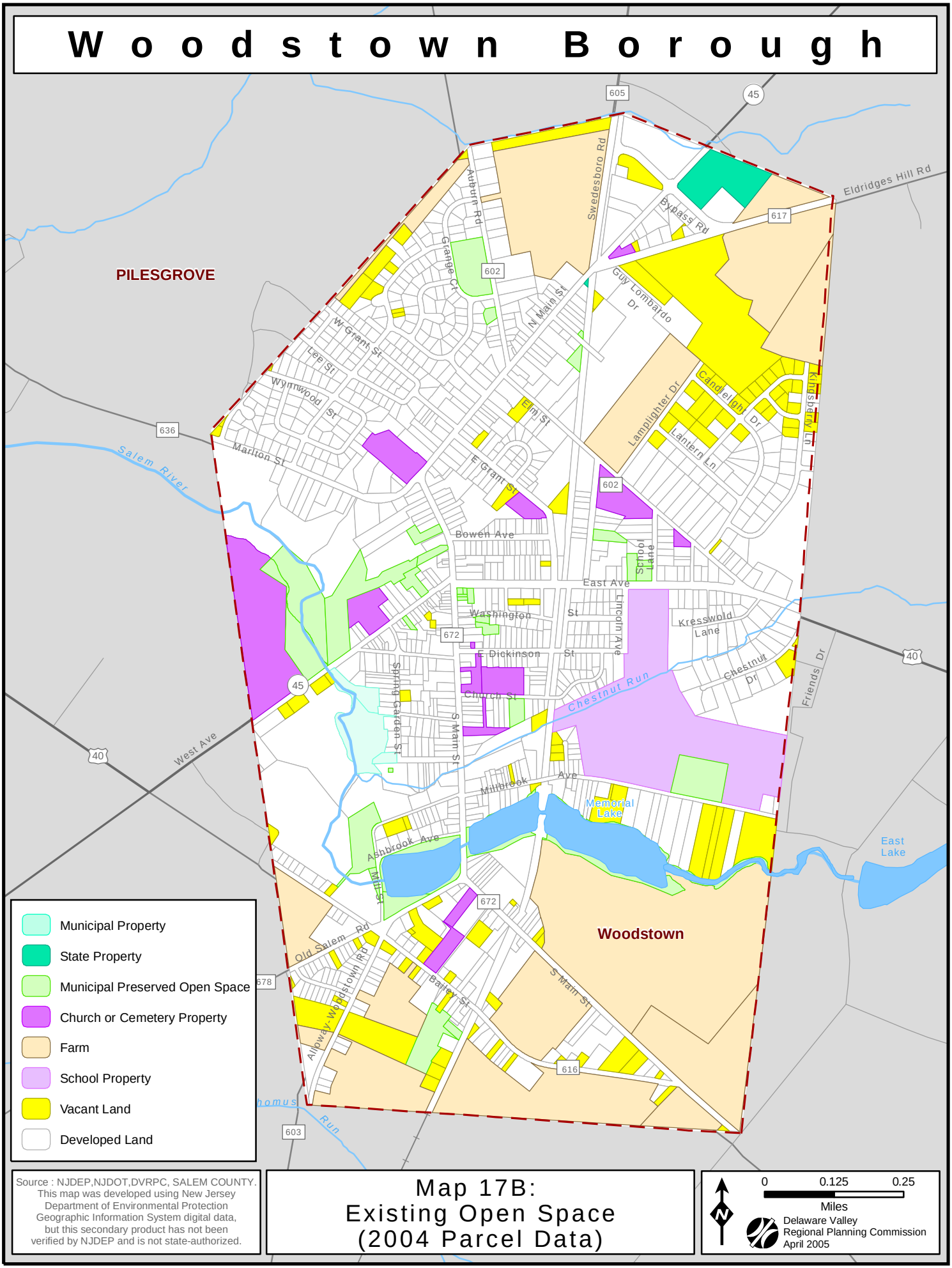
Some land in Pilesgrove is owned and managed by the state of New Jersey. In the early 1990s, NJDEP, working cooperatively with the State Agricultural Development Committee and the Nature Conservancy, acquired a 191-acre property along Featherbed Lane in Pilesgrove Township. The **Featherbed Lane Wildlife Management Area** provides habitat for endangered grassland-nesting birds and Neotropical songbirds. Recently, the Pilesgrove Township Planning Board approved plans for a residential subdivision, called High Point Estates, to be constructed on land north of the WMA. As part of the approval, the single-family homes will be clustered on smaller parcels to preserve 24 acres that will be restored as grassland habitat and donated to NJDEP for inclusion into the WMA.

NJDEP owns two other Wildlife Management Areas within Pilesgrove. The **Salem River Wildlife Management Area** is 2,500 acres of river corridor of which 327 acres are in Pilesgrove. The Pilesgrove tracts include important habitat for endangered bog turtles. The **Harrisonville Lake Wildlife Management Area** is 37 acres of habitat partly around Harrisonville Lake in South Harrison Township, Gloucester County. About six acres of shoreline are in Pilesgrove.

In 2003, Pilesgrove Township residents approved a referendum to initiate a three-cent property tax dedicated to open space acquisition and farmland preservation, generating over $75,000 annually. Given Pilesgrove's, and most of Salem County's, agrarian economy and rural character, the township's open space preservation efforts are focused almost exclusively on farmland preservation. As of January 2005, Salem County, the State Agricultural Development Committee, and Pilesgrove Township have permanently preserved 19 farms consisting of over 2,700 acres.

See **Map 17A: Pilesgrove Existing Open Space (2005)** on page 97 and **Map 17B: Woodstown Existing Open Space (2005)** on page 100.

Woodstown Borough



Source : NJDEP,NJDOT,DVRPC, SALEM COUNTY. 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.

Map 17B: Existing Open Space (2004 Parcel Data)

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Miles

Delaware Valley Regional Planning Commission
April 2005

Private Recreational Amenities and Special Events

The Woodstown-Pilesgrove community has numerous privately owned properties that are recreation assets enjoyed by many:

- Town and Country Golf Links (18-hole public golf course) – Woodstown & Pilesgrove, 180 acres;
- Game Creek Hunting Farm – Pilesgrove, 150 acres;
- Cowtown Rodeo – Pilesgrove;
- Four Seasons Campground – Pilesgrove, 145 acres;
- Salem County Beagle Club – Pilesgrove, 95 acres;
- Salem County Fairgrounds – Pilesgrove, 66 acres;
- Chestnut Run Swim Club – Woodstown, 6 acres;
- Jay Pratt Azalea Gardens – Pilesgrove; and
- Wood Lanes Bowling Center – Pilesgrove.

Because of great parks and recreation facilities owned by Woodstown, Pilesgrove, the county, state, and private groups, Woodstown and Pilesgrove are destinations for people traveling throughout the region to special events. Listed below are a few of the activities and events held in Woodstown and Pilesgrove each year:

- Cowtown Flea Market – twice weekly (Year round)
- Cowtown Produce and Livestock Auction – weekly (Year round)
- Cowtown Rodeo – weekly (May through September)
- Cowtown Polo Club – weekly (Summer and Fall)
- Nanticoke-Lenape Pow-Wow at the County Fairgrounds – annual (June)
- Motorcycle Monthly Show and Sale at County Fairgrounds – annual (June)
- South Jersey Tractor Pull at County Fairgrounds – annual (July)
- Woodstown 4th of July Parade – annual (July)
- Salem County 4-H Fair at County Fairgrounds – annual (August)
- Harvest Sheep and Wool Festival of New Jersey at the County Fairgrounds – annual (September)
- Delaware Valley Bluegrass Festival at the County Fairgrounds – annual (September)
- Woodstown Fall Festival – annual (September)
- South Jersey Gas Engine Club Show at County Fairgrounds – annual (October)
- The Great Pumpkin Carve at County Fairgrounds – annual (October)
- Woodstown-by-Candlelight Christmas House Tour – annual (December).

ENVIRONMENTAL ISSUES

KNOWN CONTAMINATED SITES

A 2001 NJDEP inventory of Known Contaminated Sites reported 124 contaminated sites in Salem County. Five of these sites are located in Woodstown Borough and six are located in Pilesgrove Township. See **Appendix I: Known Contaminated Sites and Underground Storage Tanks**. See also **Map 18: Known Contaminated Sites**.

The New Jersey *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. 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 as Superfund sites, which make them eligible for federal cleanup funds. Other sites are handled by state or individual programs, or through private funds. There are five Superfund sites in Salem County, none of which are in Woodstown or Pilesgrove.

One site of special concern for borough and township residents is the Woodstown-Pilesgrove Sanitary Landfill, a 44-acre inactive landfill jointly owned by both municipalities. The landfill was in operation from 1980 to 1985, after which NJDEP ordered the site closed when a general operating permit expired. According to NJDEP procedures, the municipalities were supposed to submit a "Closure and Post-Closure Care Plan" for the landfill, but a plan has not been submitted to date. Woodstown and Pilesgrove periodically sample on-site groundwater monitoring wells and NJDEP's Bureau of Field Operations is currently implementing closure actions to prevent the release of methane, a greenhouse gas, and to mitigate the impact of landfill leachate. In 2003, NJDEP planned to conduct, but never released, an "Immediate Environmental Concern Assessment" to identify conditions that threaten human health or the environment.

Underground Storage Tanks

There are a number of private residences and private properties in Woodstown Borough and Pilesgrove Township that still have underground storage tanks, used primarily to hold heating oil. As these tanks age and rust they often begin to leak, which becomes a serious threat to the groundwater below them. These sites sometimes overlap with Known Contaminated Sites, but are often less contaminated and require a lower level of remediation. See **Appendix I: Known Contaminated Sites and Underground Storage Tanks**.

Site Remediation and Waste Management (SRWM), formerly known as SRP (Site Remediation Program), provides financial aid and technical guidance in cleaning up the state's more serious contaminated sites that pose a danger to human health and the environment. SRWM maintains an inventory of 38,000 sites, of which 25,000 require no further remediation action. Despite full remediation, those sites remain on the NJDEP database of *Known Contaminated Sites* or *Underground Storage Tanks*. Thus, use of the lists is constrained by the need to determine the

current status of any site of interest. A case manager is assigned to every *Known Contaminated Site* and *Underground Storage Tank* case and can provide further information on each site. To learn more about a contaminated site, contact one of the lead agencies overseeing the case or visit the website: http://www.state.nj.us/dep/srp/.

RADON

Radon is a radioactive gas that comes from the natural decay of uranium found in nearly all soils. It is invisible, odorless, and tasteless. It moves up through the ground to the air above, and into all types of homes through cracks and other holes in foundations. A build-up of radon-contaminated air (internal alpha particle exposure hazard) within a home can pose a long-term health hazard to residents, specifically for lung cancer. The only method of detection is to conduct a test for alpha particles in the air within a home. Fortunately, radon testing is inexpensive. All radon test results conducted in the state are reported to DEP by certified companies, which perform the tests or manufacture the test kits. This data is used to classify municipalities into a three-tier system, which identifies the potential for homes with indoor radiation problems.

NJDEP classifies municipalities into three categories – high (Tier 1), moderate (Tier 2), or low (Tier 3) – as to the risk of having high radon levels. Woodstown Borough is listed as a Tier 1 municipality with high risk of having high radon levels in homes. In January 2005, Pilesgrove Township was upgraded from Tier 2 to Tier 1. In a 2005 press release, NJDEP reported that it will provide municipalities whose radon designation was upgraded with materials to develop an outreach program for homeowners. New homes in Tier 1 municipalities are required by the Radon Hazard Subcode to incorporate radon resistant construction techniques to prevent radon from entering buildings from soils. Candlelight Village, an 80-home subdivision built between 1999 and 2003, has incorporated these passive radon prevention systems into design and construction.

The criteria for a Tier 1 municipality designation is that five or more homes, of 25 or more homes tested, have radon concentrations greater than or equal to 4 picocuries per liter in air. The level at which homeowners should take immediate action is 4.0 picocuries per liter in air. If radon levels are high in a home, NJDEP suggests that the homeowner take the following actions: (1) prevent radon from entering the house by repairing cracks and insulation and (2) dilute radon concentrations currently in the house by installing a radon extraction system and/or frequently ventilating indoor air. NJDEP maintains www.njradon.org as an information source for concerned citizens. Free information packets are available upon request. All companies conducting radon testing and mitigations are certified by NJDEP and listed on their website.

OTHER ENVIRONMENTAL CONCERNS

Toxic Releases

According to the U.S. EPA annual Toxics Release Inventory (TRI), Dupont's Chambers Works facility in Deepwater, Salem County ranks high in the release of toxic chemicals to the environment in New Jersey. In 2002 (the most recent data available), approximately 3.7 million pounds of toxic chemicals were released to land, air, and water by the facility. Salem County, as a whole, ranks first statewide in toxic releases with a total of 14 facilities cumulatively releasing 4.4 million pounds.

The Chambers Works facility is located in Deepwater, about ten miles west of Woodstown, on the Delaware River. Air releases from industrial sources pose a direct health and environmental risk to the Woodstown-Pilesgrove area, particularly with prevailing winds from the west. Point source and fugitive air emissions accounted for more than 1.1 million pounds of the toxic releases in Salem County during 2002. Chambers Works accounted for approximately 547,000 pounds of air pollutants, followed by the Deepwater Generating Station with nearly 458,000 pounds.

Hazardous Materials Facilities and Handlers

Woodstown and Pilesgrove are home to several companies engaged in transporting bulk quantities of chemicals and other hazardous materials. NJDEP and U.S. EPA closely regulate businesses that transport hazardous materials; they must receive appropriate permits and submit periodic monitoring reports. Other federal and state agencies also may require them to submit reports or meet additional requirements in order to protect surrounding human populations and employees. Since September 11, 2001, hazardous material transportation companies must utilize effective security measures to guard against terrorist attacks.

SJ Transportation, located on Route 40 near East Lake Road, is a hauler of hazardous, industrial and infectious wastes, as well as bulk material, throughout the United States and eastern Canada. Monarch Environmental (formerly C. R. Warner), also located on East Lake Road, is a recycler and processor of used and waste oils, oil filters, and lubricants, received in bulk shipments. Used oil is delivered to the facility, then chemically or thermally treated, and stored on site. Recovered oil is sold as fuel oil after it reaches consumer specifications. The Salem County Short Line, operated by the Southern Railroad Company of New Jersey, is an active railroad line that runs through Woodstown and Pilesgrove. The 17-mile line, that runs from Swedesboro, Gloucester County, to Salem City, delivers material to large-scale manufacturers such as Mannington Mills and Anchor Glass. In Woodstown, the railroad delivers agricultural chemical and fertilizer components to South Jersey Farmers Exchange, located on East Avenue in Woodstown. Helena Chemical is a national supplier of agricultural chemicals, seed, fertilizers, and related products and has a Woodstown facility located in the Erdners Busy Corner warehouse complex off North Main Street. The South Jersey Farmers Exchange, located on East Avenue in Woodstown, also provides bulk quantities of fertilizers and crop protection products to area farmers.

PSE&G Salem Nuclear Generating Station

The Woodstown-Pilesgrove area is about 12 miles northeast of three Public Service Electric & Gas (PSE&G) nuclear reactors – Salem 1, Salem 2 and Hope Creek – located in Lower Alloways Creek Township. Woodstown and Pilesgrove are outside of the Emergency Planning Zone, or "Plume" Zone, which extends out in a ten-mile radius of the facility. The Plume Zone is the area in which immediate evacuation and other protective actions would be taken in the event of a nuclear accident. NJDEP operates the Forward Command Post in Pilesgrove, about one mile south of Woodstown. The Forward Command Post functions as the primary command center during an emergency. From the command post, environmental officials would determine the location and extent of radioactivity and the appropriate responses. For example, scientists dispatched from the command post can take radioactive measurements from air, soil, water, shellfish, natural vegetation, crops and milk from dairy cattle, within a 50 mile radius of the nuclear facility to determine the extent of environmental and food contamination.

Historic 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, 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. While the task force examined 18 agricultural sites throughout New Jersey (none in Salem County), it is estimated that 5 percent of the state's land area is impacted by residues from agricultural pesticides. 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.

Source: DVRPC

Irrigation at a sod farm in Pilesgrove

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APPENDIX A: Total Maximum Daily Loads Supplementary Information

Table: TMDLs for Phosphorus in Memorial and Harrisonville Lakes

From TMDL Report: "Phosphorus in 13 Eutrophic Lakes in the Lower Delaware Water Region"						
Lake	**Date Proposed**	**Date Approved**	**Lake Acres**	**Lakeshed Acres**	**% overall required load reduction in TP[1]**	
Harrisonville	4/21/03	Sep-03	18	5,638.50	85%	
Memorial	4/21/03	Sep-03	21.7	4,828.20	86%	

TMDL Calculations (annual loads and % reductions) for Sources of Phosphorus						
	Memorial Lake			**Harrisonville Lake**		
	Kg TP/yr	**% of Loading Capacity**	**% Required Reduction***	**Kg TP/yr**	**% of Loading Capacity**	**% Required Reduction[2]**
Loading Capacity	930	100%		540.0	100%	
Point Sources other than Stormwater	n/a	n/a	n/a	n/a	n/a	n/a
Nonpoint and Stormwater and other Sources:						
med/high density residential	1.8	20.0%	88%	0.5	0.1%	92%
low density/rural residential	17.0	1.8%	88%	13.0	2.6%	92%
commercial	6.3	70.0%	88%	0.6	0.1%	92%
industrial	6.3	70.0%	88%	0.2	0.1%	92%
mixed urban/other urban	9.3	1.0%	88%	2.0	0.4%	92%
agricultural	490.0	53.0%	88%	134.0	28.0%	92%
forest, wetland, water	78.0	8.4%	0%	88.0	18.0%	0%
barren land	4.2	50.0%	0%	4.7	9.0%	0%
septic systems				12.0	2.5%	92%
waterfowl						
internal load				5.2	1.0%	0%
air deposition onto lake surface	0.6	10.0%	0%	0.5	0.1%	0%
groundwater				71.0	14.0%	0%
Margin of Safety	310.0	34.0%	n/a	170.0	34.0%	n/a

[1] TP = Total Phosphorus
[2] Percent reductions shown for individual sources are necessary to achieve overall required reduction

Source: NJDEP Division of Watershed Management

Table: TMDLs for Fecal Coliform in Stream Segments in Woodstown and Pilesgrove

From TMDL Report: "Fecal Coliform in 27 Stream Segments in the Lower Delaware Water Region"							
Date Proposed	**Date Approved**	**Station Name/Waterbody**	**Site ID**	**River Miles/Water-shed Acres**	**% Reduction Required (w/ MOS) – LA[1]**	**% Reduction Required – WLA[2]**	**Implementation – Segment Specific Recommendations**
04/21/03	Sept. 2003	Salem River at Woodstown and at Courses Landing - watershed upstream of Salem River's confluence with Game Creek (in Carneys Point). This is the full length of the Salem River & watershed in Pilesgrove and Woodstown.	1482500 & 1482537	73.5 mi/ 27,211 ac	84%	84%	There are horse farms, dairy farms, a poultry farm, an agricultural products operation, and a rodeo in the watershed. Cattle were observed in the stream. Both Woodstown Lake and Avis Mill Pond attract large Canada Goose population. The Township of Woodstown receives sewer service; the remainder of the watershed is on septic systems. Monitoring: Long segment would benefit from fecal coliform sampling to narrow scope of impairment.
04/21/03	Sept. 2003	Two Penny Run at Danceys Corner and Courses Landing - watershed downstream to Laytons Lake (in Carneys Point). Full length of Two Penny Run & its watershed in Pilesgrove.	1482560	8.9 mi/ 4,989 ac	90%	90%	Majority of watershed is agricultural land, good buffer on one side of stream. Many horse farms as well as a large cow and sheep farm observed. Potential septic impacts from homes on septic systems, including trailer parks. Monitoring: coliphage to determine if septic systems are a source. Strategies: prioritize for EQIP/SCCSP funds to install agricultural BMPs.
04/21/03	Sept. 2003	Oldmans Creek at Jessups Mill and at Porches Mill - watershed upstream from head of tide. Full length of Oldmans Creek, including Indian Run tributary, & watershed in Pilesgrove.	1477510	37.6 mi/ 14,897 ac	95%	95%	Predominant land use of this watershed is agriculture and there are several lakes. Streamside land uses include crops, raising livestock, pastureland for horses, scattered homes and open space. Monitoring: coliphage to determine if septic systems are a source. Strategies: prioritize for EQIP/SCCSP funds to install agricultural BMPs; encourage community based goose management programs.
From TMDL Report: "Fecal coliform to address 3 stream segments in the Lower Delaware Water Region"							
5/2/05		Major Run at Sharptown – watershed upstream from confluence of Major Run and Salem River	1482530	4.19 mi/ 2,152 ac	98%	98%	The watershed that drains this segment is largely agricultural. It is possible that manure application for fertilizer and livestock may be of concern. Small pockets of residences are present. Much of the segment has a wooded buffer. A lake is present above the sampling site. Monitoring: Additional fecal coliform monitoring is suggested in order to locate potential sources. Strategies: The lake area should be investigated for presence of excessive numbers of geese and if needed a goose management program should be implemented; prioritize for EQIP funds to install agricultural BMPs; Phase II stormwater program.
[1] LA = Load allocation from nonpoint and stormwater sources [2] WLA = Waste load allocation from any point sources							

Source: NJDEP Division of Watershed management

Table: TMDLS for Phosphorus in a Stream Segment in Pilesgrove

From TMDL Report: "Phosphorus in 5 Stream Segments in the Lower Delaware Water Region"							
			Site ID	**River Miles/Water-shed Acres**	**% Reduction Required (w/ MOS) – LA[1]**	**% Reduction Required – WLA[2]**	
07/05/05		Oldmans Creek at Porches Mill	1477510	16.4 mi/ 7,471 ac	80%	n/a	

TMDL Calculations (annual load and % reductions) for Sources of Phosphorus (07/05/05 TMDL)

	Oldmans Creek at Porches Mill				
	Sources	**Kg TP[1]/yr**	**% of Loading Capacity**	**% Required Reduction[2]**	
	Loading Capacity	1874.5	100%	80%	
	Point Sources other than Stormwater	n/a	n/a	n/a	
	Nonpoint and Stormwater and other sources:				
	med/high density residential	3.5	20.0%	80%	
	low density/rural residential	56.67	3.0%	80%	
	commercial	3.94	20.0%	80%	
	industrial	1.31	10.0%	80%	
	mixed urban/other urban	12.44	70.0%	80%	
	agricultural	613.36	32.7%	80%	
	forest, wetland, water	96.51	5.1%	0%	
	barren land	16.57	90.0%	0%	
	Harrisonville Lake TMDL[3]	500	26.7%	0%	
	Margin of Safety	570.16	30.4%	n/a	

[1] TP = Total Phosphorus
[2] The upstream watershed of Oldmans Creek has an approved Lake TMDL. The Loading Capacity from that TMDL was used as the loading of the upstream watershed.

Source: NJDEP Division of Watershed Management

APPENDIX B: Private Well Testing Act

The Private Well Testing Act (*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.

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*), Volatile Organic Compounds (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 ground water in the aquifer, which may be different from water out of a kitchen faucet. Property owners may choose to also have the tap water tested to assure that filters or treatments are working effectively.

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 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 ground waters tend to be acidic (pH below 7), while ground waters 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 NJDEP, and to the local health authority. Suspicious or unexpected results are neither confirmed nor

verified by NJDEP. Local health authorities will investigate suspect results, if necessary.

In February 2004, 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 8 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 ground water 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 ground water from fecal contaminants.

For those wells in the counties where mercury testing is required, 14 wells failed for mercury. Nine southern counties, including Burlington, Camden, Gloucester, and Salem, are required to test for mercury, which has been linked to neurological problems.

The test results for Salem County, Woodstown, and Pilesgrove are summarized in the table below. 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.

Summary of PWTA Test Results for Salem County (September 2002 – March 2003)

Municipality	**# Wells sampled**	**Total # Wells over the MCL***	**Fecal coliform/ E. coli**	**Nitrate**	**Mercury**	**Any VOC** over the MCL**
Pilesgrove Township	20	1	0	1	0	0
Woodstown Borough	1	0	0	0	0	0
Salem County Totals	***101***	***9***	***0***	***9***	***1***	***0***

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

* MCL – Maximum Contaminant Level, set as the limit of a particular substance allowable to achieve a water quality standard
** VOC – Volatile Organic Compound.

APPENDIX C: Federal and State Conservation Programs for Farmers

There are several financial and economic incentive programs and technical assistance to help farmers plan and use conservation practices on their farms. The United States Department of Agriculture Natural Resources Conservation Service (NRCS) has a Farm Service Agency office in Waretown, Mannington Township, Salem County that serves Salem and Gloucester counties. NRCS staff members are available to work with farmers to help identify their conservation goals and then craft appropriate conservation plans to meet those goals.

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

The **Conservation Reserve Program (CRP)** is offered by NRCS and administered by the Farm Service Agency. It provides technical and financial aid and gives farmers assistance in complying with federal, state and tribal environmental laws. The primary environmental goals of this program include reducing soil erosion, reducing sedimentation in streams and lakes, improving water quality, establishing wildlife habitat, and enhancing forest and wetland resources. Website: http://www.nrcs.usda.gov/programs/crp/.

The State of New Jersey partnered with the USDA to help farmers protect water quality by establishing a $100 million **Conservation Reserve Enhancement Program (CREP)**, which is the New Jersey version of the federal program**.** Under an agreement signed by Governor McGreevy in February 2004, the USDA provides $77 million and the state contributes $23 million for New Jersey farmers to install stream buffers, in order to reduce the flow of nonpoint source pollution into the state's waterways. New Jersey's goal is to enroll 30,000 acres of agricultural land into this state-federal program over a 10-year period. Types of buffers to be installed include trees, shrubs, vegetative filter strips, contour grass strips and grass waterways. Under the program, a landowner installs and maintains approved practices through a 10 or 15-year rental contract agreement. A landowner entering the state Farmland Preservation Program or Green Acres Program also may opt for a permanent easement under the Conservation Reserve Enhancement Program. This would provide additional payment for permanent maintenance of approved conservation practices. The program will pay landowners annual rental and incentive payments for participating in the program as well as 100 % 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 targeted for wetlands preservation is called the **Wetlands Reserve Program (WRP)**. 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. WRP is made possible by a reauthorization in the Farm Security and Rural Investment Act of 2002 known as the Farm Bill. The program has three enrollment options: permanent easement, 30-year easement, or restoration cost-share agreement, which has a minimum 10-year commitment. Applications are accepted on a continuous basis

and may be obtained and filed at any time. Please see the website for more details: www.nrcs.usda.gov/programs/farmbill/2002/

The **Grassland Reserve Program (GRP)** is another conservation program authorized by the Farm Bill 2002. GRP is a voluntary program that protects grasslands, pasturelands, and rangelands without prohibiting grazing. Participants voluntarily put limitations on the future land use of their land while retaining the ability and right to conduct grazing practices, hay production, mow or harvest for seed production, conduct fire rehabilitation, and construct firebreaks and fences. There are four enrollment options: permanent easement; 30-year easement; rental agreement, which is available in 10, 15, 20 or 30-year contracts; and restoration agreement. Participants are compensated in different ways according to the enrollment option. For more information and application procedures visit the GRP website: www.fsa.usda.gov/dafp/GRP/default1.htm

The **Wildlife Habitat Incentives Program (WHIP)** is similar to those above in that it is also a USDA voluntary program, but differs in that WHIP targets landowners who want to preserve and protect fish and wildlife habitat on non-federal lands. The program provides technical and cost sharing provisions to protect these environments. Enrollment consists of a cost share agreement lasting from 5 to 10 years. In New Jersey, NRCS has received over $900,000 to implement WHIP since 1998, where the majority of funds have been used for cost share payments to landowners. A state plan has been developed in New Jersey and targets several areas as priority wildlife habitat areas. NRCS has also targeted a priority species: the bog turtle, for protection. For more information visit the NRCS New Jersey website: www.nj.nrcs.usda.gov

The **Environmental Quality Incentives Program (EQIP)** is also a part of the reauthorized Farm Bill of 2002. EQIP is a voluntary program that focuses on conservation that promotes both agricultural production and environmental quality. The program itself offers technical and financial assistance with installation and implementation of structural and management practices on agricultural land. EQIP features a minimum contract term compared to other programs lasting a maximum of 10 years. Landowners are eligible for incentive and cost share payments of up to 75% and sometimes up to 90% while still engaging in livestock or agricultural production activities. For more information please visit the website: www.nrcs.usda.gov/programs/eqip

The **Conservation Security Program (CSP)** is a voluntary program administered by the NRCS and authorized by the Farm Bill 2002. 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. 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/csp/

The **Forestland Enhancement Program (FLEP)** is also authorized through the Farm Bill 2002 and replaces the Stewardship Incentives Program (SIP) and the Forestry incentives Program (FIP). FLEP is a voluntary program for landowners of non-industrial private forest and provides

technical, educational and cost-sharing assistance in an effort to promote the conservation of these forested areas. Landowners must have a forest management plan and are limited to 1,000 acres per year for the cost-share practices. For more information about this program please visit the website: http://www.fs.fed.us/spf/coop/programs/loa/flep.shtml and the National Association of State Foresters website to find your local agency: www.stateforesters.org

The **Farm and Ranch Lands Protection Program (FRPP)** is a voluntary land conservation program that assists farmers to keep their lands for agricultural purposes. FRPP provides matching funds to those provided by state, tribal, local government or non-government organizations offering farm and ranch protection programs designed to purchase conservation easements. The FRPP is authorized by the Farm Bill 2002 and 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 non-agricultural uses, as well as to develop a conservation plan for any highly erodable 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/farmbill/2002/ and search for the Farm and Ranch Lands Protection Program.

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 give landowners up to 50% of costs associated with approved soil and water conservation projects. Farms are only eligible if they are already enrolled in a permanent or 8-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 3 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: http://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 administered by the New Jersey Department of Environmental Protection's Division of Fish and Wildlife Endangered Nongame Species Program. Participating landowners receive both technical and financial assistance through this competitive grant program. Last year $1.12 million was awarded for a variety of preservation programs including habitat improvements, habitat management and habitat protection projects. Generally a 5-year minimum commitment is required and longer terms are preferred. A 25% 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. Interested landowners are encouraged to contact Kim Korth, ENSP assistant zoologist at (609) 984-1581 for additional details. To learn more about the program in general visit the website: http://www.state.nj.us/dep/fgw/ensp/lip_prog.htm or http://www.state.nj.us/dep/fgw/ensp/pdf/lip_broch.pdf

APPENDIX D: Annotated Inventory of Vertebrate Fauna

An inventory of known or probable wild animal species in Woodstown Borough and Pilesgrove Township

Compiled by Francis G. Rapa
Woodstown-Pilesgrove Joint Environmental Commission

Key to Notes:

B – *Breeding.* (birds only) This species breeds in Salem County.

WP(AS) – *Woodstown-Pilesgrove (Audubon Society*). (birds only) This species has been reported in Woodstown and/or Pilesgrove by New Jersey Audubon Society at least once between 1990 and 2004.

WP(NH) – *Woodstown-Pilesgrove (Natural Heritage*). This rare species is listed as occurring in Woodstown and/or Pilesgrove by the New Jersey Natural Heritage Program.

S(NH) – *Salem County (Natural Heritage).* This rare species is listed as occurring in Salem County by the New Jersey Natural Heritage Program.

E – *Endangered.* This is a State-listed Endangered Species.

T – *Threatened.* This is a State-listed Threatened Species.

EX – *Exotic* - This is a non-indigenous species.

WP(FF) – *Woodstown-Pilesgrove (Freshwater Fishes).* (fishes only) This species has been confirmed in Woodstown and Pilesgrove waterbodies.

LO (FF) – *Likely Occuring (Freshwater Fishes).* (fishes only) This species has been recorded in the Oldmans Creek, Salem River or Alloway Creek Watershed or adjacent portions of the Delaware River.

Arranged in taxonomic order

BIRDS

Common Name	**Scientific Name**	**Notes**
Red-throated Loon	*Gavia stellata*	
Common Loon	*Gavia immer*	
Pied-billed Grebe	*Podilymbus podiceps*	B, E, S(NH)
Horned Grebe	*Podiceps auritus*	
Red-necked	*Grebe Podiceps*	
Northern Gannet	*Morus bassanus*	
Great Cormorant	*Phalacrocorax carbo*	
Double-crested Cormorant	*Phalacrocorax auritus*	B
American Bittern	*Botaurus lentiginosos*	B, E
Least Bittern	*Ixobrychus exilis*	B
Great Blue Heron	*Ardea herodias*	B, WP(NH)
Great Egret	*Casmerodius albus*	B
Snowy Egret	*Egretta thula*	B
Little Blue Heron	*Egretta caerulea*	B
Tricolored Heron	*Egretta tricolor*	
Cattle Egret	*Bubulcus ibis*	B
Green-backed Heron	*Butorides striatus*	
Green Heron	*Butorides virescens*	B
Black-crowned Night Heron	*Nycticorax nycticorax*	B, T
Yellow-crowned Night Heron	*Nyctanassa violaceus*	T
Glossy Ibis	*Plegadis falcinellus*	B
Sandhill Crane	*Grus canadensis*	B
Tundra Swan	*Cygnus columbianus*	B, WP(AS)
Mute Swan	*Cygnus olor*	B
Snow Goose	*Chen caerulescens*	WP(AS)

Common Name	Scientific Name	Notes
Ross's Goose	*Chen rossii*	WP(AS)
Brant	*Branta bernicla*	
Canada Goose	*Branta canadensis*	B
Wood Duck	*Aix sponsa*	B
Green-winged Teal	*Anas crecca*	
Blue-winged Teal	*Anas discors*	B
American Black Duck	*Anas rubripes*	B
Mallard	*Anas platyrhynchos*	B
Northern Pintail	*Anas acuta*	
Northern Shoveler	*Anas clypeata*	
Gadwall	*Anas Strepera*	B
Eurasian Wigeon	*Anas penelope*	
American Wigeon	*Anas americana*	B
Canvasback	*Aythya valisineria*	
Redhead	*Aythya americana*	
Ring-necked Duck	*Aythya collaris*	
Greater Scaup	*Aythya marila*	
Lesser Scaup	*Aythya affinis*	
Common Eider	*Somateria mollissima*	
King Eider	*Somateria spectabilis*	
Common Goldeneye	*Bucephala clangula*	
Bufflehead	*Bucephala albeola*	WP(AS)
American Woodcock	*Philohela minor*	B
Hooded Merganser	*Lophodytes cucullatus*	WP(AS)
Common Merganser	*Mergus merganser*	
Red-breasted Merganser	*Mergus serrator*	
Ruddy Duck	*Oxyura jamaicensis*	B
Black Vulture	*Coragyps atratus*	B, WP(AS)
Turkey Vulture	*Cathartes aura*	B
Osprey	*Pandion haliaetus*	B, T, S(NH)
Swallowtail Kite	*Elanoides forficodus*	
Mississippi Kite	*Ictinia mississippiensis*	WP(AS)
Bald Eagle	*Haliaeetus leucocephalus*	B, E, WP(NH)
Golden Eagle	*Aquila chrysaetos*	
Northern Harrier	*Circus cyaneus*	B, E, S(NH)
Sharp-shinned Hawk	*Accipiter striatus*	
Cooper's Hawk	*Accipiter Cooperii*	B, T, S(NH)
Northern Goshawk	*Accipiter gentilis*	E
Red-shouldered Hawk	*Buteo lineatus*	B, E, S(NH)
Broad-winged hawk	*Buteo platypterus*	B
Red-tailed Hawk	*Buteo jamaicensis*	B
Rough-legged Hawk	*Buteo lagopus*	
American Kestrel	*Falco sparverius*	B
Merlin	*Falco columbarius*	
Peregrine Falcon	*Falco peregrinus*	B, E, S(NH)
Common Barn Owl	*Tyto alba*	B
Eastern Screech Owl	*Otus asio*	B
Great Horned Owl	*Bubo virginianus*	B
Snowy Owl	*Nyctea scandiaca*	
Barred Owl	*Strix varia*	B, T, S(NH)
Long-eared Owl	*Asio otus*	T
Short-eared Owl	*Asio flammeus*	E
Northern Saw-whet Owl	*Aegolius acadicus*	
Ring-necked Pheasant	*Phasianus colchicus*	B, EX
Ruffed Grouse	*Bonasa umbellus*	

Common Name	Scientific Name	Notes
Eastern Wild Turkey	*Meleagris gallopavo*	B
Chukar	*Alectoris graeca*	
Northern Bobwhite	*Colinus virginianus*	B
Yellow Rail	*Coturnicops noveboracensis*	
Black Rail	*Laterallus jamaicensis*	T
Clapper Rail	*Rallus longirostris*	B
King Rail	*Rallus elegans*	B
Virginia Rail	*Rallus limocola*	B
Sora	*Porzana carolina*	
Common Moorhen	*Gallinula chloropus*	B
American Coot	*Fulica americana*	B
Black-bellied Plover	*Pluvialis squatarola*	
Lesser/American Golden Plover	*Pluvialis dominica*	WP(AS)
Semipalmated Plover	*Charadrius semipalmatus*	
Piping Plover	*Charadrius melodus*	E
Killdeer	*Charadrius vociferus*	B
Black-necked Stilt	*Himantopus mexicanus*	
American Avocet	*Recurvirostra americana*	
Greater Yellowlegs	*Tringa melanoleuca*	
Lesser Yellowlegs	*Tringa flavipes*	
Willet	*Catoptrophorus semipalmatus*	B
Solitary Sandpiper	*Tringa solitaria*	
Spotted Sandpiper	*Actitis macularia*	B
Upland Sandpiper	*Bartramia longicauda*	B, E, WP(NH), WP(AS)
Semipalmated Sandpiper	*Calidris pusilla*	
Western Sandpiper	*Calidris mauri*	
Least Sandpiper	*Calidris minutilla*	
White-rumped Sandpiper	*Calidris fuscicollis*	WP(AS)
Baird's Sandpiper	*Calidris bairdii*	WP(AS)
Pectoral Sandpiper	*Calidris melanotos*	WP(AS)
Purple Sandpiper	*Calidris maritima*	
Curlew Sandpiper	*Calidris ferruginea*	
Stilt Sandpiper	*Calidris himantopus*	
Dunlin	*Calidris alpina*	
Buff-breasted Sandpiper	*Tryngites subruficollis*	WP(AS)
Ruff	*Philomachus pugnax*	
Short-billed Dowitcher	*Limnodromus griseus*	
Long-billed Dowitcher	*Limnodromus scolopaceus*	
Common Snipe	*Gallinago gallinago*	
Hudsonian Godwit	*Limosa limosa*	WP(AS)
American Woodcock	*Scolopax minor (Philohela minor)*B	
Wilson's Phalarope	*Phalaropus tricolor*	WP(AS)
Red-necked Phalarope	*Phalaropus lobatus*	
Laughing Gull	*Larus atricilla*	
Little Gull	*Larus minutus*	
Common Black-headed Gull	*Larus ridibundus*	
Lesser Black-backed Gull	*Larus fuscus*	WP(AS)
Black-headed Gull	*Larus ridibundus*	WP(AS)
Bonaparte's Gull	*Larus philadelphia*	
Ring-billed Gull	*Larus delawarensis*	(1)
Herring Gull	*Larus argentatus*	
Iceland Gull	*Larus glaucoides*	
Glaucous Gull	*Larus hyperboreusi*	
Great Black-backed Gull	*Larus marinusi*	
Gull-billed Tern	*Sterna nilotica*	

Common Name	Scientific Name	Notes
Caspian Tern	*Sterna caspia*	
Royal Tern	*Sterna maxima*	
Roseate Tern	*Sterna dougallii*	E
Common Tern	*Sterna hirundo*	
Forster's Tern	*Sterna forsteri*	B
Least Tern	*Sterna antillarum*	E
Black Tern	*Childonias niger*	WP(AS)
Black Skimmer	*Rynchops niger*	E
Rock Dove	*Columba livia*	B
Mourning Dove	*Zenaida macroura*	B
Black-billed Cuckoo	*Coccyzus erythropthalmus*	B
Yellow-billed Cuckoo	*Coccyzus americanus*	B
Common Nighthawk	*Chordeiles minor*	
Chuck-will's-widow	*Caprimulgus carolinensis*	B
Whip-poor-will	*Caprimulgus vociferus*	B
Chimney Swift	*Chaetura pelagica*	B
Ruby-throated Hummingbird	*Archilochus colubris*	B
Belted Kingfisher	*Ceryle alcyon*	B
Red-headed Woodpecker	*Melanerpes erythrocephalus*	B, T, S(NH)
Red-bellied Woodpecker	*Melanerpes carolinus*	B
Yellow-bellied Sapsucker	*Sphyrapicus varius*	
Downy Woodpecker	*Picoides pubescens*	B
Hairy Woodpecker	*Picoides villosus*	B
Northern Common Flicker	*Colaptes auratus*	B
Pileated Woodpecker	*Dryocopus pileatus*	
Olive-sided Flycatcher	*Contopus borealis*	
Eastern Wood Pewee	*Contopus virens*	B
Yellow-bellied Flycatcher	*Empidonax flaviventris*	
Acadian Flycatcher	*Empidonax virescens*	B
Alder Flycatcher	*Empidonax alnorum*	
Willow Flycatcher	*Empidonax traillii*	B
Least Flycatcher	*Empidonax minimus*	
Eastern Phoebe	*Sayornis phoebe*	B
Great Crested Flycatcher	*Myiarchus crinitus*	B
Western Kingbird	*Tyrannus verticalis*	
Eastern Kingbird	*Tyrannus Tyrannus*	B
Horned Lark	*Eremophila alpestris*	B, WP(AS)
Purple martin	*Progne subis*	B
Tree Swallow	*Tachycineta bicolor*	B
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	B
Bank Swallow	*Riparia riparia*	B
Cliff Swallow	*Hirundo pyrrhonota*	B
Barn Swallow	*Hirundo rustica*	B
Blue Jay	*Cyanocitta cristata*	B
American Crow	*Corvus brachyrhynchos*	B
Fish Crow	*Corvus ossifragus*	B
Common Raven	*Corvus corax*	
Black-capped Chickadee	*Paurs atricapillus*	
Carolina Chickadee	*Parus carolinensis*	B
Boreal Chickadee	*Parus hudsonicus*	
Tufted Titmouse	*Parus bicolor*	B
Red-breasted Nuthatch	*Sitta canadensis*	
White-breasted Nuthatch	*Sitta carolinensis*	B
Brown Creeper	*Certhia americana*	
Carolina Wren	*Thryothorus ludovicianus*	B

Common Name	Scientific Name	Notes
House Wren	*Troglogytes aedon*	B
Winter Wren	*Troglodytes troglodytes*	
Sedge Wren	*Cistothorus platensis*	B, E, S(NH)
Marsh Wren	*Cistothorus palustris*	B
Golden-crowned Kinglet	*Regulus satrapa*	
Ruby-crowned Kinglet	*Regulus calendula*	
Blue-gray Gnatcatcher	*Polioptila caerulea*	B
Eastern Bluebird	*Sialia sialis*	B
Veery	*Catharus fuscescens*	
Gray-cheeked Thrush	*Catharus minimus*	
Swainson's Thrush	*Catharus ustulatus*	
Hermit Thrush	*Catharus guttatus*	
Wood Thrush	*Hylocichla mustelina*	B
American Robin	*Turdus migratorius*	B
Catbird	*Dumetella carolinensis*	B
Northern Mockingbird	*Mimus polyglottos*	B
Brown Thrasher	*Toxostoma rufum*	B
Water Pipit	*Anthus rubescens*	
Cedar Waxwing	*Bombycilla cedrorum*	B
Northern Shrike	*Lanius exubitor*	
Loggerhead Shrike	*Lanius ludovicianus*	E
European Starling	*Sturnus vulgaris*	B, EX
White-eyed Vireo	*Vireo griseus*	B
Solitary Vireo	*Vireo solitarius*	
Yellow-throated Vireo	*Vireo flavifrons*	B
Warbling Vireo	*Vireo gilvus*	B
Philadelphia Vireo	*Vireo philadelphicus*	
Red-eyed Vireo	*Vireo olivaceus*	B
Blue-winged Warbler	*Vermivora pinus*	B
Golden-winged Warbler	*Vermivora chrysoptera*	
Tennesee Warbler	*Vermivora peregrina*	
Orange-crowned Warbler	*Vermivora celata*	
Nashville Warbler	*Vermivora reficapilla*	
Northern Parula	*Parula americana*	B
Yellow Warbler	*Dendroica petechia*	B
Chestnut-sided Warbler	*Dendroica pensylvanica*	
Magnolia Warbler	*Dendroica magnolia*	
Cape May Warbler	*Dendroica tigrina*	
Black-throated Blue Warbler	*Dendroica caerulescens*	
Yellow-rumped Warbler	*Dendroica coronata*	
Black-throated Green Warbler	*Dendroica virens*	
Blackburnian Warbler	*Dendroica fusca*	
Yellow-throated Warbler	*Dendroica dominica*	
Pine Warbler	*Dendroica pinus*	B
Prairie Warbler	*Dendroica discolor*	B
Palm Warbler	*Dendroica palmarum*	
Bay-breasted Warbler	*Dendroica castanea*	
Blackpoll Warbler	*Dendroica striata*	
Cerulean Warbler	*Dendroica cerulea*	
Black and White Warbler	*Miniotilta varia*	B
American Redstart	*Setophaga ruticilla*	B
Prothonotary Warbler	*Protonotaria citrea*	B
Worm-eating Warbler	*Helmitheros vermivorus*	B
Ovenbird	*Seiurus aurocapillus*	B
Northern Waterthrush	*Seiurus noveboracensis*	

Common Name	Scientific Name	Notes
Louisiana Waterthrush	*Seiurus motacilla*	B
Kentucky Warbler	*Oporornis formosus*	B, WP(AS)
Connecticut Warbler	*Oporornis agilis*	
Mourning Warbler	*Oporornis philadelphia*	
Common Yellowthroat	*Geothlypis trichas*	B
Hooded Warbler	*Wilsonia citrina*	B
Wilson's Warbler	*Wilsonia pusilla*	
Canada Warbler	*Wilsonia canadensis*	
Yellow-breasted Chat	*Icteria virens*	B
Summer Tanager	*Piranga rubra*	B
Scarlet Tanager	*Piranga olivacea*	B
Northern Cardinal	*Cardinalis cardinalis*	B
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	
Blue Grosbeak	*Guiraca caerulea*	B
Indigo Bunting	*Passerina cyanea*	B
Dickcissel	*Spiza americana*	WP(AS)
Rufous-sided Towhee	*Pipilo erythrophthalmus*	B
American Tree Sparrow	*Spizella arborea*	
Chipping Sparrow	*Spizella passerina*	B
Field Sparrow	*Spizella pusilla*	B
Vesper Sparrow	*Pooecetes gramineus*	B, E, WP(NH)
Lark Sparrow	*Chondestes grammacus*	WP(AS)
Savannah Sparrow	*Passerculus sandwichensis*	B, T, WP(NH), WP(AS)
Grasshopper Sparrow	*Ammodramus savannarum*	B, T, WP(NH), WP(AS)
Henslow's Sparrow	*Ammodramus henslowii*	E, WP(AS)
Sharp-tailed Sparrow	*Ammodramus caudacutus*	
Seaside Sparrow	*Ammodramus maritima*	B
Fox Sparrow	*Passerella iliaca*	
Song Sparrow	*Melospiza melodia*	B
Lincoln's Sparrow	*Melospiza lincolnii*	
Swamp Sparrow	*Melospiza georgiana*	B
White-throated Sparrow	*Zonotrichia albicollis*	
White-crowned Sparrow	*Zonotrichia leucophrys*	WP(AS)
House Sparrow	*Passer domesticus*	B, EX
Dark-eyed Junco	*Junco hyemalis*	
Lapland Longspur	*Calcarius lapponicus*	WP(AS)
Snow Bunting	*Plectophenax nivalis*	WP(AS)
Bobolink	*Dolichonyx oryzivorus*	B, T, WP(NH), WP(AS)
Eastern Meadowlark	*Sturnella magna*	B
Red-winged Blackbird	*Agelaius phoeniceus*	B
Rusty Blackbird	*Euphagus carolinus*	
Brewer's Blackbird	*Euphagus cyanocephalus*	WP(AS)
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	WP(AS)
Boat-tailed Grackle	*Quiscalus major*	B
Common Grackle	*Quiscalus quiscula*	B
Brown-headed Cowbird	*Molothrus ater*	B
Orchard Oriole	*Icterus spurius*	B
Northern Oriole (Baltimore Oreole)	*Icterus galbula*	B
Pine Grosbeak	*Pinicola enucleator*	
Purple Finch	*Carpodacus purpureus*	
House Finch	*Carpodacus mexicanus*	B
Red Crossbill	*Loxia curvirostra*	
White-winged Crossbill	*Loxia leucoptera*	
Common Redpoll	*Carduelis flammea*	
Pine Siskin	*Carduelis pinus*	

Common Name	Scientific Name	Notes
American Goldfinch	*Carduelis tristis*	B
Evening Grosbeak	*Hesperiphona vespertinus*	

(1) New Jersey Audubon Society reports 8,000 Ring-billed Gulls at Sharptown on April 4, 1983.

MAMMALS

Common Name	Scientific Name	Notes
Opossum	*Didelphis marsupialis*	
Masked Shrew	*Sorex cinereus*	
Short-tailed Shrew	*Blarina brevicauda*	
Least Shrew	*Crytotis parva*	
Hairy-tailed Mole	*Parascalops breweri*	
Eastern Mole	*Scalopus aquaticus*	
Star-nosed Mole	*Condylura cristata*	
Little Brown Bat	*Myotis lucifugus*	
Northern Long-Eared Bat, Keen Myotis	*Myotis septentrionalis*	
Small-footed Bat	*Myotis leibii*	
Silver-haired Bat	*Lasionycteris noctivagans*	
Eastern Pipistrel	*Pipistrellus subflavus*	
Big Brown Bat	*Eptesicus fuscus*	
Red Bat	*Lasiurus borealis*	
Hoary Bat	*Lasiurus cinereus*	
Evening Bat	*Nycticeius humeralis*	
Eastern Cottontail	*Sylvilagus floridanus*	
Eastern Chipmunk	*Tamias striatus*	
Woodchuck	*Marmota monax*	
Gray Squirrel	*Sciurus carolinensis*	
Red Squirrel	*Tamiasciurus hudsonicus*	
Southern Flying Squirrel	*Glaucomys volans*	
Beaver	*Castor candensis*	
Nutria	*Myocastor coypus*	EX
Marsh Rice Rat	*Oryzomys palustris*	
White-footed Mouse	*Peromyscus leucopus*	
Meadow Vole	*Microtus pennsylvanicus*	
Pine Vole	*Microtus pinetorum*	
Muskrat	*Ondatra zibethicus*	
Southern Bog Lemming	*Synaptomys cooperi*	
Brown Rat, Norway Rat	*Rattus norvegicus*	EX
House mouse	*Mus musculus*	EX
Meadow Jumping Mouse	*Zapus hudsonius*	
Eastern Coyote	*Canis latrans var.*	
Red Fox	*Vulpes vulpes*	
Gray Fox	*Urocyon cinereoargenteus*	
Black Bear	*Ursus americanus*	Reports (1)
Raccoon	*Procyon lotor*	
Long-tailed Weasel	*Mustela frenata*	
Mink	*Mustela vison*	
Striped Skunk	*Mephitis mephitis*	
River Otter	*Lutra canadensis*	
Bobcat	*Felis rufus*	E, S(NH), (2)
White-tailed Deer	*Odocoileus virginianus*	

(1) While Salem County is not presently considered "occupied" range, the black bear population is steadily increasing throughout southern New Jersey, with occasional sightings reported in Salem County over the past thirty years. Most recently, in June 2004, a bear was reported on a farm in Upper Pittsgrove within a mile of Pilesgrove and another in neighboring Woolwich, Gloucester County in March 2005. Both resident and transient black bears are not improbable in Woodstown-Pilesgrove. If it does not presently exist, an established, breeding population is likely to occur in Salem County in the near-term future. Forested wetlands of southern Pilesgrove Township and a large forest complex along the Oldmans Creek in eastern Pilesgrove offer the most suitable black bear habitat in the Woodstown-Pilesgrove area. Studies of coastal plain black bears in North Carolina document that the species is highly adaptable to agricultural regions, using river corridors and old fields as travel corridors between foraging areas.

(2) The NJ Endangered and Non-game species program (ENSP) and NJ Natural Heritage Program have documented recorded sightings of bobcats in Salem County, although scent-post surveys have failed to provide physical evidence of their presence. A highly reclusive animal, bobcat have been documented by State biologists in areas east of Woodstown-Pilesgrove, specifically in or around Upper Pittsgrove Township and the author of this checklist has heard anecdotal reports of bobcats in southern Pilesgrove. Suitable habitat exists throughout the county. Like black bears, bobcats are highly adaptable and prefer mixed habitats, including areas of forests, farmland and early succession vegetation. In South Jersey, "dense thickets of briars and conifers serve as resting and escape cover (NJ Division of Fish and Wildlife)." A bobcat specialist with the ENSP conveyed that bobcats likely occur locally in Woodstown and Pilesgrove.

REPTILES

Common Name	**Scientific Name**	**Notes**
Common Snapping Turtle	*Chelydra s. serpentina*	
Stinkpot	*Sternotherus odoratus*	
Eastern Mud Turtle	*Kinosternon s. subrubrum*	
Spotted Turtle	*Clemmys guttata*	
Bog Turtle	*Clemmys muhlenbergi*	E, WP(NH)
Eastern Box Turtle	*Terrapene c. carolina*	
Red-bellied Turtle	*Pseudemys rubriventris*	
Red-eared Turtle	*Pseudemys scripta elegans*	EX
Eastern Painted Turtle	*Chrysemys p. picta*	
Midland Painted Turtle	*Chrysemys picta marginata*	
Northern Fence Lizard	*Sceloporus undulatus hyacinthinus*	
Five-lined Skink	*Eumeces fasciatus*	
Northern Water Snake	*Nerodia s. sipedon*	
Northern Brown Snake	*Storeria d. dekayi*	
Northern Red-bellied Snake	*Storeria o. occipitomaculata*	
Eastern Garter Snake	*Thamnophis s. sirtalis*	
Eastern Ribbon Snake	*Thamnophis s. sauritus*	
Eastern Smooth Earth Snake	*Virginia v. valeriae*	
Eastern Hognose Snake	*Heterodon platyrhinos*	
Northern Ringneck Snake	*Diadophis punctatus edwardsi*	
Southern Ringneck Snake	*Diadophis p. punctatus*	
Eastern Worm Snake	*Carphophis a. amoenus*	
Northern Black Racer	*Coluber c. constrictor*	
Rough Green Snake	*Opheodrys aestivus*	
Black Rat Snake	*Elaphe o. obsoleta*	
Eastern King Snake	*Lampropeltis g. getulus*	
Eastern Milk Snake	*Lampropeltis triangulum triangulum*	
Scarlet Kingsnake	*Lampropeltis triangulum elapsoides*	
"Coastal Plain" Milk Snake intergrade	*L. t. triangulum x L. t. elapsoides*	

AMPHIBIANS

Common Name	Scientific Name	Notes
Marbled Salamander	*Ambystoma opacum*	
Spotted Salamander	*Ambystoma maculatum*	E
Eastern Tiger Salamander	*Ambystoma t. tigrinum*	E, S(NH)
Red-spotted Newt, Eastern Newt	*Notophthalmus v. viridescens*	
Eastern Red-backed Salamander	*Plethodon c. cinereus*	
Northern Slimy Salamander	*Plethodon g. glutinosus*	
Four-toed Salamander	*Hemidactylium scutatum*	
Northern Red Salamander	*Pseudotriton r. ruber*	
Eastern Mud Salamander	*Pseudotriton m. montanus*	T
Northern Two-lined Salamander	*Eurycea b. bislineata*	
Eastern Spadefoot Toad	*Scaphiopus h. holbrookii*	
Fowler's Toad	*Bufo woodhousii fowleri*	
Northern Cricket Frog	*Acris c. crepitans*	
Northern Spring Peeper	*Hyla c. crucifer*	
Northern Gray Treefrog	*Hyla versicolor*	
Southeastern Chorus Frog	*Pseudacris feriarum*	
New Jersey Chorus Frog	*Pseudacris triseriata kalmi*	
American Bullfrog	*Rana catesbeiana*	
Green Frog	*Rana clamitans melanota*	
Wood Frog	*Rana sylvatica*	
Southern Leopard Frog	*Rana spenocephala*	
Pickerel Frog	*Rana palustris*	

FRESHWATER FISHES

Common Name	Scientific Name	Notes
American Brook Lamprey	*Lampetra appendix*	LO(FF)
Sea Lamprey	*Petromyzon marinus*	LO(FF)
Shortnose Sturgeon	*Acipenser brevirostrum*	E, LO(FF)
Atlantic Sturgeon	*Acipenser oxyrinchus*	LO(FF)
American Eel	*Anguilla rostrata*	WP(FF)
Blueback Herring	*Alosa aestivalis*	WP(FF)
Hickory Shad	*Alosa mediocris*	LO(FF)
Alewife	*Alosa pseudoharengus*	WP(FF)
American Shad	*Alosa sapidissima*	LO(FF)
Gizzard Shad	*Dorosoma cepedianum*	WP(FF)
Goldfish	*Carassius auratus*	EX, LO(FF)
Satinfin Shiner	*Cyprinella analostana*	WP(FF)
Common Carp	*Cyprinus carpio*	EX, WP(FF)
Eastern Silvery Minnow	*Hybognathus regius*	WP(FF)
Common Shiner	*Luxilus cornutus*	WP(FF)
Golden Shiner	*Notemigonus crysoleucas*	WP(FF)
Bridle Shiner	*Notropis bifrenatus*	WP(FF)
Spottail Shiner	*Notropis hudsonius*	WP(FF)
Swallowtail Shiner	*Notropis procne*	WP(FF)
Blacknose Dace	*Rhinichthys atratulus*	LO(FF)
Creek Chub	*Semotilus atromaculatus*	WP(FF)
Fallfish	*Semotilus corporalis*	WP(FF)
White Sucker	*Catostomus commersoni*	WP(FF)
Creek Chubsucker	*Erimyzon oblongus*	WP(FF)
White Catfish	*Ameiurus catus*	WP(FF)

Common Name	Scientific Name	Notes
Channel Catfish	*Ictalurus punctatus*	WP(FF)
Yellow Bullhead	*Ameiurus natalis*	WP(FF)
Brown Bullhead	*Ameiurus nebulosus*	WP(FF)
Tadpole Madtom	*Noturus gyrinus*	WP(FF)
Margined Madtom	*Noturus insignis*	WP(FF)
Redfin or Grass Pickerel	*Esox americanus*	WP(FF)
Northern Pike	*Esox lucius*	EX, LO(FF)
Chain Pickerel	*Esox niger*	WP(FF)
Rainbow Trout	*Oncorhynchus mykiss*	EX, WP(FF)
Brown Trout	*Salmo trutta*	EX, WP(FF)
Brook Trout	*Salvelinus fontinalis*	WP(FF)
Rainbow Smelt	*Osmerus mordax*	LO(FF)
Eastern Mudminnow	*Umbra pygmaea*	WP(FF)
Pirate Perch	*Aphredoderus sayanus*	WP(FF)
Inland Silverside	*Menidia beryllina*	LO(FF)
Banded Killifish	*Fundulus diaphanus*	WP(FF)
Mummichog	*Fundulus heteroclitus*	LO(FF)
Western Mosquitofish	*Gambusia affinis*	EX, WP(FF)
Eastern Mosquitofish	*Gambusia holbrooki*	LO(FF)
Fourspine Stickleback	*Apeltes quadracus*	LO(FF)
Threespine Stickleback	*Gasterosteus aculeatus*	LO(FF)
White Perch	*Morone americana*	WP(FF)
Striped Bass	*Morone saxatilis*	WP(FF)
Mud Sunfish	*Acantharchus pomotis*	WP(FF)
Blackbanded Sunfish	*Enneacanthus chaetodon*	LO(FF)
Bluespotted Sunfish	*Enneacanthus gloriosus*	WP(FF)
Banded Sunfish	*Enneacanthus obesus*	LO(FF)
Redbreast Sunfish	*Lepomis auritus*	WP(FF)
Green Sunfish	*Lepomis cyanellus*	EX, LO(FF)
Pumpkinseed	*Lepomis gibbosus*	WP(FF)
Warmouth	*Lepomis gulosus*	LO(FF)
Bluegill	*Lepomis macrochirus*	EX, WP(FF)
Largemouth Bass	*Micropterus salmoides*	EX, WP(FF)
White Crappie	*Pomoxis annularis*	EX, WP(FF)
Black Crappie	*Pomoxis nigromaculatus*	EX, WP(FF)
Swamp Darter	*Etheostoma fusiforme*	LO(FF)
Tessellated Darter	*Etheostoma olmstedi*	WP(FF)
Yellow Perch	*Perca flavescens*	WP(FF)
Hogchoker	*Trinectes maculatus*	WP(FF)

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APPENDIX E: Annotated Inventory of Flora

A list of wild plants likely, historically and presently occuring in Salem County with special emphasis on Pilesgrove Township and Woodstown Borough.

Compiled by Francis G. Rapa
Woodstown-Pilesgrove Joint Environmental Commission

Edited by
Joseph R. Arsenault

Explanation of Notes:

Bold typeface - denotes species that is known or confirmed to exist as a wild (non-cultivated) species within Woodstown and/or Pilesgrove through direct observation, botanical survey, recent records, environmental iImpact statements or other means.

WP(S) – *Woodstown-Pilesgrove, Stone* - This plant species was historically observed or recorded within Woodstown and/or Pilesgrove by Whitmer Stone.

WP(M)– *Woodstown-Pilesgrove, Montgomery* – This plant species was observed or recorded within Woodstown and/or Pilesgrove by Montgomery and Fairbrothers.

WP(NH) - *Woodstown-Pilesgrove, Natural Heritage* - This is an endangered plant species that is documented as occuring within Woodstown and/or Pilesgrove by the New Jersey Natural Heritage Program.

S(NH) - *Salem, Natural Heritage*- This is an endangered plant species that is documented as occuring within Salem County by the New Jersey Natural Heritage Program.

NUS - *Nonindigenous US Native* - This plant species' native range includes portions of the United States outside of southern New Jersey. It has colonized or grows wild in natural areas within Salem County.

NEX - *Nonindigenous Exotic* - This plant species is native to foreign countries and it has colonized or grows wild in natural areas within Salem County.

SE - *State Endangered* - This plant species is listed on New Jersey's official endangered species list.

FE - *Federal Endangered* - This plant species is listed a an endangered species by the US Fishand Wildlife Service.

Scientific Name	Common Name(s)	Notes
Acalypha gracilens	slender threeseed mercury	
Acalypha rhomboidea	Virginia threeseed mercury	
Acer negundo	**Boxelder**	
Acer platanoides	**Norway maple**	**NEX**
Acer rubrum var. trilobum	**red maple**	**WP(S)**
Acer rubrum	**red maple**	
Acorus calamus	**calamus**	
Adiantum pedatum	northern maidenhair	WP(M)
Aesculus flava	yellow buckeye	
Agalinis fasciculata	Beach false foxglove	
Agalinis paupercula var. paupercula	smallflower false foxglove	
Agalinis purpurea	purple false foxglove	
Agalinis setacea	threadleaf false foxglove	
Agastache nepetoides	yellow giant hyssop	WP(NH)
Agrimonia parviflora	**harvestlice**	
Agrimonia rostellata	beaked agrimony	
Agrostemma githago	common corncockle	
Ailanthus altissima	**tree of heaven**	**NEX**
Aira caryophyllea	**silver hairgrass**	

Scientific Name	Common Name(s)	Notes
Albizia julibrissin	**mimosa**	**NEX**
Aletris farinosa	white colicroot	
Allium canadense var. canadense	**meadow garlic**	
Allium tricoccum	**wild leek**	**WP(S)**
Allium vineale ssp. vineale	**wild garlic**	**NEX**
Alnus serrulata	**hazel alder**	
Alopecurus aequalis var. aequalis	shortawn foxtail	WP(NH)
Alopecurus carolinianus	Carolina foxtail	
Amaranthus arenicola	sandhill amaranth	
Amaranthus cannabinus	**tidalmarsh amaranth**	
Amaranthus rudis	tall amaranth	
Amaranthus spinosus	spiny amaranth	
Ambrosia artemisiifolia	**annual ragweed**	
Ambrosia trifida	**great ragweed**	**WP(S)**
Amelanchier canadensis	**Canadian serviceberry**	
Amelanchier Hintermedia	Shad-bush	WP(S)
Amelanchier laevis	Allegheny serviceberry	
Amelanchier obovalis	coastal serviceberry	
Amelanchier stolonifera	running serviceberry	
Amianthium muscitoxicum	flypoison	WP(S), WP(NH)
Amorpha fruticosa	**desert false indigo**	
Amphicarpaea bracteata var. bracteata	American hogpeanut	
Anagallis arvensis	scarlet pimpernel	
Andropogon gerardii	big bluestem	
Andropogon gyrans var. gyrans	Elliott's bluestem	
Anemone quinquefolia	**nightcaps**	**WP(S)**
Angelica atropurpurea	purplestem angelica	
Antennaria howellii ssp. canadensis	Canadian pussytoes	SE
Antennaria howellii ssp. neodioica	Howell's pussytoes	
Antennaria neglecta	field pussytoes	
Antennaria parlinii ssp. fallax	Parlin's pussytoes	
Antennaria parlinii	Parlin's pussytoes	
Antennaria plantaginifolia	**woman's tobacco**	
Anthemis arvensis	corn chamomile	
Anthoxanthum odoratum	**sweet vernalgrass**	**NEX**
Apios americana	**groundnut**	**WP(S)**
Aplectrum hyemale	Adam and Eve, Puttyroot	SE
Apocynum cannabinum	**Indianhemp**	
Apocynum Hfloribundum		
Aquilegia canadensis	red columbine	WP(S)
Arabidopsis thaliana	**mouseear cress**	
Aralia spinosa	devil's walkingstick	
Arisaema triphyllum	**Jack-in-the-pulpit**	
Aristida lanosa	woollysheath threeawn	S(NH), SE
Aristida longispica	**slimspike threeawn**	
Aristida oligantha	prairie threeawn	
Aristida purpurascens var. virgata	arrowfeather threeawn	
Aristolochia serpentaria	Virginia snakeroot	
Armoracia rusticana	horseradish	
Arrhenatherum elatius var. elatius	tall oatgrass	NEX
Artemisia ludoviciana	white sagebrush	
Asclepias amplexicaulis	clasping milkweed	WP(S)
Asclepias incarnata	**swamp milkweed**	
Asclepias purpurascens	purple milkweed	
Asclepias rubra	red milkweed	S(NH)

Scientific Name	Common Name(s)	Notes
Asclepias syriaca	**common milkweed**	
Asclepias tuberosa	butterfly milkweed	
Asclepias variegata	redring milkweed	WP(NH)
Asclepias verticillata	whorled milkweed	
Asplenium platyneuron	**ebony spleenwort**	**WP(M)**
Athyrium filix-femina	common ladyfern	
Athyrium filix-femina ssp. angustum	subarctic ladyfern	WP(M)
Athyrium filix-femina ssp. aspleniodes	asplenium ladyfern	WP(M)
Atriplex patula	spear saltbush	
Atriplex prostrata	triangle orache	
Baccharis halimifolia	**eastern baccharis**	
Barbarea verna	early yellowrocket	
Belamcanda chinensis	blackberry lily	
Berberis thunbergii	**Japanese barberry**	**NEX**
Berteroa incana	hoary false madwort	
Betula nigra	river birch	
Bidens aristosa	bearded beggarticks	NUS
Bidens coronata	crowned beggarticks	
Bidens discoidea	small beggarticks	
Bidens frondosa	**devil's beggartick**	
Boehmeria cylindrica	**smallspike false nettle**	
Botrychium dissectum	**cutleaf grapefern**	**WP(M)**
Botrychium matricariifolium	matricary grapefern	
Botrychium virginianum	rattlesnake fern	WP(M)
Brassica nigra	**black mustard**	
Brassica rapa var. rapa	field mustard	NEX
Bromus japonicus	**Japanese brome**	
Bromus racemosus	bald brome	
Bromus tectorum	**cheatgrass**	**NEX**
Buglossoides arvensis	corn gromwell	
Calamagrostis canadensis var. canadensis	bluejoint	
Callitriche heterophylla	**twoheaded water-starwort**	
Callitriche terrestris	**terrestrial water-starwort**	
Caltha palustris	yellow marsh marigold	
Calystegia sepium ssp. sepium	hedge false bindweed	
Calystegia spithamaea ssp. spithamaea	low false bindweed	
Calystegia spithamaea	low false bindweed, erect bindweed	S(NH), SE
Camelina microcarpa	littlepod false flax	
Campanula aparinoides	marsh bellflower	
Campsis radicans	**trumpet creeper**	
Cardamine bulbosa	**bulbous bittercress**	
Cardamine concatenata	cutleaf toothwort	
Cardaria draba	whitetop	
Carex abscondita	thicket sedge	WP(S)
Carex alata	broadwing sedge	
Carex albolutescens	greenwhite sedge	
Carex amphibola	eastern narrowleaf sedge	SE
Carex annectens	yellowfruit sedge	WP(S)
Carex argyrantha	hay sedge	
Carex atlantica ssp. atlantica	prickly bog sedge	WP(S)
Carex atlantica ssp. capillacea	prickly bog sedge	WP(S)
Carex atlantica	prickly bog sedge	
Carex barrattii	Barratt's sedge	S(NH)
Carex brevior	shortbeak sedge	

Scientific Name	Common Name(s)	Notes
Carex bullata	button sedge	WP(S)
Carex canescens	silvery sedge	
Carex caroliniana	Carolina sedge	
Carex cephalophora	oval-leaf sedge	
Carex collinsii	Collins' sedge	WP(S)
Carex comosa	longhair sedge	
Carex complanata	hirsute sedge	
Carex crinita	fringed sedge	WP(S)
Carex debilis	white edge sedge	
Carex digitalis	slender woodland sedge	
Carex festucacea	fescue sedge	
Carex folliculata	northern long sedge	WP(S)
Carex frankii	Frank's sedge	S(NH)
Carex glaucodea	blue sedge	
Carex granularis	limestone meadow sedge	
Carex hirsutella	fuzzy wuzzy sedge	
Carex hormathodes	marsh straw sedge	
Carex hyalinolepis	shoreline sedge	HNS
Carex hystericina	bottlebrush sedge	
Carex interior	inland sedge	
Carex intumescens	greater bladder sedge	WP(S)
Carex lacustris	hairy sedge	WP(S)
Carex laevivaginata	smoothsheath sedge	
Carex lasiocarpa	woollyfruit sedge	
Carex laxiculmis	spreading sedge	
Carex laxiflora	broad looseflower sedge	
Carex lupuliformis	false hop sedge, hop-like sedge	SE
Carex lupulina	hop sedge	
Carex lurida	**shallow sedge**	**WP(S)**
Carex nigromarginata	black edge sedge	
Carex pensylvanica	Pennsylvania sedge	
Carex prasina	drooping sedge	
Carex rosea	rosy sedge	
Carex scoparia	broom sedge	
Carex seorsa	weak stellate sedge	WP(S)
Carex silicea	beach sedge	
Carex sparganioides	burr reed sedge	
Carex squarrosa	squarrose sedge	
Carex stipata	owlfruit sedge	
Carex straminea	eastern straw sedge	
Carex stricta	upright sedge	
Carex styloflexa	bent sedge	
Carex swanii	Swan's sedge	WP(S)
Carex tenera	quill sedge	
Carex tetanica	rigid sedge	
Carex tribuloides	blunt broom sedge	
Carex typhina	cattail sedge	S(NH)
Carex umbellata	parasol sedge	
Carex utriculata	Northwest Territory sedge	WP(NH)
Carex venusta var. minor	darkgreen sedge	WP(S)
Carex venusta	darkgreen sedge	
Carex vestita	velvet sedge	
Carex vulpinoidea	fox sedge	WP(S)
Carpinus caroliniana	American hornbeam	WP(S)
Carya alba	**Mockernut hickory**	

Scientific Name	Common Name(s)	Notes
Carya glabra	**pignut hickory**	
Carya ovata	**shagbark hickory**	
Carya pallida	sand hickory	
Castanea dentata	**American chestnut**	
Castanea pumila	chinkapin	S(NH), SE
Catalpa speciosa	**Northern catalpa**	**NUS**
Ceanothus americanus	**New Jersey tea**	**WP(S)**
Celastrus orbiculata	**Asian bittersweet**	**NEX**
Celtis occidentalis	**common hackberry**	
Celtis tenuifolia	dwarf hackberry	
Cenchrus longispinus	mat sandbur	
Cenchrus tribuloides	sanddune sandbur	
Centaurea nigrescens	Tyrol knapweed	
Ceratophyllum demersum	coon's tail	
Cercis canadensis	eastern redbud	SE
Chaerophyllum procumbens	spreading chervil	
Chamaecrista fasciculata var. fasciculata	sleepingplant	
Chamaedaphne calyculata	leatherleaf	
Chamaelirium luteum	fairywand	
Chamaesyce polygonifolia	seaside sandmat	
Chasmanthium laxum	slender woodoats	
Chelidonium majus	celandine	NEX
Chelone glabra	**white turtlehead**	
Chenopodium ambrosioides	Mexican tea	NEX
Chimaphila maculata	**striped prince's pine**	**WP(S)**
Chimaphila umbellata	pipsissewa	
Chionanthus virginicus	**white fringetree**	
Chrysopsis mariana	Maryland goldenaster	
Chrysosplenium americanum	American golden saxifrage	
Cimicifuga racemosa	black bugbane	
Cinna arundinacea	**sweet woodreed**	
Circaea lutetiana ssp. canadensis	broadleaf enchanter's nightshade	
Cirsium arvense	**Canada thistle**	**NEX**
Cirsium discolor	field thistle	
Cirsium horridulum var. horridulum	yellow thistle	
Cirsium muticum	swamp thistle	WP(S)
Cirsium vulgare	bull thistle	NEX
Claytonia virginica var. virginica	**Virginia springbeauty**	
Clematis terniflora	**sweet autumn virginsbower**	**NEX**
Clematis virginiana	devil's darning needles	
Clethra alnifolia	**coastal sweetpepperbush**	
Comandra umbellata	bastard toadflax	
Commelina communis var. communis	Asiatic dayflower	NEX
Commelina diffusa	**climbing dayflower**	
Comptonia peregrina	sweet fern	
Conoclinium coelestinum	blue mistflower	
Coreopsis rosea	pink tickseed	S(NH)
Cornus alternifolia	**alternateleaf dogwood**	**WP(S)**
Cornus amomum	**silky dogwood**	
Cornus florida	**flowering dogwood**	
Cornus racemosa	gray dogwood	
Corylus americana	American hazelnut	WP(S)
Crataegus crus-galli	cockspur hawthorn	
Crataegus intricata	Copenhagen hawthorn	
Crataegus monogyna	oneseed hawthorn	

Scientific Name	Common Name(s)	Notes
Crataegus phaenopyrum	Washington hawthorn	
Crataegus pruinosa	waxyfruit hawthorn	
Crataegus uniflora	dwarf hawthorn	
Crotalaria sagittalis	arrowhead rattlebox	
Croton willdenowii	Willdenow's croton	
Cryptotaenia canadensis	Canadian honewort	
Cunila origanoides	common dittany	
Cuscuta cephalanthi	buttonbush dodder	SE
Cuscuta compacta	compact dodder	WP(S)
Cuscuta coryli	hazel dodder	S(NH)
Cuscuta gronovii	scaldweed	
Cuscuta pentagona var. pentagona	fiveangled dodder	
Cuscuta polygonorum	smartweed dodder	S(NH)
Cynodon dactylon	**Bermudagrass**	**NEX**
Cyperus bipartitus	slender flatsedge	
Cyperus dentatus	toothed flatsedge	
Cyperus diandrus	umbrella flatsedge	
Cyperus erythrorhizos	redroot flatsedge	
Cyperus esculentus	chufa flatsedge	
Cyperus filicinus	fern flatsedge	
Cyperus flavescens	yellow flatsedge	
Cyperus grayi	Gray's flatsedge	
Cyperus lancastriensis	manyflower/Lancaster flatsedge	SE
Cyperus odoratus	fragrant flatsedge	S(NH)
Cyperus polystachyos	manyspike/coast flatsedge	S(NH), SE
Cyperus pseudovegetus	marsh flatsedge	S(NH), SE
Cyperus refractus	reflexed flatsedge	SE
Cyperus retrofractus	rough flatsedge	SE
Cyperus strigosus	**strawcolored flatsedge**	
Cypripedium acaule	moccasin flower, pink lady's slipper	
Cytisus scoparius	scotchbroom	NEX
Danthonia compressa	flattened oatgrass	
Danthonia spicata	**poverty oatgrass**	
Decodon verticillatus	**swamp loosestrife**	
Dennstaedtia punctilobula	eastern hayscented fern	WP(S), WP(M)
Deschampsia flexuosa	wavy hairgrass	
Desmodium canescens	hoary ticktrefoil	
Desmodium laevigatum	smooth ticktrefoil	
Desmodium obtusum	stiff ticktrefoil	
Desmodium ochroleucum	cream ticktrefoil	S(NH)
Desmodium paniculatum var. paniculatum	panicledleaf ticktrefoil	
Desmodium viridiflorum	velvetleaf ticktrefoil	WP(S)
Dianthus armeria	Deptford pink	NEX
Dicentra cucullaria	dutchman's breeches	WP(S)
Dichanthelium acuminatum var. fasciculatum	western panicgrass	WP(S)
Dichanthelium acuminatum var. lindheimeri	Lindheimer panicgrass	WP(S)
Dichanthelium boscii	Bosc's panicgrass	
Dichanthelium clandestinum	**deertongue**	**WP(S)**
Dichanthelium depauperatum	starved panicgrass	
Dichanthelium dichotomum var. dichotomum	**cypress panicgrass**	**WP(S)**
Dichanthelium dichotomum	cypress panicgrass	

Scientific Name	Common Name(s)	Notes
Dichanthelium ovale var. addisonii	Addison's rosette grass	
Dichanthelium scoparium	velvet panicum	
Dichanthelium sphaerocarpon var. isophyllum	roundseed panicgrass	WP(S)
Dichanthelium spretum	Eaton's rosette grass	
Dichanthelium villosissimum var. villosissimum	whitehair rosette grass	
Dichanthelium wrightianum	Wright's rosette grass	
Digitaria filiformis	slender crabgrass	
Digitaria ischaemum	smooth crabgrass	
Dioscorea quaternata	fourleaf yam	WP(S)
Dioscorea villosa	**wild yam**	
Diospyros virginiana	common persimmon	WP(S)
Dipsacus fullonum	Fuller's teasel	NEX
Dirca palustris	eastern leatherwood	WP(S), S(NH)
Doellingeria infirma	cornel-leaf whitetop	
Draba verna	**spring draba**	
Drosera intermedia	spoonleaf sundew	
Dryopteris campyloptera	mountain woodfern	
Dryopteris carthusiana	spinulose woodfern	WP(M)
Dryopteris carthusiana x intermedia		WP(M)
Dryopteris cristata	crested woodfern	WP(M)
Dryopteris intermedia	intermediate woodfern	WP(S), WP(M)
Dryopteris marginalis	marginal woodfern	WP(M)
Dryopteris Hseparabilis		
Dryopteris Htriploidea		
Dulichium arundinaceum	threeway sedge	WP(S)
Echinochloa crus-galli	barnyardgrass	
Echinochloa muricata var. muricata	rough barnyardgrass	
Echinochloa walteri	coast cockspur grass	
Eclipta prostrata	false daisy	
Elaeagnus umbellata var. parvifolia	**autumn olive**	**NEX**
Elatine americana	American waterwort	
Eleocharis acicularis var. acicularis	needle spikerush	
Eleocharis acicularis	needle spikerush	
Eleocharis erythropoda	bald spikerush	
Eleocharis fallax	creeping spikerush	
Eleocharis flavescens var. flavescens	yellow spikerush	
Eleocharis melanocarpa	blackfruit spikerush	S(NH), SE
Eleocharis olivacea	bright green spikerush	
Eleocharis palustris	common spikerush	
Eleocharis parvula	dwarf spikerush	
Eleocharis quadrangulata	squarestem spikerush	
Eleocharis tenuis var. verrucosa	slender spikerush, warty spikerush	SE
Eleocharis tortilis	twisted spikerush	SE
Eleocharis tricostata	three-angle spikerush	
Elephantopis carolinianus	Carolina elephantsfoot	S(NH), SE
Eleusine indica	Indian goosegrass	
Elodea nuttallii	western waterweed	
Elymus canadensis	Canada wildrye	
Elymus repens	**quackgrass**	**NEX**
Epigaea repens	trailing arbutus	
Epilobium coloratum	**purpleleaf willowherb**	
Equisetum arvense	**field horsetail**	**WP(M)**
Equisetum Hferrissii		

Scientific Name	Common Name(s)	Notes
Equisetum fluviatile	water horsetail	
Equisetum hyemale var. affine	scouringrush horsetail	WP(S)
Equisetum hyemale	scouringrush horsetail	WP(M)
Eragrostis capillaris	lace grass	
Eragrostis cilianensis	stinkgrass	
Eragrostis hypnoides	teal lovegrass	
Eragrostis pilosa	Indian lovegrass	
Erigeron strigosus var. beyrichii	Beyrich's fleabane	
Eriocaulon compressum	flattened pipewort	
Erodium cicutarium	redstem stork's bill	
Erythronium americanum	**dogtooth violet, trout lilly**	
Euonymus americana	**strawberry bush**	**WP(S)**
Euonymus atropurpurea var. atropurpurea	eastern wahoo	
Euonymus atropurpurea	eastern wahoo	
Eupatorium dubium	coastalplain joepyeweed	
Eupatorium hyssopifolium	hyssopleaf thoroughwort	
Eupatorium leucolepis var. leucolepis	justiceweed	
Eupatorium maculatum var. maculatum	spotted joepyeweed	
Eupatorium perfoliatum	common boneset	
Eupatorium purpureum	sweetscented joepyeweed	
Eupatorium rotundifolium	roundleaf thoroughwort	
Eupatorium serotinum	lateflowering thoroughwort	
Euphorbia corollata	flowering spurge	
Euphorbia cyparissias	cypress spurge	NEX
Euphorbia ipecacuanhae	**American ipecac**	**WP(S)**
Euphorbia purpurea	Darlington's glade spurge	WP(S), WP(NH), SE
Eurybia radula	low rough aster	S(NH), SE
Eurybia spectabilis	western showy aster	
Euthamia graminifolia var. graminifolia	flat-top goldentop	
Euthamia graminifolia	**flat-top goldentop**	
Fagus grandifolia	**American beech**	
Festuca subverticillata	nodding fescue	
Fimbristylis autumnalis	slender fimbry	
Fimbristylis caroliniana	Carolina fimbry	
Fragaria virginiana	**Wild strawberry**	
Fraxinus americana	**white ash**	**WP(S)**
Fraxinus pennsylvanica	**green ash**	
Froelichia gracilis	slender snakecotton	NUS
Fumaria officinalis ssp. officinalis	drug fumitory	
Galactia regularis	eastern milkpea	
Galactia volubilis	downy milkpea	SE
Galearis spectabilis	showy orchid	WP(S)
Galium aparine	stickywilly	
Galium asprellum	rough bedstraw	WP(S)
Galium circaezans var. circaezans	licorice bedstraw	
Galium tinctorium	stiff marsh bedstraw	WP(S)
Galium trifidum	threepetal/small bedstraw	SE
Galium triflorum	fragrant bedstraw	
Galium verum	Yellow Spring bedstraw	NEX
Gamochaeta purpurea	spoonleaf purple everlasting	
Gaura biennis	biennial beeblossom	
Gaylussacia baccata	black huckleberry	
Gentiana saponaria	harvestbells	
Geranium carolinianum	Carolina geranium	
Geranium maculatum	spotted geranium	

Scientific Name	Common Name(s)	Notes
Geum virginianum	cream avens	
Glechoma hederacea	ground ivy	NEX
Gleditsia triacanthos	honeylocust	
Glyceria acutiflora	creeping mannagrass	
Glyceria canadensis	rattlesnake mannagrass	
Glyceria obtusa	Atlantic mannagrass	
Glyceria septentrionalis	floating mannagrass	
Glyceria striata	**fowl mannagrass**	**WP(S)**
Gratiola neglecta	clammy hedgehyssop	
Gratiola virginiana	roundfruit hedgehyssop	
Gymnopogon ambiguus	bearded skeletongrass	
Hamamelis virginiana	**American witchhazel**	
Helenium autumnale	common sneezeweed	
Helenium flexuosum	purplehead sneezeweed	
Helianthemum bicknellii	oary frostweed	
Helianthus angustifolius	swamp sunflower	
Helianthus decapetalus	thinleaf sunflower	WP(S)
Helianthus giganteus	giant sunflower	
Helianthus Hlaetiflorus	cheerful sunflower	
Helianthus strumosus	paleleaf woodland sunflower	
Helonias bullata	swamppink	WP(S), S(NH), SE, FE
Hemerocallis fulva	orange daylily	NEX
Hepatica nobilis var. obtusa	roundlobe hepatica	
Heteranthera multiflora	bouquet mudplantain	S(NH)
Heteranthera reniformis	kidneyleaf mudplantain	
Heuchera americana	American alumroot	WP(S)
Hibiscus moscheutos ssp. moscheutos	crimsoneyed rosemallow	
Hibiscus moscheutos	crimsoneyed rosemallow	
Hibiscus syriacus	rose of Sharon	NEX
Hieracium caespitosum	meadow hawkweed	
Hieracium gronovii	queendevil	
Hieracium piloselloides	tall hawkweed	
Hieracium venosum	rattlesnakeweed	
Holcus lanatus	common velvetgrass	NEX
Holosteum umbellatum	jagged chickweed	
Hottonia inflata	American featherfoil	S(NH), SE
Houstonia caerulea	azure bluet	
Huperzia lucidula	Shining clubmoss	WP(S), WP(M)
Humulus lupulus var. lupulus	common hop	WP(S)
Hydrocotyle ranunculoides	floating marshpennywort	S(NH), SE
Hydrocotyle umbellata	manyflower marshpennywort	
Hydrophyllum virginianum	Shawnee salad	
Hylotelephium telephium ssp. telephium	witch's moneybags	
Hypericum adpressum	creeping/Bartons St. Johnswort	S(NH), SE
Hypericum boreale	northern St. Johnswort	
Hypericum canadense	lesser Canadian St. Johnswort	
Hypericum denticulatum	coppery St. Johnswort	
Hypericum gymnanthum	claspingleaf St. Johnswort	
Hypericum hypericoides ssp. hypericoides	St. Andrew's cross	
Hypericum mutilum	**dwarf St. Johnswort**	
Hypericum perforatum	common St. Johnswort	
Hypericum punctatum	**spotted St. Johnswort**	
Ilex glabra	inkberry	
Ilex laevigata	smooth winterberry	
Ilex opaca	**American holly**	

Scientific Name	Common Name(s)	Notes
Ilex verticillata	**common winterberry**	**WP(S)**
Impatiens capensis	**jewelweed**	
Ipomoea coccinea	redstar	
Ipomoea hederacea	ivyleaf morning-glory	NEX
Ipomoea pandurata	man of the earth	
Iris pseudacorus	paleyellow iris	NEX
Isoetes engelmannii	Appalachian quillwort	
Isoetes riparia	shore quillwort	
Isoetes tenella	spiny-spore quillwort	
Isotria verticillata	purple fiveleaf orchid	WP(S)
Itea virginica	Virginia sweetspire	
Juncus acuminatus	tapertip rush	
Juncus debilis	weak rush	
Juncus dichotomus	forked rush	WP(S)
Juncus effusus var. solutus	lamp rush	WP(S)
Juncus effusus	**common rush**	
Juncus scirpoides	needlepod rush	
Juncus secundus	lopsided rush	
Juncus subcaudatus	woodland rush	
Juncus tenuis	poverty rush	WP(S)
Juniperus virginiana	**eastern redcedar**	**WP(S)**
Kalmia latifolia	**mountain laurel**	
Kosteletzkya virginica	Virginia saltmarsh mallow	
Krigia virginica	Virginia dwarfdandelion	
Kyllinga brevifolia	shortleaf spikesedge	
Lactuca biennis	tall blue lettuce	
Lactuca canadensis	Canada lettuce	
Lamium amplexicaule	henbit deadnettle	NEX
Lamium purpureum	purple deadnettle	NEX
Laportea canadensis	Canadian woodnettle	
Lathyrus japonicus var. maritimus	beach pea	
Lathyrus japonicus var. pellitus	beach pea	
Lathyrus palustris	marsh pea	
Leersia oryzoides	**rice cutgrass**	
Leersia virginica	**whitegrass**	**WP(S)**
Lemna perpusilla	minute duckweed	S(NH), SE
Leontodon taraxacoides ssp. taraxacoides	lesser hawkbit	
Lepidium campestre	field pepperweed	
Lepidium virginicum	**Virginia pepperweed**	
Leptochloa fusca ssp. fascicularis	bearded sprangletop	
Lespedeza violacea	violet lespedeza	
Leucothoe racemosa	swamp doghobble	
Liatris pilosa var. pilosa	shaggy blazing star	
Ligustrum vulgare	European privet	NEX
Lindera benzoin var. benzoin	northern spicebush	WP(S)
Lindera benzoin var. pubescens	northern spicebush	
Lindera benzoin	**northern spicebush**	
Lindernia dubia var. anagallidea	yellowseed false pimpernel	
Lindernia dubia	yellowseed false pimpernel	
Linum intercursum	sandplain flax	S(NH), SE
Linum medium	stiff yellow flax	WP(S)
Liparis liliifolia	brown widelip orchid	
Liparis loeselii	yellow widelip orchid	
Liquidambar styraciflua	**sweetgum**	**WP(S)**
Liriodendron tulipifera	**tuliptree, yellow poplar**	

Scientific Name	Common Name(s)	Notes
Lobelia cardinalis	cardinalflower	
Lobelia inflata	Indian-tobacco	
Lobelia puberula	downy lobelia	WP(S)
Lolium perenne ssp. perenne	**perennial ryegrass**	
Lolium pratense	meadow ryegrass	NEX
Lonicera japonica	**Japanese honeysuckle**	**NEX**
Lonicera sempervirens	trumpet honeysuckle	
Ludwigia alternifolia	**seedbox**	
Ludwigia hirtella	spindleroot	
Ludwigia palustris	**marsh seedbox**	
Ludwigia peploides ssp. glabrescens	floating primrose-willow	
Ludwigia sphaerocarpa	globefruit primrose-willow	
Luzula acuminata	hairy woodrush	S(NH), SE
Luzula bulbosa	bulbous woodrush	
Luzula echinata	hedgehog woodrush	
Luzula multiflora ssp. multiflora var. multiflora	**common woodrush**	
Lycopodiella alopecuroides	foxtail clubmoss	WP(M)
Lycopodiella Hcopelandii		WP(M)
Lycopodiella inundata	inundated clubmoss	
Lycopodium clavatum	running clubmoss	WP(M)
Lycopodium dendroideum	tree groundpine	
Lycopodium digitatum	**fan clubmoss**	**WP(M)**
Lycopodium Hhabereri		
Lycopodium hickeyi	Pennsylvania clubmoss	
Lycopodium obscurum	**rare clubmoss**	**WP(S), WP(M)**
Lycopodium tristachyum	deeproot clubmoss	
Lycopus americanus	**American water horehound**	
Lycopus amplectens	clasping water horehound	
Lycopus europaeus	gypsywort	
Lycopus rubellus	taperleaf water horehound	
Lycopus uniflorus	northern bugleweed	
Lycopus virginicus	**Virginia water horehound**	
Lygodium palmatum	American climbing fern	
Lyonia ligustrina var. ligustrina	maleberry	WP(S)
Lyonia ligustrina	maleberry	
Lysimachia ciliata	fringed loosestrife	
Lysimachia hybrida	lowland yellow loosestrife	
Lysimachia quadrifolia	whorled yellow loosestrife	WP(S)
Lysimachia terrestris	earth loosestrife	
Lythrum salicaria	**purple loosestrife**	**NEX**
Maclura pomifera	**osage orange**	**NUS**
Magnolia virginiana	**sweetbay**	
Maianthemum canadense	**Canada mayflower**	**WP(S)**
Maianthemum racemosum ssp. racemosum	**feathery false lily of the vally false solomons seal**	**WP(S)**
Maianthemum stellatum	starry false lily of the vally	
Marrubium vulgare	horehound	
Medeola virginiana	**Indian cucumber**	**WP(S)**
Melampyrum lineare var. latifolium	narrowleaf cowwheat	
Melanthium virginicum	Virginia bunchflower	S(NH), SE
Melilotus officinalis	yellow sweetclover	NEX
Melissa officinalis	common balm	
Menispermum canadense	common moonseed	WP(S)
Mentha arvensis	wild mint	WP(S)

Scientific Name	Common Name(s)	Notes
Mentha spicata	spearmint	
Mikania scandens	**climbing hempvine**	
Mimulus alatus	sharpwing monkeyflower	WP(S)
Miscanthus sinensis	Chinese silvergrass	NEX
Mitchella repens	**partridgeberry**	**WP(S)**
Monotropa hypopithys	pinesap	
Monotropa uniflora	Indianpipe	WP(S)
Morella caroliniensis	southern bayberry	
Morella pensylvanica	**northern bayberry**	
Morus alba	**white mulberry**	**NEX**
Muhlenbergia mexicana	Mexican muhly	
Muhlenbergia schreberi	**nimblewill**	
Myosotis arvensis	field forget-me-not	
Myosotis laxa	bay forget-me-not	
Myosotis verna	spring forget-me-not	
Myriophyllum humile	low watermilfoil	
Myriophyllum pinnatum	cutleaf watermilfoil	S(NH), SE
Najas flexilis	nodding waternymph	
Najas gracillima	slender waternymph	
Nelumbo lutea	**American lotus**	**WP(S), WP(NH), SE**
Nelumbo nucifera	sacred lotus	
Nuphar lutea ssp. advena	**yellow pond-lily**	
Nuphar lutea ssp. pumila	yellow pond-lily	SE
Nuphar lutea ssp. rubrodisca	yellow pond-lily	
Nuttallanthus canadensis	**Canada toadflax**	
Nymphaea odorata ssp. odorata	American white waterlily	WP(S)
Nymphaea odorata	American white waterlily	
Nymphoides cordata	little floatingheart	S(NH)
Nymphoides peltata	yellow floatingheart	
Nyssa sylvatica	**tupelo, blackgum**	
Obolaria virginica	Virginia pennywort	
enothera biennis	**common evening-primrose**	
Oenothera fruticosa ssp. fruticosa	narrowleaf evening-primrose	
Oenothera fruticosa	narrowleaf evening-primrose	
Oldenlandia uniflora	clustered mille graines	
Onoclea sensibilis	**sensitive fern**	**WP(M)**
Onosmodium virginianum	wild Job's tears	S(NH), SE
Ophioglossum pusillum	northern adderstongue	WP(M)
Ophioglossum vulgatum	southern adderstongue	WP(S), WP(M)
Opuntia humifusa	**Devil's tongue cactus, eastern prickly pear**	
Ornithogalum umbellatum	sleepydick	NEX
Orontium aquaticum	goldenclub	
Osmunda cinnamomea	**cinnamon fern**	**WP(M)**
Osmunda claytoniana	interrupted fern	WP(M)
Osmunda regalis var. spectabilis	royal fern	WP(M)
Osmunda regalis	**royal fern**	
Oxalis stricta	common yellow oxalis	
Panax trifolius	dwarf ginseng	
Panicum amarum	bitter panicgrass	
Panicum anceps	beaked panicgrass	WP(S)
Panicum dichotomiflorum	**fall panicgrass**	
Panicum philadelphicum	Philadelphia panicgrass	WP(S)
Panicum rigidulum var. elongatum	redtop panicgrass	
Panicum rigidulum var. pubescens	redtop panicgrass	

Scientific Name	Common Name(s)	Notes
Panicum rigidulum var. rigidulum	redtop panicgrass	
Panicum rigidulum	redtop panicgrass	
Panicum verrucosum	warty panicgrass	
Panicum virgatum var. virgatum	switchgrass	
Panicum virgatum	**switchgrass**	
Parthenocissus quinquefolia	**Virginia creeper**	
Paspalum dissectum	mudbank crowngrass	
Paspalum laeve	field paspalum	
Paspalum setaceum	thin paspalum	
Paulownia tomentosa	**princesstree**	**NEX**
Pedicularis lanceolata	swamp lousewort	WP(S)
Peltandra virginica	green arrow arum	
Phalaris arundinacea	**reed canarygrass**	**NUS**
Phaseolus polystachios var. polystachios	wild kidney bean	WP(NH)
Phegopteris hexagonoptera	broad beechfern	WP(M)
Phleum pratense	**timothy**	**NEX**
Phlox maculata ssp. maculata	Spotted phlox	WP(NH)
Phlox maculata	wild sweetwilliam	
Phlox paniculata	fall phlox	
Phoradendron leucarpum	oak mistletoe	WP(S)
Photinia floribunda	purple chokeberry	
Photinia melanocarpa	black chokeberry	
Phragmites australis	**common reed**	**NUS**
Phyllostachys aurea	**golden bamboo**	**NEX**
Phyllostachys viridiglaucescens	greenwax bamboo	NEX
Physalis heterophylla	clammy groundcherry	
Physalis longifolia var. subglabrata	longleaf groundcherry	
Phytolacca americana	**American pokeweed**	
Pilea pumila	Canadian clearweed	
Pinus echinata	**shortleaf pine**	
Pinus serotina	pond pine	
Pinus strobus	**eastern white pine**	
Pinus taeda	**loblolly pine**	**S(NH)**
Pinus virginiana	**Virginia pine**	
Plantago aristata	**largebracted plantain**	
Plantago lanceolata	**English plantain**	**NEX**
Plantago major	**common plantain**	NUS
Plantago virginica	**Virginia plantain**	
Platanthera ciliaris	yellow fringed orchid	
Platanthera flava var. herbiola	palegreen orchid	S(NH)
Platanthera flava	palegreen orchid	
Platanthera lacera	green fringed orchid	
Pluchea odorata var. succulenta	sweetscent	
Poa annua	annual bluegrass	
Poa trivialis	rough bluegrass	NEX
Podophyllum peltatum	**mayapple**	**WP(S)**
Pogonia ophioglossoides	snakemouth orchid	
Polemonium reptans	**Greek valerian**	**WP(S), WP(NH)**, **SE**
Polygala incarnata	procession flower	SE
Polygala lutea	orange milkwort	
Polygala mariana	Maryland milkwort	S(NH)
Polygala polygama	racemed milkwort	
Polygala sanguinea	purple milkwort	WP(S)
Polygonatum biflorum var. commutatum	smooth Solomon's seal	WP(S)
Polygonella articulata	coastal jointweed	

Scientific Name	Common Name(s)	Notes
Polygonum arifolium	**halberdleaf tearthumb**	
Polygonum aviculare	prostrate knotweed	
Polygonum careyi	Carey's smartweed	
Polygonum convolvulus	**black bindweed**	
Polygonum cuspidatum	**Japanese knotweed**	**NEX**
Polygonum erectum	erect knotweed	
Polygonum hydropiperoides	**swamp smartweed**	**WP(S)**
Polygonum lapathifolium	**curlytop knotweed**	
Polygonum orientale	kiss me over the garden gate	NEX
Polygonum pensylvanicum	**Pennsylvania smartweed**	
Polygonum perfoliatum	Asiatic tearthumb	NEX
Polygonum persicaria	spotted ladysthumb	NEX
Polygonum punctatum	**dotted smartweed**	
Polygonum ramosissimum	bushy knotweed	
Polygonum robustius	stout smartweed	
Polygonum sagittatum	**arrowleaf tearthumb**	
Polygonum scandens var. scandens	climbing false buckwheat	
Polygonum setaceum	bog smartweed	WP(NH)
Polypodium virginianum	rock polypody	WP(S)
Polystichum acrostichoides var. acrostichoides	Christmas fern	
Polystichum acrostichoides	**Christmas fern**	**WP(M)**
Pontederia cordata	**pickerelweed**	
Populus alba	white poplar	NEX
Populus grandidentata	bigtooth aspen	WP(S)
Populus heterophylla	swamp cottonwood	
Populus nigra	Lombardy poplar	
Potamogeton crispus	**curly pondweed**	**NEX**
Potamogeton epihydrus	ribbonleaf pondweed	
Potamogeton foliosus	leafy pondweed	
Potamogeton nodosus	longleaf pondweed	
Potamogeton pulcher	spotted pondweed	
Potamogeton pusillus ssp. pusillus	small pondweed	WP(S)
Potamogeton pusillus	small pondweed	
Potentilla argentea	silver cinquefoil	
Potentilla canadensis	dwarf cinquefoil	WP(S)
Potentilla norvegica	Norwegian cinquefoil	
Potentilla simplex	**common cinquefoil**	
Prenanthes alba	white rattlesnakeroot	
Prenanthes serpentaria	cankerweed	
Prenanthes trifoliolata	gall of the earth	
Proserpinaca intermedia	intermediate mermaidweed	
Proserpinaca palustris	marsh mermaidweed	
Proserpinaca pectinata	combleaf mermaidweed	
Prunella vulgaris	**Common selfheal**	
Prunus americana	American plum	WP(S)
Prunus angustifolia	Chickasaw plum	S(NH), SE
Prunus cerasus	sour cherry	NEX
Prunus serotina	**black cherry**	
Pseudognaphalium obtusifolium	rabbittobacco	
Pseudosasa japonica	arrow bamboo	NEX
Pteridium aquilinum var. latiusculum	western brackenfern	
Pteridium aquilinum	western brackenfern	
Ptilimnium capillaceum	herbwilliam	
Pueraria montana var. lobata	Kudzu-vine	NEX

Scientific Name	Common Name(s)	Notes
Pycnanthemum setosum	awned mountainmint	
Pycnanthemum tenuifolium	narrowleaf mountainmint	
Pycnanthemum verticillatum var. verticillatum	whorled mountainmint	
Pycnanthemum verticillatum	**whorled mountainmint**	
Pyrola americana	American wintergreen	WP(S)
Pyxidanthera barbulata	flowering pixiemoss	
Quercus alba	**white oak**	**WP(S)**
Quercus bicolor	swamp white oak"	
Quercus falcata	**southern red oak**	**WP(S)**
Quercus Hheterophylla		
Quercus lyrata	overcup oak	S(NH), SE
Quercus marilandica	**blackjack oak**	
Quercus michauxii	swamp chestnut oak	
Quercus palustris	**pin oak**	
Quercus phellos	**willow oak**	**WP(S)**
Quercus prinus	**chestnut oak**	
Quercus rubra var. ambigua	northern red oak	
Quercus rubra	**northern red oak**	
Quercus Hrudkinii		
Quercus Hsaulii		
Quercus stellata	**post oak**	**WP(S)**
Quercus velutina	**black oak**	
Ranunculus abortivus	**littleleaf buttercup**	
Ranunculus bulbosus	St. Anthony's turnip	NEX
Ranunculus ficaria	fig buttercup	NEX
Ranunculus hispidus var. nitidus	bristly buttercup	
Ranunculus pusillus	low spearwort	
Ranunculus recurvatus	blisterwort	
Ranunculus repens	creeping buttercup	
Ranunculus sceleratus	**cursed buttercup**	
Ranunculus trichophyllus var. trichophyllus	threadleaf crowfoot	
Rhexia mariana var. mariana	Maryland meadowbeauty	
Rhexia virginica	handsome Harry	
Rhododendron atlanticum	dwarf azalea	S(NH), SE
Rhododendron periclymenoides	**pink azalea**	
Rhododendron viscosum	swamp azalea	WP(S)
Rhus copallinum	**Flameleaf sumac**	
Rhynchospora capitellata	brownish beaksedge	
Rhynchospora chalarocephala	loosehead beaksedge	
Rhynchospora globularis	globe beaksedge, coarse grass-like beaked-rush	S(NH), SE
Rhynchospora gracilenta	slender beaksedge	
Rhynchospora macrostachya	tall horned beaksedge	
Rhynchospora nitens	shortbeak beaksedge	
Rhynchospora pallida	pale beaksedge	S(NH)
Rhynchospora recognita	globe beaksedge	
Rhynchospora scirpoides	longbeak beaksedge	S(NH)
Ribes hirtellum	hairystem gooseberry	
Robinia hispida	bristly locust	NUS
Robinia pseudoacacia	**black locust**	**NUS**
Robinia viscosa	clammy locust	
Rorippa nasturtium-aquaticum	watercress	
Rorippa palustris ssp. hispida	hispid yellowcress	

Scientific Name	Common Name(s)	Notes
Rorippa palustris	bog yellowcress	
Rorippa sylvestris	creeping yellowcress	
Rosa carolina	Carolina rose	
Rosa multiflora	**multiflora rose**	**NEX**
Rosa palustris	swamp rose	
Rotala ramosior	lowland rotala	WP(S), WP(NH)
Rubus cuneifolius	sand blackberry	
Rubus flagellaris	northern dewberry	
Rubus hispidus	bristly dewberry	WP(S)
Rubus idaeus	**American red raspberry**	
Rubus laciniatus	cutleaf blackberry	NEX
Rubus occidentalis	black raspberry	
Rudbeckia laciniata	cutleaf coneflower	
Rumex verticillatus	swamp dock	
Sagina decumbens	trailing pearlwort	
Sagina procumbens	birdeye pearlwort	
Sagittaria calycina var. spongiosa	hooded arrowhead	
Sagittaria latifolia	broadleaf arrowhead	
Sagittaria montevidensis	giant arrowhead	
Sagittaria rigida	sessilefruit arrowhead	
Salix alba	white willow	NEX
Salix fragilis	crack willow	NEX
Salix humilis var. tristis	prairie willow	WP(S)
Salix humilis	prairie willow	WP(S)
Salix interior	sandbar willow	
Salix nigra	**black willow**	**WP(S)**
Salix sericea	silky willow	
Sambucus nigra ssp. canadensis	common elderberry	WP(S)
Sanguinaria canadensis	bloodroot	
Sanguisorba canadensis	Canadian burnet	WP(S)
Sanicula odorata	clustered blacksnakeroot	
Sassafras albidum	**sassafras**	
Saxifraga pensylvanica	eastern swamp saxifrage	
Saxifraga virginiensis	early saxifrage	
Schoenoplectus americanus	chairmaker's bulrush	
Schoenoplectus fluviatilis	river bulrush	
Schoenoplectus maritimus	cosmopolitan/saltmarsh bulrush	SE
Schoenoplectus novae-angliae	New England bulrush	S(NH)
Schoenoplectus pungens var. pungens	common threesquare	
Schoenoplectus robustus	sturdy bulrush	
Schoenoplectus smithii	Smith's bulrush	
Schoenoplectus tabernaemontani	softstem bulrush	
Scirpus atrovirens	green bulrush	
Scleranthus annuus	German knotgrass	
Scleria pauciflora	fewflower nutrush	
Scleria reticularis	netted nutrush	
Scleria triglomerata	whip nutrush	WP(S)
Scrophularia lanceolata	lanceleaf figwort	
Scrophularia marilandica	carpenter's square	
Scutellaria elliptica	hairy skullcap	
Scutellaria galericulata	marsh skullcap	WP(S)
Scutellaria integrifolia	helmet flower	WP(S)
Scutellaria lateriflora	blue skullcap	
Scutellaria parvula var. missouriensis	Leonard's skullcap, small skullcap	S(NH), SE
Selaginella apoda	meadow spikemoss	WP(M)

Scientific Name	Common Name(s)	Notes
Senna hebecarpa	American senna	
Sericocarpus asteroides	toothed whitetop aster	
Sericocarpus linifolius	narrowleaf whitetop aster	
Setaria faberi	**Japanese bristlegrass**	**NEX**
Setaria magna	giant bristlegrass"	
Setaria parviflora	marsh bristlegrass	
Sherardia arvensis	blue fieldmadder	
Sida spinosa	prickly fanpetals	
Silene antirrhina	sleepy silene	
Silene latifolia ssp. alba	bladder campion	
Silene stellata	widowsfrill	
Sisymbrium officinale	hedgemustard	
Sisyrinchium atlanticum	eastern blue-eyed grass	WP(S)
Sisyrinchium fuscatum	coastalplain blue-eyed grass	WP(S)
Sisyrinchium mucronatum	needletip blue-eyed grass	
Sium suave	hemlock waterparsnip	
Smilax pseudochina	bamboo vine	WP(S)
Smilax rotundifolia	**roundleaf greenbrier**	
Solanum carolinense	Carolina horsenettle	
Solanum dulcamara	climbing nightshade	
Solanum physalifolium	hoe nightshade	
Solanum ptychanthum	West Indian nightshade	
Solidago canadensis	**Canada goldenrod**	
Solidago latissimifolia	Elliott's goldenrod	
Solidago nemoralis	**gray goldenrod**	
Solidago rugosa	**wrinkleleaf goldenrod**	
Solidago uliginosa	bog goldenrod	
Solidago ulmifolia	elmleaf goldenrod	
Sonchus asper	spiny sowthistle	
Sparganium americanum	**American bur-reed**	
Spartina cynosuroides	big cordgrass	
Spergula arvensis	corn spurry	
Spergularia salina	salt sandspurry	
Sphenopholis intermedia	slender wedgescale	
Sphenopholis nitida	shiny wedgescale	
Sphenopholis obtusata	prairie wedgescale	
Spiraea prunifolia	bridalwreath spirea	
Spiraea tomentosa	steeplebush	
Spiranthes lacera var. gracilis	northern slender ladies'-tresses	
Spiranthes odorata	marsh ladies'-tresses	S(NH)
Spiranthes tuberosa	little ladies'-tresses	
Spirodela polyrrhiza	common duckmeat	
Sporobolus clandestinus	rough dropseed	
Sporobolus vaginiflorus	poverty dropseed	
Stachys aspera	hyssopleaf hedgenettle	
Stachys hyssopifolia	hyssopleaf hedgenettle	
Stachys palustris	marsh hedgenettle	
Staphylea trifolia	American bladdernut	WP(S)
Strophostyles helvula	trailing fuzzybean	
Strophostyles umbellata	pink fuzzybean	WP(S)
Stylosanthes biflora	sidebeak pencilflower	S(NH)
Symphyotrichum concolor	eastern silver aster	
Symphyotrichum dumosum var. dumosum	rice button aster	
Symphyotrichum lanceolatum ssp. lanceolatum var. lanceolatum	white panicle aster	

Scientific Name	Common Name(s)	Notes
Symphyotrichum lateriflorum var. lateriflorum	**calico aster**	
Symphyotrichum novae-angliae	New England aster	
Symphyotrichum pilosum	**hairy white oldfield aster**	
Symphyotrichum puniceum var. puniceum	purplestem aster, shining aster	SE
Symphyotrichum subulatum	eastern annual saltmarsh aster	
Symphytum officinale	**common comfrey**	**WP(S)**
Taenidia integerrima	yellow pimpernel	
Taraxacum officinale	**common dandelion**	**NUS**
Taxodium distichum	bald cypress	
Tephrosia virginiana	Virginia tephrosia	
Teucrium canadense	Canada germander	
Thalictrum pubescens	king of the meadow	WP(S)
Thalictrum thalictroides	rue anemone	
Thelypteris noveboracensis	**New York fern**	**WP(S), WP(M)**
Thelypteris palustris var. pubescens	eastern marsh fern	WP(S), WP(M)
Thelypteris palustris	eastern marsh fern	
Thelypteris simulata	bog fern	
Thlaspi arvense	field pennycress	
Tilia americana	American basswood	
Tipularia discolor	**crippled cranefly**	**S(NH)**
Torreyochloa pallida var. pallida	pale false mannagrass	
Toxicodendron pubescens	Atlantic poison oak	
Toxicodendron radicans ssp. radicans	**eastern poison ivy**	
Toxicodendron radicans	**eastern poison ivy**	
Tradescantia virginiana	Virginia spiderwort	
Triadenum virginicum	Virginia marsh St. Johnswort	
Trichostema setaceum	narrowleaf bluecurls	WP(NH)
Tridens flavus var. flavus	**purpletop tridens**	
Trientalis borealis	starflower	
Trifolium aureum	golden clover	NEX
Trifolium pratense	**red clover**	**NEX**
Trifolium repens	**white clover**	**NEX**
Trillium cernuum	whip-poor-will flower	WP(S)
Triodanis perfoliata var. perfoliata	clasping Venus' looking-glass	WP(S)
Triodanis perfoliata	clasping Venus' looking-glass	
Triplasis purpurea	purple sandgrass	
Tripsacum dactyloides	eastern gamagrass	
Tsuga canadensis	eastern hemlock	WP(S)
Typha angustifolia	narrowleaf cattail	
Typha latifolia	**broadleaf cattail**	
Ulmus americana	**American elm**	
Ulmus rubra	slippery elm	
Urtica dioica ssp. gracilis	California nettle	
Urtica dioica	**stinging nettle**	**NUS**
Utricularia gibba	humped/two-flower bladderwort	S(NH), SE
Utricularia inflata	swollen bladderwort	
Utricularia macrorhiza	common bladderwort	
Utricularia purpurea	eastern purple bladderwort	S(NH)
Utricularia radiata	little floating bladderwort	
Uvularia perfoliata	perfoliate bellwort	
Uvularia sessilifolia	sessileleaf bellwort	WP(S)
Vaccinium angustifolium	lowbush blueberry	

Scientific Name	Common Name(s)	Notes
Vaccinium corymbosum	**highbush blueberry**	
Vaccinium fuscatum	black highbush blueberry	
Vaccinium pallidum	**Blue Ridge blueberry**	
Veratrum viride	green false hellebore	
Verbena hastata	swamp verbena	
Vernonia glauca	broadleaf ironweed	WP(NH), SE
Vernonia noveboracensis	New York ironweed	
Veronica agrestis	green field speedwell	
Veronica americana	American speedwell	
Veronica hederifolia	ivyleaf speedwell	NEX
Veronica officinalis	common gypsyweed	
Veronica persica	birdeye speedwell	
Viburnum acerifolium	mapleleaf viburnum	WP(S)
Viburnum dentatum	**southern arrowwood**	**WP(S)**
Viburnum nudum var. cassinoides	withe-rod	WP(S)
Viburnum prunifolium	**blackhaw**	
Vicia americana	**American vetch**	
Vicia tetrasperma	lentil vetch	
Vicia villosa ssp. varia	winter vetch	
Vicia villosa	winter vetch	
Viola affinis	sand violet	
Viola arvensis	European field pansy	
Viola bicolor	field pansy	
Viola brittoniana	northern coastal violet	
Viola conspersa	American dog violet	
Viola cucullata	marsh blue violet	
Viola hirsutula	southern woodland violet	
Viola lanceolata	bog white violet	
Viola palmata	early blue violet	
Viola pedata	birdfoot violet	
Viola Hprimulifolia		WP(S)
Viola pubescens var. pubescens	downy yellow violet	
Viola pubescens	downy yellow violet	
Viola sagittata var. sagittata	arrowleaf violet	
Viola sagittata	arrowleaf violet	WP(S)
Viola sororia	**common/northern blue violet**	**SE**
Vitis aestivalis	summer grape	WP(S)
Vitis labrusca	**fox grape**	
Vitis riparia	riverbank grape	
Vitis vulpina	frost grape	
Vulpia octoflora	sixweeks fescue	
Vulpia sciurea	squirreltail fescue, Squirreltail six-weeks grass	WP(NH), SE
Wisteria floribunda	**Japanese wisteria**	**NEX**
Wisteria sinensis	**Chinese wisteria**	**NEX**
Wolffia brasiliensis	Brazilian watermeal	
Wolffia columbiana	Columbian watermeal	
Wolffiella gladiata	Florida mudmidget, sworb bogmat	S(NH), SE
Woodwardia areolata	netted chainfern	WP(M)
Woodwardia virginica	**Virginia chainfern**	**WP(M)**
Xanthium strumarium var. canadense	**Canada cockleburr**	
Yucca filamentosa	Adam's needle	
Zizania aquatica	**annual wildrice**	

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revised 06/2005

APPENDIX F: State Endangered and Threatened Species

Birds			
Endangered		**Threatened**	
American Bittern	*Botaurus lentiginosos*	Bobolink	*Dolichonyx oryzivorus* BR
Eagle, bald	*Haliaeetus leucocephalus* BR **	Bald Eagle	*Haliaeetus leucocephalus* NB **
Falcon, peregrine	*Falco peregrinus*	Cooper's Hawk	*Accipiter cooperii*
Goshawk, northern	*Accipiter gentilis* BR	Red-shouldered Hawk	*Buteo lineatus* NB
Grebe, pied-billed	*Podilymbus podiceps**	Black-crowned night-heron	*Nycticorax nycticorax* BR
Harrier, northern	*Circus cyaneus* BR	Yellow-crowned night-heron	*Nyctanassa violaceus*
Hawk, red-shouldered	*Buteo lineatus* BR	Red knot	*Calidris canutus* BR
Owl, short-eared	*Asio flammeus* BR	Osprey	*Pandion haliaetus* BR
Plover, piping	*Charadrius melodus***	Barred owl	*Strix varia*
Sandpiper, upland	*Batramia longicauda*	Long-eared owl	*Asio otus*
Shrike, loggerhead	*Lanius ludovicianus*	Black rail	*Laterallus jamaicensis*
Skimmer, black	*Rynchops niger* BR	Black skimmer	*Rynchops niger* NB
Sparrow, Henslow's	*Ammodramus henslowii*	Grasshopper sparrow	*Ammodramus savannarum* BR
Sparrow, vesper	*Pooecetes gramineus* BR	Savannah sparrow	*Passerculus sandwichensis* BR
Tern, least	*Sterna antillarum*	Vesper sparrow	*Pooecetes gramineus* NB
Tern, roseate	*Sterna dougallii***	Red-headed woodpecker	*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 muhlengergii***		
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		Fish	
Endangered		Endangered	
Bat, Indiana	*Myotis sodalis***	Sturgeon, shortnose	*Acipenser brevirostrum***
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*		

**** Also on the federal Endangered and Threatened list**

APPENDIX G: Rare Plant and Animal Species and Natural Communities Presently Recorded in the NJ Natural Heritage Database for Woodstown Borough & Pilesgrove Township

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

Scientific name	Common Name	Federal Status*	NJ Status*	State Rank**
Ecosystems				
Bald eagle foraging area		LT	E	S1, S2
Bald eagle nest buffer		LT	E	S1, S2
Vascular Plants				
Agastache nepetoides	Yellow giant-hyssop			S2
Alopecurus Aequalis var Aequalis	Short-awn meadow-foxtail			S2
Amianthium muscitoxicum	Fly poison		E	S2
Asclepias variegate	White milkweed			S2
Carex utriculata	Bottle-shaped sedge			S2
Euphorbia purpurea	Darlington's glade spurge		E	S1
Nelumbo lutea	American lotus		E	S1
Phaseoulus polystachios var polystachios	Wild-kidney bean			S2
Phlox maculata var maculata	Spotted phlox			S3
Polemonium reptans	Greek-Valerian		E	S1
Polygonum setaceum var setaceum	Bristly smartweed			S2
Rotala ramosior	Toothcup			S3
Sisyrinchium fuscatum	Sand-plan blue-eyed grass			S2
Trichostema setaceum	Narrow-leaf bluecurls			S2
Vernonica glauca	Broad-leaf ironweed		E	S1
Vulpia elliotea	Squirrel-tail six-weeks grass		E	S1
Vertebrates				
Dolichonyx oryzivorus	Bobolink		T/T	S2
Clemmys muhlenbergii	Bog turtle	LT	E	S2
Terrapene carolina	Eastern box turtle			S5
Ammodramus savannarum	Grasshopper sparrow		T/S	S2
Ardea herodias	Great blue heron		S	S2, S4
Passerculus sandwichensis	Savannah sparrow		T/T	S2, S4
Bartramia longicauda	Upland sandpiper		E	S1
Pooecetes gramineus	Vesper sparrow		E	S1, S2

*** Key to Federal and State Status Codes**

T	Threatened species – may become endangered if conditions surrounding the species begin to or continue to deteriorate.
E	Endangered species – one whose prospects for survival within the state are in immediate danger due to one or many factors.
S	Stable species
LT	Taxa formerly listed as threatened

**** Key to State Element Rank**

S1	Critically imperiled in NJ because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres).
S2	Imperiled in NJ because of rarity (6 to 20 occurrences).
S3	Rare in state with 21 to 50 occurrences. Includes elements which are widely distributed but with small populations/acreage, or with restricted distribution but locally abundant.
S4	Apparently secure in state, with many occurrences.
S5	Demonstrably secure in state and essentially ineradicable under present conditions.

APPENDIX H: Woodstown & Pilesgrove's Historical and Cemeteries Inventory

Historical Site or Cemetery	Location
Woodstown Borough	
David Bassett House (1755)	298 Bailey Street
Isaiah Clawson House (1850)	74 North Main Street
Samuel Dickeson House (1749)	42 North Main Street
Harris House	222 North Main Street
Isaiah Shinn House (1742)	68 North Main Street
Jachonias Wood House (1792)	110 South Main Street
Jeremiah Wood House (1735)	45 Lotus Avenue
Asbury Methodist Church Cemetery	149 South Main Street
First Baptist Church Cemetery	25 Church Street
Lawnside Cemetery	West Avenue and Route 45
Methodist Church of Woodstown Cemetery	322 South Main Street
Society of Friends Cemetery	63 West Avenue
Spencer UAME Church Cemetery	314 Bailey Street
Woodstown Presbyterian Church Cemetery	36 Church Street
Pilesgrove Township	
Samuel Bassett House (1757) [possible Underground Railroad stop]	29 Fox Road
Champneys-Reed (1746)	100 Old Salem Road
Zaccheus Dunn House	67 East Lake Road
Hill-Austin House	146 Old Salem Road
Morgan's Folly (1804)	20 Layton Road
Seven Stars Tavern	Old Kings Highway/Auburn Road
Daughters Conference of Cedar Grove Cemetery (at Mount Salem AUMP Church)	50 Cedar Lane
Major Christian Piercy's Gravesite	556 Eldridge's Hill Road
Morning Star Baptist Church Cemetery	Swedesboro Road
Mount Laurel AME Church Cemetery	31 Avis Mill Road
Pilesgrove Methodist Episcopal Meeting Cemetery	Jill Road
Salem County Veterans' Cemetery	Route 45 and Cemetery Road
Sharptown United Methodist Cemetery	22 Church Street

APPENDIX I: Known Contaminated Sites & Underground Storage Tanks (2001)

Table: Known Contaminated Sites in Woodstown & Pilesgrove

Site ID	Name	Address	Town	Status	Lead Agency	Remedial Level
NJC876017708	Coastal Service Station	Route 40 & East Lake Road	Woodstown	Active	BUST	C2
NJD986596096	Shell Service Station	Route 40	Woodstown	Active	BUST	C2
NJD986604783	Mobil Service Station	East Avenue and N. Main Street	Woodstown	Active	BFO-S	C2
NJL800507717	Woodstown Center	East Avenue	Woodstown	Active	BUST	C2
NJL800588865	Residence	East Avenue	Woodstown	Active	BFO-S	C1
NJD002335958	Richman Ice Cream Company	Route 40 & Kings Highway	Pilesgrove	Active	BFO-S	C1
NJD011881174	CR Warner INC	East Lakes and Daretown Roads	Pilesgrove	Active	BFO-S	C1
NJL000043968	Woodstown-Pilesgrove Sanitary Landfill	Robbins Road	Pilesgrove	Pending	BFO-CA	C3
NJL600053359	Hess Service Station	Routes 40 & 45	Pilesgrove	Active	BUST	C2
NJL600200364	Salem County Road Deparment	Cemetery Road	Pilesgrove	Active	BUST	C2
NJL800428880	Woodstown Station	Harding Way	Pilesgrove	Active	BFO-S	C1

Source: NJDEP, 2001

***** See next page for explanations of Status, Lead Agencies, and Remedial Level

Table: Underground Storage Tanks in Woodstown & Pilesgrove

BUST Case ID	Tank Number	Name	Address	Town	Lead Agency	Status	Remedial Level
	6932	New Jersey Department of Military and Veteran Affairs	North Main Street	Woodstown	BFO-IN	AA	
	6932	Woodstown National Guard Armory	North Main Street	Woodstown	BFO-IN	AA	
90-01-03-1307	11792	Coastal Mart #7224**	East Lake Road & Route 40	Woodstown	BUST	ATP	C2
92-08-12-1116	62075	Mobil Service Station #15-EB2**	North Main & East Street	Woodstown	BUST	NFA-A	C1
91-02-15-1319	66170	Woodstown Central Office (New Jersey Bell)	South Main Street	Woodstown	BUST	NFA-A	
93-09-02-0902	76359	Shell Service Station**	Route 40/45 & Green Street	Woodstown	BUST	NFA-A	
88-10-20-0914	76359	Shell Service Station**	Route 40/45 & Green Street	Woodstown	BUST	ATP	C2
90-10-23-1246	84170	Amerada Hess	Route 40 & Route 45	Woodstown	BUST	ATP	C2
	90871	Private Property	North Main Street	Woodstown	BFO-IN	AA	
	94601	Woodstown-Pilesgrove Board of Education	East Avenue	Woodstown	BFO-IN	NFA-A	B
92-09-25-0921	120098	Salem County Vocational School	Route 45 (Woodstown-Salem Road)	Woodstown	BUST	NFA-A	C1
	120098	Salem County Vocational School	Route 45 (Woodstown-Salem Road)	Woodstown	BFO-IN	NFA-A	B
	127669	Peterson Building	North Main Street	Woodstown	BFO-IN	ATP	
	163190	Lawnside Cemetery Association	West Ave.	Woodstown	BFO-IN	AA	

BUST Case ID	Tank Number	Name	Address	Town	Lead Agency	Status	Remedial Level
	218405	S-J Transportation Co.	Route 40	Woodstown	BFO-IN	NFA-A	B
99-07-29-1522-02	No registration	Woodstown Center**	East Avenue	Woodstown	BUST	ATP	C2
99-06-14-1423-04	61120	Salem County Road Department**	Route 45 & Cemetery Lane	Pilesgrove	BUST	ATP	C2
92-02-21-0822	61120	Salem County Road Department	Route 45 & Cemetery Lane	Pilesgrove	BUST	NFA-A	C1
00-03-09-1111-30	109154	CR Warner Inc, Woodstown garage**	East Millbrook Avenue	Pilesgrove	BFO-IN	NFA-A	B
01-01-03-1343-03	140528	Coastal Mart	Route 40	Pilesgrove	BUST	ATP	C2
99-10-14-1500-00	165846	Woodstown State Police**	Route 40 (Harding Highway)	Pilesgrove	BFO-IN	AA	
	237107	Corbyl Construction	PO Box 209, Woodstown	Pilesgrove	BFO-IN	NFA-A	B

Source: NJDEP, 2002

** Site also appears on Known Contaminated Site List (2001)

Code	Status
Active	This site is under the management of a Lead Agency
Pending	This site is awaiting assessment by a Lead Agency
NFA–A	No further action for a partial area of a site
ATP	The site is assigned to a case management program listed under "Lead Agency"
AA	This site is awaiting case management assignment

Code	Lead Agencies
BFO	Bureau of Field Operations
BFO-CA	Bur. of Field Operations – Case Assignment Section
BFO-IN	Bur. of Field Operations – Initial Notice Section
BFO-S	Bur. of Field Operations – Southern
BUST	Bur. of Underground Storage Tanks

Explanation of Remedial Levels

Remedial Level	Explanation of Site Complexity
B	A single-phase remedial action in emergency response; simple removal activities of contaminants; usually no impact to soil or groundwater.
C1	A remedial action with simple sites; one or two contaminants localized to soil and the immediate spill or discharge area.
C2	A remedial action with more complicated contaminant discharges; multiple site spills and discharges; more than one contaminant, with both soil and groundwater impacted or threatened.
C3	A multiphase remedial action with high complexity and threatening sites. Multiple contaminants some at high concentrations with unknown sources continuing to impact soils, groundwater, and possibly surface waters and potable water resources. Dangerous for direct contact with contaminated soils.
D	Same conditions as C3 except that D levels are also usually designated federal "Superfund Sites."
NA	Not assessed

DELAWARE VALLEY REGIONAL PLANNING COMMISSION

Publication Abstract

Title: ***Environmental Resource Inventory for Woodstown Borough and Pilesgrove Township, Salem County, New Jersey***

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Geographic Area Covered: Woodstown Borough and Pilesgrove Township, Salem County, New Jersey

Key Words: Environment, environmental resource inventory, environmental commission, conservation, master planning, natural resources, Salem County, Woodstown, Pilesgrove Township.

ABSTRACT

This publication documents the natural and community resources of Woodstown Borough and Pilesgrove Township, Salem County, New Jersey. The natural resource information includes descriptions, tables and maps of land use; soils; steep slopes; drinking water aquifers and wells; surface waters including watersheds, streams, lakes, wetlands, and floodplains; impacts on water resources; vegetation including forests and grasslands; animal communities; threatened and endangered species; Heritage Priority Sites; and known contaminated sites. Community resources that are briefly described include population, transportation, township utilities and services, and protected open space. A short history of the communities is also included.

For More Information Contact:

Delaware Valley Regional Planning Commission
190 North Independence West
Philadelphia, PA 19106-1520
Phone: 215-592-1800
Fax: 215-592-9125
Internet: www.dvrpc.org

Staff Contacts:	**Direct Phone:**	**Email**
Patty Elkis, PP, AICP, Project Planner & Manager	215-238-2838	pelkis@dvrpc.org
Suzanne McCarthy, Project Planner	215-238-2934	smccarthy@dvrpc.org
Alison Hastings, Project Planner	215-238-2929	ahastings@dvrpc.org
Kim Korejko, GIS Analyst	215-238-2932	kkorejko@dvrpc.org

for the BOROUGH of

WOODSTOWN

SALEM COUNTY, NEW JERSEY

&

for the TOWNSHIP of

PILESGROVE

SALEM COUNTY, NEW JERSEY

Delaware Valley
Regional Planning
Commission

190 N. Independence Mall West
8th Floor
Philadelphia, PA 19106-1520
215.592.1800
www.dvrpc.org