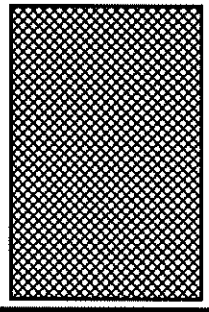
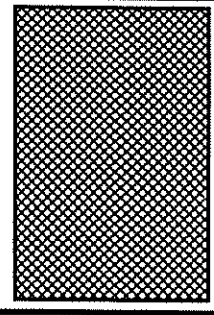
# TOWNSHIP OF EAST WINDSOR

**MERCER COUNTY**
**NEW JERSEY**



# NATURAL RESOURCES INVENTORY



**THE ORIGINAL OF THIS REPORT WAS SIGNED AND SEALED IN ACCORDANCE WITH N.J.S.A. 45:14A-12**

**Richard T. Coppola, P.P. # 1378**

**PREPARED BY: COPPOLA & COPPOLA ASSOCIATES**
**PRINCETON JUNCTION ~ NEW JERSEY**

# TOWNSHIP OF EAST WINDSOR
# NATURAL RESOURCES INVENTORY

**September 2000**

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# NATURAL RESOURCES INVENTORY

**September 2000**

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# TOWNSHIP OF EAST WINDSOR
# NATURAL RESOURCES INVENTORY

**September 2000**

## INTRODUCTION

The Township of East Windsor is situated in the southeast corner of Mercer County and contains approximately 15.65 square miles, or 10,016 acres of land. The Millstone River forms the northern boundary line for both East Windsor Township and Mercer County. The Borough of Hightstown is located in its entirety within the north central portion of East Windsor Township at the crossroads of New Jersey State Highway 33, County Route 539 and County Route 571.

The municipality is traversed from east to west by County Route 571 (Princeton-Hightstown Road and Etra Road) and from north to south by County Route 539 (Old York Road and Main Street). The Route 133 by-pass road recently has been constructed, with its alignment running through the northern part of the Township, and linking the eastern portion of New Jersey State Highway 33 within East Windsor Township with the western section of County Route 571 in the Township.

U.S. Route 130 and New Jersey State Highway 33 enter East Windsor Township from the southwest and split so that U.S. Route 130 heads north and New Jersey State Highway 33 heads northeast through the Township. The New Jersey Turnpike parallels U.S. Route 130 to the east. Interchange 8 of the New Jersey Turnpike is located within East Windsor Township, east of Hightstown Borough, with access onto New Jersey State Highway 33.

In addition to Hightstown Borough being located within the center of the Township, East Windsor Township is bordered on the south and southeast by Millstone Township in Monmouth County, on the southwest by Washington Township, on the west by West Windsor Township, and on the north and northeast by Cranbury Township and Monroe Township, both in Middlesex County.

Similar to many rural and suburban areas throughout the State, the Township of East Windsor has been experiencing development pressures. This is due in part to the location of the denser community of Hightstown Borough within East Windsor Township where development seeks to expand outward into the Township. Additionally, the location of an interchange on the New Jersey Turnpike within the Township and numerous intersections of major arterial and collector roads tend to promote development.

There are three (3) major nonresidential development areas in the Township, including the Route 571 campus corridor, the Route 130 retail corridor and the NJ Turnpike/Route 33 industrial/retail corridor. All three (3) of these nonresidential areas currently are experiencing relatively rapid development and redevelopment.

Additionally, East Windsor Township contains a wide variety of housing, from historic Victorian and contemporary executive homes, to townhomes and condominiums. The East Windsor Township municipal officials are appropriately proactive in managing the growth of the Township in order to achieve a balanced development pattern which enhances the quality of life for the residents of the Township.

An integral part of East Windsor Township is the variety of natural features situated amidst the portions of the Township which have developed or are planned by the Township to be developed. The natural features contained within the Township include wetlands, steep topographic slopes, flood plains, an important aquifer recharge area and rivers and streams. Additionally, the Township's geological formations and soil characteristics present important considerations for land development and land preservation.

It is the purpose of this "Natural Resources Inventory" report to identify and evaluate the natural features of East Windsor Township in order to provide additional information to the Township in its continued efforts to both protect its environmental resources and to promote sound land development.

## UPDATED TOWNSHIP BASE MAP

The February 2000 "Base Map" of East Windsor Township was prepared by Coppola & Coppola Associates utilizing Township Tax Map sheets and an original base map provided by the Township Engineering Division. The "Base Map" depicts roadways, lot lines and water courses. It is upon the "Base Map" that the graphic information contained within this "Natural Resources Inventory" is presented.

The "Base Map" initially was drafted at a scale of 1" = 1,000', which created a map approximately three feet by four feet (3' x 4') in size. The map was then photographically reduced to an eleven inch by seventeen inch (11" x 17") size for use within published reports.

On the 11" x 17" sheets, the scale of the map is approximately 1" = 2,700'. At this scale, one (1) square inch equals approximately 167 acres. The users of the maps in this report, therefore, should be aware of the inherent limitations of portraying graphic material at this scale; while the information is shown as accurately as possible, slight distortions in the drafting and reproduction process will necessarily be magnified several times due to the extreme reduction in the scale of the "Base Map".

## EAST WINDSOR TOWNSHIP'S EXISTING ZONE PLAN

The existing "Zoning Map" of the Township of East Windsor, dated April 5, 2000, is included within this report for informational purposes as an aide to the reader in order to more easily understand the textual discussions.

# TOWNSHIP OF EAST WINDSOR

## MERCER COUNTY ~ NEW JERSEY

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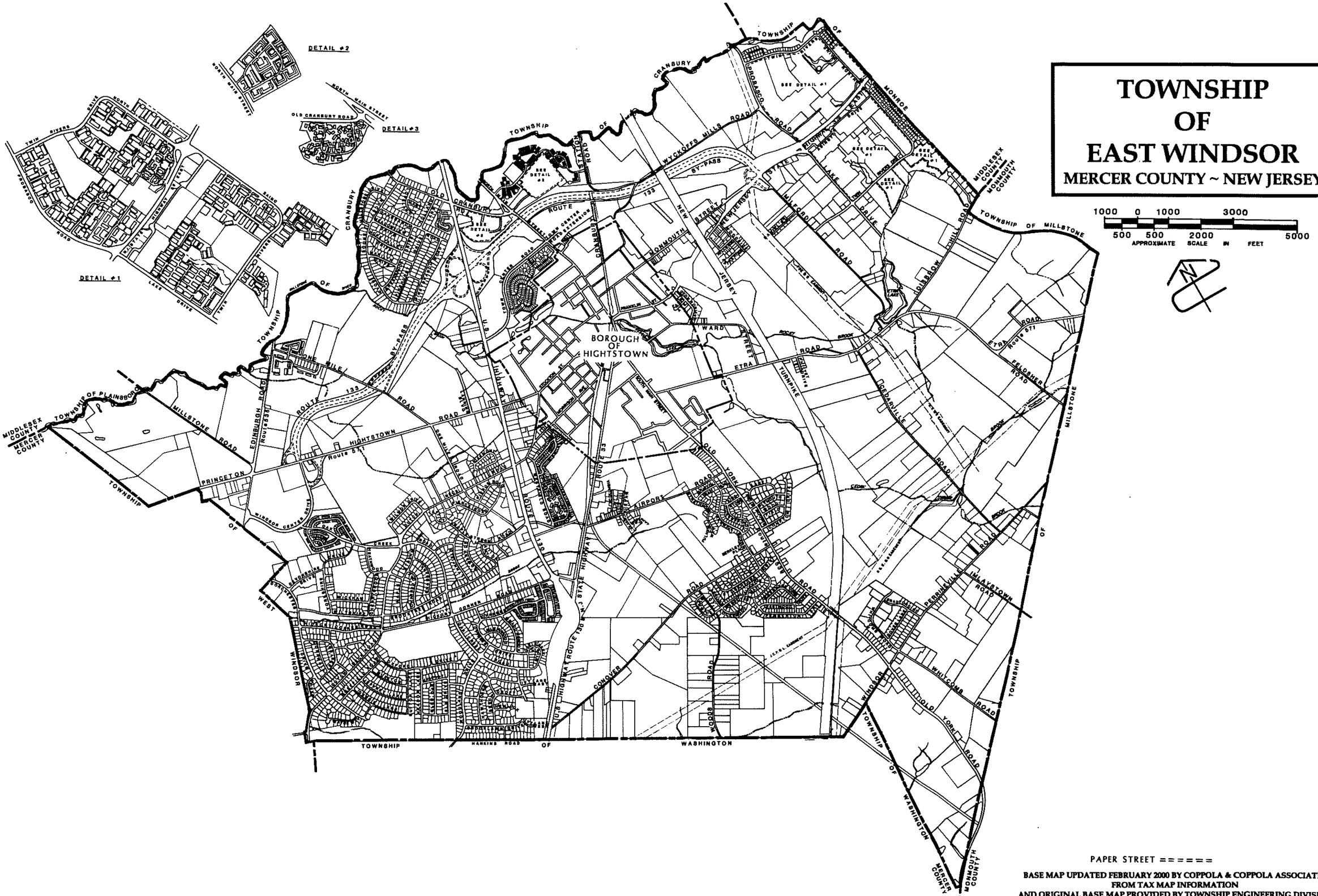


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BASE MAP UPDATED FEBRUARY 2000 BY COPPOLA & COPPOLA ASSOCIATES
FROM TAX MAP INFORMATION
AND ORIGINAL BASE MAP PROVIDED BY TOWNSHIP ENGINEERING DIVISION

# TOWNSHIP OF EAST WINDSOR

## MERCER COUNTY ~ NEW JERSEY

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APPROXIMATE SCALE IN FEET

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## ZONING MAP

April 5, 2000

| | |
|---|---|
| R-A | Rural Agriculture |
| R-E | Rural Estate |
| R-1 | Residential Low Density |
| R-2 | Residential Low Density |
| R-3 | Residential Medium Density |
| R-M | Residential Multifamily |
| SL | Residential Small Lot |
| PRC | Planned Retirement Communities |
| PUD | Planned Unit Development |
| NC | Neighborhood Commercial |
| HC | Highway Commercial |
| TC | Turnpike Commercial |
| R-O | Research Office |
| I-O | Industrial Office |
| MH | Manufactured Housing |
| PAC | Planned Adult Community |
| ARH | Age-Restricted Housing |

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BASE MAP UPDATED FEBRUARY 2000 BY COPPOLA & COPPOLA ASSOCIATES
FROM TAX MAP INFORMATION
AND ORIGINAL BASE MAP PROVIDED BY TOWNSHIP ENGINEERING DIVISION

## SOILS

Soils have inherent characteristics that pose varying kinds of limitations for community development. The "Soil Survey of Mercer County, New Jersey", published during January 1972 by the United States Department of Agriculture, Soil Conservation Service, provides a listing of the soil types within Mercer County and a detailed description of their suitability for various types of land development and plant cultivation.

Regarding East Windsor Township, the "Soil Survey" lists a total of thirty-four (34) soil types throughout the Township. The location of soil types within the Township are shown on the "Soils" map. The accompanying chart, which is keyed to the map by the number assigned to a soil type, summarizes the "Degree And Kind Of Soil Limitations For Community Development" that each of the soils present for different types of community development.

As indicated in the "Soil Survey", the soil information and rankings are intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations due to the fact that the soil has been tested at a depth of only five to six feet (5'-6'). Moreover, because of the scale of the "Soil Survey" maps, small areas of different soil types may be included within the mapped area of a specific soil. In any case, the information is not intended to eliminate the need for on-site engineering investigation, testing and analysis of the soils for a particular type of community development as may be proposed.

As indicated on the chart, the soils are rated "S" Slight, "M" Moderate or "R" Restrictive for each type of community development. More specifically, the ratings by the Soil Conservation Service are based upon the following meanings of the terms:

"S": Slight ratings mean little or no limitations for the particular type of community development, or limitations which can easily be corrected by the use of normal equipment.

"M": Moderate ratings mean the presence of some limitations which normally can be overcome by careful design and management at somewhat higher cost.

"R": Restrictive, or severe, limitations are those which normally cannot be overcome without exceptional, complex or costly measures.

The chart of the "Degree And Kind Of Soil Limitations For Community Development" also lists the problems (e.g., high water table, steep slopes, slow permeability, etc.) associated with the ratings of the soils for the various types of community development.

# TOWNSHIP OF EAST WINDSOR

## MERCER COUNTY ~ NEW JERSEY

1000 0 1000 3000

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APPROXIMATE SCALE IN FEET

## SOILS

DETAIL #1

DETAIL #2

DETAIL #3

**NOTE:**
**Please Refer To The "Degree And Kind Of Soil Limitations For Community Development" Chart For A Listing Of The Soils As Numbered On This Map.**

**SOURCE:**
**United States Department of Agriculture, Soil Conservation Service Soil Survey, January 1972.**

**PREPARED BY: Coppola & Coppola Associates ~ Princeton Junction ~ New Jersey**

PAPER STREET = = = = = =

BASE MAP UPDATED FEBRUARY 2000 BY COPPOLA & COPPOLA ASSOCIATES
FROM TAX MAP INFORMATION
AND ORIGINAL BASE MAP PROVIDED BY TOWNSHIP ENGINEERING DIVISION

# TOWNSHIP OF EAST WINDSOR

## DEGREE AND KIND OF SOIL LIMITATIONS FOR COMMUNITY DEVELOPMENT



### KEY TO RATINGS

- **S:** SLIGHT ratings means little or no limitation, or limitations easily corrected by the use of normal equipment.
- **M:** MODERATE ratings mean the presence of some limitations which normally can be overcome by careful design and management at somewhat greater cost.
- **R:** RESTRICTIVE or severe limitations are those which normally cannot be overcome without exceptional, complex or costly measures.

### KEY TO PROBLEMS

1. Moderately High To High Water Table.
2. Low Available Water Capacity.
3. Loose Sand.
4. Frequent Stream Overflow.
5. Low Organic Matter Content.
6. Gravelly In Places.
7. Low Natural Fertility.
8. Seasonally High Water Table.
9. Loamy Sand Surface Soil.
10. Loose Surface Soil.
11. Steep Slopes.
12. Some Surfaces Below Grade Of Adjacent Land.
13. Moderately Steep Slopes.
14. Low Available Water Capacity In Sandy Areas.
15. Severely Eroded.
16. Ground Water Pollution Hazard.
17. Slow Permeability In Clayey Substratum.
18. Slow Permeability Overall.
19. Moderate To High Frost Action Potential.
20. Gentle Slopes.
21. Fill Material May Be Unsettled.
22. Variable Fill Material.

**SOURCE:**
United States Department of Agriculture,
Soil Conservation Service Soil Survey,
January 1972.

**PREPARED BY:**
Coppola & Coppola Associates
Princeton Junction ~ New Jersey

| | MAP SYMBOL | SEPTIC TANK ABSORPTION FIELDS | PROBLEMS | STREETS AND PARKING LOTS | PROBLEMS | LAWNS AND LANDSCAPING | PROBLEMS | ATHLETIC FIELDS | PROBLEMS | PARKS AND PICNIC AREAS | PROBLEMS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. ALLUVIAL LAND | Ad | R | 4 | R | 1,4,19 | R | 1,4 | R | 1,4 | M | 1,4 |
| 2. ALLUVIAL LAND | Ae | R | 4 | R | 1,4,19 | R | 1,4 | R | 1,4 | R | 1,4 |
| 3. AURA | AfB | M | 18 | M | 19,20 | S | | M | 20 | S | |
| 4. GRAVELLY MATERIAL | Cg | S | 16 | S | 21 | M | 5,6,7 | M-S | 5,6,22 | S | |
| 5. STRATIFIED SUBSTRATUM | Cu | S | 16 | S | | M | 5,7 | M | 5,7 | S | |
| 6. DRAGSTON | DwB | M-R | 1 | M | 1,19 | S-M | 1 | R | 1 | M | 1 |
| 7. ELKTON | Ek | R | 8,18 | R | 8,19 | R | 8 | R | 8,18 | R | 8 |
| 8. EVESBORO | EvB | S | 16 | S | | R | 2,7 | R | 7,14 | M | 9 |
| 9. FALLSINGTON | Fd | R | 8 | R | 8 | R | 8 | R | 8 | R | 1 |
| 10. FRESH WATER MARSH | Fm | R | 1 | R | 1 | R | 1 | R | 1 | R | 1 |
| 11. FORT MOTT | FrB | S | 16 | S | | R | 2,7 | R | 10 | R | 10 |
| 12. FORT MOTT | FrC | M | 11 | M | | R | 2,7 | R | 10,11 | R | 10 |
| 13. GALESTOWN | GaB | S | 16 | S | | R | 9 | M | 9 | M | 9 |
| 14. KLEJ | Km | M | 1 | M | 1 | S | | M | 1 | S | |
| 15. LENOIR | Lk | R | 1,18 | R | 19 | M | 1 | R | 1 | M | 9 |
| 16. MATAPEAKE | MoA | S-R | 17 | M | 19 | S | | S | | S | |
| 17. MATAPEAKE | MoB | S-R | 17 | M | 19 | S | | M | 20 | S | |
| 18. MATAPEAKE | MoC2 | M | 11 | M | 19 | M | 11 | R | 11 | M | 11 |
| 19. MATTAPEX | Mq | R | 1 | R | 19 | M | 1 | R | 1 | M | 1 |
| 20. OTHELLO | Ot | R | 1 | R | 1,19 | R | 1 | R | 1 | R | 1 |
| 21. PITS | Pg | VARIABLE | 16 | S-R | 1,12 | R | 2,7 | R | 7,14 | R | 3,12 |
| 22. PLUMMER | Pv | R | 1 | R | 1 | R | 1 | R | 1 | R | 1 |
| 23. PORTSMOUTH | Pw | R | 1 | R | 1 | R | 1 | R | 1 | R | 1 |
| 24. SANDY & SILTY LAND | SdD | R | 13 | R | 13,19 | R | 2,13 | R | 11 | R | 11 |
| 25. SANDY & SILTY LAND | SdE | R | 11 | R | 11,19 | R | 11 | R | 11 | R | 11 |
| 26. SASSAFRAS | SrA | S | | S | | S | | S | | S | |
| 27. SASSAFRAS | SrB | S | | S | | S | | M | 20 | S | |
| 28. SASSAFRAS | SrC | M | 1,11 | M | | M | 11 | R | 11 | M | 11 |
| 29. SASSAFRAS | SsB | S | | S | | S | | M | 20 | S | |
| 30. SASSAFRAS | SrC2 | M | 1,11 | M | | M | 11 | R | 11 | M | 11 |

# TOWNSHIP OF EAST WINDSOR

## DEGREE AND KIND OF SOIL LIMITATIONS FOR COMMUNITY DEVELOPMENT



### KEY TO RATINGS

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12. Some Surfaces Below Grade Of Adjacent Land.
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**SOURCE:**
United States Department of Agriculture,
Soil Conservation Service Soil Survey,
January 1972.

**PREPARED BY:**
Coppola & Coppola Associates
Princeton Junction ~ New Jersey

| | MAP SYMBOL | SEPTIC TANK ABSORPTION FIELDS | PROBLEMS | STREETS AND PARKING LOTS | PROBLEMS | LAWNS AND LANDSCAPING | PROBLEMS | ATHLETIC FIELDS | PROBLEMS | PARKS AND PICNIC AREAS | PROBLEMS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 31. SASSAFRASS | StC3 | M | 11 | M | | R | 11 | R | 11 | M | 11 |
| 32. SASSAFRASS | SyB | M | 1 | M | 1 | S | | M | 1,20 | S | |
| 33. TINTON | TnB | S | 16 | S | | R | 2,7 | R | 3,7,14 | R | 3 |
| 34. WOODSTOWN | WfB | R | 1 | R | 1 | R | 1 | R | 1 | M | 1 |

More specifically, the criteria used by the Soil Conservation Service for the ratings of the various soil types for the different types of community development listed on the "Degree And Kind Of Soil Limitations For Community Development" chart are as follows:

**Suitability For Septic Disposal**

While the majority of East Windsor Township is served by sanitary sewer services, the land area in the southeastern portion of the Township, mostly designated within the "R-A" Rural Agriculture or the "R-E" Rural Estate zoning districts, is not served by public sewerage facilities. Therefore, identifying the suitability of the subject soils for on-site wastewater effluent disposal is an important consideration both for site selection and system design.

Suitable areas for septic disposal require a soil that has enough, but not excessive, drainage; in other words, soils that can adequately absorb the effluent, yet sufficiently filter the effluent to prevent groundwater contamination. Therefore, there must be unsaturated soil material beneath the absorption field to filter the effluent effectively.

Criteria used for the ratings were percolation rate, depth to seasonally high water table, slope, amount of stone, depth to and kind of bedrock, and flood hazard.

The "Soil Limitations For Septic Tank Absorption Fields" map graphically indicates the location and ranking of the soils in East Windsor Township suitable for septic disposal. Again, it should be noted and clearly understood that the mapped information does not take the place of onsite investigation.

As indicated on the map, most of the properties with "R" restricted or severe soil limitations for septic disposal are located within the areas of East Windsor Township currently provided public sewerage treatment services. The previously noted southeastern section of East Windsor Township, which is not within the area currently provided public sewerage treatment services, for the most part exhibits "S" slight soil limitations for septic effluent disposal.

The residentially zoned properties located between Route 130 and the New Jersey Turnpike, however, have "R" restrictive or severe limitations for septic effluent disposal, mostly because these properties contain wetlands and/or have a high water table. These physical conditions of the land reinforces the prudent need to require large lot sizes to accommodate onsite septic effluent disposal and safeguard an adequate potable ground water supply.

# TOWNSHIP OF EAST WINDSOR

## MERCER COUNTY ~ NEW JERSEY

1000 0 1000 3000

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APPROXIMATE SCALE IN FEET

DETAIL #1

DETAIL #2

DETAIL #3

BOROUGH OF HIGHTSTOWN

TOWNSHIP OF CRANBURY

TOWNSHIP OF MONROE

TOWNSHIP OF MILLSTONE

TOWNSHIP OF PLAINSBORO

TOWNSHIP OF WEST WINDSOR

TOWNSHIP OF WASHINGTON

MIDDLESEX COUNTY

MERCER COUNTY

MONMOUTH COUNTY

# SOIL LIMITATIONS FOR SEPTIC TANK ABSORPTION FIELDS

| | |
|---|---|
| | RESTRICTIVE |
| | MODERATE-RESTRICTIVE |
| | MODERATE |
| | SLIGHT-RESTRICTIVE |
| | SLIGHT |
| | VARIABLE |

**NOTE:**
**Please Refer To The "Degree And Kind Of Soil Limitations For Community Development" Chart For A Listing Of The Soils As Numbered On This Map.**

**SOURCE:**
**United States Department of Agriculture, Soil Conservation Service Soil Survey, January 1972.**

**PREPARED BY: Coppola & Coppola Associates ~ Princeton Junction ~ New Jersey**

PAPER STREET ======

BASE MAP UPDATED FEBRUARY 2000 BY COPPOLA & COPPOLA ASSOCIATES
FROM TAX MAP INFORMATION
AND ORIGINAL BASE MAP PROVIDED BY TOWNSHIP ENGINEERING DIVISION

## Streets And Parking Lots

For these ratings, it is assumed that the roads will be of the hard surfaced type, similar to most of the roads in East Windsor Township. Criteria used for the ratings were the depth to the water table, natural drainage, slope, depth to bedrock and flood hazard.

## Lawns And Landscaping

The soils are rated for their ability to support turf and ornamental trees and plants. Criteria used for the ratings were natural fertility, available water capacity, depth to bedrock, natural drainage and slope. Other considerations are the texture of the subsurface soil and subsoil and the content of salts, sodium and sulfidic materials.

## Athletic Fields

Athletic fields require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains and not dusty when dry.

Therefore, the criteria used for the ratings were slope, natural drainage, texture and depth to bedrock.

## Parks And Picnic Areas

Parks and picnic areas are listed together by the Soil Conservation Service because they have similar soil requirements. Parks and picnic areas are subject to heavy foot traffic; most vehicular traffic is confined to access roads and parking areas.

The best soils are firm when wet, are not dusty when dry, are not subject to flooding during the period of use and do not have excessive slopes or boulders. Therefore, the criteria used for the ratings were depth to water table, slope, natural drainage and texture.

## HYDRIC SOILS

The "Hydric Soils" map shows the location of the environmentally fragile soils classified as being "Hydric" by the United State Department of Agriculture Soil Conservation Service (1985). By definition, "Hydric Soils" are either:

- Saturated at or near the soil surface with water that is virtually lacking free oxygen for significant periods during the growing season; or
- Flooded frequently for long periods during the growing season.

The water saturated or flooded condition of the soil affects plant growth and supports hydrophytes and/or wetlands vegetation.

"Hydric Soils" in New Jersey are classified into three (3) groups based upon the degree to which they consistently display hydric conditions:

Group 1: Soils nearly always display consistent hydric conditions;

Group 2: Soils display consistent hydric conditions in most places, but additional verification is needed; and

Group 3: Soils displaying hydric conditions in a few places, and additional verification is needed.

As shown on the "Hydric Soils" map, most of East Windsor Township's land area exhibits "Hydric Soils". While it might be ideal for lands containing "Hydric Soils" not to be developed, this unilateral approach is not legally possible.

Nevertheless, reasonable care should be taken by applicants during the formative stages of site plan and subdivision preparation, and by the Township Planning Board and Township Zoning Board of Adjustment during the application review process, to incorporate the "Hydric Soils" land areas within that portion of a tract which need not be physically developed or, where applicable, within any land area to be set aside as open space.

# TOWNSHIP OF EAST WINDSOR

## MERCER COUNTY ~ NEW JERSEY

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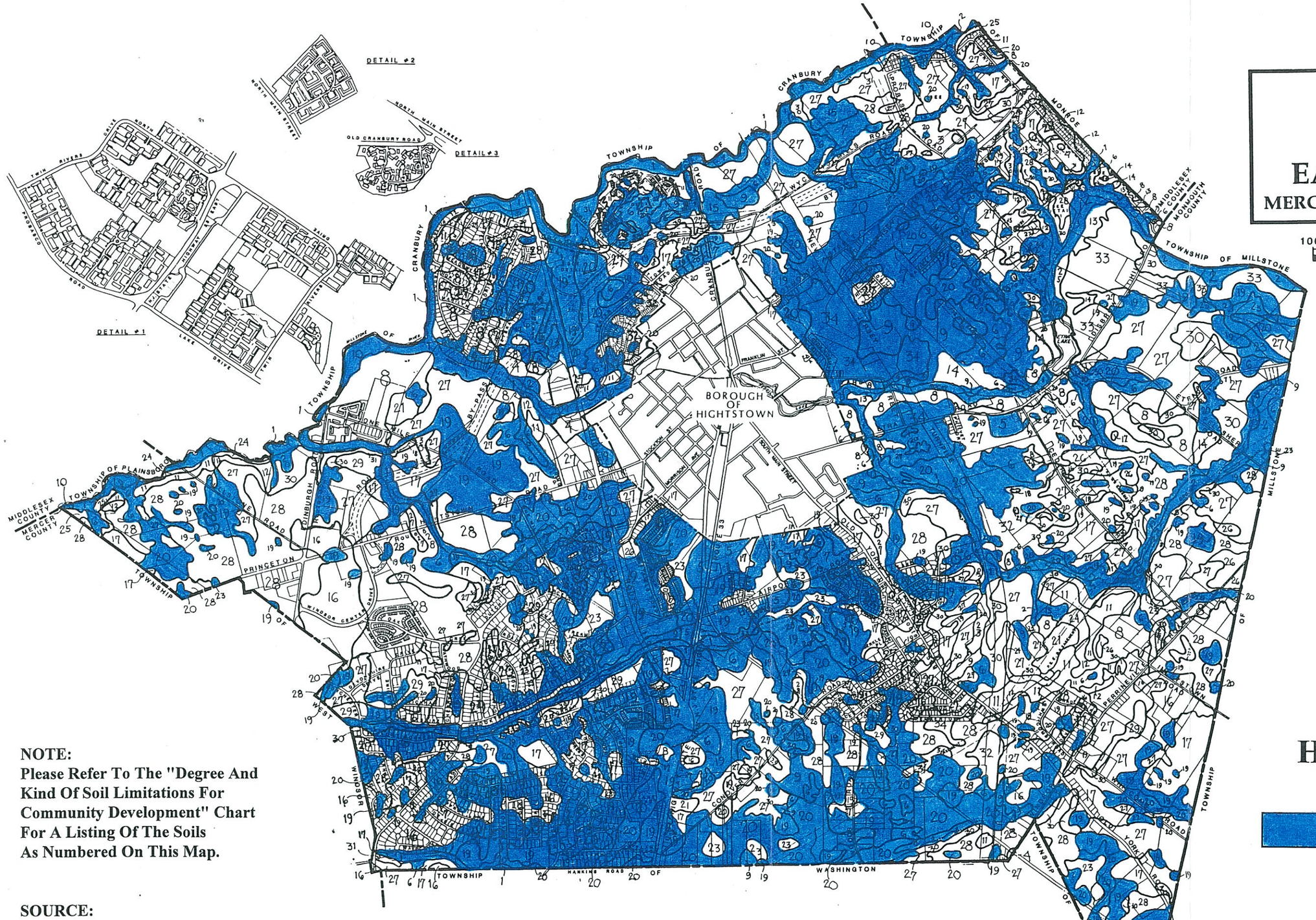
APPROXIMATE SCALE IN FEET




## HYDRIC SOILS

HYDRIC SOILS

**NOTE:**
**Please Refer To The "Degree And Kind Of Soil Limitations For Community Development" Chart For A Listing Of The Soils As Numbered On This Map.**

**SOURCE:**
**United States Department of Agriculture, Soil Conservation Service Soil Survey, January 1972.**

**PREPARED BY: Coppola & Coppola Associates ~ Princeton Junction ~ New Jersey**

PAPER STREET ======

12

BASE MAP UPDATED FEBRUARY 2000 BY COPPOLA & COPPOLA ASSOCIATES
FROM TAX MAP INFORMATION
AND ORIGINAL BASE MAP PROVIDED BY TOWNSHIP ENGINEERING DIVISION

## GEOLOGY

East Windsor lies in the physiographic province of New Jersey known as the "Coastal Plain". The Coastal Plain of New Jersey is located south of Lower New York Bay and the Raritan River estuary and east of a line which runs from New Brunswick to Trenton and then down the west side of the Delaware River to Wilmington, Delaware. Located within the Coastal Plain is about one-fourth (¼) of New Jersey's population.[1]

The Coastal Plain is comprised of unconsolidated sediments that overlap rocks of the Piedmont Province. These sediments, which range in age from Cretaceous to Miocene (approximately 135 to 5.3 million years ago), dip toward the coast and extend beneath the Atlantic Ocean to the edge of the Continental Shelf. The Coastal Plain sediments thicken southeastward from a featheredge along the northwestern margin of the province to approximately four thousand five hundred feet (4,500') near Atlantic City.

The sediments consist of layers of sand, silt and clay which were deposited alternately in deltaic and marine environments as sea levels fluctuated during Cretaceous and Tertiary time. These layers of sediment outcrop in irregular bands that trend northeast-southwest. A thin veneer of Late Tertiary and Quaternary sand and gravel deposited by rivers covers wide areas of the Coastal Plain.

The topography of the Coastal Plain is flat to very gently undulating. However, erosion-resistant gravel or iron-cemented sediment underlies upland areas and isolated hills. Coastal Plain sediments have been mined in the past for bog iron, glass sand, foundry sand, ceramic and brick clay, the mineral glauconite for use in fertilizer, and titaniuim from the mineral ilmenite in sand deposits. Today, the Coastal Plain sediments continue to supply glass sand and are extensively mined for sand and gravel construction material. The sand formations are productive aquifers and important ground water reservoirs.

East Windsor Township is located in the "Inner Coastal Plain" section of the Coastal Plain province; this area contains a greater proportion of clays in the sediments, while the topmost formation, the Cohansey, is usually well-sorted porous sand.

The specific geological formations for East Windsor Township are shown on the "Geological Formations" map. As indicated, the geology in the western half of East Windsor Township is the Magothy Formation and the Merchantville Formation, while the eastern half of the Township consists of the Woodbury Formation and the Englishtown Formation.[2]

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[1] New Jersey Department of Environmental Protection, New Jersey Geological Survey, Geologic Map of New Jersey, 1996.

[2] U.S. Department of the Interior, U.S. Geological Survey. Bedrock Geologic Map of Central and Southern New Jersey, 1998.

# TOWNSHIP OF EAST WINDSOR

## MERCER COUNTY ~ NEW JERSEY

1000 0 1000 3000
500 500 2000 5000
APPROXIMATE SCALE IN FEET

DETAIL #1

DETAIL #2

DETAIL #3

Kmg

Kmv

Kwb

Ket

BOROUGH OF HIGHTSTOWN

## GEOLOGICAL FORMATIONS
July 2000

| CRETACEOUS SYSTEM | |
|---|---|
| Ket | Englishtown Formation |
| Kmg | Magothy Formation |
| Kmv | Merchantville Formation |
| Kwb | Woodbury Formation |

Source: Bedrock Geological Map,
Central New Jersey,
United States Geological Survey, 1998.

PAPER STREET ======

BASE MAP UPDATED FEBRUARY 2000 BY COPPOLA & COPPOLA ASSOCIATES
FROM TAX MAP INFORMATION
AND ORIGINAL BASE MAP PROVIDED BY TOWNSHIP ENGINEERING DIVISION

PREPARED BY COPPOLA & COPPOLA ASSOCIATES
PRINCETON JUNCTION ~ NEW JERSEY

## Magothy Formation

The Magothy Formation is primarily comprised of sand and clayey silt. The Magothy Formation is part of the Potomac-Raritan-Magothy aquifer system, which is the highest ranking aquifer system in the State (see later discussion under "Groundwater Aquifers").

The Magothy formation is a relatively thin series of alternating dark clays and fine white sands characterized by charcoal fragments or carbonized fossil woods. Forty-three (43) species of marine invertebrate fossils and abundant flora have been removed from the Magothy formation, and all of these fossils indicate that the Magothy formation was deposited in the swamps and estuaries of an advancing sea.

## Merchantville Formation

The Merchantville Formation is primarily comprised of clayey silt and glauconite sand. Once extensively worked, this formation is still used occasionally for brick clay. Shark teeth, turtles and fish vertebrae and a wide variety of distinctive invertebrate fossils have been found in this formation. The Merchantville Formation is part of the Merchantville-Woodbury confining layer that separates the aquifer in the Raritan and Magothy Formations from the overlying aquifers.

## Woodbury Formation

The Woodbury Formation primarily is comprised of clayey silt and also is part of the Merchantville-Woodbury confining layer that separates the aquifer in the Raritan and Magothy Formations from the overlying aquifers. The Woodbury formation contains about fifty feet (50') of non-glauconitic black marine clays that weather to a brown color. The lack of the glauconite, the chocolate-brown weathering characteristics, and a very different fossil fauna distinguish the Woodbury Formation from the underlying Merchantville Formation.

## Englishtown Formation

The Englishtown Formation is primarily comprised of sand and clayey silt and is part of the Englishtown aquifer system. The Englishtown aquifer transmits less water than the aquifer in the Magothy Formation, but still yields sufficient water to be considered an important aquifer. The Englishtown formation is a distinctive white to yellow quartz sand that decreases in thickness from one hundred forty feet (140') in Monmouth County to a thickness of only twenty feet (20') in Gloucester County.

## CRITICAL AREAS

The "Critical Areas Map" indicates those portions of the Township of East Windsor that have limited development potential because of steep slopes, 100-year flood plains and/or freshwater wetlands. These three (3) categories of environmentally sensitive lands can be identified and mapped on a site plan and/or subdivision submission with a high degree of accuracy and certainty. The presence of one or more of these features clearly justifies the limitation of the density and/or intensity of development.

### Slopes 15% & Greater

Slope is indicated as a percentage; i.e., the change in vertical elevation (in feet) per one hundred feet (100') of horizontal distance. Aside from the sheer physical impediment of improving a site for construction on steep slopes or rocky ledges, the degree of slope has a direct bearing on a number of other physical characteristics. For example, absorption or soil drainage is inversely related to the degree of slope. Steep slopes necessarily have poor drainage due to increased run-off. The natural evolution of soil types also is impeded on steep slopes due to the inherently limited amount of ground cover that can develop in areas of high erosion.

Slopes fifteen percent (15%) and greater are potentially critical environmental impact areas. On these slopes, the soils are often thin and have low natural fertility. Moreover, in areas where the slope of the land exceeds fifteen percent (15%), development costs rise sharply along with the potential for environmental problems and the associated costs that will invariably result if proper attention is not paid to the treatment for hillside or mountain development. For these reasons, it usually is recommended that relatively low densities prevail in areas where slopes are fifteen percent (15%) or greater in grade.

As shown on the "Critical Areas Map" from information on the U.S. Geological Survey Maps (Allentown [1981], Hightstown [1981], Roosevelt [1981] and Jamesburg [1981]), most of the steep slope areas within East Windsor Township are situated in small, isolated areas scattered throughout the Township. Additionally, several steep slope locations have been identified in conjunction with the bridges and support structures along the New Jersey Turnpike and Route 130.

# TOWNSHIP OF EAST WINDSOR

## MERCER COUNTY ~ NEW JERSEY

1000 0 1000 3000
500 500 2000 5000
APPROXIMATE SCALE IN FEET

DETAIL #1

DETAIL #2

DETAIL #3

BOROUGH OF HIGHTSTOWN

TOWNSHIP OF PRINCETON

TOWNSHIP OF PLAINSBORO

TOWNSHIP OF WEST WINDSOR

TOWNSHIP OF WASHINGTON

TOWNSHIP OF CRANBURY

TOWNSHIP OF MILLSTONE

MIDDLESEX COUNTY

MONMOUTH COUNTY

MERCER COUNTY

## CRITICAL AREAS MAP

**June 2000**

| |
|---|
| SLOPES 15% & GREATER |
| 100-YEAR FLOOD PLAINS |
| FRESHWATER WETLANDS |
| 100-YEAR FLOOD PLAINS & FRESHWATER WETLANDS |

**Note: For Listing And Description Of The Numbered Types Of Freshwater Wetlands, See Table In Text Of Natural Resources Inventory.**

**SOURCES:**

**SLOPES 15% & GREATER:**
U.S. Geological Survey Maps: Allentown (1981), Roosevelt (1981), Hightstown (1981) & Jamesburg (1981) Quadrangles, With Corresponding Slope Overlay Maps (1975).

**100-YEAR FLOOD PLAINS:**
Federal Emergency Management Agency Flood Insurance Rate Maps: Community Panel Numbers 340244, 0001B-0004B.

**FRESHWATER WETLANDS:**
State Of New Jersey Department Of Environmental Protection Freshwater Wetlands Maps: From March 1986 Infrared Photographs For Allentown, Roosevelt, Hightstown & Jamesburg Quadrangles.

PAPER STREET ======

BASE MAP UPDATED FEBRUARY 2000 BY COPPOLA & COPPOLA ASSOCIATES
FROM TAX MAP INFORMATION
AND ORIGINAL BASE MAP PROVIDED BY TOWNSHIP ENGINEERING DIVISION

**PREPARED BY COPPOLA & COPPOLA ASSOCIATES**
**PRINCETON JUNCTION ~ NEW JERSEY**

## 100-Year Flood Plains

Lands indicated to be within the 100-year flood boundary have a one percent (1%) chance of flooding in any given year. The source maps used for the delineation of the 100-year flood plains in East Windsor Township were prepared by the Federal Emergency Management Agency, through the Federal Insurance Administration, which is charged with the responsibility of delineating the flood prone areas within the Township under the authority of the National Flood Insurance Act of 1968.

It should be understood that the source maps, all dated December 11, 1981, were prepared to facilitate flood plain management activities and do not show all the special flood hazard areas in East Windsor Township or all the planimetric features outside the flood plain.

As shown on the "Critical Areas Map", significant 100-year flood plain areas exist within East Windsor Township along the Millstone River and its tributaries, Bear Brook, Rocky Brook and Cedar Swamp Creek. However, as noted above, not all of the flood plain areas in the Township have been mapped by FEMA, and it is certain that many additional 100-year flood plain areas exist within East Windsor Township associated with the myriad number of stream tributaries in the municipality.

## Freshwater Wetlands

"Wetlands" are physical characteristics that present severe constraints for land development. The delineation of the freshwater wetlands within East Windsor Township was drafted from information mapped by the New Jersey Department of Environmental Protection (NJDEP) from March 1986 infrared photographs.

The extent of the freshwater wetlands mapped by the NJDEP was based upon the definition of "wetlands" adopted by the U.S. Fish and Wildlife Service, as follows:

> "Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three (3) attributes: 1) At least periodically, the lands support predominantly hydrophytes; 2) The substrate is predominantly undrained hydric soil; and/or 3) The substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year."

The U.S. Fish and Wildlife Service's "Cowardin Classification System" classifies wetlands systems according to type. The five (5) basic ecological systems are: Marine, Estuarine, Riverine, Palustrine and Lacustrine. Further differentiation is possible by class, subclass, water regime and special modifiers. The twenty-four (24) types of freshwater wetlands delineated in East Windsor Township are listed in the "Identification of Freshwater Wetlands" table which is included in Appendix I to this report.

Although site specific investigation is required to document the actual extent of freshwater wetlands on any particular property, it appears from the information mapped by the New Jersey Department of Environmental Protection (NJDEP) that freshwater wetlands are the most widespread constraint to development in East Windsor Township.

## WATER QUALITY

Water quality is a concern throughout New Jersey, created primarily by the relatively high density of development. In fact, Executive Order 109 recently was signed by the governor to require comprehensive environmental assessments before the New Jersey Department of Environmental Protection (DEP) approves any new or amended Wastewater Management Plan. As a result, an applicant for a new or amended Wastewater Management Plan must examine wastewater alternatives before any major changes will be made to a sewer service area.

### Surface Water Systems

Almost all of East Windsor Township lies within the Millstone River Watershed drainage basin, which is part of Watershed Management Area 10 as defined by the New Jersey Department of Environmental Protection.[3] Additionally, a small portion of East Windsor Township, located south of Windsor-Perrineville Road in the southeastern corner of the Township, falls within the Assunpink watershed; much of this land is owned by the New Jersey Department of Environmental Protection.

Regarding the Millstone River Watershed, the Millstone River drains an area of two hundred seventy-one (271) square miles that includes portions of Mercer, Hunterdon, Somerset, Middlesex and Monmouth Counties. The Millstone River itself is thirty-eight (38) miles long and flows from Millstone Township in Monmouth County to the Raritan River near Manville and Bound Brook Boroughs in Somerset County.

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[3] New Jersey Department of Environmental Protection, 1996 State Water Quality Inventory Report, updated through 1998.

The population centers within the Millstone River Watershed drainage basin include East Windsor Township, as well as Princeton Township, Princeton Borough, Manville Borough, South Brunswick Township, West Windsor Township, Hightstown Borough and Pennington Borough.

The major water tributaries within the Millstone River Watershed include Stony Brook, Cranbury Brook, Bear Brook, Ten Mile River, Six Mile River and Bedens Brook. The largest impoundment of water in the area is Carnegie Lake in Princeton Township, but there are a large number of smaller lakes within the subject watershed.

As shown on the "Major Stream Corridors" map, there are four (4) primary watercourses in East Windsor Township, including the Millstone River, Bear Brook, Rocky Brook and Cedar Swamp Brook. All of these water bodies have been classified by the New Jersey Department of Environmental Protection (NJDEP) as Fresh Water Class 2, Non-Trout waterways (FW2-NT). The FW2-NT classification is for fresh waters not suitable for trout because of their physical, chemical or biological characteristics, but which are suitable for a wide variety of other fish species.

Designated uses for FW2-NT waters, according to NJDEP criteria include the following:

- Maintenance, migration and propagation of natural and established biota;
- Primary and secondary contact recreation;
- Industrial and agricultural water supplies;
- Public potable water supply after such treatment as required by law or regulation; and
- Any other reasonable use.

Five (5) ambient water quality monitoring stations currently exist within the Millstone River Watershed, and the 1998 monitoring data indicates generally good to fair water quality throughout the watershed. There are no water quality monitoring stations in East Windsor Township; the closest water quality monitoring station to the Township is on the Millstone River at Grovers Mills in Plainsboro Township. The monitored water of the Millstone River at the Grovers Mills station is classified as good, which is defined as partially supporting primary contact recreation (e.g., swimming).

# TOWNSHIP OF EAST WINDSOR

## MERCER COUNTY ~ NEW JERSEY

1000 0 1000 3000
500 500 2000 5000
APPROXIMATE SCALE IN FEET

# MAJOR STREAM CORRIDORS

LOCATION OF MAJOR STREAM CORRIDORS

PAPER STREET ======

BASE MAP UPDATED FEBRUARY 2000 BY COPPOLA & COPPOLA ASSOCIATES
FROM TAX MAP INFORMATION
AND ORIGINAL BASE MAP PROVIDED BY TOWNSHIP ENGINEERING DIVISION

**PREPARED BY: Coppola & Coppola Associates ~ Princeton Junction ~ New Jersey**

While the water quality monitoring at the Grovers Mills station has indicated that the river contains high levels of dissolved oxygen, lead, cadmium, phosphorus, inorganic nitrogen and fecal coliform, these conditions reflect an improvement in water quality since the spring of 1992; total phosphorus, instream BOD, dissolved oxygen and possible fecal coliform bacteria have improved, although the amount of many of these items are still elevated.

Treatment plant effluent from the Hightstown Borough and East Windsor Township sewerage treatment plants were contributors to the dissolved oxygen and nutrient problems in the Millstone River; however, the East Windsor plant has since been completely replaced with a new "state of the art" facility, and the Hightstown plant has been substantially upgraded.

The predominant nonpoint pollution sources in the Millstone River Watershed are those associated with suburban development, which has increased throughout the watershed. Runoff from construction sites, developed sites, storm sewers and roads are contributing to excessive sediment loading. Septic systems also are reported to be a pollution problem throughout the watershed.

Nonpoint pollution associated with agriculture is limited in this watershed to the regions drained by Etra Lake, Peddie Lake, Cranbury Brook, and lower reaches of the Millstone River near its confluence with the Raritan River. Sediments, nutrients and pesticides are suspected of coming from croplands. Summarily, it is a combination of agricultural and suburban development runoff that is suspected of degrading the fish communities in the upper Millstone River.

The entire length of Bear Brook, which is a tributary to the Millstone River, is classified as a stream where toxic contaminants are suspected of impairing waters based upon biological monitoring evidence, including either a significant number of physical abnormalities detected on the bodies of collected aquatic insects and/or an unexplainable low number of organisms present at the study site.[4]

The Township of East Windsor is minimizing water pollution problems through its storm water management practices, open space preservation, retention of natural vegetation and the acquisition of stream corridor buffers and easements.

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[4] New Jersey Department of Environmental Protection, New Jersey 1994 State Water Quality Inventory Report.

## Groundwater Aquifers

Groundwater aquifers are geological formations that contain significant quantities of saturated, permeable materials and provide water to wells and springs. Aquifer recharge areas are porous soil or rock formations where water can percolate from the surface into the aquifer. Protection of aquifer recharge areas assures that the aquifer can continue to provide adequate quantities of potable water and remain free of contamination.

Sole-source aquifers are those aquifers that contribute more than fifty percent (50%) of the drinking water to a specific area, and the potable water would be impossible to replace if the aquifer were contaminated.

Sole-source aquifers are defined by guidelines set forth by the U.S. Environmental Protection Agency (USEPA) as authorized in Section 1424(e) of the Safe Drinking Water Act of 1974. Any federally-funded project in an area that could affect groundwater in a sole-source aquifer must be reviewed by the USEPA. The "project review area" includes the aquifer's "recharge zone" and it's "stream-flow source zone". The source zone is the upstream area that contributes recharge water to the aquifer. Seven (7) sole-source aquifers are defined in New Jersey and their project review area covers most of the State, including East Windsor Township.

East Windsor Township is located above the Potomac-Raritan-Magothy aquifer system and the Merchantville-Woodbury confining unit.[5] Aquifers in New Jersey have been ranked based upon their ability to provide groundwater to high-capacity wells; these wells include water supply, irrigation, and industrial supply wells tested for maximum yield. The Potomac-Raritan-Magothy aquifer system is the highest ranking aquifer in New Jersey, with a median yield in excess of five hundred (500) gallons per minute.

The Potomac-Raritan-Magothy aquifer system is a sole-source aquifer located in the Coastal Plain province.[6] The Potomac-Raritan-Magothy aquifer system is the most heavily pumped of all aquifers in New Jersey and provides fresh water over an area of about two thousand five hundred (2,500) square miles.

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5 New Jersey Department of Environmental Protection, New Jersey Geological Survey, Aquifers of New Jersey, 1998.

6 New Jersey Department of Environmental Protection, New Jersey Geological Survey, USEPA-Designated Sole-Source Aquifer Project Review Areas in New Jersey, 1999.

The Potamic-Raritan-Magothy aquifer system is made up of three (3) major aquifers, which are described in a 1984 U.S. Geologic Survey Report as the lower, middle and upper aquifers, separated by two (2) confining beds. A confining bed is an impermeable rock layer commonly of shale or clay.

The lower aquifer of the Potamic-Raritan-Magothy system consists mainly of undifferentiated sand, gravel, silt and clay. The lower aquifer lies on bedrock, which serves as a confining layer. The middle aquifer is composed of sand with some silt and clay.

The confining bed overlying the upper aquifer of the Potomac-Raritan-Magothy aquifer system is composed primarily of sediments of the Merchantville formation and the Woodbury Clay formation of the late Cretaceous Age. The Merchantville-Woodbury confining bed is the most extensive confining bed with the New Jersey Coastal Plain and functions as a confining layer between the upper aquifer of the Potamic-Raritan-Magothy system and the Englishtown aquifer system, located southeast of East Windsor Township.

Two (2) U.S. Geological Survey studies have identified the aquifer and aquifer recharge areas of the Potomac-Raritan-Magothy aquifer system. The exposed outcrop area is the area where the aquifer receives water, which then migrates to the lower levels in the aquifer. With confined aquifers such as the Potomac-Raritan-Magothy system, the outcrop area serves as the primary aquifer recharge area.

As indicated on the "Recharge Area For Potamic/Magothy/Raritan Aquifer" map, the Township of East Windsor serves as part of the recharge area for the Potomac-Raritan-Magothy system.

Protection of the water quality of this aquifer is of prime importance to maintain adequate potable water supplies in the region. the maintenance of adequate water supply is accomplished through careful site development techniques in the aquifer recharge area, including open space preservation.

## WILDLIFE

East Windsor Township's farmlands, pastures, woodlands and swamps provide habitat for a wide diversity of wildlife.[7] Eastern chipmunks, gray squirrels and white-tailed deer are the most commonly seen mammals. Waterfowl, such as wood ducks, are located along the rivers and streams throughout the Township. Woodpeckers, blue jays, northern cardinals, tufted titmice and chickadees are some of the birds prevalent in the Township throughout the year.

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[7] Laurie Pettigrew, New Jersey Wildlife Viewing Guide, Helena, Falcon Publishing, 1998.

# TOWNSHIP OF EAST WINDSOR

## MERCER COUNTY ~ NEW JERSEY

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APPROXIMATE SCALE IN FEET

N

DETAIL #1

DETAIL #2

DETAIL #3

BOROUGH OF HIGHTSTOWN

TOWNSHIP OF CRANBURY

TOWNSHIP OF PLAINSBORO

TOWNSHIP OF WEST WINDSOR

TOWNSHIP OF WASHINGTON

TOWNSHIP OF MILLSTONE

MIDDLESEX COUNTY

MERCER COUNTY

MONMOUTH COUNTY

# RECHARGE AREA FOR POTOMAC/MAGOTHY/ RARITAN AQUIFER

POTOMAC/MAGOTHY/
RARITAN AQUIFER
RECHARGE AREA

**SOURCE:**
**N. J. Department of Environmental Protection, N. J. Geological Survey, USEPA Designated Sole-Source Aquifer Project Review Areas in New Jersey, 1999.**

**PREPARED BY: Coppola & Coppola Associates ~ Princeton Junction ~ New Jersey**

PAPER STREET ======

BASE MAP UPDATED FEBRUARY 2000 BY COPPOLA & COPPOLA ASSOCIATES
FROM TAX MAP INFORMATION
AND ORIGINAL BASE MAP PROVIDED BY TOWNSHIP ENGINEERING DIVISION

During spring and fall, the woodland areas become home to a variety of migrant birds. During the winter season, mink and river otters can be found along the banks of the streams in the Township.

The farm fields in East Windsor Township provide prime habitat for grassland birds (e.g., upland sandpipers, vesper sparrows, grasshopper sparrows & bobolinks) and for mammals (e.g., white-tailed deer and eastern cottontail rabbits. These same fields also provide prime hunting grounds for red-tailed hawks and American kestrels.

Ground-nesting killdeer feed in open areas within East Windsor Township, while swallows feed on the insects overhead. During the fall, thousands of Canada geese feed on cut grain, and sandpipers, dowitchers and yellowlegs search puddles for food after rain. The edges of the watercourses throughout the Township provide a particularly attractive environment for northern mockingbirds, woodchucks, bobwhite quail and ring-necked pheasants.

The Natural Heritage Program, which is part of the Division of Parks and Forestry in the New Jersey Department of Environmental Protection, contains an inventory of rare and endangered species for Mercer County, which is included in Appendix II to this document. The rare and endangered species found throughout Mercer County, including East Windsor Township, include the wood turtle (threatened animal species) and the Virginia bunchflower (endangered plant species). The inventory is based upon the research and observations of numerous individuals and organizations, and new locations for animal and plant species are continually added to the database. Therefore, while the inventory summarizes the existing data known to date, it is not intended to substitute for onsite surveys required for environmental assessments.

# APPENDIX I

## IDENTIFICATION OF FRESHWATER WETLANDS CHART

# IDENTIFICATION OF FRESHWATER WETLANDS

## TOWNSHIP OF EAST WINDSOR
## MERCER COUNTY, NEW JERSEY

01 UPLAND: Non-wetlands.

03 PFO1A - PALUSTRINE: Forested, broad leaved deciduous, temporary.

06 R2OW - RIVERINE: Lower perennial; open water (unknown bottom), intermittently flooded/inundated.

07 POWH - PALUSTRINE: Open water (unknown bottom), permanent.

09 PFO1C - PALUSTRINE: Forested; broad leaved deciduous, seasonal.

10 PEM1C - PALUSTRINE: Emergent; persistent, seasonal.
PSS1C - PALUSTRINE: Scrub/shrub; broad leaved deciduous, seasonal.

11 POWHh - PALUSTRINE: Open water (unknown bottom), permanent, diked/impounded.

16 PFO1B - PALUSTRINE: Forested; broad leaved deciduous, saturated.

19 PEM1B - PALUSTRINE: Emergent; persistent, saturated.

20 PSS1B - PALUSTRINE: Scrub/shrub; broad leaved deciduous, saturated.

24 MODAg: Agricultural lands, turf farms (both grown crops and turf cultivation).

26 PEM1B - PALUSTRINE: Emergent; persistent, saturated.
PSS1B - PALUSTRINE: Scrub/shrub; broad leaved deciduous, saturated.

27 PSS1C - PALUSTRINE: Scrub/shrub; broad leaved deciduous, seasonal.

32 PSS1C - PALUSTRINE: Scrub/shrub; broad leaved deciduous, seasonal.
PFO1C - PALUSTRINE: Forested; broad leaved deciduous, seasonal.

39 PFO1E - PALUSTRINE: Forested; broad leaved deciduous, seasonal saturated.

43 POWHx - PALUSTRINE: Open water; permanent, excavated.

44 MODL: Lawns, stormwater management areas, areas not normally inundated.

48 MODD: Disturbed areas (surface/vegetation disturbed. Nature of activity not readily apparent).

51 PSS1B - PALUSTRINE: Scrub/shrub; broad leaved deciduous, saturated.
PEM1B - PALUSTRINE: Emergent; persistent, saturated.

53 PFO1C - PALUSTRINE: Forested; broad leaved deciduous, seasonal.
PEM1C - PALUSTRINE: Emergent; persistent, seasonal.

55 PSS1E - PALUSTRINE: Scrub/shrub; broad leaved deciduous, seasonal saturated.
PEM1E - PALUSTRINE: Emergent; persistent, seasonal saturated.

56 PFO1B - PALUSTRINE: Forested; broad leaved deciduous, seasonal saturated.
PEM1B - PALUSTRINE: Emergent; persistent, seasonal saturated.

60 PFO1C - PALUSTRINE: Forested; broad leaved deciduous, saturated.
PSS1B - PALUSTRINE: Scrub/shrub; broad leaved deciduous, saturated.

83 PFO8C - PALUSTRINE: Forested; white cedar, seasonal.

**Source:** State of New Jersey Department of Environmental Protection Freshwater Wetlands Maps, from March 1986 Infrared Photographs for Allentown, Roosevelt, Hightstown & Jamesburg quadrangles.

# APPENDIX II

## RARE SPECIES AND NATURAL COMMUNITIES TABLE

# RARE SPECIES AND NATURAL COMMUNITIES TABLE
## Mercer County, New Jersey

| Name | Common Name | Federal Status | State Status | GRANK | SRANK |
|---|---|---|---|---|---|
| VERTEBRATES | | | | | |
| Accipiter cooperii | Cooper's hawk | | T/T | G5 | S3B,S4N |
| Acipenser brevorpstrum | Shortnose sturgeion | LE | E | G3 | S3 |
| Ammodramus henslowii | Henslow's sparrow | | E | G4 | S1B |
| Ammodramus savannarum | Grasshopper sparrow | | T/S | G5 | S2B |
| Bartramia longicauda | Upland sandpiper | | E | G5 | S1B |
| **Clemmys insculpta** | **Wood turtle** | | **T** | **G4** | **S3** |
| Clemmys muhlenbertii | Bog turtle | LT | E | G3 | S2 |
| Dolichonyx oryzivorus | Bobolink | | T/T | G5 | S2B |
| Eurycea longicauda | Longtail salamander | | T | G5T5 | S2 |
| Falco aparverius | American kestrel | | INC/S | G5 | S3B |
| Graptemys geographica | Common map turtle | | U | G5 | S3 |
| Lynx rufus | Bobcat | | E | G5 | S3 |
| Passerculus sandwichensis | Savannah sparrow | | T/T | G5 | S2B,S4N |
| Petrochelidon pyrrhonota | Cliff swallow | | S/S | G5 | S2B |
| Podilymbus podiceps | Pied-billed grebe | | E/S | G5 | S1B,S3N |
| Pooecetes gramineus | Vesper swallow | | E | G5 | S1B,S2N |
| Strix varia | Barred owl | | T/T | G5 | S3B |
| Sturnella magna | Eastern meadowlark | | D/S | G5 | S3B,S4N |
| INVERTEBRATES | | | | | |
| Alasmidonta heterodon | Dwarf wedgemussel | LE | E | G1G2 | S1 |
| Alasmidonta undulata | Triangle floater | | | G4 | S3 |
| Alasmidonta varicosa | Brook floater | | | G3 | S1 |
| Cicindela marginipennis | Cobblestone tiger beetle | | | G2G3 | S1S2 |
| Faronta rubripennis | Pink streak | | | G3G4 | S3 |
| Gomphus abbreviatus | Spine-crowned clubtail | | | G3G4 | S2S3 |
| Lampsilis cariosa | Yellow lampmussel | | | G3G4 | S1 |
| Lampsislis radiata | Eastern lampmussel | | | G5 | S3 |
| Lasmigona subviridis | Green floater | | | G3 | SH |
| Leptodea ochracea | Tidewater mucket | | | G4 | S1 |
| Libumia nasuta | Eastern pondmussel | | | G4G5 | S1 |
| Nicrophorus americanus | American burying beetle | LE | E | G1 | SH |
| VASCULAR PLANTS | | | | | |
| Agastache nepetoides | Yellow giant hyssop | | | G5 | S2 |
| Agastache scrophulariifolia | Purple giant hyssop | | | G4 | S2 |
| Agrimonia microcarpa | Small fruited groovebur | | | G5 | S2 |
| Alopecurus aequalis | Marsh meadow foxtail | | | G5 | S2 |
| Aplectrum hyemale | Puttyroot | | E | G5 | S1 |
| Ascelpias rubra | Red milkweed | | | G4G5 | S2 |
| Asclepias variegata | White milkweed | | | G5 | S2 |
| Aster radula | Low rough aster | | E | G5 | S1 |
| Bidens bidentoides | Bur-marigold | | E | G3 | S2 |
| Cacalia atriplicifolia | Pale indian plantain | | E | G4G5 | S1 |
| Cacalia suaveolens | Sweet-scented indian plaintain | | | G3G4 | SX.1 |
| Calamagrostis pickeringii | Pickering's reedgrass | | E | G4 | S1 |
| Callitriche verna | Spring water starwort | | | G5 | S2 |
| Calystegia spithamaea | Erect bindweed | | E | G4G5 | S1 |
| Carex barrattii | Barratt's sedge | | | G3G4 | S4 |
| Carex frankii | Frank's sedge | | | G5 | S3 |

# RARE SPECIES AND NATURAL COMMUNITIES TABLE
## Mercer County, New Jersey

| Name | Common Name | Federal Status | State Status | GRANK | SRANK |
|---|---|---|---|---|---|
| Carex haydenii | Cloud sedge | | E | G5 | S1 |
| Carex hitchcockiana | Hitchcock's sedge | | | G5 | S2 |
| Carex jamesii | Nebraska sedge | | E | G5 | S1 |
| Carex willdenowii | Willdenow's sedge | | | G5 | S2 |
| Castilleja coccinea | Scarlet indian paintbrush | | | G5 | S2 |
| Cercis canadensis | Redbud | | E | G5 | S1 |
| Crataegus calpodendron | Pear hawthorn | | E | G5 | S1 |
| Crataegus chrysocarpa | Fineberry hawthorn | | | G5 | S1 |
| Cuscuta cephalyanthi | Button-bush dodder | | E | G5 | S1 |
| Cuscuta polygonorum | Smartweed dodder | | | G5 | S2 |
| Cynoglossum virginianum | Wild comfrey | | | G5T5 | S2 |
| Cyperus lancastriensis | Lancaster flatsedge | | | G5 | S1 |
| Cystopteris protrusa | Lowland brittle fern | | | G5 | S2 |
| Dicentra canadensis | Squirrel-corn | | E | G5 | S1 |
| Ellisia nyctelea | Aunt Lucy | | E | G5 | S1 |
| Eragrostis frankii | Frank's lovegrass | | | G5 | S2 |
| Eriocaulon parkeri | Parker's pipewort | | | G3 | S2 |
| Eriophorum gracile | Slender cottongrass | | E | G5 | SH |
| Euphorbia marilandica | Maryland spurge | | E | GUQ | SH.1 |
| Geum vernum | Spring avens | | | G5 | S2 |
| Holonias bullata | Swamp pink | LT | E | G3 | S3 |
| Heteranthera multiflora | Mud plaintain | | | G4 | S2 |
| Hybanthus concolor | Green violet | | E | G5 | S1 |
| Jeffersonia diphylla | Twinleaf | | E | G5 | S1 |
| Limosella subulata | Mudweed | | E | G4 | S1 |
| **Melanthium virginicum** | **Virginia bunchflower** | | **E** | **G5** | **S1** |
| Mimulus alatus | Winged monkey flower | | | G5 | S3 |
| Nuphar microphyllum | Small yellow pondlily | | E | G4G5 | SH |
| Penstemon laevigatus | Smooth beard tongue | | E | G5 | S1 |
| Phlox pilosa | Downy phlox | | E | G5 | SH |
| Platanthera peramoena | Purple fringeless orchid | | E | G5 | S1 |
| Potamogeton vaginatus | Sheathed pondweed | | | G5 | SH |
| Pycnanthemum clinopodioides | Basil mountain mint | | E | G2 | S1 |
| Ranunculus ambigens | Water-plaintain spearwort | | | G4 | S2 |
| Ranunculus pusillus | Low spearwort | | | G5 | S2 |
| Ranunculus reptans | Creeping buttercup | | E | G5 | SH |
| Rhynchospora globularis | Grass-like beaked rush | | E | G5 | S1 |
| Rhynchospora pallida | Pale beak rush | | | G3 | S3 |
| Scirpus longii | Long's bulrush | | E | G2 | S2 |
| Scutellaria nervosa | Veined skullcap | | | G5 | S2 |
| Stachys palustris | Marsh hedge-nettle | | E | G5 | SH |
| Tradescantia ohiensis | Ohio spiderwort | | | G5 | S2 |
| Verbena simplex | Narrow-leaved vervain | | E | G5 | S1 |
| Zigadenus leimanthoides | Oceanorus | | E | G4Q | S1 |

**KEY TO TABLE:**
LE – Formally listed as endangered.
LT – Formally listed as threatened.
D – Declining species
E – Endangered species
T – Threatened species
S – Stable species
INC – Increasing species
U – Undetermined species.

**GRANK (Global Element Rank):**

G1 – Critically impaired globally because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.

G2 – Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of other factors making it very vulnerable to extinction throughout its range.

G3 – Either vary rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g. a physiographic region in the East) or because of some other factors making it vulnerable to extinction throughout its range; with the number of occurrences in the range of 21 to 100.

G4 – Apparently secure globally, although it may be quite rare in parts of the range, especially at the periphery.

G5 – Demonstrably secure globally, although it may be quite rare in parts of the range, especially at the periphery.

**SRANK (State Element Rank):**

S1 – Critically imperiled in New Jersey because of extreme rarity (5 or fewer occurrences or very few remaining individuals or areas). Elements so ranked are often restricted to very specialized conditions or habitats and/or restricted to an extremely small geographical area of the state. Also included are elements which were formerly more abundant, but because of habitat destruction or some other critical factor of its biology, they have been demonstrably reduced in abundance. In essence, these are remaining elements for which, even with intensive searching, sizable additional occurrences are unlikely to be discovered.

S2 – Imperiled in New Jersey because of rarity (6 to 20 occurrences). Historically, many of these elements may have been more frequent but are now known from very few extant occurrences, primarily because of habitat destruction. Diligent searching may yield additional occurrences.

S3 – Rare in state with 21 to 100 occurrences (plant species in this category have only 21 to 50 occurrences). Includes elements which are widely distributed in the state but with small populations/acreages or elements with restricted distribution, but locally abundant. Not yet imperiled in state but may soon be if current trends continue. Searching often yields additional occurrences.

S4 – Apparently secure in state, with many occurrences.

S5 – Demonstrably secure instate and essentially ineradicable under present conditions.

SH – Elements of historical occurrence in New Jersey. Despite some searching of historical occurrences and/or potential habitat, no extant occurrences are known. Since not all of the historical occurrences have been field surveyed and unsearched potential habitat remains, historically ranked taxa are considered possibly extant and remain a conservation priority for continued work.