

# ENVIRONMENTAL RESOURCE INVENTORY

# ERI

OCTOBER 2018

For the Township of:

## WEST DEPTFORD

Gloucester County, New Jersey



by:



with:

**ENVIRONMENTAL  
COMMISSION of  
WEST DEPTFORD  
TOWNSHIP**



**The Delaware Valley Regional Planning Commission** is the federally designated Metropolitan Planning Organization for a diverse nine-county region in two states: Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer in New Jersey.



**DVRPC's vision** for the Greater Philadelphia Region is a prosperous, innovative, equitable, resilient, and sustainable region that increases mobility choices by investing in a safe and modern transportation system; that protects and preserves our natural resources while creating healthy communities; and that fosters greater opportunities for all.

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The Environmental Planning Work Program assists local governments in completing plans and studies that balance the natural resources of communities in our region with transportation and development needs. The program identifies and addresses such local environmental issues as land use, water quality and quantity, flooding, wildlife habitat, natural vegetation, open space, and recreation.

The following members of the West Deptford Environmental Commission and the West Deptford Township Committee were instrumental in the development of this ERI:

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## Executive Summary

An Environmental Resource Inventory (ERI) identifies and describes the natural resources of a community—its soil, water, air, plants, and animals—which are fundamental to its character. The protection and wise use of those resources is essential to the health, safety, and welfare of current and future residents. The ERI provides a basis for municipal actions to preserve and use those resources, although it does not include recommendations to those ends. It is, instead, a compendium of existing information about a community's natural resources, presented in a form that is useful to a broad audience.

The ERI is an important tool for environmental commissions, open space committees, planning boards, and zoning boards of adjustment, enabling these groups to identify and prioritize environmental challenges and opportunities. When adopted into the master plan, the ERI can support the development of resource protection ordinances and resource-based land use planning.

Each ERI reflects a particular moment in time. West Deptford Township's last ERI was published in 1979 by Alex J. Bergin Associates, and while some of the township's natural resource base has remained consistent since that time, much has changed.

Bordered and intersected by a multitude of waterways, West Deptford Township has developed among a variety of landscapes and natural resources, including open water along the Delaware River, tidal creeks, tidal and nontidal wetlands, and farther upland, fields and deciduous and coniferous forests. Located in the Inner Coastal Plain, the township contains expanses of flat land with high-quality soils that are ideal for agriculture. Oriented across the Delaware River from Philadelphia, it has thrived as an inner suburb that also contains industrial and commercial facilities. Like many municipalities along the industrial Delaware River, the township has faced environmental challenges, including water quality impairments, flooding, and site contamination.

For at least four decades, West Deptford has integrated goals for preserving its natural resources into its master plans. Since 1977, the township's master plans have included goals to provide open space that is accessible to schoolchildren and residents, and to protect such features as stream valleys, slopes, and woods for aesthetic, recreational, water quality, and other purposes. Since 1994, the township has also included a goal in its Land Use Plan Element to “furnish for all age levels an adequate supply of recreational facilities and open space” and “safeguard the environment through local controls and monitoring in addition to requirements of other agencies.”

Several documents were used to prepare this ERI, including West Deptford's 1979 Natural Resources Inventory and its Master Plans and Master Plan Reexaminations dating back to 1977, as well as other reference works. All resources are listed in the **References** section at the end of this report (page 151). The maps and geographic data in this report are primarily derived from the New Jersey Department of Environmental Protection's (NJDEP's) Geographic Information System mapping and from the Landscape Project produced by the Endangered and Nongame Species Program of the New Jersey Division of Fish and Wildlife. This information is available on the NJDEP website, which provides access to data that may be updated in the future.



## West Deptford Overview

West Deptford Township is located along the Delaware River (Figure 1) in Gloucester County, New Jersey. Encompassing 15.9 square miles of land area (10,176 acres) and 1.9 square miles of water area (1,190 acres), it is a large municipality relative to many of its neighbors, which include (from east to west) Westville Borough, Deptford Township, Woodbury City, National Park Borough, Woodbury Heights Borough, Mantua Township, East Greenwich Township, and Paulsboro Borough (Figure 2: Basemap). West Deptford is also located across the Delaware River from Tinicum Township in Delaware County, Pennsylvania, and the City of Philadelphia, with which it has had close historical ties.

**Figure 1:** Delaware River from the Wheelabrator Site



Source: Michael Hogan, [www.hoganphoto.com](http://www.hoganphoto.com)

The 2010 U.S. Census recorded 21,677 residents in West Deptford Township. Since then, the township has seen a slight decline in population, with approximately 21,493 residents estimated in 2015 (2015 Five-Year American Community Survey). The median household income is \$66,964 (2015 Five-Year American Community Survey), and the poverty rate is 5.8 percent (2015 Five-Year American Community Survey).

Because West Deptford Township is located in a major industrial corridor along the Delaware River, it is well connected to the north and south by roads and highways. I-295 and NJ-44 bisect the township, the New Jersey Turnpike runs through its southwest corner, and NJ-45 forms part of its eastern border.

While no passenger rail lines run through Gloucester County, New Jersey Transit buses 401, 402, and 410 connect West Deptford Township to Philadelphia, and there is local service on the 455 route between Cherry Hill Township and Paulsboro Borough. The proposed Glassboro-Camden Line will address the county's current absence of passenger rail. In addition, the trail component of the project, which is known as the Gloucester County Light Rail with Trail, will connect cyclists and pedestrians in West Deptford Township to

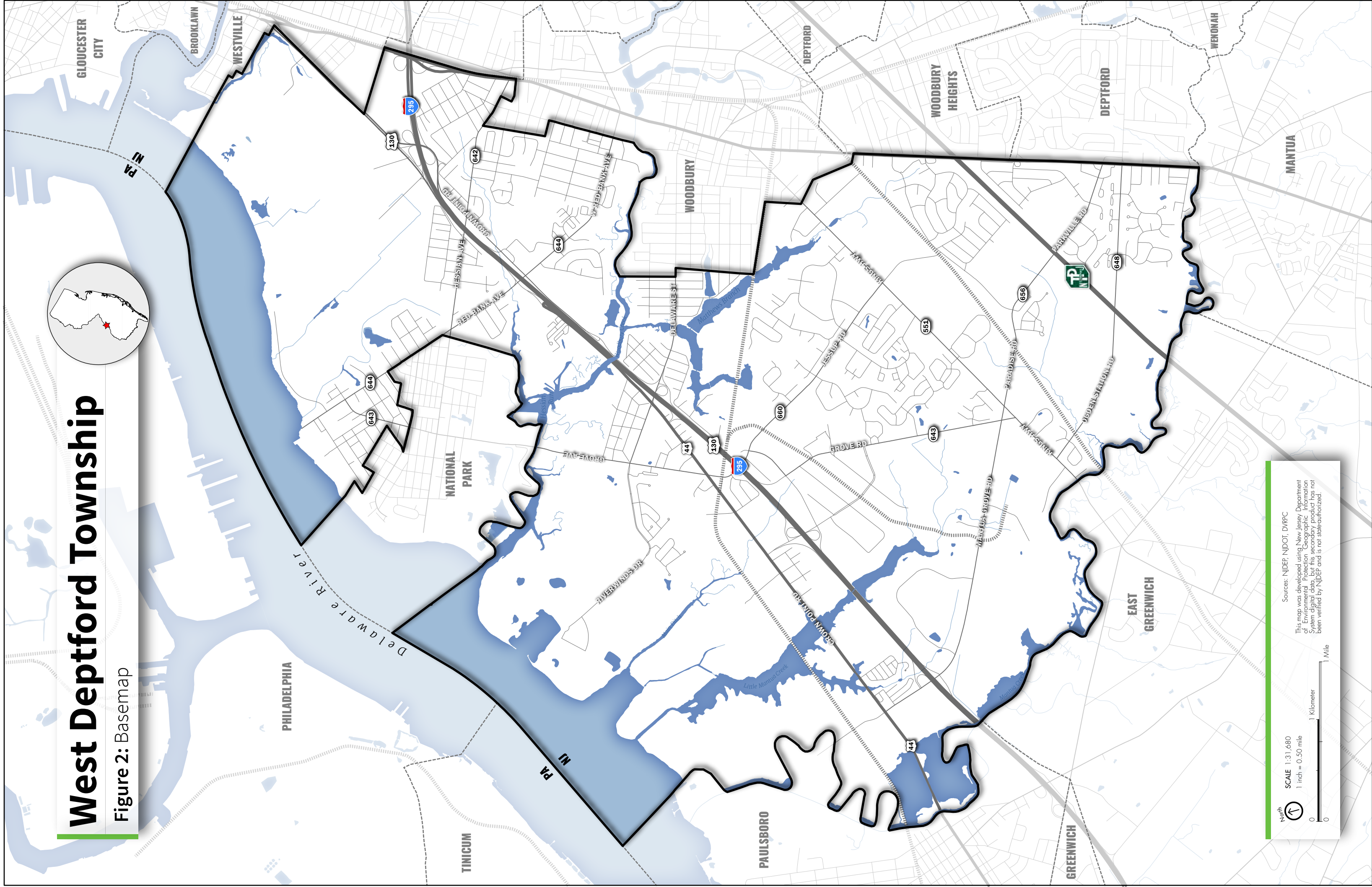
the region's Circuit Trail network, a system of trails in Greater Philadelphia that will be 800 miles in total when fully constructed.

Because it is located at the lower, downstream end of the Delaware River estuary, and thus at the "bottom end" of several watersheds, West Deptford Township contains many waterways, including Woodbury Creek, Hessian Run, Matthews Branch, Little Mantua Creek, Mantua Creek, and a variety of tributaries. All of these waterways run through West Deptford Township on their way to the Delaware River.



# West Deptford Township

Figure 2: Basemap



North

SCALE 1:31,680  
1 inch = 0.50 mile  
0 1 Kilometer 1 Mile

Sources: NJDEP, NJDOT, DVRPC

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





# Brief Township History

*Compiled by Ed Komczyk and Miriam Reichenbach, West Deptford Environmental Commission*

## Early History

For millennia prior to European settlement, various peoples occupied the land that would become West Deptford Township. By the 1600s, the time of European arrival, the residents of this area were Lenni Lenape. European settlers referred to this group as the "Delaware." The Lenni Lenape inhabited much of southern New Jersey and their settlements were usually located along stream banks. They farmed, maintained orchards, fished, and hunted. The Lenni Lenape valued the area for its abundance of fish and game, and used the region's creeks extensively for transportation.

During the beginning of European settlement, West Deptford Township remained rural, heavily forested, and sparsely populated. The first accounts of Europeans in West Deptford's environs are found in historical accounts as early as 1614. At this time, the Swedes and the Dutch began to explore the region, the Dutch establishing trade with the Lenni Lenape as the Dutch West India Company. The Dutch were not interested in establishing permanent settlements, but they built forts to protect their business interests.

Permanent settlements came years later and were minor until the English took over the territory known as West Jersey, which was roughly the western side of the state. Early pioneers navigated the stream that is now called Woodbury Creek,

looking for plots of land that were not already occupied.

Although they feared encounters with the Mantas tribe (a Lenni Lenape tribe), their desire to find a home outweighed their fears. The small territory that these pioneers first established was known as the Wilkins property, and it fell within the borders of the current West Deptford Township. Some of the names of these early pioneer families, such as Wilkins, Bender, Budd, Rambo, Lodge, Leonard, Platt, and Low, can still be found in the township today.

Prior to the start of the Revolutionary War, these early pioneers struggled merely to find shelter and provisions. Despite these hardships, they grew their small plots of land into farms. Farm life took a

**Figure 3:** Candor Hall/Ladd's Castle, Constructed ca. 1688 by John Ladd (Lafayette Avenue)



Source: Google Maps, October 2013

lower priority, however, when the Revolutionary War came to the area. While the British occupied Philadelphia, the Continental Army's entire defense of the Delaware River depended on the success of Fort Mercer. On October 22, 1777, Count Von Donop and Hessian troops attacked Fort Mercer by land while the British fleet attempted to destroy the fort from the Delaware River. The battle lasted less than an hour with the Hessians retreating, leaving the wounded behind. Their leader, Count Von Donop, was carried to the Whitall house and rowed across Woodbury Creek to the Low house on Jobstown Road, where he died three days later.

## The Birth and Development of a Township in New Jersey

As the Revolutionary War ended, soldiers returned to their family farms, unaware of the changes that were about to take place in their region. The township continued to develop after the war, and by the 1840s, railroads were transforming the nation. The first railroads in West Deptford's environs were built between the cities of Camden and Woodbury, and extended to Kings Highway and ran the length of West Deptford Township. The Swedesboro Railroad, which travels from Woodbury City to Swedesboro Borough, was built in 1869 and had two stations within West Deptford's borders: Parkville Station and Odgen Station.

As railroads brought more people to the area, it was decided that a large area of Deptford Township should be dissolved, and West Deptford Township was born. The territory composed within the boundaries of what is now West Deptford was created by an act of the New Jersey State Legislature, which was approved on March 1, 1871. Three weeks later, on March 21, 1871, the town clerk and three committeemen met at Thorofare No. 3 School to lay the foundations for governing the new township.

In 1874, the Delaware River Railroad laid rails and constructed stations in Thoroughfare, Leonard's Farm, and Paradise. Local farmers were then able to export their goods to other areas of the region. By 1893, another new technology began to leave its mark on West Deptford's landscape. The Thomas-Houston Electric Company began to crisscross the area with its trolley lines. Lines ran through what is currently the Sunoco Refinery, across Crown Point Road, and continued to Colonial Avenue in Colonial Manor. Many of the trolley lines became obsolete during the 1940s when Public Service Transportation replaced trolleys with buses. Most of the tracks from the old trolley lines can no longer be found, as the steel was deemed too valuable and was removed during World War II to help with the war effort.

## Changes in Township Boundaries

In the late 19th and early 20th centuries, West Deptford's boundaries changed as new municipalities formed. When the New Jersey State Legislature organized West Deptford into a township in 1871, it assigned the township a northern border of Big Timber Creek, a southern border of Mantua Creek, and additional borders along the Delaware River and the city of Woodbury. On February 20, 1878, an additional act of the State Legislature changed the eastern boundary line of the township. As a result, the line of the West Jersey Railroad became the township line from Big Timber Creek to the junction of that railroad with the Gloucester and Woodbury Turnpike at North Woodbury. The whole of the village of Westville was therefore incorporated into Deptford Township.

On April 15, 1902, by an act of the New Jersey State Legislature, the Borough of National Park was cut out of the middle-northern portion of West Deptford Township. On April 7, 1914, the Newbold section of the township was incorporated into the Borough of Westville when that municipality was formed by an act of the State Governing Body in 1914.

Another change took place within the last 50 years when the boundary of the township with the Borough of Paulsboro shifted. West Deptford and Paulsboro mutually agreed to this change, which enabled the straightening of the Mantua Creek between the township and the borough.

### Neighborhood Formation in the Twentieth Century

By the early 1900s, the Industrial Revolution was underway and changed West Deptford's farming community, one small neighborhood at a time. Verga and Colonial Manor, distinct neighborhoods within the northern section of the township, attracted families who came to build homes, open small family businesses, and travel to and from work via new trolley lines that were constructed in the 1890s and 1900s.

By the 1950s, Greenfields and Greenfields Village, located in the southern end of the township, continued the established farming tradition; however, at the same time, it attracted families who were looking to build homes and raise families in a newly established suburbia. Before the Village of Greenfields was constructed in 1952, the Griscom Farm of Greenfields had been in the Griscom family for eight generations (Figure 4). Formerly, as recorded in 1730, it was the Cooper family-owned plantation. Betsy Ross (Griscom) often visited this farm with her uncle.

Prior to the development of the village, the ground surrounding this farmland was also used as an airport, referred to as "Woodbury Airport."

Soon after the Village of Greenfields was constructed, Interstate Route 295 was built through West Deptford. This limited access highway improved connections between the township and the region in the 1960s, further hastening industrial growth in West Deptford in that decade and subsequent decades. The Mid-Atlantic Industrial Park (now called the MidAtlantic Corporate Center) and the Forest Park Corporate Center are two industrial parks in the township that were constructed in the 1970s and 1980s. West Deptford's residential population also grew during this time, more than doubling in size from 5,446 residents to 11,152 residents between 1950 and 1960, and steadily increasing by 25 percent by 1970 and 29 percent by 1980. New developments of single-family homes enabled this growth; Sherwood on the Green (1967-68) and Sherwood West (1971) offered wooded lots close to both downtown Woodbury and Route 295.

During the 1970s and 1980s, the township's leaders also developed new and updated amenities for residents, particularly in the township's central Thorofare section (often spelled "Thoroughfare" in the early accounts of the area). Thorofare was named because it was exactly that, a thoroughfare between Woodbury and Paulsboro. Now, it is the heart of the township, and the home of the township government, library, community center, and recreational parks. The West Deptford Municipal Building, which also houses the police

**Figure 4:** Greenfields Farm (1910)



Source: Gloucester County Historical Society



department, was constructed in this neighborhood in 1971. The West Deptford Free Public Library building was constructed in the early 1980s.

The late 1980s and 1990s were marked by slower population growth and the addition of an important environmental resource in the township: the Wheelabrator trash-to-steam plant, which began operations in 1989. In addition to providing sufficient energy for 12,000 homes, Wheelabrator created a wildlife refuge with a walking trail and works with local middle school children to undertake environmental projects that benefit the community.

The **Important Structures** section (page 120) contains more detailed information on key structures in West Deptford that represent how the township has developed over the past two centuries. The RiverWinds complex, a 789-acre mixed-use project that is being constructed in phases as of the publication of this ERI, is the most recent major project in West Deptford. It represents the newest chapter in West Deptford's growth over approximately 150 years from a landscape of predominantly farmland to one dominated by residential, industrial, and commercial land uses. As the remainder of the report will describe, West Deptford's environmental features reflect these major changes to the township.

## Land Use and Land Cover

Land cover is a description of the landscape on the earth's surface, such as pavement, forest, or grasslands. Land use is a description of society's use of the land, such as commercial or residential. NJDEP analyzes the land use and land cover of the state based on aerial photography. The Delaware Valley Regional Planning Commission (DVRPC) has made aerial maps of its nine-county region as recently as 2015; Figure 5: Aerial Imagery (2015) is an aerial map of West Deptford. However, the most recent land use/land cover analysis is based on aerials from 2012 (Figure 6: Land Use/Land Cover [2012]).

NJDEP lists 55 distinct land uses for West Deptford. Many are intuitive to most readers, but some may be unfamiliar and require definition (see the text box to the right). As an established suburban community, West Deptford Township contains varied land use and land cover characteristics. The township is

### Selected Land Use Definitions

Altered Lands: Nonurban areas that have been changed due to human activities.

Transitional Areas: Areas where site preparation for development has begun, but the future land use has not been realized.

Undifferentiated Barren Lands: Cleared lands that have no apparent site preparation or any indication of past activities.

Old Field: Distinguished from fallow farmland by the amount of brush cover; in old field land cover, the amount of brush cover requires extensive brush removal before plowing.

Upland Rights-of-Way, Developed: Upland (not wetland) utilities rights-of-way in developed nonurban areas.

These areas may not support the typical natural vegetation found in adjacent unaltered natural areas.

Upland Rights-of-Way, Undeveloped: Upland (not wetland) utilities rights-of-way that exist in undeveloped nonurban areas. These areas may not support the typical natural vegetation found in adjacent unaltered natural areas.

Mixed Transportation Corridor Overlap Areas: Places where railroads and roads intersect, including at-grade crossings, as well as railroad and road bridges.

Disturbed Wetlands (Modified): Former natural wetlands that have been altered by human activity but which still exhibit signs of soil saturation. Because of the alterations, these areas do not generally support typical wetland vegetation and may be unvegetated.

predominantly urbanized, with urban area comprising just under 50 percent of the total land use/land cover. Residential land, particularly single-unit homes of medium density, makes up the majority of the urbanized space, at 22 percent of West Deptford's total land use/land cover. Industrial properties are another common feature in West Deptford and make up about 10 percent of the township's land use/land cover. Four percent of the township's land use/land cover is devoted to parks and school athletic fields, and almost 3 percent is commercial.

Undeveloped lands, including forests and wetlands, make up just under 30 percent of West Deptford's land (about 16 percent and 14 percent, respectively). Much of West Deptford's forest land is located along the Delaware River, with another larger cluster located adjacent or close to the New Jersey Turnpike in the southern corner of the township. Deciduous habitat, including trees, brush, and shrubs, occurs more frequently than coniferous habitat, at about 10 percent of total land use/land cover.

Deciduous plant species are common in West Deptford's non-tidal wetlands; deciduous scrub/shrub wetlands and wooded wetlands together make up about 7 percent of the township's land use/land cover. Freshwater tidal marshes, the second-most common wetland type, make up about 2 percent of total land use/cover.

Open water is a common feature in the township, as part of the Delaware River is included in its municipal boundaries. The majority of water in the township is tidal river and stream water, and it makes up more than 15 percent of West Deptford's land use/land cover.

Although West Deptford Township has lost much of its agricultural land over the past century, the township is working to hold onto its remaining farms. At present, about 5 percent of West Deptford's land is devoted to agricultural uses, predominantly cropland and pastureland.

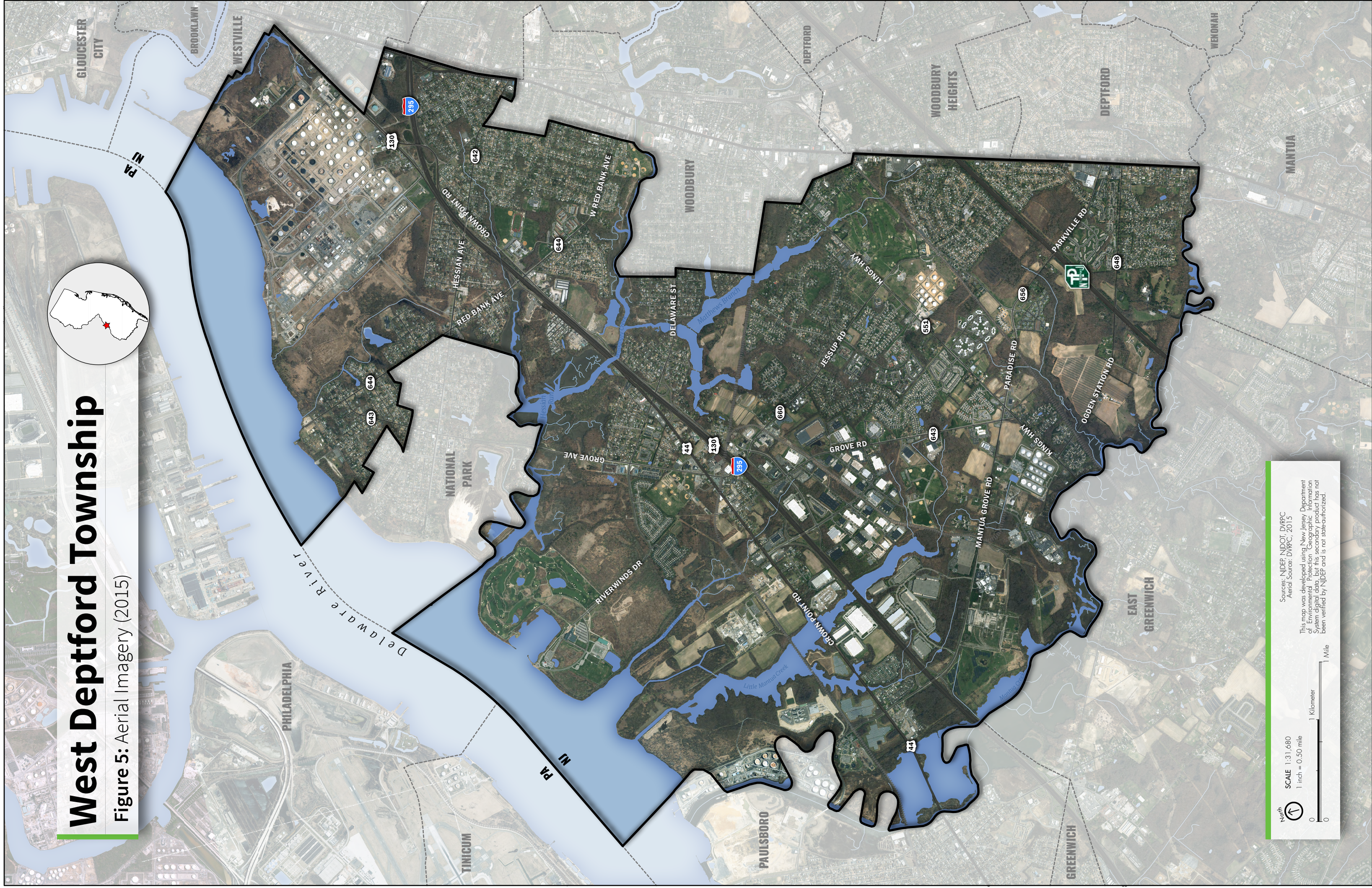
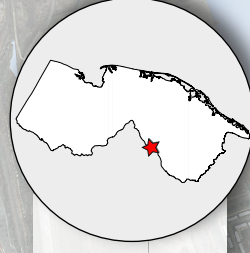






# West Deptford Township

Figure 5: Aerial Imagery (2015)



SCALE 1:31,680  
1 inch = 0.50 mile

1 Kilometer

0 1 Mile

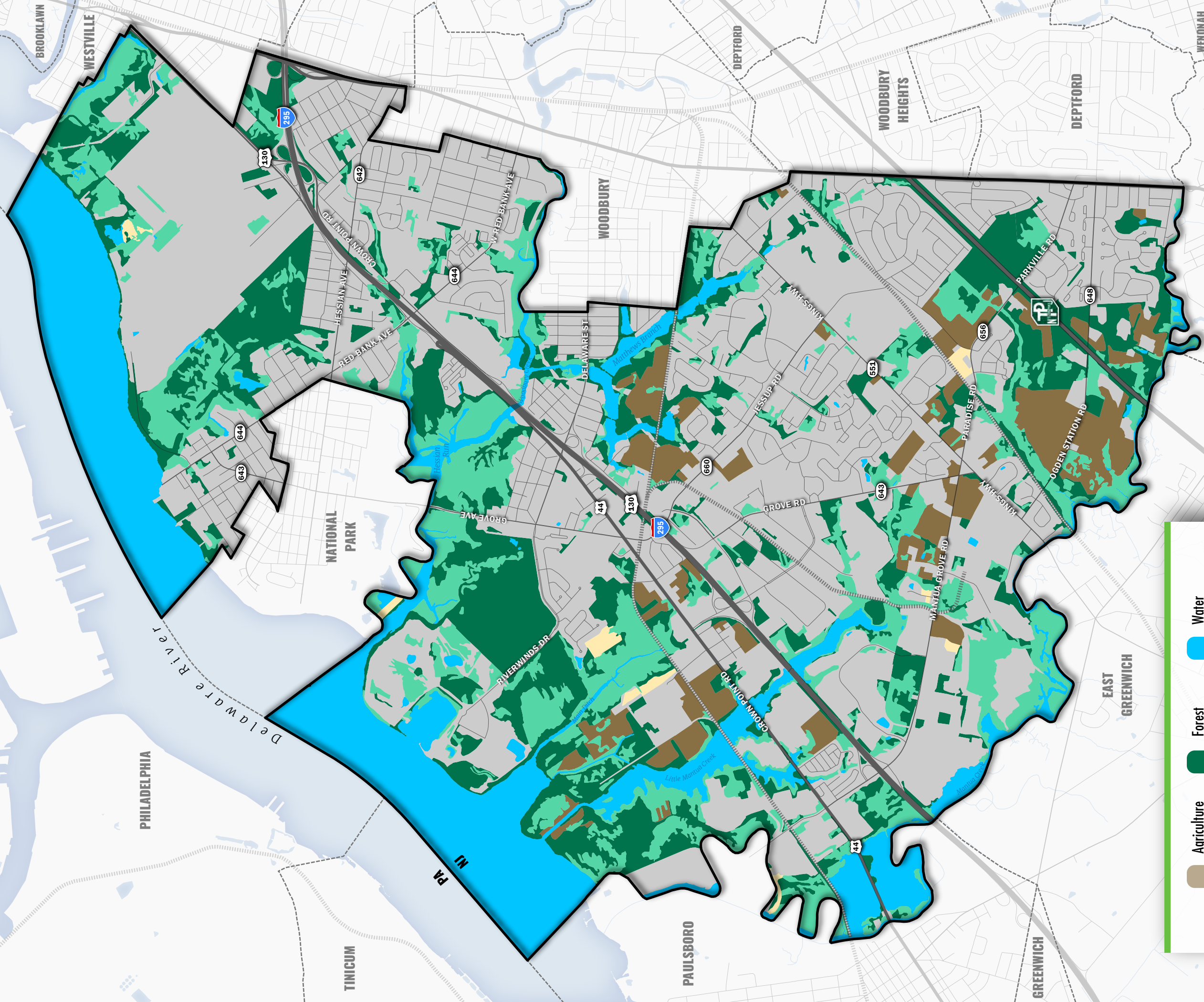
Sources: NJDEP, NJDOT, DVRPC  
Aerial Source: DVRPC, 2015

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.



# West Deptford Township

Figure 6: Land Use/Land Cover (2012)



**Legend**

- Water
- Forest
- Agriculture
- Barren Land
- Urban Area
- Wetlands

**Scale**  
SCALE 1:31,680  
1 inch = 0.50 mile  
0 1 Kilometer 1 Mile

**Sources:** NJDEP, NJDOT, DWRC  
Land Use Source: NJDEP, 2012

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.

Table 1: General Land Use/Land Cover, and Table 2: Detailed Land Use/Land Cover, list the land use and land cover classes in West Deptford and are organized in both charts by alphabetical order.

**Table 1:** General Land Use/Land Cover

Land Use	Area (Acres)	Percentage
Agriculture	572.08	5.01%
Barren Land	43.79	0.38%
Forest	1,828.82	16.02%
Urban	5,706.06	49.97%
Water	1,720.79	15.07%
Wetlands	1,547.16	13.55%
<b>Total</b>	<b>11,418.70</b>	

Source: NJDEP, 2012

**Table 2:** Detailed Land Use/Land Cover

General LU/LC Class	Land Use Group	Detailed Land Use/Land Cover Class	Area (Acres)	Percentage
Agriculture	Agricultural Upland	Cropland and Pastureland	543.96	4.76%
Agriculture	Agricultural Upland	Orchards/Vineyards/Nurseries/ Horticultural Areas	11.62	0.10%
Agriculture	Agricultural Upland	Other Agriculture	16.49	0.14%
Barren Land	Altered, Mixed, or Other Urban Land	Altered Lands	3.86	0.03%
Barren Land	Altered, Mixed, or Other Urban Land	Transitional Areas	34.95	0.31%
Barren Land	Altered, Mixed, or Other Urban Land	Undifferentiated Barren Lands	4.97	0.04%
Forest	Undeveloped Uplands: Brush/Shrubland	Coniferous Brush/Shrubland	8.16	0.07%
Forest	Undeveloped Uplands: Brush/Shrubland	Deciduous Brush/Shrubland	302.53	2.65%
Forest	Undeveloped Uplands: Brush/Shrubland	Mixed Deciduous/Coniferous Brush/Shrubland	73.39	0.64%

General LU/LC Class	Land Use Group	Detailed Land Use/Land Cover Class	Area (Acres)	Percentage
Forest	Undeveloped Uplands: Brush/Shrubland	Old Field (<25% Brush Covered)	244.97	2.15%
Forest	Undeveloped Uplands: Deciduous, Coniferous, or Mixed Forest	Coniferous Forest (>50% Crown Closure)	34.87	0.31%
Forest	Undeveloped Uplands: Deciduous, Coniferous, or Mixed Forest	Deciduous Forest (>50% Crown Closure)	655.68	5.74%
Forest	Undeveloped Uplands: Deciduous, Coniferous, or Mixed Forest	Deciduous Forest (10–50% Crown Closure)	229.27	2.01%
Forest	Undeveloped Uplands: Deciduous, Coniferous, or Mixed Forest	Mixed Forest (>50% Coniferous with >50% Crown Closure)	26.73	0.23%
Forest	Undeveloped Uplands: Deciduous, Coniferous, or Mixed Forest	Mixed Forest (>50% Deciduous with >50% Crown Closure)	31.50	0.28%
Forest	Undeveloped Uplands: Deciduous, Coniferous, or Mixed Forest	Mixed Forest (>50% Coniferous with 10–50% Crown Closure)	5.01	0.04%
Forest	Undeveloped Uplands: Deciduous, Coniferous, or Mixed Forest	Phragmites Dominate Old Field	216.71	1.90%
Urban	Altered, Mixed, or Other Urban Land	Mixed Urban or Built-Up Land	2.06	0.02%
Urban	Altered, Mixed, or Other Urban Land	Other Urban or Built-Up Land	744.06	6.52%
Urban	Altered, Mixed, or Other Urban Land	Stormwater Basin	52.50	0.46%
Urban	Altered, Mixed, or Other Urban Land	Upland Rights-of-Way, Developed	14.11	0.12%
Urban	Altered, Mixed, or Other Urban Land	Upland Rights-of-Way, Undeveloped	23.47	0.21%
Urban	Commercial/Services	Commercial/Services	312.32	2.74%
Urban	Industrial	Industrial	1,134.40	9.93%



General LU/LC Class	Land Use Group	Detailed Land Use/Land Cover Class	Area (Acres)	Percentage
Urban	Industrial	Industrial and Commercial Complexes	6.92	0.06%
Urban	Public Open Space: Recreational Land	Athletic Fields (Schools)	43.43	0.38%
Urban	Public Open Space: Recreational Land	Recreational Land	405.57	3.55%
Urban	Public Open Space: Cemetery	Cemetery	26.09	0.23%
Urban	Residential: High Density	Residential, High Density, or Multiple Dwelling	304.78	2.67%
Urban	Residential: Low-Medium Density	Residential, Rural, Single Unit	150.50	1.32%
Urban	Residential: Low-Medium Density	Residential, Single Unit, Low Density	270.11	2.37%
Urban	Residential: Low-Medium Density	Residential, Single Unit, Medium Density	1,728.78	15.14%
Urban	Transportation/Communication /Utilities	Major Roadway	204.21	1.79%
Urban	Transportation/Communication /Utilities	Mixed Transportation Corridor Overlap Areas	0.31	0.00%
Urban	Transportation/Communication /Utilities	Railroads	57.14	0.50%
Urban	Transportation/Communication /Utilities	Transportation/Communication/ Utilities	225.32	1.97%
Water	Water	Artificial Lakes	117.39	1.03%
Water	Water	Bridge over Water	1.64	0.01%
Water	Water	Tidal Rivers, Inland Bays, and Other Tidal Waters	1,591.23	13.94%
Water	Water	Tidal Mud Flat	10.53	0.09%
Wetlands	Wetlands: Containing Typical Species	Deciduous Scrub/ Shrub Wetlands	107.61	0.94%
Wetlands	Wetlands: Containing Typical Species	Deciduous Wooded Wetlands	710.74	6.22%



General LU/LC Class	Land Use Group	Detailed Land Use/Land Cover Class	Area (Acres)	Percentage
Wetlands	Wetlands: Containing Typical Species	Freshwater Tidal Marshes	282.21	2.47%
Wetlands	Wetlands: Containing Typical Species	Herbaceous Wetlands	18.35	0.16%
Wetlands	Wetlands: Containing Typical Species	Mixed Scrub/Shrub Wetlands (Deciduous Dominant)	10.52	0.09%
Wetlands	Wetlands: Containing Typical Species	Mixed Wooded Wetlands (Deciduous Dominant)	12.27	0.11%
Wetlands	Wetlands: Disturbed or Managed	Agricultural Wetlands (Modified)	21.66	0.19%
Wetlands	Wetlands: Disturbed or Managed	Disturbed Wetlands (Modified)	21.86	0.19%
Wetlands	Wetlands: Disturbed or Managed	Former Agricultural Wetland (Becoming Shrubby, Not Built Up)	2.81	0.02%
Wetlands	Wetlands: Disturbed or Managed	Managed Wetland in Built-Up Maintained Rec Area	37.04	0.32%
Wetlands	Wetlands: Disturbed or Managed	Managed Wetland in Maintained Lawn Greenspace	28.05	0.25%
Wetlands	Wetlands: Disturbed or Managed	Phragmites Dominate Coastal Wetlands	58.03	0.51%
Wetlands	Wetlands: Disturbed or Managed	Phragmites Dominate Interior Wetlands	215.20	1.88%
Wetlands	Wetlands: Disturbed or Managed	Phragmites Dominate Urban Area	5.24	0.05%
Wetlands	Wetlands: Disturbed or Managed	Wetland Rights-of-Way	15.57	0.14%
<b>Total</b>			<b>11,418.70</b>	

Source: NJDEP, 2012

## Physiography and Geology

Geography and geology, along with soils and water resources, are physical resources: the nonliving features on which West Deptford Township residents rely for a stable built environment and sustenance.

Physiography is the study of a location in relation to its underlying geology. New Jersey is characterized by four physiographic provinces (Figure 7). These provinces include the Ridge and Valley Province, the Highlands Province, the Piedmont Plateau Province, and the Coastal Plain Province. The Coastal Plain Province is further subdivided into the Inner Coastal Plain and the Outer Coastal Plain. The terrain of the four provinces is very diverse, with the rocky terrain of the northern provinces at one extreme and the sands of the coast at the other.

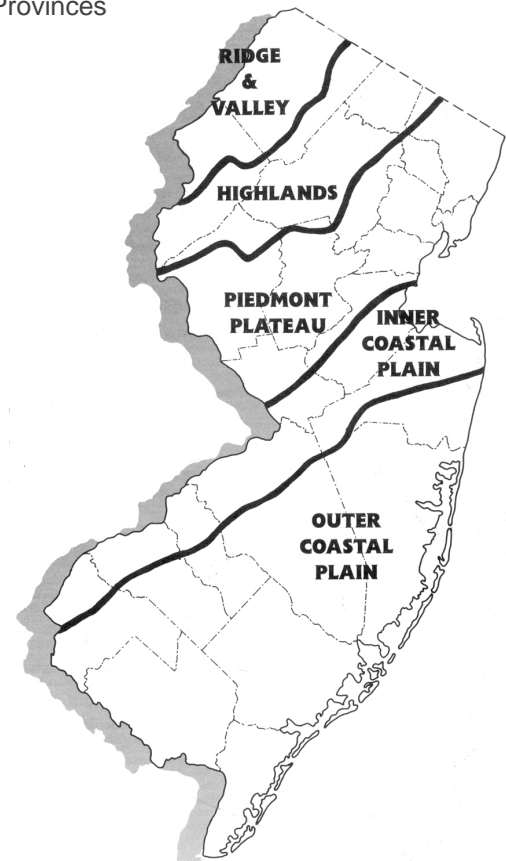
West Deptford Township is located in the Inner Coastal Plain. In New Jersey, the Inner Coastal Plain is made up of interbedded sand and clay. Deposits originating in the breakdown of Appalachian and Catskill sedimentary, metamorphic, and igneous rocks are interbedded with layers formed by oceanic (marine) 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, and the topography of the area is mostly flat and low lying.

### Geologic Formations

West Deptford Township contains nine underlying geologic formations that run roughly southeast to northwest and extend beyond the borders of the township. They are visible in Figure 8: Geology and Figure 9: Cross-Section of the Woodbury Quadrangle. Figure 9 is a cross-section of the formations within the Woodbury Quadrangle, an area demarcated by the U.S. Geological Survey (USGS) within Gloucester County, and which includes West Deptford. The section illustrated in Figure 13 is not “cut” directly through West Deptford, but the formations and the way in which they are layered would be similar underneath West Deptford.

The geology underneath the township is also described in Table 3: Geologic Formations in West Deptford Township, where the geologic formations are organized from the most recently formed (top of table) to the oldest (bottom of table). Aquifers containing groundwater that supports the region’s industries, businesses, and residents are located between these geological formations and are discussed in the **Groundwater** section (page 77). Additional information on West Deptford’s geology can be found in its 1979 Natural Resources Inventory.

**Figure 7:** New Jersey’s Physiographic Provinces

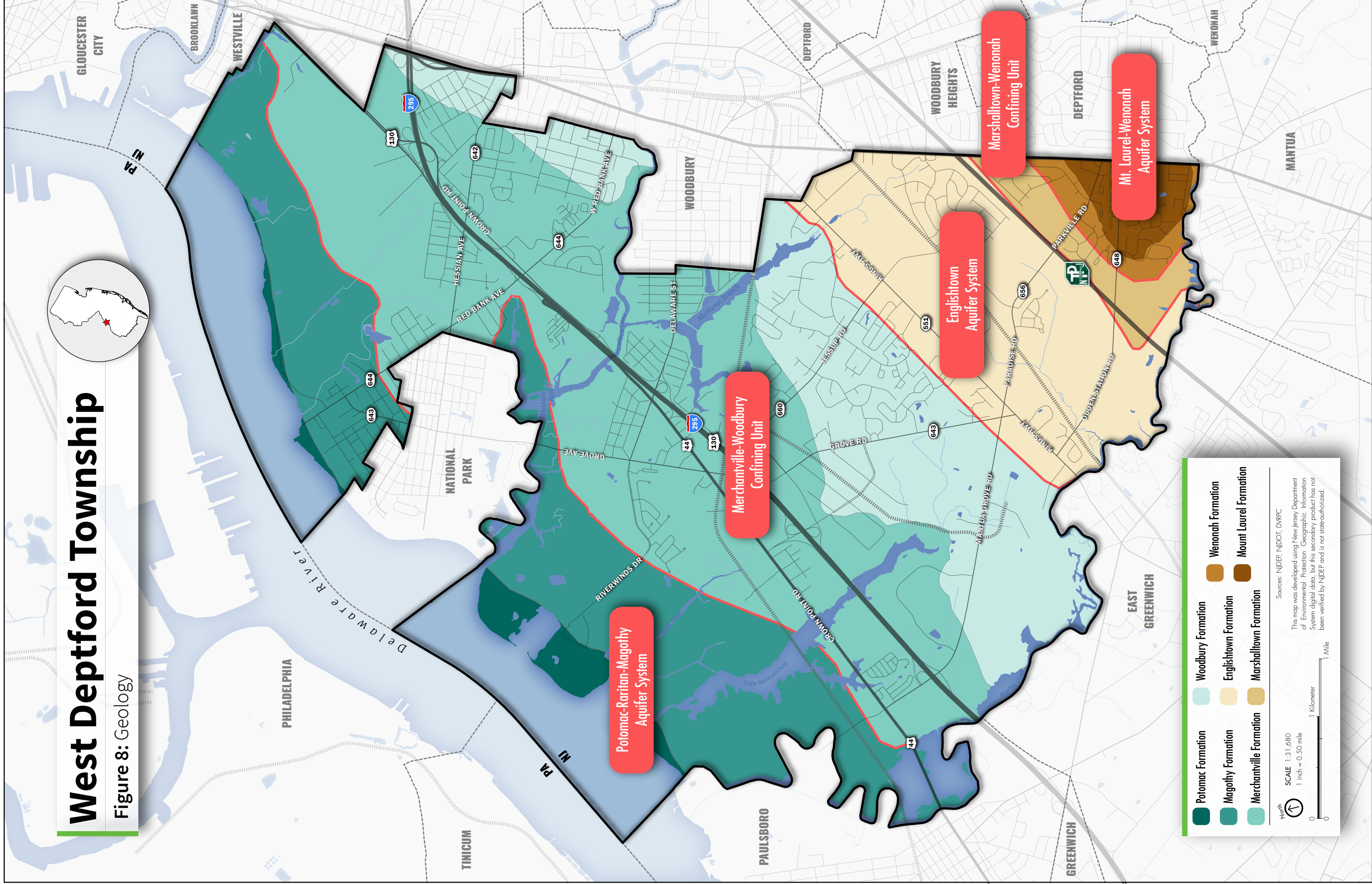


Source: NJGS



# West Deptford Township

Figure 8: Geology



	Potomac Formation		Woodbury Formation		Wenonah Formation
	Magothy Formation		Englishtown Formation		Mount Laurel Formation
	Merchantville Formation		Marshalltown Formation		

Sources: NJDEP, NJDOT, DWRPC

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.

SCALE 1:31,680  
1 inch = 0.50 mile  
1 Kilometer

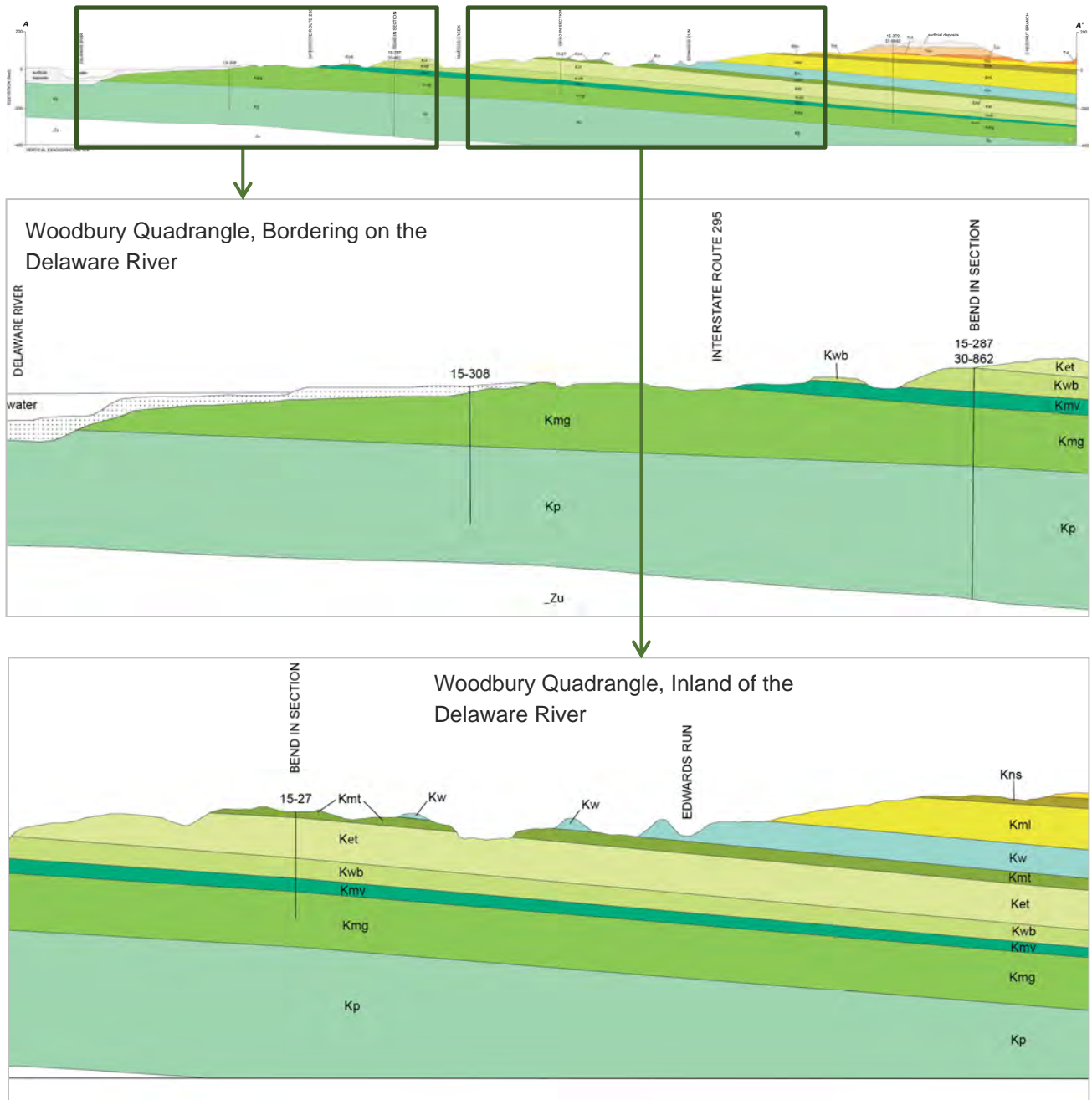
North

0 1 Mile





**Figure 9: Cross-Section of the Woodbury Quadrangle**



Source: New Jersey Geological and Water Survey OFM 59

**Table 3:** Geologic Formations in West Deptford Township

Geologic Name	Abbreviation	Physiographic Province	Lithology	Geologic Age
Mount Laurel Formation	Kml	Coastal Plain	Quartz sand, fine- to coarse-grained, slightly glauconitic	Late Cretaceous: Campanian
Wenonah Formation	Kw	Coastal Plain	Quartz sand, fine-grained, silty, clayey micaceous	Late Cretaceous: Campanian
Marshalltown Formation	Kmt	Coastal Plain	Quartz and glauconite sand, silty, and clayey	Late Cretaceous: Campanian
Englishtown Formation	Ket	Coastal Plain	Quartz sand, fine- to coarse-grained, locally interbedded with thin to thick beds of clay	Late Cretaceous: Campanian
Woodbury Formation	Kwb	Coastal Plain	Clay-silt	Late Cretaceous: Campanian
Merchantville Formation	Kmv	Coastal Plain	Glauconite sand to quartz-glauconite sand, clayey, and silty	Late Cretaceous: Campanian
Magothy Formation	Kmg	Coastal Plain	Quartz sand, fine- to coarse-grained, interbedded with thin-bedded clay or clay-silt	Late Cretaceous: Santonian
Potomac Formation	Kp	Coastal Plain	Sand, fine- to coarse-grained, interbedded with white, red, or yellow clay	Late Cretaceous: Cenomanian

Source: New Jersey Geological Survey (NJGS), 2009 Soils

## Soils

Soil is the foundation for all land uses. Soil types vary in their physical, chemical, and biological properties, influencing the vegetation and development potential of a region. Soil properties also affect the location of wells and septic facilities, often determining development potential in certain areas. Soil is a natural resource that cannot be replenished on the human time scale.

Data on soil types derives from surveys conducted by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). The Gloucester County Department of Health and Senior Services tests soil properties and checks soil types for county property owners, and the Soil Testing Laboratory at the



Rutgers New Jersey Agricultural Experiment Station tests soil properties for residents throughout New Jersey. The Cooperative Extension of Gloucester County sells soil testing kits.

### Septic Suitability

Soil type is a major determining factor in planning for the location of septic systems. West Deptford's 1979 Natural Resources Inventory notes that a variety of negative community impacts can occur if a septic system is constructed in soils with low infiltration rates, steep slopes, or high water tables, or in areas that flood. These impacts may include contamination of groundwater, potentially leading to contamination of drinking water and pollution of nearby surface water; foul odors from unfiltered effluent; toilet and septic system failure; and high costs to property owners from installing and maintaining home disposal systems. It is not known from readily accessible data what percentage of the township possesses soils unsuitable for septic systems. Further site level investigation is needed in this regard.

### Agricultural Soils

The township's 1979 Natural Resources Inventory reported that West Deptford historically was supported by its agricultural industry (as well as by its fishing and lumber industries). Soils in the township supported the growth of vegetable crops, including tomatoes, corn, asparagus, peppers, and eggplant, as well as such fruit crops as apples and peaches.

About 38 percent of West Deptford's soils are good for agriculture because of their slope, drainage rates, saturation, chemical makeup, and other qualities. Fifteen percent of the township's soils, concentrated in the south and center of the township, are considered Prime Farmland. Soils defined as Prime Farmland have the best combination of physical and chemical characteristics for producing high yields of crops. They do not substantially erode, are not saturated with water for long periods of time, and do not flood frequently.

About 16 percent of soils in West Deptford are defined as Farmland of Statewide Importance and are slightly less conducive to crop production. However, they may still sustain high yields, sometimes matching those grown in Prime Farmland soil, when managed well and under favorable environmental conditions. Each state defines this category. In New Jersey, Farmland of Statewide Importance includes soils that do not meet Prime Farmland criteria and that have a Soil Capability Class of two (i.e., the soil has severe limitations that restrict the choice of plants and/or that require special conservation practices) or a Soil Capability Class of three (i.e., the soil has very severe limitations that restrict the choice of plants and/or that require very careful management). These soils are concentrated in the lower two-thirds of West Deptford Township.

Approximately 7 percent of West Deptford Township's soils fit under the category of Farmland of Unique Importance. While these soil types do not share the conventional characteristics of prime soil, they have some combination of temperature, humidity, drainage, elevation, aspect, or locational characteristics that allow for successful growth and sale of a specialty crop, such as blueberries or cranberries. In West Deptford Township, these soils are adjacent to tidal waterways, notably the Main Ditch, Mantua Creek, and Woodbury Creek.

The remaining 62 percent of soils in West Deptford are classified as Other Soils and are not considered suitable for farming. They are typically highly saturated, have steep slopes, have been urbanized or otherwise disturbed, or do not have a chemical makeup that would facilitate the growth of crops.

The distribution of agricultural soils in West Deptford Township is listed in Table 4: Agricultural Soils and mapped in Figure 10: Agricultural Soils.

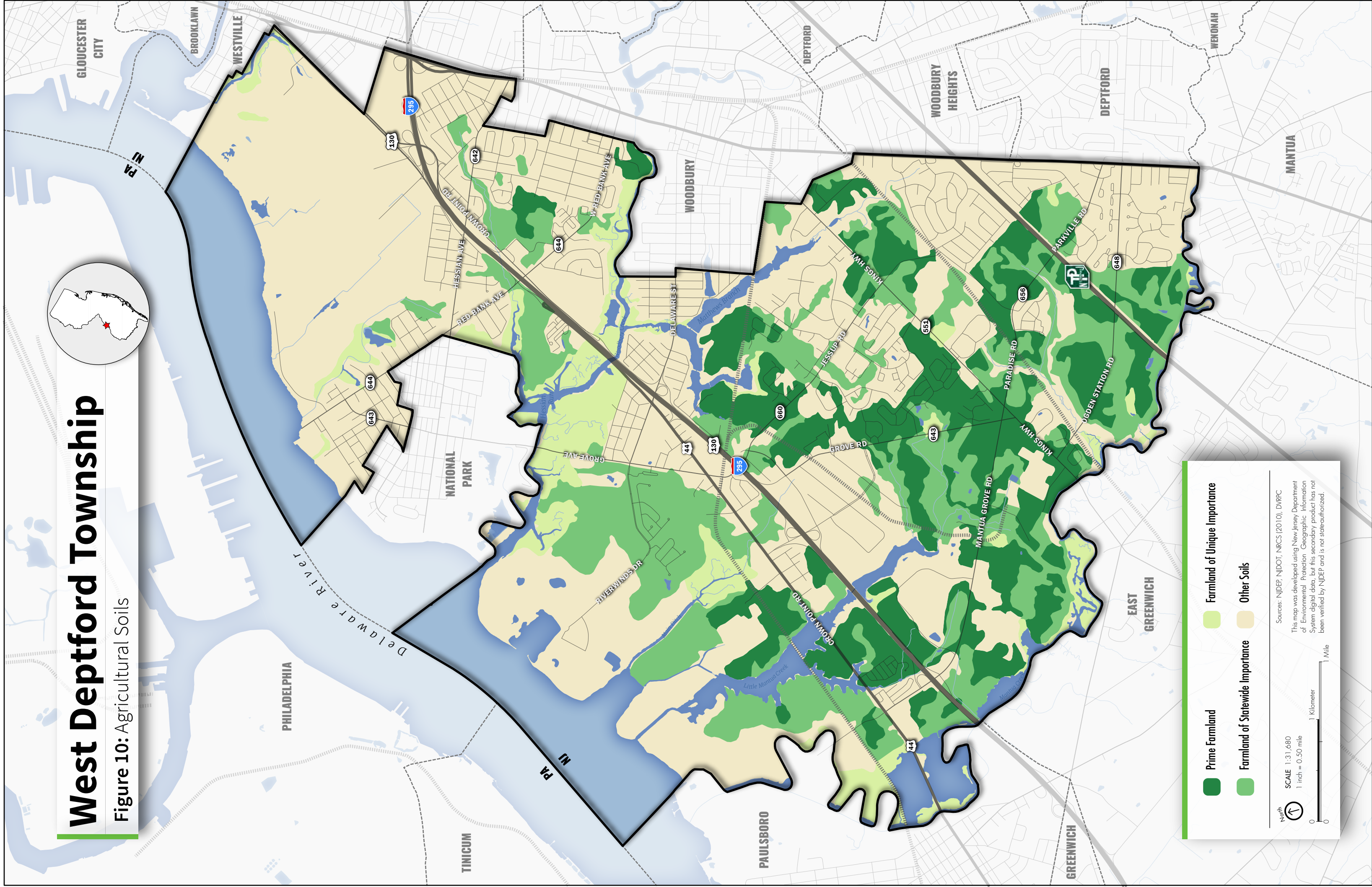
**Table 4:** Agricultural Soils

Soil Classification	Acres	Percentage
Prime Farmland	1642.10	14.57%
Farmland of Statewide Importance	1851.76	16.43%
Farmland of Unique Importance	754.70	6.69%
Other Soils	7025.29	62.31%
Total	<b>11,273.85</b>	

Source: NRCS, 2010

# West Deptford Township

Figure 10: Agricultural Soils



**Legend**

- Prime Farmland
- Farmland of Statewide Importance
- Farmland of Unique Importance
- Other Soils

Sources: NJDEP, NJDOT, NRCS (2010), 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.

SCALE 1:31,680  
1 inch = 0.50 mile  
1 Kilometer

North

0 1 Mile



## Soil Types

West Deptford Township has sandy and loamy soil series, including Berryland, Mullica, Collington, Colts Neck, Glassboro, Downer, Fallsington, Fluvaquents, Freehold, Hammonton, Keyport, Lenni, Mannington, Nanticoke, Sassafra, Udorthents, and Woodstown. The township also has disturbed soils that do not function according to their original structure, including dredged and urban soils. All of the soil series and phases (subtypes) are mapped in Figure 11: Soils.

Four soil series, sometimes in complexes containing urban land, make up almost 53 percent of the township's land area: Udorthents, Freehold, Downer, and Fallsington. These soil series are described in more detail below. Additional information on West Deptford's soils can be found in its 1979 Natural Resources Inventory.

### Udorthent Series

Udorthents and their complexes with Urban Land soils are the most common soils in the township. The township has approximately 1,881 acres (16.7 percent) of this soil, the majority being dredged coarse materials with a 0 to 8 percent slope. The Udorthent series is typically present in areas of human activity and consists of somewhat poorly drained to very poorly drained soils that have been altered mainly by filling and compaction. Large variation may occur within this series as a result of different land management practices, land use, vegetation types, and the presence of impervious surfaces. For this reason, onsite investigation is needed to determine the suitability of this soil for a particular use. In West Deptford, Udorthents are most common within a one-mile-wide band inland from and along the Delaware River.

### Freehold Series

Freehold soils and their complexes with Urban Land soils are the second-most common soil series in the township, which has 1,850 acres (16.4 percent) of Freehold soils. The most frequently represented subtypes include Freehold-Urban Land complexes and Freehold loamy sand with a 0 to 5 percent slope. Freehold soils were formed from sandy marine deposits containing glauconite. Found in many coastal plain soils, glauconite is a maritime mineral that enhances soil fertility. These soils are well drained and gently sloping, except around streambeds, where they may reach slopes of up to 40 percent. With the exception of soils on steep slopes, these soils are suitable for agricultural production and have low to moderate natural fertility. They can support a variety of crops because variations within the soils cause them to warm at different times of the growing season. Freehold sandy loams are classified as Prime Farmland soils and generally pose few constraints to development unless they have steep slopes. Different variations of Freehold soils will support upland forests of oak and poplar, which provide high-quality wildlife habitat. They are concentrated in the eastern and southeastern parts of the township.

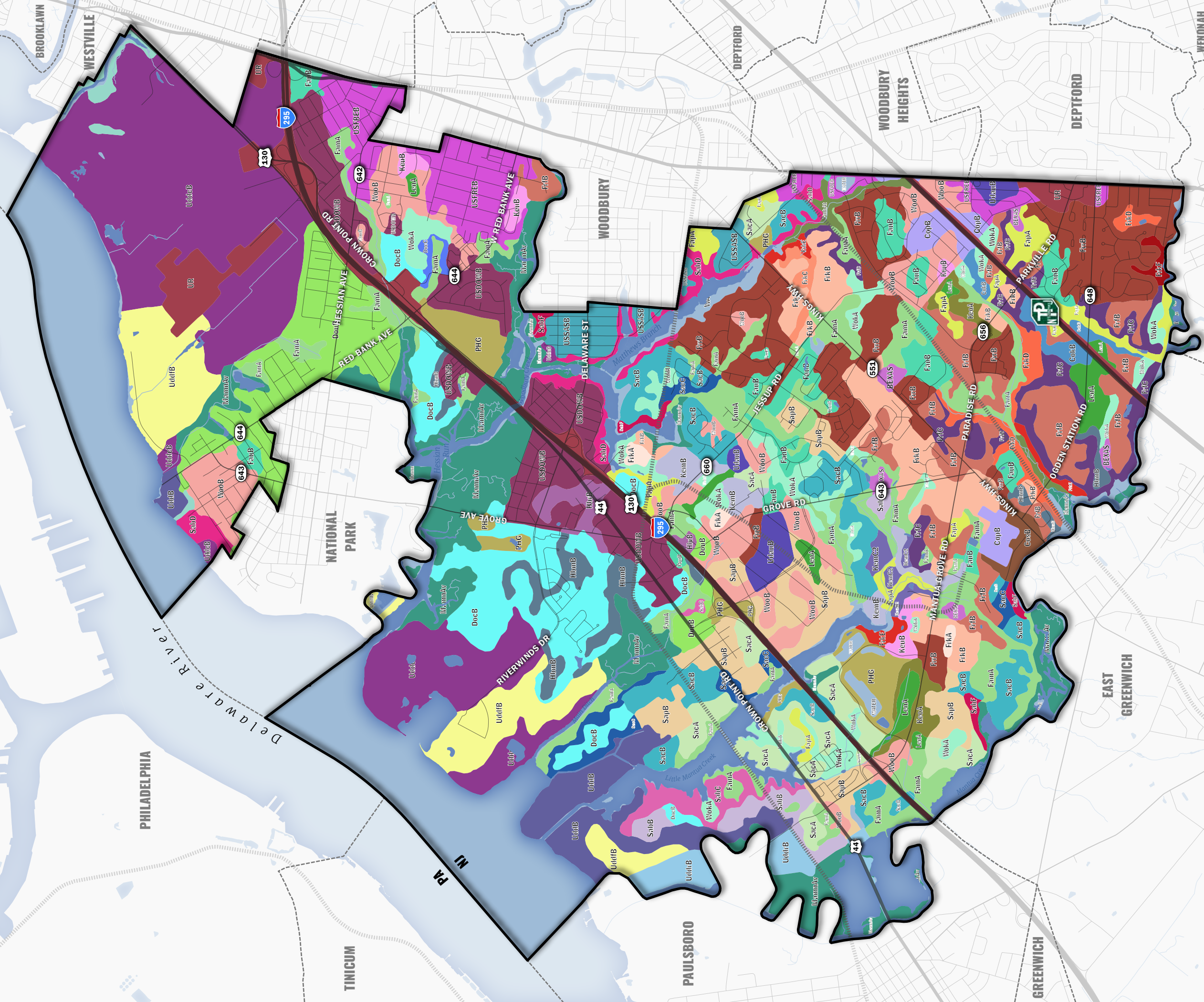






# West Deptford Township

Figure 11: Soils (See Table 5 for accompanying list of soils types)



Scale: 1:31,680  
1 inch = 0.50 mile  
1 Kilometer

North

Sources: NJDEP, NIDOT, NRCS(2010), DVPRC  
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.





### Downer Series

There are approximately 1,200 acres (10.7 percent) of Downer and Downer-Urban Land Complex soils in West Deptford Township. The majority of these soils, about 7 percent, are present in complexes with urban land. Most of the Downer phases in West Deptford have a slope of less than 5 percent, but a small portion fall in the 5 to 10 percent slope category. Downer soils are well drained, coarse-loamy soils that are derived from loamy fluviomarine deposits. They can be found in areas with slopes of up to 30 percent and are acidic but can (when found on gentler slopes) be used for growing field crops, vegetables, flowers, and some fruit trees.

### Fallsington Series

The township has approximately 1,001 acres (8.9 percent) of Fallsington and Fallsington-Urban Land Complex soils, with the majority phase being sandy loam at 0 to 2 percent slope. Fallsington soils are poorly drained fine loams, with slow to moderate permeability. They occur in flats and depressions with slopes of less than 5 percent and are formed from loamy marine and old alluvial sediments. This hydric soil of Statewide Importance is often used for cultivating truck crops and small grains, and native vegetation growing in them includes wetland forest species, such as oaks, maples, sweetgum, and pond pine. These soils possess serious constraints to development because of their high water table. Fallsington soils are scattered in pockets throughout West Deptford Township along its many water bodies and are most common in the southern half of the township.

Table 5: Soils lists all the soils found in West Deptford Township, in addition to the four described above, and shows their agricultural suitability (“Soil Capability Class”) and developmental suitability (“Development Capability”). The Soil Capability Class was developed by the USDA to determine the best agricultural use of lands by classifying and mapping erosion rates and potential in relation to both physical characteristics and agricultural capacity.

See the tables following Table 5 (page 38) for an explanation of the numbers and letters associated with the Soil Capability Class and Development Capability definitions.

**Figure 12:** Managed Meadow at the Sunoco Property



Source: Ed Komzcyk

**Table 5: Soils**

Soil Code	Soil Name (Phase)	Acres	Soil Capability Class	Development Capability		
				Building without Basement	Building with Basement	Small Commercial
BEXAS	Berryland and Mullica soils, 0 to 2 percent slopes, occasionally flooded	31.23	Berryland: 5w Mullica: 4w	C	C	C
CokC	Collington sandy loam, 2 to 5 percent slopes	45.53	3e	A	A	C
CopB	Collington-Urban Land complex, 0 to 5 percent slopes	70.35	Collington: 2e Urban Land: 8s	Collington: B Urban Land: N/A	Collington: A Urban Land: N/A	Collington: B Urban Land: N/A
CosB	Colts Neck sandy loam, 2 to 5 percent slopes	34.56	2s	A	A	A
DocB	Downer loamy sand, 0 to 5 percent slopes	399.97	2s	A	A	A
DocC	Downer loamy sand, 5 to 10 percent slopes	12.45	3e	A	A	B
DouB	Downer-Urban Land complex, 0 to 5 percent slopes	347.59	Downer: 2e Urban Land: 8s	Downer: A Urban Land: N/A	Downer: A Urban Land: N/A	Downer: A Urban Land: N/A
FamA	Fallsington sandy loam, 0 to 2 percent slopes	628.60	Undrained: 5w Drained: 3w	C	C	C
FapA	Fallsington loam, 0 to 2 percent slopes	142.52	5w	C	C	C
FauB	Fallsington-Urban Land complex, 0 to 5 percent slopes	230.05	Fallsington: 3w Urban Land: 8s	Fallsington: C Urban Land: N/A	Fallsington: C Urban Land: N/A	Fallsington: C Urban Land: N/A

Soil Code	Soil Name (Phase)	Acres	Soil Capability Class	Development Capability		
				Building without Basement	Building with Basement	Small Commercial
FmhAt	Fluvaquents, loamy, 0 to 3 percent slopes, frequently flooded	35.47	5w	C	C	C
FrfB	Freehold loamy sand, 0 to 5 percent slopes	354.09	2s	A	A	A
FrfC	Freehold loamy sand, 5 to 10 percent slopes	188.30	3e	A	A	B
FrkA	Freehold sandy loam, 0 to 2 percent slopes	19.73	1	A	A	A
FrkB	Freehold sandy loam, 2 to 5 percent slopes	277.00	2e	A	A	A
FrkC	Freehold sandy loam, 5 to 10 percent slopes	20.41	3e	A	A	B
FrkD	Freehold sandy loam, 10 to 15 percent slopes	62.85	4e	B	B	C
FrkE	Freehold sandy loam, 15 to 25 percent slopes	32.19	6e	C	C	C
FrkF	Freehold sandy loam, 25 to 40 percent slopes	12.05	7e	C	C	C
FrrB	Freehold-Urban Land complex, 0 to 5 percent slopes	580.32	Freehold: 2s Urban Land: 8s	Freehold: A Urban Land: N/A	Freehold: A Urban Land: N/A	Freehold: A Urban Land: N/A
HbmB	Hammonton loamy sand, 0 to 5 percent slopes	130.30	2w	A	C	A



Soil Code	Soil Name (Phase)	Acres	Soil Capability Class	Development Capability		
				Building without Basement	Building with Basement	Small Commercial
HbrB	Hammonton-Urban Land complex, 0 to 5 percent slopes	46.74	Hammonton: 2w Urban Land: 8s	Hammonton : A Urban Land: N/A	Hammonton: C Urban Land: N/A	Hammonton: A Urban Land: N/A
KemB	Keyport sandy loam, 2 to 5 percent slopes	77.28	2e	B	C	B
KemC2	Keyport sandy loam, 5 to 10 percent slopes, eroded	31.08	3e	B	C	B
KeoA	Keyport loam, 0 to 2 percent slopes	58.97	2w	B	C	B
KeuB	Keyport-Urban Land complex, 0 to 5 percent slopes	46.18	Keyport: 2e Urban Land: 8s	Keyport: B Urban Land: N/A	Keyport: C Urban Land: N/A	Keyport: B Urban Land: N/A
LenA	Lenni loam, 0 to 2 percent slopes	87.77	4w	C	C	C
MamnAv	Mannington-Nanticoke complex, 0 to 1 percent slopes, very frequently flooded	692.08	8w	C	C	C
MamuAv	Mannington-Nanticoke-Udorthents complex, 0 to 1 percent slopes, very frequently flooded	31.40	8w	Mannington-Nanticoke: C Udorthents: A	Mannington-Nanticoke: C Udorthents: C	Mannington-Nanticoke: C Udorthents: A
PHG	Pits, sand and gravel	160.89	8s	N/A	N/A	N/A
SabB	Sassafras loamy sand, 0 to 5 percent slopes	70.28	2e	A	A	A

Soil Code	Soil Name (Phase)	Acres	Soil Capability Class	Development Capability		
				Building without Basement	Building with Basement	Small Commercial
SabC	Sassafras loamy sand, 5 to 10 percent slopes	64.95	3e	A	A	B
SabD	Sassafras loamy sand, 10 to 15 percent slopes	104.95	4e	B	B	C
SabF	Sassafras loamy sand, 15 to 40 percent slopes	28.42	7e	C	C	C
SacA	Sassafras sandy loam, 0 to 2 percent slopes	206.55	1	A	A	A
SacB	Sassafras sandy loam, 2 to 5 percent slopes	318.46	2e	A	A	A
SacC	Sassafras sandy loam, 5 to 10 percent slopes	75.13	3e	A	A	B
SapB	Sassafras-Urban Land complex, 0 to 5 percent slopes	273.69	Sassafras: 2e Urban Land: 8s	Sassafras: A Urban Land: N/A	Sassafras: A Urban Land: N/A	Sassafras: A Urban Land: N/A
UdauB	Udorthents-Urban Land complex, 0 to 8 percent slopes	66.61	Udorthents: 3w Urban Land: 8s	Udorthents: A Urban Land: N/A	Udorthents: A Urban Land: N/A	Udorthents: B Urban Land: N/A
UddB	Udorthents, dredged materials, 0 to 8 percent slopes	222.94	3w	A	A	B
UddcB	Udorthents, dredged coarse materials, 0 to 8 percent slopes	1,153.38	3w	A	A	B

Soil Code	Soil Name (Phase)	Acres	Soil Capability Class	Development Capability		
				Building without Basement	Building with Basement	Small Commercial
UddfB	Udorthents, dredged fine materials, 0 to 8 percent slopes	354.83	3w	A	B	B
UddrB	Udorthents, dredged materials-Urban Land complex, 0 to 8 percent slopes	83.67	Udorthents, dredged materials: 3w Urban Land: 8s	Udorthents, dredged materials: A Urban Land: N/A	Udorthents, dredged materials: A Urban Land: N/A	Udorthents, dredged materials: B Urban Land: N/A
UR	Urban land	348.38	8s	N/A	N/A	N/A
USDOWB	Urban Land-Downer complex, 0 to 5 percent slopes	440.34	Urban land: 8s Downer: 2e	N/A	N/A	N/A
USFREB	Urban Land-Freehold complex, 0 to 5 percent slopes	302.59	Urban Land: 8s Freehold: 2s	Urban Land: N/A Freehold: A	Urban Land: N/A Freehold: A	Urban Land: N/A Freehold: A
USSASB	Urban Land-Sassafras complex, 0 to 5 percent slopes	101.43	Urban Land: 8s Sassafras: 2e	Urban Land: N/A Sassafras: A	Urban Land: N/A Sassafras: A	Urban Land: N/A Sassafras: A
	Water	1,527.27	-	N/A	N/A	N/A
WokA	Woodstown-Glassboro complex, 0 to 2 percent slopes	249.91	Woodstown: 2w Glassboro: 3w	Woodstown: A Glassboro: C	Woodstown: C Glassboro: C	Woodstown: A Glassboro: C
WooB	Woodstown-Urban Land complex, 0 to 5 percent slopes	392.12	Woodstown: 2w Urban Land: 8s	Woodstown: A Urban Land: N/A	Woodstown: C Urban Land: N/A	Woodstown: A Urban Land: N/A
<b>Total</b>		<b>11,273.85</b>				

Source: NRCS, 2010

Explanation of Soil Capability Class and Development Capability definitions (Table 5)

Capability Class	
1	Slight limitations that restrict their use.
2	Moderate limitations that restrict the choice of plants or that require moderate conservation practices.
3	Severe limitations that restrict the choice of plants or require special conservation practices, or both.
4	Very severe limitations that restrict the choice of plants or require very careful management, or both.
5	Subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.
6	Severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.
7	Very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.
8	Limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.
Capability Subclasses	
e	The main hazard is the risk of erosion unless close-growing plant cover is maintained.
w	Water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage).
s	Soil is limited mainly because it is shallow, droughty, or stony.
c	Chief limitation is climate that is very cold or very dry.
Key to Development Capability	
A = Not Limited	Little or no limitation(s) or easily corrected by use of normal equipment and design techniques.
B = Somewhat Limited	Presence of some limitation, which normally can be overcome by careful design and management at somewhat greater cost.
C = Very Limited	Limitations that normally cannot be overcome without exceptional, complex, or costly measures.
N/A	Limitations are not rated or listed.

## Soil Erosion

Soil erosion is one of the most important, yet least understood, environmental problems facing developing and agricultural communities alike. Geologic, or “background,” erosion occurs at approximately the same rate as soil formation, leading to neither a net loss nor gain of soil. Background erosion is an important process in which rock materials are carried and deposited by wind and water. In areas with vegetative cover, eroded rock material mixes with decomposed vegetation and creates more nutrient-rich soil.

Conversely, erosion caused by human activity has greatly increased the volume and rate of soils lost. In the United States, the most significant effects are the loss of prime agricultural soils, increased flooding, and pollution of streams and rivers. West Deptford Township has soil erosion and sediment control requirements as part of its Stormwater Control Procedures and Subdivision and Development ordinances, which are intended to reduce erosion and maintain sediments onsite during and after construction by reducing stormwater runoff and maximizing natural water infiltration techniques.

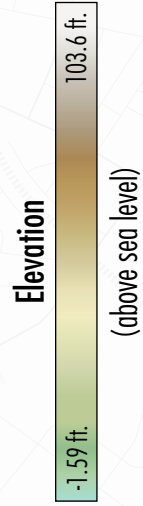
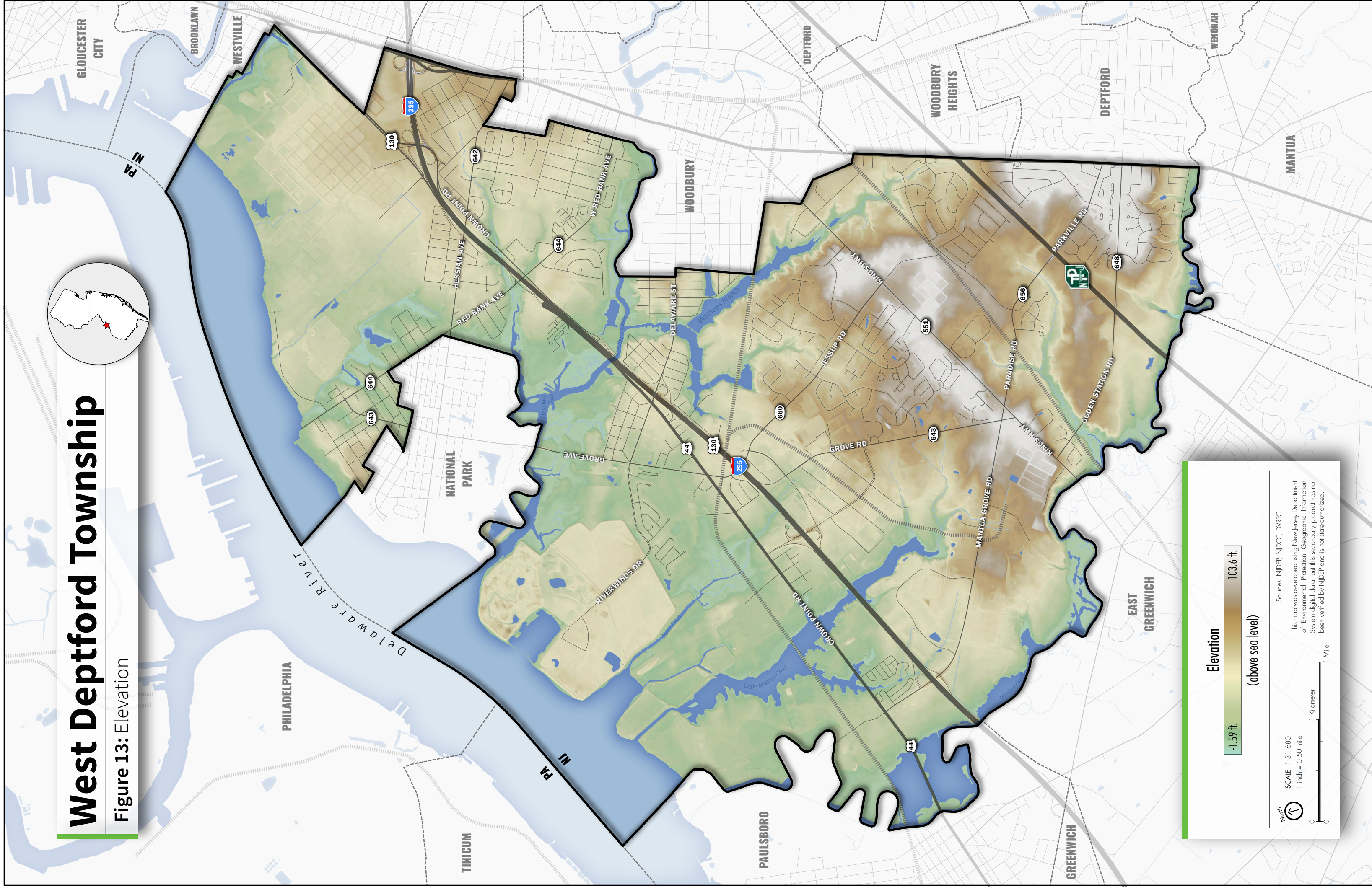
## Topography

Topography relates to the surface terrain and features of an area. West Deptford Township has a relatively flat topography that increases in elevation as one proceeds inland from the banks of the Delaware River, Mantua Creek, Little Mantua Creek, and Woodbury Creek. Its areas of highest elevation are along Kings Highway, in the neighborhoods adjacent to Parkville Road, and along West Deptford Township's border with Deptford Township. The highest elevation in the township is 103.6 feet. The township also contains some areas below sea level; the lowest elevation is 1.6 feet below sea level. The RiverWinds development, along the Delaware River in the west of the township, is constructed of dredge spoils and appears as a plateau in the topographical map. More details of West Deptford's topography are visible in Figure 13: Elevation.



# West Deptford Township

Figure 13: Elevation



North

SCALE 1:31,680  
1 inch = 0.50 mile  
1 Kilometer

Mile

Sources: NJDEP, NJDOT, DWRC

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





## Steep Slopes

Steep slopes are fragile environmental features, and development of steep slope areas is inadvisable because it can result in soil instability, erosion, increased stormwater runoff, flooding, and sedimentation of the stream below. These effects in turn result in degradation of water quality, habitat destruction, and potential damage to property.

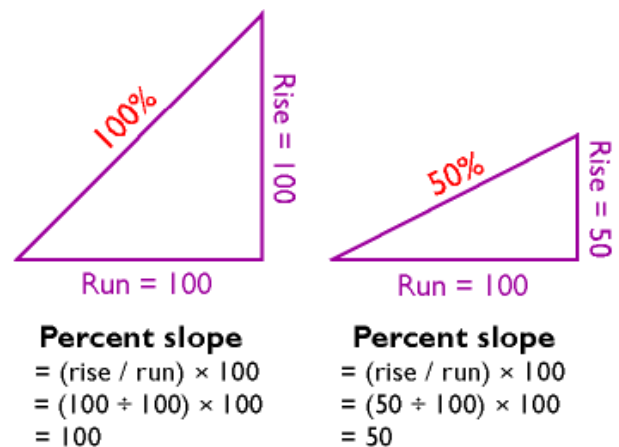
Slope can be measured in two ways; in this ERI, it is measured in the ratio of vertical rise to horizontal distance (also known as “run”; see Figure 14).

Generally, slopes under 10 percent are not subject to any development constraints in most communities.

The majority of land within West Deptford Township is less than 5 percent in slope, making much of the township ideal for agriculture and residential, commercial, and industrial development (Figure 15: Slope). Slopes of over 10 percent are typically present along waterways, where the water has eroded soil over time, and through human intervention, for example along built-up highways or in housing developments with constructed hills on which residences sit. In West Deptford, some of the steepest areas are along Mantua Creek and its tributaries, Little Mantua Creek, Matthews Branch, highway interchanges from I-295, and constructed embankments at RiverWinds and tank farms located in the township.

Although it has few naturally occurring slopes above 10 percent, West Deptford’s zoning ordinance allows cluster development in R1 Rural Residential districts in order to conserve and protect steep slopes, among other environmentally sensitive areas. As required by the township’s stormwater control procedures, developers of nonresidential major developments, residential major developments not preempted by the Residential Site Improvement Standards at N.J.A.C. 5:21, and all major developments undertaken by the township must provide topographic basemaps indicating where steep slopes and other environmentally sensitive features are located. Using that information, developers must also provide an environmental site analysis that includes a discussion of any steep slopes on the site and the potential constraints that these slopes might have on the development of the site.

**Figure 14: Percent Slope**



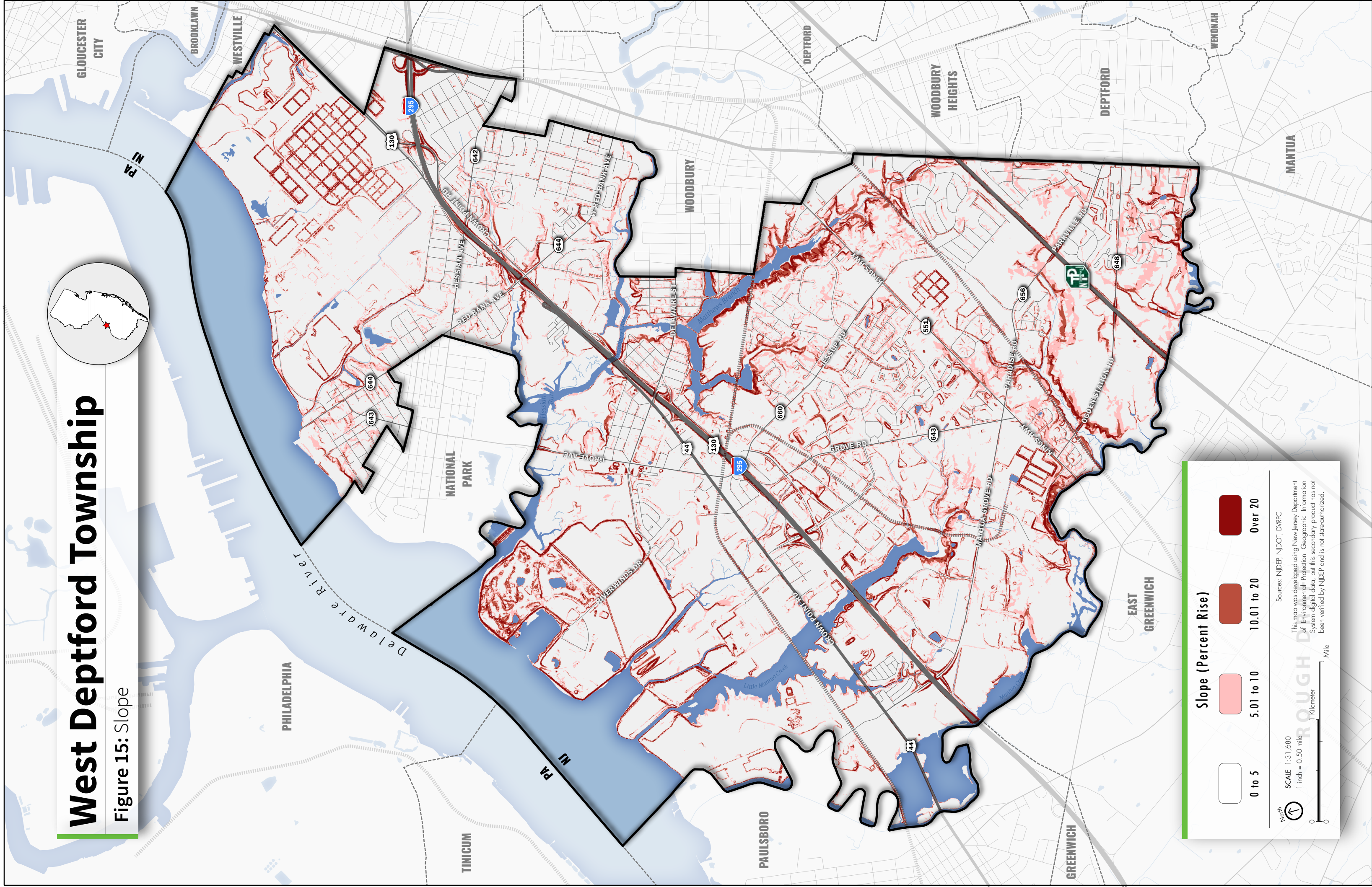
Source: Penn State University





# West Deptford Township

Figure 15: Slope



**Slope (Percent Rise)**

0 to 5	5.01 to 10	10.01 to 20	Over 20
--------	------------	-------------	---------

SCALE 1:31,680  
1 inch = 0.50 miles  
1 kilometer

North

Sources: NJDEP, NJDOT, DVRPC

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





## Hydrology and Water Resources

West Deptford Township is tied closely with its water bodies, which both form the borders of the township and run through it. The most significant body of water that borders the township is the Delaware River, but the township also contains the mouths of several other major waterways, including the Mantua Creek along the south border (Figure 16), the Little Mantua Creek and Main Ditch in the western and southern portions of the township, and Woodbury Creek and Matthews Branch in the middle of the township.

### Surface Water

#### Watersheds

A watershed is an area of land that resembles a basin in shape, surrounded by ridge-like areas of higher elevation. Any watershed drains all of its surface water bodies, groundwater, and rainfall to a common outlet, such as the outflow of a reservoir, the mouth of a bay, or the point where a tributary discharges into a larger stream. Larger watersheds can contain many smaller watersheds, or “subwatersheds.” For example, the Delaware River watershed contains all of the streams that drain into the Delaware River and then into the Delaware River Bay and Atlantic Ocean, but these individual streams also have their own watershed, where the common outlet is the point where that stream meets the Delaware River. Watersheds are natural ecological units and have distinct biotic and abiotic characteristics.

Each watershed has its own hydrologic unit code, or HUC, which is a series of numbers determined by the USGS that defines that watershed. The fewer the number of digits in the HUC, the larger the size of the watershed: HUC-2 watersheds have two-digit codes and have areas of tens of thousands of square miles, while HUC-12 watersheds, with 12-digit codes, are often less than 50 square miles. Smaller watersheds are naturally nested within larger watersheds.

NJDEP monitors HUC-11 and HUC-14 watersheds in the state. New Jersey has 152 HUC-11 watersheds and over 900 HUC-14 subwatersheds. The HUC-11 watersheds in New Jersey average about 60 square miles. HUC-14 watersheds are about nine square miles on average, so approximately six or seven HUC-14 watersheds would typically be nested within a single HUC-11 watershed.

West Deptford Township is within two HUC-11 watersheds. One is the Mantua Creek watershed, which includes all of the land that drains into the Mantua Creek. The other is the Woodbury/Big Timber/Newton Creeks watershed, which includes all of the land that drains into Woodbury Creek, Big Timber Creek, and Newton Creek. Both of these watersheds contain several HUC-14 watersheds. Within West Deptford, there

**Figure 16:** Mantua Creek



Source: Ed Komczyk

are two HUC-14 watersheds in the Mantua Creek watershed and three in the Woodbury/Big Timber/Newton Creeks watershed. Each HUC-11 and HUC-14 watershed is mapped in Figure 17: Watersheds and listed in Table 6: HUC-11 and HUC-14 Watersheds.

**Woodbury/Big Timber/Newton Creeks Watershed**

NJDEP combined the Woodbury, Big Timber, and Newton Creeks into one HUC-11 watershed. Together, these creeks drain 98.9 square miles of land in Gloucester and Camden counties into the Delaware River. Part of this watershed is 79 percent of West Deptford Township, or about 18.3 square miles (8,860 acres). It drains into the Delaware River from the Big Timber Creek just north of the township, from Woodbury Creek, and from Little Mantua Creek and Main Ditch.

**Mantua Creek Watershed**

The Mantua Creek watershed, the second HUC-11 watershed, drains 50.9 square miles of land, entirely within Gloucester County, into the Delaware River. Part of this watershed is 21 percent of West Deptford Township, or about 3.8 square miles (2,414 acres).

**Table 6:** HUC-11 and HUC-14 Watersheds

Watershed Name	HUC	Area within West Deptford (acres)	Percentage of West Deptford Land
<b>Woodbury/Big Timber/Newton Creeks</b>	<b>02040202120</b>	<b>8,859.65</b>	<b>78.59%</b>
Woodbury Creek (below Route 45)/Lower Delaware Valley to Big Timber Creek	02040202120110	4,993.94	44.30%
Main Ditch/Little Mantua Creek	02040202120120	3,472.07	30.80%
Big Timber Creek (below North Branch/South Branch Confluence)	02040202120080	393.65	3.49%
<b>Mantua Creek</b>	<b>02040202130</b>	<b>2,414.16</b>	<b>21.41%</b>
Mantua Creek (below Edwards Run)	02040202130060	1,785.83	15.84%
Mantua Creek (Edwards Run to Road to Sewell)	02040202130040	628.33	5.57%

Sources: NJDEP, 2000 (HUC-11 watersheds) and 2009 (HUC-14 watersheds)

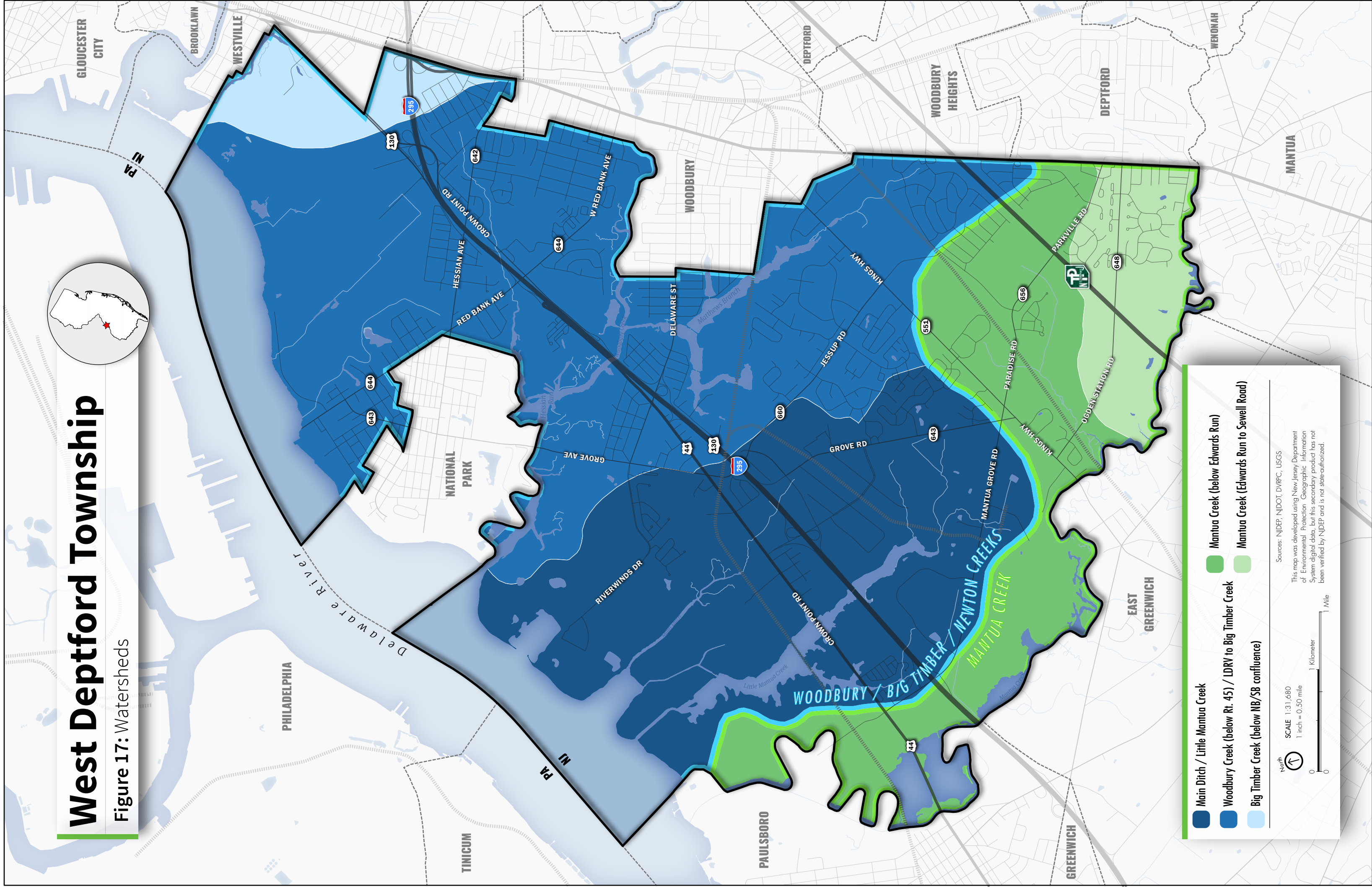
**Watershed Management Area 18**

NJDEP uses watersheds as a unit of area for managing natural resources. The agency has divided the state into 20 Watershed Management Areas. West Deptford Township is within Watershed Management Area 18, known as the Lower Delaware Region, which includes 68 municipalities in 391 square miles of southwestern New Jersey. The main watersheds of this Watershed Management Area include Oldmans Creek, Raccoon Creek, Repaupo Creek, Mantua Creek, Big Timber Creek, Cooper River, Pennsauken Creek, and Pompeston Creek, all of which drain into the Delaware River. The land in this Watershed Management Area ranges from highly urbanized along the Delaware River to forested and agricultural farther inland and to the south.



# West Deptford Township

Figure 17: Watersheds



- Main Ditch / Little Mantua Creek
- Woodbury Creek (below Rt. 45) / IDRV to Big Timber Creek
- Big Timber Creek (below NB/SB confluence)
- Mantua Creek (below Edwards Run)
- Mantua Creek (Edwards Run to Sewell Road)

Scale: 1:31,680  
 1 inch = 0.50 mile  
 1 Kilometer  
 1 Mile

Sources: NJDEP, NIDOT, DVRPC, USGS  
 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.



## Streams

West Deptford contains or is adjacent to eight named streams: Big Timber Creek, the Delaware River, Hessian Run, Mantua Creek, Little Mantua Creek, Main Ditch, Matthews Branch, and Woodbury Creek. All of these streams are freshwater and tidal. The township's 1979 Natural Resources Inventory provides an account of these streams and their context in the region. West Deptford also contains some constructed canals and waterways, which are located on the Wheelabrator property in the northern section of the township.

West Deptford contains over 58 stream miles within its boundaries, and about 33 of them (57 percent) are first- or second-order streams. First-order streams are the initial sections of stream channels with no contributing tributaries, and second-order streams are stream channels formed from only one branching section of tributaries above them. In West Deptford, only Matthews Branch in its entirety is a first-order stream. The remainder of the first-order streams in the township are tributaries of the other major creeks and rivers.

First- and second-order streams are considered "headwater" streams. The headwaters are where a stream is "born" and actually begins to flow. Headwaters are of particular importance because they tend to contain a high diversity of aquatic species, and the condition of these waters affects the water quality found downstream.

Headwaters drain only a small area of land, usually no larger than one square mile (640 acres). Because of their small size, they are highly susceptible to impairment by human activities on the land. First- and second-order streams are narrow and often shallow, and are characterized by a relatively small base flow, which is the portion of stream flow that comes from groundwater seepage, not surface water runoff. These physical characteristics make first- and second-order streams subject to greater temperature fluctuations, especially when vegetation on their banks, particularly forest land, is removed. The quality of first- and second-order streams can also easily be degraded by excessive turbidity, which is water pollution that occurs when stormwater filled with soils and sediments (eroded or weathered sands and gravels) enters the water. In addition, first-order streams are greatly affected by changes in the local water table (see definition, right) because of their small base flows. Headwaters are important sites for the aquatic life that is at the base of the food chain and often serve as spawning or nursery areas for fish.

**Water table:** The boundary between water-saturated ground and unsaturated ground. Below the water table, water fills all air pockets between soil particles or rocks.

Table 7: West Deptford Stream Orders records the length of streams in West Deptford by stream order.

**Table 7:** West Deptford Stream Orders

Stream Order	Total Length (miles)
First (smallest)	22.00
Second	10.85
Third	6.26
Fourth	13.06

Stream Order	Total Length (miles)
Seventh	5.75
<b>Total</b>	<b>57.92</b>

The Delaware River, Mantua Creek, Big Timber Creek, and Woodbury Creek are monitored for biological life, nutrients, chemicals, and other parameters. More information on water quality in these water bodies is located in the **Surface Water Quality** section (page 54).

### Lakes and Ponds

West Deptford contains 117 acres of artificial lakes and water impoundments. The majority are less than one acre in area. The largest, namely the ponds at Little Mantua Creek, range from 11 acres to 26 acres. The township's 1979 Natural Resources Inventory highlights three ponds in the Red Bank area, known as Andrea's Pond (now piped and covered over), Montgomery's Pond, and Goldy's Pond, which the report describes as being fed by a surrounding tidal estuary and wetlands area.

### Wetlands

Wetlands have numerous definitions and classifications because of their diversity and the regulation of their uses. However, a basic definition of a wetland is an area that has enough water at some time during the year to stress plants and animals that are not adapted to life in water or saturated soils.

Wetland soils, which are also known as hydric soils, are areas where the land is saturated for at least seven consecutive days during the growing season. While wetlands almost always require the presence of hydric soils, hydric soils are not always wetlands. For land to be considered a natural wetland, it must have vegetation unique to wetlands and hydric soils.

Wetlands come in a wide range of types. For example, there are saline and freshwater wetlands, tidal and nontidal wetlands, and wetlands that were created through human activity, such as agricultural wetlands or stormwater basins. The most common wetland types in West Deptford include Deciduous Wooded Wetlands (711 acres, or 6.2 percent of the township's land cover), Freshwater Tidal Wetlands (282 acres, or 2.5 percent of the township's land cover), and Phragmites Dominate Interior Wetlands (215 acres, or 1.9 percent of the township's land cover).

All of West Deptford's wetlands are freshwater. While there are wetlands distributed throughout West Deptford, the majority of them are associated with the township's streams. The largest assemblage of wetlands is along the Mantua Creek between Paulsboro and West Deptford on either side of I-295/NJ-130.

Total wetland acreage in the township, based on NJDEP's land use/land cover data, is 1,547 acres, of which 1,142 acres feature natural wetlands vegetation: wetlands that have experienced less human alteration and are more likely to contain typical or representative plants and animals that are native to that wetland type. Of West Deptford's naturally vegetated wetlands, 723 acres are classified as forested wetlands, 282 acres are freshwater tidal marshes, 118 acres are scrub/shrub wetlands, and 18 acres are herbaceous wetlands. More information on West Deptford's naturally vegetated wetland areas is found in the **Natural Vegetation: Wetlands** section (page 101).

West Deptford Township also contains 405 acres of disturbed or managed wetlands, which no longer support the typical natural wetlands vegetation found in analogous unaltered natural areas but do show signs of soil



saturation and exist in areas shown to have hydric soils on U.S. Soil Conservation Service soil surveys. West Deptford's modified wetlands include former and current agricultural wetlands, disturbed wetlands, and wetlands that occur in maintained green spaces, such as lawns, golf courses, and stormwater management areas. Definitions of some of these wetland types are located in the **Land Use and Land Cover** section (page 10).

West Deptford's modified wetlands fall into the following categories: 65 acres of wetlands found in maintained greenspace, recreational areas, or lawn, 22 acres of disturbed wetlands, 22 acres of agricultural wetlands, 16 acres of wetland rights-of-way, and 3 acres of former agricultural wetlands. West Deptford Township also contains 278 acres of wetlands dominated by phragmites plants.

New Jersey protects freshwater (interior) wetlands under the New Jersey Freshwater Wetlands Protection Act Rules: N.J.A.C. 7:7A. This law also protects transitional areas, or "buffers," around freshwater wetlands. The standard width of the transition area that is protected is 150 feet around a freshwater wetland of "exceptional resource value," which is defined as one that either discharges into trout-supporting waters or has been documented as habitat for a threatened or endangered species. The standard extent of transitional area that is protected around a freshwater wetland of "intermediate resource value" (one that is not of "exceptional resource value" or "ordinary") is 50 feet.

NJDEP's published freshwater wetland maps provide guidance on where wetlands are found in New Jersey, but they are not the final word on location. Only an official determination from NJDEP, called a "letter of interpretation" (LOI), can formally designate the presence of freshwater wetlands on a property. An LOI verifies the presence, absence, or boundaries of freshwater wetlands and transition areas on a site. The activities that are permitted to occur within wetlands are very limited, and permits are required for most of them. Violations of the wetland regulations will result in penalties determined by NJDEP. Additional information on wetlands rules and permits is available through the NJDEP Division of Land Use Regulation and on its website under "Freshwater Wetlands." See **References** (page 151).

The NJDEP Landscape Project maps wetland habitat for threatened and endangered species. Both natural and modified wetlands are included in the Landscape Project. See the **Landscape Project Priority Habitats** section (page 106) for more information on this project.

### **Agricultural Wetlands**

West Deptford Township has 18 agricultural wetland sites spread over 22 acres in the central and southern part of the township. Agricultural wetlands are modified former wetland areas currently under cultivation. These areas still show evidence of soil saturation, but they no longer support natural wetland vegetation, being instead planted with commercial crops.

Agricultural wetlands are sometimes located in areas that were drained by a technique called "tile drainage." Tile drainage was a common method of removing excess water from farm fields that exhibited one or more of the following characteristics: (1) small areas of isolated wetlands, (2) very flat land that ponded in wet weather, (3) soils that were slow to warm in the spring because of a relatively high water table, or (4) soils that had a very high clay content and, therefore, drained slowly. Tile drainage was very labor intensive, as it involved installing subsurface drainage pipes throughout a field at a depth of three to six feet; the existence of tile drainage strongly indicates a natural wetland hydrology. Drainage systems can be quite long lived and require only the periodic maintenance of drainage ditches and outlets.

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

As long as agricultural wetland areas remain in agricultural use, they are exempt from New Jersey Freshwater Wetlands Rules N.J.A.C. 7:7A. However, if an agricultural area is removed from agricultural production for more than five years, any wetlands located within that area lose their exempt status.

The NRCS sponsors the Agricultural Conservation Easement Program, a voluntary program that bundles multiple funding programs. The Wetland Reserve Enhancement Partnership is a subprogram 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 term easements. The NRCS prioritizes applications based on the easement's potential for protecting and enhancing habitat for migratory birds and other wildlife.

## Surface Water Quality

### West Deptford's Stream Designations

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

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

With the exception of the Delaware River and a tributary of the Big Timber Creek that is located in the north part of West Deptford, all of the streams within West Deptford are classified as FW2-NT/SE2, which means that they are freshwater, nontrout-producing, nontrout-maintaining, saline estuary waters.

According to NJDEP rules, “FW2-NT” waters must provide for (1) the maintenance, migration, and propagation of the natural and established biota; (2) primary and secondary contact recreation (i.e., swimming and fishing/boating); (3) industrial and agricultural water supply; (4) public potable water supply after conventional filtration and disinfection; and (5) any other reasonable uses.

SE1, SE2, or SE3 is an additional designation that refers to a waterway in which there may be a saltwater-freshwater interface. SE2 is the only classification of these three that pertains to West Deptford’s streams and means saline estuarine waters whose designated uses are listed in N.J.A.C. 7:9B-1.12. The exact point of demarcation between the fresh and saline waters must be determined by salinity measurements; for waters to be classified as “saline,” their salinity must be at least 3.5 parts per thousand of chloride ions at mean high tide. The stream is classified as FW2-NT in the fresh portions and SE1 in the saline portions.

### Big Timber Creek

The Big Timber Creek is classified as FW2-NT, indicating that it is a freshwater, nontrout-producing, nontrout-maintaining water body. Only a tributary of Big Timber Creek passes through West Deptford Township, but it is assigned the same classification as the larger stream into which it flows.

### Delaware River

The Delaware River is governed by the Delaware River Basin Commission (DRBC) Water Quality Regulations, which is a separate set of water quality regulations. The segment of the Delaware River that runs past West Deptford Township is within Zone 4 along the Delaware River, which extends from River Mile (RM) 95.0 to RM 78.8 (Figure 18). This zone proceeds north from the state boundary line between Pennsylvania and Delaware, and also includes tributaries along that segment. The quality of Zone 4 waters is required to be maintained for industrial water supplies after reasonable treatment, maintenance of resident fish and other aquatic life, wildlife, passage of anadromous fish, recreation with secondary contact (which includes fishing, canoeing, rowing, and powerboating) above RM 81.8, and navigation.

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

In addition to the classifications above, NJDEP has three tiers of surface water quality protection: Outstanding National Resource Waters, Category 1 Waters, and Category 2 Waters. West Deptford Township’s waterways fit in the Category 2 tier. Category 2 is the default tier for New Jersey waterways. It includes all

**Figure 18:** DRBC’s River Mile “Zones” on the Delaware River



Source: DRBC

waterways that do not match the more specific criteria required for the first two categories, which identify waterways of exceptional significance. Most waterways in the state are Category 2. The water quality, aesthetic value, and ecological integrity of Category 2 waters should be protected and maintained, but unlike in Outstanding National Resource Waters or Category 1 Waters, some amount of reduction in water quality is authorized to accommodate necessary and important social and economic development. For example, Category 2 waterways require a 50-foot development buffer around them rather than the 300-foot buffer required for Category 1 waterways.

### **New Jersey's Integrated Water Quality Monitoring and Assessment Report**

The Federal Clean Water Act mandates that states submit biennial reports to the U.S. Environmental Protection Agency (EPA) describing the quality of their waters. States must submit two reports: the Water Quality Inventory Report, or "305(b) Report," documenting the status of principal waters in terms of overall water quality and support of designated uses; and a list of water bodies that are not attaining water quality standards, or the "303(d) List."

States must also prioritize 303(d)-listed water bodies for Total Maximum Daily Load (TMDL) analyses. The TMDL quantifies the amount of a pollutant a water body can assimilate (its loading capacity) without violating water quality standards. The TMDL analysis identifies those high-priority water bodies for which states anticipate establishing TMDLs in the next two years.

NJDEP integrates the 303(d) List and the 305(b) Report into a single report according to EPA's guidance. The most recent draft *Integrated Water Quality Monitoring and Assessment Report*, released in 2014, places the state's waters on one of five "sublists." Sublists 1 and 2 contain waters that are attaining standards. Sublist 3 contains waters for which there is insufficient data to determine their status. Sublist 4 contains waters that do not attain water quality standards, but that meet one of the following three conditions: (1) a TMDL has been completed for the pollutant causing nonattainment; (2) other enforceable pollution control requirements are reasonably expected to result in conformance with the applicable water quality standards; or (3) nonattainment is caused by something other than a pollutant. Sublist 5 contains waters that do not attain their designated use and for which a TMDL is required. Sublist 5 is equivalent to the 303(d) List. The **TMDLs** subsection (page 62) contains additional information.

NJDEP bases the assessment of entire HUC-14 watersheds (which serve as "assessment units") on the results of one or more monitoring sites within the watershed. The results from monitoring sites located within each HUC-14 subwatershed are extrapolated to represent all of the water bodies within the entire HUC boundary. In practice, the HUC-14 approach provides a more conservative assessment since any impairment of any water body in a given HUC-14 watershed will result in that entire watershed being listed as impaired for that use or parameter. In addition, where a HUC-14 watershed contains waters of different classification, the more stringent classification is used to assess impairment, and that impairment is then applied to the entire watershed. Because of the degree of extrapolation required for this approach, NJDEP performs more detailed testing to determine the actual cause, source, and extent of impairment in the HUC-14 watershed before developing a TMDL or taking other regulatory action to address the impairment.

NJDEP identifies the designated uses (see box to the right) applicable to each HUC-14 watershed and determines whether each water quality monitoring station located in certain water bodies in that watershed indicates that the water meets the water quality standards that correspond with designated uses. Not all designated uses are applicable for all HUC-14 watersheds.

The assessment unit (the HUC-14 watershed) is then placed on the appropriate sublist (Sublists 1–5) for each use.

See Table 8: Integrated Water Quality Monitoring and Assessment Report for the most recent published status of each of West Deptford’s HUC-14 watersheds. The definitions for the numbers associated with Aquatic Life (General), Recreation, Drinking Water Supply, and Fish Consumption are listed below Table 8 on page 57-8. The designated uses “Aquatic Life (Trout)” and “Shellfish Harvesting” are not applicable for any of the HUC-14 watersheds/assessment units in West Deptford and are therefore not included in the table.

**Designated uses** refer to specific groups of species that rely on water or human uses of water. Each of these use types is associated with certain water quality standards that must be met. Designated uses include:

- aquatic life (general);
- aquatic life (trout);
- recreation;
- drinking water supply;
- industrial water supply;
- agricultural water supply;
- shellfish harvesting; and
- fish consumption.

**Table 8:** Integrated Water Quality Monitoring and Assessment Report

Assessment Unit (HUC-14 Subwatershed)	HUC ID	Aquatic Life (General)	Recreation	Drinking Water Supply	Fish Consumption
Woodbury Creek (below Route 45)/Lower Delaware Valley to Big Timber Creek	02040202120110	5	3	1	5
Main Ditch/Little Mantua Creek	02040202120120	3	3	3	5
Big Timber Creek (below North Branch/South Branch Confluence)	02040202120080	3	3	1	5
Mantua Creek (below Edwards Run)	02040202130060	3	3	1	5
Mantua Creek (Edwards Run to Road to Sewell)	02040202130040	5	5	1	5

Source: NJDEP, 2014

Sublist Number	Placement Conditions
1	The designated use is assessed and attained AND all other designated uses in the assessment unit area are assessed and attained (fish consumption use is not factored into this determination based on EPA guidance).



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

As indicated in Table 8, an assessment unit may be listed on one or more sublists (i.e., on Sublist 2 for drinking water, Sublist 3 for aquatic life, etc.). However, an assessment unit can only be placed on Sublist 1 if all uses for that assessment unit are attained. In order to determine whether or not an assessment unit supports a designated use, NJDEP identifies a suite of parameters that serve as the minimum dataset associated with each designated use.

If one or more designated uses are assessed as “nonattainment” (Sublist 5), the pollutant(s) or impairment causing the nonattainment status is identified on the “303(d) List of Impaired Waters with Priority Ranking.” When the pollutant causing nonattainment is unknown, the pollutant is listed as “pollutant unknown” or “toxic unknown.” The ranking (Low, Medium, High) refers to the priority given a specific assessment unit when determining the schedule for a TMDL. Table 9: 303(d) List of Impaired Waters with Priority Ranking lists the nonattaining assessment units and their pollutants and impairments in West Deptford Township.

**Table 9:** 303(d) List of Impaired Waters with Priority Ranking

Assessment Unit (HUC-14 Subwatershed)	HUC ID	Parameters	Ranking
Woodbury Creek (below Route 45)/Lower Delaware Valley to Big Timber Creek	02040202120110	Polychlorinated biphenyl (PCB) in Fish Tissue	Low
		pH	Medium
Main Ditch/ Little Mantua Creek	02040202120120	PCB in Fish Tissue	Low
Big Timber Creek (below North Branch/ South Branch Confluence)	02040202120080	PCB in Fish Tissue	Low

Assessment Unit (HUC-14 Subwatershed)	HUC ID	Parameters	Ranking
Mantua Creek (below Edwards Run)	02040202130060	Mercury in Fish Tissue	Low
		PCB in Fish Tissue	Low
Mantua Creek (Edwards Run to Road to Sewell)	02040202130040	Escherichia coli	Medium
		Mercury in Fish Tissue	Low
		PCB in Fish Tissue	Low
		pH	Medium
		Phosphorus (Total)	Medium

Source: NJDEP, 2014

In 2014, all of the subwatersheds in which West Deptford is located were identified on the 303(d) list. Among the subwatersheds listed in the 303(d) list, the most common pollutant was PCB, which was present in each subwatershed and was found in fish tissue. Other common pollutants in West Deptford’s waters include mercury and pH (in two of subwatersheds each). Other parameters leading to impairments include total phosphorus and *E. coli*.

PCBs were used as coolants and lubricants in electrical equipment from the 1940s until 1977, when their manufacture was stopped due to evidence of their harmful effect on the environment. PCBs do not break down quickly in the environment and accumulate in water, soil, air, and animal life. Exposure to PCBs can cause skin conditions and impair the liver and immune system in humans.

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

The pH, or acidity, of waters is very important as it affects most chemical and biological reactions. Acidity is determined by a number of complex interactions and is affected by an area’s geology. Water quality impairment due to pH may be caused by acid rain from atmospheric pollutants. With increased acidity, water is more able to carry and dissolve substances.

Phosphorus exists naturally at low levels within the environment, although excess phosphorus can lead to harmful algae blooms, which can produce “dead zones” where no aquatic life can survive. Typical causes of phosphorus pollution include overfertilization of lawns and agricultural areas; water runoff from impervious surfaces like parking lots, rooftops, roadways, and, to a lesser degree, lawns; discharge from wastewater treatment plants; and overflow from septic systems. Soil erosion is a major contributor of phosphorus to streams, and stream bank erosion occurring during floods can transport high quantities of phosphorous into the water system.

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

### Water Quality Monitoring Networks

The determination of whether or not water quality is sufficient to meet an assessment unit's (HUC-14 watershed's) designated uses is based on testing results from various water quality monitoring networks. Information about these monitoring stations is included in Table 10: Water Quality Sampling Locations within and Upstream of West Deptford.

#### NJDEP's Monitoring Networks

Across the state, NJDEP primarily relies on two water quality monitoring networks: the Ambient Surface Water Quality Monitoring Network (ASWQMN) and the Ambient Biomonitoring Network (AMNET).

NJDEP runs the ASWQMN in cooperation with the USGS. This network contains 112 stations that monitor a set of selected sites in priority regions, basins, and watersheds for nutrients (i.e., phosphorous and nitrogen), bacteria, metals, sediments, dissolved oxygen, pH, or other parameters. The closest ASWQMN stations to West Deptford are located in Philadelphia City, Pitman Borough, and Gloucester Township.

AMNET, which is administered solely by NJDEP, evaluates the health of aquatic life as a biological indicator of water quality. The network includes over 760 nontidal monitoring stations located throughout the state. Each station is sampled once every five years. The closest AMNET stations to West Deptford are located in Harrison Township, Glassboro Borough, Mantua Township, Bellmawr Borough, and Washington Township.

Each site is tested only for the diversity of aquatic life. In testing this water quality parameter, NJDEP samples streams for benthic (bottom-dwelling) macroinvertebrates, which include such insects as dragonfly and caddisfly larvae (Figure 19), clams, mussels, snails, worms, and crustaceans that are large enough to be seen by the naked eye. Macroinvertebrates are studied because they are a good indicator species: if pollution harms a stream, their populations are adversely affected and require a significant amount of time to recover. While chemical tests measure water quality on a given day, the presence or absence of macroinvertebrates represents water quality changes over a longer period preceding the testing day. Water bodies are rated on the number of different species of organisms present, as well as the number of individuals within those populations.

**Figure 19:** Caddisfly Larva (Unidentified Species)



#### DRBC: Delaware Estuary Boat Run

The Delaware River and its tributaries are also assessed by the DRBC. The Commission describes its Delaware Estuary monitoring program, the Delaware Estuary Boat Run, as one of the longest-running monitoring programs in the world. Once per month from April to October, the Commission collects samples at

22 stations along the tidal Delaware River. The Commission conducts sampling of bacteria, nutrients, dissolved oxygen, heavy metals, chlorophyll-a, dissolved silica, and volatile organics.

### Other Sampling Programs

The New Jersey Office of Science, the EPA Environmental Monitoring and Assessment Program, and the AmeriCorps NJ Watershed Ambassadors Program have also historically maintained monitoring stations around or within West Deptford. NJDEP tracks these locations on its NJ GeoWeb map service. NJDEP uses all of these resources statewide but does occasionally omit some years or types of sampling. Appendix B in the 2014 New Jersey Integrated Report contains the full list of the data sources used for monitoring the state's surface waters.

**Table 10:** Water Quality Sampling Locations within and Upstream of West Deptford

Station Name	Station ID	Program Name	Municipality
Delaware River at Fort Mifflin at Philadelphia, PA	01474703	ASWQMN	City of Philadelphia
Mantua Creek at East Holly Avenue at Pitman, NJ	01475001	ASWQMN	Pitman Borough
South Branch Big Timber Creek at Blackwood, NJ	01467330	ASWQMN	Gloucester Township
North Branch Big Timber Creek at Glendora, NJ	01467359	ASWQMN	Gloucester Township
Edwards Run at Pitman—Jefferson Rd	AN0673	AMNET	Harrison Township
Mantua Creek at Greentree Rd	AN0668	AMNET	Glassboro Borough
Chestnut Bridge at Lambs Rd	AN0670	AMNET	Mantua Township
Little Timber Creek at Devon Rd	AN0666	AMNET	Bellmawr Borough
Edwards Run at Jessups Mill Rd	AN0674	AMNET	Mantua Township
Turners Run at Last Bridge Crossing	AN0657	AMNET	Washington Township
Mantua Creek at Lambs Rd	AN0669	AMNET	Mantua Township
Delaware River at RM 87.90		DRBC Boat Run	Paulsboro Borough
Delaware River at RM 93.20		DRBC Boat Run	City of Philadelphia

Sources: USGS, NJDEP, DRBC

Water monitoring data from all of these stations is located within the Water Quality Portal at the National Water Quality Monitoring Council's website, the EPA's STORage and RETrieval (STORET) central warehouse, and the USGS National Water Information System.

## TMDLs

For impaired waters (waters on Sublist 5), the state is required by the EPA to establish a TMDL. As mentioned previously in the section on New Jersey's Integrated Water Quality Monitoring and Assessment Report, a TMDL quantifies the amount of a pollutant a water body can assimilate (its loading capacity) without violating water quality standards. The purpose of a TMDL is to initiate a management approach or restoration plan based on the sources of pollutants and the percentage reductions of each pollutant that must be achieved to attain water quality standards. These sources can be point sources, coming from a single "point," such as a sewage treatment plant; or nonpoint sources, which come from a collection of sources, such as runoff from various types of residential, commercial, or agricultural lands.

As listed in Table 9, there are five HUC-14 watersheds in West Deptford Township that are listed on Sublist 5. West Deptford has no TMDLs, and none of its subwatersheds are scheduled to receive TMDL reports as per NJDEP's draft two-year TMDL schedule, which is listed in the most recent Integrated Water Quality Monitoring and Assessment Report (2014).

In general, implementation of a TMDL relies on actions mandated by the Municipal Stormwater Regulation Program, including the ordinances required to be adopted by municipalities under that permit (see the **Nonpoint Sources** subsection on page 64 for details of the statewide basic requirements of this program). It also depends on private landowners making voluntary improvements to their land.

## Potential Causes of Water Quality Impairments

### Point Sources

Point sources of discharge, 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 waterbodies. The act classified all water pollution into one of two categories: "point source" pollution coming from a single source, such as an industrial pipe; and "nonpoint source" pollution, which comes from many diffuse sources. Although the Federal Clean Water Act only required states to regulate point sources, New Jersey also regulates nonpoint sources through the authority of the NJPDES rules (see the **Nonpoint Sources** section on page 64).

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 periodically conduct water quality, biological and toxicological analyses, and thermal impact and cooling water assessments.

As of February 2017, 48 active NJPDES permits for point source discharges were issued for activities in West Deptford. Eight permits, which exclude 27 5G3 general permits for construction activities and 13 5G2 general permits for basic industrial stormwater, are shown in Table 11: NJPDES Permits for Point Source Discharges. More information on each facility's permit is available at NJDEP's DataMiner data portal.



**Table 11: NJPDES Permits for Point Source Discharges**

NJPDES Permit Number	Program Interest Number	Facility Name	Facility Address	Start and Expiration Dates	Discharge Category Description	Discharge Category Code
NJ0005185	46773	Solvay Specialty Polymers USA, LLC	10 Leonards Lane	1/1/2017–12/31/2020	Industrial Wastewater	B
NJ0024686	46394	Gloucester County Utilities Authority	Paradise Road	10/1/2016–9/30/2021	Sanitary Wastewater	A
NJG0198137				1/1/2017–12/31/2021	Sludge Quality Category 4 (General Permit)	S4G
NJ0033588	46464	Coim USA, Inc.	286 Mantua Grove Road, Bldg 1	4/1/2016–11/30/2019	Stormwater	RF
NJ0033952	46229	Colonial Pipeline Company Woodbury Junction	696 Mantua Grove Road	8/1/2014–7/31/2019	Stormwater	RF
NJ0062391	46890	Wheelabrator Gloucester Co., LP	600 US Route 130	8/1/2016–9/30/2019	Industrial Wastewater	B
					Stormwater	RF
NJ0171905	476539	West Deptford Energy Station	3 Paradise Road	10/1/2016–9/30/2021	Industrial Wastewater	B
NJG0130001	49417	Matteo Brothers Mgmt, Inc.	1692 Crown Point Road	7/1/2016–9/30/2018	Scrap Metal Processing (General Permit)	SM2

Source: NJDEP, 2017

Discharge Category Code	Description
5G2	Stormwater Basic General Permit: Available to regulated industrial facilities that have eliminated, or can eliminate within six months of authorization, all exposure of industrial materials or activities to stormwater discharges.

Discharge Category Code	Description
5G3	Construction Activity Stormwater General Permit: Authorizes point source discharges from certain construction activities. Permit holders are required to develop a soil erosion and sediment control plan to manage waterway pollution from construction sites.
A	Sanitary Wastewater: Issued to facilities that discharge primarily domestic sewage from residential and commercial properties.
B	Industrial Wastewater: Issued to facilities that discharge treated and nontreated wastewater derived from, among other sources, process and nonprocess wastewater, contact and noncontact cooling water, and stormwater runoff.
RF	Industrial Stormwater Discharger Individual Permit: Issued to facilities that discharge stormwater that is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant.
S4G	Sludge Quality Category 4 General Permit: Issued to public or private sewer treatment facilities with a permitted flow of over 5 million gallons per day to implement the provisions of the Sludge Quality Assurance Regulations for residual quality and quantity monitoring.
SM2	Scrap Metal Processing and Recycling General Permit: Issued to facilities that process and recycle scrap metal, including from vehicles.

Although the NJPDES program has made progress in regulating point source discharges, NJDEP has allowed many minor discharges without regard to their cumulative impact on surface water quality. If the environmental commission receives notice from NJDEP when an individual applies for a permit to discharge to surface water under the NJPDES, the commission can examine the application and evaluate the proposal, in particular, the need for the permit, the location of the discharge, and the potential negative impacts to the township's water quality. **The Community Development Department, during its permit review process, should consult with the environmental commission to learn about the potential negative impacts to the township of projects discharging to surface water.**

### Nonpoint Sources

Nonpoint source pollution, which comes from a wide variety of sources rather than from a single point, such as a discharge pipe, has a detrimental effect on the water quality and ecology of streams in most townships, including West Deptford. These sources are also the most difficult to identify and remediate because they are diffuse, widespread, and cumulative in their effect.

Nonpoint source pollution in West Deptford is derived from stormwater drainage off paved surfaces, such as streets and parking lots, commercial/industrial areas, residential sites (with and without detention basins), lawns, and from agricultural fields that lack adequate vegetative buffers. Some of this runoff comes to the waterways from similar sources in upstream townships, and some of it derives from West Deptford land uses.

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

In February of 2004, NJDEP issued a new Stormwater Management Rule, as required by EPA's Phase II Stormwater Management Program for Municipal Separate Stormwater Sewer Systems (MS4). Its most recent update was in 2017. 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) that contain stormwater sewer systems that are separated from regular sewer systems. Each entity with this type of sewer system is required to obtain an MS4 general permit for the stormwater system.

Under this permit, a town must meet certain specific requirements in planning, ordinance adoption, education, and management of township facilities and investigation of parts of the stormwater system. Municipalities are classified as either Tier A or Tier B under the stormwater rules. West Deptford is listed among the Tier A municipalities, which have higher population levels and densities, as well as more stringent requirements than Tier B municipalities.

West Deptford Township addressed the NJPDES permit requirements with its Stormwater Management Plan, which adopted the performance standards set out in N.J.A.C. 7:8-5. West Deptford enacted its stormwater control ordinance, "Stormwater Control Procedures," in 2007, which regulates erosion and sedimentation on major construction sites. The township also enacted an ordinance for regulating the design of storm drain inlets in 2013.

Municipalities may adopt more restrictive stormwater requirements than those required by New Jersey, which sets minimum requirements. All development, regardless of its size or how it is regulated, should have its effect on stormwater considered.

The NJPDES permit requires municipalities to develop an outreach program to educate residents on the science of stormwater and its effects on the community. West Deptford's Environmental Commission and Public Works Department run a booth at West Deptford Family Fun Day, an outdoor community festival held annually, which provides information on water quality to visitors. The booth has exhibited a groundwater display, which includes a three-dimensional diorama that enables visitors to add colored dye and see how it moves through a model hydrological system.

The township also regularly sends out water quality tips through its website and annual calendar, and through its weekly email blasts.

The following is a brief set of guidelines for municipal stormwater managers to ensure compliance with the Tier A Municipal Stormwater General Permit through a Stormwater Program to reduce the discharge of pollutants from the municipality's MS4s, and a Stormwater Pollution Prevention Plan that helps implement a series of policies and programs known as the Statewide Basic Requirements.

Stormwater Management Statewide Basic Requirements include the following:

1. Comply with state and local public notice requirements when public participation in the stormwater program is required or desired.
2. Control postconstruction stormwater management in new development and redevelopment through:
  - adopting a stormwater management plan in accordance with N.J.A.C. 7:8;
  - adopting and implementing a stormwater control ordinance in accordance with N.J.A.C. 7:8; this ordinance requires that the equivalent of the annual groundwater recharge volume that existed before development be recharged after development;
  - ensuring compliance with Residential Site Improvement Standards (RSIS) for stormwater management, which require non-structural strategies to the maximum extent practicable;
  - ensuring long-term operation and maintenance of Best Management Practices on municipal property; and
  - requiring that new storm drain inlets meet new design standards.
3. Conduct local public education:
  - Distribute educational information about stormwater requirements, nonpoint source pollution, and stewardship annually to residents and businesses, and conduct a yearly educational event with stormwater as the focus, such as a booth with these messages at a community day.
  - Label all municipal storm drain inlets with a “don’t dump trash here” message.
  - Distribute information annually regarding fertilizer and pesticide application, storage, disposal, and landscaping techniques that minimize nutrient deposition into waterways.
  - Distribute information annually regarding the proper identification, handling, and disposal of wastes, including pet waste and litter.
4. Control improper disposal of waste through improved yard waste collection and through adoption of ordinances for pet waste, litter, improper dumping, and wildlife feeding.
5. Control solid and floatable waste from entering waterways through more frequent street sweeping; retrofitting storm drain inlets during road repairs; and instituting programs for stormwater facility management, roadside erosion control, and outfall pipe scouring and/or erosion.
6. Manage the township’s maintenance yard operations to improve water quality, specifically regarding storing de-icing materials, refueling gas-powered equipment, maintaining vehicles, and general housekeeping.

## Floodplains and Stormwater

### 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 1-percent floodplain, also known as the 100-year floodplain, is defined as the land area that will be inundated by the overflow of water that has a 1 percent chance of occurring in any given year (the 100-year flood). The probability of flooding is computed based on historical river flows and flood events. At least 10

years of data is required to calculate flood probabilities. This number represents a moving average and can be periodically recalculated to account for changes in flood trends in an area.

The *Flood Hazard Area* is the land, and the space above that land, which lies below the flood hazard area design flood elevation. In New Jersey, the flood hazard area design flood elevation is a flood equal to the 100-year/1-percent flood, plus an additional amount of water in fluvial areas to account for possible future increases in flows due to development or other factors.

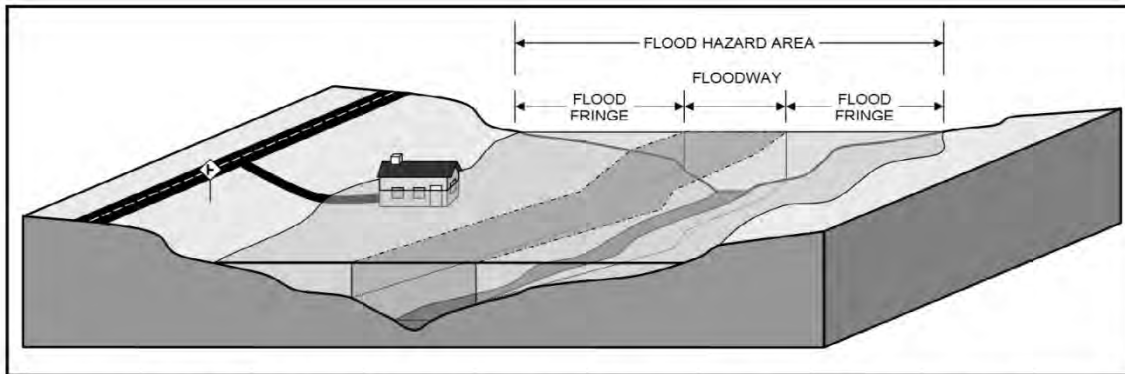
Floodplains require protection in order to prevent loss of or damage to property constructed on them. Equally important is the preservation of the aquatic communities that exist in floodplains. As food for many other species, these aquatic communities support the aquatic ecosystem as a whole. In addition, floodplains remove and mitigate various pollutants dissolved in stormwater, particularly fertilizer, when vegetation located within them absorbs the pollutants through their roots. The vegetation can also physically trap nutrients and sediments and prevent them from traveling farther downstream. All efforts to keep development out of floodplains will help to preserve the flood-carrying capacity of streams and their water quality.

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. NJDEP adopted a Flood Hazard Control Act in 2007, which was most recently amended in 2016. The areas of the floodplain regulated by this law are depicted in Figure 20. Full text of the revised Flood Hazard Area Control rules and other additional information on floodplain activities is available from NJDEP Division of Land Use Regulation and from its website under “Land Use.” See the **References** section (page 151). West Deptford manages development in its floodplains through its Flood Damage Prevention Code in its municipal code. The township has appointed a Construction Code Official/Zoning Official to administer the Flood Damage Prevention Code. All development that is subject to review under the the New Jersey Municipal Land Use Law (N.J.S.A. 40:55D-1 et seq.) or the New Jersey Uniform Construction Code (NJAC 5:23) must comply with the Flood Damage Prevention Ordinance.

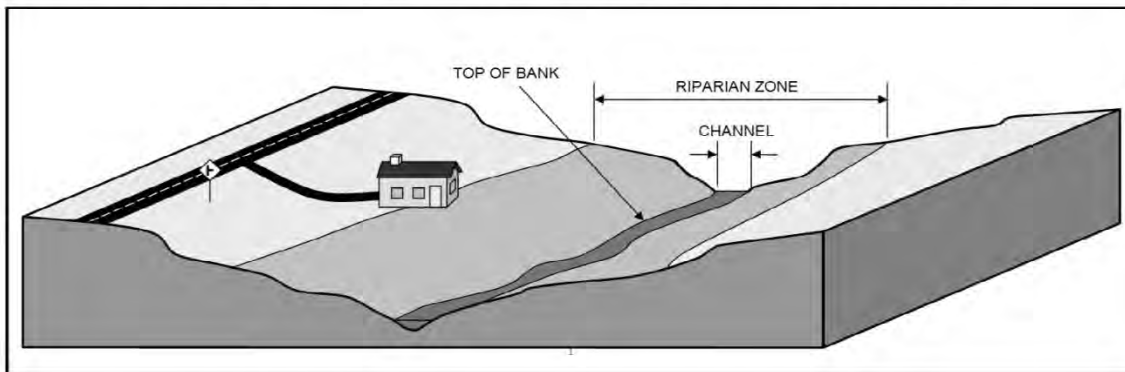
West Deptford’s floodplains are depicted in Figure 21: Floodplains using digitized coverage of the Federal Emergency Management Agency’s (FEMA’s) Flood Insurance Rate Maps (FIRMs). The boundaries of the 100-year and 500-year floodplains shown on the FIRMs were digitized from maps in 2010. Table 12: Floodplain Area indicates that 2,852 acres, or 25 percent of the township’s land area, falls within the 100-year floodplain. An additional 469 acres, or 4 percent of the township’s land area, falls within the 500-year floodplain.



**Figure 20:** Flood Hazard Area and Riparian Zone Definitions



THE FLOOD HAZARD AREA IS COMPRISED OF THE FLOODWAY AND FLOOD FRINGE



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

Source: NJDEP, NJAC 7:13

**Table 12:** Floodplain Area

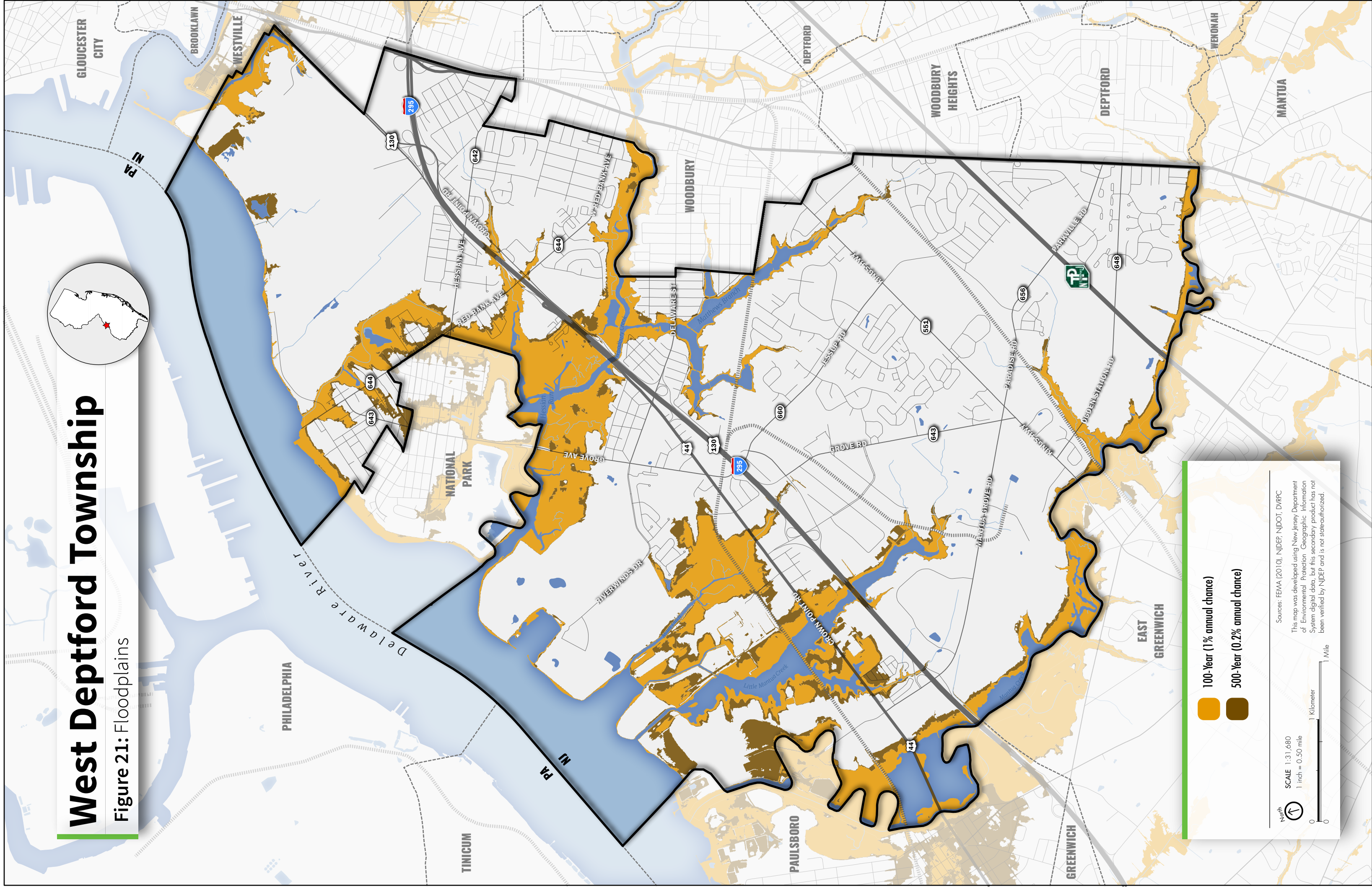
Floodplain Zone	Acres	Percentage
N/A	7,952.89	70.54%
1 Percent/100-Year	2,851.60	25.29%
0.2 Percent/500-Year	469.32	4.16%
<b>Total</b>	<b>11,273.81</b>	

Source: FEMA, 2010

West Deptford's largest floodplain areas are located along the banks of Mantua Creek, Little Mantua Creek, Main Ditch, Hessian Run, a Delaware River tributary that runs behind Red Bank Elementary School and is locally known as "back the banks," and a tributary of the Big Timber Creek. Some of the land in these floodplains is occupied by forests and wetlands, but some neighborhoods are at risk from flooding, particularly those in the vicinity of Red Bank Avenue, along First Avenue, and at points along I-295.

# West Deptford Township

Figure 21: Floodplains



- 100-Year (1% annual chance)
- 500-Year (0.2% annual chance)

North

SCALE 1:31,680  
1 inch = 0.50 mile  
1 Kilometer

Mile

Sources: FEMA (2010), 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.





## Impervious Coverage

The volume of stormwater runoff that is carried to a stream also affects the condition of the stream channel. Increased volumes of stormwater usually result from increased impervious surface within a subwatershed. As an area becomes developed, without required stormwater management measures, greater volumes of stormwater that flow at higher speeds are funneled into storm drains and then discharged to streams. 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. These factors are directly related to the proportion of a subwatershed covered in impervious surfaces. When impervious cover reaches 25 percent to 30 percent within a subwatershed, streams can become severely degraded. See Figure 22: Impervious Coverage.

Because of the widespread presence of development within West Deptford, impervious cover is a major issue within the township. While new development must comply with NJDEP's Stormwater Management Rules, much of West Deptford was constructed before NJDEP passed these rules, and these older properties do not include technology to capture or treat stormwater. The subwatershed draining into Main Ditch/Little Mantua Creek is the least impervious, with 31 percent of its land in a subwatershed that is above the 10 percent impairment threshold. The most developed subwatershed is the Big Timber Creek, with 51 percent of its land above the impairment threshold and 47 percent above the severe degradation threshold. See Table 13: Acres at Impervious Surface Thresholds.

**Table 13:** Acres at Impervious Surface Thresholds

Assessment Unit (HUC-14 Subwatershed)	HUC Identification Number	Total Acres	Acres of Impervious Surface (IS) Over 10%	Percentage of Total Acres with IS>10%	Acres of IS Over 25%	Percentage of Total Acres with IS>25%
Woodbury Creek (below Route 45)/Lower Delaware Valley to Big Timber Creek	02040202120110	4,993.94	2,418.86	48.44%	2,038.69	40.82%
Main Ditch/Little Mantua Creek	02040202120120	3,472.07	1,080.90	31.13%	854.73	24.62%
Big Timber Creek (below North Branch/South Branch Confluence)	02040202120080	393.65	200.27	50.87%	185.06	47.01%
Mantua Creek (below Edwards Run)	02040202130060	1,785.83	563.47	31.55%	411.58	23.05%

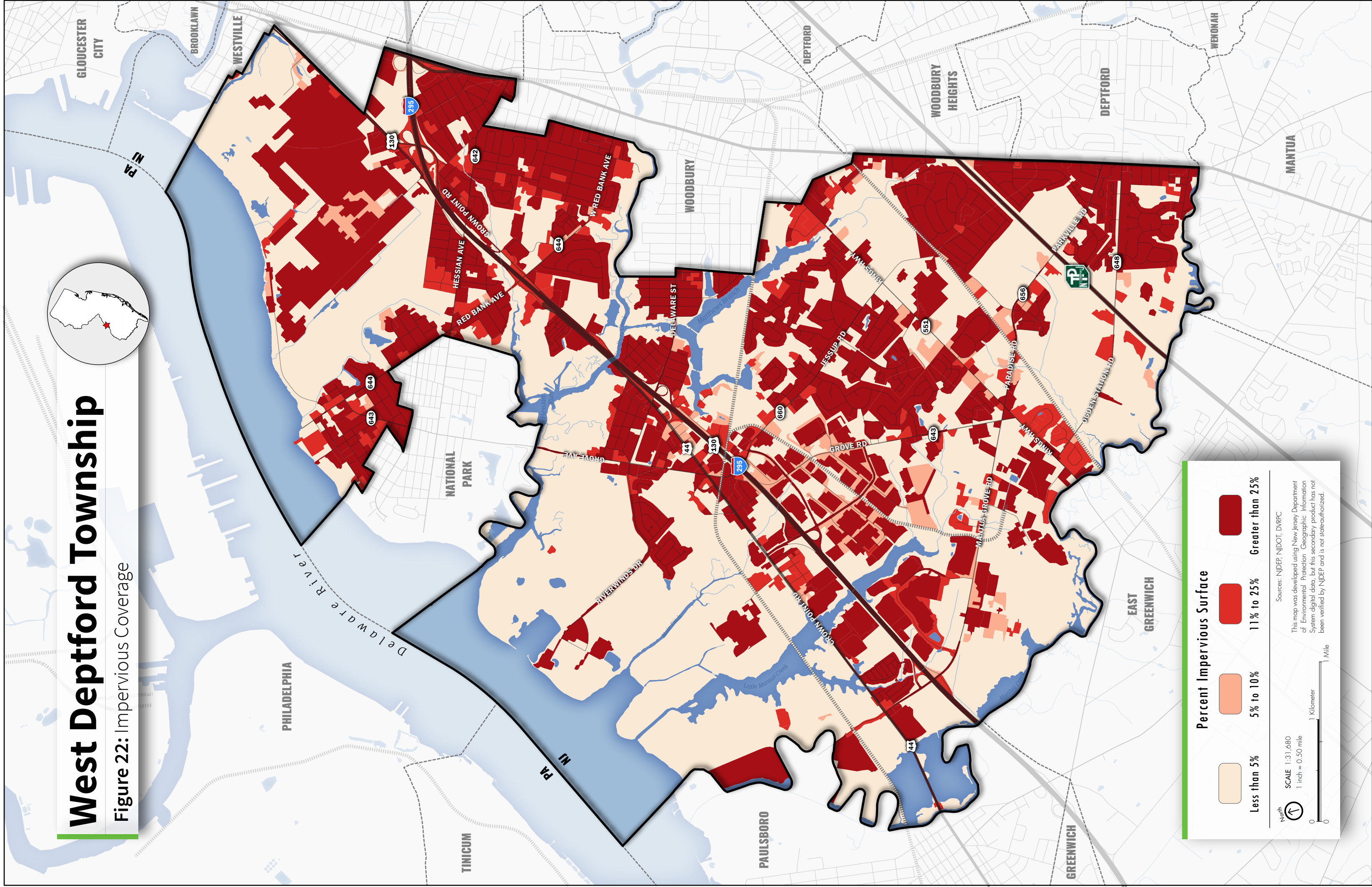


Assessment Unit (HUC-14 Subwatershed)	HUC Identification Number	Total Acres	Acres of Impervious Surface (IS) Over 10%	Percentage of Total Acres with IS>10%	Acres of IS Over 25%	Percentage of Total Acres with IS>25%
Mantua Creek (Edwards Run to Road to Sewell)	02040202130040	628.33	261.43	41.61%	223.90	35.63%

Source: NJDEP, 2012

# West Deptford Township

Figure 22: Impervious Coverage



**Percent Impervious Surface**

Less than 5%	5% to 10%	11% to 25%	Greater than 25%
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Scale: 1:31,680  
1 inch = 0.50 mile  
1 Kilometer

Sources: NJDEP, NJDOT, DWRPC

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.



## Flooding Issues

### Delaware River

The township's "back the banks" waterway regularly contributes to flooding in the area around Red Bank Avenue. Much of this area contains wetlands, but some properties flood. One of these properties, and one that particularly affects the functioning of the township, is Red Bank Elementary School on Walnut Avenue. The school is located next to a wetland that has been heavily influenced by human activity. The school's property used to be Washington Park, an amusement park that was formerly a regional destination. It then was purchased by the Campbell Soup Company and was used to grow vegetables for their soup. In World War I, it was the site of a munitions factory.

### Mantua Creek

The township's 1979 Natural Resources Inventory listed the Mantua Terrace area off Route 45 as the area of the township that received the "most frequent and damaging" flooding, and this southeast corner of the township continues to get flooded from Mantua Creek during storms. The Natural Resource Inventory indicated that floodwaters have historically "reached the rooftops of houses," and that "during serious floods, entire houses have been swept away."

The township is acquiring abandoned properties (with landowner permission) on the south side of First Avenue. This area will be suitable for a greenway that can accept floodwaters without damage to property. The township will seek FEMA funding for the acquisitions to protect the stream corridor.

### Matthews Branch

A tributary of Matthews Branch stretches into Woodbury City, where it becomes Bell Lake. Flooding occurs on the portion of the tributary adjacent to Bell Lake—across from Sanderson Way—in West Deptford Township. This flooding has led to the death of oak trees surrounding the waterway, which have suffered from saturated soil conditions.

### Woodbury Creek

The approximate meeting place between Woodbury Creek and Hessian Run is the site of Willow Woods, a mobile home park located off I-295. Willow Woods borders wetlands, but the wetlands are not always sufficient to absorb floodwaters that occur during storms and the site frequently floods.

## Stream Buffers and Greenways

Vegetated stream buffers (Figure 23) are one strategy for reducing the effects of stormwater runoff. The stream buffer is an area comprised of a stream channel and the land immediately inland of the channel. Stream buffers are quite effective at filtering substances that would otherwise be carried into streams by floods or stormwater; they can limit the entrance of sediment, pollutants, and nutrients into the stream itself. The vegetation located within the buffer area traps sediment and it can absorb some of the nutrients in fertilizer that flows to the stream from lawns and farms.

When a stream buffer contains enough trees and large shrubs to create a strong root system and shade, this vegetation can stabilize the stream banks and control the stream's water temperature. The buffer can also serve as a green corridor or "greenway" that gives wildlife greater mobility between larger forested habitat areas, enabling animals to find food, shelter, or other resources. People can also use greenways for recreation. Their linear nature makes them well suited for jogging, walking, and biking. They can also be used for fishing or boat launching if they contain access points to the water. Enhanced access to West Deptford's waterways, if created with minimal impact to the environment, allows visitors to experience them



directly, and through their enjoyment, become more determined stewards and advocates for these waterways.

In aesthetic terms, stream buffers can also help preserve the preindustrial or presuburban character of a community, providing a sense of “visual relief.” Overall, stream buffers can enhance a community’s quality of life, improve water quality, increase property values, provide tourism and recreation opportunities, and bolster the economic value of a community.

The importance of a healthy, intact stream buffer zone has been well documented scientifically over the past 50 years, especially for headwater streams. There is less agreement and continuing research on the best minimum width of a buffer for streams. In general, the wider the stream buffer, the more likely it will provide the township with the benefits described in the previous three paragraphs. In addition to the floodplain regulations discussed in the **Floodplains** subsection (page 66), New Jersey state law requires a 50-foot buffer around most streams, although municipalities can establish wider buffers. More information on stream buffers, including widths to support different ecological functions and further reading materials, can be found at ConservationTools.org, an online resource that was developed by the Pennsylvania Land Trust Association. See the **References** section (page 151).

**Figure 23:** Forested Riparian Buffers along Mantua Creek



Source: Michael Hogan, [www.hoganphoto.com](http://www.hoganphoto.com)

Figure 6: Land Use/Land Cover (2012) shows that most of the streams in West Deptford Township have a degree of border by vegetated riparian buffers, although a few are very narrow or even nonexistent in some locations. The best-protected areas for most of the streams are close to the Delaware River; farther inland, most of the creeks have fewer riparian buffer areas.

The New Jersey Audubon Society has identified some riparian buffer areas in West Deptford Township—the National Park Dredge Spoils and the Mantua, Woodbury, and Big Timber creeks—as Important Birding Areas. These areas are discussed in the **Birds** subsection (page 112). Protecting these riparian buffers from

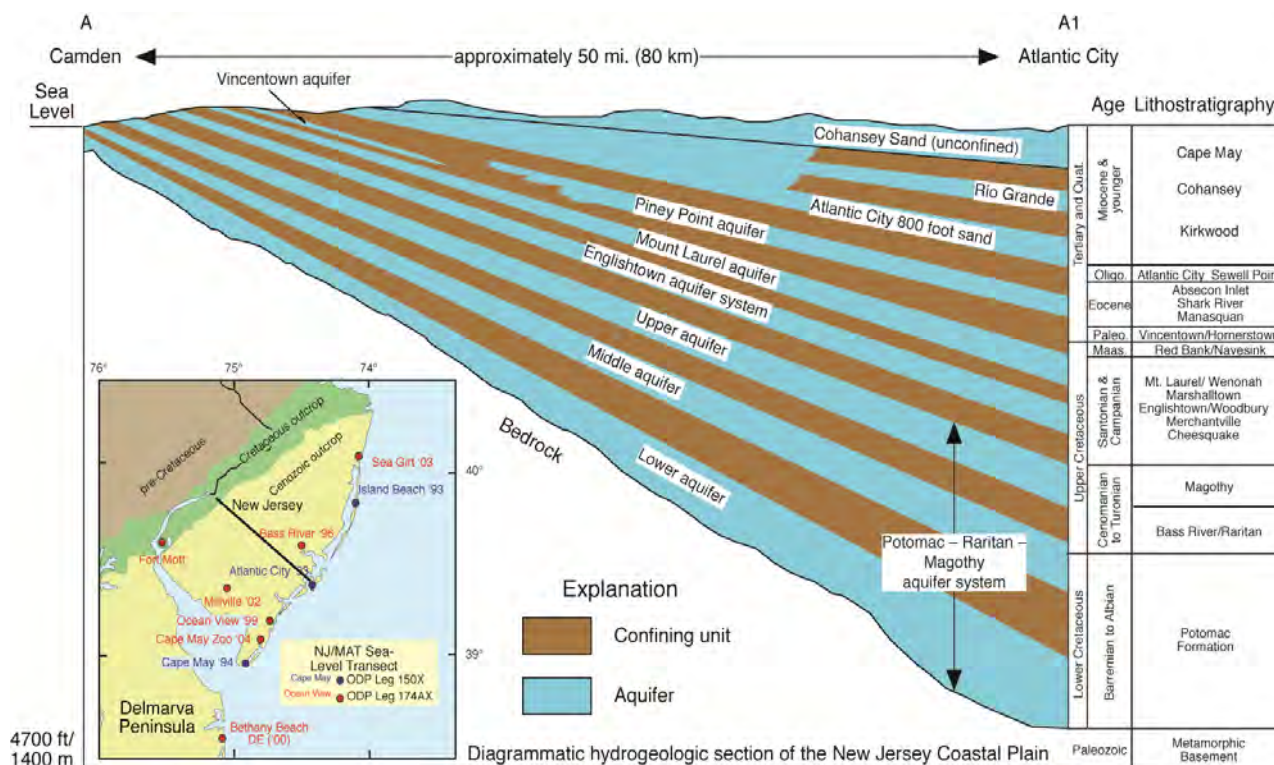
development and enhancing or maintaining healthy vegetation in the stream corridor can help improve water quality, reduce flooding, and encourage biodiversity in the township. **Environmental commissions can also encourage the preservation of existing vegetation and replanting of native vegetation along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

## 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 aquifers are not horizontal but tilted toward the southeast, getting deeper as they cross the state toward the Atlantic Ocean. This cross-section is depicted in Figure 24: Aquifers of Southern New Jersey along a Line from Camden to Atlantic City. Because of this tilting, each aquifer emerges on the land surface in a sequential manner. The deepest and oldest strata emerge on the surface near the Delaware River. Where each individual layer emerges is called its “outcrop” area. The Potomac-Raritan-Magothy formation, the deepest and most abundant aquifer, is a major water source for Inner Coastal Plain communities.

**Figure 24:** Aquifers of Southern New Jersey along a Line from Camden to Atlantic City



Sources: M. Martin, *Ground-Water Flow in the New Jersey Coastal Plain: U.S. Geological Survey Professional Paper, v. 1404-H* (1998), 1–146; P. J. Sugarman et al., *Hydrostratigraphy of the New Jersey Coastal Plain: Sequences and Facies Predict Continuity of Aquifers and Confining Units: Stratigraphy, v. 2* (2005), 259–75

Other smaller aquifers on top of the Potomac-Raritan-Magothy formation are the Englishtown and the Mount Laurel-Wenonah. These aquifers are separated by two confining units, the Merchantville-Woodbury and the Marshalltown-Wenonah (see Figure 8: Geology).

## Aquifers and Confining Units

### Potomac-Raritan-Magothy Aquifer

The Potomac-Raritan-Magothy aquifer is a principal geological formation underlying West Deptford Township and is the primary source of drinking water for West Deptford's public wells. It has an outcrop area that matches the route of the Delaware River, and so it outcrops along West Deptford's western border.

The Potomac-Raritan-Magothy aquifer is actually a large series of formations that have been combined and described as a single unit because the individual formations—the Potomac group and the Raritan and Magothy formations—are indistinguishable from one another over large areas of the Coastal Plain, as 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).

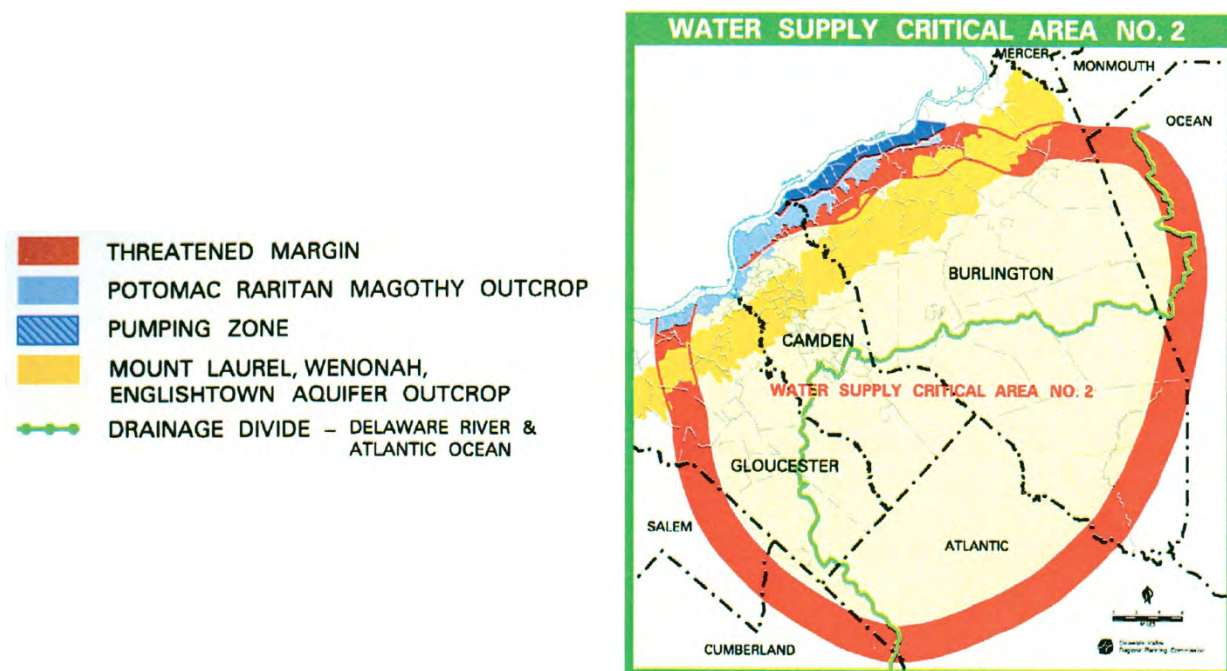
In the Delaware Valley, three aquifers designated as lower, middle, and upper have been distinguished within the Potomac-Raritan-Magothy system. West Deptford Township draws all three aquifer layers for its water. These aquifers are divided by two confining units. The aquifers are largely made up of sands and gravels, locally interbedded with silt and clay. The lower aquifer sits on the bedrock surface. The confining units are



composed primarily of very fine-grained silt and clay sediments that are less permeable and thus reduce the movement of water between the aquifers. They also help to slow the entry of any contaminants on the surface down into the groundwater.

The Potomac-Raritan-Magothy 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 this high usage, the levels of water in this aquifer declined to such low levels that NJDEP established the region as a water supply critical area (Critical Area Number 2) three decades ago, as shown in Figure 25. All water supply companies and authorities within this area have annual limits on water withdrawals from the Potomac-Raritan-Magothy aquifer. The majority of West Deptford Township is within the boundary of the Critical Area; a small portion of the township is in the Threatened Margin.

**Figure 25:** Extent of Water Supply Critical Area Number 2



Source: DVRPC

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 NJDEP for any additional water allocations from the Potomac-Raritan-Magothy.

In Gloucester and Salem counties, use of the lower Potomac-Raritan-Magothy aquifer for drinking water is limited due to high chloride concentrations (saltwater 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. As a general practice, preventing contamination of the land in aquifers emerging on the land surface is extremely important in order to maintain a safe drinking water supply.

Whatever the cause, most of the lower aquifer is not usable for drinking supply. There are also problems with salinity levels in the upper and middle Potomac-Raritan-Magothy aquifers, especially for wells closest to the



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

#### Merchantville-Woodbury Confining Unit

Overlying the upper aquifer of the Potomac-Raritan-Magothy system, the Merchantville-Woodbury confining bed is the oldest confining unit in the New Jersey Coastal Plain. It is composed of two subunits, both dating from the Late Cretaceous. The younger Woodbury Clay is a thick, massive layer of clayey silt, which overlies the Merchantville Formation, a bed of glauconite. The Merchantville-Woodbury unit is a large, effective confining unit that can reach a thickness of over 450 feet.

#### Englishtown Aquifer System

The Englishtown Formation, of the Late Cretaceous period (65 to 100 million years ago), outcrops in the Inner Coastal Plain in an irregular band that extends from Raritan Bay to the Delaware River, adjacent to Salem County. Lying on top of the Merchantville-Woodbury confining unit, it outcrops in the southeast corner of West Deptford. Where the Englishtown Formation is exposed, the primary components are fine-to-medium grained sands. While the Englishtown Formation is a significant water source in Monmouth and Ocean counties, it is commonly less than 40 feet thick in parts of Burlington, Camden, Gloucester, and Salem counties. It is not a major source of water in Gloucester County due to its small size and greater proportion of fine-grained sediments, resulting in lower yields. More productive aquifers lie above and below it.

#### Marshalltown-Wenonah Confining Unit

The Marshalltown and Wenonah formations comprise a leaky confining unit separating the Englishtown aquifer and the Mount Laurel-Wenonah aquifer. The Marshalltown portion is a 10-to-20-foot-thick layer of glauconitic silt and sand, while the Wenonah formation is quartz sand that is fine grained near the Marshalltown formation and gradually becomes coarser grained in its upper part. As the grain size of the Wenonah unit increases, the formation begins to hold more water, and the upper part of the Wenonah formation becomes part of the Mount Laurel-Wenonah aquifer. This unit outcrops in the southeast corner of West Deptford.

#### Mount Laurel-Wenonah Aquifer

The Mount Laurel-Wenonah aquifer is composed of the Wenonah Formation and the Mount Laurel Sand, both of the Early Cretaceous period (130 to 150 million years ago). It is thickest in Burlington, Camden, Gloucester, and Salem counties, reaching 100 to 120 feet. The Mount Laurel-Wenonah aquifer is affected by withdrawals from the Englishtown aquifer, which lies below it. Because of Englishtown withdrawals, more Mount Laurel-Wenonah water leaks through the confining layer to the Englishtown aquifer. Reductions in the Potomac-Raritan-Magothy aquifer system also negatively affect water levels in the Mount Laurel-Wenonah aquifer. The Mount Laurel Sand is the dominant formation within this aquifer, and all the wells that make use of this aquifer are situated on or near the outcrop area for the Mount Laurel Sand. This aquifer outcrops in the smallest area, relative to the other locally outcropping aquifers and confining units, in the southeast corner of West Deptford.

#### 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.

NJGS has developed a methodology for evaluating land areas for their ability to transmit water to the subsurface, using precipitation records, soil surveys, and land use/land cover data. NJDEP has used this

methodology to map the groundwater recharge potential of land areas throughout the state. *Recharge* is equivalent to the amount of precipitation per year that could reach the water table in an area with a particular combination of soils and land use. It is expressed as inches per year.

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

In West Deptford Township, 32.1 percent of the land experiences moderate recharge, at a rate of 6 to 9 inches per year. Lands with the highest potential recharge rates (between 10 and 14 inches per year) make up 15.0 percent of the land and are scattered throughout the township. Areas with high groundwater recharge rates often occur in undeveloped upland areas, especially those underlaid by permeable soils. 42.4 percent of West Deptford has no groundwater recharge. These areas are often located in wetlands, which have a low recharge rate because they are already saturated. Urban areas also experience very low recharge because of their impervious surface cover. Development in West Deptford that is not designed to let stormwater naturally absorb into the soil onsite would likely decrease the rate of possible groundwater recharge, especially if it occurred in the township's remaining high-recharge areas (see Figure 26: Groundwater Recharge Rate).

In general, on high-recharge lands, large amounts of paving and high impervious cover will have the most detrimental impact, although they are also usually the places that are most suitable for building because they are on well-drained soils. Projects that are below the one-acre "major project" threshold under the state and township stormwater rules may also have a detrimental impact because they are not required to maintain predevelopment groundwater recharge, whereas all "major projects" are. These are also regions where the dilution of substances from septic systems, such as nitrates, may require a larger land area because the soils are usually more "porous." For example, minimum average lot sizes of two to four acres are often needed for proper nitrate dilution from septic systems in areas having 10 or more inches per year of groundwater recharge.

While the surest way to protect groundwater recharge is to leave land undeveloped, there are ways in which urbanized areas can preserve groundwater and stormwater standards. Best Management Practices, such as tree trenches, bioswales, rain gardens, rain barrels, infiltration basins, and porous pavement can be used with great success to capture, treat, and infiltrate precipitation in developed areas from all but the most significant storm events. Also referred to as green stormwater infrastructure, these techniques are often used in more developed communities to manage stormwater and protect drinking water supplies. The use of these techniques should be encouraged where it is appropriate to install them.

Over the last several decades, in spite of increased development, the water level readings in the majority of observation wells within West Deptford Township show an increase in groundwater. Table 14: USGS Groundwater Observation Wells shows the wells in West Deptford that were monitored within the past five years. These wells all monitor the upper, medium, or lower layers of the Potomac-Raritan Magothy system, which has had pumping restrictions since 1986, as previously discussed. The observed water level has risen in 11 of 13 wells, indicated by a decreased depth in feet below land surface. If the water levels were dropping, wells might have to be drilled deeper to reach sizable and usable quantities of water.

**Table 14:** USGS Groundwater Observation Wells

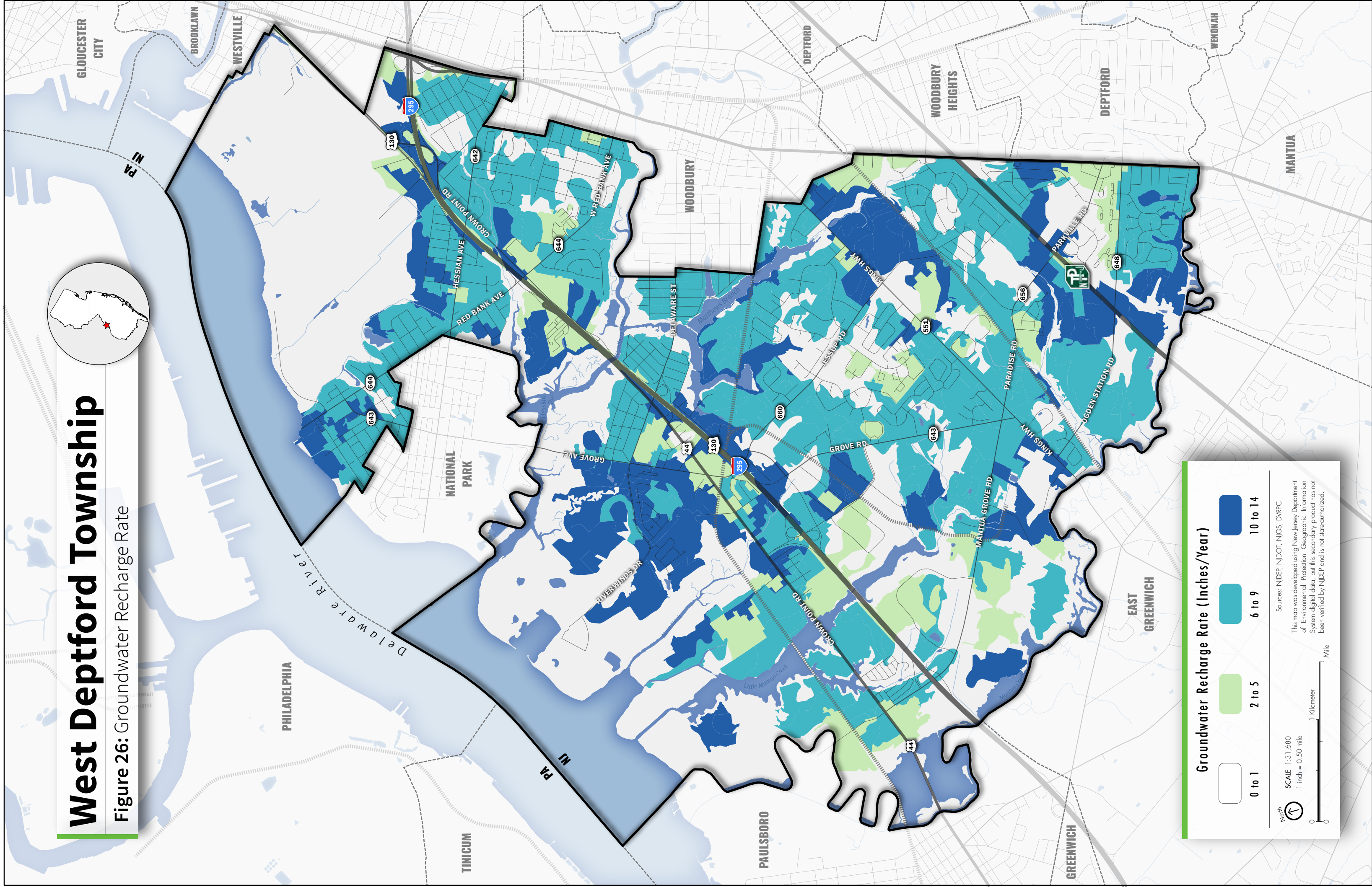
Observation Site Number	Site Name	Depth of Well (ft)	Depth of Hole (ft)	Date of First Observation	Water Level (ft below land surface)	Date of Last Observation	Water Level (ft below land surface)
394820075103301	Test 8-79	308	?	2/1/1979	77	12/5/13	63.24
394821075102601	West Deptford PW 4	289	?	3/14/1963	84	12/5/13	88.57
394913075110501	5 Kings Highway	450	?	7/1/1973	81	12/5/13	68.42
394923075101901	Deep 1	188	188	2/7/1994	77	12/2/13	62.55
394939075100701	Irr	140	?	1/29/1973	34	12/2/13	25.08
395030075123601	Pennwalt TW 1	114	?	2/1/1969	20	12/3/13	14.3
395044075124201	Pennwalt TW 8	271	?	4/21/1969	25	12/3/13	19.56
395107075094601	6 Red Bank Avenue	372	?	10/4/1973	66	12/5/13	40.2
395115075125701	Pz-3I	111	200	8/22/1991	23	12/3/13	15.12
395132075083201	PW 7	366	378	12/8/1980	85	12/5/13	46.27
395153075094901	Eagle Point 6A	331	351	4/7/1981	68	12/3/13	29.7
395215075104101	ICP-NU02	39	39	6/29/2011	18	7/25/12	20.27
395221075085601	150321—Eagle Point 5	277	?	10/29/1948	46	12/3/13	36.23

Source: NJDEP, 2017



# West Deptford Township

Figure 26: Groundwater Recharge Rate



**Groundwater Recharge Rate (Inches/Year)**

0 to 1	2 to 5	6 to 9	10 to 14
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Sources: NJDEP, NJDOT, NJGS, 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.

North

SCALE 1:31,680  
1 inch = 0.50 mile  
1 Kilometer

0 1 Mile





### **Public Water Supply Wells**

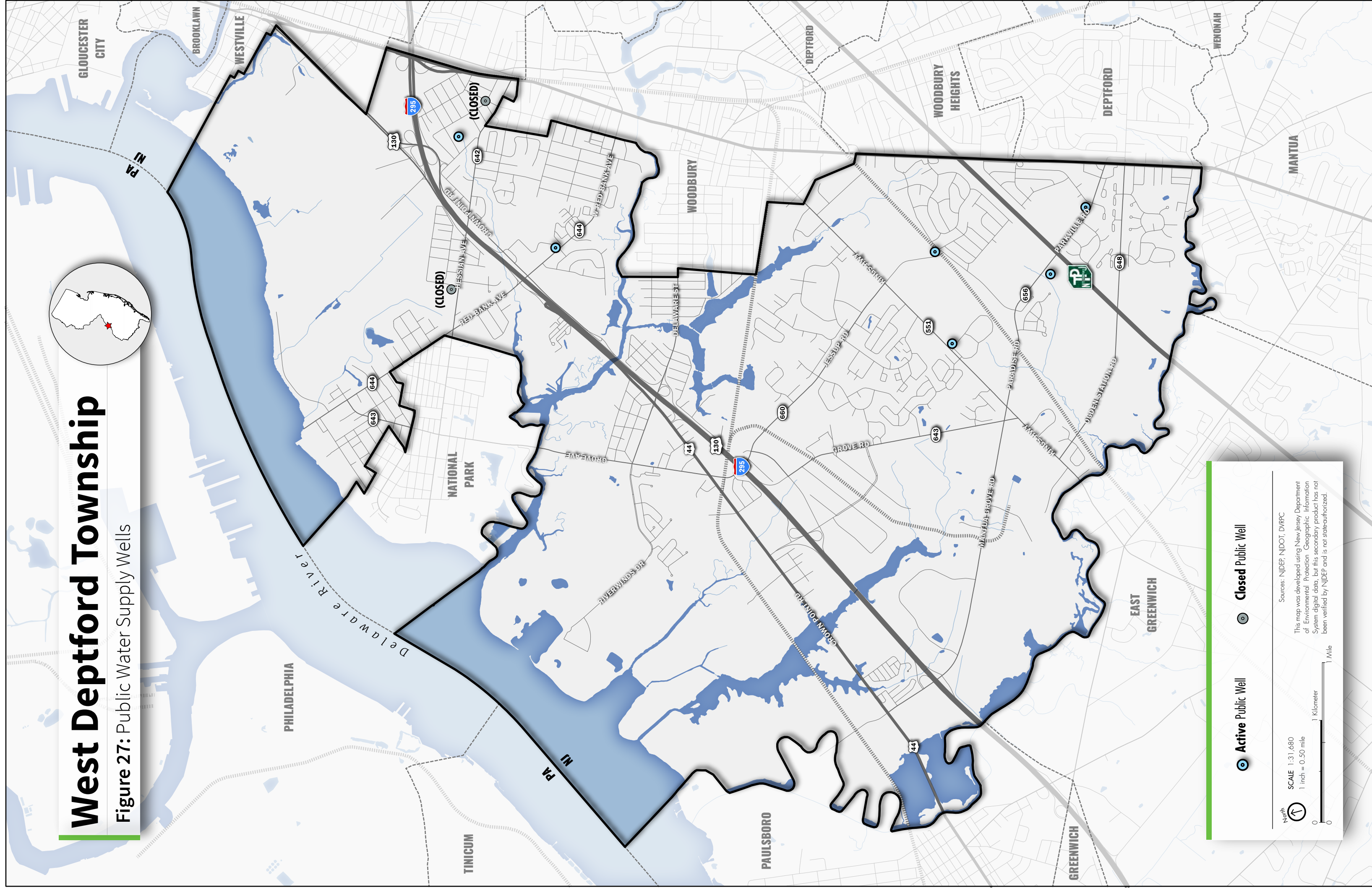
Public water supply wells, which may be publically or privately owned, are defined as those that serve at least 25 people or 15 service connections for at least 60 days per year. According to EPA, public water supply wells serve 90 percent of people in the United States with drinking water. Examples of public water supply wells include municipalities, subdivisions, and nursing homes. Nearly all West Deptford residents receive their water from public water supply wells. All public wells in the township are shown on Figure 27: Public Water Supply Wells.

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



# West Deptford Township

Figure 27: Public Water Supply Wells



- Active Public Well
- Closed Public Well

North



SCALE 1:31,680

1 inch = 0.50 mile



Mile

Sources: NJDEP, NJDOT, DWRPC

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.





## Drinking Water

West Deptford Township receives its drinking water from three community water-supply systems: the West Deptford Township Water Department (serving about 21,000 West Deptford residents), the Woodbury City Water Department (serving about 60 West Deptford residents), and the National Park Water Department (serving about 40 West Deptford residents).

Each of these systems relies on groundwater wells. The West Deptford Water Department uses six wells for groundwater. The township also purchases additional groundwater from the New Jersey American Water Company. The Woodbury City Water Department uses seven wells for groundwater, which, as in West Deptford, pull water from the lower, middle, and upper Potomac-Raritan Magothy aquifer. The city also purchases additional groundwater from the New Jersey American Water Company. The National Park Water Department uses two wells for groundwater, which is solely taken from the lower Potomac-Raritan Magothy aquifer.

As required by state and federal regulations, most notably the 1974 federal Safe Drinking Water Act, the drinking water quality of all utilities is regularly monitored for a variety of chemical and biological contaminants. Monitored chemical contaminants include inorganic compounds, radionuclides (i.e., radioactive compounds), and synthetic organic chemicals. The synthetic organic chemicals that are monitored include volatile organic chemicals (i.e., organic chemicals that readily become gases), pesticides, herbicides, and disinfection by-products. Biological contaminants that are monitored include coliform and *Legionella* bacteria, as well as parasites, such as *Giardia* and *Cryptosporidium*. Turbidity (or cloudiness) is also tested. Lead and copper are also tested at a sample number of household taps. Drinking water utilities are required to notify their customers if the levels of any monitored chemicals exceed the regulated standards.

Drinking water supplies are rated for their susceptibility to contamination by different parameters, a rating that reflects the potential for contamination rather than its existence. Wells vary in their susceptibility to the tested contaminants, and each of West Deptford's three municipal sources has different types of susceptibility. See Table 15: Contaminant Susceptibility Ratings for Drinking Water Sources for these ratings from 2004, the most recent year in which NJDEP released reports on municipal water systems. Overall, the drinking water from the three municipal systems does not have a high degree of susceptibility to tested contaminants.

**Table 15:** Contaminant Susceptibility Ratings for Drinking Water Sources

Well Susceptibility	Pathogens			Nutrients			Pesticides			Volatile Organic Chemicals			Inorganics			Radionuclides			Radon			Disinfection By-product Precursors		
	High	Medium	Low	High	Medium	Low	High	Medium	Low	High	Medium	Low	High	Medium	Low	High	Medium	Low	High	Medium	Low	High	Medium	Low
West Deptford			6			6			6	1		5		6		1	4	1		1	5		6	
Woodbury			5			5			5			5		5			4	1			5		5	
National Park			2		2				2	2			1	1		2				2			2	

Source: NJDEP, 2004

In addition to the water utilities, West Deptford contains public and private water supply wells, as well as farmland irrigation systems that draw on groundwater.

The 2002 Private Well Testing Act (PWTA) requires state-certified laboratory water testing in order to sell a residential property. It also requires landlords to test the private well water supplied to their tenants and provide their tenants with a written copy of the results. The data generated by these tests is provided to both the homeowners and the NJDEP Bureau of Safe Drinking Water. NJDEP uses the data to assess the quality of the water from private wells throughout the state. If the tests detect parameters in excess of the maximum contaminant level, the laboratory must notify various parties, including the homeowner, public health authority, and NJDEP. The PWTA does not require homeowners to treat private well water if an exceedance is identified. However, local health authorities may require the installation of treatment equipment and may notify surrounding homeowners and businesses.

PWTA testing data gathered for wells located in West Deptford Township is summarized in Table 16: PWTA Data. The number of wells tested in West Deptford is a small sample size, so the results may not be representative of all of the private wells in the township. Of these wells, a majority (14 of 17, or 82 percent) exceeded maximum contaminant levels for iron, and several (four out of 17, or 24 percent) exceeded maximum contaminant levels for manganese.

Iron and manganese are considered *secondary parameters*, which occur naturally in water. Their presence at concentrations above the recommended limit will generally cause a nuisance rather than public health effects. Well water with iron in high concentrations can be orange, which may discolor laundry, and has an unpleasant taste. Well water with high concentrations of manganese may be brown or black, which also can cause stains, as well as a bitter, metallic taste. There are physical (filtration) and chemical strategies available for removing these two parameters from well water; Penn State Extension provides a brief overview of these strategies (see **References**, page 151).

**Table 16:** PWTA Data

Parameter	Percentage of Wells that Exceeded a Maximum Contaminant Level	Number of Wells Tested under PWTA
Nitrate	0.0%	17
Iron	82.4%	17
Manganese	23.5%	17
Gross Alpha Particle Radioactivity	0.0%	15
Mercury	0.0%	17
Volatile Organic Compounds	0.0%	17
Fecal Coliform/E. Coli	0.0%	17
pH	0.0%	17

Source: NJDEP, 2002-14

## Sewer

The majority of developed areas in West Deptford Township are approved for sewer service (see Figure 28: Approved Sewer Service Area). During the drafting of this report, NJDEP approved the incorporation of approximately 59 acres of mixed-use development in the RiverWinds area into West Deptford's sewer service area. These parcels include 970 residences, over 14,000 square feet of retail space, and a 16,500-square-foot conference center. NJDEP approved the addition of these parcels into the Gloucester County Utilities Authority (GCUA) Wastewater Management Plan, thus giving approval for sewer lines to be extended to the mixed-use development, but had not yet updated the sewer service map for the township.

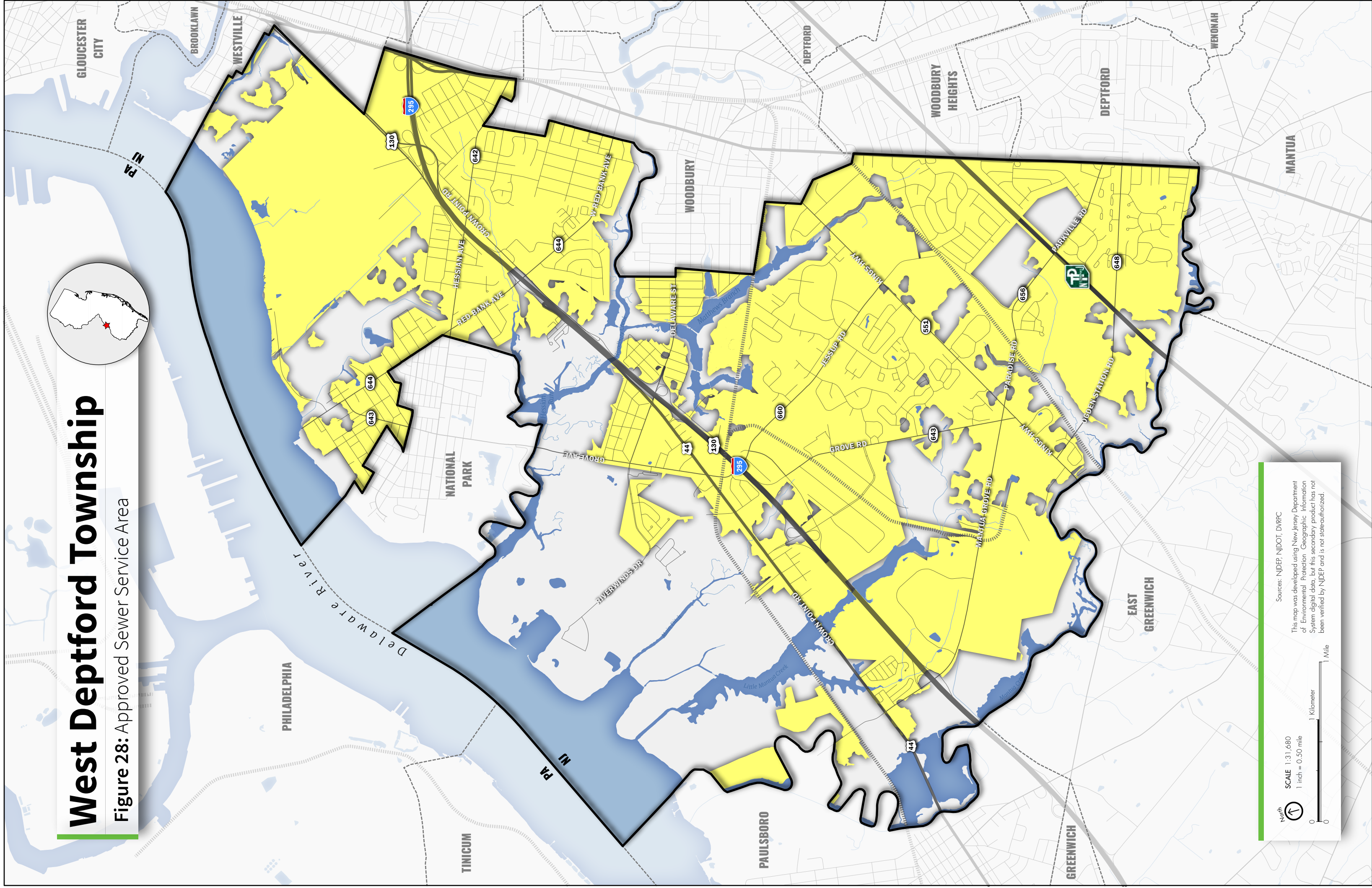
Sewer service is handled by GCUA, which is located in West Deptford. GCUA is a regional wastewater collection system that serves 16 municipalities in the county and treats over 6.3 billion gallons of wastewater annually. Wastewater is treated at GCUA's facility, and the treated water is discharged to the Delaware River. The biosolids removed as part of the treatment process are processed by digestors.





# West Deptford Township

Figure 28: Approved Sewer Service Area



SCALE 1:31,680  
1 inch = 0.50 mile

1 Kilometer

0 1 Mile

Sources: NJDEP, NJDOT, DWRC

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.



## The Value of Biological Resources

When a community protects wildlife and habitat, it is also protecting biodiversity, which encompasses the variety of genetic material within a particular species population, the variety of species (plants, animals, microorganisms) within a community, and the variety of natural communities within a given region. Biodiversity allows species to adapt and evolve as their environments change, improving their chances for survival, as well as that of the biological communities of which they are a part. A diversity of plant and animal species is also necessary to maintain healthy human environments, agricultural productivity, and ecosystem health. Other types of organisms, including fungi and bacteria—many of which are 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.

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

While the decline of biodiversity is indeed a global problem, conservation needs to occur on both global and local levels if it is to succeed. West Deptford contains numerous types of natural habitats, all of which are important for maintaining biodiversity; the most common are deciduous upland forest, deciduous wooded wetlands, and oldfield brush and shrubland, but many others are represented in the township. The following sections will identify and describe in more detail the plant and animal communities that inhabit these habitats within West Deptford Township.

## Natural Vegetation

A region's vegetation is dependent on many factors, the most important of which are climate and soils. West Deptford's climate is temperate, and rainfall averages almost 48 inches per year. A majority of West Deptford's soils are generally well drained, supporting a large diversity of trees and several agricultural crops. The township also contains a substantial amount of poorly drained soils that exhibit ponding and hydric characteristics, and which sustain wetland plants. For a detailed description of West Deptford's soils, see the **Soil Types** section on page 29.

West Deptford's natural vegetation types, along with human-influenced types of land cover, have been tabulated and mapped by NJDEP's 2012 land use/land cover analysis. The 2012 land use/land cover dataset, which is based on infrared aerial photography, is the most recent available. Each land cover type, including vegetation, is based on definitions provided by the Anderson Land Use Classification System, which was created by the USGS (see Figure 29: Natural Vegetation and Table 17: Natural Vegetation).



**Table 17: Natural Vegetation**

Type of Vegetation	NJDEP 2012 Land Cover Categories Included (See Table 2: Detailed Land Use/Land Cover)	Acres	Percentage of Total Land
Brush/Shrubland	Coniferous Brush/Shrubland, Deciduous Brush/Shrubland	310.69	2.72%
Brush/Shrubland—Oldfield	Mixed Deciduous Brush/Shrubland, Old Field (<25% Brush Covered), Phragmites Dominate Old Field	535.06	4.69%
Tidal Marshes—Freshwater	Freshwater Tidal Marshes	282.21	2.47%
Upland Forest—Coniferous	Coniferous Forest (>50% Crown Closure)	34.87	0.31%
Upland Forest—Deciduous	Deciduous Forest (>50% Crown Closure), Deciduous Forest (10–50% Crown Closure)	884.95	7.75%
Upland Forest—Mixed (Coniferous Dominate)	Mixed Forest (>50% Coniferous with >50% Crown Closure), Mixed Forest (>50% Coniferous with 10–50% Crown Closure)	31.74	0.28%
Upland Forest—Mixed (Deciduous Dominate)	Mixed Forest (>50% Deciduous with >50% Crown Closure)	31.50	0.28%
Water	Artificial Lakes; Bridge Over Water; Tidal Mud Flat; Tidal Rivers, Inland Bays, and Other Tidal Waters	1,720.79	15.07%
Wetlands—Herbaceous	Herbaceous Wetlands	18.35	0.16%
Wetlands—Modified	Agricultural Wetlands (Modified)	21.66	0.19%
Wetlands—Phragmites Dominate	Phragmites Dominate Coastal Wetlands, Phragmites Dominate Interior Wetlands, Phragmites Dominate Urban Areas	278.47	2.44%
Wetlands—Scrub/Shrub	Deciduous Scrub/Shrub Wetlands, Former Agricultural Wetland (Becoming Shrubby, Not Built Up), Mixed Scrub-Shrub Wetlands (Deciduous Dominate)	120.94	1.06%
Wetlands—Wooded—Deciduous	Deciduous Wooded Wetlands	710.74	6.22%

Type of Vegetation	NJDEP 2012 Land Cover Categories Included (See Table 2: Detailed Land Use/Land Cover)	Acres	Percentage of Total Land
Wetlands—Wooded Mixed (Deciduous Dominate)	Mixed Wooded Wetlands (Deciduous Dominate)	12.27	0.11%
Wetlands (Modified)	Disturbed Wetlands, Managed Wetland in Built-Up Rec Area, Managed Wetland in Maintained Lawn Greenspace, Wetland Rights-of-Way	102.52	0.90%
<b>Total</b>		<b>5,096.76</b>	<b>44.64%</b>

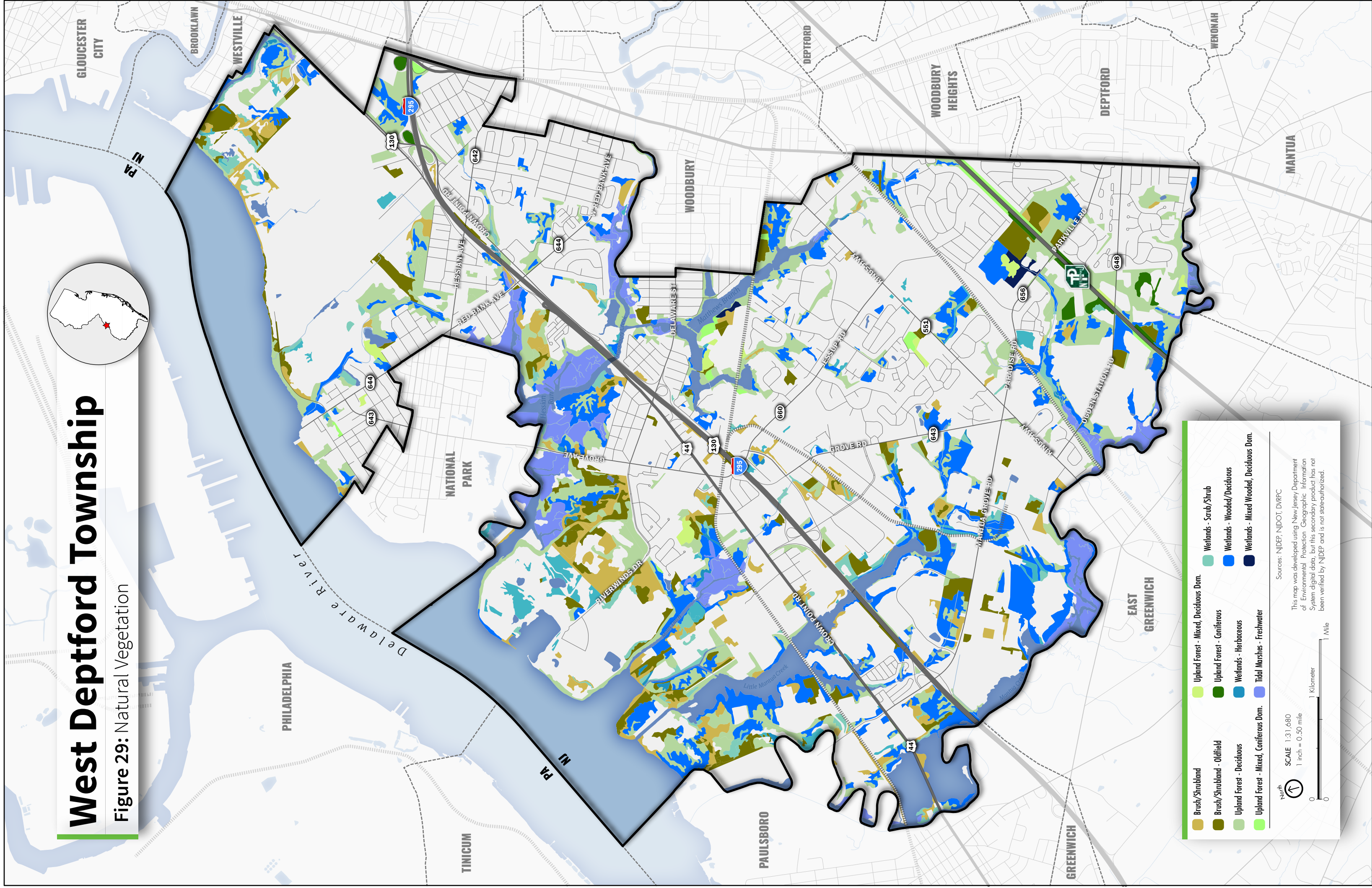
Source: NJDEP, 2012

The main types of land cover in West Deptford are described briefly below. For a more complete list of plant species that may be encountered in West Deptford, see **Appendix A**.



# West Deptford Township

Figure 29: Natural Vegetation



	Brush/Shrubland		Upland Forest - Mixed, Deciduous Dom.		Wetlands - Scrub/Shrub
	Brush/Shrubland - Oldfield		Upland Forest - Coniferous		Wetlands - Wooded/Deciduous
	Upland Forest - Deciduous		Wetlands - Herbaceous		Wetlands - Mixed Wooded, Deciduous Dom.
	Upland Forest - Mixed, Coniferous Dom.		Tidal Marshes - Freshwater		

Sources: NJDEP, NJDOT, DVRPC

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

North

SCALE 1:31,680  
1 inch = 0.50 mile  
0 1 Kilometer 1 Mile





## Wetlands

As was discussed in the **Surface Water: Wetlands** subsection (page 52), a wetland, in basic terms, is an area that has enough water at some time during the year to stress plants and animals that are not adapted to life in water or saturated soils. West Deptford contains tidal wetlands that are associated with tidal portions of the Delaware River system, as well as interior wetlands that are found either in nontidal lowlands associated with waterways or in isolated areas surrounded by uplands that may be fed by groundwater or rainwater. Although more of West Deptford's wetlands are interior, the township contains freshwater tidal wetland habitat along the banks of each of the water bodies that run through it, with the exception of Little Mantua Creek. None of the township's marshes are saline.

Wetlands compose 1,547 acres, or 13.6 percent, of West Deptford's total land use/land cover. West Deptford contains forested wetlands, freshwater tidal marshes, scrub/shrub wetlands, and herbaceous wetlands. The township also contains phragmites dominate wetlands, which support an aggressive non-native plant, *Phragmites*. West Deptford also contains "modified" wetlands, which are former wetland areas that have been altered by human activities, such as agriculture or development, and no longer support typical natural wetlands vegetation. Because this section covers typical wetland species communities, modified wetlands will not be discussed in detail. However, modified wetlands may support some common wetland species.

### Forested Wetlands

Forested wetlands are dominated by deciduous trees. There are 723 acres of forested wetland land cover in West Deptford. The predominant forested wetland canopy species may include red maple (*Acer rubrum*), tupelo (*Nyssa sylvatica*), green ash/red ash (*Fraxinus pennsylvanica*), black willow (*Salix nigra*), swamp white oak (*Quercus bicolor*), willow oak (*Quercus phellos*), southern red oak (*Quercus falcata*), American sweetgum (*Liquidambar styraciflua*), and American sycamore (*Platanus occidentalis*). These species combine to form a series of mixed hardwood lowland habitats throughout New Jersey. In West Deptford, this habitat type is found along or slightly inland of waterways.

### Freshwater Tidal Wetlands

Freshwater tidal wetlands, which are present on 282 acres of the township's land cover, are co-dominated by annual and perennial herbaceous plant species that grow in tidal waters with salinities of less than one part per thousand. Freshwater marsh species in western New Jersey often include yellow water lily (*Nuphar lutea*), green arrow arum (*Peltandra virginica*), pickerel weed (*Pontederia cordata*), annual wild rice (*Zizania aquatica*), dotted smartweed (*Polygonum punctatum*), smooth beggartick (*Bidens laevis*), and broadleaf cattail (*Typha latifolia*). Marshes with this type of vegetation are most often found on the tidal Delaware River and its tributaries.

### Phragmites Dominate Interior Wetlands

Phragmites dominate interior wetlands are a type of interior wetland that contains herbaceous vegetation dominated by *Phragmites*. *Phragmites* is an invasive grass species that is six feet or more in height, and grows rapidly and in large stands, choking out native species in the process. It moves into wetland areas from adjoining drier land, growing through underground shoots that are difficult to eradicate. As it spreads, *Phragmites* often traps silt and thus gradually raises the land level, converting the habitat to one that is drier. This wetland classification is located along virtually all of West Deptford's waterways, generally closer to the Delaware River, and makes up 278 acres in the township.

### Scrub/Shrub Wetlands

Scrub/shrub wetlands are closely associated with deciduous wooded wetlands, and often make up transitional areas between deciduous wetland and other land cover types. They are located on 121 acres of West Deptford's land. Typical native species in scrub/shrub wetlands in New Jersey include sweet pepperbush (*Clethra alnifolia*), buttonbush (*Cephalanthus occidentalis*), swamp rose (*Rosa palustris*), elderberry (*Sambucus* species), arrowwood viburnum (*Viburnum dentatum*), winterberry (*Ilex verticillata*; Figure 30), and silky dogwood (*Cornus amomum*). In West Deptford, these wetlands exist along or near each of the township's waterways, with the exception of Matthews Branch.

Figure 30: Winterberry (*Ilex verticillata*)



### Herbaceous Wetlands

In New Jersey, non-*Phragmites* herbaceous wetlands feature vegetation such as Jack-in-the-pulpit (*Arisaema triphyllum*), jewelweed (*Impatiens capensis*), rice cutgrass (*Leersia oryzoides*), reed canary grass (*Phalaris arundinacea*), pond lily (Nymphaeaceae family), tearthumb (*Polygonum arifolium*), cordgrass (*Spartina* species), cattail (*Typha* species), and various ferns. These wetlands are found along each of West Deptford's waterways but make up only 18 acres of West Deptford's land cover.

Wetlands are a critical ecological resource, supporting both terrestrial and aquatic animals and often boasting greater biodiversity than that found on dry land. Wetlands can play a vital role in maintaining water quality by filtering surfacewaters and groundwaters of contaminants and sediments. They also help regulate water quantity by serving as aquifer recharge areas. They aid in the control of flooding by storing and slowing down stormwater runoff. They also provide high-quality animal and plant habitat and food, and create picturesque and recreational landscapes that add immeasurably to the quality of life for area residents.

### Upland Forests

Upland forests are the second-most abundant natural vegetation type in West Deptford after wetlands. Upland forests are dominated by tree cover and do not have water at or near the soil surface. The majority of West Deptford was covered with upland deciduous forest before human settlement, at which time residents began clearing forests for lumber and farmland. Most upland areas have been converted to development. As indicated in Table 17, 983 acres (8.6 percent) of West Deptford's land use/land cover is now composed of upland forests. Today's upland forests are second or third growth. They are found throughout the township, although they tend to be located near stream corridors or are on soils or slopes less suited for agriculture or development.

The township's 1979 Natural Resources Inventory included a list of the benefits that these forested areas offer, including streambank protection, reduction of erosion and sedimentation, cover and nesting areas for animals, protection from the elements of wind and rain, and food sources for wildlife.

### Deciduous Forest

Deciduous forest comprises the majority of upland forest in West Deptford (885 acres).

Some of the most recognizable trees in local deciduous forests are black oak (*Quercus velutina*; Figure 31), white oak (*Quercus alba*), mockernut hickory (*Carya tomentosa*), American sweetgum (*Liquidambar styraciflua*), American beech (*Fagus grandifolia*), and flowering dogwood (*Cornus florida*). The composition of West Deptford's upland deciduous forests is largely one of mixed oaks—black, red, and white oaks

(*Quercus velutina*, *Q. rubra*, and *Q. alba*)—joined by other hardwoods such as birch (*betula* species), sycamore (*Platanus occidentalis*), beech (*Fagus grandifolia*), hickory (*carya* species), eastern black walnut (*Juglans nigra*), and locust (black locust, *Robinia pseudoacacia*; and honey locust, *Gleditsia triacanthos*). The understory is dominated by flowering dogwood, black cherry (*Prunus serotina*), and sassafras (*Sassafras albidum*). Vines, such as wild grapes (*vitis* species), Virginia creeper (*Parthenocissus quinquefolia*), and poison ivy (*Toxicodendron radicans*), are common. Spicebush (*Lindera benzoin*), arrowwood viburnum (*Viburnum dentatum*), and black haw (*Viburnum prunifolium*) are common shrubs in moister locations.

Figure 31: Black Oak (*Quercus velutina*)



### Coniferous Forest

Coniferous forestland is located on 35 acres in West Deptford, near and along the New Jersey Turnpike and I-295. Coniferous forests are typically composed of successional plant species and may include red cedar (*Juniperus virginiana*), Virginia pine (*Pinus virginiana*), and pitch pine (*Pinus rigida*). They will most likely be overgrown over time by dominant deciduous trees, such as ash (*fraxinus* species), birch, oak, and hickory.

### Mixed Forest

An additional 63 acres of forest consist of mixed deciduous and coniferous trees, and represent an intermediate stage in forest succession (see box at right).

**Succession** is the process of change in the species structure of an ecological community over time, beginning with relatively few “pioneering” plants and animals and developing through increasing complexity until it becomes a stable or self-perpetuating “climax” community.



## Grasslands and Agricultural Lands

Grasslands are considered to be one of the most endangered ecosystems globally. They are threatened by human development, new agricultural technology, grazing, desertification, soil erosion, and invasive species. Grasslands provide habitat for specialized species, such as grassland birds and shade-intolerant herbaceous plants that cannot live elsewhere. Many species of increasingly rare grassland birds require large contiguous patches of grassland for successful breeding and roosting.

NJDEP defines grassland habitat as brushland, shrubland, or old field that was cleared or disturbed at one time and then abandoned. Following abandonment, old field land cover is overgrown by perennial herbs and grasses. These pioneer plants remain the dominant species for three to 20 years. Later, woody plants take over in the process of habitat succession.

Grassland is often encountered along wood edges or roadsides, and in landscapes where mowing is infrequent and where

woody plants are not yet the dominant vegetation. To be sustained, grasslands must be mowed every one or two years. Grasslands are also highly susceptible to invasive species.

Brushland, shrubland, or old fields comprise 846 acres, or 7.4 percent, of West Deptford's land use/land cover. As mentioned in the **Land Use and Land Cover** section (page 10), old field land cover is farmland that has become idle and has transitioned to land suitable for grassland and brushland species habitat. Brushland and shrubland is scattered throughout the township. Most brush and scrubland is scattered in small patches, with particularly large patches close to the RiverWinds development and the Delaware River tributary known as "back the banks."

In addition to brushland and old field, active agricultural cropland and pastureland is considered suitable "grassland" habitat for wildlife. In 2012, agricultural cropland and pastureland covered 544 acres, or 4.8 percent of the township's total land area.

## Rare Plant Species

According to the Natural Heritage Database, NJDEP's maintained list of documented sightings of threatened and endangered species, three rare plant species have been observed in West Deptford. As seen in Table 18: Rare Plant Species, these plant species do not have recorded observations in recent years. Anecdotally, two other Natural Heritage Database-listed plant species (*Sagittaria subulata*, or awl-leaf arrowhead, which is

**Figure 32:** Eastern Prickly Pear (*Opuntia humifusa*) along Jobstown Road



Source: Carl Ford

an S3-ranking species; and *Schoenoplectus smithii*, or Smith's clubrush, which is an S2-ranking species) have been observed in West Deptford in the past decade.

**Table 18:** Rare Plant Species

Common Name	Scientific Name	Federal Status	State Status	State Rank	Last Observed
Curtiss' Three-Awn Grass	<i>Aristida dichotoma</i> var. <i>curtissii</i>	N/A	N/A	S3	9/29/2008
Lancaster Flat Sedge	<i>Cyperus lancastrimensis</i>	N/A	Endangered	S1	9/29/1999
Schweinitz's Flat Sedge	<i>Cyperus schweinitzii</i>	N/A	Endangered	S1	9/29/2008

Source: NDJEP, 2016

State Rank	
S1	Critically imperiled in New Jersey (5 or fewer occurrences observed)
S2	Imperiled in New Jersey (6–20 occurrences observed)
S3	Rare in state (21–100 occurrences)
S4	Apparently secure in state

### Curtiss' Three-Awn Grass

Curtiss' three-awn grass (*Aristida dichotoma* var. *curtissii*) is a clumped annual grass that contains seeds with a long, twisted bristle. It is typically found in dry clearings, fields, and roadsides, or on thin soils on outcrops. It usually grows in shallow, barren, or compacted soil. Its range is widespread from Ontario to Florida and from South Dakota to Texas; it is fairly common in Iowa, Missouri, Arkansas; and it is infrequent in the eastern United States. In New Jersey, it is considered rare, with between 21 and 100 occurrences. It was last recorded in West Deptford in 2008.

### Lancaster Flat Sedge

Lancaster flat sedge (*Cyperus lancastrimensis*) is a perennial sedge with spiky flowers. It grows in disturbed, sunny, or partly shaded places and in moist or dry soils, often on riverbanks and flood plains. New Jersey is at the northern extent of its range, which extends south to Georgia and west to Oklahoma. It is considered critically imperiled in New Jersey, with five or fewer occurrences, and it was last recorded in West Deptford in 1999.

### Schweinitz's Flat Sedge

Schweinitz's flat sedge (*Cyperus schweinitzii*) is a perennial sedge with spikelet flowers. It produces a tall seed head resembling the spines of an open umbrella (Figure 33). It grows in the majority of the central and northeastern lower 48 states and occupies sites with exposed, sandy soil, including riverbanks, sandy openings in woods, fields, and roadsides. It is considered critically imperiled in New Jersey, and it was last recorded in West Deptford in 2008.

**Figure 33:** Schweinitz's Flat Sedge (*Cyperus schweinitzii*)



Source: Katy Chayka, 2014, [www.minnesotawildflowers.info](http://www.minnesotawildflowers.info)

## Landscape Project Priority Habitats

The Landscape Project, developed by the Endangered and Nongame Species Program of the NJDEP Division of Fish and Wildlife, documents the value of habitats within New Jersey. It categorizes habitats into one of five groups according to their importance, with Rank 5 being the highest. Ranks 3–5 include habitats that possess two exceptional conditions: (1) a documented occurrence of one or more species on 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.” Ranks 1 and 2 include habitats that either have a documented occurrence of a Species of Special Concern in New Jersey, or are deemed suitable for species on the state or federal threatened and endangered species lists but for which there are no documented occurrences or sightings. These habitats are labeled “suitable habitats.”

The Landscape Project identifies both critical and suitable habitat in West Deptford. Preserving these habitats will help maintain the diversity of species that still exist in the township and improve the likelihood of survival for endangered and threatened species. See Figure 34: Threatened and Endangered Species Habitat and Table 19: Threatened and Endangered Species Habitat. Landscape Project areas in West Deptford Township provide habitat for eight rare species, which are described in the following sections on animals found in West Deptford.

**Table 19:** Threatened and Endangered Species Habitat

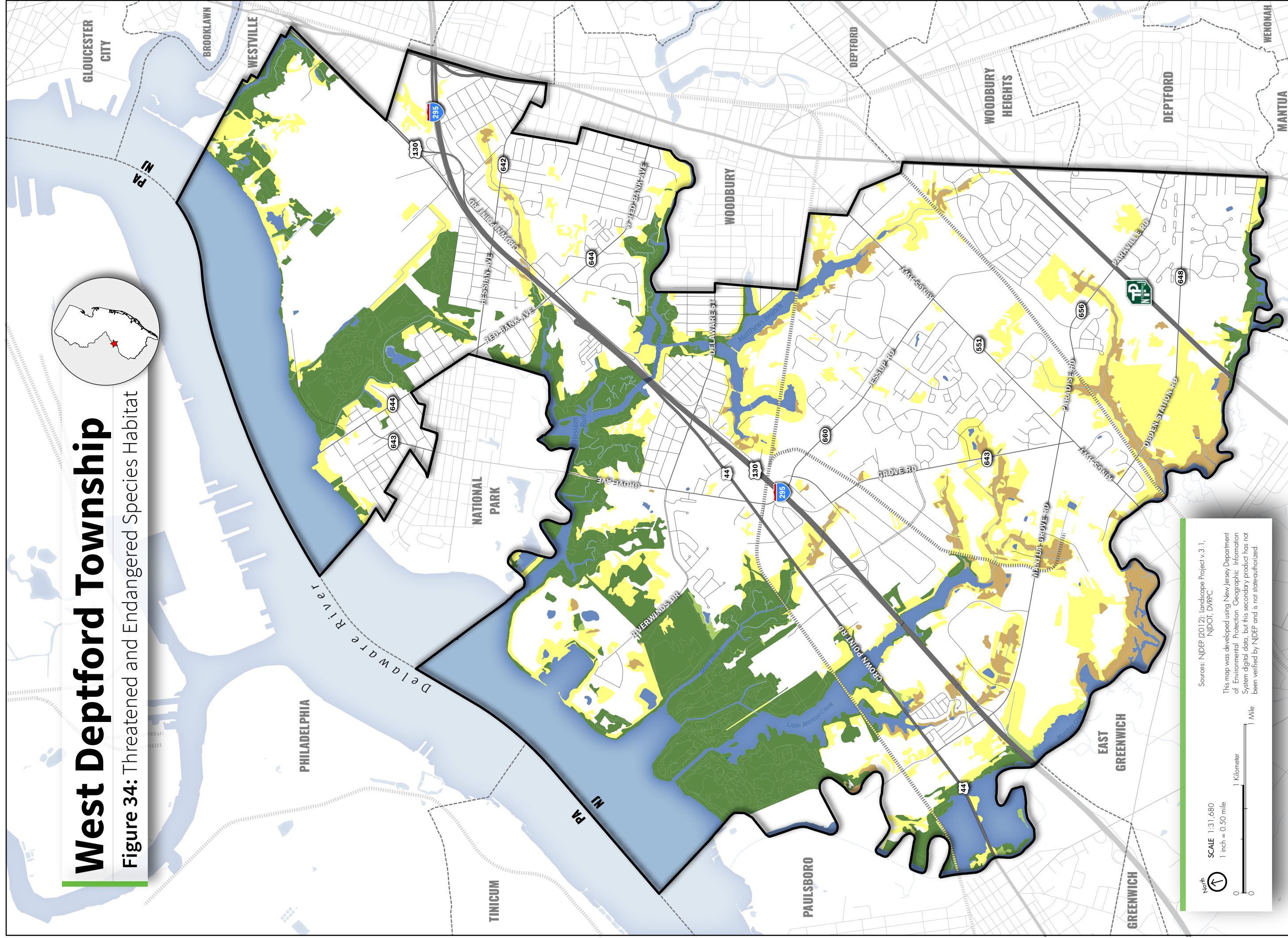
Rank	Rank Description	Acres
1	Habitat Specific Requirements	1,372.65
2	Special Concern	373.45
3	State Threatened	67.79
4	State Endangered	1,895.46
5	Federal Listed	1,055.04

Source: NJDEP, 2012



# West Deptford Township

Figure 34: Threatened and Endangered Species Habitat



North

SCALE 1:31,680  
1 inch = 0.50 mile

0 1 Kilometer 1 Mile

Sources: NIDEP (2012); Landscape Project v.3.1, NJDOT, DYRPC

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 NIDEP and is not state-authorized.

**Rank 1 - Habitat Specific Requirements**  
Species-specific habitat patches that meet habitat-specific suitability requirements for endangered, threatened or special concern wildlife species, but that do not intersect with any confirmed occurrences of such species.

**Rank 2 - Special Concern**  
Assigned to species-specific habitat patches containing one or more occurrences of species considered to be species of special concern.

**Rank 3 - State Threatened**  
Assigned to species-specific patches containing one or more occurrences of State threatened species.

**Rank 4 - State Endangered**  
Assigned to species-specific habitat patches with one or more occurrences of State endangered species.

**Rank 5 - Federal Listed**  
Assigned to species-specific habitat patches containing one or more occurrences of wildlife listed as endangered and threatened pursuant to the Federal Endangered Species Act of 1973.





## Animal Communities

Although no comprehensive inventory of the different animal species within West Deptford Township exists, there are a variety of different types of records that can be pieced together. Using federal, state, scientific, and nonprofit sources, it is possible to identify and describe known and possible animals in West Deptford. A compilation of animals that may be found in West Deptford Township is included in Appendices B, C, D, and E.

### Invertebrates

Invertebrates are the basis of a healthy environment and are part of every food chain; they provide food for amphibians and fish, and are part of the nutrient cycling systems that create and maintain fertile soils.

Invertebrates consist of insects

(beetles, butterflies, moths, dragonflies [Figure 35], 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 are smaller than 50 millimeters. As mentioned in the **Water Quality Monitoring Networks** subsection (page 60), benthic macroinvertebrate communities can be monitored to track a water body's ecological health and are relatively simple to collect from shallow freshwater streambeds.

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. NJDEP's AMNET program surveys streams for macroinvertebrate communities, which indicate water quality levels.

There are 10 invertebrate species listed as endangered in New Jersey: four butterfly species, three mussel species, two beetle species, and one dragonfly species. There are also 14 invertebrate species listed as threatened: six dragonfly species, five mussel species, and three butterfly species. Before New Jersey communities were as heavily developed as they are today, freshwater mussels were abundant in the state's streams and were a major food source, particularly for indigenous populations. Because of the destruction of suitable aquatic habitats by dams and pollution, the native mussel population has sharply declined.

### Rare Invertebrates

According to the Natural Heritage Database, one State Threatened species, the Eastern pondmussel (*Ligumia nasuta*), was observed in West Deptford in 2007. The Eastern pondmussel occurs from North Carolina to the Saint Lawrence River Basin in Canada, and westward through northern parts of the

**Figure 35:** Halloween Pennant Dragonfly (*Celithemis eponina*)



Source: Kevin Jeffers

continent's Interior Basin. In New Jersey, the species can be found in the Delaware River and several of its tributaries. It is generally found in tidewaters and is sometimes found in ponds and lakes. Eastern pondmussels were listed as State Threatened in late 2002. Federal and state enforcement of the Clean Water Act and Endangered Species Act, stream encroachment rules, and local environmental reviews of proposed development projects can help protect existing populations.

**Table 20:** Rare Invertebrate Species

Common Name	Scientific Name	Federal Status	State Status	State Rank	Last Observed
Eastern Pondmussel	<i>Ligumia nasuta</i>	N/A	Threatened	S2	2007

Source: NJDEP, 2016

State Rank	
S1	Critically imperiled in New Jersey (5 or fewer occurrences observed)
S2	Imperiled in New Jersey (6–20 occurrences observed)
S3	Rare in state (21–100 occurrences)
S4	Apparently secure in state

## Vertebrates

Vertebrates are less numerous than invertebrates, but their larger size makes them much more visible and thus better studied and recorded. Fish, amphibians, reptiles, birds, and mammals are fairly well documented.

### Fish

West Deptford's rivers, creeks, and wetlands provide habitat and food to freshwater fish. Like mussels, fish were once abundant along the Delaware River and its tributaries. Water quality degradation from urban development and agricultural practices, as well as dam construction, has caused most fish populations to decline.

Nevertheless, a variety of fish species have been observed in West Deptford's environs. No known list of fish species exists that is focused only on West Deptford, but several groups are tracking them in the

**Figure 36:** American Shad (*Alosa sapidissima*)



Source: Photo by David Harp/ChesapeakePhotos.com © 2009

township. See **Appendix B** for a list of freshwater fish species encountered near West Deptford.

The NJDEP Division of Fish and Wildlife counts fish in the Lower Delaware River, which is the section of the Delaware River that West Deptford borders, through its annual Delaware River Seine Survey. Native, non-native, and invasive fish are included in this inventory. This program has lasted for over three decades. Its most recent available records (2014) list 48 species, with American shad (*Alosa sapidissima*; Figure 36), blueback herring (*Alosa aestivalis*), white perch (*Morone americana*), eastern silvery minnow (*Hybognathus regius*), and Atlantic menhaden (*Brevoortia tyrannus*) being the most common.

The New Jersey Conservation Foundation records a variety of species of fish in the Big Timber/Mantua Creek watershed and farther inland. Species mentioned in this watershed include largemouth bass (*Micropterus salmoides*), striped bass (*Morone saxatilis*), yellow perch (*Perca flavescens*), American eel (*Anguilla rostrata*), chain pickerel (*Esox niger*), and channel catfish (*Ictalurus punctatus*).

Other organizations that have tracked fish species near West Deptford include the Academy of Natural Sciences of Drexel University and the USGS. Fish counted by the Academy of Natural Sciences are from Big Timber Creek, Mantua Creek, and Woodbury Creek; fish counted by the USGS are from Raccoon Creek near Swedesboro Township; and fish counted by NJDEP (not as part of the Delaware River Seine Survey) are from upstream tributaries of the Big Timber Creek (near Turnersville and Lakeland) and Mantua Creek (the Chestnut Branch near Sewell).

The Natural Heritage Database includes one federally listed endangered species of fish, the shortnose sturgeon (*Acipenser brevirostrum*), which has been observed in West Deptford (see Table 21: Rare Vertebrate Species). The Delaware River is a migration corridor for this species.

### Amphibians and Reptiles

New Jersey contains 71 species of amphibians and reptiles. This list includes 16 salamanders, 16 frogs (Figure 37) and toads, 13 turtles, three lizards, and 23 snakes. Amphibians of some types, such as bullfrogs (*Rana catesbeiana*), are abundant. Other species are rare, in part because they depend on vernal ponds, which typically form on a seasonal basis. Amphibians may also be rare because they also depend on high-quality waterways. There are three state-listed

**Figure 37:** Green Frog (*Rana clamitans melanota*)



Source: Michael Hogan, [www.hoganphoto.com](http://www.hoganphoto.com)



endangered species in New Jersey (two salamander species and one tree frog species) and three state-listed threatened species (two salamander species and one tree frog species). No species in these categories is known to reside in West Deptford.

Reptiles can also be quite elusive when surveys attempt to find and record them. No reptile species of special concern are known to reside in West Deptford. There are eight state-listed endangered reptile species in New Jersey (three snake species and five turtle species) and three state-listed threatened species (one snake species and two turtle species). As with amphibians, no species in these categories is known to reside in West Deptford.

No known list exists of amphibians or reptiles that is focused only on West Deptford. However, many of the species recorded by the NJDEP Division of Fish and Wildlife may be found in West Deptford. See Appendix C for a list of amphibians and reptiles found in New Jersey.

### 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, an established migratory air route in North America.

Common birds found in West Deptford include waterfowl, gulls, herons/egrets, doves, sparrows, wrens, finches, and some owls and raptors. Reflecting West Deptford's location as a developed waterfront community, some of the more common bird species recently found in West Deptford include the Canada goose (*Branta Canadensis*; Figures 38 and 39), mallard (*Anas platyrhynchos*), bufflehead (*Bucephala albeola*; Figure 38), rock dove (*Columba livia*), American robin (*Turdus migratorius*), European starling (*Sturnus vulgaris*), and northern junco (*Junco hyemalis*).

Bird species have been tracked in the West Deptford area by local birders for decades, most notably through the Audubon Society, which was founded in 1897. The National Audubon Society relies on volunteers to record bird species during its annual Christmas Bird Count, which is a 116-year old national citizen science tradition. Over the course of one predetermined day in mid-December (the first Saturday after December 14), groups travel through their neighborhoods ("sectors"), recording the birds that they identify. Each area has a leader who guides the process, and Ronald Kegel, an expert birder, is the head of the Christmas Bird Count in the Gloucester County area.

**Figure 38:** Canada Goose (*Branta canadensis*) and Bufflehead (*Bucephala albeola*)



Source: Kevin Jeffers

Sectors 1 and 3 in Gloucester County include parts of West Deptford Township. Sector 1 also includes National Park Borough, and Sector 3 also includes Woodbury City. According to Mr. Kegel, the species

outside of West Deptford but still counted in Sectors 1 and 3 would likely be interchangeable because of similar habitat types throughout, although Woodbury might be somewhat different because it is more developed. Over the past 11–12 years, 72 species were observed in Area 1, and 96 species were observed in Area 3. Data from the 2005 through 2016 Christmas Bird Count (excluding 2009 and 2013) are located in Appendix D.

Six bird species of conservation concern are known to exist in West Deptford: the State Endangered American bittern (*Botaurus lentiginosus*), bald eagle (*Haliaeetus leucocephalus*), and pied-billed grebe (*Podilymbus podiceps*); the State Threatened osprey (*Pandion haliaetus*); and two species of special concern: the great blue heron (*Ardea Herodias*) and least bittern (*Ixobrychus exilis*).

### Important Bird and Birding Areas

The Important Bird Area is a global effort by the National Audubon Society to identify, promote, and conserve areas that are vital to birds and other species. Important Bird Areas are not regulated but are instead designated by Audubon chapters as high priority areas for conservation within their jurisdiction. The New Jersey Audubon Society has an expanded initiative called the Important Bird and Birding Area (IBBA) Program that identifies areas that provide essential habitat for sustaining bird populations (Bird Areas), as well as areas that provide exceptional opportunities for bird watching (Birding Areas). The New Jersey IBBA program has identified 122 sites within the state.

Three IBBAs are within Gloucester County, and two have land within West Deptford Township: the National Park Dredge Spoils IBBA; and the Mantua, Woodbury, and Big Timber Creeks IBBA (Figure 40: Important Bird and Birding Areas).

The Mantua, Woodbury, and Big Timber Creeks IBBA is 7,340 acres and includes the main channels of each creek listed in the IBBA's name from the Delaware River inland. It contains diverse habitats, including tidal wetlands, interior wetlands, and upland forest. It is one of New Jersey's most urbanized IBBAs, surrounded on all sides by suburban development. This area provides breeding and wintering habitat for the State Endangered red-shouldered hawk (*Buteo lineatus*) and is home to an exceptional single-species concentration of the migratory waterfowl, northern pintail (*Anas acuta*). It is a major wintering site for waterfowl, such as mallards (*Anas platyrhynchos*) and American black ducks (*Anas rubripes*). A breeding pair of State Endangered bald eagles is known to live within this IBBA as well; the bald eagles' nest and foraging area is located at the confluence between Mantua Creek and the Delaware River.

The National Park Dredge Spoils IBBA is a 172-acre site located on the northern bank of Woodbury Creek along the Delaware River. The site is mainly located in National Park but contains a small area within West Deptford. The site, consisting of inactive dredge spoils, has reverted to a mix of habitat types, including scrub-shrub wetland, nontidal wetland, and freshwater ponds. The site is a breeding site for soras (*Porzana Carolina*), Virginia rails (*Rallus limicola*), least bitterns (*Ixobrychus exilis*), and others. A variety of fall migrants use the site and waterfowl species overwinter there.

### Resident Canada Goose Populations

The State of New Jersey now has a “resident” Canada goose population of approximately 100,000 birds that no longer migrate to more southern locales and may double in size in the next five to 10 years. While geese can provide enjoyable wildlife viewing opportunities, they can also cause property and environmental damage. Goose droppings that wash into lakes during storms can elevate coliform bacteria to unhealthy levels, polluting surface waters and closing lakes to swimming. Also, because geese can be quite aggressive during the nesting season, they can potentially injure humans.

However, removing geese or preventing them from residing in park areas is a difficult task. Because geese move freely, the most effective management solutions are best conducted at the community level. Like all waterfowl, Canada geese are protected by the Migratory Bird Treaty Act. Therefore, a management program may require the USDA’s approval. Management techniques include planting shrubby vegetation around streams, lakes, and ponds to block waterfowl access; discouraging humans from feeding geese; and using fertility reduction techniques, such as egg addling or removal.

**Figure 39:** Canada Geese (*Branta canadensis*)

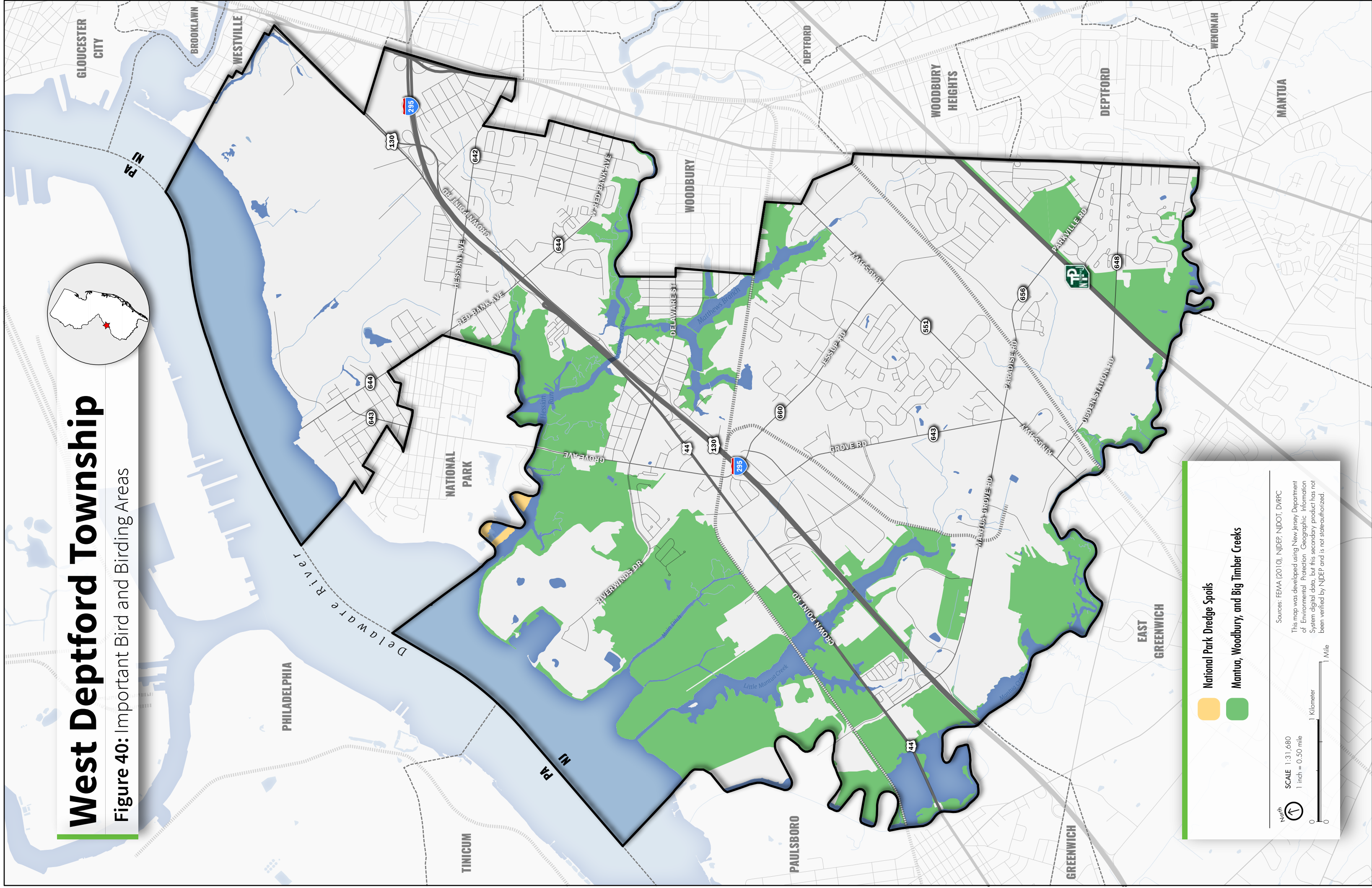


Source: Michael Hogan, [www.hoganphoto.com](http://www.hoganphoto.com)



# West Deptford Township

Figure 40: Important Bird and Birding Areas



**Legend**

- National Park Dredge Spoils
- Mantua, Woodbury, and Big Timber Creeks

Sources: FEMA (2010), 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.

SCALE 1:31,680  
1 inch = 0.50 mile

0 1 Kilometer 1 Mile





## Mammals

Mammals are more easily documented than other species because they tend to be larger and live in habitats also ideal for human development. There are over 50 mammal species in New Jersey, nine of which are listed by the state as endangered. Six of these state-listed species are whales, and of the three land-based species, none are known to exist within the borders of West Deptford.

According to Karl Anderson, naturalist and past director of the Rancocas Nature Center, 31 species of mammals are likely present in West Deptford, even if just passing through (see Appendix E). These include the opossum (*Didelphis marsupialis*), the only marsupial in North America; two species of shrews; two species of moles; four species of bats; 11 native rodent species and two non-native species; a single hoofed mammal, the white-tailed deer (*Odocoileus virginianus*); three “dog” species (red fox, grey fox, and eastern coyote); four members of the weasel family; and the raccoon (*Procyon lotor*).

**Figure 41:** Southern Flying Squirrel (*Glaucomys volans*)



Source: Kevin Jeffers

## Rare Vertebrate Species

According to the Natural Heritage Database, seven rare vertebrate species have been sighted in West Deptford: six bird species and one fish species. They are listed in Table 21: Rare Vertebrate Species, and brief descriptions of these species follows.

**Table 21:** Rare Vertebrate Species

Common Name	Scientific Name	Federal Status	State Status	State Rank
American Bittern	<i>Botaurus lentiginosus</i>	N/A	Endangered	S1B, S3N
Bald Eagle	<i>Haliaeetus leucocephalus</i>	N/A	Endangered (Exception: “Threatened” for Wintering Individuals)	S1B, S2N
Great Blue Heron	<i>Ardea herodias</i>	N/A	Special Concern	S3B, S4N
Least Bittern	<i>Ixobrychus exilis</i>	N/A	Special Concern	S3B, S3N
Osprey	<i>Pandion haliaetus</i>	N/A	Threatened	S2B
Pied-Billed Grebe	<i>Podilymbus podiceps</i>	N/A	Endangered	S1B, S3N
Shortnose Sturgeon	<i>Acipenser brevirostrum</i>	Endangered	Endangered	S1

Source: NJDEP, 2016

State Rank	
S1	Critically imperiled in New Jersey (5 or fewer occurrences observed)
S2	Imperiled in New Jersey (6–20 occurrences observed)
S3	Rare in state (21–100 occurrences)
S4	Apparently secure in state
B	Indicates the state rank for the Breeding population in the state
N	Indicates the state rank for the Nonbreeding population in the state

### American Bittern

The shy American bittern (*Botaurus lentiginosus*) hunts and nests in wetlands, where its striped, thin body serves as camouflage and enables it to hide among reeds. When frightened, a bittern will take on the appearance of a reed, pointing its beak upward and swaying back and forth like a blade of grass. Their camouflage also enables them to stalk their prey—small mammals, amphibians, reptiles, crustaceans, mollusks, fish, and insects—along the edge of the water throughout the day. American bitterns are mainly threatened by the destruction of wetlands for development.

### Bald Eagle

Bald eagles (*Haliaeetus leucocephalus*; Figure 42) can be found throughout the state year-round. They nest close to water, enabling them to hunt and eat fish and other aquatic species. According to the Conserve Wildlife Foundation of New Jersey, there are now 150 nesting pairs of eagles in the state after they were driven to the brink of extirpation (local extinction) in 1970 from the effects of the pesticide DDT. Eagles are very sensitive to human disturbance and will abandon their nest sites if people encroach on the area during the nesting season. They also continue to be affected by chemicals and heavy metals in their environment.

### Great Blue Heron

The great blue heron (*Ardea herodias*), at 46 inches in length and with a wingspan of 72 inches, is the largest heron found in North America. This wading bird is found in a wide variety of aquatic habitats, including freshwater and saltwater marshes, lake edges, streams, and shorelines. The great blue heron feeds on aquatic reptiles, amphibians, and small fish. It nests in adjacent woodlands, in colonies of up to five hundred breeding pairs. While

**Figure 42:** Bald Eagle (*Haliaeetus leucocephalus*) Nest in West Deptford



Source: Garry Baldwin

the non-breeding population is stable in New Jersey, breeding pairs have been identified as a species of special concern.

#### Least Bittern

With a length of 13 inches and a wingspan of 17 inches, the least bittern (*Ixobrychus exilis*) is the world's smallest heron. It has a similar camouflage-based hunting and hiding strategy to the American bittern, as well as a similar diet. Like the American bittern, it is threatened because of the destruction of the wetlands that it uses as a breeding area and a source for food.

#### Osprey

Ospreys (*Pandion haliaetus*) live close to the Atlantic and Pacific shorelines throughout much of the North and South American continents. They build large stick-based nests (Figure 43) close to water and on high structures, which may include trees, as well as channel markers, old duck blinds, and telephone poles. Their diet is mainly fish, and their foot structure, keen eyesight, and ability to dive into several feet of water make them highly adapted to hunt fish. Osprey populations have struggled from past DDT applications, from the removal of tall trees along the coast, from entanglement with trash, and from bioaccumulating chemicals in the fish that they eat. Conservationists have helped the New Jersey population bounce back from a nadir of 50 nests in 1974, and there are now over 600 nests in the state.

**Figure 43:** Osprey (*Pandion haliaetus*)



#### Pied-Billed Grebe

The pied-billed grebe (*Podilymbus podiceps*) is a duck-like bird that spends most of its time on the water. Its beak—so called because its white bill takes on a black ring in mating season—is thick and well adapted to cracking open mollusks and crustaceans for food. Pied-billed grebes eat a variety of other plant and animal species, as well as their own feathers on occasion, which are believed to aid in digestion. In the late 19th century and early 20th century, pied-billed grebes were hunted almost to extirpation in New Jersey for food and for their plumage. Although habitat conservation in the early 20th century helped their population grow, they remain vulnerable to destruction of the wetland habitat in which they reside. They are also vulnerable to disturbance during their nesting season, because they leave their nests for long periods if disturbed, making it easier for the eggs to be destroyed.

#### Shortnose Sturgeon

The shortnose sturgeon (*Acipenser brevirostrum*) is the smallest of three sturgeon species that occur in eastern North America. Sturgeon are sometimes called “living fossils” since they are among the oldest bony fishes, and have retained many primitive characteristics. This species migrates between freshwater and saltwater during its life (making it “diadromous”) and is found in large estuaries and near-shore waters along the Atlantic Coast from Canada to Florida. A significant portion of New Jersey's shortnose sturgeon occurs in the upper tidal Delaware River. This species is listed as state and federally endangered. Once heavily fished for their meat and eggs, sturgeon are now threatened more by river dredging and water quality degradation



from contaminants like endocrine-disrupting chemicals. Other threats include boat strikes, bycatch, and poaching.

## The Built Environment

### Important Structures

#### Early Schools

##### The Thoroughfare Academy

The Thoroughfare Academy was organized about 1815 as the first school in West Deptford, which was then part of Deptford Township. The present building's corner stone was laid in 1905 and the school opened for classes in 1906, much to the gratification of the proud residents of Thoroughfare. The school was later known as Thorofare No. 3 School since it was the third building used as a school in this section of the township.

##### Mantua Grove School

Situated on the corner of Mantua Grove Road and Kings Highway, the original school on this site was a log cabin used from 1810 until 1841. A two-room school house was built in 1842 and is still used by the Township Board of Education, although not for classes.

##### Red Bank School No. 1

Red Bank School No. 1 (Figure 44) was built in 1896 and was closed as a school in June 1976. It is located at the corner of Hessian and Red Bank avenues.

##### Thorofare Colored School

The Thorofare Colored School was constructed in 1929 at the urgent plea of the township's African-American population. At a later date, this school was known as Thorofare No. 4 School and was used as a nonsegregated educational center. This school, which was situated on Salem Avenue toward Crown Point Road, was closed and was subsequently torn down in 1986.

**Figure 44:** Former Red Bank School No. 1



Source: Google Maps, October 2013

#### Current Schools

##### Oakview Elementary School

Constructed in 1954 on Dubois Avenue, Oakview School was the very latest in design and efficiency, and it is still used to educate children from preschool to second grade.

### Greenfields Elementary School

Greenfields School, located on Hill Lane in the Greenfields Village Development, was dedicated in 1956 to serve the pupils in what at the time was the new section of the township. Additions were constructed in 1965 and 1990 to serve those students displaced by the closure of the older schools. The school now serves children in kindergarten, third grade, and fourth grade.

### Red Bank Elementary School

Red Bank Elementary School, formerly known as Red Bank No. 2 School, is located on Philadelphia Avenue. It was dedicated in 1965 and continues to serve the residents living in the northern portion of the township in kindergarten through second grade. After closing Red Bank No. 1, this school became known as the Red Bank School.

### West Deptford Middle School

The school was officially opened for classes in September 1972 and continues to serve children in grades five through eight.

### West Deptford Senior High School

This school, located on Old Crown Point Road, was dedicated in 1960 and originally served grades six through nine. In 1964, the Junior-Senior High School housed grades seven through twelve and graduated its first class. In 1972, after construction of the Middle School, the high school served grades nine through twelve, and it became known as the Senior High School.

### Public Library and Environmental Information Center

In 1963, an article ran in the *Woodbury Times* stating that books were being collected to start a library in West Deptford Township. The library was officially organized on November 22, 1965. Delbert Moore, a member of the Board of Education, convinced the board members to donate a room of the old Thorofare School on Crown Point Road to the library. In 1972, the library collection was moved to the first floor of the old Town Hall, and in 1979, the township passed a referendum creating a new 18,000-square foot municipal library located next to the township building. In 1988, the library was dedicated, and former Governor Thomas Kean was one of several dignitaries present for the occasion.

The library is notable for being home to the South Jersey Environmental Information Center (SJEIC), a unique feature for a public library. Officially opened in 1992, this collection was formed when a resident asked a question concerning mercury, which the library staff could not answer. The issue of township residents needing more information concerning environmental affairs came to the attention of the township council. The library received a two-year grant, funded in part by the state, for \$189,000. The check was presented to the library by Lucinda Florio, wife of former Governor Jim Florio.

The SJEIC functioned not as a technical library but as a citizens' reference center. The center was committed to providing accurate, timely, and neutral information on the environment, and was a first point of contact for those looking for environmental information.

There is no current funding for the SJEIC, but the library continues to grow with the support of a very active Friends of the Library group.

### Police Department

The police department is housed in the Township Municipal Building, which was constructed in 1971. The first full-time police officer in West Deptford was James Callahan, who was appointed in January 1951. He was later appointed Chief and served until the end of 1954. The police force was formally organized in 1955

and Chief Ray Roberts served from January 1955 until the end of 1956, supervising five officers. The department now includes more than 30 officers in several divisions.

### **Fire Departments**

The first fire company in West Deptford was organized at Thorofare in 1910. The first fire house was constructed at the same time. The second Fire Association was organized by five men who met in Verga on July 7, 1916. Colonial Manor Fire Association was organized February 23, 1922, and the firehouse was dedicated at ceremonies held on September 12, 1970. Greenfields Fire Association, the township's newest fire association, was organized on June 20, 1956.

### **Public Works Department**

The West Deptford Water and Sewer Department was started in 1966 with a supervisor and two employees. A year later, in 1967, the GCUA was created by the Gloucester County Board of Chosen Freeholders. Fourteen communities were founding members, including West Deptford Township. In 1971, the township undertook its biggest sewerage expansion with the construction of a system in Verga, the river area, Delaware Street, Woodbury Terrace, Mantua Terrace, and most of Thorofare. The project took nearly two years to complete and eliminated several thousand septic systems. The GCUA began accepting sewerage from those communities in April of 1974.

Beginning in 1973, a 12-inch transmission line was constructed to provide water service in the township. In 1974, improvements were added to the water system in the Delaware Street area. Two more wells were added during the 1970s, and additional sections of the township were tied into the system. During the 1980s, loops were installed and the 12-inch mains were extended out farther, to the edges of the township. Two more wells were drilled in 1981, and a new two-million gallon tank was added in 1988.

## **Historical Sites**

### **Parkville**

In the mid-nineteenth century, a hydropathic institute was constructed at Parkville on the Mantua Grove Road near the Salem Pike. This institution used what is now known as hydrotherapy: the use of water for pain treatment and therapy. The institute was built within the locality of "Teatown" and was opened in 1848 according to the statement, "The proprietors of the new village of Parkville are preparing to open a Hydropathic Institute to be ready about July 1, under the care of Dr. Bell. Parkville is located in a lovely spot, amidst delightful salubrious range of hills, where a series of springs of the purest and most delicious water ever tasted boils up all seasons of the year, the temperature of which rarely, if ever, ranges above 50 degrees." The owners applied to the state at the end of 1850 for a charter "for the cure of diseases, with a capital not exceeding \$100,000," but the bill to charter the institute was lost in the Senate.

Parkville's streets were originally laid out and log cabins were constructed along them. One road was laid out to a large tank filled with cold water. Visitors to the institute bathed in it and were then wrapped in woolen blankets and taken to the log cabins to complete their treatments.

### **Eagle Point**

This large parcel, in the northernmost corner of the township bordered by the Delaware River and Westville, has quite a bit of history. Its names have included Howell Shad Fishery, Fancy Hill, Eagle Point Farm, U.S. Powder Bag Loading Plant, Campbell Soup Tomato Farm, Texaco Refinery, and Coastal Eagle Point.

The parcel was purchased shortly after 1890 by William Thompson for the purpose of constructing a 600-acre summer recreation park and amusement center on the Delaware River. This park, known as "Washington Park on the Delaware," opened on Memorial Day, 1895. For the next two decades, it was one of the largest amusement parks and recreation areas in the United States. Money was no object to Thompson, also known as the "Duke of Gloucester."

Music from two bands and guest artists with their conductors cost more than \$50,000 per season. Arthur Pryor, John Phillip Sousa, Victor Herbert, and Alessandro Liberatti were some of the top musical talent appearing at the park.

Arguably the most fabulous attraction at the park was the spectacular electric fountain, built at a cost of \$75,000 and a first in the region. In the center of the swaying, dancing streams of water was a huge glass stage where actors and actresses would perform famous scenes from history. The stage was housed underground, as were the dressing rooms.

A giant elevator raised the glass box

in the center of the fountain display so that all could see the scene; then it was lowered for a change of scene. Multi-colored lights played on the stage through the fountain and created a dazzling display of colors. Some of the streams of water reached a height of 80 feet. Each evening, several different scenes would magically appear out of the fountain and then would just as magically disappear.

Another main attraction at the park was the world's largest Ferris wheel, which towered over 100 feet. There were also four roller coasters, several merry-go-rounds, and a "shoot-the-chute" (Figure 45) featuring four boats carrying twelve passengers launched down a greased chute, 40 feet in height, to a lake where the boat landed with a tremendous splash. A pier, reaching out into the Delaware over 1,800 feet, was used to dock the river boats "Sylvan Dell" and "Sylvan Glen." These boats brought thousands of passengers to the park from Philadelphia. The average daily attendance of the park was 50,000 persons and, at a special appearance of William Jennings Bryan, over 100,000 persons were in attendance.

Washington Park went out of style in about 1915, and most of the buildings were demolished. During World War I, the Ordnance Department of the U.S. government erected a large bag-loading plant on the site, known as the Woodbury Bag Loading Plant, to help process gunpowder for the war effort. It employed several thousand people, predominantly women, since the "boys" were off to war. The site consisted of more than 130 buildings, including a hospital, offices, warehouses, dormitories, an employment bureau, and a trolley station. The plant prepared "propellant charges," silk bags filled with gunpowder that were inserted in the chamber of a gun behind the projectile.

**Figure 45:** Shoot-the-Chute at Washington Park



Source: Township of Westville, New Jersey, [www.westville-nj.com](http://www.westville-nj.com)



After the war, this facility ceased to be used by the government, and the property was purchased by the Campbell Soup Company of Camden, which raised tomatoes on the land for canning operations in Camden. Then, around 1948, the Texas Oil Company (now known as Texaco) acquired the property from the Campbell Soup Company under a long-term lease, building a refinery with deep water port accommodations servicing ocean-going ships from all over the world. In 1985, Texaco sold the property to Coastal Corporation of Houston, Texas. Coastal has since sold the property to Sunoco Corporation.

### Soupy Island

The Sanitarium Association of Philadelphia was instituted by a group of charitable-minded people in 1877 and incorporated in 1879. Its main purpose was to give low-income children of Philadelphia a chance to get a breath of clean air, especially on hot summer days. In its promotional materials, the Sanitarium Association of Philadelphia wrote that it accomplished this objective by “taking the children and their mothers on our two steamers from Philadelphia to the home of the Sanitarium, at Red Bank, New Jersey, six miles below the city on the broad banks of the Delaware,” where, “under shady trees and in the pure country air, are playgrounds, bathing pools, a pavilion for shelter from storms, a merry-go-round [Figure 46], hospital, and all that makes for a healthy, happy, young America.”

The Sanitarium Association began working toward this goal in a modest way in 1877, when they transported a few children to Point Airy Wind-Mill Island, in the Delaware River, by rowboat. In 1877, the Association purchased 104 acres in West Deptford just north of what is now the National Park Borough boundary. The site was located on fairly high, dry ground along the river for about a quarter-mile, and the Association developed a main park of 18 acres and added shade trees.

**Figure 46:** Carousel at Soupy Island



Source: John S. Masi, [www.flickr.com](http://www.flickr.com), September 10, 2012

The Association remodeled an old hotel into a hospital. Here, a mother, after obtaining a doctor’s certificate, could bring her baby for two weeks or longer. The hospital and its staff was responsible for restoring hundreds of children to good health. There was a physician in charge, a resident physician, and a well-trained corps of nurses in attendance. The mothers and caretakers received individual instruction in the care of their sick children before they left for home. Those in the hospital were served three hot meals each day, and bottles of milk were provided for the babies. There was an infants’ bath-house and a large double pool

constructed along the riverfront for boys and girls, each section with its own caretaker. Around 1914, the Association also constructed a steam-powered merry-go-round in the park pavilion.

The name of the park changed from the Sanitarium Association of Philadelphia to the Sanitarium Playground Association of New Jersey, but to most it is known as “Soupy Island.” Today, the park opens to local schools in May for picnics and remains open until Labor Day for family reunions, company outings, and other social functions.

## RiverWinds

The roughly 789-acre complex known as RiverWinds is the most recent major project in West Deptford. It was built on township-owned land that previously held dredge spoils from the Delaware River. In 1999, construction began on the site’s infrastructure. By 2008, the site contained a 110,000-square-foot multi-use community center (Figure 47); a hockey rink; soccer and football fields; a golf course and tennis center; age-restricted single-family homes, condominiums, and apartments; commercial buildings; and a restaurant. Plans for further development that might include boutique-type shops and family housing, as well as a marina, are under examination.

**Figure 47:** RiverWinds Community Center



Source: Aimee Boucher

## Contamination and 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 are those on the National Priorities List, commonly known as Superfund sites. Information on Superfund sites can be retrieved using the Comprehensive Environmental Response, Compensation, and Liability Information System. Most other contaminated sites are handled by the state—specifically, NJDEP. However, NJDEP may not have knowledge of all contamination present in a given municipality, as some contaminants from a previous use of a property may continue to be undetected (for example, contaminants may be buried underground on a site that has not been disturbed since that time), or the contamination may be unreported by the site owners.

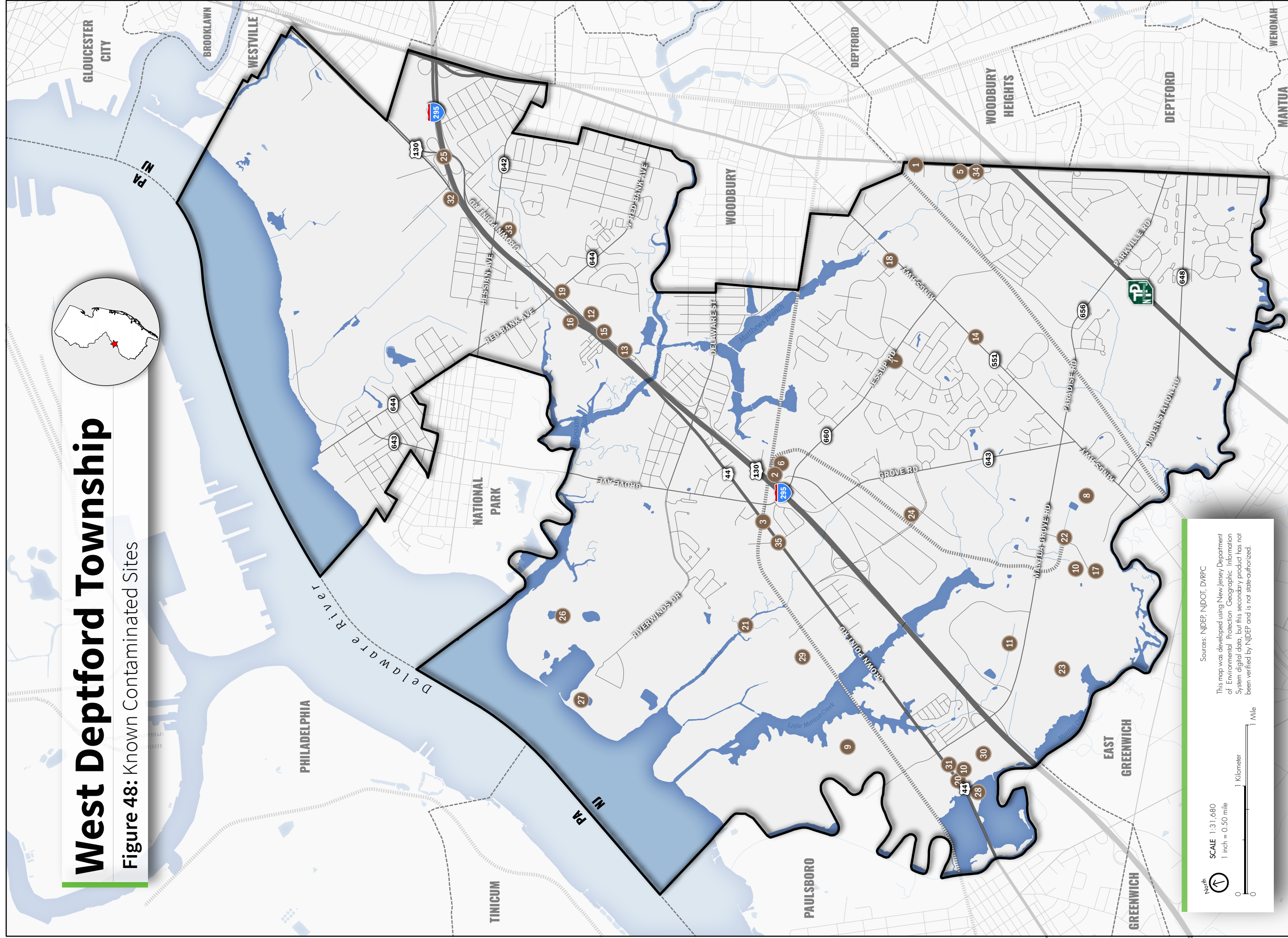
As of July 2017, there were 35 active known contaminated sites within West Deptford Township, or, in the instance of the Woodbury CITGO, on West Deptford's border (see Table 22: Known Contaminated Sites and Figure 48: Known Contaminated Sites). Active sites have confirmed contamination of the soil, groundwater, and/or surface water, and have one or more active cases, potentially alongside additional pending and closed cases.

Among the known contaminated sites in West Deptford Township are chemical and pharmaceutical companies, other manufacturing facilities, gas stations, fuel utilities, and residential properties. Addresses of private residences are not included on the list in order to maintain confidentiality. Thirty-three of these sites are regulated at the state level; one site, the James Matteo & Sons site, is regulated at the state level and at the federal level as an EPA-designated Superfund site; and one, the Tempo Development Group/Birchly Court site, is solely regulated at the federal level as a Superfund site. The James Matteo & Sons site and the Tempo Development Group/Birchly Court site have been combined together as two phases in a single EPA Superfund project.



# West Deptford Township

Figure 48: Known Contaminated Sites



SCALE 1:31,680  
 1 inch = 0.50 mile

Sources: NJDEP, NIDOT, 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.

- |   |                        |    |                                   |    |                           |    |   |    |                           |    |  |
|---|------------------------|----|-----------------------------------|----|---------------------------|----|---|----|---------------------------|----|--|
| 1 | 3 Greenwood Avenue     | 7  | Coastal Pipeline                  | 13 | General Engines Co.       | 19 | Lukoil #57279                           | 25 | Riggins Transport MVA     | 31 | Station Stop                           |
| 2 | Accurate Inc.          | 8  | Colonial Pipeline Co.             | 14 | Gulf Oil Corp.            | 20 | Manchester Machinery & Welding Co. Inc. | 26 | Riverwinds Golf Course    | 32 | Sunoco Partners Marketing & Terminal   |
| 3 | Andrew B. Duffy Inc.   | 9  | Crown Vista Energy                | 15 | Interstate Citgo          | 21 | Mantua Preserve Corp.                   | 27 | Riverwinds Restaurant     | 33 | Tempo Development Group Subdivision    |
| 4 | Bostik Inc.            | 10 | Dana Transport Systems Inc.       | 16 | James Mattheo & Sons Inc. | 22 | Nalco Chemical Co. Inc.                 | 28 | Shell Services Co.        | 34 | Woodbury Creek Wetland Mitigation Bank |
| 5 | Brother's Dry Cleaning | 11 | Forest Park Corporate Cntr.       | 17 | Johnson Matthey Inc.      | 23 | NJ West Deptford Project                | 29 | Solvay Specialty Polymers |    |  |
| 6 | Camden Press           | 12 | Freedom International Trucks Inc. | 18 | Lukoil #57330             | 24 | Phoenix Color Graphics Inc.             | 30 | South Shore Property      |    |  |





**Table 22:** Known Contaminated Sites

Name	Address	Site ID	Program Interest Number	Remedial Level
3 Greenwood Avenue	3 Greenwood Avenue	487424	614739	Not Listed in NJDEP Database
Accucote, Inc. @ Jessup Road Office Park	271 Jessup Road	125912, 7768	14907	C3
Andrew B. Duffy, Inc.	322 Crown Point Road	20653	32973	C2
Bostik, Inc. @ Mid-Atlantic Industrial Park	2000 Nolte Drive	7758	55024	Not Listed in NJDEP Database
Brothers Dry Cleaning @ Southwood Shopping Center	875 Mantua Avenue	7710	506255	C2
Camden Press @ Jessup Road Office Park	271 Jessup Road	125912	166258	Not Listed in NJDEP Database
Coastal Pipeline	Jessup Road & Forest Creek Lane	65325	G000028639	Not Listed in NJDEP Database
Colonial Pipeline Co. Woodbury Junction	Mantua Grove Road	14375	G000004366	D
Crown Vista Energy Project	Paradise Road	64901	G000024946	Not Listed in NJDEP Database
Dana Transport Systems, Inc.	51 57 Crown Point Road	91707	133800	C1
Forest Park Corporate Center	Mantua Grove Road	92043	619729	Not Listed in NJDEP Database
Freedom International Trucks, Inc., of NJ	I-295 & Old Crown Point Road	60012	164835	C1
General Engines Co., SLF	I-295	56180	30628	D
Gulf Oil Corp.	358 Kings Highway	14642	6343	D

Name	Address	Site ID	Program Interest Number	Remedial Level
Interstate CITGO	Crown Point Road	45312	727	C2
James Matteo & Sons, Inc.	1708 Route 130	38935 (NJDEP), NJD011770013 (EPA)	26178	C3
Johnson Matthey, Inc. @ Mid-Atlantic Industrial Park	2001 Nolte Drive	14637	12697	C2
Lukoil #57330	839 Kings Highway	15433	3776	Not Listed in NJDEP Database
Lukoil Service Station #57279	945 Redbank Avenue	7776	3778	C2
Manchesters Machinery & Welding Co., Inc.	Crown Point Road	7754	G000005968	C1
Mantua Preserve Corp.	Leonard Lane	193846	518538	Not Listed in NJDEP Database
Nalco Chemical Company, Inc.	1927 Nolte Drive	15894	G000003763	D
NJ West Deptford Project	240 Mantua Grove Road	223711	746473	B
Phoenix Color Graphics Inc @ Mid-Atlantic Industrial Park	551 Mid-Atlantic Parkway	29315	572524, 667099, 021688	Not Listed in NJDEP Database
Riggins Transport MVA	I-295	129637	172205	B
RiverWinds Golf Course	Crown Point Road	93422	758711	Not Listed in NJDEP Database
RiverWinds Restaurant	Jobstown Road	74407	G000039018	C1
Shell Services Co.	Crown Point Road	563569	705896	B
Solvay Specialty Polymers USA	Crown Point Road	14545	15010	D
South Shore Property	Mantua Grove Road	563562	705889	B

Name	Address	Site ID	Program Interest Number	Remedial Level
Station Stop	79 Crown Point Road Lot 2	50713	13916	C2
Sunoco Partners Marketing & Terminals	Route 130 & I-295	15834	3724	D
Tempo Development Group Subdivision (Birchly Court)	Crown Point Road	NJN000202726 (EPA ID)	N/A (Superfund Site)	N/A
Woodbury CITGO (located on Woodbury border)	897 Mantua Pike	15436	003775	C2
Woodbury Creek Wetland Mitigation Bank	Crown Point & Jobstown Roads	72213	G000023702	C1

Sources: NJDEP and EPA, 2017

Remedial Level	Explanation of Site Complexity
A	Emergency Action—Stabilization.
B	A single-phase remedial action with a single contaminant affecting only the soil.
C1	Remediation does not require a formal design. The source of the contamination is known or has been identified. There is a potential for groundwater contamination.
C2	Remediation requires a formal design. The source of the contamination is known, OR the release has caused groundwater contamination.
C3	A multi-phased remediation action where the source of the contamination is either unknown or there is an uncontrolled discharge to soil and/or groundwater.
D	A multi-phased remediation with multiple sources/releases to multiple media, including groundwater.
S	Should have a Remedial Level but this field was either Blank or designated as "N/A" in Pre-NJEMS data.

Table 22 and Figure 48 bring together information from two sources: the New Jersey Contaminated Sites Geographic Information Systems (GIS) dataset from the “State of New Jersey – GIS Open Data” site, which was last updated in April 2017 but is a static dataset, and a “live” report, “Known Contaminated Sites by County,” from NJDEP DataMiner gathered in July 2017. The list of contaminated sites includes (1) active sites with Licensed Site Remediation Professional oversight and (2) “known” contaminated sites (i.e., sites where contamination has been detected).



Many contaminated sites have multiple names that may refer to past or present owners or uses. The site ID is the most reliable means of getting updates on the status of a contaminated site. Sites move relatively quickly on and off NJDEP's Known Contaminated Sites List, and the most updated version is located on DataMiner.

Some of the sites do not have a listed remedial level, which a reader might otherwise use to determine the complexity of the contaminated site in question. There are several reasons why NJDEP may not assign a remedial level to a site. If the site is determined to be contaminated because of the presence of an unregulated heating oil tank, the case is transferred to a separate program under NJDEP: the Unregulated Heating Oil Tank program. This type of contaminant source is not managed under NJDEP's Site Remediation program, which is the program that assigns remedial levels. Another reason is if the source of the contamination is a relatively small petroleum spill of less than 100 gallons that does not flow into surfacewaters ("waters of the state") and is remediated within 90 days. Sites that meet these criteria are managed by local health departments, not the NJDEP Site Remediation Program. A third reason why a site may not have a listed remedial level is because it has been transferred to another remediating party during the process of remediation, including but not limited to an entity managing the site under the Industrial Site Recovery Act.

### Tempo Subdivision/Birchly Court Superfund Site

On November 19, 2015, buried crushed battery casings were discovered at a residential site at Birchly Court during a sewer lateral repair. This site was at one time owned by the Matteo family, which owned the Matteo Metal and Iron Superfund Site, a former scrap metal salvaging operation and junkyard at 1692 Crown Point Road. The Gloucester County Hazardous Materials Response Team and the West Deptford Township Police Department undertook emergency action, filling in the exposed sewer line trench to prevent further spread of the contaminants, and referred the site to NJDEP. On March 14, 2016, NJDEP requested that EPA evaluate the site. By sampling soil on the property and surrounding properties, EPA determined that the levels of hazardous substances qualified the area for a contaminants removal action under the Comprehensive Environmental Response, Compensation and Liability Act of 1980.

EPA professionals identified elevated concentrations of lead and PCBs on the site. Lead concentrations were discovered to be as high as 415 milligrams per liter (mg/L), which is much higher than the 5 mg/L value used as a threshold for hazardous concentrations of lead. Lead is particularly harmful to prenatal development, as well as neurological development in children aged six or younger. PCB concentrations of up to 32 parts per million were also detected in the battery casing samples. Sustained long-term exposure to PCBs may affect the skin, liver, and immune system, and may be carcinogenic at high levels.

The EPA project team determined that it needs to remove contaminated soil from 26 residential properties and estimates that the total project will last two years. The cleanup also requires deed restrictions on several public right-of-way areas, including roads, to ensure that future construction does not disturb contaminated soils beneath these rights-of-way. EPA intends to remediate the soil at the Superfund site to the NJDEP's Residential Direct Contact Soil Remediation Standard. This work is ongoing as of the publication of this report. As of June 22, 2017, EPA had removed and disposed of nearly 2,000 tons of lead-contaminated material from the site.

### Underground Storage Tanks

Property owners in West Deptford may use storage tanks to store fuel oil, or in the case of service stations, gasoline or diesel fuel. Older storage tanks are increasingly likely to have outdated leak control and corrosion

prevention measures and must be monitored for emissions. Corrosion and leakage of underground storage tanks can become a serious threat to the groundwater and soil surrounding it.

Sites with underground storage tanks are monitored under an NJDEP program called the Bureau of Underground Storage Tanks. Sites are registered, receive permits, and are monitored for leaks at regular intervals. As of the publication of this ERI, the Woodbury CITGO on Mantua Boulevard was the only site in West Deptford Township (or in this case, on the Woodbury-West Deptford border) with an underground storage tank that was pending to undergo remediation.

Some homeowners in West Deptford Township may also have underground storage tanks, which on residential properties are used primarily to hold home heating oil. Those private residences are not publicly listed by NJDEP unless they pose a health hazard.

### Groundwater Contamination

There are six sites within West Deptford that have evidence of groundwater contamination from various sources (see Table 23: CEAs). These sites are restricted by a Classification Exception Area (CEA) designation, which is a geographically defined area within which the local groundwater resources are known to be contaminated (i.e., the water quality does not meet drinking water and groundwater quality standards for specific contaminants). A CEA can be established for a contaminated site’s aquifer if state drinking water quality standards are not met because of: (1) natural groundwater quality, (2) discharges from an NJPDES permitted site, or (3) pollution caused by human activity.

A CEA designation suspends aquifer use in the affected areas until state drinking water standards are met. It is not a groundwater remedy but rather an institutional control established in conjunction with an approved remedy. NJDEP may revise or establish a CEA at any time to more accurately reflect the groundwater conditions using revised data.

Before a CEA expires, the remediation party collects at least two rounds of groundwater samples in a way that accounts for seasonal fluctuations in the groundwater table and represents the entire horizontal and vertical extent of the groundwater CEA. If the samples indicate that contaminant concentrations have decreased below the target groundwater quality standard, the permittee can request removal of the CEA from NJDEP. When NJDEP approves the removal, the permit is terminated. If the samples indicate that the contaminant concentration is not going to be reduced below the standard by the expiration of the CEA, the licensed site remediation professional will have to undertake active remediation and apply to NJDEP to extend the CEA.

**Table 23: CEAs**

Name	Address	Preferred ID	Area of Site (Acres)	Depth of Site (Feet)	Established Date	Duration (Years)
Coastal Pipeline	Jessup Road & Forest Creek Lane	G000028639	1.84	50	8/14/2015	5.7

Name	Address	Preferred ID	Area of Site (Acres)	Depth of Site (Feet)	Established Date	Duration (Years)
General Engines Company Incorporated	I-295	30628	4.44	15	10/12/2016	14
Interstate CITGO	I-295 & Riley Avenue	727	0.031	20	4/9/2003	21.34
Lukoil #57330	839 Kings Highway	3776	0.38	50	2/12/2013	15
Nalco Chemical Company Incorporated	1927 Nolte Drive	G000003763	1.25	12	3/13/2013	10.3
RiverWinds Restaurant	1045 RiverWinds Drive	G000039018	4.36	15	1/23/2015	Indeterminate

Source: State of New Jersey, GIS Open Data

### Historic Landfills

As of 2014, when NJDEP most recently updated its landfill records, West Deptford was home to four historic landfills: Coastal Eagle Point (now owned by Sunoco), General Engines Company, Hofsteder-Landmark, and part of the Woodbury City landfill (see Table 24: Historic Landfills). Of these, only General Engines Company was properly closed in accordance with NJDEP's Division of Solid and Hazardous Waste's Solid Waste Regulations.

**Table 24:** Historic Landfills

Name	Address	Solid Waste Program Interest Number	Owner/Operator Type	Sole Source?
Coastal Eagle Point (Now Sunoco)	Route 130 & I-295	132205	Industrial	Yes
General Engines Co	I-295	132208	Industrial	Yes
Hofsteder-Landmark	Woodbury Creek	132206	Private	Yes
Woodbury City	Tatum and Woodbury Creek	132207	Government	No

Source: NJDEP, 2014

Landfills pose a number of potential environmental problems, including groundwater contamination and harmful air emissions. Current EPA landfill regulations mandate that the owner or operator of the landfill

conduct at least 30 years of postclosure care and monitoring to ensure that the landfill's leachate (i.e., water that has passed through a landfill) is properly removed and treated so that it does not leak into its surroundings and contaminate the surrounding soil and groundwater. While current landfill regulations have greatly decreased the probability of landfill failure within the 30-year postclosure window, it is likely that these systems will remain in danger of leaking and contaminating the outside environment well into the future, beyond the mandated postclosure period. The owners or operators of West Deptford's four historic landfills and the NJDEP Division of Solid and Hazardous Waste may serve as a reference for determining the time that remains for pumpage and/or collection to occur at these landfill sites.

## Radon

Radon is a radioactive gas that comes from the natural decay of uranium found in nearly all soils. It moves up through the ground to the air above, and into homes through cracks and other holes in foundations. A buildup of radon-contaminated air within a home can pose a long-term health hazard to residents, potentially causing 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 NJDEP by certified companies, which perform the tests or manufacture the test kits. This data is used to classify municipalities into a three-tier system, which identifies the potential for homes with indoor radiation problems.

As of 2015, the most recent date listed on the NJDEP website, West Deptford was listed as a Tier 2 municipality; that is, a municipality with moderate potential of having high radon levels in homes. The criteria for a Tier 2 municipality designation is that of at least 25 homes tested in the municipality, between 5 and 24 percent have radon concentrations greater than or equal to 4.0 picocuries per liter in the air. A 4.0 picocurie measurement is the level at which homeowners should take immediate action to remove the radon in their homes.

The state does not require radon preventative measures in new homes outside of Tier 1 areas but encourages these homeowners to test for radon and mitigate it. NJDEP maintains [www.njradon.org](http://www.njradon.org) as an information source on radon and radon mitigation for residents.

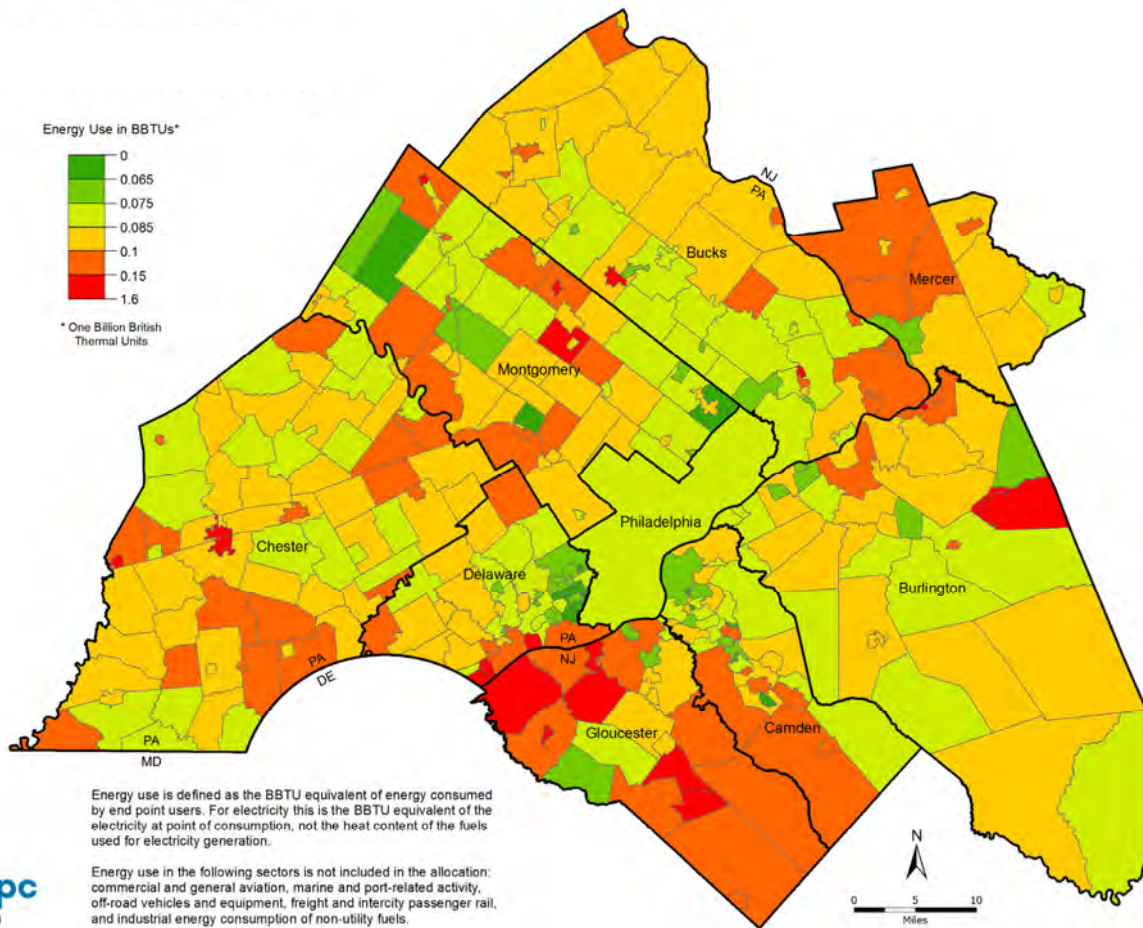
## West Deptford's Energy Use

Every five years, DVRPC updates its greenhouse gas inventory for the nine-county Greater Philadelphia region for which it develops plans. DVRPC estimates energy use in the entire region, as well as in each county and each municipality within this region, including West Deptford.



In its most recent estimation for West Deptford, using 2010 data, DVRPC calculated that West Deptford consumed 3,920 billion British thermal units (BBtus) of energy in a year. A British thermal unit (Btu) is the amount of energy needed to cool or heat one pound of water by one degree Fahrenheit. A gallon of gasoline contains about 114,000 Btus, so West Deptford's total energy use in 2010 was equivalent to about 34.4 million gallons of gasoline. West Deptford performed below average in comparison with other municipalities in terms of energy use per capita (including in-town residents and workers [Figure 49]). The total cost of West Deptford's energy use was estimated to be \$120 million. The combustion of fuels for this consumed energy, in combination with several nonenergy sources of greenhouse gases, resulted in the release of 358,000 metric tons of carbon dioxide equivalent gases.

**Figure 49:** Energy Use per Population and Employment by Municipality (2010)



Source: DVRPC

Energy use is calculated by tabulating energy consumption across the commercial, industrial, and residential sectors, along with mobile (i.e., vehicle) energy consumption. Of the sectors for which data was available and able to be allocated to the municipal level, the mobile-highway sector (i.e., private vehicles) consumed the most energy in West Deptford. Their total was about 1,224 BBtus of energy, or about 31 percent of the total energy consumed in the township (see Table 25: Energy Use and Cost). The industrial sector was a close second, with an estimated consumption of 1,183 BBtus, or about 30 percent of the total energy consumed in the township.

The energy expenditures were highest for the commercial sector (approximately \$46.6 million, or 39 percent of the total energy costs for the township) and for the industrial sector (approximately \$28.5 million, or 24 percent of the total energy costs for the township). This discrepancy exists in part because of the differences in the fuel mixture used for these two energy consumers. The mobile highway sector used a mixture of approximately 80 percent motor gasoline and 20 percent diesel, while the commercial and industrial building sectors together used a mixture of approximately 56 percent electricity and 43 percent natural gas.

**Table 25: Energy Use and Cost**

Sector	Energy Use (BBtu)	Percentage of Total Energy Use	Energy Expenditures	Percentage of Total Energy Expenditures
Residential	790	20%	\$21,589,326	18%
Commercial	719	18%	\$46,613,511	39%
Industrial	1,183	30%	\$28,450,150	24%
Mobile—Highway	1,224	31%	\$22,903,918	19%
Mobile—Transit	2	<1%	N/A	0%
TOTAL	3,917	100%	\$119,556,904	100%

Source: DVRPC, 2013

For more information on where West Deptford’s energy use fits into the region’s consumption, DVRPC published a summary report (September 2014) and accompanying methods and sources document (April 2015).

## Homeowner’s Associations (HOAs)

HOAs are groups of residences that are run by a collective of homeowners, with or without oversight from a parent company. HOA members pool funds to maintain sidewalks, park space, or other amenities mutually owned by the members or parent company. They also develop a set of rules about their properties to which each member household adheres. Because these rules are followed by groups of residents rather than individuals, they have the potential to result in a greater aggregate impact on a municipality, which may be negative or positive.

Gloucester County maintains a list of HOAs in the county and identified 25 separate HOAs in West Deptford, acknowledging that this list may not be exhaustive (see Table 26: Homeowner’s Associations in West Deptford). Some HOAs in the township have contracts with homeowners that prevent homeowners from reducing their environmental footprint, for example by using clotheslines or rain barrels, or by constructing rain gardens. Some expand homeowners’ footprints by requiring regular watering of lawns. However, HOAs may become partners with municipalities in implementing environmental goals. HOAs can reduce their environment impact by starting a recycling or composting program, growing a community garden, constructing a trail, installing green stormwater infrastructure, building solar panels, requiring low-impact landscaping practices (in terms of chemical use or mowing), sharing information like energy or water-saving tips, or constructing or renovating buildings that are energy efficient.

**Table 26:** HOAs in West Deptford

HOA Owner	HOA Location
1225 N Broad Street Condo Association	1225 N Broad Street
417 Development Corporation	1595 Imperial Way
Abert Development Corporation	1123 Parliament Way
Romi Cohn	Shira Court
Country Creek Condo c/o Mamco Property Management	Country Creek Condo
DR Horton, Inc.	Moore Road
DR Horton, Inc.	Highgrove Court
Fairmont Building Corporation c/o Pulte Home	1411 Weatherly Court
Fairmont Building Corporation c/o Pulte Home	Pennfield Drive
Fairmont Building Corp. c/o Pulte Home	1621 Pennfield Drive
Forrest Creek Condominium Association	Apple Lane
Hampton Crescent, LLC	25-50 Highbridge Lane
Main Street Mantua Investments, LLC	640 W Red Bank Avenue
Nottingham Estates Homeowners Association	Patsy Court
Park West/Pinnacle Realty Services	Parkville Station Road
Pelican Place at RiverWinds Condo	Pelican Place Condo
Reserve at RiverWinds HOA c/o Mamco Property Management	King Fisher Way
Richland Partners, LLC	Karen Ann Court
Signature Homes at Kings Crossing	Ogden Station Road
Saint Regis Walk HOA c/o Hanco.	Parkville Station Road
Stone's Throw Condo c/o Mamco Property Management	Off Delaware Street
The Grande at Kings Woods Condo c/o DR Horton, Inc.	Highbridge/Lionheart Lanes
Unknown c/o West Deptford Township	Off Ogden Station Road
Village at RiverWinds HOA c/o Mamco Property Management	Jobstown Road Extension

HOA Owner	HOA Location
Village at RiverWinds HOA c/o Mamco Property Management	RiverWinds Drive

Source: Gloucester County, 2017

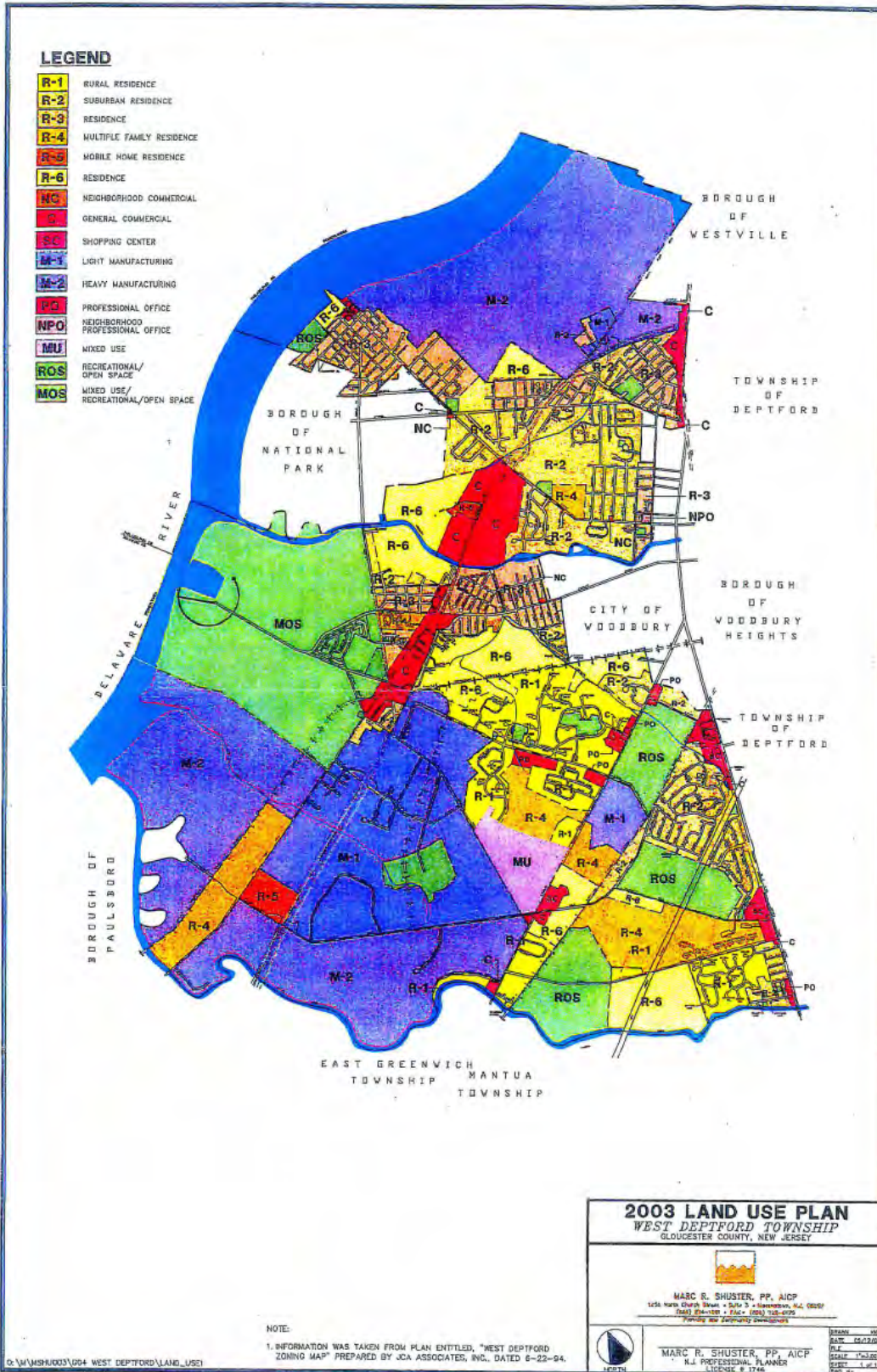
## Open Space

In 1971, eight years prior to the publication of West Deptford’s 1979 Natural Resources Inventory, the township contained about 32 acres of land in use as local parks and recreational land. Six years later, in 1977, township leaders outlined in their master plan an ambitious goal to allocate 1,985 acres of land to “conservation, open space, public, and semi-public” land uses. In the 1977 master plan, the township highlighted several areas proposed for future open space facilities, including an “active recreation area” between Woodbury Terrace and Woodbury Creek, and a park system along both sides of Matthews Branch between Kings Highway and Woodbury Creek. The township also proposed to expand conservation lands in the floodplains and wetlands along the Delaware River, Hessian Run, Mantua Creek, and other stream areas.

At present, the township contains 652 acres of open space land within 41 parcels that has been deed-restricted (permanently preserved) for use by township residents. The township continues to promote the development of open space and recreation space, as evidenced by the green parcels in its most recent (2003) land use plan (Figure 50: West Deptford 2003 Land Use Plan).



Figure 50: West Deptford 2003 Land Use Plan



Source: West Deptford Township

## Parks and Recreation

West Deptford has been establishing parks for longer than it has been planning for open space. The oldest park in the township is the Little League Complex on Grove Road, which was established in 1958. West Deptford Township is now home to a widespread park system that provides a variety of active and passive recreational opportunities for area residents, and the township contains over 512 acres of municipally owned recreation land (Table 27: Municipal Parks).

Amenities for active recreation in the township’s parks include soccer fields, baseball/softball fields, tennis courts, basketball courts, street hockey courts, a football field, a lacrosse field, and a skate park. In addition to sports fields and courts, West Deptford contains a number of playgrounds, smaller “tot lots,” walking tracks, outdoor theater facilities, a scout building, and trails. Passive recreation encompasses most other park activities, including walking, fishing, bird watching, bike riding, boating, and picnicking.

The township’s parks range in scale and scope. At 150 acres, the largest park in West Deptford is RiverWinds Lane, which includes a community center and multiple soccer fields, football fields, and street hockey courts, as well as a walking track.

The township also contains several medium-sized parks with a variety of amenities. One of these parks is Union Field, which is 35 acres and includes 15 baseball fields (the Little League Complex) and the Field of Dreams playground. The Field of Dreams, a 20-year old playground, was given a full restoration in 2012, with much of the work done by volunteers and funding from local businesses and industries.

The smallest parks in the township are the tot lot playgrounds, some of which are less than one half-acre. These parks typically include fenced-in play areas for toddlers that provide various outdoor play equipment, such as slides, swings, and sand boxes.

One of West Deptford’s primary goals to improve its open space amenities is to rehabilitate its older parks, particularly the tot lot at First Avenue along Mantua Creek in the southeast corner of the township, and the “Back Beach” park area along Red Bank Avenue and 2nd Street.

**Table 27: Municipal Parks**

Park Name/Location	Acres	Amenities
Barnsdale Road	8.00	Open Space
Centre & Manhattan	0.25	Open Space
Cleveland & Wilson	1.04	Tot Lot, Open Space
Crescent Court	0.28	Tot Lot, Basketball Court
Crown Point Road & Center	0.86	Open Space
Crown Point Road & Church	1.50	Little Theater Building, Tot Lot, Basketball Court
Elberne & Academy	8.70	Open Space
Fernwood Drive	3.00	Tot Lot, Open Space

Park Name/Location	Acres	Amenities
First Avenue	0.25	Tot Lot
Frances Avenue	1.50	Tot Lot, Four Tennis Courts
Grant & Morris	0.24	Tot Lot
Grove Road	10.63	Little League Complex, 15 Baseball/Softball Fields, Tot Lot
Jessup & Greenfields	1.00	Two Basketball Courts
Lauderdale Road	0.36	Open Space
Lecato & Mansion	0.19	Tot Lot
Locksley Lane	5.00	Open Space
Metropolitan Avenue	86.50	West Deptford Park, Nine Soccer Fields, Six Softball Fields, Three Basketball Courts, Skate Park, Tot Lot, Walking Track
Parkville & Saint Regis	1.13	Open Space
Parkville Road	130.00	Open Space
Pennfield Drive	8.00	Tot Lot, Open Space
Plantation & Royal	10.00	Tot Lot, Open Space
Red Bank & Hessian	1.90	Scout Building, Open Space
Red Bank Avenue	5.30	Lacrosse Field
Rivergate Park	22.18	Tot Lot, Three Tennis Courts, Basketball Court, Boat Ramp
RiverWinds Lane	150.00	Community Center, Nature Trail, Three Football Fields, Three Soccer Fields, Three Street Hockey Courts, Walking Track
Route 45 & Turnpike	0.93	Tot Lot, Basketball Court
Salem & Grove	0.89	Tot Lot, Basketball Court
Saint Regis Drive	0.94	Tot Lot, Basketball Court
Sterling & Meadowcroft	0.20	Tot Lot
Storrie & Brewer	0.50	Tot Lot, Basketball Court
Union Field	35.00	Baseball Field, Field of Dreams Playground, Community Playground
Westwood & Nottingham	16.50	Two Tot Lots, Open Space

Source: West Deptford Township, 2009

## Deed-Restricted Open Space Inventory

Of West Deptford’s 652 acres of deed-restricted land, about 73 percent (by area) is owned by West Deptford Township and is used for recreation. The other 27 percent is owned by a mixture of public (state and county) and private entities (see Table 28: Deed-Restricted Open Space and Figure 51: Deed-Restricted Open Space).

West Deptford’s 1979 Natural Resources Inventory noted that “the planning of linear parks, walking trails and bicycle trails, playgrounds, ecological centers, and conservancy areas will do much to control and direct the urbanization of the Township.” The open space maps in this report can be used as a reference for the creation of new open space and its coordination with development or infill.

**Table 28:** Deed-Restricted Open Space

Landowner/Easement Holder	Number of Parcels	Total Acres Preserved
State of New Jersey	1	40.69
Gloucester County	2	4.77
West Deptford Township	35	473.92
Nonprofit	2	27.56
Farmer	1	106.00
<b>Total</b>	<b>41</b>	<b>652.94</b>

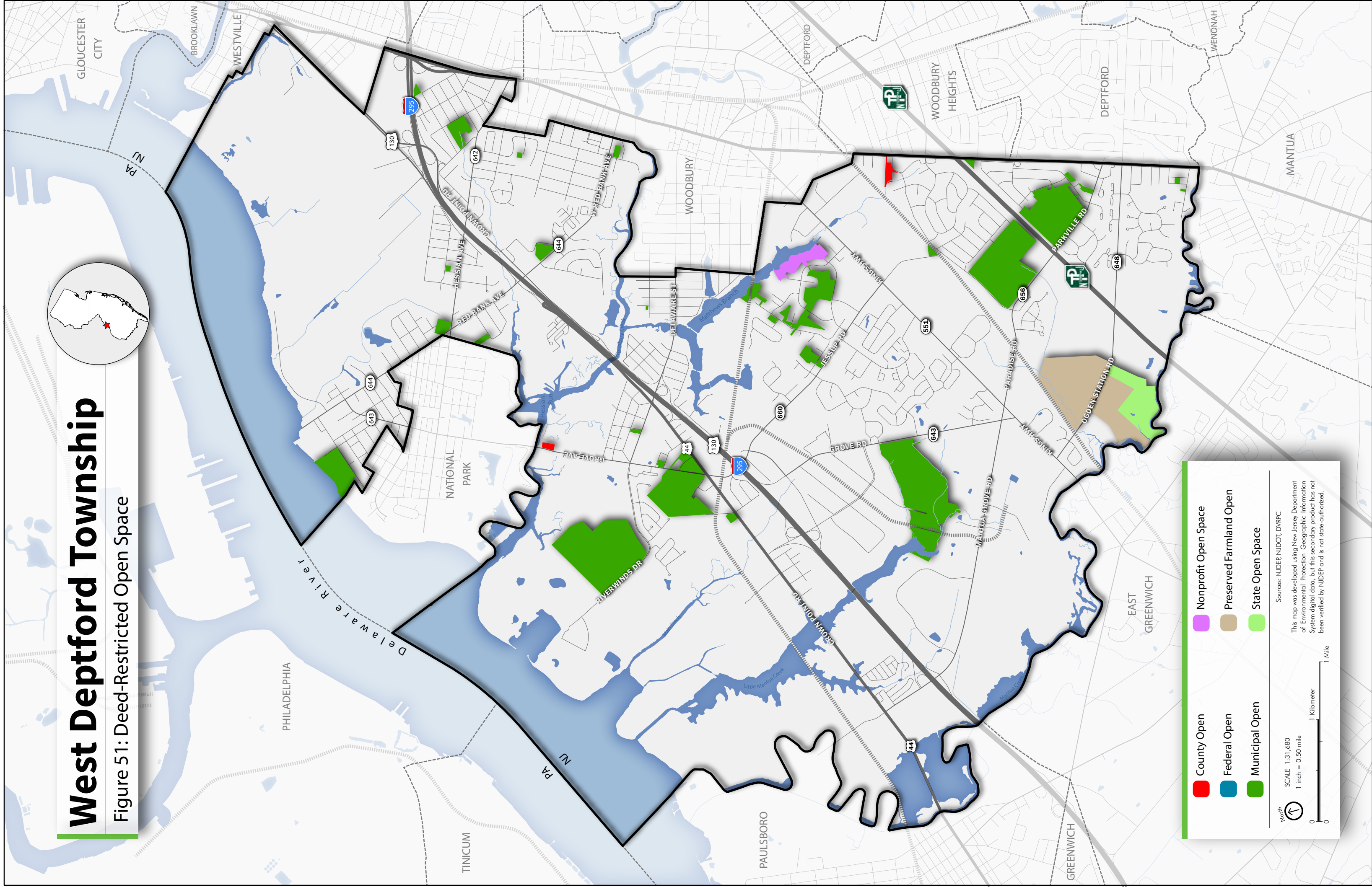
Source: DVRPC, 2011





# West Deptford Township

Figure 51: Deed-Restricted Open Space



**County Open** (Red square)

**Federal Open** (Blue square)

**Municipal Open** (Green square)

**Nonprofit Open Space** (Purple square)

**Preserved Farmland Open** (Brown square)

**State Open Space** (Light Green square)

Sources: NJDEP, NJDOT, DVRPC

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

North

SCALE 1:31,680  
1 inch = 0.50 mile  
0 1 Kilometer 1 Mile



West Deptford residents are proud of their preserved open space, much of which is conservation land. One parcel of note is the 46-acre Lodge Farm, a former farm property located along Mantua Creek off Ogden Station Road. In 2006, partners from the State of New Jersey, New Jersey Conservation Foundation, South Jersey Land and Water Trust, and the Federation of Gloucester County Watersheds worked to preserve this parcel as the first state-owned Wildlife Management Area. It is the single preserved parcel in West Deptford that is owned by the state.

One of the two conservation parcels in West Deptford that is associated with a nonprofit organization is the Ullrich Wildlife Sanctuary, located off Kings Highway/Mahley Avenue and near the Matthews Branch. This sanctuary consists of eight acres of forested land, about seven of which are located in West Deptford. Florence Ullrich donated the development rights on this parcel to the Humane Society's Wildlife Land Trust in 2007, and it is the first wildlife sanctuary with an easement owned by this land trust in the state. The parcel functions strictly as wildlife habitat, with recreational and commercial hunting and trapping prohibited. While the parcel is still owned by the Ullrich family, the Humane Society's Wildlife Land Trust makes periodic inspections to monitor and enforce the conditions of the easement.

A township-owned site of note is Moore's "Strawberry Vale Farm," accessible from Parkville Road and consisting of two lots straddling the New Jersey Turnpike. The site, formerly farmland that passed through several families (most recently the Moores), was preserved using New Jersey Green Acres funding and contains trails and wildlife habitat.

### Wheelabrator Wildlife Refuge

The 150-acre Wheelabrator Wildlife Refuge is located on property along NJ-130 that is owned by Wheelabrator, a waste-to-energy company. The refuge, although not permanently preserved, is a favorite destination in the region for passive recreation. It also includes a mixture of wooded, field, and wetland habitat. Wheelabrator worked with the New Jersey Audubon Society and the Gloucester County Nature Club to create habitat for a variety of species, and the refuge was certified by the Wildlife Habitat Council as a "Wildlife at Work" site that contains recreation amenities that minimally interfere with wildlife. According to eBird.org, a crowd-sourced bird watching website, 182 species of birds have been observed at the refuge since 2011. Its 1.5-mile trail begins with a butterfly garden, passes through tall-grass fields and woods, and ultimately brings hikers to the Big Timber Creek and the Delaware River, providing views over the river to Philadelphia.



## Preserved Working Farmland

Most of West Deptford's farmland has been lost to development. The township is home to one preserved farm, which is commonly known as the Urban Farm (Figure 52) because it was owned by the Urban family from 1938 until 2013

when it was sold to the Grasso family, its current owners. At 106 acres, it is one of the few remaining large, active farms in the township. New Jersey's and Gloucester County's farmland preservation programs pooled funding to pay the \$1 million needed to create an easement on the farm. They succeeded in October 2012, one month before then-owner George "Dutch" Urban passed away.

**Figure 52:** Urban Farm



Source: Lori M. Nichols/South Jersey Times, <http://s.nj.com/UGCZ6IO>

According to the 2015 Gloucester County Farm Preservation Plan

Update, West Deptford has 615 acres of active agricultural land. Like West Deptford Township, Gloucester County seeks to preserve more of that land, and in its 2015 Farm Preservation Plan Update identified the 69-acre DeHart Farm and the 25-acre Hamel Farm as high priorities for preservation. According to the county, these two farms are the last remaining active farm parcels in the township and as such are of great cultural and economic importance to the county and township. If the county or another entity preserves these farms, they should also preserve easements for trails alongside them.

## Land Types for Conservation

West Deptford has a robust open space protection program, with 652 acres of open space protected permanently. The township's wetlands are also afforded protections from development by the State of New Jersey's Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A). However, even with these protections, there are a variety of types of undeveloped open space within the township that could be considered for conservation.

Lands with higher natural resource values that could be prioritized for conservation purposes, based on the maps provided in this report, are as follows. They are organized by degree of importance within each map category, unless otherwise noted:

Land Use/Natural Vegetation (in no particular order)

- agricultural land uses;

- forest land (see Figure 37: Natural Vegetation for subtypes);
- land along waterways;
- wetlands (see Figure 37: Natural Vegetation for subtypes);
- brush/shrubland; and
- barren land (with the goal of converting it into a natural use);

#### Slope

- land with slopes of 20 degrees or more; and
- secondarily, land with slopes of between 10 and 20 degrees;

#### Soils

- land with soil types that are poor for development (Development Capability of C);

#### Agricultural Soils

- prime farmland;
- farmland of statewide importance; and
- farmland of unique importance;

#### Floodplains

- land within the 1 percent/100-year floodplain; and
- land within the 0.2 percent/500-year floodplain;

#### Impervious Coverage

- land with impervious surface of less than 5%;

#### Groundwater Recharge

- land with a high groundwater recharge rate of 10 to 14 inches per year; and
- land with a moderate groundwater recharge rate of 6 to 9 inches per year;

#### Landscape Project Priority Habitat

- Rank 5 (federal listed species) lands;
- Rank 4 (state endangered species) lands;
- Rank 3 (state threatened species) lands;
- Rank 2 (special concern species) lands; and
- Rank 1 (habitat-specific requirements) lands.

## Development Constraints

The development of homes, commercial and industrial facilities, and infrastructure is limited by several types of environmental features, as well as from regulations governing certain environmental features. These restrictions are called “constraints” from a development perspective. Steep slopes, flood hazard areas, and wetlands or poorly draining soils all serve as functional constraints to development. These constraints are reinforced by state rules concerning the development of wetlands (Freshwater Wetlands Protection Act, N.J.A.C. 7:7A), flood hazard areas (Flood Hazard Area Control Act Rules, N.J.A.C. 7:13), habitat (New Jersey Endangered Species Conservation Act), and tidal shorelines (Coastal Zone Management Rules, N.J.A.C.

7:7); and federal laws concerning the development of federally-listed species habitat (as defined in the Endangered Species Act). West Deptford's zoning ordinance also encourages or requires additional open space for mobile home communities, mixed use developments, and cluster developments. As mentioned previously, the Planning Board is authorized to permit cluster development in the R-1 zone, if the proposed development protects floodplains, steep slopes or other environmentally sensitive areas; or complements residential development. The township's zoning code also prohibits reductions in lot sizes that reduce dimensions of open space below the requirements of the code.

Sometimes, development is prohibited, as in the case of wetlands and extremely steep slopes. Other times, construction may occur, but it can be subject to long and costly permitting processes, reviews, and special design considerations. These rules are in place not to make development more costly, but rather to ensure that the ecosystem services for the community (beneficial floodplains, aesthetic value, or greenway access, for example) are protected, while avoiding environmental degradation such as the erosion or the sedimentation of streams.

Even if regulatory constraints did not exist, construction in floodplains, steep slopes, or poor soils may result in higher up-front costs to builders in order to construct sufficiently resilient buildings or infrastructure. If development does not adequately account for the physical constraints that exist on a parcel, it may cause damage to the property over time, particularly in the form of foundation or septic system failure.

## Conclusion

The history of West Deptford reflects the history of the country, growing from a forest populated by the Lenni Lenape, to a colonial settlement of European farmers and tradesmen, to a suburban community with rapid residential and commercial development. After approximately 150 years, the township of West Deptford has grown from a rural farming community to one of the largest residential and business centers in Gloucester County, and its environmental features reflect that change. The early Lenni Lenape and European settlers who migrated to West Deptford found the area surrounding the shores of the Delaware River to be a good place to live, and many generations later, in part because of West Deptford's waterfront location, its varied habitats, and its open space, people are still finding that to be true.

## References

### Local Planning Documents

West Deptford Township. *Open Space and Recreation*. September 2, 2001.

———. *West Deptford Township Gloucester County Master Plan Document*. May 2009.

West Deptford Township Environmental Commission. *Natural Resources Inventory*. 1979.

### Township History

Brown, C. Douglas. *On Eagles' Wings: West Deptford Township Quasquicentennial*. 1996.

Maska, April and Noreen Mikulski. *Images of America West Deptford*. Charleston, SC: Arcadia Publishing, 2011.

New Jersey Department of Labor and Workforce Development. "Table 6. New Jersey Resident Population by Municipality: 1930–1990." Accessed May 21, 2018.  
[www.nj.gov/labor/lpa/census/1990/poptrd6.htm](http://www.nj.gov/labor/lpa/census/1990/poptrd6.htm).

Shirk, Edmund George. *The Centennial of West Deptford Township*. 1971.

### Land Use/Land Cover

New Jersey Department of Environmental Protection. "2012 Land Use/Land Cover Classification." Accessed May 21, 2018. [www.nj.gov/dep/gis/digidownload/metadata/lulc12/anderson2012.html](http://www.nj.gov/dep/gis/digidownload/metadata/lulc12/anderson2012.html).

### Geology

New Jersey Department of Environmental Protection and New Jersey Geological Survey. "Bedrock Geology of the Woodbury Quadrangle, Gloucester County, New Jersey." Prepared by Scott D. Stanford and Peter J. Sugarman. 2004. [www.state.nj.us/dep/njgs/pricelst/ofmap/ofm59.pdf](http://www.state.nj.us/dep/njgs/pricelst/ofmap/ofm59.pdf).

———. "Physiographic Provinces of New Jersey." Prepared by Richard F. Dalton. 2003.  
[www.nj.gov/dep/njgs/enviroed/infocirc/provinces.pdf](http://www.nj.gov/dep/njgs/enviroed/infocirc/provinces.pdf).

### Soils

Gloucester County. *Comprehensive Farmland Preservation Plan Update*. 2015.

Rutgers University. "Cooperative Extension of Gloucester County." New Jersey Agricultural Experiment Station. Accessed May 21, 2018. [njaes.rutgers.edu/county/quickinfo.asp?Gloucester](http://njaes.rutgers.edu/county/quickinfo.asp?Gloucester).

U.S. Department of Agriculture. "Downer Series." Accessed May 21, 2018.  
[soilseries.sc.egov.usda.gov/OSD\\_Docs/D/DOWNER.html](http://soilseries.sc.egov.usda.gov/OSD_Docs/D/DOWNER.html).

———. "Soil Survey Manual: Chapter Three. Examination and Description of Soil Profiles." Revised by Soil Science Division Staff, Natural Resources Conservation Service. Accessed May 21, 2018.  
[nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2\\_054253](http://nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_054253).

———. "Web Soil Survey." Natural Resources Conservation Service. Accessed May 21, 2018.  
[websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx](http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx).



## Steep Slopes

West Deptford Township. "Stormwater Control Procedures" §141-2(C). Code of the Township of West Deptford. Adopted April 5, 2007. [clerkshq.com/default.ashx?clientsite=WestDeptford-nj](http://clerkshq.com/default.ashx?clientsite=WestDeptford-nj).

———. "Cluster Developments" §166-40A(1). Code of the Township of West Deptford. Amended April 3, 2014. [clerkshq.com/default.ashx?clientsite=WestDeptford-nj](http://clerkshq.com/default.ashx?clientsite=WestDeptford-nj).

## Hydrology and Water Resources

New Jersey Department of Environmental Protection. "New Jersey Water Withdrawal, Use, Transfer and Discharge Summary 1990 to 1999 by NJDEP 11-Digit Hydrologic Unit Code (HUC11)." Division of Water Supply and Geoscience. Accessed May 21, 2018. [www.state.nj.us/dep/njgs/enviroed/HUC11.htm](http://www.state.nj.us/dep/njgs/enviroed/HUC11.htm).

## Wetlands

New Jersey Department of Environmental Protection. "Freshwater Wetlands." Division of Land Use Regulation. Accessed May 21, 2018. [www.nj.gov/dep/landuse/fww/fww\\_main.html](http://www.nj.gov/dep/landuse/fww/fww_main.html).

State of New Jersey. "Freshwater Wetlands Protection Act Rules" N.J.A.C. §7:7A. *New Jersey Administrative Code*. Accessed May 21, 2018. [www.nj.gov/dep/rules/rules/njac7\\_7a.pdf](http://www.nj.gov/dep/rules/rules/njac7_7a.pdf).

U.S. Department of Agriculture. "Agricultural Conservation Easement Program." Natural Resources Conservation Service. [www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/acep](http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/acep).

U.S. Fish & Wildlife Service. "National Wetlands Inventory." Accessed May 21, 2018. [www.fws.gov/wetlands/data/mapper.html](http://www.fws.gov/wetlands/data/mapper.html).

U.S. Geological Service. "Technical Aspects of Wetlands: Wetland Definitions and Classifications in the United States." Prepared by Ralph W. Tiner. Accessed May 21, 2018. [water.usgs.gov/nwsum/WSP2425/definitions.html](http://water.usgs.gov/nwsum/WSP2425/definitions.html).

## Surface Water Quality

Delaware River Basin Commission. "Administrative Manual Part III: Water Quality Regulations with Amendments through December 4, 2013, 18 CFR Part 410." Accessed May 21, 2018. [www.nj.gov/drbc/library/documents/WQregs.pdf](http://www.nj.gov/drbc/library/documents/WQregs.pdf).

———. "Delaware Estuary Boat Run Water Quality Data." Accessed May 21, 2018. [www.nj.gov/drbc/quality/datum/boat-run.html](http://www.nj.gov/drbc/quality/datum/boat-run.html).

National Water Quality Monitoring Council. "Water Quality Data." Accessed May 21, 2018. [www.waterqualitydata.us/portal](http://www.waterqualitydata.us/portal).

New Jersey Department of Environmental Protection. "2014 New Jersey Integrated Water Quality Assessment Report: Appendix B: 2014 Two-Year TMDL Schedule." June 2015. [www.nj.gov/dep/wms/bears/docs/2014\\_draft\\_2yr\\_tmdl\\_schedule.pdf](http://www.nj.gov/dep/wms/bears/docs/2014_draft_2yr_tmdl_schedule.pdf).

———. "2014 New Jersey Integrated Water Quality Assessment Report: Appendix B: Data Sources." June 2015. [www.nj.gov/dep/wms/bears/docs/2014\\_data\\_sources.pdf](http://www.nj.gov/dep/wms/bears/docs/2014_data_sources.pdf).

- . “2014 New Jersey Integrated Water Quality Assessment Report.” December 2015 Draft. Division of Water Monitoring and Standards. Accessed May 21, 2018. [www.state.nj.us/dep/wms/bears/docs/2014\\_draft\\_integrated\\_report\\_with\\_appendices.pdf](http://www.state.nj.us/dep/wms/bears/docs/2014_draft_integrated_report_with_appendices.pdf).
  - . “Ambient Macroinvertebrate Network (AMNET).” Bureau of Freshwater Monitoring. Accessed May 21, 2018. [www.state.nj.us/dep/wms/bfbm/amnet.html](http://www.state.nj.us/dep/wms/bfbm/amnet.html).
  - . “Ambient Surface Water Quality Monitoring Network (ASWQMN).” Bureau of Freshwater and Biological Monitoring. Accessed May 21, 2018. [www.state.nj.us/dep/wms/bfbm/surfacewater.html](http://www.state.nj.us/dep/wms/bfbm/surfacewater.html).
  - . “DEP DataMiner.” Accessed May 21, 2018. [www13.state.nj.us/DataMiner/Home/Documents?isExternal=y](http://www13.state.nj.us/DataMiner/Home/Documents?isExternal=y).
  - . “Discharge Category Codes.” Accessed May 21, 2018. [www.nj.gov/dep/dwq/pdf/Dis\\_cat\\_list.pdf](http://www.nj.gov/dep/dwq/pdf/Dis_cat_list.pdf).
  - . “NJ-GeoWeb.” Accessed May 21, 2018. [njwebmap.state.nj.us/NJGeoWeb/WebPages/Map/FundyViewer.aspx?THEME=Sapphire&UH=True&RIDZ=636117094442130945](http://njwebmap.state.nj.us/NJGeoWeb/WebPages/Map/FundyViewer.aspx?THEME=Sapphire&UH=True&RIDZ=636117094442130945).
  - . “Tier A Municipal Stormwater Permit.” Division of Water Quality, Bureau of Nonpoint Pollution Control. Accessed May 21, 2018. [www.nj.gov/dep/dwq/tier\\_a.htm](http://www.nj.gov/dep/dwq/tier_a.htm).
- State of New Jersey. “Surface Water Quality Standards” N.J.A.C. §7:9B. New Jersey Administrative Code. Accessed May 21, 2018. [www.nj.gov/dep/rules/rules/njac7\\_9b.pdf](http://www.nj.gov/dep/rules/rules/njac7_9b.pdf).
- U.S. Environmental Protection Agency. “STORET Central Warehouse.” Accessed May 21, 2018. [ofmpub.epa.gov/storpubl/dw\\_pages.querycriteria](http://ofmpub.epa.gov/storpubl/dw_pages.querycriteria).
- U.S. Geological Survey. “National Water Information System: Web Interface.” Accessed May 21, 2018. [waterdata.usgs.gov/nwis](http://waterdata.usgs.gov/nwis).

## Floodplains

- New Jersey Department of Environmental Protection. “Flood Hazard Area Control Act Rules” N.J.A.C §7:13. Accessed May 21, 2018. [www.nj.gov/dep/landuse/lawsrules/fhacar\\_index.html](http://www.nj.gov/dep/landuse/lawsrules/fhacar_index.html).

## Drinking Water

- New Jersey Department of Environmental Protection. “NJ Private Well Testing Act Data Summary (Sep. 2002 to Apr. 2014).” August 17, 2017. [njdep.maps.arcgis.com/apps/MapSeries/index.html?appid=826ec9fae77543caa582a787d5f088e7](http://njdep.maps.arcgis.com/apps/MapSeries/index.html?appid=826ec9fae77543caa582a787d5f088e7).
  - . “Water Supply and Geoscience.” *DEP Dataminer*. Accessed May 21, 2018. [www13.state.nj.us/DataMiner/Search/SearchByCategory?isExternal=y&getCategory=y&catName=Water+Supply+and+Geoscience](http://www13.state.nj.us/DataMiner/Search/SearchByCategory?isExternal=y&getCategory=y&catName=Water+Supply+and+Geoscience).
- State of New Jersey. “Private Well Testing Act Rules” N.J.A.C. §7:9E. New Jersey Administrative Code. Accessed May 21, 2018. [www.nj.gov/dep/watersupply/pwta/pdf/pwtafinal.pdf](http://www.nj.gov/dep/watersupply/pwta/pdf/pwtafinal.pdf).
- . “Surface Water Quality Standards” N.J.A.C. §7:9B. New Jersey Administrative Code. Accessed May 21, 2018. [www.nj.gov/dep/rules/rules/njac7\\_9b.pdf](http://www.nj.gov/dep/rules/rules/njac7_9b.pdf).

PennState Extension. "Iron and Manganese in Private Water Systems." Accessed May 21, 2018.  
[extension.psu.edu/iron-and-manganese-in-private-water-systems](http://extension.psu.edu/iron-and-manganese-in-private-water-systems).

State of New Jersey. *Source Water Assessment Report for National Park Water Department*. Prepared by Bradley Campbell, et al. November 2004. [www.nj.gov/dep/swap/reports/swar\\_0812001.pdf](http://www.nj.gov/dep/swap/reports/swar_0812001.pdf).

———. *Source Water Assessment Report for West Deptford Township Water Department*. Prepared by Bradley Campbell, et al. November 2004. [www.nj.gov/dep/swap/reports/swar\\_0820001.pdf](http://www.nj.gov/dep/swap/reports/swar_0820001.pdf).

———. *Source Water Assessment Report for Woodbury City Water Department*. Prepared by Bradley Campbell, et al. November 2004. [www.nj.gov/dep/swap/reports/swar\\_0822001.pdf](http://www.nj.gov/dep/swap/reports/swar_0822001.pdf).

## Endangered Species

Conserve Wildlife Foundation of New Jersey. "Bald Eagle Project." Accessed May 21, 2018.  
[www.conservewildlifenj.org/protecting/projects/baldeagle](http://www.conservewildlifenj.org/protecting/projects/baldeagle).

———. "Conserve Wildlife Foundation of New Jersey." Accessed May 21, 2018.  
[www.conservewildlifenj.org](http://www.conservewildlifenj.org).

———. "Eastern Pondmussel." In *Endangered and Threatened Wildlife of New Jersey*, edited by Bruce E. Beans and Larry Niles, 2003; edited and updated Jeanette Bowers-Altman and Michael J. Davenport, 2010. Accessed May 21, 2018.  
[www.conservewildlifenj.org/species/fieldguide/view/Ligumia%20nasuta](http://www.conservewildlifenj.org/species/fieldguide/view/Ligumia%20nasuta).

Gray, Asa. "Porter's Sedge." In *Manual of the Botany of the Northern United States*, 5th ed., iss. 6. New York: Ivison, Phinney, Blakeman, 1867. Accessed May 21, 2018.  
[www.efloras.org/florataxon.aspx?flora\\_id=1&taxon\\_id=242357678](http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=242357678).

NatureServe Explorer. "Aristida dichotoma var. curtissii." Accessed May 21, 2018.  
[explorer.natureserve.org/servlet/NatureServe?searchName=Aristida+dichotoma+var.+curtissii](http://explorer.natureserve.org/servlet/NatureServe?searchName=Aristida+dichotoma+var.+curtissii).

New Jersey Department of Environmental Protection. "New Jersey's Endangered and Threatened Wildlife." Division of Fish and Wildlife. April 2, 2012. [www.state.nj.us/dep/fgw/tandespp.htm](http://www.state.nj.us/dep/fgw/tandespp.htm).

———. "Special Plants of NJ—Appendix I—Categories & Definitions." Division of Parks & Forestry. Accessed May 21, 2018. [www.state.nj.us/dep/parksandforests/natural/heritage/spplant\\_ap1.html](http://www.state.nj.us/dep/parksandforests/natural/heritage/spplant_ap1.html).

New York Natural Heritage Program. "Online Conservation Guide for *Cyperus schweinitzii*." Accessed May 21, 2018. [guides.nynhp.org/guide.php?id=9550&part=2](http://guides.nynhp.org/guide.php?id=9550&part=2).

U.S. Department of Agriculture. "Cyperus lancastricensis Porter ex A. Gray." Natural Resources Conservation Service. PLANTS Database. Accessed May 21, 2018.  
[plants.usda.gov/core/profile?symbol=CYLA3](http://plants.usda.gov/core/profile?symbol=CYLA3).

University of Texas at Austin. "Cyperus schweinitzii ." Lady Bird Johnson Wildflower Center. Accessed May 21, 2018. [www.wildflower.org/plants/result.php?id\\_plant=CYSC3](http://www.wildflower.org/plants/result.php?id_plant=CYSC3).

University of Wisconsin–Madison. "Aristida dichotoma var. curtissii A.Gray." Consortium of Wisconsin Herbaria. Accessed May 21, 2018. [wisflora.herbarium.wisc.edu/taxa/index.php?taxon=6495](http://wisflora.herbarium.wisc.edu/taxa/index.php?taxon=6495).

Virginia Botanical Associates. "Aristida dichotoma Michx. var. curtissii Gray." Digital Atlas of the Virginia Flora. Accessed May 21, 2018. [vaplantatlas.org/index.php?do=plant&plant=434](http://vaplantatlas.org/index.php?do=plant&plant=434).

## Plant Species

Anderson, Karl. *Plants at Taylor's Refuge, Cinnaminson, New Jersey*. 1994–2008.

Gleason, Henry A., and Arthur Cronquist. *Manual of Vascular Plants of Northeastern United States and Adjacent Canada*, 2nd ed. New York: Botanic Garden, 1991.

U.S. Department of Agriculture. "PLANTS Database." Natural Resources Conservation Service. Accessed May 21, 2018. [plants.usda.gov](http://plants.usda.gov).

## Animal Species

Academy of Natural Sciences of Drexel University. *Fisheries Section Database*. Compiled by David Keller. June 2017.

Anderson, Karl. *New Jersey Mammals*. Unpublished work. June 2015.

Keller, David. Email conversation. June 8, 2017.

New Jersey Audubon Society. *Christmas Bird Count Data for Gloucester County, Areas 1 and 3*. 2006-2016. Compiled by Ronald Kegel. Unpublished work. 2017.

———. "Mantua, Woodbury, and Big Timber Creeks: Important Bird & Birding Areas Site Guide." Accessed September 8, 2017.  
<https://web.archive.org/web/20170923063517/www.njaudubon.org/SectionIBBA/IBBASiteGuide.aspx?sk=2965>.

———. "National Park Dredge Spoils: Important Bird & Birding Areas Site Guide." Accessed September 8, 2017.  
<https://web.archive.org/web/20170923062932/www.njaudubon.org/SectionIBBA/IBBASiteGuide.aspx?sk=2966>.

New Jersey Department of Environmental Protection. *Ambient Biomonitoring Network: Lower Delaware Water Region: Watershed Management Areas 17, 18, 19, and 20: Route 3 (2006-2007) Benthic Macroinvertebrate Data*, Vol. 1. October 2010.  
[www.state.nj.us/dep/wms/bfbm/download/ldlRnd3.pdf](http://www.state.nj.us/dep/wms/bfbm/download/ldlRnd3.pdf).

———. "Online Field Guide for Reptiles and Amphibians." Division of Fish and Wildlife. June 6, 2014.  
[www.njfishandwildlife.com/ensp/fieldguide\\_herps.htm](http://www.njfishandwildlife.com/ensp/fieldguide_herps.htm).

———. "Studying the Delaware River – 2014 Report." Division of Fish and Wildlife. Prepared by Jennifer Pyle. March 10, 2015. [www.nj.gov/dep/fgw/artdelstudy15.htm](http://www.nj.gov/dep/fgw/artdelstudy15.htm).

## Contaminated Sites

Ileto, Christie. "Toxic Soil Removal Plan in the Works in West Deptford." *ABC-6 Action News*. July 6, 2017.  
[6abc.com/news/toxic-soil-removal-plan-in-the-works-in-west-deptford/2190610](http://6abc.com/news/toxic-soil-removal-plan-in-the-works-in-west-deptford/2190610).



New Jersey Office of Geographic Information Systems. "Groundwater Contamination (Classification Exception Areas)." June 22, 2017. [njogis-newjersey.opendata.arcgis.com/datasets?q=classification%20exception%20area](http://njogis-newjersey.opendata.arcgis.com/datasets?q=classification%20exception%20area).

———. "New Jersey Contaminated Sites." April 26, 2017. [njogis-newjersey.opendata.arcgis.com/datasets/new-jersey-contaminated-sites](http://njogis-newjersey.opendata.arcgis.com/datasets/new-jersey-contaminated-sites).

New Jersey Department of Environmental Protection. "2015 New Jersey Radon Potential Map." Accessed May 21, 2018. [www.njradon.org/radonin.htm](http://www.njradon.org/radonin.htm).

———. "DEP DataMiner." Accessed May 21, 2018. [www13.state.nj.us/DataMiner/Home/Documents?isExternal=y](http://www13.state.nj.us/DataMiner/Home/Documents?isExternal=y).

———. "New Jersey Landfill List." Division of Solid and Hazardous Waste. December 2014. [www.nj.gov/dep/dshw/lrm/landfill.htm](http://www.nj.gov/dep/dshw/lrm/landfill.htm).

U.S. Environmental Protection Agency. "Action Memorandum RV1: Request for a Removal Action at the Birchly Court Site, West Deptford, Gloucester County, New Jersey." Prepared by David Rosoff. July 25, 2016.

———. "EPA Proposes Further Cleanup of Lead-Contaminated Residential Properties in West Deptford, N.J." Prepared by Elias Rodriguez. June 22, 2017. [www.epa.gov/newsreleases/epa-proposes-further-cleanup-lead-contaminated-residential-properties-west-deptford-nj](http://www.epa.gov/newsreleases/epa-proposes-further-cleanup-lead-contaminated-residential-properties-west-deptford-nj).

———. "Matteo & Sons Inc, Thorofare, NJ." Accessed May 21, 2018. [cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0204061](http://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0204061).

———. "Record of Decision: Operable Unit Two, Matteo and Sons, Inc. Superfund Site, West Deptford, Gloucester County, New Jersey." September 2017. [semspub.epa.gov/work/02/528267.pdf](http://semspub.epa.gov/work/02/528267.pdf).

———. "Search Superfund Site Information." Accessed May 21, 2018. [cumulis.epa.gov/supercpad/CurSites/srchsites.cfm](http://cumulis.epa.gov/supercpad/CurSites/srchsites.cfm).

## Energy Use

Delaware Valley Regional Planning Commission. "Energy and Emissions Profile for West Deptford Township, Gloucester County, NJ." Accessed May 21, 2018. [www.dvrpc.org/webmaps/MunicipalEnergy/mcdDetail.aspx?mcdcode=3401578800](http://www.dvrpc.org/webmaps/MunicipalEnergy/mcdDetail.aspx?mcdcode=3401578800).

———. "Energy Use and Greenhouse Gas Emissions in Greater Philadelphia: 2010 Summary." September 2014. [www.dvrpc.org/Reports/13040.pdf](http://www.dvrpc.org/Reports/13040.pdf).

———. "Energy Use and Greenhouse Gas Emissions in Greater Philadelphia, 2010: Methods and Sources." April 2015. [www.dvrpc.org/EnergyClimate/pdf/2010\\_Energy\\_Use\\_and\\_Greenhouse\\_Gas\\_Emissions\\_in\\_Greater\\_Philadelphia-Methods\\_and\\_Sources.pdf](http://www.dvrpc.org/EnergyClimate/pdf/2010_Energy_Use_and_Greenhouse_Gas_Emissions_in_Greater_Philadelphia-Methods_and_Sources.pdf).

## Homeowner's Associations

Gloucester County Office of Assessment. *Homeowners' Associations*. Compiled by Jeff Taylor. June 29, 2017. Unpublished work.

## Land Conservation

Gloucester County. *Comprehensive Farmland Preservation Plan Update*. October 2015.

Humane Society Wildlife Land Trust. "Ullrich Wildlife Sanctuary." Accessed May 21, 2018.  
[www.wildlifelandtrust.org/sanctuaries/ullrich-wildlife-sanctuary.html](http://www.wildlifelandtrust.org/sanctuaries/ullrich-wildlife-sanctuary.html).

Laday, Jason. "One of Few Active Farms in West Deptford Celebrates 30 Years of Farmland Preservation."  
*South Jersey Times*. October 16, 2013.

New Jersey Conservation Foundation. "Saving Land: Big Timber Creek / Mantua Creek Watershed."  
Accessed May 21, 2018. [njconservation.org/bigtimbercreek.htm](http://njconservation.org/bigtimbercreek.htm).

New Jersey Department of Environmental Protection. "Recreation and Open Space Inventory." Accessed  
May 21, 2018. <http://www.nj.gov/dep/greenacres/openspace.html>.

South Jersey Land and Water Trust. "Preserved Properties." Accessed May 21, 2018.  
[sjlandwater.org/preserved-properties](http://sjlandwater.org/preserved-properties).

Waste Management. "Wheelabrator Honored with State Environmental Stewardship Award." March 26,  
2014. [www.wm.com/about/press-room/2014/20140326\\_Wheelabrator.jsp](http://www.wm.com/about/press-room/2014/20140326_Wheelabrator.jsp).



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# Appendix A

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## Appendix A: Plants in West Deptford's Vicinity

Appendix A is compiled by Karl Anderson: naturalist, past director of the Rancocas Nature Center, and a friend of the West Deptford Environmental Commission. This appendix includes plants that Mr. Anderson and his colleagues observed in the region and which are likely to be found in West Deptford.

Common Name	Scientific Name
ACERACEAE: Maple Family	
Box Elder	<i>Acer negundo</i>
Norway Maple	<i>Acer platanoides</i>
Red Maple	<i>Acer rubrum</i>
Silver Maple	<i>Acer saccharinum</i>
ACORACEAE: Sweet Flag Family	
Acorus Calamus	<i>Sweet flag</i>
AGAVACEAE: Agave Family	
Yucca Filamentosa	<i>Adam's needle</i>
ALISMATACEAE: Water Plantain Family	
Small Water Plantain	<i>Alisma subcordatum</i>
Broad-Leaved Arrowhead	<i>Sagittaria latifolia</i>
Awl-Leaved Arrowhead	<i>Sagittaria subulata</i>
AMARANTHACEAE: Amaranth Family	
Salt-Marsh Water Hemp	<i>Amaranthus cannabinus</i>
Green Amaranth	<i>Amaranthus retroflexus</i>
Slender Cottonweed	<i>Froehlichia gracilis</i>
ANACARDIACEAE: Cashew Family	
Staghorn Sumac	<i>Rhus typhina</i>
Poison Ivy	<i>Toxicodendron radicans</i>
APIACEAE: Parsley Family	
Queen Anne's Lace	<i>Daucus carota</i>
APOCYNACEAE: Dogbane Family	
Indian Hemp	<i>Apocynum cannabinum</i>
Common Periwinkle	<i>Vinca minor</i>
AQUIFOLIACEAE: Holly Family	
American Holly	<i>Ilex opaca</i>
Winterberry	<i>Ilex verticillata</i>

Common Name	Scientific Name
ARACEAE: Arum Family	
Arrow Arum	<i>Peltandra virginica</i>
ARACEAE: Arum Family (Continued)	
Skunk Cabbage	<i>Symplocarpus foetidus</i>
ASCLEPIADACEAE: Milkweed Family	
Common Milkweed	<i>Asclepias syriaca</i>
ASTERACEAE: Composite Family	
Yarrow	<i>Achillea millefolium</i>
White Snakeroot	<i>(Eupatorium rugosum) Ageratina altissima</i>
Common Ragweed	<i>Ambrosia artemisiifolia</i>
Field Chamomile	<i>Anthemis arvensis</i>
Annual Wormwood	<i>Artemisia annua</i>
Great Ragweed	<i>Artemisia trifida</i>
Mugwort	<i>Artemisia vulgaris</i>
Bearded Beggar Ticks	<i>(Bidens polylepis) Bidens aristosa</i>
Estuarine Beggar Ticks	<i>Bidens bidentoides</i>
Spanish Needles	<i>Bidens bipinnata</i>
Purple-Stemmed Beggar Ticks	<i>Bidens connata</i>
Devil's Beggar Ticks	<i>Bidens frondosa</i>
Showy Bur Marigold	<i>Bidens laevis</i>
Musk Thistle	<i>Carduus nutans</i>
Chicory	<i>Cichorium intybus</i>
Canada Thistle	<i>Cirsium arvense</i>
Field Thistle	<i>Cirsium discolor</i>
Horseweed	<i>Conyza canadensis</i>
Pilewort	<i>Erechtites hieracifolia</i>
Daisy Fleabane	<i>Erigeron annuus</i>
Rough Fleabane	<i>Erigeron strigosus</i>
Coastal Plain Joe-Pye Weed	<i>(Eupatorium dubium) Eupatoriadelphus dubius</i>
Late-Flowering Boneset	<i>Eupatorium serotinum</i>
Grass-Leaved Goldenrod	<i>Euthamia graminifolia</i>
Galinsoga	<i>Galinsoga parviflora</i>
Sneezeweed	<i>Helenium autumnale</i>
Thin-Leaved Sunflower	<i>Helianthus decapetalus</i>
Camphorweed	<i>Heterotheca subaxillaris</i>

Common Name	Scientific Name
ASTERACEAE: Composite Family (Continued)	
Cat's-Ear	<i>Hypochoeris radicata</i>
Dwarf Dandelion	<i>Krigia virginica</i>
Tall Blue Lettuce	<i>Lactuca biennis</i>
Wild Lettuce	<i>Lactuca canadensis</i>
Prickly Lettuce	<i>Lactuca serriola</i>
Climbing Hempweed	<i>Mikania scandens</i>
Sweet Everlasting	<i>(Gnaphalium obtusifolium) Pseudognaphalium obtusifolium</i>
Green-Headed Coneflower	<i>Rudbeckia laciniata</i>
Groundsel	<i>Senecio vulgaris</i>
Canada Goldenrod	<i>Solidago canadensis</i>
Tall Goldenrod	<i>Solidago canadensis var. scabra</i>
Early Goldenrod	<i>Solidago juncea</i>
Rough-Stemmed Goldenrod	<i>Solidago rugosa</i>
Hairy White Oldfield Aster	<i>(Aster pilosus) Symphyotrichum pilosum</i>
Small White Aster	<i>(Aster vimineus) Symphyotrichum racemosum</i>
Dandelion	<i>Taraxacum officinale</i>
Coltsfoot	<i>Tussilago farfara</i>
Wingstem	<i>Verbesina alternifolia</i>
New York Ironweed	<i>Vernonia noveboracensis</i>
Cocklebur	<i>Xanthium strumarium</i>
BALSAMINACEAE: Touch-me-not Family	
Spotted Touch-Me-Not	<i>Impatiens capensis</i>
Pale Touch-Me-Not	<i>Impatiens pallida</i>
BETULACEAE: Birch Family	
Smooth Alder	<i>Alnus serrulata</i>
River Birch	<i>Betula nigra</i>
BIGNONIACEAE: Bignonia Family	
Trumpet Creeper	<i>Campsis radicans</i>
Common Catalpa	<i>Catalpa bignonioides</i>
BORAGINACEAE: Borage Family	
Virginia Stickseed	<i>Hackelia virginiana</i>
Small Forget-Me-Not	<i>Myosotis laxa</i>
BRASSICACEAE: Mustard Family	
Garlic Mustard	<i>Alliaria petiolata</i>



Common Name	Scientific Name
BRASSICACEAE: Mustard Family (Continued)	
Mouse-Ear Cress	<i>Arabidopsis thaliana</i>
Winter Cress	<i>Barbarea vulgaris</i>
Hairy Bitter Cress	<i>Cardamine hirsuta</i>
Whitlowgrass	<i>Draba verna</i>
Cow Cress	<i>Lepidium campestre</i>
Peppergrass	<i>Lepidium virginicum</i>
Marsh Yellow Cress	<i>Rorippa palustris</i>
Shepherd's Cress	<i>Teesdalia nudicaulis</i>
BUDDLEJACEA: Butterfly Bush Family	
Butterfly Bush	<i>Buddleja davidii</i>
BUXACEAE: Boxwood Family	
Pachysandra Terminalis	<i>Japanese pachysandra</i>
CALLITRICHACEAE: Water Starwort Family	
Larger Water Starwort	<i>Callitriche heterophylla</i>
CAMPANULACEAE: Bluebell Family	
Chinese Lobelia	<i>Lobelia chinense</i>
Triodanis Perfoliata	<i>Venus' looking-glass</i>
CANNABACEAE: Indian Hemp Family	
Japanese Hops	<i>Humulus japonicus</i>
CAPRIFOLIACEAE: Honeysuckle Family	
Japanese Honeysuckle	<i>Lonicera japonica</i>
Common Elder	<i>Sambucus canadensis</i>
Arrowwood	<i>Viburnum dentatum</i>
CARYOPHYLLACEAE: Carnation Family	
Thyme-Leaved Sandwort	<i>Arenaria serpyllifolia</i>
Mouse-Ear Chickweed	<i>Cerastium vulgatum</i>
Deptford Pink	<i>Dianthus armeria</i>
Childing Pink	<i>Petrorhagia prolifera</i>
Bouncing Bet	<i>Saponaria officinalis</i>
Knawel	<i>Scleranthus annuus</i>
White Champion	<i>Silene latifolia</i>
Common Chickweed	<i>Stellaria media</i>
CELASTRACEAE: Staff Tree Family	
Asiatic Bittersweet	<i>Celastrus orbiculatus</i>

Common Name	Scientific Name
CELASTRACEAE: Staff Tree Family (Continued)	
Chinese Euonymus	<i>Euonymus fortunei</i>
CHENOPODIACEAE: Goosefoot Family	
Lamb's Quarters	<i>Chenopodium album</i>
Mexican Tea	<i>Chenopodium ambrosioides</i>
CLETHRACEAE: White Alder Family	
Coastal Sweetpepperbush	<i>Clethra alnifolia</i>
CLUSIACEAE: Saint John'swort Family	
Dwarf Saint John's Wort	<i>Hypericum mutilum</i>
Marsh Saint John's Wort	<i>Triadenum virginicum</i>
COMMELINACEAE: Dayflower Family	
Asiatic Dayflower	<i>Commelina communis</i>
Spiderwort	<i>Tradescantia virginica</i>
CONVOLVULACEAE: Morning Glory Family	
Hedge Bindweed	<i>Calystegia sepium</i>
Ivy-Leaved Morning Glory	<i>Ipomoea hederacea</i>
CORNACEAE: Dogwood Family	
Silky Dogwood	<i>Cornus amomum</i>
CUCURBITACEAE: Gourd Family	
Bur Cucumber	<i>Sicyos angulatus</i>
CUPRESSACEAE: Cypress Family	
Eastern Redcedar	<i>Juniperus virginiana</i>
CUSCUTACEAE: Dodder Family	
Common Dodder	<i>Cuscuta gronovii</i>
CYPERACEAE: Sedge Family	
Yellow-Fruited Sedge	<i>Carex annectans</i>
Fringed Sedge	<i>Carex crinita</i>
Frank's Sedge	<i>Carex frankii</i>
Stellate Sedge	<i>Carex radiata</i>
Tussock Sedge	<i>Carex stricta</i>
Swan's Sedge	<i>Carex swanii</i>
Gray's Flatsedge	<i>Cyperus grayii</i>
Asian Flatsedge	<i>Cyperus microiria</i>
Straw-Colored Flatsedge	<i>Cyperus strigosus</i>
Blunt Spikerush	<i>Eleocharis obtusa</i>

Common Name	Scientific Name
CYPERACEAE: Sedge Family (Continued)	
Pasture Spikesedge	<i>(Cyperus brevifolioides) Kyllinga gracillima</i>
River Bulrush	<i>(Scirpus fluviatilis) Schoenoplectus fluviatilis</i>
Smith's Bulrush	<i>Schoenoplectus smithii</i>
Woolgrass	<i>Scirpus cyperinus</i>
DIOSCOREACEAE: Yam Family	
Wild Yam	<i>Dioscorea villosa</i>
DRYOPTERIDACEAE: Wood Fern Family	
Sensitive Fern	<i>Onoclea sensibilis</i>
EBENACEAE: Ebony Family	
Persimmon	<i>Diospyros virginiana</i>
ELAEAGNACEAE: Oleaster Family	
Autumn Olive	<i>Elaeagnus umbellata</i>
EQUISETACEAE: Horsetail Family	
Field Horsetail	<i>Equisetum arvense</i>
ERICACEAE: Heath Family	
Highbush Blueberry	<i>Vaccinium corymbosum</i>
EUPHORBIACEAE: Spurge Family	
Three-Seeded Mercury	<i>Acalypha rhomboidea</i>
Tooth-Leaved Croton	<i>Croton glandulosus</i>
Spotted Spurge	<i>Chamaesyce maculata</i>
Eyebane	<i>Chamaesyce nutans</i>
FABACEAE: Legume Family	
Mimosa	<i>Albizia julibrissin</i>
False Indigo	<i>Amorpha fruticosa</i>
Groundnut	<i>Apios americana</i>
Wild Sensitive Plant	<i>Chamaecrista nictitans</i>
Hoary Tick Trefoil	<i>Desmodium canescens</i>
Honey Locust	<i>Gleditsia triacanthos</i>
Japanese Bush-Clover	<i>Kummerowia striata</i>
Chinese Bush-Clover	<i>Lespedeza cuneata</i>
Black Medick	<i>Medicago lupulina</i>
White Sweet Clover	<i>Melilotus alba</i>
Yellow Sweet Clover	<i>Melilotus officinalis</i>
Black Locust	<i>Robinia pseudoacacia</i>

Common Name	Scientific Name
FABACEAE: Legume Family (Continued)	
Rabbitfoot Clover	<i>Trifolium arvense</i>
Low Hop-Clover	<i>Trifolium campestre</i>
Alsike Clover	<i>Trifolium hybridum</i>
Red Clover	<i>Trifolium pratense</i>
White Clover	<i>Trifolium repens</i>
Cow Vetch	<i>Vicia cracca</i>
Slender Vetch	<i>Vicia tetrasperma</i>
FAGACEAE: Beech Family	
White Oak	<i>Quercus alba</i>
Swamp White Oak	<i>Quercus bicolor</i>
Bur Oak	<i>Quercus macrocarpa</i>
Pin Oak	<i>Quercus palustris</i>
Willow Oak	<i>Quercus phellos</i>
Red Oak	<i>Quercus rubrum</i>
Black Oak	<i>Quercus velutina</i>
GERANIACEAE: Geranium Family	
Carolina Cranesbill	<i>Geranium carolinianum</i>
Small-Flowered Cranesbill	<i>Geranium pusillum</i>
HAMAMELIDACEAE: Witch Hazel Family	
Sweet Gum	<i>Liquidambar styraciflua</i>
IRIDACEAE: Iris Family	
Yellow Iris	<i>Iris pseudacorus</i>
Northern Blue Iris	<i>Iris versicolor</i>
Blue-Eyed Grass	<i>Sisyrinchium species</i>
JUGLANDACEAE: Walnut Family	
Bitternut	<i>Carya cordiformis</i>
Mockernut	<i>Carya tomentosa</i>
Black Walnut	<i>Juglans nigra</i>
JUNCACEAE: Rush Family	
Sharp-Fruited Rush	<i>Juncus acuminatus</i>
Common Rush	<i>Juncus effusus</i>
Path Rush	<i>Juncus tenuis</i>
Many-Flowered Wood-Rush	<i>Luzula multiflora</i>



Common Name	Scientific Name
LAMIACEAE: Mint Family (Continued)	
Ground Ivy	<i>Glechoma hederacea</i>
Henbit	<i>Lamium amplexicaule</i>
Purple Dead-Nettle	<i>Lamium purpureum</i>
Motherwort	<i>Leonurus cardiaca</i>
Northern Bugleweed	<i>Lycopus uniflorus</i>
Common Selfheal	<i>Prunella vulgaris</i>
Mountain-Mint	<i>Pycnanthemum</i> species
Marsh Skullcap	<i>Scutellaria galericulata</i>
LAURACEAE: Laurel Family	
Spicebush	<i>Lindera benzoin</i>
Sassafras	<i>Sassafras albidum</i>
LEMNACEAE: Duckweed Family	
Lesser Duckweed	<i>Lemna minor</i>
Water Meal	<i>Wolffia</i> species
LILIACEAE: Lily Family	
Wild Garlic	<i>Allium vineale</i>
Trout Lily	<i>Erythronium americanum</i>
Tawny Daylily	<i>Hemerocallis fulva</i>
Turk's-Cap Lily	<i>Lilium superbum</i>
False Solomon's-Seal	<i>(Smilacina racemosa) Maianthemum racemosum</i>
Sessile-Leaved Bellwort	<i>Uvularia sessilifolia</i>
LYCOPODIACEAE: Clubmoss Family	
Southern Ground Cedar	<i>(Lycopodium digitatum) Diphasiastrum digitatum</i>
LYTHRACEAE: Loosestrife Family	
Purple Loosestrife	<i>Lythrum salicaria</i>
MAGNOLIACEAE: Magnolia Family	
Tuliptree	<i>Liriodendron tulipifera</i>
Sweet Bay	<i>Magnolia virginiana</i>
MALVACEAE: Mallow Family	
Swamp Rose Mallow	<i>Hibiscus moscheutos</i>
Common Mallow	<i>Malva neglecta</i>
MORACEAE: Mulberry Family	
White Mulberry	<i>Morus alba</i>

Common Name	Scientific Name
NYCTAGINACEAE: Four O'Clock Family	
Wild Four O'clock	<i>Mirabilis nyctaginea</i>
NYMPHAEACEAE: Water Lily Family	
Pond Lily	<i>Nuphar advena</i>
NYSSACEAE: Black Gum Family	
Black Gum	<i>Nyssa sylvatica</i>
OLEACEAE: Olive Family	
White Ash	<i>Fraxinus americana</i>
Green Ash	<i>Fraxinus pensylvanica</i>
Privet	<i>Ligustrum vulgare</i>
ONAGRACEAE: Evening Primrose Family	
Enchanter's Nightshade	<i>Circaea lutetiana</i>
Purple Willow-Herb	<i>Epilobium coloratum</i>
Water Purslane	<i>Ludwigia palustris</i>
Evening Primrose	<i>Oenothera biennis</i>
Cut-Leaved Evening Primrose	<i>Oenothera laciniata</i>
OPHIOGLOSSACEAE: Adder's Tongue Fern Family	
Cut-Leaved Grape Fern	<i>Botrychium dissectum</i>
OSMUNDACEAE: Cinnamon Fern Family	
Cinnamon Fern	<i>Osmunda cinnamomea</i>
OXALIDACEAE: Wood Sorrel Family	
Yellow Wood Sorrel	<i>Oxalis</i> species
PHYTOLACCACEAE: Pokeweed Family	
Pokeweed	<i>Phytolacca americana</i>
PINACEAE: Pine Family	
Norway Spruce	<i>Picea abies</i>
White Pine	<i>Pinus strobus</i>
PLANTAGINACEAE: Plantain Family	
Largebracted Plantain	<i>Plantago aristata</i>
Narrowleaf Plantain	<i>Plantago lanceolata</i>
Common Plantain	<i>Plantago major</i>
PLATANACEAE: Plane Tree Family	
Sycamore	<i>Platanus occidentalis</i>
POACEAE: Grass Family	
Red-Top	<i>Agrostis gigantea</i>

Common Name	Scientific Name
POACEAE: Grass Family (Continued)	
Rhode Island Bent-Grass	<i>Agrostis stolonifera</i>
Broomsedge	<i>Andropogon virginicus</i>
Sweet Vernal Grass	<i>Anthoxanthum odoratum</i>
Hungarian Brome	<i>Bromus inermis</i>
Japanese Brome	<i>Bromus japonicus</i>
Early Brome	<i>Bromus tectorum</i>
Sandbur	<i>Cenchrus longespinus</i>
Woodreed	<i>Cinna arundinacea</i>
Orchard Grass	<i>Dactylis glomerata</i>
Lindheimer's Panic Grass	<i>(Panicum lanuginosum var. lindheimeri) Dichanthelium acuminatum</i>
Deertongue Grass	<i>(Panicum clandestinum) Dichanthelium clandestinum</i>
Large Crabgrass	<i>Digitaria sanguinalis</i>
Cockspur Grass	<i>Echinochloa crusgalli</i>
Goosegrass	<i>Eleusine indica</i>
Riverbank Wild Rye	<i>Elymus riparius</i>
Virginia Wild Rye	<i>Elymus virginicus</i>
Quack Grass	<i>Elytrigia repens</i>
Stink Grass	<i>Eragrostis cilianensis</i>
Carolina Lovegrass	<i>Eragrostis pectinacea</i>
Purple Lovegrass	<i>Eragrostis spectabilis</i>
Meadow Fescue	<i>Festuca elatior</i>
Nodding Fescue	<i>Festuca subverticillata</i>
Rice Cutgrass	<i>Leersia oryzoides</i>
White Grass	<i>Leersia virginica</i>
Italian Rye-Grass	<i>Lolium multiflorum</i>
Perennial Rye-Grass	<i>Lolium perenne</i>
Japanese Stiltgrass	<i>Microstegium vimineum</i>
Nimble Will	<i>Muhlenbergia schreberi</i>
Spreading Panic Grass	<i>Panicum dichotomiflorum</i>
Switchgrass	<i>Panicum virgatum</i>
Reed Canary Grass	<i>Phalaris arundinacea</i>
Timothy	<i>Phleum pratense</i>
Annual Bluegrass	<i>Poa annua</i>
Canada Bluegrass	<i>Poa compressa</i>

Common Name	Scientific Name
POACEAE: Grass Family (Continued)	
Kentucky Bluegrass	<i>Poa pratensis</i>
Little Bluestem	<i>Schizachyrium scoparium</i>
Rye	<i>Secale cereale</i>
Japanese Bristlegrass	<i>Setaria faberi</i>
Yellow Foxtail	( <i>Setaria glauca</i> ) <i>Setaria pumila</i>
Indian Grass	<i>Sorghastrum nutans</i>
Purpletop	<i>Tridens flavus</i>
Rat-Tail Fescue	<i>Vulpia myuros</i>
Wild Rice	<i>Zizania aquatica</i>
POLYGONACEAE: Buckwheat Family	
Dooryard Knotweed	<i>Polygonum arenastrum</i>
Halberd-Leaved Tearthumb	<i>Polygonum arifolium</i>
Knotgrass	<i>Polygonum aviculare</i>
Cespitose Knotweed	<i>Polygonum cespitosum</i>
Japanese Knotweed	<i>Polygonum cuspidatum</i>
Water-Pepper	<i>Polygonum hydropiper</i>
Mild Water-Pepper	<i>Polygonum hydropiperoides</i>
Nodding Smartweed	<i>Polygonum lapathifolium</i>
Pennsylvania Smartweed	<i>Polygonum pennsylvanicum</i>
Mile-a-Minute Vine	<i>Polygonum perfoliatum</i>
Dotted Smartweed	<i>Polygonum punctatum</i>
Arrow-Leaved Tearthumb	<i>Polygonum sagittatum</i>
Climbing False Buckwheat	<i>Polygonum scandens</i>
Virginia Knotweed	<i>Polygonum virginianum</i>
Sheep Sorrel	<i>Rumex acetosella</i>
Curly Dock	<i>Rumex crispus</i>
Broad-Leaved Dock	<i>Rumex obtusifolius</i>
Water Dock	<i>Rumex verticillatus</i>
PONTEDERIACEAE: Pickerelweed Family	
Mud Plantain	<i>Heteranthera reniformis</i>
Pickerelweed	<i>Pontederia cordata</i>
PORTULACACEAE: Purslane Family	
Spring Beauty	<i>Claytonia virginica</i>
Purslane	<i>Portulaca oleracea</i>



Common Name	Scientific Name
PRIMULACEAE: Primrose Family	
Fringed Loosestrife	<i>Lythrum salicaria</i>
RANUNCULACEAE: Buttercup Family	
Yam-Leaved Clematis	<i>Clematis terniflora</i>
Lesser Celandine	<i>Ranunculus ficaria</i>
Creeping Buttercup	<i>Ranunculus repens</i>
Tall Meadow-Rue	<i>Thalictrum pubescens</i>
ROSACEAE: Rose Family	
Indian Strawberry	<i>Duchesnea indica</i>
Apple	( <i>Pyrus malus</i> ) <i>Malus sylvestris</i>
Crab-Apple	( <i>Pyrus species</i> ) <i>Malus species</i>
Purple Chokeberry	( <i>Aronia prunifolia</i> ) <i>Photinia floribunda</i>
Red Chokeberry	( <i>Aronia arbutifolia</i> ) <i>Photinia pyrifolia</i>
Rough Cinquefoil	<i>Potentilla norvegica</i>
Black Cherry	<i>Prunus serotina</i>
Multiflora Rose	<i>Rosa multiflora</i>
Black Raspberry	<i>Rubus occidentalis</i>
Swamp Rose	<i>Rosa palustris</i>
Blackberry	<i>Rubus species</i>
RUBIACEAE: Madder Family	
Buttonbush	<i>Cephalanthus occidentalis</i>
Buttonweed	<i>Diodea teres</i>
Cleavers	<i>Galium aparine</i>
Marsh Bedstraw	<i>Galium palustre</i>
SALICACEAE: Willow Family	
Cottonwood	<i>Populus deltoides</i>
Balm of Gilead	<i>Populus x jackii</i> (the "x" indicates a cross between two species)
Weeping Willow	<i>Salix babylonica</i>
Pussy Willow	<i>Salix discolor</i>
Sandbar Willow	<i>Salix exigua</i>
Black Willow	<i>Salix nigra</i>
SCROPHULARIACEAE: Figwort Family	
White Turtlehead	<i>Chelone glabra</i>
Hedge Hyssop	<i>Gratiola neglecta</i>
False Pimpernel	<i>Lindernia dubia</i>
Winged Monkey Flower	<i>Mimulus alatus</i>

Common Name	Scientific Name
SCROPHULARIACEAE: Figwort Family (Continued)	
Canada Toadflax	<i>(Linaria canadense) Nuttallanthus canadensis</i>
Princess Tree	<i>Paulownia tomentosa</i>
Moth Mullein	<i>Verbascum blattaria</i>
Common Mullein	<i>Verbascum thapsus</i>
Corn Speedwell	<i>Veronica arvensis</i>
Ivy-Leaved Speedwell	<i>Veronica hederaefolia</i>
Persian Speedwell	<i>Veronica persica</i>
SIMARUBACEAE: Ailanthus Family	
Ailanthus	<i>Ailanthus altissima</i>
SMILACACEAE: Greenbrier Family	
Glaucous Greenbrier	<i>Smilax glauca</i>
Common Greenbrier	<i>Smilax rotundifolia</i>
SOLANACEAE: Nightshade Family	
Jimson Weed	<i>Datura stramonium</i>
Ground Cherry	<i>Physalis subglabrata</i>
Horse Nettle	<i>Solanum carolinense</i>
Bittersweet Nightshade	<i>Solanum dulcamara</i>
Black Nightshade	<i>Solanum nigrum</i>
THELYPTERIDACEAE: Marsh Fern Family	
Thelypteris Palustris	<i>Marsh fern</i>
TILIACEAE: Basswood Family	
Basswood	<i>Tilia americana</i>
TYPHACEAE: Cat-tail Family	
Hybrid Cat-Tail	<i>Typha x glauca</i> (the "x" indicates a cross between two species)
Broad-Leaved Cat-Tail	<i>Typha latifolia</i>
ULMACEAE: Elm Family	
Hackberry	<i>Celtis occidentalis</i>
American Elm	<i>Ulmus americana</i>
URTICACEAE: Nettle Family	
False Nettle	<i>Boehmeria cylindrica</i>
Wood Nettle	<i>Laportea canadensis</i>
Clearweed	<i>Pilea pumila</i>
Stinging Nettle	<i>Urtica dioica</i>

Common Name	Scientific Name
VERBENACEAE: Vervain Family	
White Vervain	<i>Verbena urticifolia</i>
VIOLACEAE: Violet Family	
European Field Pansy	<i>Viola arvensis</i>
Field Pansy	<i>Viola bicolor</i>
Common Blue Violet	<i>Viola sororia</i>
VITACEAE: Grape Family	
Virginia Creeper	<i>Parthenocissus quinquefolia</i>
Fox Grape	<i>Vitis labrusca</i>
Riverbank Grape	<i>Vitis riparia</i>

Source: Karl Anderson, 1994–2008.

Scientific and English nomenclature generally are from the USDA PLANTS website, and names in parentheses are from Gleason & Cronquist *Manual of Vascular Plants of Northeastern United States and Adjacent Canada*. The **References** section (page 151) contains full citations.

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# Appendix B

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## Appendix B: Fish Counted in West Deptford's Environs

**Table B-1:** Count Locations

Location	Location Shorthand
Big Timber Creek	BTC
Lower Delaware River	LDR
Mantua Creek	MC
Raccoon Creek	RC
Woodbury Creek	WC

**Table B-2:** Fish Species Observed

Common Name	Scientific Name	Location
ANGUILLIDAE: Freshwater Eel Family		
American Eel	<i>Anguilla rostrata</i>	BTC, LDR, MC, RC
APHREDODERIDAE: Pirate Perch Family		
Pirate Perch	<i>Aphredoderus sayanus</i>	RC
CATOSTOMIDAE: Sucker Family		
White Sucker	<i>Catostomus commersonii</i>	BTC, LDR, MC, RC
Northern Hog Sucker	<i>Hypentelium nigricans</i>	LDR
CENTRARCHIDAE: Sunfish Family		
Rock Bass	<i>Ambloplites rupestris</i>	LDR
Bluespotted Sunfish	<i>Enneacanthus gloriosus</i>	BTC
Banded Sunfish	<i>Enneacanthus obesus</i>	LDR
Redbreast Sunfish	<i>Lepomis auritus</i>	BTC, LDR, MC, RC
Green Sunfish	<i>Lepomis cyanellus</i>	LDR, RC
Pumpkinseed	<i>Lepomis gibbosus</i>	BTC, LDR, MC, RC
Bluegill	<i>Lepomis macrochirus</i>	BTC, LDR, MC, RC
Smallmouth Bass	<i>Micropterus dolomieu</i>	LDR
Largemouth Bass	<i>Micropterus salmoides</i>	BTC, LDR, MC, RC
White Crappie	<i>Pomoxis annularis</i>	LDR
Black Crappie	<i>Pomoxis nigromaculatus</i>	BTC, LDR, MC
CLUPEIDAE: Herring, Shad, Sardines, and Allies Family		
Blueback Herring	<i>Alosa aestivalis</i>	LDR
Hickory Shad	<i>Alosa mediocris</i>	LDR
Alewife	<i>Alosa pseudoharengus</i>	LDR, RC

Common Name	Scientific Name	Location
CLUPEIDAE: Herring, Shad, Sardines, and Allies Family (Continued)		
American Shad	<i>Alosa sapidissima</i>	LDR, RC
Atlantic Menhaden	<i>Brevoortia tyrannus</i>	LDR
Gizzard Shad	<i>Dorosoma cepedianum</i>	LDR
CYPRINIDAE: Carp and Minnow Family		
Goldfish	<i>Carassius auratus</i>	LDR
Satinfin Shiner	<i>Cyprinella analostana</i>	MC, RC
Spotfin Shiner	<i>Cyprinella spiloptera</i>	LDR
Common Carp	<i>Cyprinus carpio</i>	LDR
Eastern Silvery Minnow	<i>Hybognathus regius</i>	LDR, RC
Common Shiner	<i>Luxilus cornutus</i>	RC
Golden Shiner	<i>Notemigonus crysoleucas</i>	LDR, RC
Comely Shiner	<i>Notropis amoenus</i>	LDR, RC
Spottail Shiner	<i>Notropis hudsonius</i>	LDR, MC, RC
Swallowtail Shiner	<i>Notropis procne</i>	MC, RC
Fallfish	<i>Semotilus corporalis</i>	LDR, MC, RC
CYPRINODONTIDAE: Pupfish Family		
Banded Killifish	<i>Fundulus diaphanus</i>	LDR
Mummichog	<i>Fundulus heteroclitus</i>	LDR
ESOCIDAE: Pike Family		
Redfin Pickerel	<i>Esox americanus</i>	RC
Chain Pickerel	<i>Esox niger</i>	BTC, RC
GASTEROSTEIDAE: Stickleback Family		
Fourspine Stickleback	<i>Apletes quadracus</i>	LDR
ICTALURIDAE: North American Freshwater Catfish Family		
White Catfish	<i>Ameiurus catus</i>	BTC, LDR, MC, RC
Black Bullhead	<i>Ameiurus melas</i>	LDR
Brown Bullhead	<i>Ameiurus nebulosus</i>	BTC, LDR, MC, RC
Channel Catfish	<i>Ictalurus punctatus</i>	BTC, LDR, MC, WC
MORONIDAE: Temperate Bass Family		
White Perch	<i>Morone americana</i>	BTC, LDR, MC, RC, WC
Striped Bass	<i>Morone saxatilis</i>	LDR, MC, RC
PERCIDAE: Perch Family		
Tessellated Darter	<i>Etheostoma olmstedi</i>	BTC, LDR, MC, RC
Yellow Perch	<i>Perca flavescens</i>	LDR, MC

Common Name	Scientific Name	Location
PERCIDAE: Perch Family (Continued)		
Walleye	<i>Sander vitreus</i>	LDR
PETROMYZONTIDAE: Northern Lamprey Family		
American Brook Lamprey	<i>Lampetra appendix</i>	RC
Sea Lamprey	<i>Petromyzon marinus</i>	RC
POECILIIDAE: Livebearing Tooth-Carp Family		
Mosquitofish	<i>Gambusia affinis</i>	LDR
SALMONIDAE: Salmonid Family		
Brown Trout	<i>Salmo trutta</i>	LDR
SOLEIDAE: Sole Family		
Hogchoker	<i>Trinectes maculatus</i>	LDR
UMBRIDAE: Mudminnow Family		
Eastern Mudminnow	<i>Umbra pygmaea</i>	BTC, MC, RC

Sources:

- NJDEP Division of Fish and Wildlife, 2009–2014 Delaware River Seine Survey (data collected in the Lower Delaware River);
- Academy of Natural Sciences of Drexel University, Fisheries Section Database; data collected on Timber Creek, Mantua Creek, and Woodbury Creek between August 1992 and June 2011; this work was not meant to characterize the entire fish assemblage and was done only in tidal waters;
- USGS; data was collected at station USGS-01477120 on Raccoon Creek near Swedesboro between 1999 and 2012; and
- NJDEP; data was collected at Station FIBI230 on a Big Timber Creek tributary in September 2015, and at Station NJS11-267 on the Chestnut Branch of the Mantua Creek in in June 2015; both datasets were entered in the STORET database.

With the exception of the Delaware River Seine Survey data, data appear courtesy of David Keller, Academy of Natural Sciences of Drexel University.





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# Appendix C

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## Appendix C: Amphibians and Reptiles in New Jersey

Common Name	Scientific Name
FROGS AND TOADS	
American Toad	<i>Bufo americanus</i>
Bullfrog	<i>Rana catesbeiana</i>
Carpenter Frog	<i>Rana virgatipes</i>
Eastern Spadefoot (Toad)	<i>Scaphiopus h. holbrookii</i>
Fowler's Toad	<i>Bufo woodhousii fowleri</i>
Green Frog	<i>Rana clamitans melanota</i>
New Jersey Chorus Frog	<i>Pseudacris triseriata kalmi</i>
Northern Cricket Frog	<i>Acris c. crepitans</i>
Northern Gray Treefrog	<i>Hyla versicolor</i>
Northern Spring Peeper	<i>Pseudacris c. crucifer</i>
Pickerel Frog	<i>Rana palustris</i>
Pine Barrens Treefrog	<i>Hyla andersonii</i>
Southern Gray Treefrog	<i>Hyla chrysoscelis</i>
Southern Leopard Frog	<i>Rana utricularia</i>
Upland Chorus Frog	<i>Pseudacris triseriata feriarum</i>
Wood Frog	<i>Rana sylvatica</i>
LIZARDS	
Five-lined Skink	<i>Eumeces fasciatus</i>
Ground Skink	<i>Scincella lateralis</i>
Northern Fence Lizard	<i>Sceloporus undulatus hyacinthinus</i>
SALAMANDERS	
Blue-spotted Salamander	<i>Ambystoma laterale</i>
Eastern Mud Salamander	<i>Pseudotriton m. montanus</i>
Eastern Tiger Salamander	<i>Ambystoma t. tigrinum</i>
Four-toed Salamander	<i>Hemidactylium scutatum</i>
Jefferson Salamander	<i>Ambystoma jeffersonianum</i>
Longtail Salamander	<i>Eurycea l. longicauda</i>
Marbled Salamander	<i>Ambystoma opacum</i>
Mountain Dusky Salamander	<i>Desmognathus ochrophaeus</i>
Northern Dusky Salamander	<i>Desmognathus f. fuscus</i>
Northern Red Salamander	<i>Pseudotriton r. ruber</i>
Northern Slimy Salamander	<i>Plethodon glutinosus</i>

Common Name	Scientific Name
SALAMANDERS (Continued)	
Northern Spring Salamander	<i>Gyrinophilus p. porphyriticus</i>
Northern Two-lined Salamander	<i>Eurycea bislineata</i>
Redback Salamander	<i>Plethodon cinereus</i>
Red-spotted Newt	<i>Notophthalmus v. viridescens</i>
Spotted Salamander	<i>Ambystoma maculatum</i>
SNAKES	
Black Rat Snake	<i>Elaphe o. obsoleta</i>
Corn Snake	<i>Elaphe g. guttata</i>
Coastal Plain Milk Snake	<i>L. t. triangulum X L. t. elapsoides</i>
Eastern Garter Snake	<i>Thamnophis s. sirtalis</i>
Eastern Hognose Snake	<i>Heterodon platyrhinos</i>
Eastern Kingsnake	<i>Lampropeltis g. getula</i>
Eastern Milk Snake	<i>Lampropeltis t. triangulum</i>
Eastern Ribbon Snake	<i>Thamnophis s. sauritus</i>
Eastern Smooth Earth Snake	<i>Virginia v. valeriae</i>
Eastern Worm Snake	<i>Carphophis a. amoenus</i>
Northern Black Racer	<i>Coluber c. constrictor</i>
Northern Brown Snake	<i>Storeria d. dekayi</i>
Northern Copperhead	<i>Agkistrodon contortrix mokasen</i>
Northern Pine Snake	<i>Pituophis m. melanoleucus</i>
Northern Redbelly Snake	<i>Storeria o. occipitomaculata</i>
Northern Ringneck Snake	<i>Diadophis punctatus edwardsii</i>
Northern Scarlet Snake	<i>Cemophora coccinea copei</i>
Northern Water Snake	<i>Nerodia s. sipedon</i>
Queen Snake	<i>Regina septemvittata</i>
Rough Green Snake	<i>Opheodrys aestivus</i>
Smooth Green Snake	<i>Opheodrys vernalis</i>
Southern Ringneck Snake	<i>Diadophis p. punctatus</i>
Timber Rattlesnake	<i>Crotalus horridus</i>
TURTLES	
Bog Turtle	<i>Clemmys muhlenbergii</i>
Common Map Turtle	<i>Graptemys geographica</i>
Common Musk Turtle	<i>Sternotherus odoratus</i>
Common Snapping Turtle	<i>Chelydra serpentina</i>



Common Name	Scientific Name
TURTLES (Continued)	
Diamondback Terrapin	<i>Malaclemys t. terrapin</i>
Eastern Box Turtle	<i>Terrapene c. carolina</i>
Eastern Mud Turtle	<i>Kinosternon s. subrubrum</i>
Eastern Painted Turtle	<i>Chrysemys p. picta</i>
Eastern Spiny Softshell	<i>Apalone s. spinifera</i>
Redbelly Turtle	<i>Pseudemys rubriventris</i>
Red-eared Slider	<i>Trachemys scripta elegans</i>
Spotted Turtle	<i>Clemmys guttata</i>
Wood Turtle	<i>Clemmys insculpta</i>

Source: NJDEP, 2014



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# Appendix D

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## Appendix D: Birds in Areas 1 and 3 in the Gloucester County Christmas Bird Count

The following chart records bird species, organized by taxonomic order, as observed and recorded by volunteers during the National Audubon Society's Christmas bird counts. The area of observation was "Area 1" and "Area 3" in Gloucester County, which includes West Deptford. Observation year 2009 was excluded because a snowstorm on the day of the count resulted in zero birds being counted. 2013 was excluded because individual count sheets were not available. Species are organized alphabetically by scientific name.

Common Name	Scientific Name	2005	2006	2007	2008	2010	2011	2012	2014	2015	2016	TOTAL
Cooper's Hawk	<i>Accipiter cooperii</i>		1		1		1	1			1	5
Sharp-Shinned Hawk	<i>Accipiter striatus</i>	1	2	1					3			7
Red-Winged Blackbird	<i>Agelaius phoeniceus</i>			2	3	1	4	4		50		64
American Wigeon	<i>Anas americana</i>							2				2
Northern Shoveler	<i>Anas clypeata</i>							4				4
Green-Winged Teal	<i>Anas crecca</i>		12									12
Mallard	<i>Anas platyrhynchos</i>		22	48	85	150	66	4	26	10	50	461
Great Egret	<i>Ardea alba</i>		1		1							2
Great Blue Heron	<i>Ardea herodias</i>	3	7		2	3	3	7	1	1	2	29
Lesser Scaup	<i>Aythya affinis</i>		20			10						30
Ringed-Neck Duck	<i>Aythya collaris</i>			20								20
Canvasback	<i>Aythya valisineria</i>	2		70					45			117
Tufted Titmouse	<i>Baeolophus bicolor</i>	6	1		1	1	9	2	5	8	2	35
Cedar Waxwing	<i>Bombycilla cedrorum</i>			2				1				3
Canada Goose	<i>Branta canadensis</i>	72	27	188	547	582	669	243	204	276	210	3,018
Great Horned Owl	<i>Bubo virginianus</i>	2	2	2	2	2	1	1	1	1	1	15



Common Name	Scientific Name	2005	2006	2007	2008	2010	2011	2012	2014	2015	2016	TOTAL
Bufflehead	<i>Bucephala albeola</i>	3	19	41	56	57	21		197	15	5	414
Red-Tailed Hawk	<i>Buteo jamaicensis</i>	2	3	11	2	5	6	5	4		2	40
Northern Cardinal	<i>Cardinalis cardinalis</i>	7	9	13	19	9	5	17	12	1	7	99
Turkey Vulture	<i>Cathartes aura</i>	2	2			2	1	11		5		23
Hermit Thrush	<i>Catharus guttatus</i>										1	1
Brown Creeper	<i>Certhia americana</i>					1		3				4
Northern Harrier	<i>Circus cyaneus</i>						1				1	2
Northern Flicker	<i>Colaptes auratus</i>	4		1		1				1		7
Rock Dove (Rock Pigeon)	<i>Columba livia</i>	62	36	5	70	26	24	2	7		13	245
Black Vulture	<i>Coragyps atratus</i>								2		7	9
American Crow	<i>Corvus brachyrhynchos</i>		10	8	3	8	3		1	2		35
Fish Crow	<i>Corvus ossifragus</i>					5						5
Blue Jay	<i>Cyanocitta cristata</i>	9	5	8	14	15	9	11	3	6	9	89
Gray Catbird	<i>Dumetella carolinensis</i>	3					1					4
Merlin	<i>Falco columbarius</i>		1					1				2
American Kestrel	<i>Falco sparverius</i>		1									1
House Finch	<i>Haemorhous mexicanus</i>	8	107	2				10				127
Purple Finch	<i>Haemorhous purpureus</i>				1							1
Bald Eagle	<i>Haliaeetus leucocephalus</i>				1			3		1	2	7
Northern Junco	<i>Junco hyemalis</i>	106		14	21	29	47	52	172	32	50	523
Herring Gull	<i>Larus argentatus</i>						7			5		12
Ring-Billed Gull	<i>Larus delawarensis</i>	86	229	125	430	172	449	30	235	458	12	2,226
Great Black-Backed Gull	<i>Larus marinus</i>	1		1	5	1	3	10			1	22

Common Name	Scientific Name	2005	2006	2007	2008	2010	2011	2012	2014	2015	2016	TOTAL
Belted Kingfisher	<i>Megaceryle alcyon</i>	1			1	2			1		1	6
Red-Bellied Woodpecker	<i>Melanerpes carolinus</i>		6		3		4	1		1		15
Wild Turkey	<i>Meleagris gallopavo</i>				30	26	19				28	103
Song Sparrow	<i>Melospiza melodia</i>	66	1	23	12	7		20		1		130
Common Merganser	<i>Mergus merganser</i>		2						8	4		14
Northern Mockingbird	<i>Mimus polyglottos</i>	3	5	3	6	5	8	12	3	3	6	54
Brown-headed Cowbird	<i>Molothrus ater</i>		1	34								35
Black-Crowned Night Heron	<i>Nycticorax nycticorax</i>			2								2
Ruddy Duck	<i>Oxyura jamaicensis</i>	12				32			75			119
House Sparrow	<i>Passer domesticus</i>	15		10	103	3	2	1				134
Savannah Sparrow	<i>Passerculus sandwichensis</i>							11				11
Fox Sparrow	<i>Passerella iliaca</i>			1		2		4				7
Double-Crested Cormorant	<i>Phalacrocorax auritus</i>						12		5		3	20
Downy Woodpecker	<i>Picoides pubescens</i>		4	3	4	5	8	9	6			39
Hairy Woodpecker	<i>Picoides villosus</i>	1		1			1					3
Eastern Towhee	<i>Pipilo erythrophthalmus</i>							1	3			4
Carolina Chickadee	<i>Poecile carolinensis</i>	12	9	4	3	6	1	9	5	5	1	55
Common Grackle	<i>Quiscalus quiscula</i>			35						15		50
Golden-Crowned Kinglet	<i>Regulus satrapa</i>			1				1				2

Common Name	Scientific Name	2005	2006	2007	2008	2010	2011	2012	2014	2015	2016	TOTAL
Rufous Hummingbird (Possible Identification)	<i>Selasphorus rufus</i>	1										1
Red-Breasted Nuthatch	<i>Sitta canadensis</i>					1		1				2
White-Breasted Nuthatch	<i>Sitta carolinensis</i>			1				6	2			9
Yellow-Bellied Sapsucker	<i>Sphyrapicus varius</i>			1								1
American Goldfinch	<i>Spinus tristis</i>	6		1			2	2				11
Chipping Sparrow	<i>Spizella passerina</i>			1								1
European Starling	<i>Sturnus vulgaris</i>	130	12	203	123	25	44	125	66	220	301	1,249
Carolina Wren	<i>Thryothorus ludovicianus</i>	1		1		1	1	3				7
Brown Thrasher	<i>Toxostoma rufum</i>								1			1
House Wren	<i>Troglodytes aedon</i>						1		1			2
American Robin	<i>Turdus migratorius</i>	5		25	2	4	2,597	17		17	7	2,674
Mourning Dove	<i>Zenaida macroura</i>	32	108	70	43	8	35	6	14	1	1	318
White-Throated Sparrow	<i>Zonotrichia albicollis</i>	12	1	8	16	32	22	20	72	55	14	252
White-Crowned Sparrow	<i>Zonotrichia leucophrys</i>							4				4
TOTAL		676	666	990	1,610	1,239	4,087	677	1,180	1,194	738	13,057

Source: Audubon Society of New Jersey, 2006–2016; compiled by Ronald Kegel, 2017



# Appendix E





## Appendix E: Mammals in West Deptford

The following mammals have been observed in West Deptford. The list is organized alphabetically by scientific name.

Common Name	Scientific Name
Short-Tailed Shrew	<i>Blarina brevicauda</i>
Eastern Coyote	<i>Canis latrans</i>
Beaver	<i>Castor canadensis</i>
Star-Nosed Mole	<i>Condylura cristata</i>
Opossum	<i>Didelphis marsupialis</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Southern Flying Squirrel	<i>Glaucomys volans</i>
Red Bat	<i>Lasiurus borealis</i>
River Otter	<i>Lutra canadensis</i>
Woodchuck	<i>Marmota monax</i>
Striped Skunk	<i>Mephitis mephitis</i>
Meadow Vole	<i>Microtus pennsylvanicus</i>
House Mouse (introduced species)	<i>Mus musculus</i>
Long-Tailed Weasel	<i>Mustela frenata</i>
Mink	<i>Mustela vison</i>
Little Brown Bat	<i>Myotis lucifugus</i>
White-Tailed Deer	<i>Odocoileus virginianus</i>
Muskrat	<i>Ondatra zibethicus</i>
White-Footed Mouse	<i>Peromyscus leucopus</i>
Eastern Pipitrel	<i>Pipistrellus subflavus</i>
Raccoon	<i>Procyon lotor</i>
Brown Rat (introduced species)	<i>Rattus norvegicus</i>
Eastern Mole	<i>Scalopus aquaticus</i>
Gray Squirrel	<i>Sciurus carolinensis</i>
Masked Shrew	<i>Sorex cinereus</i>
Eastern Cottontail	<i>Sylvilagus floridanus</i>
Eastern Chipmunk	<i>Tamias striatus</i>
Red Squirrel	<i>Tamiasciurus hudsonicus</i>
Gray Fox	<i>Urocyon cinereoargenteus</i>
Red Fox	<i>Vulpes vulpes</i>

Common Name	Scientific Name
Meadow Jumping Mouse	<i>Zapus hudsonicus</i>

Source: Karl Anderson, 2017

# Environmental Resource Inventory for the Township of: West Deptford, Gloucester County, New Jersey

**Publication Number:** 17029

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**Geographic Area Covered:**

West Deptford Township, Gloucester County, New Jersey

**Key Words:**

Agriculture, Aquifers, Big Timber Creek, Biodiversity, Biological Resources, Built Environment, Conservation, Contaminated Sites, Delaware River, Development, Endangered Species, Energy Use, Environmental Issues, Environmental Resource Inventory, Floodplains, Forests, Geology, Gloucester County, Grasslands, Groundwater, Habitat, Land Cover, Land Preservation, Land Use, Landscape Project, Mantua Creek, Master Planning, Natural Resources, New Jersey, Open Space, Soils, Steep Slopes, Streams, Topography, Water Quality, Watersheds, West Deptford Township, Wetlands, Woodbury Creek

**Abstract:**

This publication documents the natural and community resources of West Deptford Township, Gloucester County, New Jersey. The natural resource information includes descriptions, tables, and maps of: land use; soils; drinking water, aquifers, and wells; surface waters, including watersheds, streams, lakes, wetlands, and floodplains; impacts on water resources and surface water quality; impervious coverage; vegetation, including wetlands, forests, and grasslands; animal communities; threatened and endangered species; Landscape Project Priority Habitats; and known contaminated sites. Community resources in the form of protected open space and recreation facilities are also briefly described. A short history of the community is also included.

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