

MULLICA TOWNSHIP ENVIRONMENTAL RESOURCE INVENTORY

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FORWARD

Mullica Township is located in the northeast portion of Atlantic County, in the New Jersey Pinelands. The township has a total of 55 square miles. It is bounded on the north by the Mullica River; on the east by the City of Egg Harbor; on the south by Hamilton Township; and on the west by the town of Hammonton.

Mullica Township is at a crossroad to determine its future. Its open space is both attractive to developers and residents who cherish its rural character. Whether increased development in Mullica is perceived or real it must be acknowledged.

The Mullica Township Environmental Commission with the assistance of the New Jersey Department of Environmental Protection (NJDEP) began its compilation of data in July of 1998. The Mullica Township Committee agreed to match the grant provided by the NJDEP to continue this compilation of environmental data to include historic data throughout the Township.

The information presented within this Environmental and Historic Resource Inventory is intended to

guide decisions concerning the future of Mullica Township.

We want to thank the Mullica Township Committee for their support in the effort to present this data to the people and various boards that control the fate of Mullica Township.

GEOGRAPHY

THE SCIENCE OF GEOGRAPHY DESCRIBES MAN, LAND AND CLIMATE. MULLICA TOWNSHIP, LOCATED ENTIRELY WITHIN THE NEW JERSEY PINELANDS, HAS A FLAT, SANDY TOPOGRAPHY TYPICAL OF ALL AREAS LOCATED ON THE NEW JERSEY COASTAL PLAIN.

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GEOGRAPHY

Location

Situated in south central New Jersey, thirty-eight miles east of Philadelphia and twenty-two miles west of Atlantic City, Mullica Township is easily accessible by major highways to the metropolitan areas of Boston, New York, Philadelphia, Baltimore and Washington.

Mullica is located in the Northeast portion of Atlantic County. The entire township is within the protected area known as the New Jersey Pinelands.



The township is bounded on the north by the Mullica River and Washington Township in Burlington County, on the east by the City of Egg Harbor, on the south by Hamilton Township, and on the west by the town of Hammonton.

Topography

Mullica Township has a total area of 55 square miles. The township is primarily a rural community with a few population centers, some agricultural areas, cranberry and blueberry farms, and vast acres of sparsely settled woodlands and natural wetlands.

Mullica Township lies within the Atlantic Coastal Plain geologic formation, which was formed as a result of marine deposition and erosion over the last 170 to 200 million years. The Coastal Plain is described as one of gently rolling terrain made up of sandy, droughty soils with no rock outcrops, steep slopes or mountain peaks. As part of the coastal plain, Mullica's landscape is primarily flat with small rolling hills in some areas.

Altitudes range from sea level to 110 feet above sea level.

Drainage

The Township of Mullica is drained primarily by the Mullica River and several small streams that drain into the Mullica, which is tidal in its lower reaches. The river is bounded by extensive tidal marsh areas and the northeastern and northwestern thirds of the Township are swampy in nature.

A small area in the southern portion of the township is part of the Egg Harbor River drainage basin.

Climate

Because of its position on the Coastal Plain and its proximity to the ocean, Mullica Township has a humid, temperate climate with a moderate temperature range and mild winters.

Temperatures range from a maximum average of 90°F in summer to a minimum average of 25°F in winter. The growing season averages 192 days; the average date of the first frost occurs about October 13 and the average date of the last frost occurs about April 19.

Rainfall is fairly evenly distributed throughout the year. The average annual precipitation, measured over the last thirty years is 41 inches.

The prevailing wind during the summer is from the southwest; northwest winds prevail during the winter.

Destructive wind velocities rarely occur and are generally restricted to summer thunderstorms, nor'easters and occasional hurricanes of the late summer and early fall. These storms sometimes cause tidal flooding in the Mullica River basin.

Population

The major population centers within the township are Elwood in the southern sector, Sweetwater and

Nesco in the northern sector, and Weekstown in the northeastern sector. Weekstown, Sweetwater, and Pleasant Mills are all located on or near the Mullica River. Elwood is situated along the township's only major transportation artery, State Route 30, or the "Whitehorse Pike."

Population trends have been relatively stable historically. Increases and decreases have reflected the availability of local or neighboring employment opportunities. There is a population bulge due to an influx of migrant workers during the harvest season. Mullica Township had a population of 5896 in 1990. In 1996 the population was estimated at 6154—104 persons per square mile.

Of the 1990 population of 5896, 5020 were white, 532 black, 20 Native American, 48 Asian, and 276 other. The Hispanic population was 757—145 Mexican, 606 Puerto Rican, and 6 Cuban.

The median age in Mullica Township is 32.8 years.

MULLICA TOWNSHIP GEOGRAPHIC LOCATION MAP

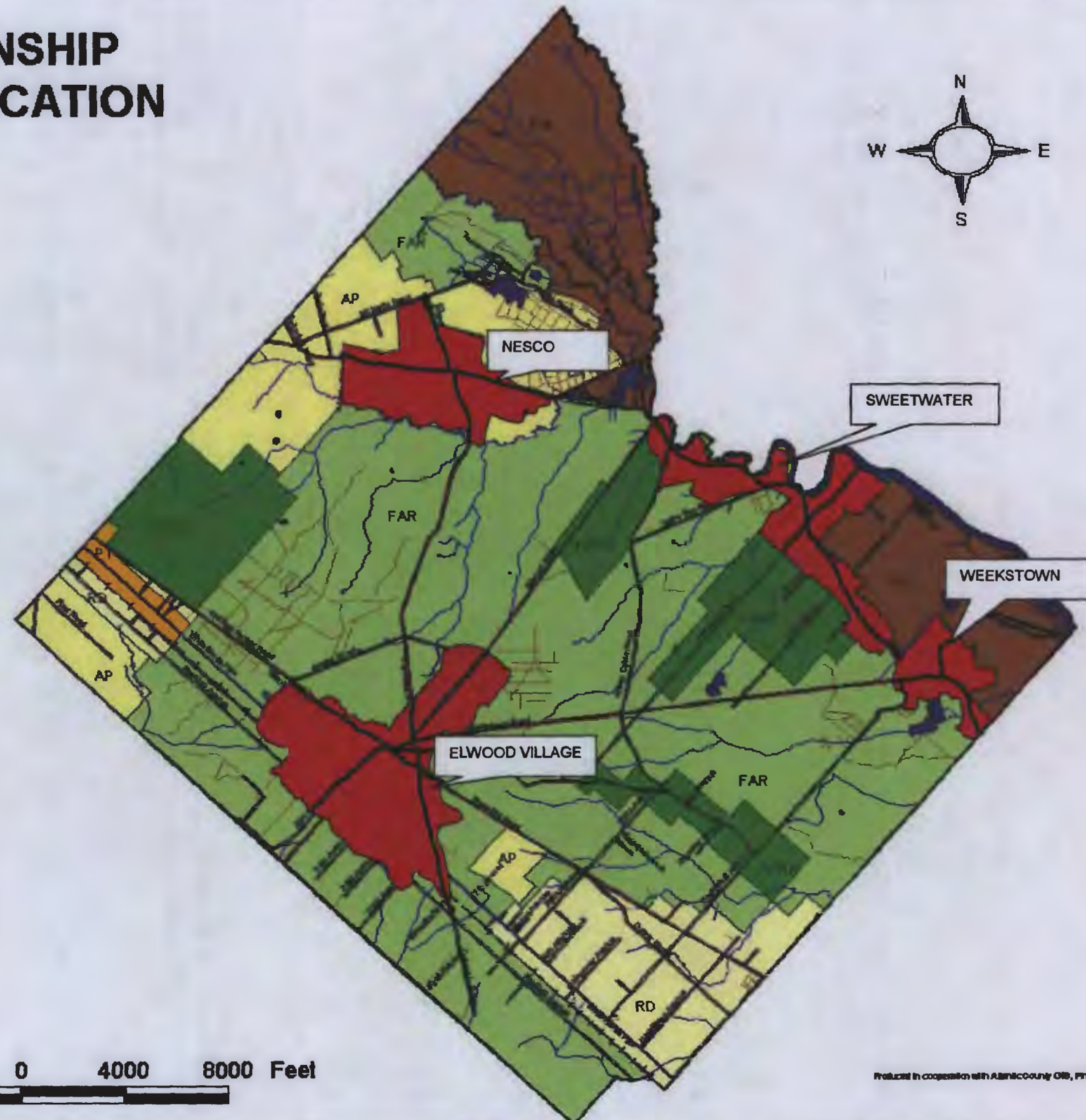
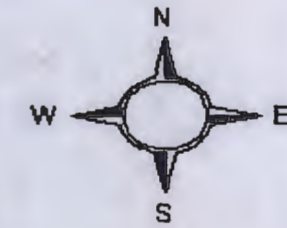
The Mullica Township Geographic Location Map depicts, in the left-hand section, the location of Atlantic County in the state of New Jersey and the placement of Mullica Township in the County. On the right, the boundaries of Mullica Township and its population centers, agricultural areas, forested areas and state owned lands are shown.

MULLICA TOWNSHIP GEOGRAPHIC LOCATION



- Roads**
 - County
 - Municipal
 - Other
 - State
 - Trail
- Lakes
- Streams
- Agricultural area
- Forested areas
- State owned
- Industrial
- Municipal boundary
- Populated Area

4000 0 4000 8000 Feet



Produced in cooperation with Atlantic County O&M, Planning Commission & DEP.

SOILS

SOILS ARE LIVING MATERIALS INVOLVED IN A CONSTANT PROCESS OF DEVELOPMENT.

THERE IS NOTHING MORE BASIC TO OUR ENVIRONMENT THAN THE LAND ITSELF. SOIL TYPES DO MUCH TO SET LIMITS ON APPROPRIATE LAND USE.

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SOILS

Soil Characteristics

Soil characteristics determine native vegetation and wildlife, and affect agricultural and engineering possibilities. The soils of Mullica Township have been tested, categorized and mapped by soil scientists, and this information is available to and vital for land-use planners.

The soils that make up the land are in a dynamic, ongoing formation process. They develop in a series of layers called horizons (see illustration at right). These horizons have specific characteristics. They are:

Permeability: How rapidly water can pass through the soil

Color: Soil samples are compared to a standard color chart

Thickness: The vertical height of the layer or horizon

Structure: The form the soil maintains;
e.g. columns or blocks

Consistence: The feel of the soil; e.g. crumbly, hard, sticky

Texture: The size of the individual grains of a soil.

Grain sizes are:

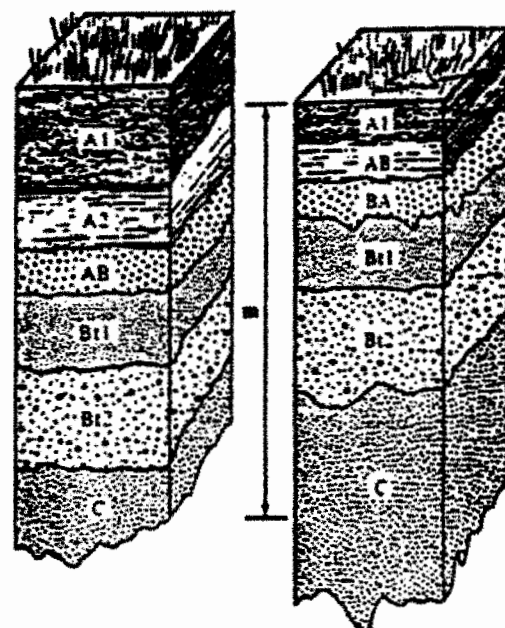
Gravel: 80 mm (approx. 3 inches) to 2 mm

Sand: 2 mm to .05 mm

Silt: .05 mm to .002 mm

Clay: Less than .002 mm

Loam: A mixture of approximately half sand and half clay/silt.



Soil Horizons

A description of the specific horizon characteristics for any given soil is called a soil profile. There are groups of soils that have similar profiles, and these groups are called a **soil series**. Each individual member of a soil series is called a **soil phase**. Soil phases differ in their surface layer, which can have variations in texture, slope, stoniness or some other characteristic that affects the use of soil by man.

The various locations where each soil phase occurs are plotted on the soil map. These areas are called **mapping units**, and are named for the soil phase they represent. The soil phases are given a symbol, which occurs in bold type at the beginning of the soil phase descriptions in the following soil description section. The soil symbols are also listed on the introductory page of the Agricultural Soils Map.

Descriptions of Soils

The soil series represented in Mullica Township are Atsion, Aura, Berryland, Downer, Evesboro, Fort Mott, Hammonton, Klej, Lakehurst, Lakewood, Matawan, Muck, Pocomoke, Sassafra, Tidal Marsh and Woodstown. The series profiles are described below, along with their soil phases and characteristics of each. The soil phases are each introduced by a symbol, called a mapping unit, that shows how each area consisting of that soil phase is labeled or represented on the soil map.

Each series is described in terms of physical features, natural vegetation, agricultural uses, and engineering qualities. Soil phases are described as having all of the characteristics of the soil series they belong to along

with some important ways in which they are unique.

When researching a soil, it is important to read the series description as well as the soil phase description.

Atsion Series

The Atsion series consists of poorly drained, sandy soils that exist as nearly level terrain. They have a prominent, organically stained (dark) subsoil. These soils are on broad flats, in depressional areas, and in narrow drainageways. They occupy low positions on the landscape.

In a representative profile in a wooded area the surface layer is

black sand 5 inches thick. The subsurface layer is light-gray sand 12 inches thick. The subsoil is 20 inches thick. The upper 7 inches is loose, dark-brown sand that is weakly cemented. The lower 13 inches is grayish- brown sand. The substratum between depths of 37 and 60 inches is grayish-brown sand.

Atsion soils are quite permeable, and drain quickly. When the water table is low, and in extended dry periods, the water table can drop as much as five feet below the surface, the availability of water in the soil is also very low. However, soils are saturated for six to eight months of the year during normal rainfall.

Where these soils are adjacent to larger streams, they are subject to flooding and since they are nearly level and in low positions they receive runoff from higher slopes. This condition imposes severe limitations for many uses.

Natural vegetation consists mainly of pitch pine, blackgum, a few red maples and a dense understory of highbush blueberry, sheep laurel, sweet pepperbush, gallberry, and greenbriar.

For agricultural purposes, these soils have low natural fertility and added fertilizers leach readily. The soils are extremely acid in the surface layer. They are best suited for blueberry

and cranberry production and large areas have been cleared for that purpose. These soils are suited to limited vegetable production.

Because of the seasonally high water table, when the water can be at a depth of 0 to 12 inches below the ground surface, Atsion soils have severe limitations for building construction, with or without a basement. The high water table also poses severe limitations for septic fields, sanitary landfills, roads, landscaping, and recreational uses such as trails and parks or campgrounds.

Atsion Phases:

Ac. Atsion sand. This phase of the Atsion soil series exists as nearly level terrain to depressional areas. Most areas are large and have irregular shapes, but some areas along streams are long and narrow.

Wetness is the main limitation to the use of this soil. Most cleared areas are used for growing blueberries or cranberries. The soil has good sites for ground-water ponds, and it is well suited to this use.

Aura Series

The Aura series consists of well drained, loamy soils that exist on nearly level or gently sloping terrain.

These soils are on the highest hilltops and divides in the landscape. They are underlain by thick, cross-bedded sand or gravel deposits. Permeability is slow or moderate, but the soils pack readily when farmed intensively. They have a moderate availability of water and are easily worked.

In a representative profile in a wooded area the surface layer is dark grayish-brown sandy loam 1 inch thick. The subsurface layer is pale-brown and yellowish-brown sandy loam 11 inches thick. The subsoil is 36 inches thick. The upper 13 inches of it is friable, strong-brown, gravelly sandy clay loam. The lower 23 inches is firm, yellowish-red gravelly sandy clay loam. The substratum is friable, yellowish-red loamy sand to a depth of 56 inches and loose, strong-brown gravelly sand to a depth of 72 inches.

Most areas are wooded. Natural vegetation consists of black, scarlet, and chestnut oaks, a few pines, and an understory of laurel, sassafras, and lowbush blueberry.

Aura soils have medium natural fertility and moderate content of organic matter. They are extremely acid in the surface layer. Some areas have been cleared and farmed. Irrigation is needed for high-value crops.

Aura soils are a good source of sand and gravel, and many pits in the area represent these soils. There are few limitations for use; there is a moderate limitation for septic and deep excavation is necessary to reach permeable material.

Aura Phases:

AmB Aura loamy sand. 0 to 5 percent slopes. This soil phase has nearly level or gentle, slightly convex slopes. Most areas are wooded. Some have been cleared and are used for growing fruits and vegetables. The subsoil is not firm and the plant roots must go deep, which is a limitation for crops. Irrigation is necessary for high-value crops.

ArB. Aura sandy loam, 2 to 5 percent slopes. This soil phase is gently sloping and is on convex side slopes and broad ridgetops. Areas of Aura soils that have a gravelly surface layer are indicated on the map by gravel symbols. Areas that contain ironstone are indicated on the map by stone symbols. This soil is well suited to growing fruits and vegetables. It has a moderate hazard of erosion. Runoff is medium in areas of intense cultivation and where the soils are compacted. Some cultivated areas have gullies in places. Crop production is limited by the moderately deep

rooting zone. Cover crops are used to increase the content of organic matter and available water capacity and reduce compaction. Erosion control practices are needed in cultivated areas. Irrigation is necessary for high-value crops.

Berryland Series

The Berryland Series consists of sandy soils that have an organically stained subsoil. They exist as nearly level, very poorly drained land. These soils are in wide depressional areas and on broad lowland flats. They occupy low positions of the landscape.

In a representative profile in a wooded area the surface layer is black sand 10 inches thick. The subsurface layer is pinkish-gray sand 5 inches thick. The subsoil is 17 inches thick. The upper 7 inches is very dark grayish-brown loamy sand, and the lower 10 inches is light brownish-gray sand. The substratum between depths of 32 and 64 inches is light brownish-gray sand.

Natural vegetation consists of pitch pine, some scattered Atlantic white cedar, blackgum, red maple and sweetgum, and a dense understory of holly, sweet pepperbush, highbush blueberry and gallberry.

Available water capacity in Berryland soils varies. The soils are saturated for seven to nine months of the year when rainfall is normal. The seasonal high water table comes right to the surface of this soil and the water ponds in some areas. The high water table provides additional water for plants; the water table starts to rise in September, reaches its peak in November, and generally starts to drop late in May. It only drops to a depth of about two feet by the end of July or August. However, permeability is moderately rapid. Where the soils have been drained, they have low available water capacity. These soils have slight hazards of water erosion and soil blowing in cleared areas.

Saturated Berryland soils have low strength. Where the soils are adjacent to larger streams, they are subject to frequent flooding. Since the soils are nearly level and are in low positions, they receive runoff from the slopes above.

These soils have low natural fertility and high content of organic matter. They are extremely acid in the surface layer and very strongly acid below. Large areas have been cleared and planted for blueberry and cranberry production. Land smoothing is necessary to prevent ponding and to prepare the fields for tillage and

harvesters. Artificial drainage is established before planting. Use of ditches and various types of irrigation control the water level.

The high water table imposes severe limitations for many community development uses--building construction, septic, sanitary landfills, roads, campsites, trails, and other recreational uses.

Berryland Phases:

Bp. Berryland sand. This soil phase has all the characteristics of the Berryland Series. It is nearly level and is found in large, irregularly shaped areas. Some areas along streams are long and narrow. Most areas are wooded. Cleared and drained areas are used for growing blueberries or cranberries. Current management practices for growing blueberries or cranberries include drainage, controlling the water table, and land smoothing. Flooding is needed for growing cranberries. Irrigation is necessary during extended dry periods. This soil is well suited to ground water ponds.

BS. Berryland sand, flooded. This nearly level soil has all the characteristics of the Berryland Series, but the firm, stained subsoil is not as developed. The surface layer is black, dark brown or very dark gray.

In places it is mucky, generally to a depth of less than sixteen inches. The underlying sand has a considerable content of rounded quartzose gravel. This soil is subject to frequent flooding, because it is adjacent to the meandering perennial streams and rivers. Stream channels are shallow in most places and floodwaters spread readily to this soil where they deposit much debris and additional soil particles. Most areas of this soil are subject to annual flooding.

Nearly all areas are wooded. Native vegetation is quite variable. Nearly pure stands of Atlantic white cedar grow where the surface layer is mucky. Where the surface layer is sandy, the vegetation includes pitch pine, blackgum, sweetgum, and a dense understory of holly, highbush blueberry, greenbrier, gallberry, and sweet pepperbush. This soil is suited to dug ponds, but there is a hazard of overflow. It has a constantly high water table that is controlled by the adjacent streams. The water table is at the surface in winter and drops only about one foot in summer, except during periods of extreme drought.

Downer Series

The Downer series exists as nearly level to gently sloping terrain made up of well-drained soils and found in high positions on the landscape.

In a representative profile in a wooded area the surface layer is dark grayish-brown loamy sand 7 inches thick. The subsurface layer is yellowish-brown loamy sand 10 inches thick. The subsoil is yellowish-brown sandy loam 16 inches thick. Between depths of 33 and 60 inches the substratum is strong-brown loamy sand and yellowish-brown sand.

The native vegetation consists of oaks, hickories, and scattered pines; the understory is blueberry and mountain laurel.

The fertility of these soils is naturally low or medium and they have a low organic matter content. Most areas are wooded, but some are farmed. Unless limed, these soils are very acid and fertilizer and lime leach out rapidly. High value crops need irrigation. Downer soils are easily worked, however, and well suited to almost all vegetables grown in the township.

Downer soils have few limitations for most community uses. They do have severe limitations for a sanitary landfill due to the low amount of filter material and rapid permeability in the substratum.

Downer Phases:

DoA. Downer loamy sand, 0 to 3 percent slope. The water capacity

of these soils is moderate and the natural fertility low; the soils are subject to blowing, but cover crops and windbreaks can alleviate this. Soils are suited to early vegetables, fruit, and specialty crops.

DsA. Downer sandy loam, 0 to 2 percent slopes. This nearly level soil is characteristic of the Downer series, but the surface layer is sandy loam. This soil is well suited for growing vegetables and fruit common to the area; however, it has a slight hazard of erosion. Cover crops help to maintain the content of organic matter.

Evesboro Series

Evesboro soils are deep, loose, excessively drained sandy soils in high positions on the landscape; they exist as nearly level to gently sloping terrain. Organic matter content and natural fertility are low and they revert to woodland if left idle. These soils have rapid permeability and their available water capacity is low.

In a representative profile in a wooded area the surface layer is loose, grayish-brown sand 3 inches thick. The subsurface layer is loose, brownish-yellow sand 23 inches thick. The substratum, between depths of 36 and 60 inches, is loose, yellow sand.

The natural vegetation is oaks, scattered pitch, Virginia, and shortleaf pines; the understory is mostly blueberry and brackenfern.

For agriculture, the soils are strongly acid unless limed and fertilizer leaches easily. Soil blowing is a problem and young plants can be damaged by sand blasting; the soil warms early in spring and gets very hot in summer, and is too droughty for most crops. Many areas that were once cleared for farming have now been abandoned. Evesboro soils are best suited for early vegetables and drought-resistant sweet potatoes, cantaloupes and pumpkins. Irrigation is needed for almost all crops and intervals between irrigations are short.

These soils are suitable for building and septic, but have severe limitations for sanitary landfills due to their rapid permeability. They also have severe limitations for lawns and landscaping due to low natural fertility and low available water capacity and for recreational uses because of the dust hazard.

Evesboro Phases:

EvB. Evesboro sand, 0 to 5 percent slopes. Most cultivated areas of this soil are used for growing sweet potatoes, peaches, grapes, and cantaloupes. Large exposed areas

that have been cleared and farmed need protection from soil blowing. Windbreaks and cover crops can be used to control blowing and prevent severe erosion. Frequent irrigation is necessary for high-value crops. This soil has slight limitations for septic field use and has a hazard of ground-water pollution.

EwB. Evesboro sand, clayey substratum, 0 to 5 percent slopes. This soil has the characteristics of the Evesboro series but it has a sandy clay or clay layer at least twelve inches thick at a depth of forty to sixty inches. Permeability in the substratum is slow. In places where the soil is gently sloping, water moves laterally over the clayey substratum. Limitations for septic are severe, because the substratum is slowly permeable. Droughtiness, low fertility and the hazard of soil blowing are the main limitations to farming and cover crops are used to control blowing and maintain organic matter content.

Fort Mott Series

The Fort Mott series consists of well drained soils in high positions on the landscape, that exist as nearly level to gently sloping terrain. The permeability is moderately rapid in the subsoil and rapid in the surface layer and the substratum. Organic

matter and natural fertility are low and most areas are wooded.

In a representative profile in a wooded area the surface layer is very dark grayish-brown sand 2 inches thick. The subsurface layer is brown sand and brownish-yellow loamy sand 23 inches thick. The subsoil is yellowish-brown sandy loam 16 inches thick. The substratum, between depths of 41 and 60 inches, is brownish-yellow gravelly loamy sand.

The natural vegetation is mixed hardwoods and the understory is mainly blueberry; scattered pines are numerous and produce nearly pure pine stands if left idle.

For agricultural purposes, unless limed, these soils are very strongly acid or extremely acid; soil blowing is severe if the land is bare, and young plants can be damaged by sandblasting. Soils are droughty, and irrigation is needed for almost all crops. The soils warm early and the main crops are lima beans and cantaloupes.

Recreational use of Fort Mott soils is limited because of severe hazard of dust. The soils also have severe limitations for sanitary landfills due to a lack of filter material and a hazard of groundwater pollution because of the rapid permeability of

the subsoil. The soils are not well suited to landscaping or golf courses because of low natural fertility and only moderate available water capacity.

Fort Mott Phases:

FrA. Fort Mott sand, 0 to 5 percent slopes. This soil is nearly level or gently sloping. Most areas are small and have irregular shapes and are wooded. A few areas have been cleared and are used for growing fruits and vegetables. Droughtiness is the main limitation to crop production. Cover crops are used to control blowing and maintain organic matter content.

Hammonton Series

Hammonton soils exist as nearly level terrain. They are moderately well drained and are found in intermediate positions on the landscape, typically on broad terraces several feet above dominantly wet areas. Permeability is moderately rapid and the available water capacity moderate but plants can draw additional water from the water table before it drops in summer. The water table is at 5 feet in summer, so deep-rooted plants can benefit even then.

In a representative profile in a cultivated area the surface layer is

very dark grayish-brown loamy sand 8 inches thick. The subsurface layer is yellowish-brown loamy sand 10 inches thick. The subsoil, 18 inches thick, is yellowish-brown sandy loam that has light-gray and brownish-yellow mottles. The substratum, between depths of 36 and 60 inches, is mottled, brownish-yellow sand. The native vegetation is oaks, hickories, and scattered pines; sour gum is common. The lowest elevations support lowland oaks, such as willow oak and southern red oak. The understory includes sheep laurel and inkberry.

For agriculture, natural fertility is low or medium and the organic-matter content is low. Most areas are wooded but some are farmed. Unless limed, Hammonton soils are very strongly acid or extremely acid and fertilizer and lime leach rapidly. These soils are easily worked, but a seasonally high water table delays tillage at times; drainage is needed for high-value crops. Irrigation is needed for high-value summer crops. Drained soils are most suited to fruits and vegetables.

Hammonton soils must be deeply drained if they are to be used for septic fields or for houses that have basements. They have severe limitations for sanitary landfills and

roads because of the seasonal high water table.

Hammonton phases:

HaA. Hammonton loamy sand, 0 to 3 percent slopes. The surface layer and subsurface layer are more than 20 inches thick in some areas. Most areas are wooded. This soil is suited to growing most fruit and vegetable crops but needs drainage for high-value crops. The use of cover crops and fertilization controls blowing and retains organic matter content.

HcA. Hammonton loamy sand, clayey substratum, 0 to 2 percent slopes. This soil phase has a clayey substratum, generally at a depth of forty to sixty inches, and thus has severe limitations for septic effluent disposal. The clayey layer is at least twelve inches thick. Wetness is the main limitation to the use of this soil for crop production. Subsurface drains are used in places to lower the water table.

HmA. Hammonton sandy loam, 0 to 2 percent slopes. This soil has a surface layer of sandy loam. Most areas are wooded. Some have been cleared and are used for growing crops. Wetness is the main limitation to the use of this soil for crop production. Subsurface drains are

used to lower the water table. When drained this soil is well suited to fruit and vegetable production. Winter cover crops are used to control erosion and to maintain the content of organic matter.

Klej Series

Klej soils are moderately well drained soils that exist as nearly level land located in intermediate positions on the landscape.

Permeability is rapid and available water capacity low but deep-rooted plants can draw water from the seasonally high water table. Natural fertility is low; organic matter content is low.

In a representative profile in a wooded area the surface layer is dark grayish-brown loamy sand 2 inches thick over pale-brown loamy sand 8 inches thick. The subsoil is 26 inches thick. It is yellowish-brown and brownish-yellow loamy sand and has brownish-gray mottles below a depth of 24 inches. Between depths of 36 and 52 inches the substratum is brownish-yellow sand that has light-gray mottles; between a depth of 52 and 60 inches it is light-gray sand that has pale brown mottles.

The native vegetation is mostly oaks, hickories, blackgums, sweetgums and scattered pines; the understory is blueberry, dogwood, and in the lower

spots sheep laurel, bayberry, inkberry and greenbriar.

Most areas are farmed, but some are wooded; the soils are easily worked. Unless limed, these soils are very strongly acid or extremely acid and fertilizers leach readily. Klej soils warm early in spring and are subject to blowing if left bare. Seasonally high water in low areas delays tillage and drainage is needed for high value crops. The main crops are early vegetables, cantaloupes and pumpkins; irrigation is needed.

Drainage is needed for septic and there are severe limitations for sanitary landfills because of the seasonally high water table. There are also severe limitations for landscaping and golf courses due to low fertility and low available water capacity. Recreational uses are severely limited because of the dust hazard.

Klej Phases:

KmA. Klej loamy sand, 0 to 3 percent slopes. This soil is rapidly permeable throughout its profile. Fertility is low and the soil is subject to blowing. Extensively farmed areas of this soil need a winter cover crop or windbreak; drainage is needed for high-value crops. Organic matter content is maintained with the use of

cover crops. If this soil is used for a septic field or for a house that has a basement, deep drainage is necessary.

KnA. Klej loamy sand, clayey substratum, 0 to 3 percent slopes. This soil has a profile similar to the one described as representative of the series, but it has a substratum of clay or sandy clay at a depth of 40 to 60 inches. The clayey layer is slowly permeable. In places of more sloping soil, the water moves sideways over the clay layer. The water table is perched over the clay and the water rises easily during periods of heavy rainfall.

Where large areas are cleared and used for growing crops, this soil has a slight hazard of water erosion and a moderate hazard of soil blowing.

Windbreak hedges and winter cover crops are generally used to control erosion. If this soil is farmed, drainage improvement is necessary, either by subsurface drains or open ditches.

This soil phase has a severe limitation for septic because of the clay substratum.

Lakehurst Series

The Lakehurst Series consists of moderately well drained and somewhat poorly drained sandy soils that have a

bleached subsurface layer. They exist as nearly level terrain. The Lakehurst soils occupy intermediate positions and depressional areas on the landscape. These soils have very low natural fertility and a low content of organic matter. Lakehurst soils are extremely acid in the surface layer and added fertilizers leach readily; permeability is rapid. The soils have a low available water capacity; however, the high water table provides additional water for plants. These soils are subject to soil blowing in cleared areas. Most areas are wooded.

In a representative profile in a wooded area the surface layer is black sand 2 inches thick. The subsurface layer is light-gray sand 9 inches thick. The subsoil is 21 inches thick. The upper 3 inches is organically stained dark reddish-brown loamy sand. The lower 18 inches is mottled, yellowish-brown sand. The substratum, between depths of 32 and 60 inches, is light brownish-gray sand that has yellowish-brown and pale-brown mottles.

Natural vegetation consists of pitch pine, white and black oak, blackgum, and hickory. The understory is lowbush blueberry, sheep laurel, and scattered gallberry.

Because of the very low fertility, low available water capacity, and rapid permeability, these soils are poorly suited to cultivated crops. These soils are also poorly suited to blueberry production because of the low water table in the summer. Land smoothing and the addition of organic material before planting are common where blueberries are to be grown. Where the soils are cleared and drained they warm early in spring and are easily worked. Irrigation is necessary. Grapes are also grown on this soil.

The fluctuating water table is a concern if the soils are used for septic fields or for building sites for houses that have basements. Deep drainage is effective in lowering the water table, because the soil material is coarse and permeability is rapid. Lakehurst soils have severe limitations for sanitary landfills due to the seasonal high water table and the danger of groundwater pollution because of the rapid permeability. There are severe limitations for recreational use because of the dust hazard. These soils are not suitable for landscaping or golf courses because of low available fertility and low available water capacity; they are also subject to soil blowing.

Lakehurst Phases:

LaA. Lakehurst sand, 0 to 3 percent slopes. This soil is subject to blowing in cleared areas. Windbreak hedges and cover crops can be used to control soil blowing and maintain the content of organic matter. This soil is poorly suited to crop production because of the very low fertility, low available water capacity, hazard of soil blowing, and wetness. The loose sand limits the use of this soil for campsites.

Lakewood Series

The Lakewood series consists of excessively drained sandy soils that have a bleached subsurface layer. They exist as nearly level to sloping terrain and occupy high positions of the landscape. Permeability is rapid, and available water capacity is low. Large cleared areas of these soils are subject to blowing.

In a representative profile in a wooded area the surface layer is very dark grayish-brown sand 2 inches thick. The bleached subsurface layer is light brownish-gray sand 10 inches thick. The subsoil is sand 28 inches thick. The upper 4 inches is brown, and the lower 24 inches is yellowish brown. The substratum, between depths of 40 and 60 inches, is brownish-yellow sand that is faintly stratified with discontinuous layers of dark-brown sandy loam.

Natural vegetation consists mainly of pitch pine but also includes chestnut oak, black oak, and white oak.

For agriculture, Lakewood soils are easily worked. However, they have very low natural fertility and low organic matter content and they are extremely acid throughout. Added fertilizers leach readily, and it is very difficult to improve the fertility. Soil temperatures are high in summer and at times, tomatoes and peppers become scorched. Lakewood soils are not generally used for crops. Some areas were once cleared for farming, but most of these have been abandoned. The only remaining large cultivated areas are used for growing grapes. Most areas are wooded and are used for pulpwood production.

The rapid permeability of these soils creates severe limitations for sanitary landfills and slight limitations for septic filter fields due to a hazard of ground water pollution. In areas of more sloping soils, special design of the septic filter field may be necessary. The soils have severe limitations for recreational uses because of poor trafficability and dust hazard.

Lakewood Phases:

LeB. Lakewood sand, 0 to 5 percent slopes. This nearly level or

gently sloping soil is has a profile representative of the Lakewood series. Most areas are on broad uplands or near large streams. Areas of this soil that are cleared and used for farming are subject to soil blowing. Windbreak hedges or cover crops can be used to control soil blowing. Very low fertility, low available water capacity, and the hazard of soil blowing are the main limitations to crop production.

LeC. Lakewood sand, 5 to 10 percent slopes. This soil is along streams and narrow drainageways. It has short, convex slopes. This soil is similar to the one described as representative of the series but it has steeper slopes. Most areas are long and narrow. This soil has a moderate hazard of erosion in cleared areas. The very low fertility and low available water capacity are the main limitations to the use of this soil for crops.

Matawan Series

The Matawan series consists of moderately well drained loamy soils. They generally occupy intermediate positions on the landscape and some areas are slightly depressional. Permeability is moderately slow. These soils have a moderate available water capacity. The water table, however, provides additional water

for plants in spring. Matawan soils have a seasonal high water table perched at a depth of 1 to 3 feet. During periods of normal rainfall, the water table starts to rise about the middle of October, reaches its peak about January, and starts to drop about April. In some areas these soils are ponded for short periods during winter and spring. The soils have a slight to moderate hazard of water erosion in cleared and cultivate areas. Because of the moderately high water table and moderately slow permeability of the subsoil, these soils generally warm later in the spring than most other sandy loams in the county.

In a representative profile in a wooded area the surface layer is dark grayish-brown sandy loam 7 inches thick. The subsurface layer is light yellowish-brown sandy loam 9 inches thick. The subsoil is light yellowish-brown or olive-yellow sandy loam and clay loam 26 inches thick. It has yellowish-brown and grayish-brown mottles in the lower part. The substratum, between depths of 42 and 60 inches, is pale-olive, stratified clay loam, sandy clay, and sandy clay loam. It has light-gray mottles.

Natural vegetation consists predominantly of scarlet, white, and black oak; scattered pitch pine; and an

understory of sassafras, holly, mountain laurel, and sheep laurel. For agriculture, some areas have been cleared so that fruits and vegetables can be grown, but most areas are filter fields because of moderately slow permeability and the perched seasonal high water table. The soils have medium natural fertility and moderate content of organic matter. Matawan soils are extremely acid or very strongly acid.

There are moderate limitations for buildings with basements because of the seasonal high water table at 1 to 3 feet and severe limitations for septic because of the moderately slow permeability. There are some limitations for road building due to shrink-swell potential and some limitations for recreational uses such as campsites and trails due to ponding and moderately high water table in spring.

Matawan Phases:

MtA. Matawan sandy loam, 0 to 5 percent slopes. This soil is nearly level or gently sloping; some areas are in depressions. Wetness is the main limitation to the use of this soil. Areas that are cleared and used for crops generally need open-ditch drainage. Land grading, diversions, open ditches, and random tile systems

are used to reduce wetness and drain depressions.

Muck

MU. Muck. This nearly level, very poorly drained soil consists of finely decomposed organic matter ranging in thickness from 16 inches to 4 feet or more. The underlying material in most places is sand or gravelly sand, but in some places this material is finer textured. Muck occupies areas adjacent to streams. It is generally on broad flats under a dense forest of Atlantic white cedar. Permeability is rapid, and available water capacity is high. The high water table is at the surface, and Muck is saturated 10 to 12 months of the year. The table drops only 1 or 2 feet, and then only during extremely droughty summers.

Natural vegetation consists mostly of Atlantic white cedars that have root systems extending into almost liquid muck. The cedars, therefore, are subject to windthrow, and the hazard of this is severe. In many areas where the cedars have been cut, red maple has replaced them. These areas have a dense understory of highbush blueberry, sweet pepperbush, and greenbrier.

Muck is poorly suited to farming. The soil is generally shallow, and it is extremely acid. Muck has a medium natural fertility and a high content of organic matter. It subsides severely upon drying, and it is subject to frequent flooding. Also, it is difficult to drain. Some areas of muck have been cleared and are used to grow cranberries, but most areas are wooded. Damage to vegetation by fire is a hazard during extremely dry periods.

Because of its low bearing capacity and the danger of flooding, Muck has severe limitations for all community uses including building, basements, septic, sanitary landfills, roads and recreational uses.

Pokomoke Series

The Pokomoke series consists of nearly level, very poorly drained, loamy soils in broad, swampy depressions and narrow drainageways. They occupy very low positions on the landscape. Some narrow areas are adjacent to small streams. If the soils are drained, permeability is moderate and available water capacity is only moderate.

The water table, however, provides additional water for plants. The soils have a seasonal high water table at the surface. During periods of normal

rainfall the water table starts to rise in September, reaches its peak early in December, remains at or near the surface until May, and drops to a depth of about two feet in summer. Where these soils are adjacent to small streams, they are subject to occasional flooding by stream overflow and surface ponding occurs in the small depressions. Because of their low positions on the landscape, the soils receive runoff from higher slopes.

In a representative profile in a wooded area the surface layer is black sandy loam 10 inches thick. The subsurface layer is gray sandy loam 8 inches thick. The subsoil is gray sandy loam 10 inches thick. The substratum, to a depth of 60 inches is gray gravelly sand in the upper 12 inches and grayish-brown sand in the lower 20 inches.

Natural vegetation consists mostly of blackgum, sweetgum, red maple, bay magnolia, white oak, pin oak, willow oak, and holly. The dense understory consists mostly of highbush blueberry, sweet pepperbush, gallberry, and greenbrier.

Pocomoke soils are not well suited to agriculture. They have medium natural fertility and high content of organic matter, but, unless limed, Pocomoke soils are extremely acid in

the surface layer and extremely acid or very strongly acid in the subsoil. Because of the high water table, these soils warm late in spring and become wet early in fall. Since they remain wet until late spring, they are not easily worked. Some areas of Pocomoke soils have been cleared so that blueberries or vegetables can be grown, but most areas are wooded. Areas cleared for blueberry production need smoothing to prevent ponding and to prepare the land for tillage equipment and harvesters. The water table is generally lowered by ditch drainage and controlled by structures in the ditches or by various types of irrigation systems. The water level is maintained at a depth of about two feet below the surface during the growing season. These soils have severe limitations for all types of community development, including home construction, roads and recreational uses, and septic systems generally fail seasonally.

Pocomoke Phases:

Po. Pocomoke sandy loam. This soil is in broad, nearly level or depressional areas and in narrow drainageways. Some narrow areas of this soil that are adjacent to small streams are subject to flooding. Drainage is necessary if this soil is used for crops. If the soil is

adequately drained, late vegetables can be grown. It is not suited to such perennial plants as peaches, apples, and grapes. If outlets are available, open ditches or subsurface drains can be used to lower the water table.

This soil is well suited to blueberries if the water table is controlled. It is generally a good site for ground-water ponds. In places where the soil had a thick, clayey substratum, the rate of recharge may be slow.

Sassafras Series

Sassafras soils are well-drained soils that exist as nearly level to gently sloping terrain, in high positions from 10 to 45 feet above sea level.

Permeability is moderate and the available water capacity is high. The water table is at 5 feet, except in some lower areas.

In a representative profile in a cultivated area the plow layer is brown sandy loam 10 inches thick. The subsurface layer is yellowish-brown sandy loam 4 inches thick. The subsoil is 24 inches thick. The upper 4 inches is strong-brown, heavy sandy loam; the middle 12 inches is yellowish-brown sandy clay loam; and the lower 8 inches is brownish-yellow, heavy sandy loam. The substratum, between depths of 38 and 64 inches, is yellowish-brown loamy sand and strong-brown gravelly sand.

Native vegetation consists of oaks, hickories, and scattered pines; abandoned fields seed in with pitch pine and shortleaf pine and the understory is blueberry and mountain laurel.

For agriculture, natural fertility is medium, but response of crops to fertilization is high; the organic matter content is moderate. Most areas are farmed. Unless limed, the soils are strongly acid or extremely acid. These soils are easily worked and suited to nearly all crops grown in the township, especially vegetables and fruit.

Sassafras soils have few limitations for community uses. They do have severe limitations for sanitary landfills because of rapid permeability in the substratum.

Sassafras phases:

SaA. Sassafras sandy loam, 0 to 2 percent slopes. This phase includes some high water areas and some sandy areas. It is well suited to farming; runoff is slow.

Tidal Marsh

In this township, Tidal marsh generally has a mineral surface layer over highly organic materia and complex sequences of mineral and

muck strata underlain by sand. The soil material is brownish. The sand generally is firm and compact and is at a depth of as much as forty feet. It is possible that in places the underlying sand is thin over other organic deposits.

These soils are almost continuously saturated and bearing capacities are low. Tidal flooding occurs twice daily. Normal tides average two to three feet in height, but in coastal storms they are as high as ten to twelve feet. Included with Tidal Marsh in mapping, especially upstream along the Mullica River, are tidal areas encroaching Muck areas. These areas originally supported trees, but the trees were killed by the continuous flooding.

During the past fifty years the mosquito commission has constructed many ditches to speed the drainage of flooded land and thus reduce the number of mosquito breeding pools.

Natural vegetation consists of a variety of grasses that tolerate saltwater. Tidal marshes in Atlantic County were once mowed so that salt hay could be harvested. Salt hay is extensively used as mulch on new grass seedlings and for such crops as strawberries. It was also used for curing cement used for concrete paving.

The soils are extremely valuable wildlife habitat for waterfowl, mammals, and crustaceans. Areas of Tidal Marsh have been diked to hold shallow depths of water seasonally for waterfowl management and muskrat management.

For agriculture, content of organic matter and available water capacity are high in Tidal Marsh soils. The mineral material is slightly acid to alkaline, and the highly organic material is extremely acid to neutral. Upon drying and oxidizing, however, reaction changes to extremely acid, even to pH 2 or less. Thus, the material is so strongly acid that no vegetation can grow in it. Iron and concrete in these soils are subject to severe corrosion.

All Tidal Marsh soils have severe limitations to all community uses due to daily flooding.

Tidal Marsh Phases:

TM. Tidal Marsh, moderately deep. This Tidal Marsh has a firm layer, generally sand, between depths of three and eight feet. Special foundation design is needed for roads and buildings on this soil. Tidal Marsh, moderately deep, has a severe hazard of storm-tide flooding. It is not suited to trees.

Woodstown Series

The Woodstown series consists of moderately well drained, nearly level soils on intermediate positions on the landscape. Permeability is moderate and the available water capacity is high; deep-rooted plants can draw additional water early in the season.

In a representative profile in a cultivated area, the plow layer is dark grayish-brown sandy loam 10 inches thick. The subsoil is 22 inches thick. The upper 14 inches is light olive-brown light sandy clay loam. The lower 8 inches is olive-yellow sandy clay loam that contains grayish-brown mottles. The substratum, between depths of 32 and 42 inches is pale-olive loamy sand. Between depths of 42 and 60 inches it is light brownish-gray sand.

Native vegetation consists mostly of oaks, hickories, blackgums, sweetgums, and scattered pines; the understory is lowbush blueberry, sheep laurel, and inkberry. For agriculture, the natural fertility is medium and the organic matter content moderate. Most areas are farmed; unless limed, these soils are very strongly or extremely acid. Planting is delayed in the spring because of excessive soil moisture and drainage is needed for high value crops. When drained, the soils are

suitable to most crops grown in the township. Irrigation is needed for high-value summer crops.

Woodstown Phases:

WcA. Woodstown sandy loam, 0 to 2 percent slopes. This soil is nearly level to depressional. Some areas are in narrow drainageways. In some areas this soil is underlain below a depth of forty inches by material that is as fine textured as clay loam or sandy clay. If this soil is adequately drained, it is suited to growing fruits and vegetables. Cover crops are generally sufficient to maintain the content of organic matter.

Suitability of Mullica Township Soils for Wildlife Habitat

A familiarity with the suitability of Mullica's soils as habitat for various species of wildlife is helpful in the following ways:

1. Planning the use of parks, refuges, nature-study areas, and other recreational developments for wildlife.
2. Selecting the better soils for creating, improving or maintaining specific kinds of wildlife habitat elements.

3. Determining the relative intensity of management needed for individual habitat elements.

4. Eliminating sites that would be difficult or not feasible to manage for specific kinds of wildlife.

5. Determining areas that are suitable for acquisition for use by wildlife.

Elements considered important are as follows:

1. Grain and seed crops such as corn, sorghum, wheat barley oats, millet, buckwheat, sunflowers, and other plants commonly grown for grain or for seed.

2. Grasses and legumes in the form of domestic perennial grasses and herbaceous legumes that are established by planting and that furnish wildlife cover and food such as bluegrass, fescue, brome, timothy, orchardgrass, reed canarygrass, clover and alfalfa.

3. Wild herbaceous plants in the form of native or introduced perennial grasses and weeds that generally are established naturally such as bluestem, quackgrass, panicgrass, goldenrod, wild carrot, nightshade, pokeweed and dandelion. These provide food and cover to wildlife.

4. Hardwood and coniferous trees including trees, shrubs and woody vines that provide food and cover for wildlife in the form of browse, nuts, fruits, buds, catkins, twigs, seeds or foliage. Some of the native kind are oaks, pines, cherry, maple, American holly, apple, hawthorn, dogwood, sumac, red cedar, Atlantic white-cedar, sassafras, hickory, sweetgum, bayberry, blueberry, huckleberry, blackhaw, vuburnum, grape, and briers. Included in this variety are commercially raised fruiting shrubs such as Autumn olive, Amur honeysuckle, Tatarian honeysuckle, crabapple, multiflora rose, highbush cranberry and silky cornel dogwood.

5. Wetland plants in the form of wild herbaceous, annual and perennial food and cover plants that grow on moist to wet sites, exclusive of submerged or floating aquatic plants. They produce food and cover used mainly by wetland forms of wildlife. They include smartweeds, wild millets, bulrushes, sedges, barnyard grass, duckweed, duckmillet, arrowarum pickerelweed, wetland grasses, wildrice, and cattails.

6. Shallow-water areas that are impoundments or excavations that provide areas of shallow water, generally not exceeding 5 feet in depth, near food and cover for wetland wildlife. Examples of such developments are shallow dugouts,

level ditches, blasted potholes, and devices that keep the water at a depth of 6 to 24 inches in marshes.

There are three kinds of wildlife considered in the township for a soil suitability rating:

1. Open land wildlife such as quail, pheasants, meadowlark, field sparrow, doves, cottontail rabbit, red fox, and woodchuck. These birds and mammals normally make their home in areas of crops, pasture, meadow, and lawns and in areas overgrown with grasses, herbs and shrubs.

2. Woodland wildlife such as ruffed grouse, woodcock, thrushes, vireo,

scarlet tanager, gray and red squirrel, gray fox, white-tailed deer, and raccoon. They obtain food and cover in stands of hardwoods, coniferous trees, shrubs, or a mixture of these plants.

3. Wetland wildlife such as ducks, geese, rails, herons, shore birds, beaver, mink, and muskrat that normally make their home in wet areas, such as ponds, marshes and swamps.

On the following page is a chart of the suitability of Mullica Township Soils for elements of wildlife habitat and kinds of wildlife.

Suitability of Mullica Township Soils for Wildlife Habitat

Soil series and map symbols	Elements of Wildlife Habitat						Kinds of Wildlife		
	Grain and Seed Crops	Grasses and Legumes	Wild Herbaceous Plants	Hard-wood and coniferous trees	Wetland Plants	Shallow Water Areas	Open Land	Wood-Land	Wetland
Atsion: Ac	Poor	Poor	Fair	Fair	Poor	Good	Poor	Fair	Fair
Aura:									
AmB	Poor	Fair	Good	Fair	Poor	Very Poor	Fair	Fair	Very Poor
ArB	Fair	Good	Good	Fair	Poor	Very Poor	Good	Fair	Very Poor
Berryland									
Bp	Very Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Fair
BS	Good	Poor	Poor	Poor	Poor	Good	Poor	Poor	Fair
Downer									
DoA	Poor	Fair	Good	Fair	Poor	Very Poor	Fair	Fair	Very Poor
DsA	Good	Good	Good	Good	Poor	Very Poor	Good	Good	Very Poor
Evesboro									
EvB	Poor	Poor	Fair	Poor	Very Poor	Very Poor	Poor	Poor	Very Poor
EwB	Poor	Poor	Fair	Poor	Very Poor	Very Poor	Poor	Poor	Very Poor
Fort Mott									
FrA	Poor	Fair	Fair	Poor	Poor	Very Poor	Fair	Poor	Very Poor
Hammonton									
HaA	Poor	Fair	Good	Fair	Poor	Poor	Fair	Fair	Poor
HcA	Poor	Fair	Good	Fair	Poor	Poor	Fair	Fair	Poor
HmA	Fair	Good	Good	Fair	Poor	Poor	Good	Fair	Poor
Klej									
KmA	Poor	Fair	Fair	Poor	Poor	Poor	Fair	Poor	Poor
KnA	Poor	Fair	Fair	Poor	Poor	Poor	Fair	Poor	Poor
Lakehurst									
LaA	Poor	Poor	Fair	Poor	Poor	Fair	Poor	Poor	Poor
Lakewood									
LeB	Poor	Poor	Fair	Poor	Very Poor	Very Poor	Poor	Poor	Very Poor
LeC	Poor	Poor	Fair	Poor	Very Poor	Very Poor	Poor	Poor	Very Poor
Mattawan									
MtA	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Muck	Very Poor	Very Poor	Very Poor	Very Poor	Good	Good	Very Poor	Very Poor	Good
Pocomoke									
Po	Very Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Sassafras									
SaA	Good	Good	Good	Good	Poor	Very Poor	Good	Good	Very Poor
Tidal Marsh									
TM	Very Poor	Very Poor	Very Poor	Very Poor	Good	Good	Very Poor	Very Poor	Good
Woodstown									
WcA	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor

Engineering Uses of the Soils

Knowledge of engineering qualities of soils is useful to those who need information about soils used as structural material or as a foundation upon which structures are built.

Among the soil properties that are highly important in engineering are permeability, strength, compaction characteristics, drainage condition, shrink-swell potential, grain size, plasticity, and reaction. Also important are depth to the water table and slope. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse.

Engineering quality information can be helpful to those who:

1. Select potential residential, industrial, commercial and recreational areas.
2. Evaluate alternate routes for roads, highways, pipelines and underground cables.
3. Seek sources of gravel, sand, or clay.

4. Plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for controlling water and conserving soil.

5. Correlate performance of structures already built with properties of the kinds of soil on which they are built to predict performance of structures of the same or similar kinds of soil in other locations.

6. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment

7. Develop preliminary estimates pertinent to construction in a particular area.

Engineering information does not eliminate the need for further investigation at sites selected for engineering work. Inspection of sites is needed because many delineated areas of a given mapping unit may contain small areas of other kinds of soil that have strongly contrasting properties and different suitabilities or limitations for soil engineering.

On the following pages is a graph of the suitability of Mullica Township soils for engineering purposes.

Engineering Suitability of Mullica Township Soils

Soil Series and Map Symbols	Topsoil	Suitability as a source of—	
		Sand and Gravel	Road Fill
Atsion: Ac	Poor: low fertility; low available water capacity; seasonal high water table	Fair for sand: high water table limits accessibility. Unsuitable for gravel	Poor: high water table;
Aura: AmB, ArB	AmB: Fair; moderate gravel content; ArB: Poor; too sandy	Fair for sand below a depth of 4 feet; excess fines. Poor for gravel; excess fines	Fair: more than 30 percent fines
Berryland: Bp, BS	Poor: high water table limits accessibility; too sandy	Fair for sand: excess fines; high water table limits accessibility; unsuitable for gravel; hazard of frequent flooding on BS	Poor: Seasonal high water table limits accessibility
Downer: DoA, DsA	Good for DsA: gravel in places. Poor for DoA: too sandy	Good for sand. Unsuitable for gravel	Good: DoA Needs binder
Evesboro: EvB	Poor: too sandy	Fair for sand: excess fines Unsuitable for gravel	Good: needs binder in places
EwB	Poor: too sandy	Poor for sand; excess fines Unsuitable for gravel	Good to a depth of 40 inches; Poor below a depth of 40 inches; more than 30 percent fines
Fort Mott: FrA	Poor: too sandy	Fair for sand below a depth of 3 ½ feet; excess fines. Unsuitable for gravel.	Fair: more than 30 percent fines.
Hammonton: HaA, , HmA	Good for HmA: moderate content of gravel. Poor for HaA; too sandy.	Fair for sand below a depth of 3 feet; excess fines. Unsuitable for gravel	Fair: more than 30 percent fines
HcA	Poor: too sandy	Unsuitable for sand and gravel	Fair: more than 30 percent fines.
Klej: KmA	Poor: too sandy	Fair for sand; excess fines Unsuitable for gravel.	Good: generally needs binder
KnA	Poor: too sandy	Unsuitable for sand and gravel	Good to a depth of 40 inches; Fair below a depth of 40 inches; more than 30 percent fines

Lakehurst: LaA	Poor: too sandy; subject to soil blowing	Fair for sand: excess fines. Unsuitable for gravel.	Good; needs binder
Lakewood: LeB, LeC	Poor: very low fertility; low available water capacity	Fair for sand: excess fines. Unsuitable for gravel.	Good; needs binder
Mattawan: MtA	Good	Unsuitable for sand and gravel: excess fines	Unsuitable above a depth of 3 feet: organic material. Poor below a depth of 3 feet: high water table hinders excavation
Muck	Poor: upper layer of organic material: high water table hinders excavation	Unsuitable for sand above a depth of three feet, fair or poor below: high water table hinders excavation; excess fines	Unsuitable above a depth of 3 feet: organic material. Poor below a depth of 3 feet: high water table hinders excavation
Pocomoke: Po	Poor: high water table limits accessibility.	Fair for sand below a depth of 2 ½ feet: seasonal high water table. Unsuitable for gravel.	Poor; seasonal high water table limits accessibility
Sassafras: SaA	Good: gravel in places	Fair for sand below a depth of 3 feet: excess fines. Poor for gravel.	Fair; more than 30 percent fines
Tidal Marsh, TM	Unsuitable: difficult to excavate because of high water; subject to flooding twice daily; becomes extremely acid in places when dry.	Unsuitable: subject to daily tidal flooding	Poor; subject to daily tidal flooding
Woodstown, WcA	Good	Fair for sand below a depth of 32 inches: excess fines; moderately high seasonal water table	Fair; more than 30 percent fines

Soil features affecting--				
	Reservoir area	Embankment Material	Excavated Ponds	Drainage
Atsion: Ac	Permeable substratum; seasonal high water table	Rapidly permeable; little cohesion; fair stability	Seasonal high water table; rapid rate of recharge unless underlain by clay	Seasonal high water table; moderately rapidly permeable; ditch banks collapse readily

Aura: AmB, ArB	Moderately rapidly permeable below a depth of 4 feet.	Good stability and compaction; good resistance to piping.	Unsuitable; low water table	Not needed
Berryland, Bp, BS	Seasonal high water table; permeable substratum.	Rapidly permeable; little cohesion; fair stability	High water table; rapid rate of recharge; flooding hazard frequent in BS	Seasonal high water table; moderate or rapid permeability; outlets difficult to establish in places; subject to stream overflow on BS
Downer, DoA, DsA	Rapidly permeable substratum; low water table.	Fair stability; rapid rate of seepage.	Low water table	Not needed; low water table
Evesboro, EvB,	Rapidly permeable	Rapidly permeable; difficult to compact.	Deep to water table	Not needed
EwB	Slowly permeable substratum.	Loose, cohesionless sand to a depth of 40 inches; clayey below a depth of 40 inches	Deep to water table	Not needed
Fort Mott, FrA	Rapidly permeable substratum.	Rapidly permeable surface layer and substratum.	Low water table	Not needed
Hammonton, HaA, HmA	Rapid rate of seepage in summer.	Pervious surface layer and C horizon.	Low water table in summer. Recharge rate low where clay is thick	Moderately or rapidly permeable
HcA	Slowly permeable substratum.	Coarse grained material to a depth of 40 inches; fine grained material below a depth of 40 inches	Low water table in summer	Moderately or moderately rapidly permeable to a depth of 40 inches; slowly permeable below a depth of 40 inches
Klej: KmA	Rapidly permeable in summer.	Fair to poor stability; rapidly permeable.	Low water table in summer	Rapidly permeable; seasonal high water table at a depth of 1 $\frac{1}{2}$ to 4', low water table in summer
KnA	Slowly permeable substratum	Coarse material to a depth of 40 inches; fine material below a depth of 40 inches.	Low water table in summer	Rapidly permeable to a depth of 40 inches; slowly permeable below a depth of 40 inches.

Lakehurst, LaA	Rapidly permeable throughout; moderately high seasonal water table.	Piping hazard; rapidly permeable.	Water table generally below a depth of 5 feet in summer	Rapidly permeable
Lakewood, LeB, LeC	Rapidly permeable; low water table.	Rapidly permeable; difficult to compact; poor resistance to piping.	Low water table	Not needed
Mattawan, MtA	Substratum permits seepage in places.	Fair stability; fair to good compaction.	Small supply of water is perched on subsoil during winter and spring	Moderately slowly permeable in subsoil
Muck	High water table	Highly organic material is unstable	Favorable	High water table; outlets difficult to establish
Pocomoke, Po	High water table; pervious substratum	Good stability and compaction to a depth of 2 ½ feet; rapidly permeable material below a depth of 2 ½ feet; little cohesion; surface layer highly organic.	Rapid rate of recharge	Outlets difficult to establish; moderately permeable in upper 2 ½ feet, rapidly permeable below
Sassafres, SoA	Seepage likely in substratum	Good stability and compaction; rapidly permeable substratum; little cohesion in substratum.	Low water table	Not needed
Tidal Marsh, TM	Subject to daily tidal flooding; hazard of storm tide.	Subject to daily tidal flooding; piping hazard; difficult to compact.	Subject to daily tidal flooding; hazard of storm tide	Subject to daily tidal flooding; becomes extremely acid in places when dry
Woodstown, WcA	Moderately high seasonal water table; substratum permits seepage in places.	Good stability and compaction to a depth of 3 feet; rapidly permeable and cohesionless substratum.	Water table drops to a depth of 5 feet or more in summer.	Moderately permeable above substratum; rapidly permeable in substratum

Soil features affecting--

	Irrigation	Grassed waterways	Shallow Excavations
Atsion: Ac	Seasonal high water table; moderately rapidly permeable; ditch banks collapse readily	Low fertility; low available water capacity where drained.	Seasonal high water table; vertical cuts cave readily
Aura, AmB, ArB	Restricted rooting depth; moderately slowly permeable.	Features favorable	Firm subsoil
Berryland, Bp, BS	Seasonal high water table; rapid rate of infiltration; low available water capacity where drained.	Not needed	Seasonal high water table; vertical cuts cave readily; hazard of stream overflow; constantly high water table in BS
Downer, DoA, DsA	Moderate available water capacity; moderate intake rate.	Medium fertility moderate available water capacity.	Vertical cuts cave readily
Evesboro, EvB	Low available water capacity; rapid intake rate; low fertility.	Low available water capacity; low fertility.	Vertical cuts cave readily
EwB	Low available water capacity; low fertility.	Low available water capacity; low fertility.	Vertical cuts cave readily
Fort Mott, FrA	Rapid intake rate; low available water capacity in upper 25 inches.	Low fertility; low available water capacity in upper 25 inches.	Conditions favorable
Hammonton: HaA, HmA	Moderate available water capacity; moderately high seasonal water table.	Moderate fertility; moderate available water capacity.	Vertical cuts cave readily; moderately high seasonal water table.
HcA	Moderately high seasonal water table; moderate available water capacity.	Moderate available water capacity; moderate fertility.	Vertical cuts cave readily; moderately high seasonal water table
Klej: KmA	Low available water capacity; rapid intake rate; low water table in summer.	Low fertility; low available water capacity; moderately high seasonal water table, low in summer.	Vertical cuts cave readily; seasonal high water table at a depth of 1 ½ to 4 feet in winter, below a depth of 5 feet in summer.
KnA	Moderately high seasonal water table; low available water capacity.	Low available water capacity; low fertility.	Vertical cuts cave readily; moderately high seasonal water table
Lakehurst: LaA	Low available water capacity; very low fertility.	Very low fertility; low available water capacity.	Moderately high seasonal water table; vertical cuts cave readily.

Lakewood: LeB, LeC	Low available water capacity; very low fertility.	Low available water capacity; very low fertility.	Vertical cuts cave readily
Mattawan: MtA	Perching because of moderately slowly permeable subsoil	Favorable	Favorable
Muck, MU	High water table; rapid intake rate; high available water capacity.	Not Needed	High water table; vertical cuts cave; low bearing capacity
Pocomoke: Po	High water table; moderate available water capacity where drained.	High water table	High water table; vertical cuts cave readily
Sassafras: SaA	High available water capacity; moderate intake rate.	Favorable	Favorable
Tidal Marsh: TM	Not needed.	Not needed	Subject to daily tidal flooding; hazard of storm tide
Woodstown: WcA	High available water capacity; moderate intake rate; moderately permeable; moderately high seasonal water table.	Moderately high seasonal water table.	Moderately high seasonal water table

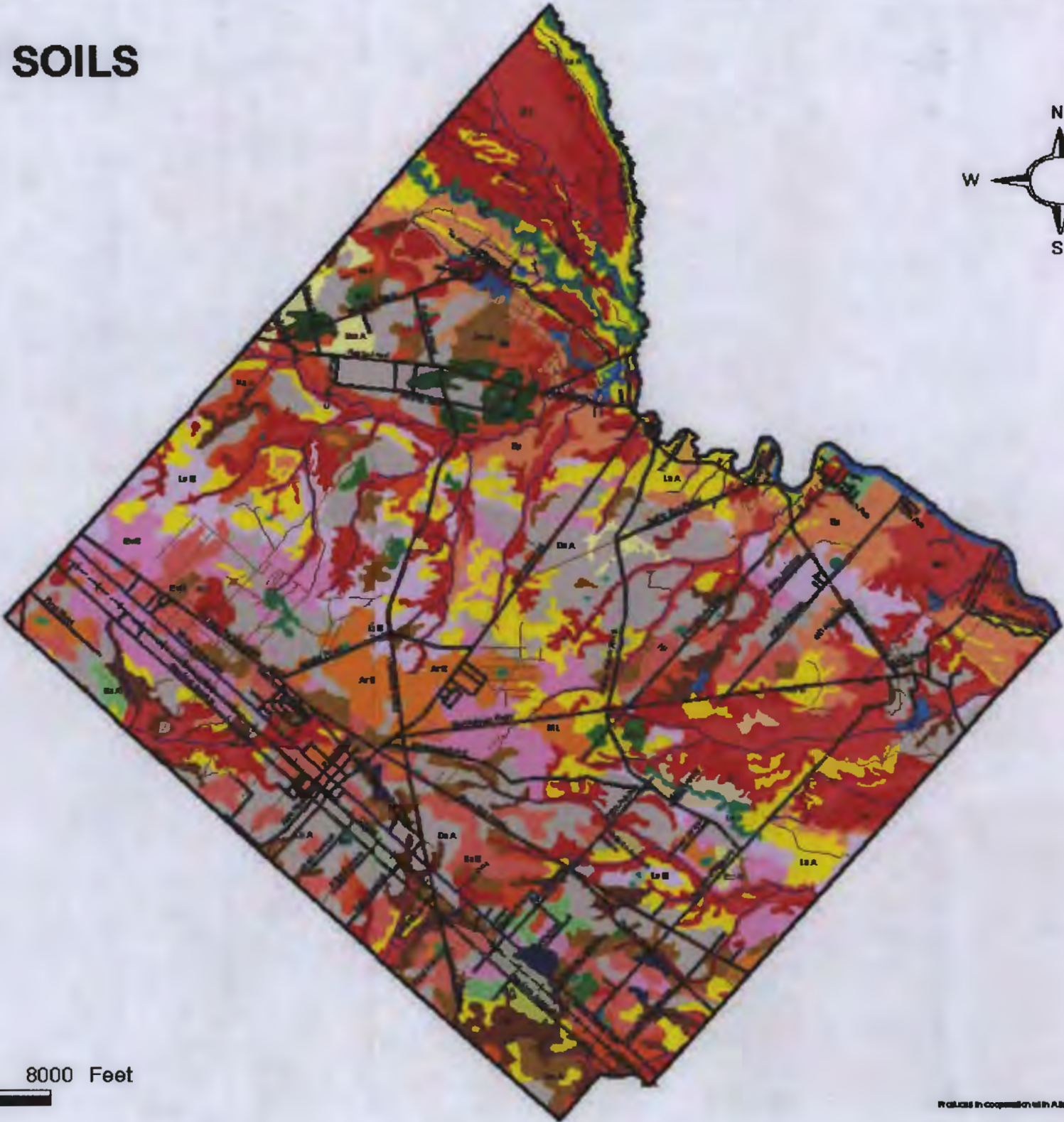
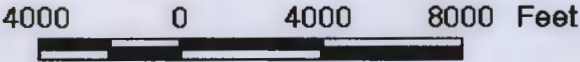
MULLICA TOWNSHIP AGRICULTURAL SOILS MAP

On the following page is a soil map. The individual soil phases found in Mullica Township are each represented by a different color on this map. On the lower left-hand corner of the map there is a key that lists the soil phase symbols and their corresponding colors. Following is a list of the map symbols and their corresponding phase.

<u>Map</u> <u>Symbol</u>	<u>Soil</u> <u>Phase</u>
Ac	Atsion sand
AmB	Aura loamy sand, 0 to 5 percent slopes
ArB	Aura sandy loam, 0 to 2 percent slopes
Bs	Berryland sand, flooded
Bp	Berryland sand
DoA	Downer loamy sand, 0 to 5 percent slopes
DsA	Downer sandy loam, 0 to 2 percent slopes
EvB	Evesboro sand, 0 to 5 percent slopes
EWB	Evesboro sand, clayey substratum, 0 to 5 percent slopes
FM	Fill land over tidal marsh
FrA	Fort Mott sand, 0 to 5 percent slopes
HaA	Hammonton loamy sand, 0 to 3 percent slopes
HcA	Hammonton loamy sand, clayey substratum, 0 to 2 percent slopes
HmA	Hammonton sandy loam, 0 to 2 percent slopes
KmA	Klej loamy sand, 0 to 3 percent slopes
KnA	Klej loamy sand, clayey substratum, 0 to 3 percent slopes
LaA	Lakehurst sand, 0 to 3 percent slopes
LeB	Lakewood sand, 0 to 5 percent slopes
LeC	Lakewood sand, 5 to 10 percent slopes
MtA	Matawan sandy loam, 0 to 5 percent slopes
MU	Muck
Po	Pocomoke sandy loam
SaA	Sassafras sandy loam
TM	Tidal Marsh, moderately deep
WcA	Woodstown sandy loam, 0 to 2 percent slopes

MULLICA TOWNSHIP SOILS

- Roads
- County
 - Municipal
 - Other
 - State
 - Train
 - Streams
 - Municipal Boundary
- SOILS
- Ac
 - AmB
 - ArB
 - BS
 - Bp
 - DoA
 - DsA
 - EvB
 - EwB
 - FM
 - FrA
 - HaA
 - HcA
 - HmA
 - KmA
 - KnA
 - LaA
 - LeB
 - LeC
 - ML
 - MU
 - MtA
 - PIT
 - Po
 - SaA
 - SaB
 - TM
 - W
 - WcA

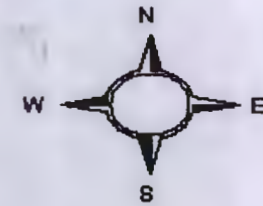


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MULLICA TOWNSHIP SOIL LIMITATIONS FOR SEPTIC MAP

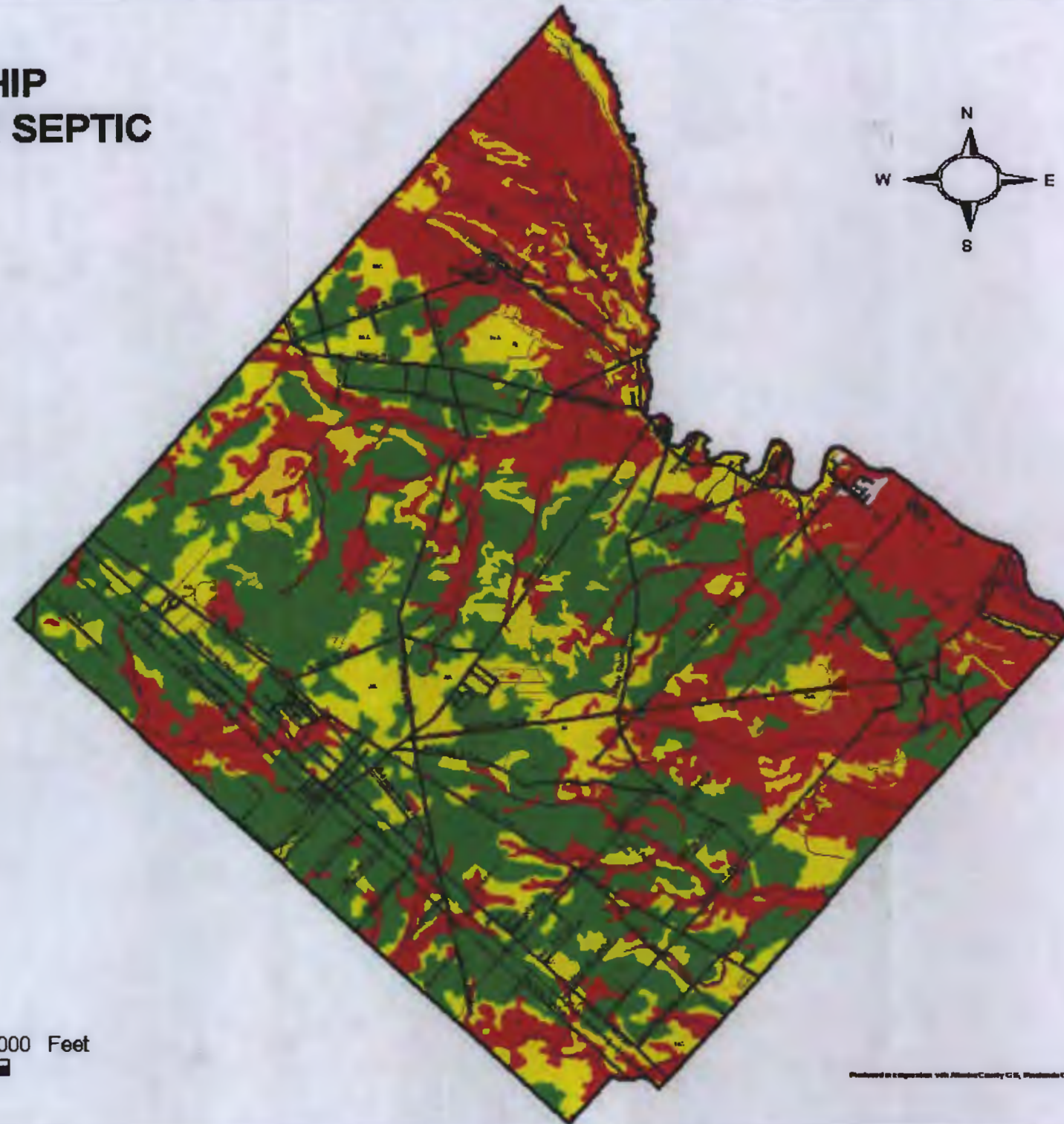
The soils map on the following page shows which areas contain suitable soils for septic systems. In order to be suitable, the soils must be of the correct permeability and the water table must be at a suitable depth (see engineering chart).

MULLICA TOWNSHIP SOIL LIMITATIONS FOR SEPTIC



- Roads
- County
 - Municipal
 - Other
 - State
 - Train
 - Streams
 - Municipal Boundary
- Soil Limitations for Septic
- Moderate
 - Severe
 - Slight

4000 0 4000 8000 Feet



Produced in cooperation with Atlantic County GIS, Pineland Computer & PL&DP.

HYDROLOGY

ONLY ONE PERCENT OF THE
EARTH'S WATER IS
AVAILABLE TO US FOR USE.
THIS CRITICAL SOURCE IS
ALL TOO OFTEN
THREATENED BY HUMAN
ACTIVITIES. SERVED
ENTIRELY BY DOMESTIC
WELLS, MULLICA TOWNSHIP
HAS EXPERIENCED THE
THREAT OF
CONTAMINATION OF ITS
WATER SUPPLY BY
INDUSTRIAL SOURCES.

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HYDROLOGY

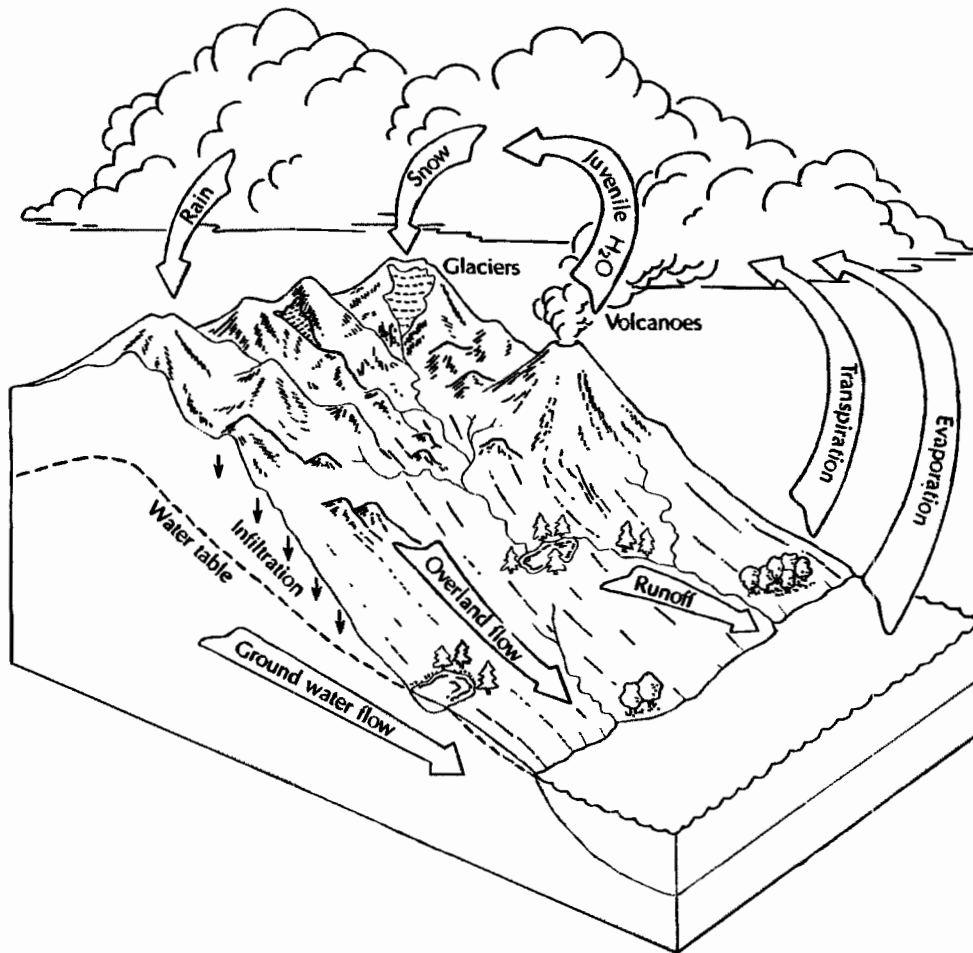
Water, like air, is a substance necessary for life. The one-percent of the earth's water available to us for use as fresh water constantly recirculates in what is known as the hydrologic cycle. This critical supply is often threatened by human activities. Capping groundwater recharge areas with non-porous surfaces and disposing of waste materials in or near them can reduce the quantity and quality of water entering the ground. This results in changes in the flow of rivers, lowers water tables and contaminates the hydrologic system. Protection and/or restoration of these flows requires innovative planning and regulation. It may also require that local government acquire land to protect wells, critical groundwater recharge areas and stream corridors. Surface water is continually vulnerable to pollution through storm water runoff, dumping of effluent, degradation of stream corridor vegetation, contamination of headwaters, and thermal pollution.

The Hydrologic Cycle

The continual recycling of the earth's water supply is called the hydrologic cycle. Moisture evaporates from the oceans and lakes (**evaporation**) and is given off by plants (**transpiration**); it then condenses in the atmosphere and returns to the earth in the form of rain, snow, sleet, or hail (**precipitation**). When

it reaches the earth, the water either runs down impervious slopes (**runoff**) or seeps down into the ground (**percolation**). Once in the ground, it either flows to lakes and rivers (**groundwater flow**) or is stored between sand and gravel particles in rocks and sediments (**aquifers**). See the diagram of the hydrologic cycle on the following page.





The hydrologic cycle.

Protecting the Water Supply

The responsibility for protecting the township's water supply is shared by many different agencies. The municipal government, advised by the Environmental Commission, adopts ordinances controlling everything from land use and solid waste collection to street sweeping and vegetation removal. The planning board approves storm water control systems as a part of site plan approval and adopts the master plan. The zoning officer

ensures compliance with local land use ordinances. The local construction official and engineer ensure that local regulations for on-site storage and discharge of storm water runoff comply with local regulations. The local board of health approves and monitors septic systems. On a state level, the New Jersey Department of Environmental Protection (NJDEP) sets standards for pollutant levels and issues permits for stream encroachment, discharges and water

diversions. The Soil Conservation District approves required soil and erosion control plans and helps farmers to use best management practices.

Surface Water

Surface water in ponds, streams, rivers, lakes, reservoirs and wetlands is replenished by rain and underground sources. It is surface waters that flood and create freshwater wetlands around them

Hydrography

The surface waters of Mullica Township consist of the Mullica River and its tributaries, one Great Egg Harbor River tributary and several small lakes. The Mullica River tributaries in Mullica Township are as follows: Sleeper Branch, Nescochague Creek, Brockaways Branch, Petties Branch, Hammonton Creek, Nortons Branch, Lucas Branch, First Branch, Pine Creek, Landing Creek, and Indian Cabin Creek. The Great Egg Harbor River has one tributary in Mullica Township—Makepeace Stream.

Pinelands streams are described as typically slow moving, brown in color, and clear to somewhat clear. The stream bottoms are sandy and in most areas the streams are overhung by dense vegetation. The water contains

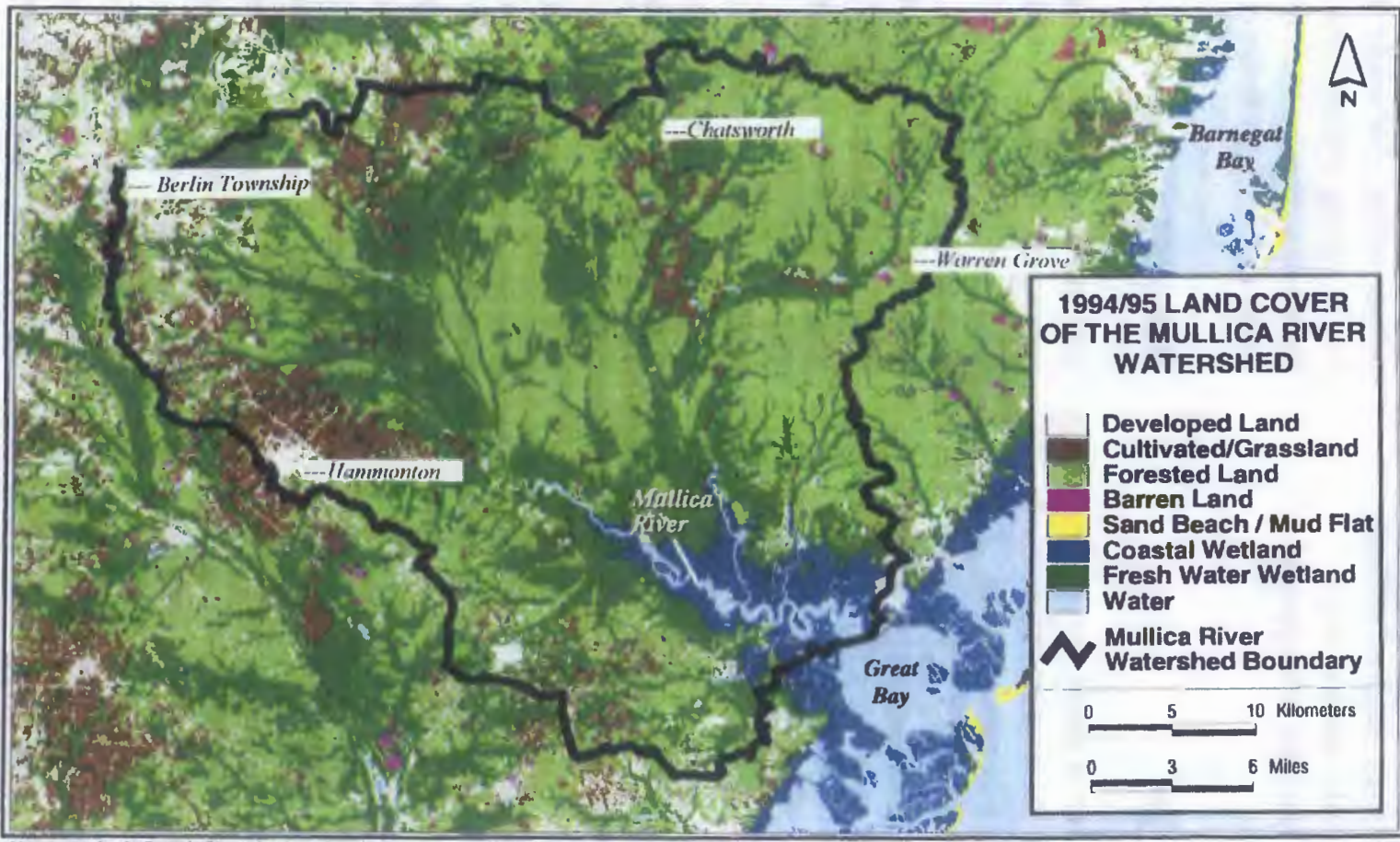
a high level of dissolved organic matter and is quite acidic in nature. Bog or swamp drainage affects the dissolved oxygen content of the water and nutrient levels are low.

Watershed

Each surface water body has a watershed, an area defined by the ridgelines that direct the runoff from precipitation into the surface water body. Mullica Township is located within the **Mullica/ Wading River Watershed Management Area**. The total drainage area of the Mullica/Wading River Basin covers approximately 569 square miles and involves parts of several counties and 23 municipalities.

The **Mullica River** has its headwaters in Berlin Township and flows about forty-five miles southeast to Great Bay and then into the Atlantic Ocean. About eighty-three percent of the river basin is covered by forest, wetlands and water. Urban areas account for five percent, with the remaining twelve percent covered by agricultural activities.

The Kirkwood-Cohansey aquifer is the major source of drinking water in the Mullica/Wading River Basin. Approximately ninety-seven percent of the rainfall entering this shallow aquifer flows into nearby streams and rivers. Since Mullica Township's



streams, rivers and wetlands are fed primarily by this aquifer, any increase in groundwater withdrawals reduces the amount available for surface-water systems.

The Mullica River and Great Bay support important commercial and recreational shellfish industries based on hard and soft shell clams, oyster, blue mussel, bay scallop and blue crab.

The lower reaches of the Mullica River serve as an important nursery and spawning ground for many transient marine fish, as well as habitat for resident estuarine fish.

Regulations to preserve water quality aim at an ideal of attaining fishable, swimable waters everywhere, or at least not lose the existing use of the water.

State Policies

The State of New Jersey classifies surface water bodies. Classification ranges from waters into which controlled amounts of wastewater effluents may be discharged to pristine trout streams.

The general policies of the State as regards surface waters are as follows:

- Water is vital to life and comprises an invaluable natural resource, which is not to be abused.
- It is State policy to restore, maintain and enhance the chemical,

physical and biological integrity of its waters, to protect the public health, safeguard the aquatic plants and animals, protect scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, agricultural and other reasonable uses of the State's waters.

- Toxic substances in waters shall not be at levels that are toxic to humans or aquatic animals and plants, or accumulate in edible plants in toxic amounts.
- Discharge of carcinogenic substances is strictly controlled.
- Existing uses shall be maintained and protected. Designated uses shall be attained as soon as technically and economically feasible.
- The State has a goal of restoring saline waters to levels that permit unrestricted shellfish harvesting.

Surface Water Classifications

The following are New Jersey Department of Environmental Protection classifications for surface water bodies:

FW—Fresh Waters.

The general surface water classification applied to fresh waters.

FW1

Fresh waters that originate in and are wholly within Federal or State parks, forests, fish and wildlife lands and other special holdings, that are to be maintained in their natural state of quality (set aside for posterity) and not subjected to any man-made wastewater discharges.

FW2

The general surface water classification applied to those fresh waters that are not designated as FW1 or Pinelands Waters.

PL—Pinelands Waters

The general surface water classification applied to Pinelands Waters.

Classification and Designated Uses of Mullica Township Surface Waters

The NJDEP Classification for all Mullica Township surface water bodies is:

PL—Pinelands Waters

Pinelands Waters are defined as all waters within the boundaries of the Pinelands Area, except those waters designated as FW1, as established in the Pinelands Protection Act.

Designated uses:

The designated uses for PL waters

are: cranberry bog water supply and other agricultural uses; maintenance, reproduction and migration of flora and fauna indigenous to this unique ecological system; and potable water supply if treated.

Mullica History

The following article appeared in the Sunday Star-Ledger of Newark, NJ on October 7, 1956. It was written by Rev. Henry Beck, author of *Jersey Genesis*. The article is a colorful slice of history along the Mullica River.

"In all that I have told you about the Mullica River in *Jersey Genesis* and out of it, there has been a piecing together of the lore of a river of refuge, the stories of people who have lived along its banks through generations since before the Revolution, and the salty humor, and neighborliness, and startling ingenuity of men and women content with what they have and what God has in store for them.

Now I will take you along the river itself, and perhaps even the bottom of the river, suggesting in what I have been told and what I believe will come to light, that a new and startling chapter remains to be written, unless, of course, New Jersey covers it up. For, at the moment, I cannot see, in the fallen trees that all

but bar the stream to boat travel in some places, in the submerged but historically important landings of old, and in the neglected hulks of famous ships in the mud, that New Jersey has very much interest in what it now owns.

However, I will not be critical. Instead, I will tell you a story of how some of all this came to light, through no doing of my own.

Bill Augustine, who takes those usually remarkable pictures that have accompanied these narratives through the years, lives with his wife most of the summer in a houseboat by the Mullica at Lower Bank. From there he has no difficulty in maintaining his daily photographic routine in Philadelphia and the South Jersey area or his recurrent contact with the Augustine home in Marlton. However, at odd moments this fall, Bill has been in a bathing suit, diving for stones at the bottom of the river, stones with which to build a landing for his boat.

One day or evening, he and his companion, diving into the brackish depths, knew for sure what they had realized in a dreamy way, that the stones were not just stones. Stones of any sort are rare along or even at the bottom of the river. These, it was quite clear, were stones from far away. Just as clearly it became evident that these were ballast, dropped overboard by ships long ago, craft that sought shallow waters with

less draught.

Some of the stones looked like those brought down from Nantucket and Martha's Vineyard, notably for the paving of streets in New York and Philadelphia. Others were obviously not native. None were the Jersey ironstone found up the banks from the river, these days especially in the ruins of forgotten furnace towns. Then one day, as Bill was taking advantage of the tide and wind to gather more, not far from where his houseboat is moored, his fingers touched upon one stone, larger, or so it seemed to be than the rest. Long and heavy, Bill admits that he would have given up any plan to bring it to the surface. However, after his companion felt its shape and size, he urged Bill to help him haul it up and into a rowboat.

That was when they discovered that it was no stone at all but a pig of Jersey Iron.

I saw it on Bill's landing the other day as a hammer was used gently to remove layers of rust in a effort to reveal the name of the furnace from which it came. Although it is believed to be a pig of iron from Martha Furnace, the name has not emerged as yet and perhaps it never will.

Conversation about the discovery enlisted more "divers" in the task of seeing what they can find on the floor of the historic Mullica and

brought my old friend, Frank Klaverkamp into the picture. Frank told me that he feels sure that this is but an index to the store of iron that lies at the bottom of the river and, for all anybody knows so far, there is the wreck of a ship, or at least a barge, nearby.

There's a barge at the bottom of the river not far off the late Zeke Forman's house, down from Green Bank," Frank said, "and the only thing that remains to be done is the organization of a thoughtful and well equipped search. The story has always been around that it's a barge such as was used to transport iron from the furnace upstream, perhaps Batsto in this case, a barge a little bigger than the skeleton of the one that lies rotting apart at the foot of Batsto pond."

You will remember that I told you about the wreck of this craft almost two years ago. It came to light that a flash flood smashed through the dam and drained the pond. I was told shortly after that the state had definite plans for its reclamation the only iron barge, as far as I knew at that time, anywhere. An expert was going to dig it out, bit by bit, I was assured. I can only report that the barge remains where it was when I wrote about it then, and that the only additional information is, through the recollection



of the river lore by Frank Klaverkamp and others, that there is another some distance below the Green Bank bridge.

It has been suggested that some cannon balls at Bulltown, cast but never used came from the bottom of the river. Frank and Bill took me to see them the other day at the home of Bill McDonald, and there I picked up the name of "the Iron Dock" and the suggestion that the balls were reclaimed from a wreck in the mud there. I was to see the area of the "Iron Dock" and other landings a short while later through the courtesy of

Fred Winterbottom, who has a boat and landing behind his house at the end of McCormack Ave. at Sweetwater. "The Iron Dock" someone said, is a place way up the river where the shoring, made of iron for the purpose at one of the old forges, is still visible at certain low tides."

Fred Winterbottom's house is where there was only a clearing and a gushing artesian well when I was walking the banks of the river, talking to people, and putting down some of the things that went into *Jersey Genesis*. There were no cottages or houses along the river in those days. Now they seem to be everywhere and all that I have seen are in good taste and, in many instances, fashion itself.

Fred, taking Bill and Frank and me aboard his "Dragon Fly," showed me enough of the river as it is today to indicate that many of its secrets have been kept intact.

By now Mrs. Winterbottom and their two children, Fred and Carol, share the fever. The children showed me items they have searched out and added to their own collection—several examples of lead shot, good size, pried from mud along the edge of the water at what I believe to have been Mordecai Landing; a hand-made saucer made of clay and highly decorated, seemingly by Indian hands; a button, perhaps from a uniform of some kind, and some broken bowls of ancient clay

pipes. The saucer should be seen immediately by an expert. I have said of it that it is too good to be a fake but I could be wrong. Prized items in the Winterbottom family collection is a pinkish stone with all the appearances of a petrified slab of bacon. Those to whom Fred Winterbottom has shown it argue first that counterparts have been found only in Ireland or in India. "You must go up the river with me," Fred proposed, and I was in his boat almost at once. Up there, at what has been called "The Forks," or the Forks of the Mullica to be exact, we came upon the rotting, half-submerged ruin of at least 2,000 feet of dockage, presumably erected for the loading of Revolutionary munitions, at first shipped to Philadelphia from the Mullica river; and then hauled painfully over land when the British began patrolling the coast.

"Near the ruined dock," Fred told us, "I have seen what seems to be the outline, virtually intact, of a fairly large building, entirely submerged, built of Jersey ironstone." Fred saw more of it when he began "playing" with an aqua lung. "But that," he hastened to point out, "wasn't this summer. The water has been too murky all this summer to find anything new. However, continuing to explore in other ways along the shore we have brought up pieces of timber, clearly parts of a ship. I found the

centerboard of another and hauled it up on land where it wouldn't interfere with navigation..."

With the tide almost as low as would permit travel along the river at all, we went to the site of an old bridge, one I hadn't seen for years and last used in the Mullica area, taking a shortcut to Amatol., that wartime village, in World War I. We prodded the muddy bottom at the site of the "Iron Dock;" we felt for timbers of old ships, long known to natives who have wondered for years what to do about them, and we looked upon an area at a bend called "The Horseshoe" for years on end, an area proposed for camping sites in the rumored plans of the state.

In building the dock behind his home on the river, Fred Winterbottom came upon startling clues to a new mystery for which I know no counterpart on the Mullica. "The strata is unusual. I went down through six feet of sand, then two feet of sawdust, and then ten more feet of sand in the tests I made," he told me. Under that there were traces of a cedar swamp far different than any that is known in the area today. There are stumps of trees that were huge all of two feet further down. It's as if the earth had been laying strata upon strata, out of sight..."

Then, along another area of the river, Fred has found another place,

he told me, where quantities of molten metal seem to have been spilled on the ground to cool, and where the ends of molds, used to fashion cannon balls perhaps, were discarded by the river.

"The boat of which only the centerboard was left had been a hand-made craft," he said, "perhaps 30 or 40 feet long."

That brought to mind for Frank Klaverkamp the pair of 16-foot oars of another day that had been found along the Mullica. "Before I could see them in their natural state," he said, "the finder had cut down the shafts and the blades for his own purposes. That's the way with so much that's to be found along the river. People just don't believe how unusual it is, reaching back into another time."

I remembered how Bill Doughty, of Barnegat Light, had told me of his own father's recollection that, as a boy, he with others saw the wrecks of British frigates below Chestnut Neck. Although the narratives seem to have slopped upstream where, Charlie DeBow and others have said, its ribs used to stick out of the water when the tide and wind were just right for such a display

Until the other day, the Mordecai Landing and Katesputak (or Cakesputer?) Swamp were no more than names in the pages of a book. Until Frank Kalaverkamp took me to see them in an abandoned C.C.C. camp now part of the state forest of the

area, the broken fireback bearing the name if Martha, for Martha Furnace, and a great "Plank" of iron, to be moved only by the combined efforts of several muscular men had given no color to the legends and lore of the old iron forge and furnaces. This suddenly, once again, the Mullica River was more than that for all that showed above the surface. It had become a hiding place of details of many more chapters of a colorful story that is a part, however unappreciated, of New Jersey's Colonial conflict.

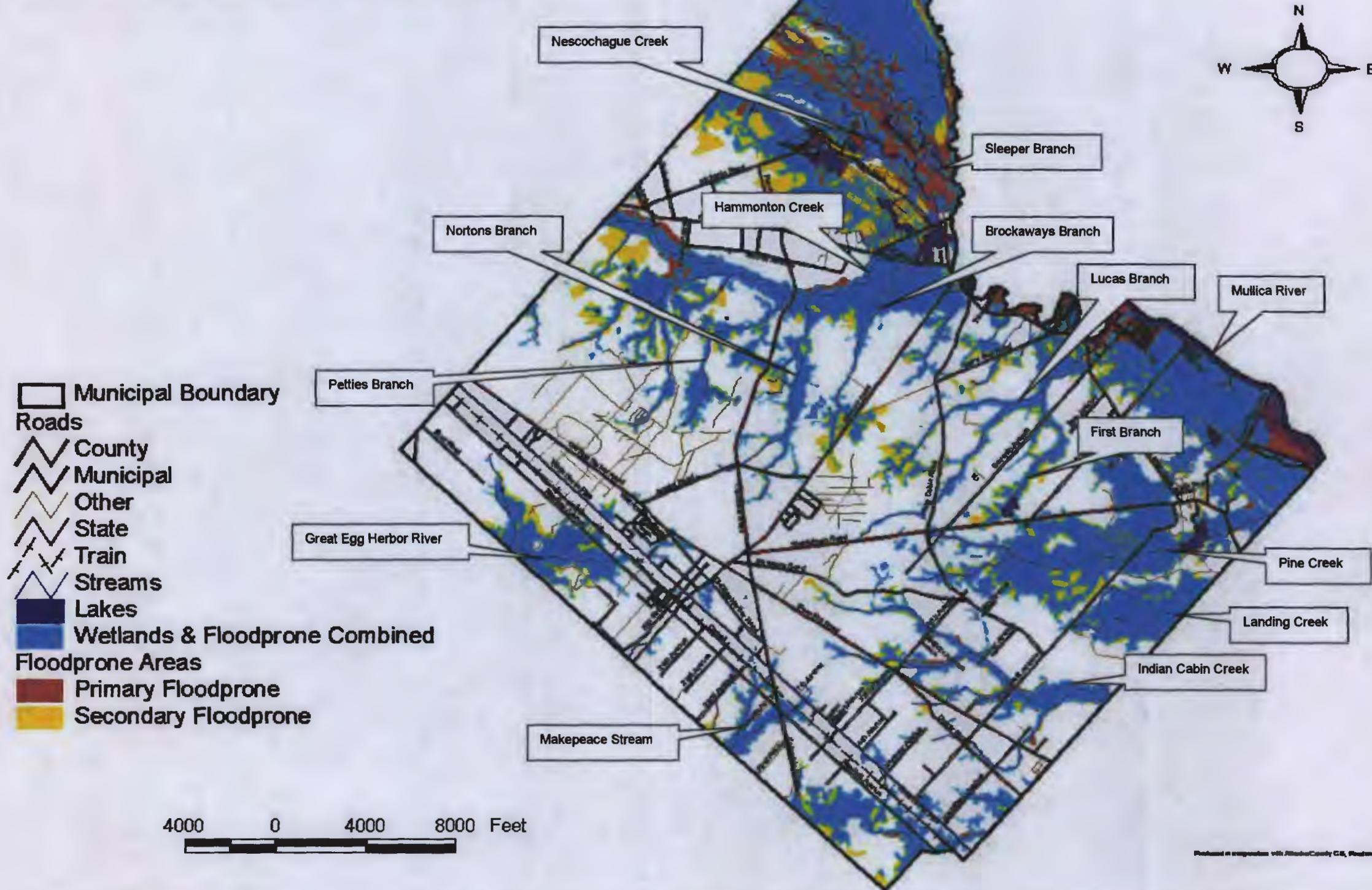
I doubt if New Jersey knows what a treasure it has or if it knows just how to begin to reclaim and preserve it. All I know it that it will require the patience, the thought and the alert "rooting" out of submerged secrets of the past on the part of a great many people who love the river to make up for what others fail, for one reason or another, to do. It is now my firm conviction that the bottom of the Mullica River is as littered with unsung history as the areas within sight have been found to be these last few years."

MULLICA TOWNSHIP HYDROLOGY MAP

On the following page is a map depicting the location of Mullica Township's major surface water bodies as listed below. The Great Egg Harbor River tributary in Mullica Township is Makepeace Stream.

- **Great Egg Harbor River**
- **Makepeace Stream**
- **Mullica River**
- **Sleeper Branch**
- **Nescochague Creek**
- **Brockaways Branch**
- **Petties Branch**
- **Hammonton Creek**
- **Nortons Branch**
- **Lucas Branch**
- **First Branch**
- **Pine Creek**
- **Landing Creek**
- **Indian Cabin Creek**

MULLICA TOWNSHIP HYDROLOGY



Freshwater Wetlands

Wetlands have long been considered the stepchildren of the environment. Known as bogs, bottom lands, marshes, fens, and just plain swamps, wetlands were seen as areas that needed remediation in the form of filling, draining and clearing. An alarming number of these vital natural areas have disappeared as a result of those activities.

Today, we recognize the importance of wetlands and the enormous diversity of life forms found there. Our freshwater wetlands provide habitat for thousands of species, both plant and animal. They supply water to upland species, provide cover and moisture for nest sites and subsequent young, and provide vital rest areas for migratory birds. Wetlands protect our water supply by acting as natural filters, trapping sediment and purifying water. During times of drought, they maintain critical base flows to surface waters and they provide a natural means of flood and storm damage protection by slowing down and temporarily storing runoff water, thus reducing downstream flooding.

Wetlands Definitions

Freshwater wetlands occur

throughout Mullica Township. They are found between dry upland areas and inland waters, along rivers and streams, and around lakes and ponds. Wetlands include marshes, which are most often covered with water; swamps and wet meadows which are covered with water for only a portion of the year; and bogs, which have a very restricted inflow and outflow of water, and often provide habitat for plant species that will not survive elsewhere. Wetlands depend on the presence of surface or ground water from rainfall, flooding, snowmelt, and/or subsurface water.

The presence of water is not always obvious and is sometimes determined by indicators, such as high water marks on tree trunks, moss lines on trees and elevated roots.

Three conditions must exist to classify an area as a wetland: the soil must be a **hydric soil**, the vegetation must be **hydrophytic vegetation**, and the area must be either flooded or saturated for enough of the time to support that vegetation.

Hydric Soils

Hydric soils are wetland soils which contain excess water long enough to inhibit oxygen content (needed for normal vegetation). There are two categories of hydric soils—organic and mineral.

- Organic soils contain a high organic matter content due to the slow breakdown of materials because of the lack of oxygen. These soils are very dark in color.
- Mineral soils have a low organic content and have been saturated long enough to substantially change their properties. They are usually gray mottled and can have dark vertical streaks, brown or orange channels left by old roots and/or the odor of hydrogen sulfide.

Hydrophytic Vegetation

Hydrophytic plants are adapted to living in wet soil conditions and are unique in that they grow in soils that lack oxygen because of the water content. There are four categories of hydrophytic plants:

- Obligate: nearly always occur in wetlands (cattails, skunk cabbage, swamp azalea, white cedar).
- Facultative wetland: occur in wetlands 2/3 of the time (cinnamon fern, pin oak, highbush blueberry, elderberry).
- Facultative: occur in wetlands between 1/3 and 2/3 of the time; also occur in uplands (red maples, foxtail grass, rhododendron).
- Facultative upland: more typical of uplands but will grow in wetlands less than 1/3 of the time

(American holly, beech, bracken fern).

Freshwater Wetlands Definition

The Freshwater Wetlands Protection Act defines a wetland as:

An area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation. . . .

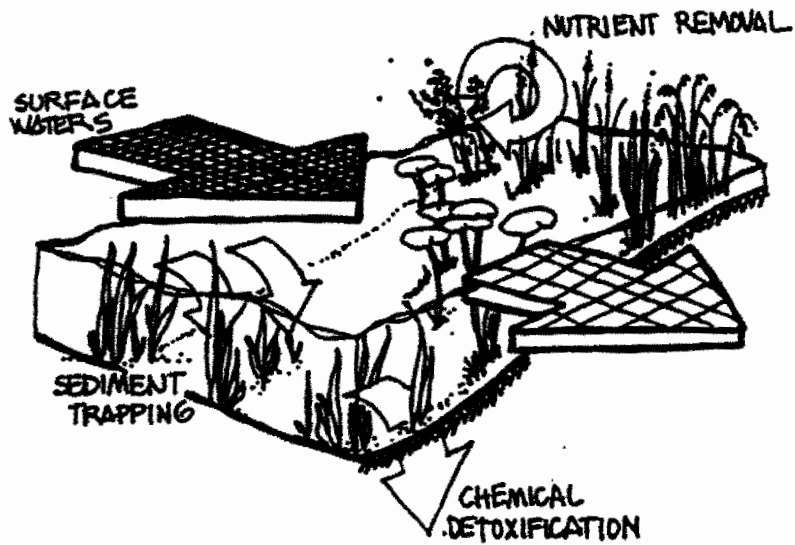
Simply put, to be a wetland, an area must be wet enough to create a hydric soil and to support hydrophytic vegetation.

On the following page is a diagram of wetlands values and functions.

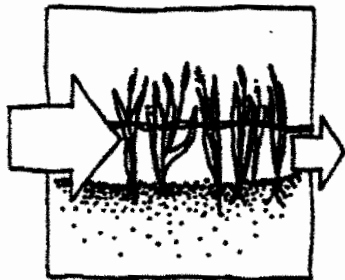
Wetlands Classifications

The Freshwater Wetlands Protection Act recognizes three classifications of wetlands. They are as follows:

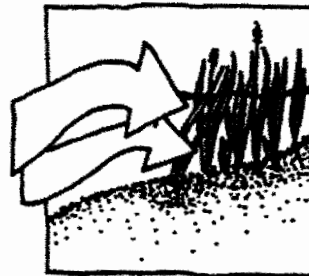
- Exceptional resource value wetlands which discharge into protected waters or trout production streams, or provide habitat for threatened or endangered species.



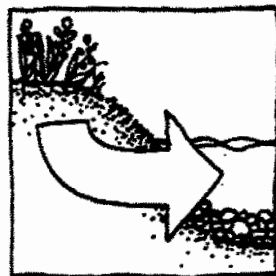
• FLOOD PROTECTION



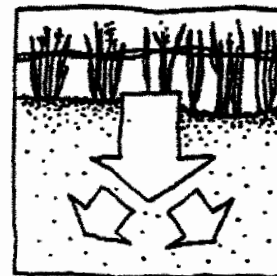
• SHORELINE STABILIZATION



• STREAMFLOW MAINTENANCE



• GROUNDWATER RECHARGE



"Wetland Regulations Guidebook"
Washington State Department of Ecology, Olympia, Washington.
1988

- Ordinary resource value wetlands which are small isolated areas not tributaries of lakes, rivers or streams, and are surrounded by development, such as drainage ditches, swales or detention facilities.
- Intermediate resource value wetlands that are not defined as exceptional or ordinary.

Transition Areas

Transition areas occur between wetlands and uplands and act as buffer zones to minimize the impact of human activities. These areas are important habitat for plants and wildlife as they contain both wet and dry land portions. Transition areas are also protected and their size depends on the classification of wetlands they surround. Pineland wetlands require a standard transition area of 300 feet.

The Freshwater Wetlands Protection Act

The freshwater wetlands in Mullica Township are protected by the New Jersey Freshwater Wetlands Protection Act, which is one of the most comprehensive wetlands protection acts in the country and supercedes any municipal land use plan or zoning ordinance.

Activities.

Nearly all activities intended to be carried out in freshwater wetlands and many activities intended in transition areas and state open waters require a permit. Examples of activities include removal, excavation, dredging, dumping, discharging, filling, destruction of plant life, erection of structures and placement of pavement.

Site classification.

The Act uses a federal method of identifying wetlands, which has four basic approaches: routine onsite determination, intermediate-level onsite determination, comprehensive onsite determination, and disturbed area and problem area determinations. Once it is decided that an area is a wetland, it is then classified; exceptional resource value wetlands have additional restrictions and limits on the types of permits issued. Intermediate and ordinary resource value wetlands allow a greater range of activities, as do transition areas.

Permits.

To obtain a permit from the DEP, applicants can request a Letter of Interpretation (LOI) which will establish what permits may be

required. Public comment is welcomed on LOIs and applicants are required to send notice of their applications to the municipal clerk and construction official of their township (who in turn, must inform the Environmental Commission), as well as all property owners within 200 feet of the proposed site.

Individual permits are evaluated for their ability to show no practicable alternatives to the site, including other freshwater wetlands where the impact might be less. Permits for exceptional resource value wetlands must show compelling public need or extraordinary hardship. The environmental impact must then meet three criteria: (1) that it will not be a threat to any threatened or endangered species; (2) it will not be a violation of water quality standards; and (3) it does not violate any marine sanctuary.

A mitigation plan is required before any activity can be approved. Mitigation takes the form of restoration, creation or enhancement of wetlands, or contribution of money to wetlands restoration funds. There are some exemptions and grandfathered activities allowed by the Act. Check with NJ Department of Environmental Protection to find out what these are. The DEP recommends that an applicant schedule a pre-application conference

to provide an informal and non-binding guidance for what may be involved.

Enforcement.

Penalties for violating the Freshwater Wetlands Protection Act can be severe—up to \$10,000 a day and restoration of damaged wetlands. Persons violating the act are also subject to civil and sometimes criminal penalties. Permits must be posted on-site for all activities involved. The public is encouraged to notify the DEP of possible violations.

Long Term Protection of Freshwater Wetlands

Deed restrictions or public ownership of wetlands provides the surest long-term protection.

Local governments can acquire wetlands through purchasing them or receiving them by donation. Funding for purchasing is available from both public and private sources. A legal document articulating a commitment to preservation must be part of any acquisition agreement, delineating the method of maintenance, responsibility for maintenance, maintenance taxes and insurance, compulsory assessment provisions, and any other specifications deemed necessary.

New Jersey legislation has directed

tax assessors to take conservation easements and wetlands into account when they are valuing land. The NJ Supreme Court has ruled that property encumbered by a perpetual easement that benefit the public should be assessed at a lower value. Municipalities should encourage reassessment of properties with wetlands.

There are also opportunities for restoration of wetlands on farms. There are programs to provide technical and financial assistance to reduce soil erosion, which helps protect wetlands from sedimentation and pesticide/fertilizer contamination. Farmers can receive benefits if they refrain from using marginal areas for 10 years. Farms that have converted wetlands that supported commodity crops can receive 50% of the cost of a planting and management program.

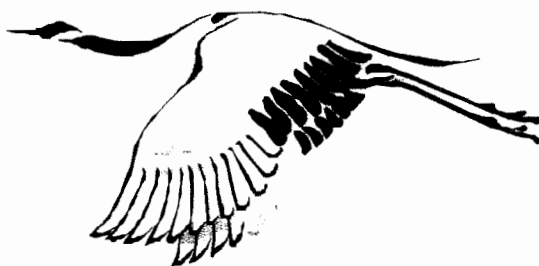
Farmers who grant at least a 50-year conservation easement can receive reduction of financial debt.

Benefits of Wetlands Preservation

Wetlands preservation benefits both the public and the individual property owner. Property owners or developers who preserve wetlands:

- may enjoy tax benefits;
- complete projects more easily by avoiding some regulatory requirements;
- finish projects for lower costs;
- gain satisfaction for protection of a valuable natural resource.

The public gains a unique resource—special areas that shelter wildlife and endangered species, prevent flooding and protect water quality.

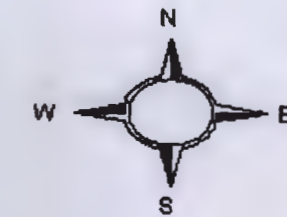


FRESHWATER AND SALINE WETLANDS MAP

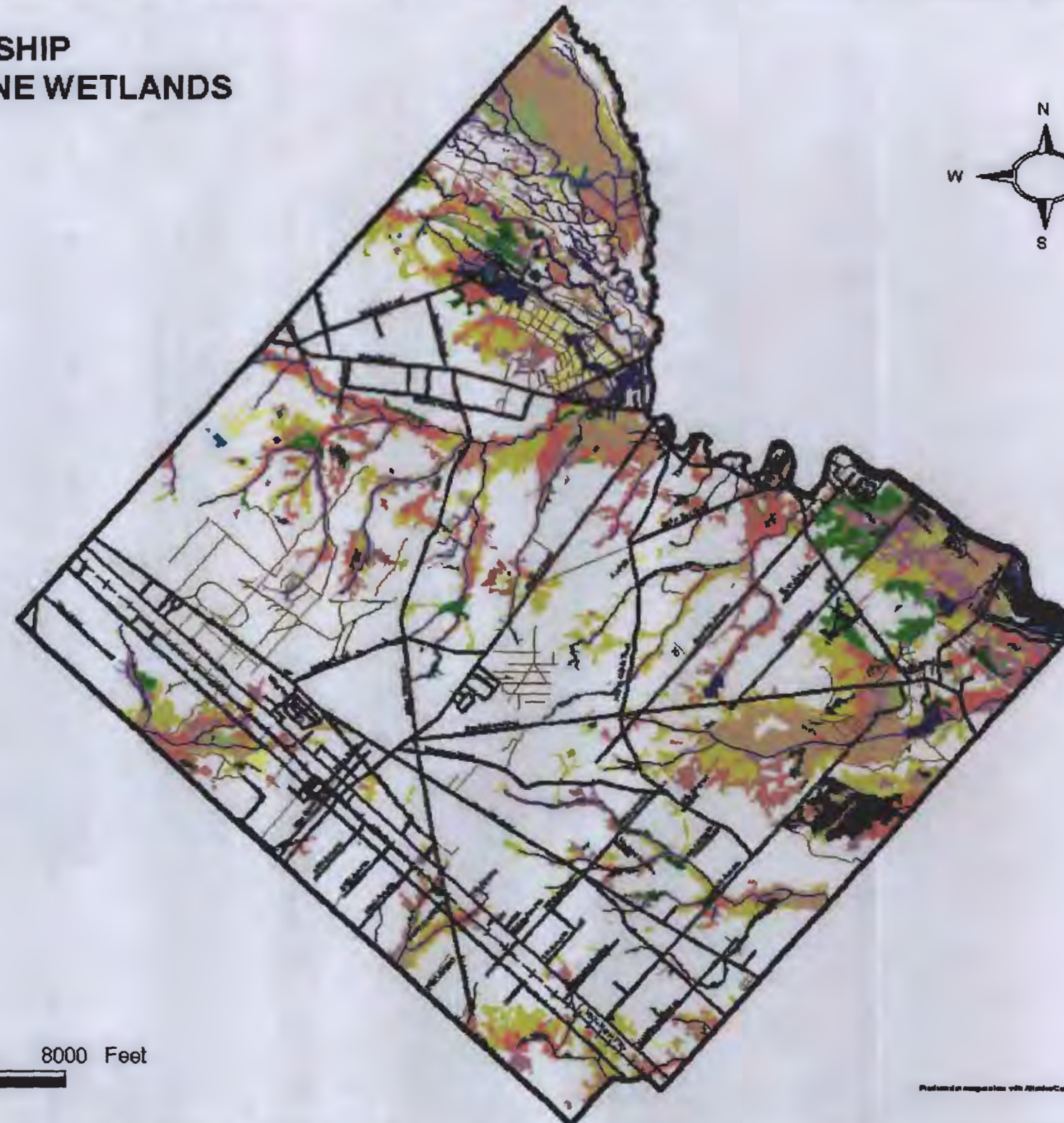
The following map shows the areas of Mullica Township that are classified as freshwater and saline wetlands.

The map key describes the type of wetland depicted by each color unit.

MULLICA TOWNSHIP FRESH WATER AND SALINE WETLANDS



- Roads**
- County
 - Municipal
 - Other
 - State
 - Train
 - Streams
- Municipal Boundary**
- Lakes**
- Fresh Water Wetlands**
- AGRICULTURAL WETLANDS (MODIFIED)
 - ARTIFICIAL LAKES
 - ATLANTIC WHITE CEDAR WETLANDS
 - CONIFEROUS & SCRUB/SHRUB WETLANDS
 - CONIFEROUS WOODED WETLANDS
 - DECIDUOUS SCRUB/SHRUB WETLANDS
 - DECIDUOUS WOODED WETLANDS
 - DISTURBED WETLANDS (MODIFIED)
 - HERBACEOUS WETLANDS
 - MANAGED WETLANDS (MODIFIED)
 - MIXED FORESTED WETLANDS (CONIFEROUS DOM.)
 - MIXED FORESTED WETLANDS (DECIDUOUS DOM.)
 - MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)
 - MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)
 - NATURAL LAKES
 - SALINE MARSHES
 - STREAMS AND CANALS
 - TIDAL WATER
 - Saline Wetland



4000 0 4000 8000 Feet

Prepared in cooperation with Atlantic County CS, Freshwater Commission & RCDSP.

Floodprone Areas

Floodplains are relatively flat areas along a stream that are naturally subject to flooding. Undeveloped floodplains act as storage basins, lowering flood crests and minimizing erosion. Development in floodplains destroys these natural flood controls, causing increased public costs for storm drains, dams and other man-made flood controls, and diminishing the natural value of the stream corridor.

The first step to protect stream corridors and wetlands is to define and map the areas, so planning board members know where they are. The Environmental Commission can then work on development strategies for preserving these ecologically important areas, such as obtaining easements from property owners.

Flood Insurance.

The National Flood Insurance Program is a Federal program that allows property owners to purchase federally backed flood insurance in return for floodplain management measures taken by the community to reduce flood risks to new development. Mullica Township

participates in this program and works with the Federal Emergency Management Agency (FEMA) to reduce further losses.

FEMA develops data concerning flood-risk areas and uses that data both for floodplain management and to determine insurance rates. Flood hazard frequency is measured by the average frequency with which a flood will occur in a given area. The agency has identified and mapped areas within the township that have a 100 year or a 500 year flood hazard frequency. The term "100-year flood" can be misleading; although it represents the long term average interval for a flood of a certain size to occur, this "representative flood" can occur in any given year of that 100 year period. In many instances, communities have sustained two or even three 100-year or greater floods within a several-year period. So the standard works as a tool for measuring the frequency of a flood of a certain magnitude, but it cannot predict its timing. Every year there is a 1% chance that a 100-year flood will occur. The 100-year flood is also referred to as the "base flood." Another term used by FEMA is the base flood elevation. This is simply the height of the representative 100-year

flood as compared to a specific elevation standard set by the government in 1929.

Of special interest to lenders is the fact that within the special flood hazard area there is a 26% chance of experiencing such a flood over a typical 30-year mortgage period. By contrast, there is only a 1% chance of suffering a fire loss over the same period.

Mullica Township controls flood-hazard risk through township ordinances. The most significant of these required ordinances are those which regulate acts such as issuing building permits for new residential construction in flood hazard areas. Buildings in those areas must be constructed so that the lowest floor will be located above the base flood elevation.

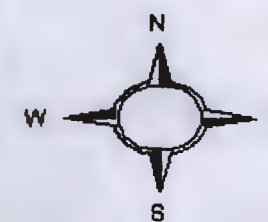
The document prepared by FEMA depicting flood hazard areas in the township is called a Flood Insurance Rate Map (referred to as a FIRM). This map shows the 100 and 500-year flood hazard areas, the base elevations and the flood insurance zones that determine insurance rates based on flood risk. It also shows areas designated as a regulatory

floodway. The regulatory floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment, so that the 100-year flood discharge can be conveyed without increasing the base flood elevation more than a specified amount. The FIRM is distributed to a wide range of users—private citizens, community officials, insurance agents and brokers, lending institutions, and Federal agencies. The map is generally used to determine the degree of flood hazard in specific areas of the township so that properties at risk can be properly insured. It allows the user to identify special flood hazard areas, identify the location of a specific property, estimate the base flood elevation at a specific site, determine the flood insurance zone at a specific site, and determine the location of the regulatory floodway. The flood insurance studies done by FEMA are also presented in a report. This report (FIS Report) is a technical document that provides information used mainly by community officials for floodplain management, and can be reviewed at township planning, zoning, or engineering offices.

MULLICA TOWNSHIP FLOODPRONE AREAS MAP

The Mullica Township Floodprone Areas map shows the portions of the Township that are 100 and 500 year flood hazard areas. The 100-year areas are labeled **Primary Floodprone**, and the 500-year areas are labeled **Secondary Floodprone**.

MULLICA TOWNSHIP FLOODPRONE



- Roads**
- County
 - Municipal
 - Other
 - State
 - Train
 - Lakes
 - Streams
 - Municipal Boundary
- Floodprone Areas**
- Primary Floodprone
 - Secondary Floodprone



4000 0 4000 8000 Feet

Prepared in cooperation with Atlantic County GIS, Philadelphia Commission & RUDCP.

Groundwater

Mullica Township is located in the Atlantic Coastal Plain physiographic province. Beneath the land surface, there exists a great quantity of fresh ground water contained in the pore spaces of the sands and gravels of the Coastal Plain.

The Township is completely dependent on groundwater for its potable water supply. Groundwater is also the primary source of water for industrial and agricultural use and it supplies the complete base flow to all freshwater streams and rivers in the township. Consequently, groundwater can be considered the township's most important natural resource.

Groundwater is obtained from wells and springs that tap into aquifers. It can be contaminated by pouring household wastes down the drain, by dumping contaminants near wellhead areas, and by polluting recharge areas.

Aquifers

Aquifers are porous underground geologic formations that hold water. They have recharge areas where precipitation infiltrates the ground and finds its way into the aquifer.

The water contained in these underground reservoirs in New Jersey is greater than the quantity in all the rivers and lakes in the state combined.

The water bearing aquifers beneath Mullica Township are members of the Kirkwood Formation—principally those known as the Kirkwood and the Cohansey Sand.

Kirkwood

The Kirkwood consists chiefly of sand, silt and clay. It is divided into two major layers. The upper layer, which marks the contact with the overlying Cohansey Sand, consists of a thick section of silty, blue Kirkwood clay. This bed of clay is approximately 300 to 400 feet thick.

Lying below the Kirkwood Clay is the Kirkwood sand. It has very good water bearing properties and is a major aquifer in southern New Jersey. The Kirkwood sand is about 80 feet thick in the vicinity of Mullica Township. The bottom contact is marked by the abrupt appearance of large amounts of greensand from the underlying formation.

The Kirkwood Sand is encountered below Atlantic City, NJ at an approximate depth of 760 to 840 feet and thus has become known

locally as the "Atlantic City 800 Foot Sand." The formation crops out over an area of about 165 square miles running along a line from Salem to Monmouth Counties. It underlies the entire outer Atlantic Coastal Plain, extending to the edge of the Continental Shelf.

The Kirkwood Sand is the most important aquifer in Atlantic County. The aquifer is of highly permeable material and is capable of yielding large amounts of water. The water occurs under artesian conditions; that is, the water-bearing sand is located between upper and lower clay confining beds and the water is under hydrostatic pressure. The outcrop (recharge) areas are in Gloucester and Camden counties. Permeability decreases as the formation nears the outcrop areas because the sands become more finely grained, reducing the size of the pore spaces in the sand.

Cohansey Sand

The Cohansey Sand aquifer is composed predominantly of highly permeable and generally well-sorted sands and gravels and is thus able to store and transmit large quantities of water. Sand grains are angular to well rounded and have an iron oxide surface stain which gives them an

orange or reddish color. Some sand beds are, however, light gray to white.

Gravel beds are generally less than one-foot thick but may be up to several feet thick. Because the sands are so highly porous, a considerable part—thirty percent or more—of their total volume is void space capable of holding water. These sands are generally medium to coarse-grained, and therefore are capable of yielding a substantial portion of their stored water for human use.

The Cohansey contains many beds and lenses of clay that usually range in thickness from a few inches to twenty feet. Clay beds may extend over several square miles. The total thickness of the Cohansey Sand ranges from 70 to 211 feet and the average thickness is 156 feet. The thickness varies throughout, but in general the aquifer thickens to the southeast.

The Cohansey is exposed at the surface throughout most of Mullica Township. Where it is covered, it is overlain by thin layers of the Bridgeton and Cape May Formations. The bottom contact of the Cohansey with the underlying Kirkwood is marked by a thick section of silty blue Kirkwood clay.

This highly productive aquifer crops out, either at the surface or beneath

a veneer of the permeable Cape May and Bridgeton deposits, over an area of 2350 square miles. This is more than the outcrop area of all the other aquifers in the NJ Coastal Plain. Because of this, it is exposed to and able to absorb vast quantities of recharge from precipitation.

Groundwater Movement

The groundwater moves slowly through the underground Kirkwood systems. It moves from areas where infiltration of rainfall is occurring to natural outlets of seepage on the land surface, and, eventually, to the ocean.

The groundwater in the Cohansey is largely unconfined, which means it represents the water-table aquifer. There is no standard pattern of movement of water in the Cohansey. Recharge and discharge are generally local and they are connected by a pattern of flow largely governed by topography.

Recharge

The major sources of recharge to the Kirkwood Formation are precipitation on the permeable parts of its outcrop and on parts of the overlying Cohansey Sand.

The Cohansey sand is recharged over most of its widespread outcrop area by the direct percolation of precipitation. The infiltration capacity of the aquifer is very high and overland flow, except in established stream channels, seldom occurs even in the heaviest storms. The Cohansey discharges locally into streams and ponds and loses water in some swampy areas through evaporation and transpiration. The seepage into streams represents the base flow of all streams and rivers in Mullica Township.

Depth to Groundwater

Groundwater in many areas of Mullica Township is at the surface during the wet season. Groundwater generally can be found at depths of two to four feet below the surface.

Supply

The quantity of water in underground storage varies slightly from season to season. It decreases with normal precipitation during the summer and fall when the use of water from vegetation and by pumpage from wells is large. It increases during the winter and early spring when vegetal growth and pumpage from wells are at a minimum.

The Cohansey Sand contains the last large essentially untapped reserve of water supply in the State of New Jersey due to the sparse development of the region. The storage capacity of this formation is estimated to be as much as 17 trillion gallons.

The extensive urbanization of the outcrop regions of the Kirkwood in Camden and Gloucester Counties, which are the prime recharge areas, limits the amount of water being returned to this aquifer.

Groundwater Quality

Generally, the quality of water contained in the Kirkwood and Cohansey aquifers is adequate for most uses but must be tested and usually must be treated to meet county standards for obtaining a mortgage or a certificate of occupancy for new construction. The water tends to have a low pH level and has a high iron concentration in some areas.

Atlantic County requires an eight-parameter test to meet county standards. The parameters are:

- Bacteria
- Nitrates
- pH
- Iron
- Mercury

- Chlorides
- Detergents
- Total Dissolved Solids

If the well is in an area of concern, however, it must also have additional testing for volatile organic chemicals and/or mercury. Areas of concern are those areas identified as sources of contamination and all surrounding areas that could be affected by the contamination. Areas of concern are indicated by block and lot.

Groundwater Pollution

The susceptibility of the Cohansey Sand aquifer to contamination from human activities is great throughout the outcrop area because of the high permeability and low buffering capacities of the sands. Landfills, septic systems, underground storage tanks and agricultural activities have all posed a threat to water quality in Mullica Township. Local township wells have evidenced contamination from volatile organic chemicals, mercury, nitrates and fecal coliform.

Contamination Sources.

One primary source of contamination in the township has been leaking underground storage tanks. The State of New Jersey Department of

Environmental Protection recently mandated that all underground storage tanks be registered and removed and/or upgraded to NJDEP standards. Removal of many of these old tanks revealed highly compromised tank walls resulting in leaking conditions and causing extensive soil and groundwater contamination. The contaminants are normally petroleum products such as gasoline, kerosene or diesel fuel, all of which release volatile organic chemicals (VOC's) into the groundwater.

Other sources of contamination have been naturally occurring heavy metals such as mercury, high nitrate content, sometimes due to heavy agricultural activities, and fecal coliform from landfill activity and from failed septic systems.

Contaminated Areas

Most remediation processes for soil and groundwater contamination are quite slow and the cleanup can take several years. During this time, the groundwater remains vulnerable to contamination within a certain radius of the contaminated site. This radius, along with the contaminated site itself, is referred to by the county as an Area of Concern (AOC).

Known Contaminated Sites

The following are the known contaminated sites in Mullica Township as listed by the NJDEP *Known Contaminated Sites Municipal Report for 1997*. This is the most recent list as of this writing. Active status indicates that the cleanup is in progress; pending status indicates that the case is waiting for assignment.

The cleanup of some of these sites may have been completed by this writing and additional sources of contamination have been discovered in Mullica Township since 1997. These changes are reflected in the County records, which are updated more frequently.

NJDEP Known Contaminated Sites:

- New Jersey Bell Telephone Mullica Township located at White Horse Pike and Columbia Roads. This case broke in 1987. As of 9/23/94 its status is pending.
- Forks Landing Marina located on Camp Swiss Avenue. This site has active status as of 12/1/89.
- Gasway Service Station located at Rte. 30 and Union Road. This case broke on 1/9/92 and involved leaking underground storage tanks containing gasoline and kerosene.

The site has had active status since 1/9/92.

- Mel's Transmission located at 7 White Horse Pike. The case broke on 12/17/92. The present status is pending.
- Joseph Perona scrap metal at the Columbia Road location. The case broke on 5/1/86. This area of concern is still active as of this writing.
- Mullica Township Landfill located on Elwood Weekstown Road. The case broke on 4/29/93 and involved groundwater quality exceedences of fecal coliform contamination.
- Perona Brothers Tire Fire site located on Route 30. The fire took place on 12/10/86.
- Citgo Gas Station located on Pleasant Mills Road. The case was reported on 3/27/97 and involved underground storage tanks leaking gasoline and diesel fuel.

Areas of Concern

The Atlantic County Division of Public Health maintains a listing of all known or suspected areas of groundwater contamination in Mullica Township (areas of concern). The list is developed based on testing of private well water by the Atlantic County Division of Public Health. Areas of concern are identified by block and

lot. The list is provided primarily for real estate transactions and is updated as needed. The township receives a copy of each updated list.

Blocks and lots included in the Area of Concern listing are not necessarily contaminated. However, these properties are located near a polluted well and may therefore be particularly vulnerable to contamination. Listed properties require additional testing (generally a volatile organic chemical [VOC] scan and/or mercury [Hg] test) to obtain a water certification. This requirement pertains only to private wells intended for potable use

Mullica Township Areas of Concern as indicated on the Atlantic County Health Department's realtors list dated August, 1999 are as follows:

Area of Concern 6401

Suspected sources of contamination:

Mel's Transmission

7 S. White Horse Pike

Block 2701

Lot 4

Center Ford

1200 S. White Horse Pike

Block 3501

Lots 2,3

The Mel's Transmission site involves a leaking underground storage tank, a

transmission fluid discharge and the presence of several 55-gallon drums containing controlled substances.

The Center Ford complaint sited visible contamination in the runoff from the property and the presence of volatile organic chemicals and PCB's. There was also a waste oil tank and a septic tank that were possible sources of contamination. This site has since been taken off the NJDEP known contaminated sites list.

This area of concern is made up of the following blocks and lots; also listed are the additional water quality tests required:

<u>Area of Concern</u>	<u>Blocks</u>	<u>Lots</u>	<u>Tests Required</u>
6401	2701	5,6,9,10	VOC
	2707	1	VOC
	3501	2,3	VOC
	3502	1,2	VOC

Area of Concern 6402

Suspected sources of contamination:
Elwood Gasway Service Station
Route 30 and Union Avenue in
Elwood
Block 3410
Lots 3,4,10 and 11

This area of concern involves the removal of seven underground storage

tanks at the Elwood Gasway Service Station property. The tanks contained diesel fuel, gasoline and kerosene. Several of the tanks were leaking and soil and groundwater testing revealed contamination from gasoline and kerosene.

Seventeen monitoring wells were installed in various locations at the site. Testing on 12/10/98 revealed the following range of contaminant levels in those wells:

Benzene	2 - 42,000 ppb*
Toluene	1300 - 5300 ppb
Ethylbenzene	800 - 5700 ppb
Xlyenes	1120 - 47,000 ppb
MTBE	400 - 3900 ppb
TBA	2200 - 5500 ppb
1,2 Dichloroethane	980 -2000 ppb
*parts per billion	

The maximum contaminant levels (MCL) in parts per billion considered to be safe by New Jersey drinking water standards are as follows:

Benzene	1
Toluene	1,000
Ethylbenzene	
Xylenes	1,000
MTBE	70
TBA	no mcl
1,2 Dichloroethane	2

The following private wells in this area of concern were tested for groundwater contamination on 7/10/97:

<u>Block</u>	<u>Lot</u>
3404	9,11
3405	4,7
3409	6,8
3410	1,2,4

All contaminant levels tested registered non-detect.

The Elwood Gasway case broke on 4/22/92. The site presently has active status in the NJDEP Site Remediation Program; however no remedial action workplan has been approved as of this writing (4/2000).

There are several potable wells in the vicinity of the site. To date, none have shown evidence of contamination.

Groundwater moves slowly in the area due to the lack of relief; it has been determined that groundwater flow from the site is to the NNW.

This area of concern is made up of the following blocks and lots; also listed are the additional water quality tests required:

<u>Area of Concern</u>	<u>Blocks</u>	<u>Lots</u>	<u>Tests Required</u>
6402	3404	10,11	VOC
	3405	4-8	VOC
	3409	8	VOC
	3410	1,3,4,10,11	VOC

Area of Concern 6403

Hanover

Suspected source(s) of contamination:
Unknown

This area of concern involves a domestic supply well (Block 11218; Lot 12) that showed a 6.45 ppb mercury level. The maximum contaminant level for mercury is 2.0 ppb.

This case broke on 4/28/92. Atlantic County Health Department testing of 14 private wells in the vicinity of the site revealed one well with an exceedence of mercury (Hg).

This area of concern is made up of the following blocks and lots; also listed are the additional water quality tests required:

<u>Area of Concern</u>	<u>Blocks</u>	<u>Lots</u>	<u>Tests Required</u>
6403	10207	2,3,4,5,9	Hg
	10302	15	Hg
	10501	1,2,3,40,41	Hg
	11206	6,9	Hg
	11207	9.02,10.01, 10.02,10.03	Hg
	11215	All	Hg
	11216	All	Hg
	11217	All	Hg
	11218	All	Hg
	11306	All	Hg
	11307	All	Hg

11308	All	Hg
11309	All	Hg
11315	1,8	
11316	1	Hg
11317	1	Hg
11318	1,2	Hg
11319	1-3	Hg

Area of Concern 6411

Suspected source of contamination:
Unknown

The area of concern is made up of the following blocks and lots; also listed are the additional water quality tests required:

Area of Concern 6409

Suspected source of contamination:
Unknown

This area of concern involves a domestic well (Block 10501; Lot 5) that exceeded the maximum contaminant level for VOC's.

The case broke on 6/96. On 6/97 five private wells in the area were tested for VOC's, mercury, and nitrates. One well exceeded for VOC's.

This area of concern is made up of the following blocks and lots; also listed are the additional water quality tests required:

<u>Area of Concern</u>	<u>Blocks</u>	<u>Lots</u>	<u>Tests Required</u>
6409	9603	7	VOC
	9702	1	VOC
	10302	13-14; 23-25	VOC
	10501	4-7	VOC

<u>Area of Concern</u>	<u>Blocks</u>	<u>Lots</u>	<u>Tests Required</u>
6411	2301	2,5	VOC
	2903	1-19	VOC
	2905	1-3	VOC
	3704	All	VOC
	3705	All	VOC
	3706	All	VOC
	3707	All	VOC
	3708	All	VOC

Area of concern 6416 Poplar Ave

Suspected source of contamination:
Unknown

This area of concern involves a domestic supply well (4216 White Horse Pike, Block 3040; Lot 4) that exceeded the MCL for volatile organics. The case broke on 1/5/99. Five wells in the vicinity were tested for VOC's, mercury and nitrates by the Atlantic County Health Department. One exceeded the MCL

for volatile organics with a trichloroethane level of 1.82 (MCL 1.0). This well was tested again in 2/99 and was non-detect.

This area of concern is made up of the following blocks and lots; also listed are the additional water quality tests required:

<u>Area of Concern</u>	<u>Blocks</u>	<u>Lots</u>	<u>Tests Required</u>
6416	3038	1,3	VOC
	3039	1	VOC
	3040	1-5	VOC
	3201	1	VOC
	3203	1	VOC
	3916	1	VOC
	4125	6,7	VOC
	4137	8,9	VOC

**Area of concern 6421
Hanover Ext.**

This area of concern overlaps with area 6403. The case broke on 4/9/99. Five wells were tested for mercury, one for mercury and volatile organics and three for all three parameters. One domestic supply well exceeded the maximum contaminant level for mercury, thus extending the Hanover Street radius of concern.

This area of concern is made up of the following blocks and lots; also listed

are the additional water quality tests required:

<u>Area of Concern</u>	<u>Blocks</u>	<u>Lots</u>	<u>Tests Required</u>
6421	10402	4,5, 7-10, 13-15	Hg
	11120	5	Hg
	11121	3	Hg
	11122	12	Hg
	11207	2,5,6, 7,9,01	Hg
	11208	1-6	Hg
	11209	1-11	Hg

**Area of concern 6422
Poplar Ave. Ext.**

Suspected source(s) of contamination:

Block 3401

Lot 3;

Block 3404

Lot 10;

Block 3407

Lot 2;

Block 3409;

Lot 1

On August 12, 1999, the NJDEP received notification of mercury and volatile organic compound contamination in several domestic supply wells near Union and Poplar Avenues in the Elwood section of Mullica Township. The contaminants

included mercury, benzene, styrene, 1,2-dichloroethane, 1,1-dichloroethane, trichloroethane and tetrachloroethane.

Four properties were identified as possible sources.

Block 3401, Lot 3, was identified as a former gas station. Two underground storage tanks were identified on the site that contained a petroleum product that smelled like gasoline. A former pump island was also identified on the property.

Block 3404, Lot 10 was also identified as a former gasoline station. Fill pipes for two underground storage tanks were identified. Mercury, styrene, 1,2-dichloroethane, 1,1-dichloroethane, trichloroethane and tetrachloroethane were detected in the groundwater near the site.

Block 3407, Lot 2 was identified as a former gun/gunsmithing shop. One underground storage tank was identified and a septic tank.

Block 3409, Lot 1 was identified as a former gasoline station. One underground storage tank containing a petroleum product was identified on the site. Also identified were former garage bays, a hydraulic lift, an aboveground tank, pump islands and a septic system.

The owners of these sites were asked to sign an agreement to conduct a voluntary preliminary assessment and site investigation of their property. They were informed that the NJDEP's Division of Publicly Funded Site Remediation was directly handling the domestic supply well contamination, and might soon be moving into source identification activities. At that time, the department would conduct any remedial investigation and remedial actions of both soil and ground water and any other remedial activities required at the sites if the owners failed to conduct those activities. The owners were also informed that the Department would conduct, and that the owners would be liable for, all remedial actions for any contamination which had migrated from the property.

Several wells in the area were tested in April of 1999 and the following exceeded the maximum contaminant levels (MCL's are given in parentheses):

927 White Horse Pike

Block 3408, Lot 2

Benzene (1.0)	1.2 ppb
Trichloroethene (1.0)	1.7 ppb
Methylene Chloride (3.0)	6.0 ppb
Tetrachloroethene (1.0)	1.1 ppb

111 White Horse Pike

Block 3408

		<u>Area of</u>			<u>Tests</u>
		<u>Concern</u>	<u>Blocks</u>	<u>Lots</u>	<u>Required</u>
Lot 1					
Mercury (2)	2.4 ppb				
Methylene Chloride (3.0)	6.7 ppb				
Benzene (1.0)	1.5 ppb	6422	3040	4	VO; Hg
Trichloroethene (1)	2.2 ppb		3401	All	VO; Hg
			3402	All	VO; Hg
4509 White Horse Pike			3404	5,6	VO; Hg
Block 3409			3406	All	VO; Hg
Lot 7			3407	All	VO; Hg
Benzene (2)	522.72 ppb		3408	All	VO; Hg
Styrene (100)	115.73 ppb		3409	1-7,9	VO; Hg
Trichloroethene (1)	4.07 ppb		4113	All	VO; Hg
1,2 dichloroethane (2)	56.04 ppb		4149	4,6,7	
				8,9	VO; Hg
4401 White Horse Pike			4161	All	VO; Hg
Block 3407			4172	2,4	VO; Hg
Lot 2			4173	All	VO; Hg
Mercury (2)	26.04 ppb		4184	3	VO; Hg
Trichloroethene (1)	8.02 ppb		4185	All	VO; Hg
1,1 dichloroethane (2)	5.0 ppb		4196	3,4	VO; Hg
Methylene Chloride (3)	29.11 ppb		4197	All	VO; Hg
Tetrachloroethene (1)	18.29ppb		41109	All	VO; Hg
			41121	All	VO; Hg
4416 White Horse Pike			41133	All	VO; Hg
Block 3403			41145	All	VO; Hg
Lot 1			41157	1,2,4	VO; Hg
Mercury (2)	2.77 ppb		41158	All	VO; Hg
1,1 dichloroethane (2)	4.3 ppb				

4216 South White Horse Pike
Block 3040
Lot 4
Chloroform (10) 45.56 ppb

This area of concern is made up of the following blocks and lots; also listed are the additional water quality tests required:

The NJDEP Known Contaminated Sites List updates are not consistent. The last update was in 1997; the next update is expected in the fall of 2000.

The Atlantic County Health Department Realtor's List is updated continually as new information becomes available.

MULLICA TOWNSHIP AREAS OF CONCERN MAP

The following map shows the approximate locations of contaminated sites and areas of concern in Mullica Township according to the most current available information.

MULLICA TOWNSHIP AREAS OF CONCERN MAP



- Roads
- County
 - Municipal
 - Other
 - State
 - Train
 - Open Space

- | | |
|----------|----------|
| AOC 6401 | AOC 6411 |
| AOC 6402 | AOC 6416 |
| AOC 6403 | AOC 6421 |
| AOC 6409 | AOC 6422 |

4000 0 4000 8000 Feet



VEGETATION AND WILDLIFE

MULLICA TOWNSHIP HAS A
WIDE DIVERSITY OF HABITAT
FOR VEGETATION AND
WILDLIFE, INCLUDING
HABITAT SUPPORTIVE OF MANY
THREATENED AND
ENDANGERED SPECIES.

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WILDLIFE

It is not known how the disappearance of a given species affects the ecology of the planet as a whole, but we do know that biodiversity gives an important stability to the ecology of a region. Mullica Township is important habitat for several of New Jersey's threatened and endangered animal and plant species.

Threatened and Endangered Species

When a population falls below certain numbers in the country, it is listed by the federal government as **endangered or threatened**; if the species declines in the state but is generally stable in the country as a whole, it is listed as **state endangered or threatened**. Sometimes a population occurs in only one location in the entire world; it is then referred to as **globally rare**.

This section contains 1) a description of sites and a list of the threatened and endangered species they contain; 2) a list of threatened and endangered species that have been observed in Mullica Township, along with descriptions and illustrations; and 3) a map of general areas (sites) that are habitat for the threatened and endangered species populations occurring in the Township. Also described in this section is a special area of study known as the **Elwood Corridor**.

The site descriptions and species lists were taken from the Natural Heritage

Database of the Natural Lands Management Office of the New Jersey Department of Environmental Protection Division of Parks and Forestry. The Elwood Corridor data was supplied by the New Jersey Conservation Foundation. This important precaution is advised. The purpose of the maps is to enable the Environmental Commission and the Planning Board to make wise and prudent decisions concerning new development in these sensitive areas. It is the job of the Environmental Commission to help determine any need for protection of these sites; sometimes it is possible for the township to purchase them and preserve them as open space. The maps should not, however, be used as a means of locating any of the species or for disturbing them in any way.

The Natural Lands Management Office requires that the following notice be included whenever information provided by the Natural Heritage Database is published:

CAUTIONS AND RESTRICTIONS ON NATURAL HERITAGE DATA

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

Natural Heritage Site Descriptions

The Natural Lands Management Office has mapped out sites that are habitat for certain threatened and endangered species. The sites are of two types, **macrosites**, which cover large areas, and **standard sites** which are smaller, more concentrated habitats. The Natural Heritage Database contains several thousand records of individual occurrences of listed species and ecosystems, but much work still needs to be done. The mapping is intended for "red-flagging" the general areas in which the occurrences are located, areas that may therefore be significant for endangered biological diversity.

Biodiversity significance is rated in the database as follows:

Outstanding significance: Generally a "last of the least" type, such as an only known occurrence of any species.

Very high significance: The most outstanding occurrence of any community or species.

High significance: Occurrence of a very important species or element or a good concentration of any element.

Moderate significance: State-rare species or concentration of species close to becoming threatened or endangered.

Of general biodiversity interest or open space.

NE of Weekstown Site

The NE of Weekstown site is located in the floodplain of the Mullica River west of Green Bank Road. The site is situated in a muddy, intertidal shore area in fresh to brackish water. It is of **moderate significance** because it contains a rare plant species. The globally rare **Parker's pipewort** has been observed on this site.

Columbia Road Swales

The Columbia Road Swales is a section of mowed powerline right-of-way fifty feet wide that runs parallel to the railroad. Several intermittent streams cross the site. This site includes a wetland habitat for rare plant species plus a buffer area. It is of **Very High significance** due to excellent occurrences of three globally rare plant species and an occurrence of a globally imperiled plant species. Special concern species are also present. The site is habitat for the Pine Barren Reedgrass which is on the Pinelands Commission endangered and threatened species list; Barratt's Sedge, also endangered in the Pinelands and globally rare; the Pine Barren Boneset which is on the state endangered species list, the Pinelands endangered or threatened

species list and globally rare. Pine Barren Boneset is imperiled in the state because of its rarity due to destruction of habitat. The site is also habitat to the Pine Barren Gentian which is on the Pinelands Commission endangered or threatened species list, is imperiled in the state because of its rarity due to destruction of habitat and is globally rare; and the Pale Beak Rush which is rare in the state and globally rare.

Reading at Darmstadt Site

The Reading site is a sandy roadside and mowed powerline right-of-way in a pitch-pine lowland. The site is of **Very High significance**, containing good populations of globally imperiled and globally rare plant species. Found in this site are Pine Barren Reedgrass which is on the Pinelands Commission endangered and threatened species list; Barratt's Sedge, also endangered in the Pinelands and globally rare; Pine Barren Gentian which is on the Pinelands Commission endangered or threatened species list, is imperiled in the state because of its rarity due to destruction of habitat and is globally rare; and Knieskern's Beaked Rush which is on the federal endangered species list, the state endangered species list, the Pinelands Commission endangered or threatened species list, is considered to be critically imperiled in New Jersey because of

its extreme rarity and is critically imperiled globally because of its extreme rarity.

Mackenzie Swales

Mackenzie swales is a mowed powerline right-of-way adjacent to a railroad with a rolling topography. The driest portions are damp meadows, the wettest are sphagnum bogs. The site includes successional wetland habitat for rare plant species and an adjacent forested buffer area. It is a Very High significance site, containing one federally listed threatened plant species and five additional globally rare plant species. Found on this site are the Pine Barren Reedgrass which is on the Pinelands Commission endangered and threatened species list; Barratt's Sedge, also endangered in the Pinelands and globally rare; Pine Barren Gentian which is on the Pinelands Commission endangered or threatened species list, is imperiled in the state because of its rarity due to destruction of habitat and is globally rare; New Jersey Rush which is on the state endangered species list, the Pinelands Commission endangered and threatened species list, is imperiled in the state because of its rarity due to destruction of habitat, and is imperiled globally because of its rarity; Knieskern's Beaked Rush which is on the federal endangered species

list, the state endangered species list, the Pinelands Commission endangered or threatened species list, is considered to be critically imperiled in New Jersey because of its extreme rarity and is critically imperiled globally because of its extreme rarity; Pale Beak Rush which is rare in the state and globally rare; Curly Grass Fern which is on the Pinelands Commission endangered and threatened species list, is rare in the state and is globally rare; Pine Barren Bellwort, which is on the state endangered species list and Fringed Yellow-Eyed Grass which is on the state endangered species list and is critically imperiled in the state due to its rarity.

Batsto Macrosite

The Batsto Macrosite contains numerous pine barren savannas and cedar swamps along undeveloped portions of the upper Mullica rivers, and extensive pitch pine lowlands, pine oak, and oak pine forests in undeveloped portions of the watershed for the river. This macrosite is of Outstanding significance due to the numerous exemplary globally rare communities and plant and insect species.

Species in this habitat include:

Globally critically imperiled, federally threatened, state endangered, and Pinelands endangered or threatened

- Knieskern's Beaked Rush

Globally imperiled, federal and state endangered, and Pinelands endangered or threatened:

- Chaffseed

Globally imperiled, Pinelands endangered or threatened, state endangered and under consideration for federal endangered or threatened status:

- Bog Asphodel

Globally imperiled, state endangered and Pinelands endangered or threatened:

- New Jersey Rush
- Long's Bulrush

Globally rare, state endangered and Pinelands endangered or threatened:

- Pine Barren Boneset

State endangered, Pinelands endangered or threatened:

- Spreading Pogonia

State endangered:

- Timber Rattlesnake
- Pine Barrens Treefrog
- False Boneset
- Bristling Panicgrass
- Small Headed Beaked Rush
- Lace-Lip Ladies' Tresses

- Least Tern
- Pine Barren Bellwort
- Fringed Yellow-Eyed Grass
- Button Bush Dodder
- Coast Flatsedge
- Twisted Spikerush

State threatened:

- Red-Headed Woodpecker
- Northern Pine Snake
- Barred Owl

Globally rare and Pinelands endangered or threatened:

- Barratt's Sedge
- Pink Tickseed
- Pine Barren Smokegrass
- Curly Grass Fern

Pinelands endangered or threatened:

- Red Milkweed
- Pinebarren Reedgrass
- Pinebarren Gentian
- Southern Twayblade
- Hairy Ludwigia
- Climbing Fern
- Pine Barren Smoke Grass
- Crested Yellow Orchid
- Curly Grass Fern

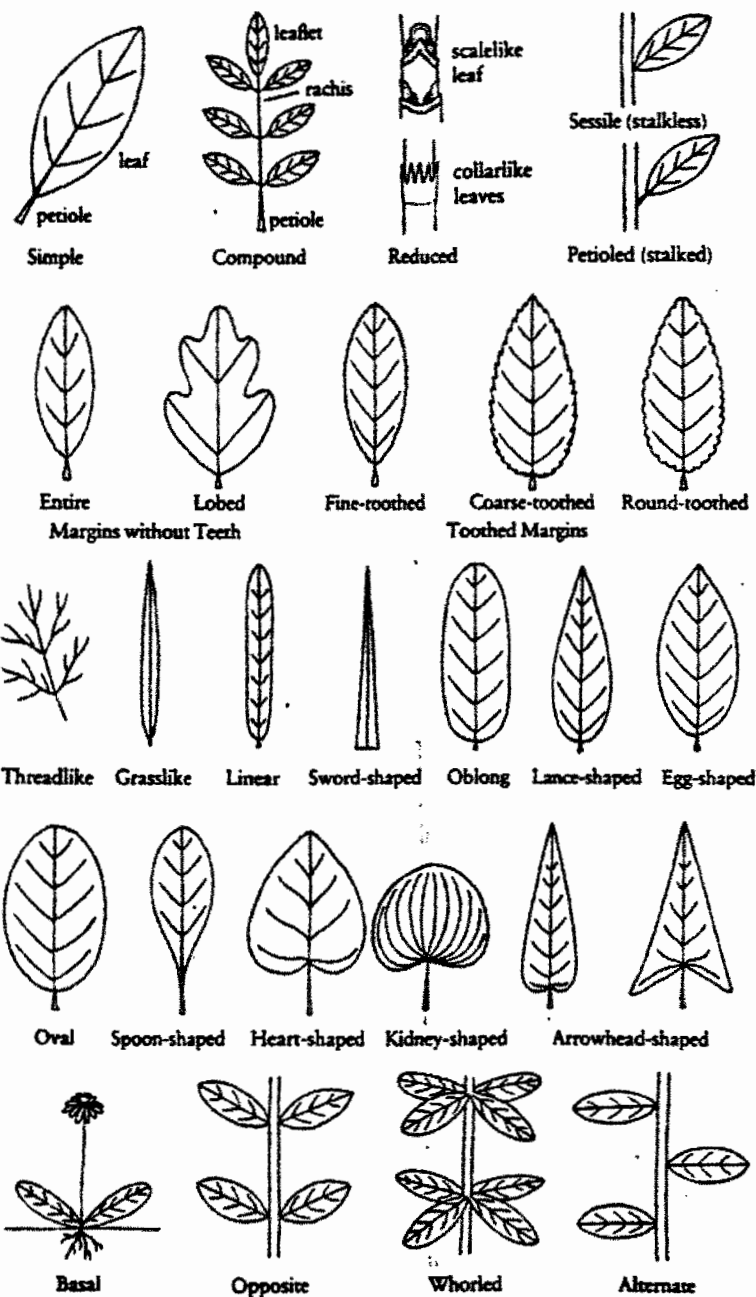
Globally rare:

- Herodias Underwing
- Scarlet Bluet
- Parker's Pipewort
- A Spanworm
- Lemmer's Pinion Moth
- Doll's Merolonche
- Coastal Swamp Metarranthi

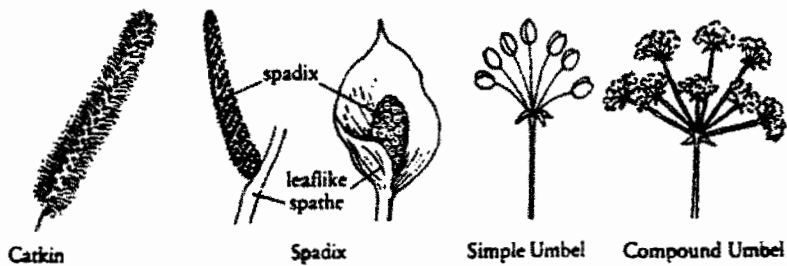
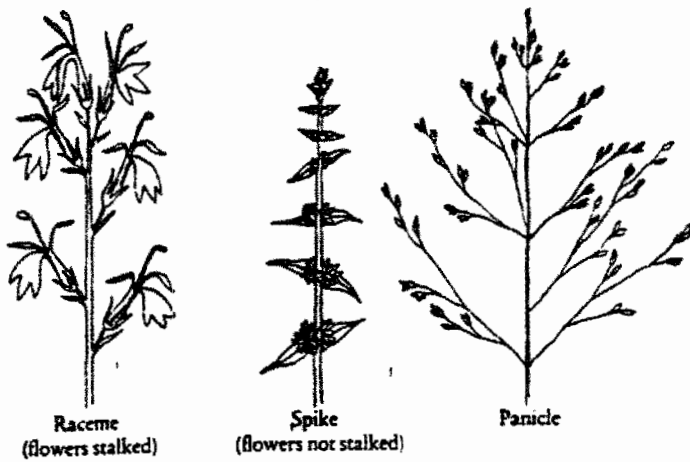
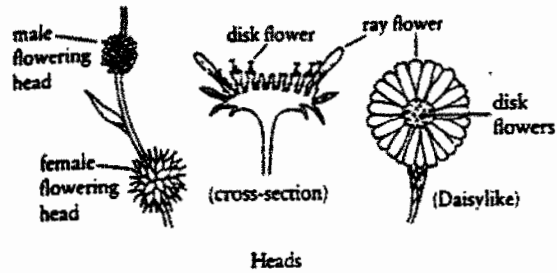
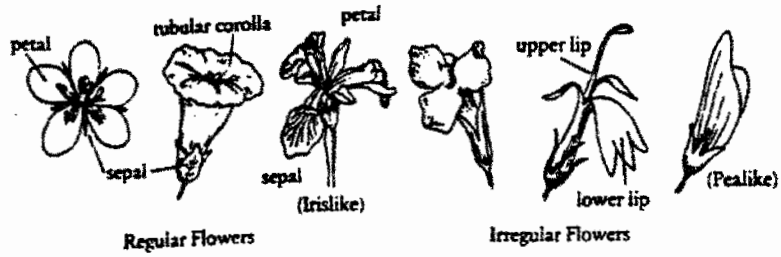
- Hessel's Hairstreak
- Pitch Pine Lowland Forest
- Pale Beak Rush
- Coppery Emerald
- Treetop Emerald
- Pine Barrens Zale

On the following pages are drawings of leaf types and arrangements and flower types and arrangements to help understand the plant species descriptions.

Leaf types and arrangements.



Flower types and arrangements.

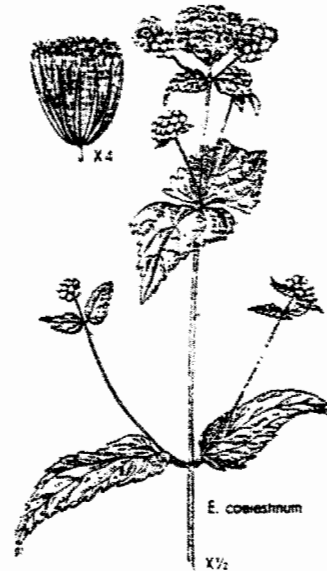


Description of Species

Barratt's Sedge (*Carex Barrattii*). This grass has a smooth stem that grows to about 3-8 dm. tall; the blades are 2-4 cm. wide. Staminate spike is long and narrow, 3-5 cm long. The 2-5 pistillate spikes are cylindrical, long and drooping. Seed is straw-colored and oval-shaped. Found in wet ground, especially in pine-barren swamps.



Blue Boneset (*Eupatorium coelestinum*). A perennial with a slender stem growing two to three feet tall. The leaves are opposite, deltoid-ovate, mostly 3-10 cm. long and 2-5 cm. wide and sparsely hairy. Flowers grow 35-70 in each head; ordinarily bright blue or violet, often turning purple in drying. Found in woodlands, on stream banks, in meadows and fields.



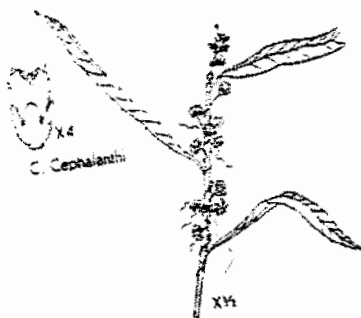
Bog Asphodel (*Narthecium americanum*). Erect, linear leaves radiating from the base; the raceme is 3-6 cm long and crowded. The flowers are 4-6 mm long. The seed pod is long and pointed, 10-14 mm. Grows in pine-barren bogs.



Bristling Panicgrass (*Panicum aciculare*). Sparse plant with stems 8-20 inches tall; forms dense clumps; leaves long, tapered, hairy, stiffly spreading. Spikelets oval shaped, blunt, sparse; few flowers. Found in sandy woods.



Button Bush Dodder (*Cuscuta Cephalanthi*). Flowers in clusters of 4; about 3 mm. long, stemless. In loose clusters; tube-shaped with lobes erect or spreading.



Canbys Lobelia (*Lobelia Canbyi*). Erect stem, simple or branched above, 4-10 dm. tall. Leaves are linear, up to 5 cm. Long, 2-5 cm. Wide. Racemes are slender with few flowers, 1-3 dm. long. Flower stems and bracts about the same size. Flower is blue, about 10 mm. long. Found in swamps on the coastal plain.



Chaffseed(*Schwalbea americana*). A perennial plant with a simple stem, 12 to 24 inches tall; upper leaves alternate and stemless, covered with soft, downy hairs; single yellow flowers tinged with purple grow out of the axils of the upper leaves. Found in moist, sandy soil.



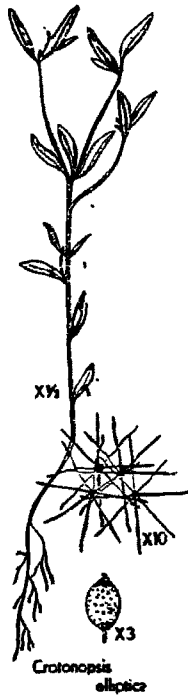
Curly Grass Fern (*Schizaea pusilla*). Slender rhizomes, radiating densely from base; mostly unbranched. Leaves very numerous, narrowly linear, 2-6 cm. long, 0.3-0.4 mm.wide; toothless, unbranched, curled and stemless. 8-14 Sporangia per segment. Found on hummocks in bogs or in wet, grassy places, in acid soil.



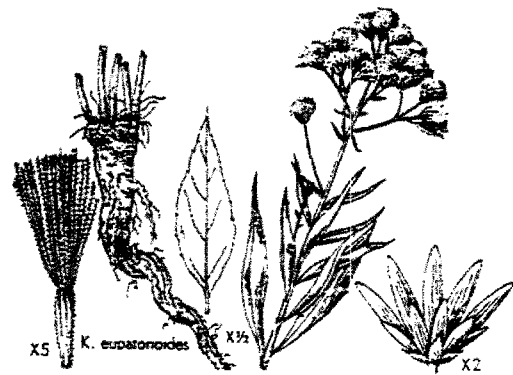
Coast Flatsedge (*Cyperus polystachyos*) An annual fern, stems 2-6 dm. tall. Leaves shorter than the stem, 1-3 mm. wide. Bracts 3-5, 5-18 cm. long. The umbel has 1-6 stemless rays or spikes up to 6 cm. long. Up to Each ray consists of 10-15 spikelets, commonly 8-15 mm. long and 1-1.8 mm. wide. The scales on the spikelets are straw-colored and oblong-shaped. Found in wet soil mostly near the coast.



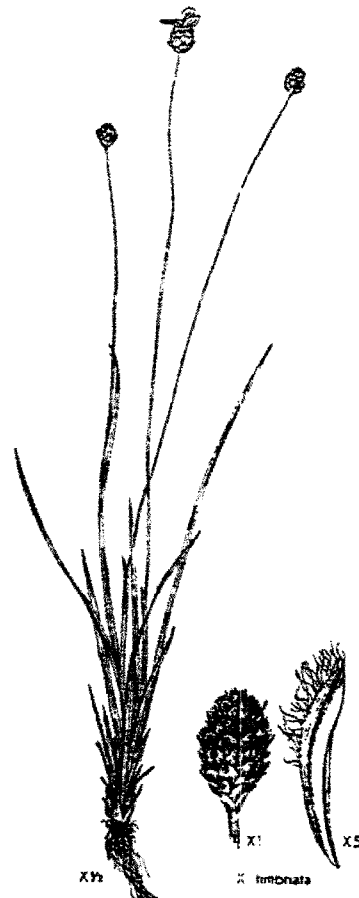
Elliptical Rushfoil (*Crotonopsis elliptica*). Stems 1-4 dm. tall, slender, usually repeatedly branched. Leaves linear to ovate lance-shaped, 1-3 cm. long. Only 1 or 2 capsules in each spike. Found in sandy soils or rocky barrens.



False Boneset (*Kuhnia eupatorioides*). Plants 3-13 dm. tall. Leaves narrow and lance-shaped to broad-based and lance-shaped, 2.5-10 cm. long; toothed. Heads mostly in small clusters terminating the branches; flowers 7-33 in each head; creamy white. Found in dry open spaces, especially in sandy soils.



Fringed Yellow-eyed Grass (*Xyris fimbriata*). Stems stout, 6-10 dm. tall. Leaves 3-6 dm. long, 5-10 mm wide. Spike oval-shaped, 10-25 mm. long, 8-12 mm. thick. The bracts that make up the spike are straw colored to brown and broadly oval, about 7 mm. long. The sepals are 6-9 mm long and fringed. Found in wet pine barrens.

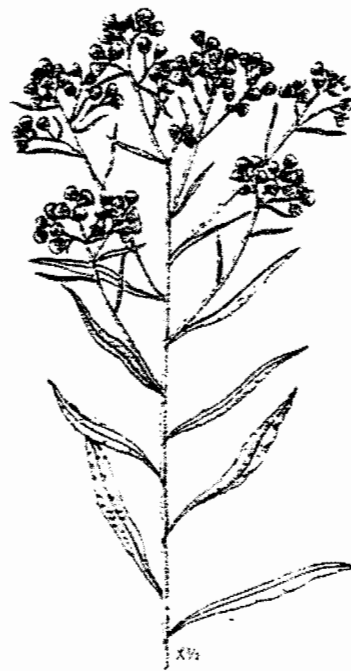


Hairy Ludwigia (*Ludwigia hirtella*). Stems are erect, branched, 4-10 dm. tall, hairy with spreading hairs. The leaves are erect, lance-shaped, 2-5 cm. long, stemless. Pedicels 3-8 mm. long, branching out near the top. Flower petals 10-15 mm. long. Capsule is 4-6 mm. long, thick and square above, sharply angled, round below; hairy with spreading hairs.

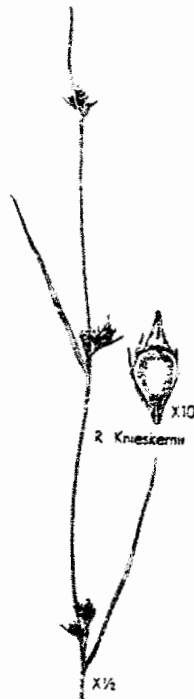
Found in swamps on the coastal plain.



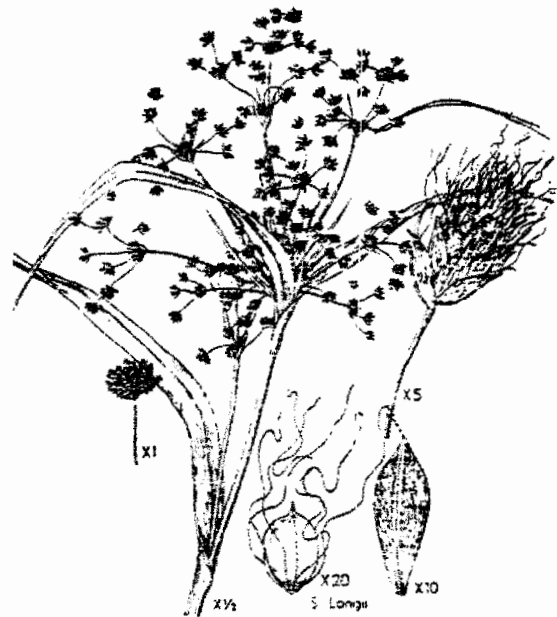
Hellers Everlasting (*Gnaphalium Helleri*). A fragrant, annual plant, about 1-8 dm. tall, erect. The stem is thinly white and hairy. Leaves numerous, linear and lance-shaped, up to about 10 cm. long and 1 cm. wide, stemless, hairy above and wooly beneath. The blooms are branched and many-headed; flat or round-topped. Flowers are yellowish white or somewhat dingy and bristled. Found in dry, commonly sandy soil, often in woods.



Knieskerns Beaked Rush (*Rhynchospora Knieskernii*). Stems up to 5 dm. tall. Leaves 1-2 mm. wide, long, slender, tapering. Head 5-10mm. wide. Seed oval; 1.1-1.3 mm. long, half as wide. Triangular with 6 bristles. Found in pine barren bogs.



Longs Bulrush (*Scirpus Longii*). A perennial with stems up to 2 dm. tall. Leaves 5-10 mm. wide; bracts look like leaves but are droopy at the ends. Blooms are in several rays ascending from the base; branched. The ultimate branches bear one to several spikelets 5 - 8 mm long. Seeds have long bristles. Found in marshes.



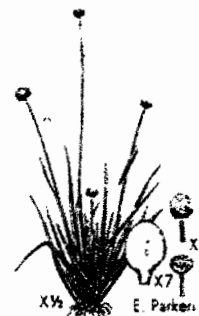
New Jersey Rush (*Juncus caesariensis*).
Stem 4-7 dm. tall. Leaves rough, very long and narrow, up to 3 dm. long. Bloomed portion is branched, 6-12 cm. high, about 2/3 as thick. Blooms are at the end and the sides of the branches, about 1 cm. in diameter with 2-6 flowers. The capsule is a long ellipse tapering to a short beak. Found in sphagnum bogs in the pine barrens.



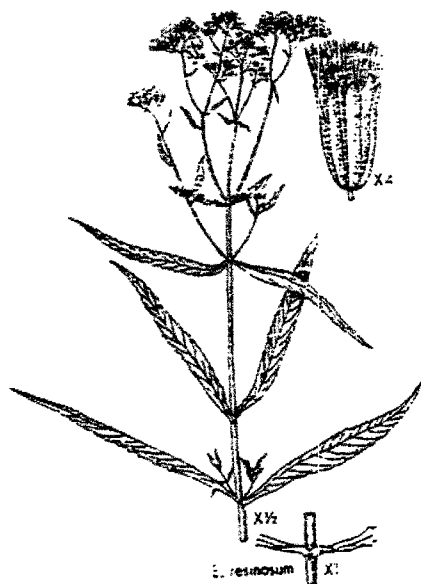
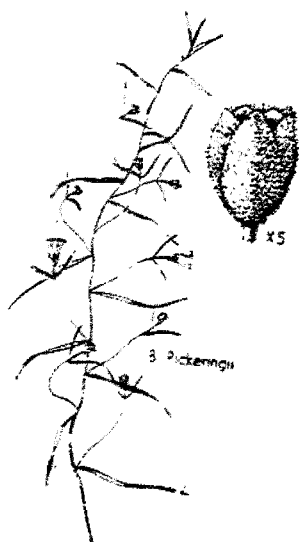
Pale Beak Rush (*Rhynchospora pallida*).
Stems 3-8 dm. tall, bulbous at the base, usually exceeding the leaves. Flower clusters dense and round, 1-2.5 cm. wide with 2 bracts. Seed is oval, 1.3-1.6 mm. long, brown with pale central spot; up to 3 bristles.



Parkers Pipewort (*Eriocaulon Parkerii*).
Leaves thin, 2-6 cm. long. Stems 3-20 cm long, but can reach 2 m. when growing in deep water. Heads are 3-5 mm. in diameter. Usually found in shallow water, occasionally in deep water or on miry shores.

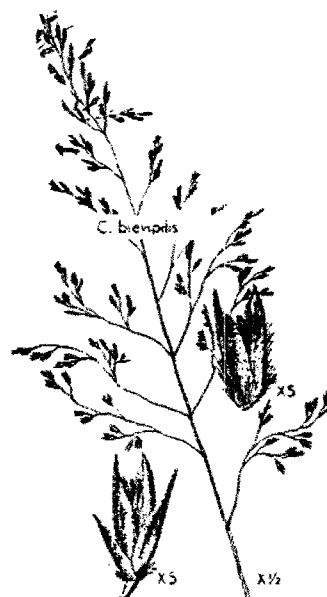


Pickerings Morning Glory (*Breweria Pickeringii*). Stems freely branched up to 8 dm. long; thin. Leaves linear, 3-5 cm. long, 2-5 mm. wide, gradually narrowed at the base. Flower stems slender, about as long as the leaves, with two smaller bracts. White flowers are about 12 mm. long. Found in dry pine barrens on the coastal plain.

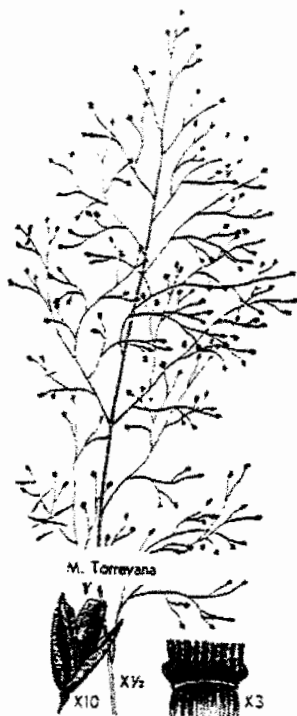


Pine Barren Reedgrass (*Calamovilfa brevipilis*). Slender erect stems, 5-12 dm. tall from a thick short rhizome. The panicle is 1-3 dm long, loose, with ascending or spreading branches. Found in swamps and bogs, pine barrens.

Pine Barren Boneset (*Eupatorium resinosum*). Fibrous rooted perennial, 4-10 dm. tall. Leaves are long, lance-shaped, stemless and serrated, 5-13 cm. long and 5-15 mm. wide. Flower stems have small bracts; flowers white, 3-4 mm. long, mostly 9-14 in each head. Found in wet places, especially the pine barrens.



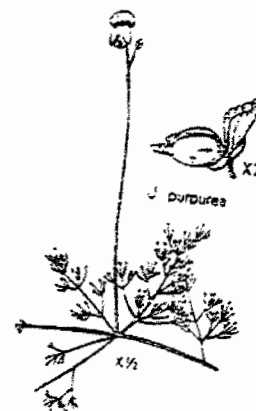
Pine Barren Smoke Grass (*Muhlenbergia Torreyana*). Stems very slender, 2-4 dm. tall. Panicle slender, $\frac{1}{4}$ to $\frac{1}{2}$ as long as the entire plant. Spikelets are drab, ellipse-shaped. Found in moist or wet, sandy or peaty soil, open meadows and bogs.



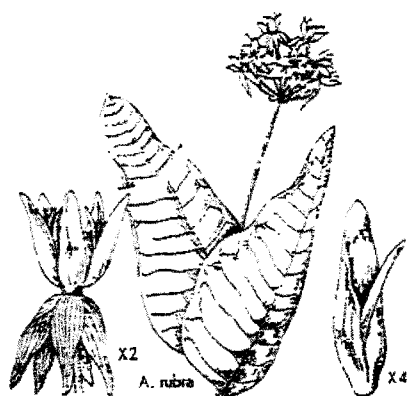
Pink Tickseed (*Coreopsis rosea*). Perennial with well-developed, creeping rhizomes. Stem erect, 2-6 dm. tall. Leaves 2-5 cm. long, linear, untoothed. Flowers numerous, 0.5-1 cm wide; pink to sometimes white; yellow centers. Found in wet, often sandy or acid soil, or in shallow water.



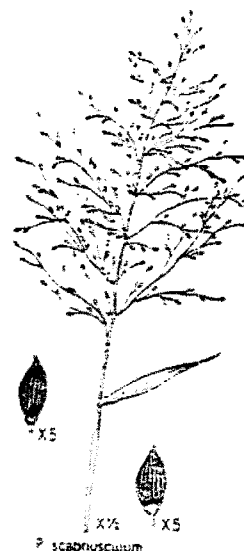
Purple Bladderwort (*Utricularia purpurea*). Stems are submerged, up to 1 m. long. Leaves are numerous, in whorls of 5-7 separated by nodes; with many branches. Flowering branches are 3-15 cm. long with 1-4 flowers. Flowers are about 1 cm. long, violet or red-violet, the upper lip flat or concave, the lower lip bearing a yellow spot at the base. Found in quiet water along the coastal plain



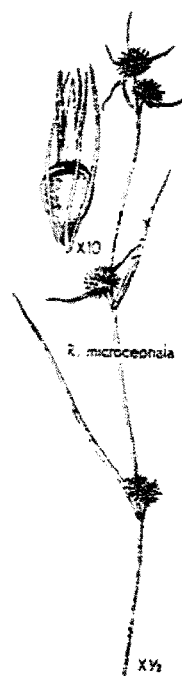
Red Milkweed (*Asclepias rubra*). Stems 5-12 dm. tall, bearing several pairs of leaves and 1 to few small terminal umbels. Leaves are stemless and lance-shaped, 8-12 cm. long and rounded at the base. The flower is red, 8-10 mm. long; hoods slender, erect, red or orange-red, 8-9 mm. long, horn nearly erect and nearly as long as the hood. Pods are 8-10 cm. long, erect on stem. Found in swamps, bogs, and wet woods on or near the coastal plain.



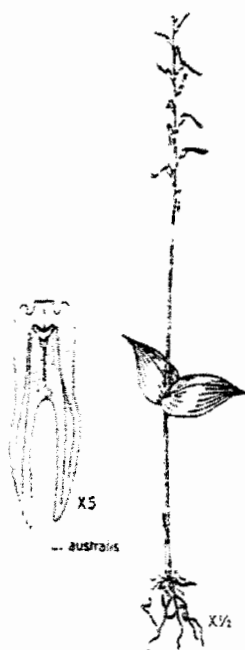
Sheathed Panic Grass (*Panicum scabriusculum*). A tufted grass with few erect stems 8-12 dm. tall. Panicle oval-shaped with spreading or ascending branches, 8-12 or even 20 cm. long. Spikelets oval or lance-shaped, pointed, 2.2 to 2.6 mm. long. Found on wet ground in the coastal plain.



Small Headed Beaked Rush (*Rhynchospora microcephala*). Stems erect, up to 1 m. tall. Heads dense, 8-15 mm. wide. Spikelets dark brown, with one perfect flower. Found on wet, acid soil on the coastal plain.



Southern Twayblade (*Listeria australis*). Stem is 1.5-3 dm. tall. Leaves are ovate, 1-2.5 cm. long, rounded at the base. Flower petals are oblong, about 2mm. Lip is narrow and oblong, dull red, 6-10 mm. long, cleft into two nearly linear lobes. Found in shaded bogs and wet woods.



Spreading Pogonia (*Cleistes divaricata*). Slender stem, 2-6 dm. tall. Leaf long and stemless, 5-11 cm. long, 8-20 mm. wide. Flower somewhat nodding, purple-brown sepals and pink to rose-purple petals. Lip slightly exceeding the petals, greenish, veined with purple. Found in swamps and wet woods, mostly on the coastal plain.



Swamp pink (*Hellonias bullata*). Spoon-shaped leaves are evergreen, thick, naked stem ending in oval-shaped raceme of small pink flowers. Found in swamps and bogs.



Twisted Spikerush (*Eleocharis tortilis*). A grass with stems of 10-32 inch length, which are often spirally twisted; spikelets are egg-shaped with few flowers. Honeycombed seeds are oval with angular ridges and are topped with a cone-shaped tubercle. Found in springy swamps, wet woods and thickets.



Barred Owl (*Strix varia*). Breeding range throughout U.S. Habitat is forests, mainly swampy woodlands. Nest typically cavity in tree, hollow in top of broken tree stub, or abandoned hawk

nests; rarely on ground. No lining except that already present. Strong attachment to nest year after year. Only owl besides the barn owl that has dark eyes.



Eastern Tiger Salamander (*Ambystoma tigrinum*). Breed in abandoned gravel pits. Needs fresh water and terrestrial environments for breeding. Decline seems to be due to introduction of fish into their natural breeding grounds and destruction of their man-made ones (gravel pits).



Northern Pine Snake (*Pituophis melanoleucus*). A subspecies of the pine-gopher snake. Large and powerfully built; small head. White, pale gray or yellowish with black blotches near front of body, often brownish toward rear. Generally diurnal, but may be active at night during hot weather. This snake takes refuge in mammal or tortoise burrows or under large rocks or logs. Noted for its consumption of rodents. When confronted, the snake hisses loudly, sometimes flattening its head and vibrating its tail, and then lunges at the intruder.



Pine Barrens Treefrog (*Hyla andersonii*) This endangered frog has long limbs and digits ending in adhesive disks for climbing trees and twigs. Males have a vocal sac which connects beneath their necks and may inflate. The coloration is green with lavender stripes bordered in white. Considerable orange also occurs along the folds of the legs. Pine Barrens Treefrogs are 1.125 to 1.75 inches long. Females grow larger than males. Habitat is the swamps, bogs and warm

acid waters of the New Jersey Pine Barrens. They feed on small insects and other invertebrates.



Timber rattlesnake (*Crotalus horridus*). 35- 74 V2" long; yellowish-brownish-or pinkish-gray, with tan or reddish-brown back stripe dividing chevron-like crossbands; dark stripe behind eye. Black tail. Found in unsettled swampy areas, canebrake thickets, and flood plains. Active April to October, in the daytime in spring and fall, at night during the summer. When approached, remains motionless. Record longevity exceeds 30 years.



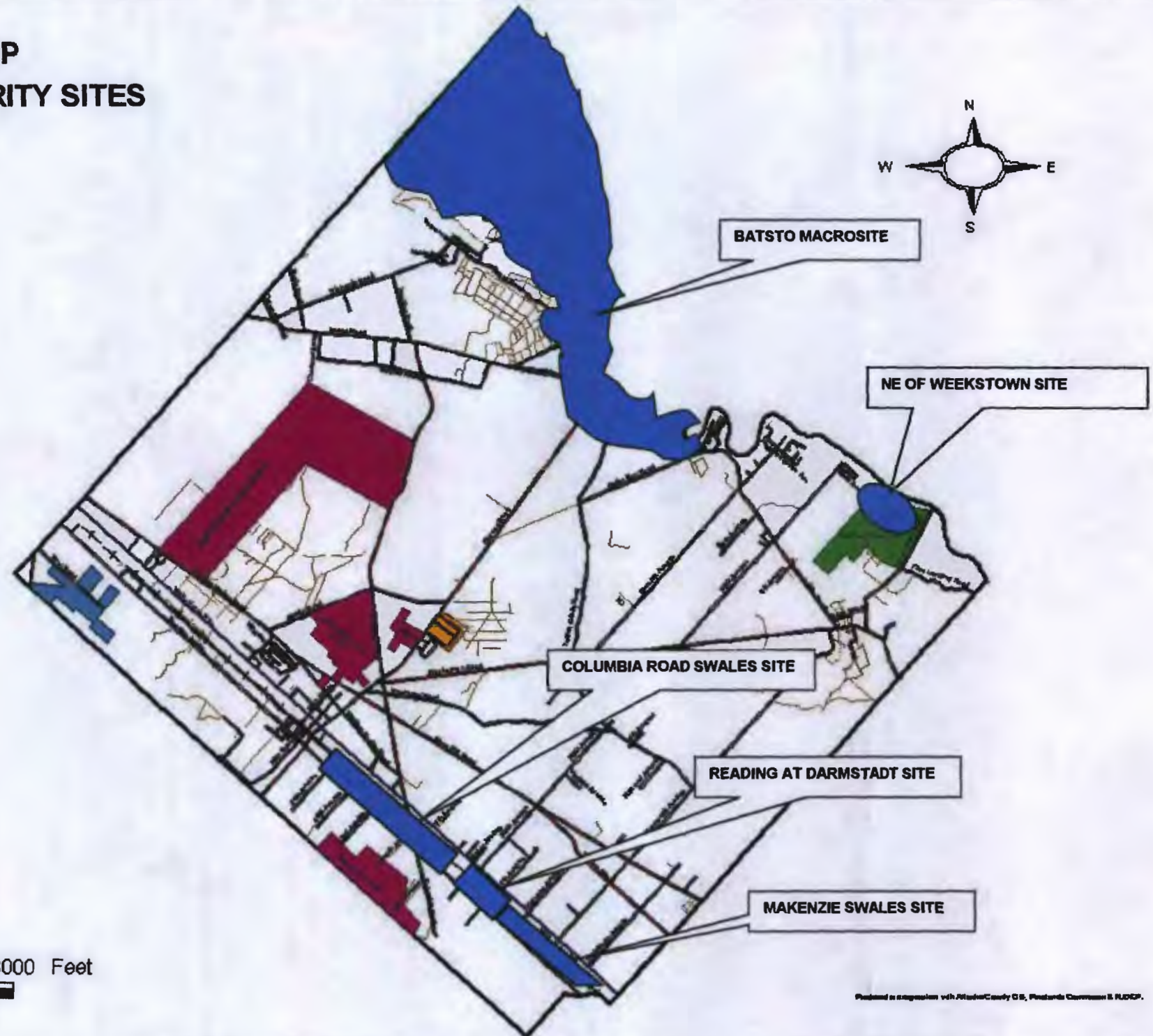
NATURAL HERITAGE SITE MAP FOR MULLICA TOWNSHIP

This map depicts the location of the sites where incidents of various threatened and endangered species have been recorded.

MULLICA TOWNSHIP NATURAL HERITAGE PRIORITY SITES

- Roads**
- County
 - Municipal
 - Other
 - State
 - Train
 - Open
 - Farmland Preservation
 - Municipal Boundary
 - Wildlife Management Areas
 - Recreation Area
 - Site

4000 0 4000 8000 Feet



Prepared in cooperation with Atlantic County GIS, Planning Commission & RUCDP.

The Elwood Corridor

Description

The Elwood Corridor is a loosely defined area that extends roughly

from Batsto in Burlington County through West Atlantic County to Cape May County. Mullica's town of Elwood is located in the approximate center of the corridor—thus the name "Elwood Corridor."



The red hatched area depicts the approximate boundaries of the Elwood Corridor landmass in Atlantic County. The position of Mullica Township within the Elwood Corridor is also depicted.

The Elwood Corridor was conceived by the authors of the Pinelands Act of the 1970's, which defined several "critical areas", among these *linkage corridors* that "connect areas which are preserved in their natural state. They provide continuity for dispersal and genetic exchange among populations of a plant or animal species, ensuring both the recolonization of populations which become locally extinct and the maintenance of genetic variability." However, none of the public money targeted large public acquisitions in those areas. It hasn't been until recently that agencies have been trying to rekindle interest in the corridor before it gets fragmented beyond recognition.

In Burlington and Cape May counties, much of the Pinelands were preserved in public land, such as the Wharton , Bass River, Green Bank and Belleplain State Forests. But in Atlantic County, much of the land was subdivided on tax maps into small parcels that were sold in early land-development schemes.

Several government agencies and environmental organizations are loosely coordinating their efforts to buy the most important pieces while they still can and to slow development in the intervening pieces as much as possible.

Entities with holdings in the corridor area include the New Jersey Conservation Foundation, the Atlantic County Park System, New Jersey Natural Lands Trust, the Pinelands Commission, the Green Acres Program, and the Division of Fish, Game and Wildlife. The Green Acres agency coordinates the acquisitions.

Purpose

Several years ago, a scientist pointed out the importance of a "land bridge" connecting large preservation areas in Burlington and Cape May Counties. The land bridge is essential to maintaining genetic variability among wildlife populations, both plant and animal, by providing a continuity of habitat for dispersal and genetic exchange, particularly in the face of continuing fragmentation of southern New Jersey's natural habitats. Genetic exchange ensures the recolonization of populations which otherwise would become locally extinct.

Characteristics

Although portions of the Elwood Corridor are interspersed with various types of human development and numerous paved roads pass through it, it nevertheless has large tracts of forested open space. In addition to being an important dispersal route,

these open space areas serve as annual migrating bird feeding habitat and residential bird nesting habitat. The corridor also serves as an important link between lepidopteran (butterflies and moths) and odonate (dragonflies and damselflies) populations, and a necessary migration route for reptile and amphibian populations, especially for snakes and box turtles.

Protection

Application of protective measures in this area would ensure that many critical resources are preserved. The Elwood Corridor lands support a highly diverse group of rare, threatened and endangered plants. Protection would preserve and enhance recreational opportunities such as fishing, boating, camping, nature study and historic sites.

A protected corridor would link existing publicly owned lands and help develop a large contiguous parcel that supports maintenance of the region's ecological character and facilities management.

Several public and private entities have been involved in the preservation of these lands, notably among them the New Jersey Conservation Foundation and the New Jersey Natural Lands Trust, both of whom have been leaders in the use of

various acquisition techniques to protect lands for the public.

1985 Hammonton News Article

Headline: Elwood Was Once Proposed as Atlantic City's Dumping Ground

Byline: The Way It Was by J.G. Wilson

Article: "ELWOOD - "They're trying to turn us into a trash pile." Or, "They want to turn us into a place where the rest of the county can get rid of its junk and trash."

Then there was, "Dump the dump!"

All the above quotes of course were produced by the county's efforts to install a regional landfill at Amatol not too long ago.

Now let's change the quotes and headlines a bit: "They are trying to make Elwood the swill tub for Atlantic City."

Amatol and Elwood are both located in Mullica Township. Where Amatol ends and Elwood begins no one can truly say, for both are local names of areas without corporate boundaries, though Elwood can be termed "the capitol of Mullica Township."

The point is, locating the regional dump had a precedent. Many readers may be surprised to learn the

"swill tub" episode, which had Elwood in an uproar, occurred in 1890!

The problems began when the Atlantic City hotels began to ship their garbage to Elwood late in June on the narrow-gauge railroad.

The line was in financial trouble in 1880 and in 1883 was taken over by the powerful Reading Railroad, double-tracked and re-named the Atlantic City Railroad.

But in 1880 the line had been re-duced to hauling garbage. The cars were unloaded into wagons owned by a man named Barclay Middleton. The stuff was carted through the village streets apparently in uncovered vehicles by Middleton to a huge piggery located on land owned by Thomas Smith.

This prompted Dion Woolley the publisher of "The Hornet", a small Hammonton Newspaper, to charge the disposal program was making Elwood "the swill tub of Atlantic City."

This was picked up by M. F. Champlin, an erudite citizen and resident of Elwood, to write a long letter of protest to the South Jersey Republican. The Republican carried the letter on the front page of its July 31, 1880 issue and it embodies an excellent chronology of the issue.

It seems that shortly after the trains started arriving with their odiferous "freight", some women of the community approached Middletown to voice their displeasure.

But Middletown told them, rather arrogantly, that he was within his rights and "I would like to see them stop it if they could."

A few days later a petition was drawn condemning the nuisance and was signed by every resident asked with the exception of one. The document was given to the local officials and there was a meeting of the Township Committee on June 28.

The community had no board of health but no problem. One was organized on the spot and included the township assessor along with Walter Miller, township clerk, George Biggs, who was made chairman and a Mr. Bassett.

The newly created board of health wasted no time. It declared the introduction of the garbage into Elwood a nuisance and ordered the clerk to serve notice on Middleton and William Bischoff, agent for the railroad. The notice was clear enough - "there must not be any more garbage brought here by cars or drawn from the Elwood Station by wagons after June 30."

On July 1 a member of the board of health (Bassett) met with Smith, who was described as the owner of the Middleton farm and a garbage contractor.

Then came the astonishing news that Bassett had told Smith that he "might continue to bring the nuisance here in the cars and Middleton might

continue to draw the stuff through the streets in his wagons without regard to the feelings of the people."

Apparently Biggs concurred. On July 3 Champlin, the writer of the letter, called on Biggs and asked him if in his capacity as chairman he intended to call a meeting of the board of health. Biggs answered in the negative saying the board had been illegally organized, since the salaries of its members had not been stipulated!

Later that day, Champlin called on Bassett and asked if the board contemplated any action but was told that he (Bassett) had called on Smith and told him he could continue to bring in the garbage. Bassett added he could tell Smith how to bring the stuff in without creating a nuisance.

Biggs apparantly concurred in this but Miller, the township clerk, would have no parts of it and resigned.

This story has to end in something of an anti-climax. There was an uproar of course, but the only "hard news" we have of what happened next is a terse note in the Aug. 14 issue of SJR, which announced the problem had been solved and that Atlantic City is now burying its garbage."

We can speculate that political pressure was applied behind the scenes and the powers, not wishing to antagonize a united bloc of voters, worked out the details."

Studies

New Jersey Conservation Foundation 1996 Survey

The New Jersey Conservation Foundation is presently conducting a project involving the Elwood Corridor. The purpose of the project is to establish a "greenway" through Atlantic County that would provide a forest corridor between Burlington and Cape May Counties. There are twenty-four project sites covering most of the corridor with the exception of the cities of Egg Harbor City and Hammonton. Four of these project sites are in Mullica Township.

In 1996 the New Jersey Conservation Foundation requested that Herpetological Associates, Inc. (HA) of Forked River New Jersey conduct a survey of the project sites. HA composed a list of eighteen sites suitable for study. Of the eighteen, four are in Mullica Township. They are as follows:

Site # 2. Pleasant Mills/
Nescohague Creek/ Nesco

Site # 3. Colombia Road/
Sailor Boy Road/ Amitol

Site #7. Indian Cabin Branch
and other Mullica tributaries

Site # 8 Negro
Branch/Weekstown

The eighteen sites were priority ranked as follows:

P4: Very High Priority

P3: High Priority

P2: Medium Priority

P1: Low Priority

Of these eighteen sites, HA selected ten that were considered important priority sites. These ten sites were scheduled for a rare wildlife species survey and habitat evaluation in 1996. The other eight sites of medium and low priority will be studied as time and funding allows.

Two of the ten important priority sites selected are located in Mullica Township—sites #3 and #7. Site #3 is ranked P4—Very High Priority. Site #7 is ranked P3—High Priority.

Survey Results

Site #3 Columbia Road

Rank: P4 (Very High Potential)

Location: Northern Mullica Township east of Moss Mill Road, North of Elwood-Pleasant Mills Road.

Habitat: Typical mixed deciduous, oak pine forest.

ETR Species: No ETR wildlife species found, some rare plants may occur on site.

Looked For:

Cooper's hawk - as in the other study areas, this widespread but secretive raptor may possibly occur in the wood.

Tiger Salamander - potential breeding habitat exists on-site.

Southern gray treefrog - vernal pond forested habitat also exists on site.

Remarks: Additional herpetological surveys and plant studies should be conducted.

Site #7 - Indian Cabin Branch

Rank: P3 (High Priority)

Location: In Mullica Township, north of Egg Harbor City, west of the Mullica River, east of Moss Mill Road, and south of Elwood-Pleasant Mills Road.

Habitat: Mostly mixed oak/pine or pine/oak forest with scattered white cedar. Areas around wetland corridors contain red maple, tupelo, sassafras, and mixed oaks.

ETR Species: No important wildlife species found; rare plants may be present.

Looked for: Pine Barrens treefrog - likely in the area, particularly along Elwood-Weekstown Road near an old cranberry bog.

Remarks: This is a large, mostly unbroken tract and contains good potential habitat for ETR plant and wildlife species, additional surveys are recommended.

New Jersey Conservation Foundation 1997 Survey

In 1997, HA conducted a second survey with the following disclaimer: "This 1997 survey for endangered, threatened, and/or rare (ETR) plant species was conducted as a continuation of work first proposed to the New Jersey Conservation Foundation for completion during 1996. The preliminary report...identified ten priority sites based upon the results of the 1996 field work. In 1997, the plant survey team was confronted with the dilemma of examining these ten sites. It was readily determined that the budget was not ample enough to even allow an adequate survey of any one site, but would permit cursory surveys of a few sites. Cursors surveys for ETR plants may often overlook some of these "hard-to-find" special

organisms. However, they cover much more ground and may locate more potential habitat given the same amount of time. With the latter statement in mind, it was decided to conduct cursory surveys of the Clark's Landing Areas, Indian Cabin Branch [Mullica Township] Columbia Road [Mullica Township] and Egg Harbor City Area [Mullica Township] sites."

Survey Results

The twelve ETR plant species reported as occurring within the cursory surveyed sites are listed in the table on the following page by site of occurrence. The first eight were observed during the 1997 surveys. The remainder was from the private records of Ted Gordon.

Elwood Corridor ETR Plant Species Observed by Site

Species	Year Found	Site			
		Clarks Landing Area	Indian Cabin Branch	Columbia Road	Egg Harbor City Area
Pine Barren Gentian	1997 1994		√ √*	√	
Pine Barren Reedgrass	1997		√	√	
Wand-like Three-awned Grass	1997		√		
Pine Barren Boneset	1997		√		
Coast Violet	1997				√
Barratt's Sedge	1997	√			√
Coast Flatsedge	1997			√	
Big-leaf Sphagnum	1997				√
Curly Grass Fern	early 1990's				√
Pine Barren Rattlesnake Root	about 1994		√*		
Wand-like Goldenrod	about 1994		√*		
White Milkweed	1994			√	

*Actually occurring approximately 500 feet outside of this site, but within the Indian Cabin Branch Watershed

Source: HA and Ted Gordon field data.

The following portion of the HA study text refers to plant surveys conducted in Mullica Township. The classifications following the species names are the Natural Heritage Classifications for ETR species. They are as follows:

E - Endangered

LP - Listed as threatened or endangered in the Pinelands

G1 - Critically imperiled globally

G2 - Imperiled globally

G3 - Globally rare

S1 - Critically imperiled in state

S2 - Imperiled in state

S3 - Rare in state

Egg Harbor City Quadrangle

Near the end of a hunter's trail that runs east from Indian Cabin Rd. (0.3 mi. north of its junction with Elwood-Weekstown Rd.) between Lucas Branch and Second Branch, a small population of the globally rare Pine Barren gentian (*Gentiana autumnalis*; G3, S3, LP) was found. Seven plants with a total of 10 buds were scattered over a 250-foot stretch that included a 2 yard-long strip of wand-like three-awned grass (*Aristida Wrgata*; S2). A diversity of associated species included pyxie, (*Pyxidantha barbulata*), capitate beaked rush (*Rhynchospora capitellata*), Torrey's beaked rush (*R. torreyana*), orange milk-wort (*Polygala*

lutea), small-flowered Muhly (*Muhlenbergia uniflora*), Nuttalls lobelia (*Lobelia nuttallii*), orange grass (*Hypericum gentianoides*), sand myrtle (*Leiophyllum buxifolium*), thread-leaved sundew (*Drosera filiformis*), white colicroot (*Aletris farinosa*), primrosed-leaved violet (*Viola primulifolia*), slender aster (*Aster gracilis*), and grass-leaved blazing star (*Liatris graminifolia*).

Along Lucas Branch to the north is a pristine hardwood swamp with scattered, tall Atlantic white cedar harboring an impressive population of the infrequent bog fern (*Thelypteris simulata*). This is not a rare species. Bordering the rear of a pond on the east side of Darmstadt Avenue (dirt road), 0.5+1- miles northeast of its junction with Indian Cabin Road, were two clumps of Pine Barren reedgrass (*Calamovilfa brevifolia*, LP). Associated species were a peat moss (*Sphagnum tenenon*), sand myrtle, leatherleaf (*Chamaedaphne calyculata*), white beaked rush (*Rhynchospora alba*), foxtail clubmoss (*Lycopodiella alopecuroides*), shortleaf milkwort (*Polygala brevifolia*), pyxie, and teaberry

At 0.8 mile northeast of Laurel Hill Cemetery along the west side shoulder of Pleasant Mills-Elwood

Road, just south of the head of Brockaway's Branch, a single flowering Pine Barren gentian (*Gentiana autumnalis*, LP, G3, S3) was seen.

About 15 Pine Barren gentian (*G. autumnalis*), both in flower and in bud, were discovered along the dirt portion of Fifth Avenue 2.3+/- miles northeast of its junction with Moss Mill Road (Route 561). The plants were located on the edge of deep potholes along a 150-foot stretch about 0.1-mile southwest of Elwood-Weekstown Road. In a Sphagnum, leatherleaf swamp on the west side of the flooded road were four flowering plants of the globally rare and state endangered Pine Barren boneset (*Eupatorium resinosum*; G3, S2, E, LP). Associated species in this wet pocket were blunt manna grass (*Glyceria obtusa*), soft rush (*Juncus effusus*), Canada rush (*J. canadensis*), brown rush (*J. pelocarpus*), three-way sedge (*Dulichium arundinacium*), cranberry (*Vaccinium macrocarpon*), highbush blueberry (*V. corymbosum*), marsh St. Johnswort (*Triadenum virginicum*), button sedge (*Carex bullata*), Walter's sedge (*Carex striata*), buttonbush (*Cephalanthus occidentalis*), white beaked rush (*Rhynchospora alba*), and red maple (*Acer rubrum*).

A small patch (2 feet by 2 feet) of the state endangered coast flatsedge (*Cyperus polystachyos*; S1, E) was found at the trail entrance of an abandoned blueberry field and an adjacent Scott's pine (*Pinus sylvestris*) plantation on the east side of Columbia Rd., 2+ miles south of its junction with Route 542 at Nesco. The plants were in sparsely vegetated moist sand associated with capitate beaked rush (*Rhynchospora capitellata*) and path rush (*Juncus tenuis*). On the west side of Columbia Road, within a 0.5 mile stretch extending north of this spot, were a few plants of *Calamovilfa brevipilis* (LP). Here prior to 1997, a few Pine Barren *Gentiana* were seen. These appear to have suffered from untimely mowing. Most likely, this occurrence is still extant since the root stock and habitat remains. Along the road shoulder on the south side of Duerer Street, 0.6+/- mile east of its junction with Fifth Street and Moss Mill Road, the following 3 elements were seen near a streamlet that flows east into Indian Cabin Creek: *Gentiana autumnalis*, Pine Barren rattlesnake root (*Prenanthes autumnalis*; S2, LP), and wand-like goldenrod (*Solidago stricta*; S3, LP). These were last observed in about 1994. The site was not visited during the current survey.

Atsion Quadrangle

West of the Mullica River and the Pleasant Mills church, behind the guardrail along the north side of Route 542, just west of its junction with Richards Road, was a fine population of 16+/- white milkweed (*Asclepias variegata*; S2). This occurrence, which frequently suffers from untimely mowing, was last seen in 1995. It likely is still present.

The following table summarizes the ETR species discovered within the Elwood Corridor in the 1997 study. Of the twelve species listed, eight were found in Mullica Township.

Summary of Endangered, Threatened, and Rare Plant Species Discovered within the Elwood Corridor in Atlantic County, New Jersey in 1997. (Numbers refer to code used on the plant location maps).

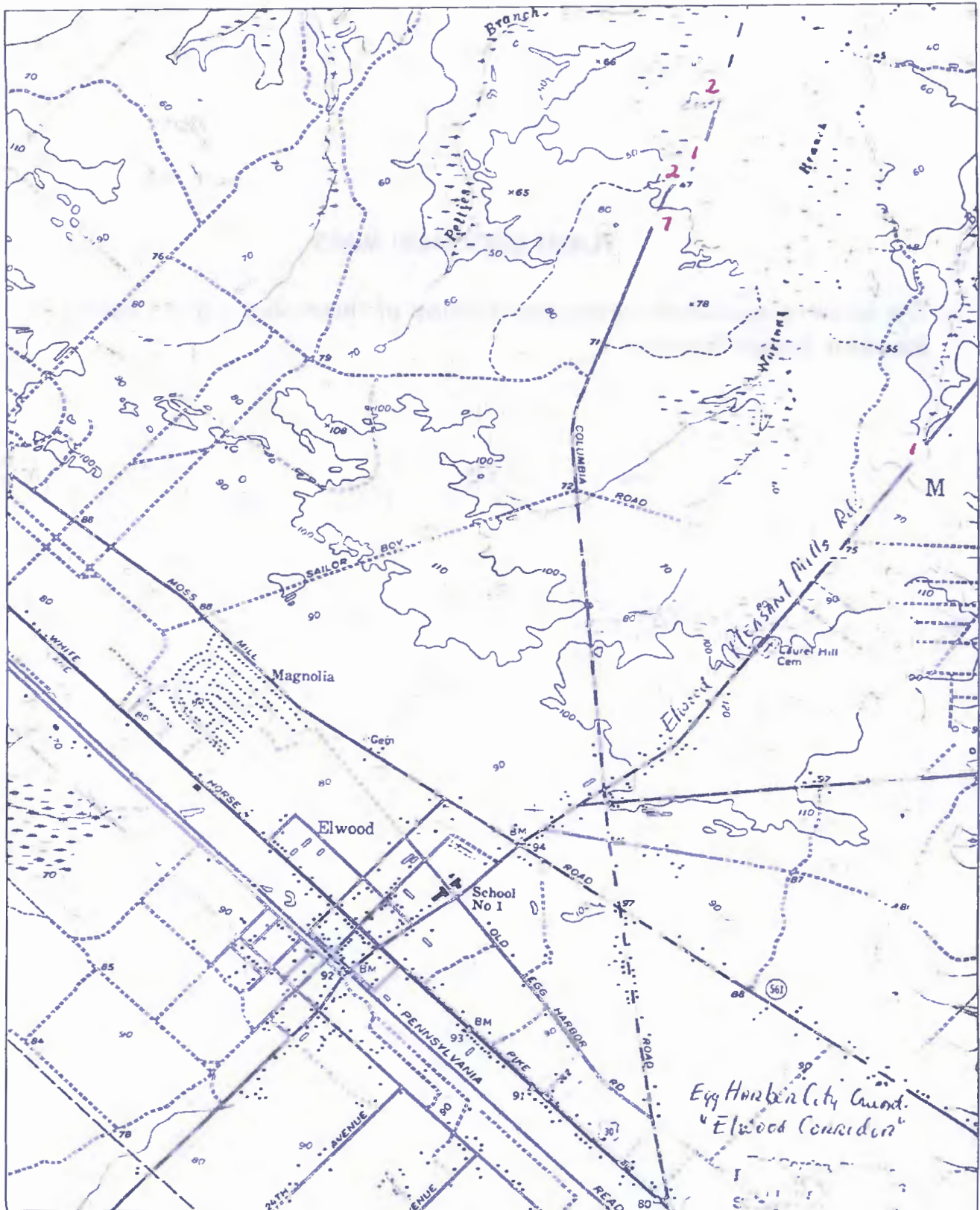
Code	Scientific Name	Common Name
1.	<i>Gentiana autumnalis</i>	Pine Barren Gentian
2.	<i>Calamovilfa brevipilis</i>	Pine Barren Reedgrass
3.	<i>Aristida virgata</i>	Wand-like Three-awned Grass
4.	<i>Eupatorium resinosum</i>	Pine Barren Boneset
5.	<i>Viola brittoniana</i>	Coast Violet
6.	<i>Carex barrattii</i>	Barratts Sedge
7.	<i>Cyperus polystachyos</i>	Coast Flatsedge
8.	<i>Sphagnum macrophyllum</i>	a peat moss
9.	<i>Schizaea pusilla</i>	Curly Grass Fern
10.	<i>Prenanthes autumnalis</i>	Pine Barren Rattlesnake Root
11.	<i>Solidago stricta</i>	Wand-like Goldenrod
12.	<i>Asclepias variegata</i>	White Milkweed

HA confirmed 12 ETR species during this survey.

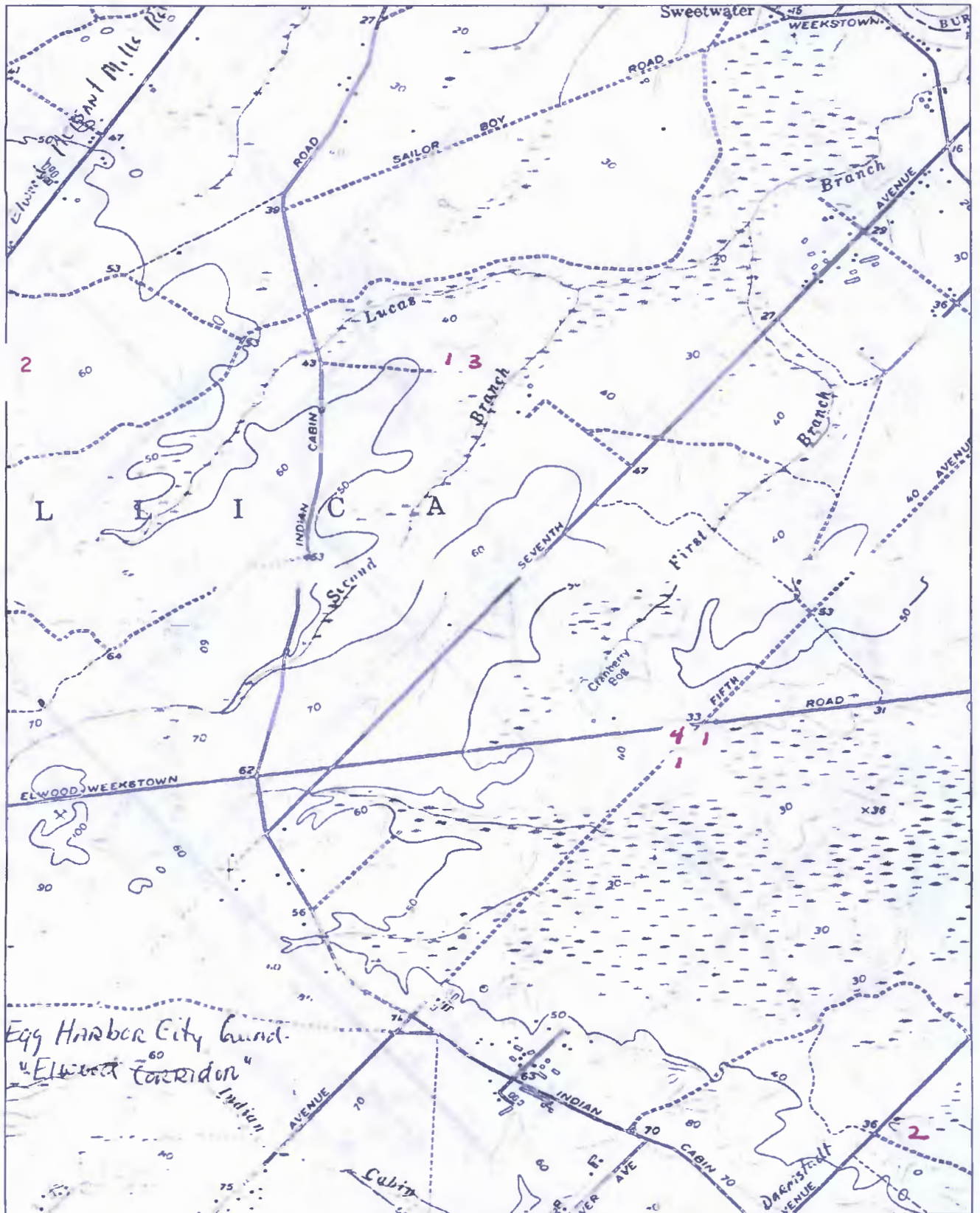
PLANT LOCATION MAPS

The following maps show the location of sitings of threatened and endangered species in Mullica Township.

Egg Harbor City Quadrangle



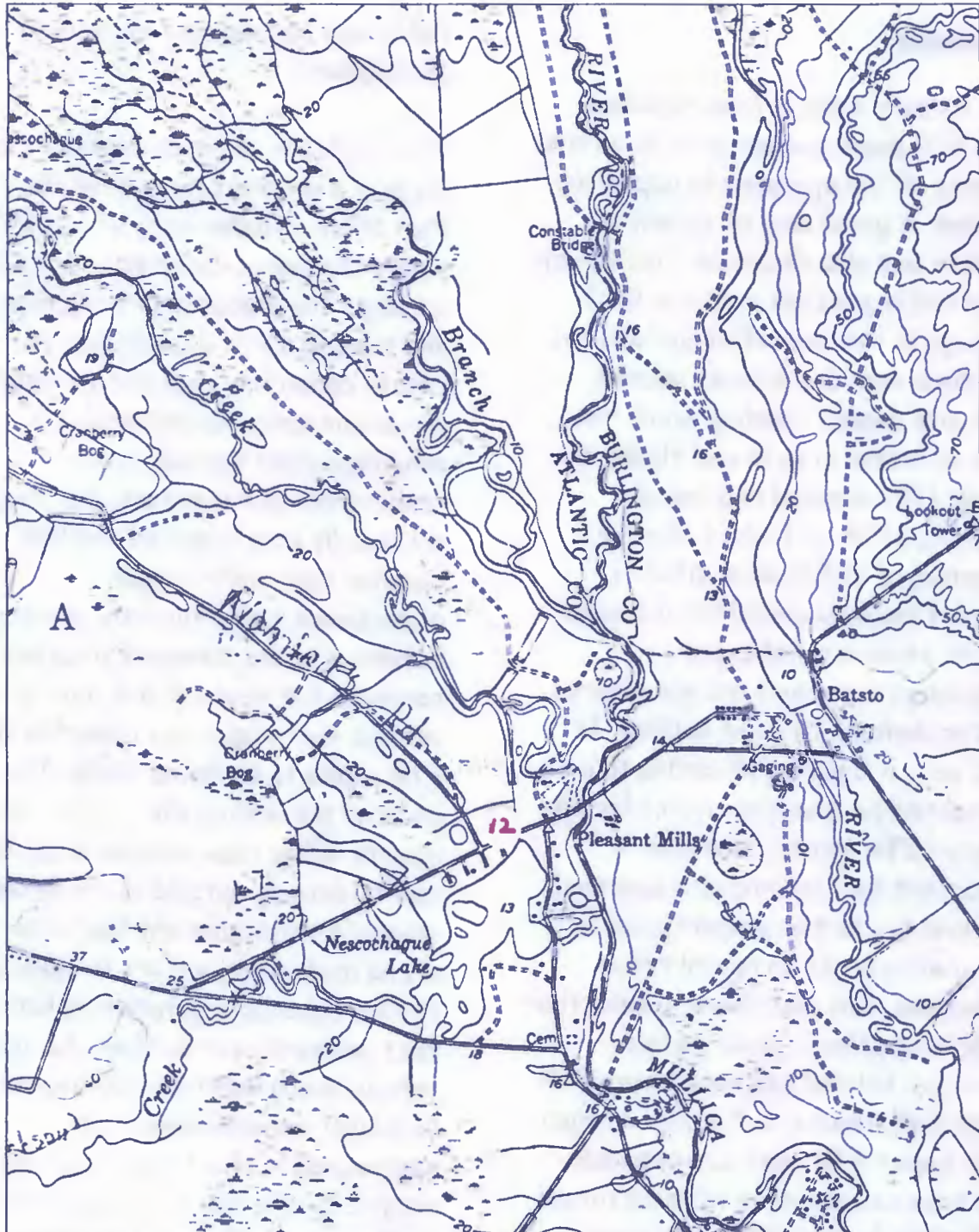
Egg Harbor City Quadrangle



Egg Harbor City Quadrangle



Atsion Quadrangle



Discussion

The cursory surveys have revealed that ETR plant species were occurring in some of the appropriate appearing habitat. A great deal of potential habitat was also observed. The survey team was impressed with the 1997 findings in the face of an initially hot and then very dry summer season, with late season flooding which may have affected growth and flowering. These 1997 surveys only barely scratched the surface of the full potential of the studied sites to support these and additional special plants. However, not every undeveloped wetland and upland area was potential ETR plant habitat. In this vein, if a parcel of land is to be protected (in whatever form) for the sake of ETR plants, then it is important that an intensive approach be directed to the property(ies) in question in order to reveal these resources. One must keep in mind that undeveloped land (given suitable potential habitat) without known ETR plant occurrences, but within a region with known ETR plant occurrences, can have considerable value as future ETR plant habitat. This may come about naturally or through active management, but will only happen if those environments are relieved of

the direct and indirect impacts of development.

The shoulders of paved roadsides can support a surprisingly diverse flora that often includes many of the ETR plants that were observed in the 1997 surveys. The placement of the roads and related earth disturbance can create conditions that are amenable to certain early successional and volunteer plant species. Such conditions occur in nature, but they are usually widely spread and less common than anthropogenic disturbance. Unfortunately, mowing activities in the surveyed sites were conducted in locations and during periods that negatively impacted the ETR plants to be found there. The goals of preventing shrub and tree growth in the road shoulders can be met by mowing outside of the growing season. It was apparent that mowing crews made every effort to take down the herbaceous vegetation including that in sharply cut ditches and behind vehicle guard barriers. County and municipal agencies should be approached in this regard and relief sought for the few areas where ETR plants occur in the road shoulders.

The goal of the NJCF project is to protect and preserve as much of the Elwood Corridor land as possible. The

best method of achieving that goal is through land acquisition.

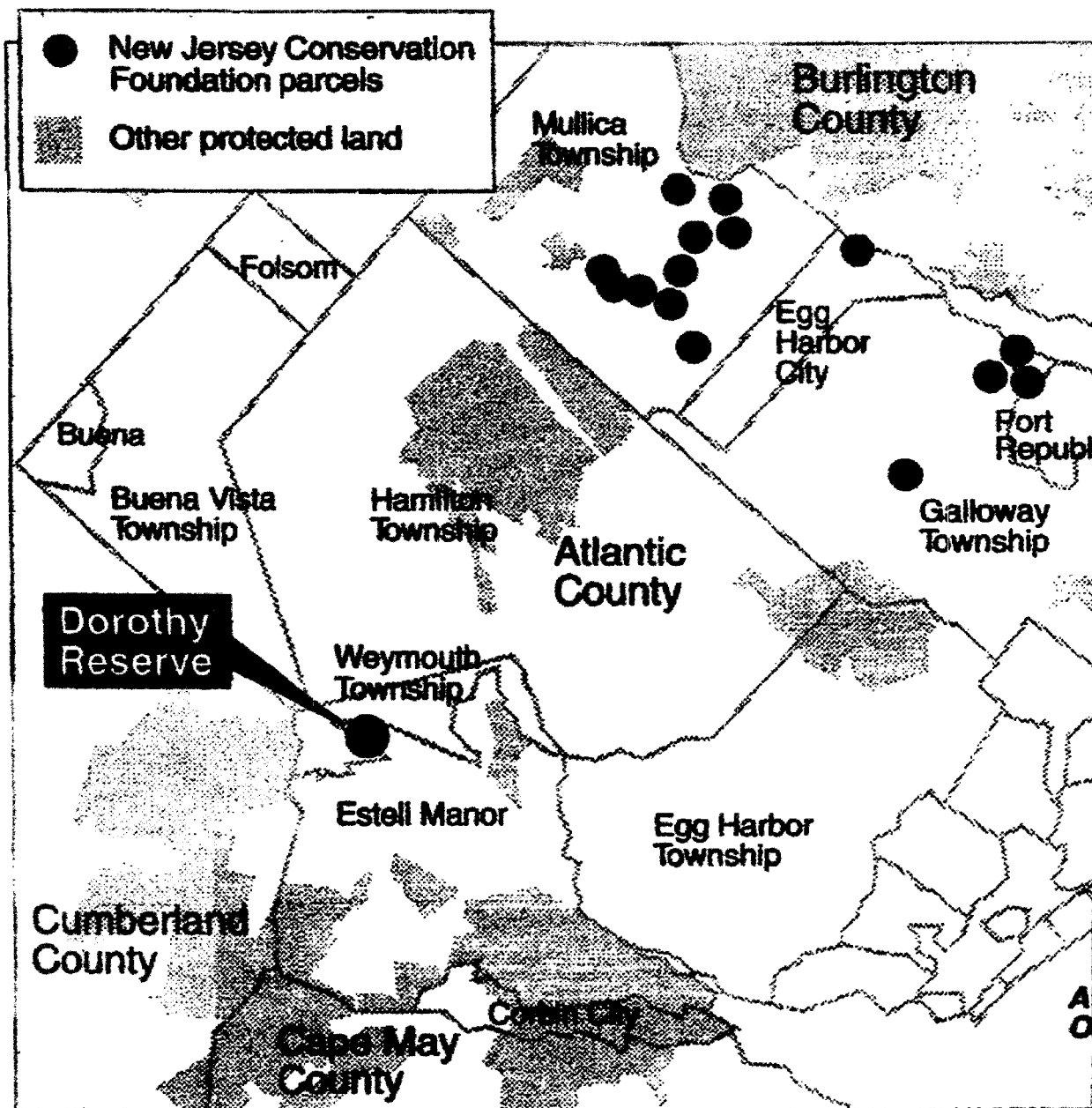
Land acquisition would involve approximately two thousand acres in the lower Mullica and Wading River watersheds, considerably enlarging present state landholdings. These lands provide exceptional habitat for otter, mink, muskrat, and various

wading birds and are a prime feeding area for the bald eagle.

Protection of this corridor linking northern and southern forests is also essential to pineland preservation.

Acquisition of seventy-five hundred acres of strategically located land would provide another major recreational area in the Pinelands and contribute to the establishment of a permanent corridor.

Overview of Protected Areas in Elwood Corridor Land Mass



LAND USE

HOW WE USE OUR SPACE IS
CRITICAL TO OUR WELL-BEING
AND THAT OF ALL OTHER
LIVING THINGS.

PRESERVATION OF OPEN SPACE
AND DEVELOPMENT HAVE
OFTEN BEEN AN ISSUE IN THIS
LARGELY RURAL COMMUNITY.

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LANDUSE

General Description

Mullica Township is a fairly large and quite rural municipality with an area of approximately 55 square miles. Its boundaries are entirely within the New Jersey Pine Barrens, and Pinelands regulations significantly impact Mullica's zoning laws. Most of the township is sparsely developed. There are a few population centers within the political boundaries, including Elwood in the southern sector, Sweetwater in the northern sector, Pleasant Mills in the northern sector and Weekstown in the northeastern sector. With the exception of Elwood, all these population centers grew up near or immediately adjacent to the Mullica River. Elwood is situated along the township's only major transportation artery, Route 30, also known as the White Horse Pike. Overall there are vast expanses of woodland acreage and natural wetlands in Mullica, and the overwhelming majority of Township land remains either vacant, wooded or in agricultural or recreational use.

Future growth can be expected to remain low for the following reasons: Industrial growth is weak; Mullica is not well situated to attract manufacturing because of its geographic location. Drainage costs are high due to the lack of relief in the topography. Efforts to provide a public water system have repeatedly failed.

In addition, a significant amount of Mullica Township open space has been identified as crucial habitat for various species—some of them endangered or threatened—and conservation groups, along with the State of New Jersey, have recommended preservation through acquisition for as much of this acreage as possible.

The existing Master Plan and zoning laws were adopted to achieve conformance with the NJ Pinelands Commission Comprehensive Management Plan (CMP). The Pinelands Commission as the regional planning entity has direct administrative authority in all Pinelands areas. The CMP is intended to provide a strategy to preserve and protect the environmental qualities of the region through appropriate land use policies. Local implementation is required by incorporation into master plans.

Other regulatory boundaries within township limits are the Wharton State Forest, Green Bank State Forest, State of New Jersey Critical Areas and CAFRA.

Existing Land Use

Existing land use in Mullica Township consists of public and privately owned open space, roads, railroads, public and private recreational areas, population centers, and agricultural areas. The entire township covers about 35,200 acres.

Open Space

Publicly Owned

Mullica Township has about 6,566 acres of publicly owned open space.

Approximately 5344 acres are owned by the State of New Jersey in the form of the Wharton State Forest, Green Bank State Forest, Hammonton Creek Wildlife Management Area, Makepeace Wildlife Management Area and scattered smaller holdings in various parts of the township.

The following lots listed by block are state owned and reserved for conservation purposes:

Block	Lot	Block	Lot
101	1	6002	4
102	1	6201	12
	4	6401	8
	5	Block	Lot
103	1	6702	9
201	1	6704	1
202	1	8207	4
502	25	8404	3
	3	10102	8
1401	3	10705	1
	4	10904	1
	5		3
	15	11001	2
1504	6	11002	1
1901	1		4
2301	2.01		6
	5	11010	1
	6		2
	7		3
2501	16		4
2601	1-5-6	11011	3
	2		5
	3	11012	3
	4	11101	2
2602	1		3
2603	1	11102	1
Block	Lot		4
2604	1		5
2605	1	11103	1
2606	8		2
2607	1		3
	2		4
2608	1	11112	1
2609	1		2
2610	1		4
2611	1	11113	1
2903	1		5
2905	2		6
	2.01		8
3205	1		9
3405	8		10
3917	1	11114	1
3923	11	11115	1
4117	6		3
4170	5	11116	2
4193	6		3
4501	1	11201	2
5201	3		3
5202	5 6 7	11202	1
5301	4		2

Block	Lot
11202	3
	4
	5
11202	6
11203	1
	2
	3
	6
11210	4
11211	2
	3
11212	5
11316	10
11317	11
	13
11405	5
	8

Two non-profit organizations own land in Mullica Township. The New Jersey Conservation Foundation holds 86.59 acres and the Preservation and Wildlife Society owns 3.29 acres. Following is a list of lots owned by these agencies:

New Jersey Conservation Foundation

Block	Lot
5901	7
6201	14
	15
	16
6501	2
7302	5
7707	10
8504	8
9001	8
9102	16
9501	1
9802	5

Preservation and Wildlife Society

Block	Lot
1602	15
	16
	18

Mullica Township owns 1136 acres. Of these, some are deeded from the state with Conservation Restrictions, some are set aside for conservation and open space through the state Green Acres Program and the rest are various lots, small and large, some used for municipal purposes, some simply abandoned by the owner(s).

The lots deeded to Mullica Township by the State of New Jersey with Conservation Restrictions had been acquired by the state under the Limited Practical Use Pinelands Acquisition Program. The Conservation Restrictions run with the land in perpetuity and are as follows:

1. **PROMISES BY GRANTOR:** The Grantor promises that the Grantor has done no act to encumber the Property other than the restrictions for open space and conservation purposes contained herein. The Property shall remain subject to the Conservation Restrictions recited in this deed after any conveyance.
2. **CONSERVATION RESTRICTIONS:** Grantee covenants that

the property will be kept as open space and will be retained forever in a natural, scenic, or open condition and used only for open space, conservation purposes, garden, agriculture or forest management activities (including free standing garden sheds without foundations and fences) and that:

[A] No development of the property will be permitted, meaning that no permanent structure, building, pavement or other similar improvement shall be developed, placed or situated on the property.

[B] No dumping or placement of landfill material, trash, waste, or unsightly or offensive materials shall be allowed on the Property. ,

[C] No mining or excavation, dredging, or removal of topsoil, sand, gravel, loam, rock, or other mineral substances shall be allowed on the property.

[D] No long-term storage or placement of topsoil, sand, gravel, loam, rock, or other mineral substances shall be allowed on the property.

3. DEVELOPMENT RIGHTS are extinguished by this instrument. No development or other rights in or appurtenant to the property may be transferred to, or used for the benefit of, any other property and that the property may not be

used for assemblage purposes or to meet density requirements.

4. PERMITTED USE includes meeting side/rear yard requirements and septic requirements to support houses existing at the time of conveyance. This means that if the subject Property is incorporated into an adjacent developed property, although the subject property itself cannot be further developed, it can be used to meet the property line set back and septic requirements of zoning regulations.

5. REMEDIES: In the event of any violation of these Conservation Restrictions, Grantor may, in its sole discretion and with prior notice, institute suit or take any other action it deems necessary to enjoin such violation, require restoration of the Property to its prior condition and additionally seek damages and costs incurred in bringing the action and curing the violation. Grantee further agrees to pay whatever costs Grantor incurs in enforcing the Grantees obligations pursuant to this Deed with Conservation Restrictions. Such costs shall include, but not be limited to, labor and other personnel costs, equipment and material costs, attorney and other professional fees, and court costs.

The lots deeded to Mullica Township from the state with Conservation Restrictions are:

Block	Lot	Block	Lot
1901	6	4157	4
4127	2	4159	1
4134	4	4160	1
4136	1	4161	2
4137	1	6005	13
4139	4	6201	6
4140	3	6602	9
4141	6	7704	7
4142	1	8208	2
4143	1	8207	4
4144	2	8404	6
4146	3		10
4147	1		3
4148	1	8601	3
4149	1	10302	21
4151	1	11218	13
4152	2		
4153	1		
4154	3		
4155	1		
4156	5		

The Green Acres Program maintains an inventory of all lands acquired and/or developed with the aid of State Green Acres or Federal Land and Water Conservation Fund Assistance, and all lands dedicated, maintained or used for recreation, open space and conservation purposes which are held by the municipality. "Recreation and conservation purposes" means use of lands for

parks, natural areas, historic areas, forests, camping, fishing, water reservoirs, wildlife reserves, hunting, boating, winter sports, and similar uses for either public recreation or conservation of natural resources, or both.

"Open space purposes" means land that is undeveloped and retained in its natural state or lands reserved for

Block	Lot	Acreage
7501	10	74.33
	11	74.33
408	24	0.27
3133	1	0.23

future park and recreation development.

The lots set aside under the Green Acres Program are:

Privately owned open space

Mullica Township has approximately 16,600 acres of privately owned open space (nearly half the total acreage of the township!). The lots, listed by block number, are as follows:

BLOCK LOT						
102 2	102 3	103 3	301 1	402 1	403 1	404 1
405 17	406 1	406 5	407 1	407 17	407 21	408 18
409 1	409 13	411 1	412 1	413 10	414 1	414 2
414 13	415 1	415 17	415 21	601 3	701 1	701 2
701 7	701 8	701 11	701 14	701 19	701 23	701 27
701 29	701 32	701 33	701 34	701 37	701 38	701 40
701 41	701 42	701 43	701 44	701 45	701 46	704 1
705 2	705 4	705 7	706 1	707 1	707 4	801 1
801 2	801 3	801 4	801 6	801 17	901 1	901 2
902	902 8	902 0	903 1	1001 1	1001 8	1001 9
1001 0	1001 21	1001 22	1001 23	1001 24	1001 27	1001 28
1001 32	1001 45	1001 52	1001 55	1001 63	1101 14	1101 15
1101 18	1102 2	1102 6	1102 13	1102 17.02	1102 17.05	1102 17.06
1102 18.02	1102 18.03	1102 18.04	1102 18.05	1102 18.06	1201 6	1201 8
1301 4	1401 1	1401 2	1401 6	1401 8	1401 9	1401 10
1401 13	1401 14	1401 17	1401 18	1501 10	1501 17	1501 19
1502 6	1503 1	1503 4	1503 7	1504 1	1504 2	1504 5
1504 7	1504 11	1504 11.01	1504 11.02	1504 11.03	1601 1.03	1601 9
1601 16	1601 22	1602 3	1602 13	1603 4	1603 7	1603 10
1603 14	1603 17	1701 12	1702 2	1703 1	1703 2	1703 3
1703 4	1704 1	1704 2	1705 1	1705 2	1706 1	1707 1
1708 1	1709 1	1709 2	1710 1	1711 1	1712 1	1801 1
1801 2	1801 11	1801 12	1801 13	1801 14	1901 3	1901 4
1901 5.02	1901 5.03	1901 10	1901 11	1901 12	1901 13	1901 14
1901 15	2001 1	2001 3	2001 5	2002 1	2037 2	2111 2

2133 2	2235 2	2236 2	2253 3	2254 1	2301 2.02	2301 2.03
2301 2.04	2301 2.05	2301 3	2301 4	2401 1	2401 4	2401 5
2401 6	2401 8	2401 9	2401 18	2501 1	2501 3	2501 6
2501 7	2501 8	2501 9	2501 10	2501 11	2501 12	2501 13
2501 19	2501 25	2501 26	2501 27	2501 28	2501 29	2501 30
2501 31	2501 32	2501 33	2501 34	2501 35	2501 36	2501 37
2501 38	2606 7.01	2701 7	2701 8	2707 4	2707 5	2707 6
2707 7	2708 3	2710 1	2711 1	2711 2	2718 1	2719 1
2729 1	2731 2	2738 1	2738 2	2739 1	2740 1	2801 1
2802 1	2803 1	2811 1	2812 1	2813 1	2814 1	2814 2
2815 1	2815 2	2816 1	2817 1	2818 1	2819 1	2821 1
2822 1	2823 1	2824 1	2824 2	2825 1	2826	2827
2827 2	2828	2829	2831 1	2832 1	2833 1	2834 1
2835 1	2836 1	2837 1	2838 1	2839 1	2841 4	2842 1
2843 1	2844 1	2844 2	2844 4	2845 1	2846 1	2847 1
2848 1	2849 1	2851 2	2901 8	2903 2	2903 14	2903 18
2904 1	2905 1	2905 3	2905 4	2905 5	2906 1	2907 1
2908 1	2909 1	2910 1	2912 1	3001 1	3002 1	3003 1
3004 1	3005 1	3006 1	3007 1	3008 1	3026 4	3026 14
3028 1	3031 7	3031 8	3031 9	3031 10	3031 11	3031 12
3031 13	3031 14	3032 2	3032 3	3032 4	3032 5	3032 6
3032 7	3033 13	3033 14	3033 15	3033 16	3033 17	3033 18
3034 12	3035 6	3036 7	3037 6	3037 7	3037 8	3037 9
3037 10	3037 11	3038 1	3039 1	3040 1	3040 5	3040 6
3101 2	3102 2	3102 4	3102 7	3103 2	3103 4	3104 1
3105 2	3105 3	3105 6	3106 1	3107 2	3107 5	3108 2
3108 5	3108 6	3108 7	3108 15	3108 16	3109 1	3109 2

3110 4	3111 1	3111 8	3111 9	3111 12	3112 2	3112 7
3112 10	3112 12	3112 16	3112 19	3113 1	3113 4	3113 6
3113 8	3113 10	3114 1	3114 6	3114 7	3114 9	3114 12
3115 1	3116 1	3116 2	3117 1	3117 2	3117 4	3118 1
3118 2	3119 1	3120 1	3120 4	3120 6	3121 2	3121 4
3122 1	3122 4	3122 7	3123 1	3123 2	3124 2	3125 1
3125 4	3126 1	3127 1	3127 2	3127 3	3128 1	3128 2
3128 3	3129 1	3129 2	3130 1	3130 2	3131 1	3132 1
3133 2	3134 1	3135 2	3136 2	3137 2	3137 4	3137 8
3201 1	3202 1	3203 1	3204 1	3206 1	3206 2	3206 4
3206 5	3206 7	3207 1	3207 5	3208 6	3208 9	3208 11
3302 4	3302 6	3302 9	3401 1	3401 7	3402 2	3403 2
3403 3	3404 1	3404 7	3406 1	3407 1	3409 5	3410 3
3410 13.01	3501 3	3503 1	3504 1	3504 2	3505 1	3506 1
3507 1	3508 1	3509 1	3510 1	3510 2	3511 9	3511 10
3511 12	3511 13	3512 3	3512 5	3512 6.01	3512 6.02	3512 7.01
3512 7.02	3512 8	3513 4	3513 9	3513 11	3513 13	3513 14
3513 15	3513 18	3514 2	3514 8	3514 10	3514 13	3602 1
3701 1	3703 1	3705 1	3706 1	3707 1	3708 1	3709 1
3710 1	3711 1	3712 1	3713 1	3714 1	3715 1	3716 1
3718 1	3719 14	3720 1	3720 4	3720 11	3720 15	3720 18
3720 19	3720 20	3720 21	3720 23	3721 4	3721 8	3721 9
3721 10	3721 11	3721 12	3721 13	3722 2	3722 4	3722 17
3722 18	3722 20	3722 21	3722 22	3722 29	3722 31	3725 2
3801 2	3801 3	3802 1	3901 1	3902 1	3903 1	3904 1
3905 1	3906 1	3907 1	3908 1	3909 1	3910 2	3912 1
3915 2	3917 3	3917 4	3917 5	3917 10	3918 2	3923 2
3923 4	3923 6	3923 7	3923 9	3923 10	3923 12	3924 2

3924 3	4001 1	4001 2	4002 1	4002 2	4101 1	4102 1
4102 2	4102 4	4103 1	4103 2	4103 3	4103 6	4104 1
4104 2	4104 3	4105 1	4105 2	4105 3	4105 4	4105 5
4106 1	4106 2	4106 3	4107 1	4107 2	4107 4	4107 5
4107 6	4108 1	4108 2	4108 5	4108 6	4109 1	4109 2
4110 1	4110 2	4110 3	4111 1	4111 2	4112 1	4112 2
4112 3	4112 4	4113 1	4113 2	4114 1	4114 2	4114 3
4115 1	4115 4	4115 8	4117 2	4117 3	4117 4	4117 5
4118 2	4118 3	4119 3	4119 4	4120 2	4120 3	4120 4
4120 5	4120 6	4121 1	4121 3	4122 1	4122 2	4122 5
4123 1	4123 4	4124 2	4124 3	4124 4	4125 1	4125 2
4125 4	4125 6	4125 8	4126 1	4126 2	4126 3	4127 1
4127 3	4127 5	4128 1	4128 2	4128 3	4128 4	4128 6
4128 8	4129 1	4129 2	4129 4	4129 6	4130 1	4130 2
4130 3	4131 1	4131 2	4131 5	4132 1	4132 2	4132 3
4132 4	4133 1	4133 3	4133 5	4133 6	4134 1	4134 2
4134 3	4135 1	4135 2	4135 3	4136 2	4136 3	4137 2
4137 3	4137 5	4137 7	4137 8	4137 9	4138 1	4139 2
4139 3	4140 1	4141 1	4141 2	4141 3	4141 4	4141 7
4142 2	4143 2	4143 3	4145 1	4145 2	4145 3	4145 4
4145 7	4146 1	4146 2	4146 5	4146 6	4148 3	4148 4
4149 5	4149 7	4149 9	4150 1	4150 2	4150 3	4151 2
4151 3	4152 1	4152 3	4152 4	4154 1	4154 2	4154 4
4156 1	4156 2	4156 3	4156 4	4156 6	4156 10	4157 1
4157 3	4158 2	4158 3	4158 4	4159 2	4160 2	4160 3
4161 1	4161 3	4161 5	4162 1	4162 2	4162 3	4163 2
4163 3	4164 1	4164 2	4164 4	4164 5	4165 1	4165 3
4165 5	4165 6	4166 2	4166 3	4166 4	4166 5	4166 8

4167 1	4167 2	4167 3	4167 4	4167 5	4167 6	4167 8
4168 1	4168 2	4168 3	4168 5	4168 7	4169 1	4169 3
4170 1	4170 2	4170 3	4170 4	4171 1	4171 2	4171 4
4172 1.01	4172 1.02	4172 2	4172 3	4172 4	4173 1	4173 2
4173 5	4174 1	4174 2	4174 3	4175 1	4176 1	4176 2
4176 3	4176 4	4177 2	4177 4	4177 6	4177 7	4178 2
4178 3	4178 5	4179 1	4179 2	4179 3	4179 5	4179 6
4179 8	4180 1	4180 2	4180 3	4180 6	4181 1	4181 2
4181 3	4181 4	4181 6	4181 7	4182 1	4182 2	4182 4
4182 6	4182 8	4183 2	4184 1	4184 3	4185 1	4185 2
4186 1	4187 1	4187 2	4187 3	4187 4	4188 1	4188 3
4188 4	4188 5	4188 7	4188 8	4189 1	4189 2	4189 3
4189 4	4189 5	4189 6	4189 7	4190 1	4190 2	4190 3
4191 1	4191 2	4191 4	4192 1	4193 1	4193 2	4193 3
4193 8	4193 9	4194 1	4194 2	4195 1	4195 2	4195 3
4196 1	4196 2	4196 3	4196 4	4196 5	4197 3	4198 1
4198 2	4199 1	4199 2	4199 3	4199 6	4199 7	4201 2
4201 6	4201 9	4202 4	4202 7	4202 9	4202 12	4202 13
4202 14	4203 3	4204 1	4204 6	4302 3	4306 1	4401 1
4402 1	4402 4	4403 1	4404 4	4404 5	4404 6	4404 7
4405 9	4405 11	4405 12	4405 13	4405 14	4405 15	4405 16
4406 1	4601 1	4601 2	4601 3	4601 5	4701 6	4701 14.02
4701 31	4701 35	4701 39	4703 PARK	4705 5	4705 11	4705 14
4705 16	4706 2	4706 3	4801 16	4801 20	4801 23	4801 27
4901 15	4901 19	4903 1	4903 2	4903 4	4903 5	4904 8
4904 9	4904 11	4904 13	4904 14	4905 1	5001 6	5002 1
5002 13	5002 30	5101 4	5101 5	5101 6	5101 8	5101 9
5101 12	5101 13	5101 14	5102 1	5102 2	5102 3	5102 4

5201 1	5201 2	5201 5	5201 6	5201 7	5202 1	5202 3
5202 4	5301 1	5301 2	5301 3	5301 6	5301 8	5301 10.01
5301 11	5301 12	5302 3	5302 8	5401 1	5401 3	5401 4
5402 1	5403 1	5405 1	5407 1	5502 1	5502 14	5502 16
5502 17	5502 21	5601 10	5601 11	5601 12	5601 16	5601 18
5701 12	5701 14	5701 18	5701 21	5701 22	5701 23	5701 24
5701 25	5701 26	5701 28	5701 32	5701 35	5701 38	5701 40
5701 43	5701 45	5801 1	5801 2	5801 3	5801 4	5801 5
5801 6	5801 7	5801 8	5801 9	5801 10	5801 11	5801 12
5901 2	5901 6	5901 8	5901 13	5903 1	5903 2	5903 3
5903 4	5903 5	5904 1	5904 7.01	5904 7.02	5904 10	5904 13
5904 14	5904 18	5905 1	5905 2	5905 3	5906 1	5906 4
5907 1	5907 7	5907 12	5908 1	5908 10	5908 15	5908 16
5908 17	5908 18	5909 1	5909 10	5909 17	5909 19	5909 20
5909 22	5909 23	5909 24	5909 25	5909 26	5909 27	5909 28
5909 29	5911 4	5911 5	6001 1	6001 7	6001 10	6001 11
6001 12	6001 13	6001 14	6001 15	6001 16	6001 17	6002 2
6002 5	6003 1	6003 11	6003 15	6004 9	6004 11	6004 16
6005 6	6005 7	6005 10	6005 12	6005 14	6101 1	6101 2
6101 5	6101 10	6102 2	6102 9	6102 10	6102 15	6102 17
6103 4	6103 6	6103 11	6103 12	6201 2	6201 4	6201 5
6201 8	6201 10	6201 11	6201 13	6201 17	6201 18	6201 21
6201 23	6201 24	6201 25	6201 26	6202 2	6202 3	6202 4
6202 9	6202 10	6202 11	6202 13	6202 14	6202 16	6202 17
6301 1	6301 3	6301 4	6301 5	6301 6	6301 11	6401 1
6401 2	6401 6	6401 7	6401 11	6401 14	6401 16	6401 17
6401 20	6401 33	6501 1	6501 3	6501 5	6501 6	6501 7
6601 1	6601 2	6601 3	6601 4	6601 5	6601 7	6601 8

6601 9	6601 11	6601 12	6601 13	6602 1	6602 2	6602 3
6602 4	6602 5	6602 6	6602 7	6602 8	6602 10	6602 11
6602 12	6602 13	6603 2	6603 3	6603 4	6603 5	6603 6
6603 8	6603 9	6603 10	6603 15	6603 16	6701 1	6701 4
6701 5	6701 6	6701 7	6701 9	6701 11	6701 14	6701 15
6701 17	6702 1	6702 2	6702 3	6702 4	6702 5	6702 6
6702 7	6702 10	6702 11	6703 1	6703 2	6704 2	6801 3
6801 4	6802 1	6802 2	7001 9	7001 10	7101 2	7101 4
7101 7	7101 8	7101 9	7101 10	7101 11	7101 12	7201 3
7201 5	7201 6	7201 7	7201 8	7202 1	7202 2	7202 3
7301 1	7301 2	7301 4	7301 5	7301 6	7301 8	7301 9
7302 1	7302 3	7302 4	7302 6	7302 8	7302 11	7302 13
7302 14	7302 15	7302 16	7302 17	7302 18	7303 1	7303 2
7303 3	7303 4	7303 5	7303 6	7303 7	7303 8	7303 9
7303 10	7303 11	7401 1	7401 2	7401 3	7401 4	7401 6
7401 7	7401 8	7401 9	7402 1	7403 1	7403 2	7403 3
7403 5	7404 1	7404 2	7404 3	7404 5	7501 1	7501 2
7501 4	7501 5	7501 6	7501 7	7501 8	7501 9	7602 2
7606 2	7611 1	7611 3	7612 1	7612 2	7613 1	7614 2
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8404 5	8404 9	8404 11	8405 1	8406 2	8407 6	8407 9
8407 11.02	8407 12	8407 14	8407 15	8408 1	8408 2	8409 1
8411 5	8412 1	8412 2	8412 3	8412 4	8501 1.01	8501 1.02
8501 3	8501 5	8501 8	8502 3	8503 3	8503 4	8503 7
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41136 1	41137 1	41138 1	41139 1	41142 4	41143 1	41144 1
41145 1	41145 2	41145 3	41146 2	41147 1	41147 2	41147 3
41148 1	41149 1	41150 1	41151 1	41153 1	41154 2	41155 2

Roads

While the majority of the roads in the township are paved, Mullica has several miles of unimproved roads (see map). There is only one major highway in the municipality, State Rt. 30, also known as the White Horse Pike. This highway transects the southern portion of the township from the eastern to the western border.

Railroads

The New Jersey Transit rail line transects the southern portion of the township from west to east paralleling Route 30. Some railroad right-of-way properties are habitat for certain endangered plant species.

Recreational Areas

Mullica Township has set aside the following blocks and lots for recreational use:

Block 8901; Lots 2-8, 10-15

Block 8902; Lots 2-8, 10-25, 27-30

Block 8903; Lots 1-30

Block 8404; Lots 1-5, 9-13

Populated Areas

Mullica Township has several population centers and two housing developments. The population centers include Elwood in the southern sector, Sweetwater in the northern sector, Pleasant Mills in the northern sector and Weekstown in the northeastern sector. With the exception of Elwood, all these population centers grew up near or immediately adjacent to the Mullica River. Elwood is situated along the township's only major transportation artery, Route 30, also known as the White Horse Pike. The housing developments are Wharton Park and Totem Village.

Landfills

There is one municipal landfill in Mullica Township. It is located on Elwood Road, Block 9001, Lot 17 and covers 134 acres.

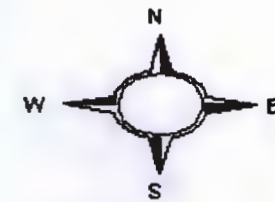
Agricultural Areas

Mullica has one Farmland Preservation Area, the Franceschini farm, consisting of a total of 243.71 acres. The property is identified as block 10205, lots 8 & 18; block 10104, lot 19 and block 10205, lot 1.

Active agricultural areas produce blueberries, strawberries, sweet potatoes, tomatoes and other general truck produce.

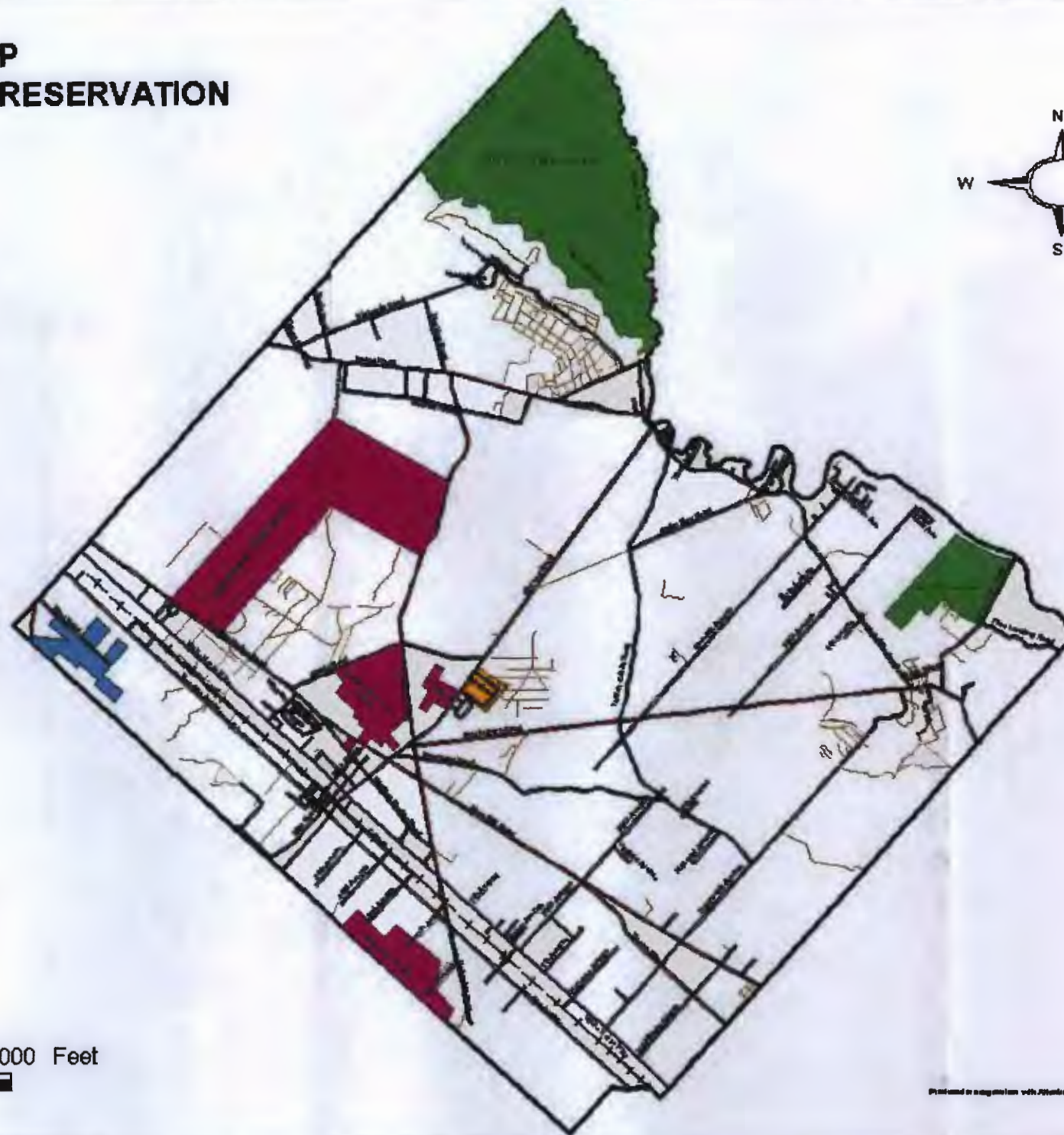
MULLICA TOWNSHIP LANDUSE MAP

MULLICA TOWNSHIP OPEN SPACE AND FARMLAND PRESERVATION



- Roads**
- County
 - Municipal
 - Other
 - State
 - Train
 - Opens.shp
 - Farmland Preservation
 - Municipal Boundary
 - Wildlife Management Areas
 - Recreation Area

4000 0 4000 8000 Feet



Printed in cooperation with Atlantic County GIS, Planning Commission & RDCP.

MULLICA TOWNSHIP OPEN SPACE MAP

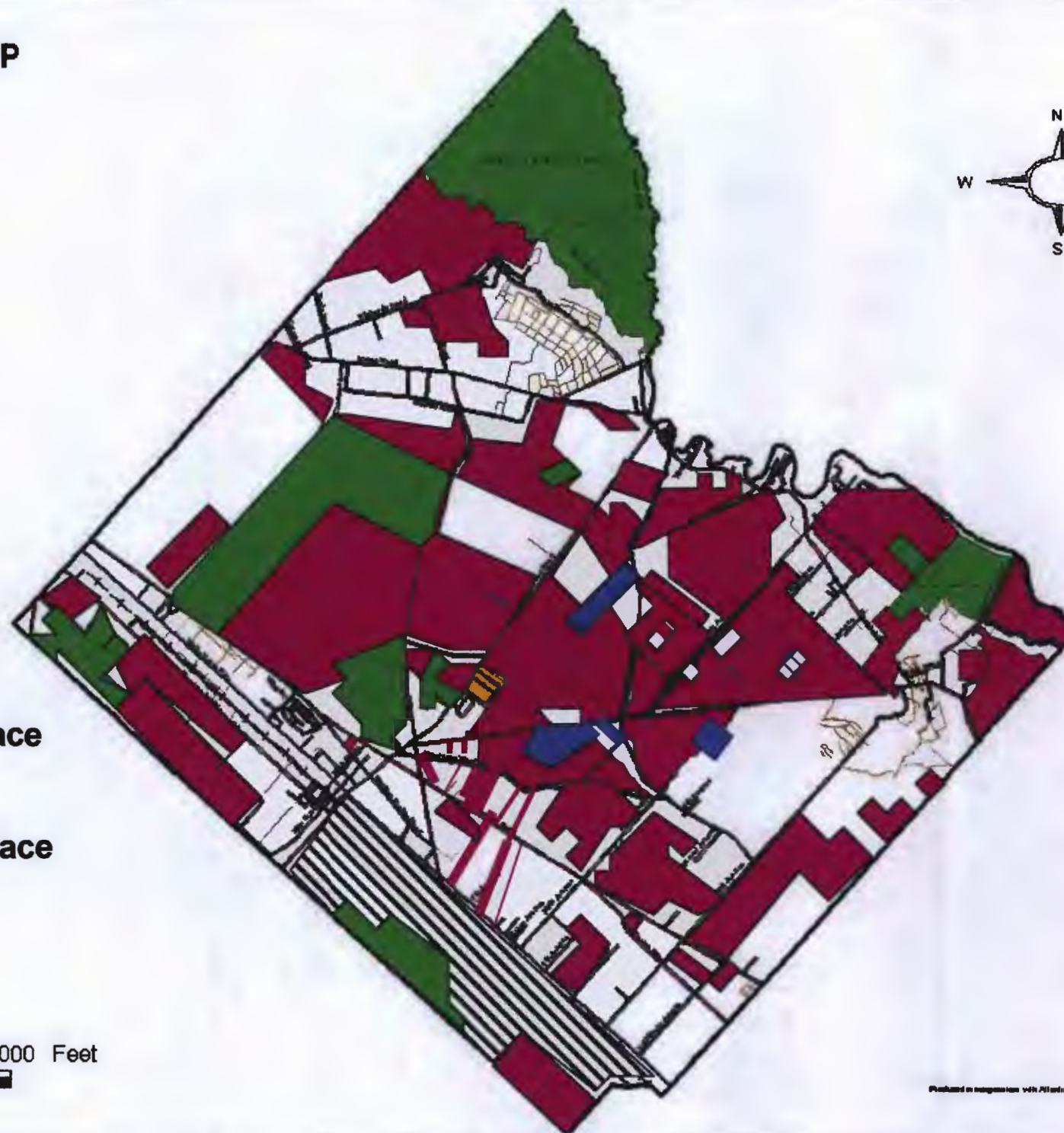
This map is not intended to show accurate boundaries but rather to depict the approximate proportions of publicly owned open space, privately owned space and developed land.

MULLICA TOWNSHIP OPEN SPACE



- Roads**
- County
 - Municipal
 - Other
 - State
 - Train
- Open Space**
- Publicly Owned Open Space
 - Municipal
 - Developed
 - Privately Owned Open Space
 - Recreational Area
 - Mixed

4000 0 4000 8000 Feet



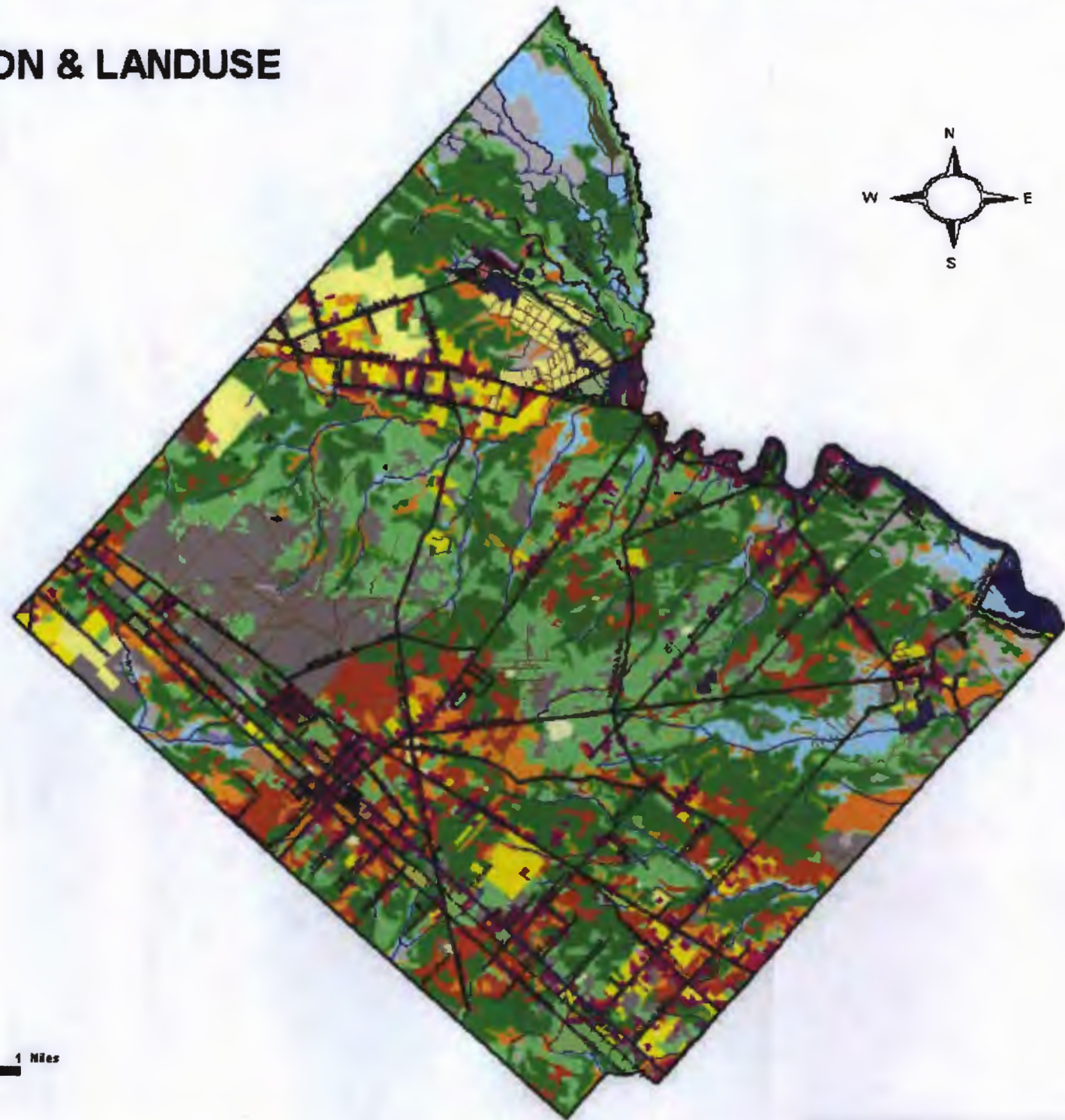
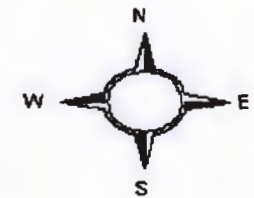
Produced in cooperation with NJ Office of County GIS, Pennsylvania Department of Transportation, and NJ DEP.

MULLICA TOWNSHIP VEGETATION AND LANDUSE MAP

MULLICA TOWNSHIP VEGETATION & LANDUSE

- Roads**
- County
 - Municipal
 - Other
 - State
 - Train
- Municipal Boundary**
- Lakes**
- Streams**
- Landuse**
- Altered Lands
 - Athletic Fields (Schools)
 - Brush-Dominant and Bog Wetlands
 - Brushland/Shrubland
 - Cedar Swamp
 - Commercial and Services
 - Confined Feeding Operations
 - Coniferous Forest
 - Coniferous Wooded Wetlands
 - Coniferous/Deciduous Forest
 - Cranberry Bogs
 - Cropland and Pastureland
 - Deciduous Forest
 - Deciduous Wooded Wetlands
 - Deciduous/Coniferous Forest
 - Extractive Mining
 - Industrial
 - Lake or Pond
 - Non-Tidal Marshes
 - Orchards, Vineyards, Nurseries, Horticultural Areas
 - Other Agriculture
 - Other Urban or Built-up Land
 - Recreational Land
 - Reservoir
 - Residential
 - River Channel
 - Saline Marshes
 - Transitional Areas
 - Undifferentiated Barren Lands

1 0 1 Miles



Prepared in cooperation with Atlantic County GIS, Protected Resources & PLDGP.

Zoning

Mullica Township zoning regulations are known as **ARTICLE X, ZONING DISTRICTS AND PERMITTED USES**. The text begins with the following introduction:

In order to implement the goals and objectives of the Pinelands Comprehensive Management Plan as revised effective March 2, 1992 and

To exercise stewardship over the lands and waters of Mullica Township, by providing for future development at suitable locations and appropriate intensities with respect to the limitations and sensitivities of natural and built systems.

To protect the unique characters of Mullica Township. To define this character as a mixture of desirable residential settings, attractive and productive non-residential uses; rural and agriculture living opportunities; and the scenic attributes which result from natural topography, drainage features, wetlands, open lands and forested areas.

To ensure a reasonable balance among various land uses. To provide a land use plan which would be in conformance with the Pinelands

Comprehensive Management Plan PCMP (NJAC 7:50-1 et seq.)

To provide standards for development that will ensure compatible land use relationships between the various land uses that characterize Mullica Township.

To protect the environmental integrity of the land or Mullica Township while understanding the individuals rights of land ownership.

The township is hereby divided into the following districts which shall be known as:

- PA** -Preservation Area
- AP** -Agricultural Production
- RD** -Rural Development Area
- PT** -Pinelands Town
- NV** -Nesco Village
- SV** -Sweetwater Village
- WV** -Weekstown Village
- EV** -Elwood Village
- FAR** -Forest Area Residential.

This district includes a section designated as a receiving area for the Forest Area Transfer Program (**FARR**)

EFFECT ON ESTABLISHMENT OF DISTRICTS

A. Following the effective date of this ordinance:

1. No building shall be erected, moved, altered, rebuilt or enlarged, except as specified elsewhere in this ordinance, no shall any land or building be used, designed

or arranged to be used for any purpose or in any manner, except in conformity with all regulations, requirements and/or restrictions specified in this ordinance for the district in which such building or land is located.

2. No yard or open space required in connection with any building or use shall be considered as proving a required open space for any other building of the same or any other lot.

3. No lot shall be formed from part of a lot already occupied by a building unless such building, all yards, and open spaces connected therewith, and the remaining lot comply with all requirements prescribed by this ordinance for the district in which said lot is located. No permit shall be issued for the erection of a building on any new lot thus created unless such building and lot comply with all the provisions of this ordinance.

B. Any existing use which is not in conformity with the provisions of the Mullica Township Development Ordinances as amended shall not be subject to the enforcement of the use provisions of this ordinance for a period of one (1) year from the adoption of these amendments to permit the owner of the non-conforming use to bring the use into compliance with the provision of this ordinance as amended, or to obtain

any appropriate variances and/or waivers from all governmental bodies having jurisdiction over the use of the land including, but not limited to the Mullica Township Board of Zoning Adjustment.

C. All conditions (not uses) which are not in conformance with the schedule of district regulations set forth in accordance with Section 1004 shall not be subject to enforcement of those regulations.

REGULATIONS GOVERNING THE USE OF LAND IN THE ZONING DISTRICTS

Preservation Area District (PA)

I. The following uses are permitted in the Preservation Area District

1. Agricultural employee housing as an element of, and accessory to, an active agricultural operation subject to Planning Board approval.

2. Berry agriculture and horticulture of native plants and other agricultural activities compatible with the existing soil and water conditions that support traditional Pinelands berry agriculture.

3. Forestry.

4. Bookkeeping.

5. Fish and wildlife management.

6. Low intensity recreational uses, provided that:

a. The parcel proposed for low intensity recreational use has an area of at least fifty acres;

b. The recreational use does not involve the use of motorized vehicles except for necessary transportation;

c. Access to bodies of water is limited to no more than fifteen linear feet of frontage per one thousand feet of water body frontage;

d. The parcel will contain no more than one campsite per two acres, provided that the campsites shall not be clustered at a net density exceeding six campsites per acre and providing the campsites are duly licensed by the Township;

e. Clearing vegetation, including ground cover and soil disturbance, does not exceed five percent of the total parcel; and

f. No more than one percent of the parcel will be covered with impermeable surfaces.

7. Expansion of Intensive recreational uses, provided that:

a. The intensive recreational use was in existence on February 7, 1979 and the capacity of the use will not exceed two times the capacity of the use on February 7, 1979;

b. The use is necessary to achieve recreational use of a particular element of the existing Pinelands environment; and

c. The use environmentally and aesthetically compatible with the character of the Preservation Area District and the characteristics of the particular basin in which the use is to be located taking into consideration the proportion of cleared and developed land, ambient water quality, ecologically sensitive areas and unique resources, and will not unduly burden public services.

8. Public service infrastructure which is necessary to serve only the needs of the Preservation Area District uses. Centralized waste water treatment and collection facilities shall be permitted to service the Preservation Area District only in accordance with Section 701.2.26.

9. Street, Identification, and Directional Signs.

10. Accessory uses.

11. Pinelands development credits, subject to Note 1015 hereof.

12. Detached single family dwellings on 3.2 acre lots in accordance with Section 1014.

13. Detached single family dwellings on 1.0 acre lots, in accordance with Section 1014 B.

14. Home occupations subject to Note 3.

Agricultural Production District (AP)

PERMITTED USES

1. Residential dwelling units not to exceed a gross density of one unit per 10 acres, except as otherwise provided in this note, provided that:

a. The dwelling is accessory to an active agricultural operation;

b. The dwelling is for an operator or employee of the farm who is actively engaged in and essential to the agricultural operation;

c. The dwelling is to be located on a lot which is under or qualified for agricultural assessment;

d. The dwelling is located on a lot which has an active production history or where a farm management plan has been prepared which demonstrates that the property will be farmed as a unit unto itself or as part of another farm operation in the area; and

e. A residential lot has not been subdivided from the property within the previous five years unless the lot has been subdivided pursuant to Section 1014, Section C of this ordinance.

f. No more than one lot may be created for a dwelling pursuant to this subsection at any one time.

2. Residential dwelling units at a density of one unit per 3.2 acres provided the conditions of Section 1014 are met.

3. Agriculture.

4. Agricultural employee housing as an element of, and accessory to, an active agricultural operation.

5. Forestry.

6. Fish and wildlife management.

7. Low intensity recreational uses, provided that.

a. The parcel proposed for low intensity recreational use has an area of at least fifty acres;

b. The recreational use does not involve the use of motorized vehicles except for necessary transportation;

c. Access to bodies of water is limited to no more than fifteen linear feet of frontage per one thousand feet of water body frontage;

d. Clearing of vegetation, including ground cover and soil disturbance, does not exceed five percent of the entire parcel; and

e. No more than one percent of the entire parcel will be covered with impermeable surfaces.

8. Expansion of intensive recreational uses, provided that:

a. The intensive recreational use was in existence on February 7, 1979 and the capacity of the use will not exceed two times the capacity of the use on February 7, 1979;

b. The use is necessary to achieve recreational use of a particular element of the existing Pinelands environment; and

c. The use is environmentally and aesthetically compatible with the character of the Pinelands Agricultural Production Area and the characteristics of the particular basin in which use is to be located, taking into consideration the proportion of cleared and developed land, ambient water quality, ecologically sensitive areas and unique resources, and will not unduly burden public services.

9. Agricultural commercial establishments, excluding supermarkets, restaurants, and convenience stores, provided that:

a. The principal goods or products available for sale were produced in the Pinelands; and

b. The sales area of the establishment does not exceed five thousand square feet.

10. Agricultural products processing facilities.

11. Public service infrastructure. Centralized waste water treatment and collection facilities shall be permitted to service the Agricultural Production District only in accordance with Section 701.5.2b.

12. Street, Identification and Directional signs.

13. Accessory uses.

14. Pinelands development credits, in accordance with Section 1015.

15. Detached single family dwellings on one (1) acre lots, in accordance with Section 1014.

Conditional Uses

1. Pinelands resource-related industrial uses, excluding resource extraction and uses that only rely on sand or gravel as raw products, provided that:

a. The unit(s) shall be clustered on one acre lots;

b. The remainder of the parcel, including all contiguous lands in common ownership, which is not assigned to individual residential lots shall be permanently dedicated for agricultural uses through recordation of the restriction on the deed to the parcel; and

c. The restriction on the deed to the parcel, including any rights to be redeemed for further residential development, shall be done in accordance with N.J.A.C. 7:50-5, Part IV, so as to sever any Pinelands Development Credits allocated to the parcel.

2. Residential dwellings units at a gross density of one unit per 40 acres, provided that:

a. The unit (s) shall be clustered on one acre lots;

b. The remainder of the parcel, including all contiguous lands in common ownership, which is not assigned to individual residential lots shall be permanently dedicated for agricultural uses through recordation of the restriction on the deed to the parcel; and

- c. The restriction on the deed to the parcel, including any rights to be redeemed for future residential development, shall be done in accordance with N.J.A.C. 7:50-5, Part IV, so as to sever any Pinelands Development Credits allocated to the parcel.

Rural Development District - RD

I. PERMITTED USES

Land in Rural Development Area may be utilized as follows:

(A) Residential Dwelling Unit lots shall be permitted in accordance with the scheduled district regulations.

This schedule includes a gross residential density of one dwelling unit per 3.6 acres.

(B) Detached single family dwellings on 1.0 acre lots, in accordance with Section 1014.B.

(C) In addition to the residential uses permitted under (A) above, the following uses are permitted in the Rural Development Area:

1. Commercial uses such as road side stands, retail sale facilities, retail food establishments, farm supply facilities and similar uses, eating and drinking establishments, and other similar uses.

2. Commercial shopping centers subject to Planning Boards Approval (see Note 7); automobile, new car sales and service establishments (see Note 10); places of worship (see Note 11); gasoline service stations (see Note 17).

3. Existing residential uses present a legally constructed at the time of the adoption of this ordinance.

4. Light industrial subject to Planning Board Approval (see Note 15).

6. Professional offices subject to Planning Board Approval (see Note 12); medical complexes and nursing homes subject to Planning Board Approval (see Note 14); and automobile repair garage (see Note 18).

II. CONDITIONAL USES

A. Detached single family dwellings on 1.0 acre lots, in accordance with Section 1007.A.

SECTION 1007A: RURAL DEVELOPMENT DISTRICT LAND TRANSFER PROGRAM

In accordance with the provisions of N.J.A.C. 7:50-5.30 which permits the establishment of a Land Transfer Program in a Rural Development Area, the Land Transfer Program provided for herein is designed to permit an equitable distribution of the allowable development units while insuring flexibility for property owners to sell

and/or purchase parcels which contain less than the minimum required lot area or which may be otherwise unsuitable for development.

The Mullica Township Land Transfer Program for the Rural Development Zone is permitted as a conditional use subject to Planning Board Approval which approval shall be granted upon compliance by the applicant with the following conditions:

A. The applicant shall satisfy the minimum lot size requirements for development (3.6 acres) to utilize the Land Transfer Program, the applicant may acquire non-contiguous land subject to the provisions of this section.

B. The portion of the lot to be improved must consist of a parcel with a minimum size of 1 acre (43560 sq. ft.), and be in existence at the time that this ordinance is certified.

C. The applicant must show proof of ownership of sufficient additional non-contiguous land to reach a total of 3.6 acres. Proof of ownership may consist of a true copy of a deed properly recorded or such other proof as may satisfy the Board that the applicant is the legal owner of the additional non-contiguous acreage.

D. The additional non-contiguous land must be located in the Rural Development (RD) Zone in Mullica Township. Property owners will not be permitted to subdivide

property to create 1 acre lots for the purpose of exercising development rights under this transfer program.

E. Each 1 acre or large lot sought to be improved must be shown by the applicant to be eligible for a permit (permissible) for a single realty unit septic system in accordance with the applicable regulations of the New Jersey Pinelands Commission, the New Jersey Department of Environmental Protection and Energy, the Atlantic County Board of Health, and any other agency having jurisdiction over the design and/or installation of septic systems for the property.

F. The lot proposed for development otherwise meets the minimum standards of Article VII of this ordinance.

Restrictions must also be noted on any plans or plots approved by the Planning Board of the Zoning Board.

G. The applicant who satisfies the density requirement (3.6 acres) pursuant to the Land Transfer Program set forth in this section must deed restrict both parcels of land to preclude further development not in accordance with this section or with the New Jersey Pinelands Comprehensive Management Plan. The portion of the non-contiguous property which is not subject to improvement or development shall be permanently dedicated through recordation of a restriction on the

deed to the property as open space, agriculture, forestry, and low intensity recreational uses with no further development permitted. The deed restriction shall be in a form to be approved by the Planning Board attorney and the Pinelands Commission.

H. The non-contiguous parcel utilized to complete one (1) total parcel of acreage (3.6 acres or more) for purposes of this section may not be transferred, encumbered, assigned, leased, rented, or use for any purpose insistent with its utilization as part of the development parcel.

I. Any property used as a non-contiguous assemblage for purposes of this section may be transferred or assigned in any manner separately from the portion of the non-contiguous parcel which is developed.

J. A property once transferred to complete the assemblage of a non-contiguous buildable parcel pursuant to this section may not be used to complete an assemblage of any other non-contiguous parcel pursuant to the provisions of this section.

K. A non-contiguous parcel assembled pursuant to the provisions of this paragraph may not thereafter be segregated or subdivided.

L. Development permitted on the property shall be

in accordance with all development requirements of the RD District, Mullica Development Ordinance, PCMP, and all applicable statutes and regulations.

Pinelands Town District (PT)

I. The following uses are permitted in a Pinelands Town District:

1. Single family dwelling detached structure, with a gross density of one unit per acre.
2. Public and private education uses.
3. Place of worship subject to site plan review by the Planning Board.
4. Parks, playgrounds, play fields, or recreational uses of land and/or city owned or operated building subject to site plan approval by the Planning Board.
5. Road side stands, retail sale facilities, retail food establishments, farm supply facilities, eating and drinking establishments.
6. Commercial shopping centers subject to Planning Board Approval (see Note 7); automobile, new car sales and service establishments (see Note 10); gasoline service stations (see Note 17); automotive repair (see Note 18).

7. Light industrial, subject to Planning Approval (see Note 15).

8. Professional offices subject to Planning Board Approval (see Note 12); medical complexes and nursing homes subject to Planning Board Approval (see Note 14).

All uses in the Pinelands Town are subject to the provisions of N.J.A.C. 7:50-5.27 which provides:

(a) Any of the uses set forth in I(1) through (8) of this section are authorized in a Pinelands Town provided that:

1. Public service infrastructure necessary to support the use is available, or can be provided without any development in the PA and FAR Zones; and

2. The character and magnitude of the use is compatible with existing structures and uses in the Township.

(b) No residential dwelling units or nonresidential use shall be located in a parcel of less than one acre unless served by a centralized waste water treatment plant.

(c) Any municipal variance approval which grants relief from the density or lot area requirements for a residential or principal nonresidential use in the PT District shall require that Pinelands Development Credits be used for all dwelling units or lots in excess of that permitted without the variance.

Nesco Village (NV)

The following uses shall be permitted in Nesco Village:

1. Single family detached residential with a bulk density requirement of 5 acres per dwelling unit.

2. Agricultural, forestry, campgrounds uses.

3. Public Utilities and infrastructures subject to Note 5.

4. Educational uses (see Note 6).

5. Place of worship (see Note 11).

6. Parks, playgrounds, playfields, or recreational uses of land and/or township owned or operated buildings subject to site plan approval by the Planning Board.

7. A one acre minimum lot size is required for all development, subject to Section 1014.B.

8. The following uses are conditionally permitted subject to review by the Planning Board and the conditions as outlines in the referenced note.

a. In-Home professional.

b. In-Home or cottage industry work.

c. More than one principle use structure on the same lot, i.e., separate building for a business that is operated and administered by the resident of the Residential Program.

d. Up to 3 family structure, mother-daughter or SRO apartment. This is to facilitate and support making housing opportunities affordable.

9. All commercial uses, accessory uses, and conditional uses with the exception of the Land Transfer Program which are provided for anywhere in the Mullica Township Land Use Ordinance shall be permitted use in the Village, subject to site plan approval by the Mullica Township Planning Board.

10. All uses in the Nesco Village are subject to the provisions of N.J.A.C. 7:50-5.27 which provides:

a. Any of the uses set forth in I(1) through (8) of this section are authorized in a Pinelands Village, provided that:

1. Public service infrastructure necessary to support the use is available, or can be provided without any development in the PA and FAR Zones; and

2. The character and magnitude of the use is compatible with existing structures and uses in the Village.

b. No residential dwelling units or nonresidential use shall be located in a parcel of less than one acre unless served by a centralized waste water treatment plant.

c. Any municipal variance approval which grants relief

from the density or lot area requirements for a residential or principal nonresidential use in the NV District shall require that Pinelands Development Credits be used for all dwelling units or lots in excess of the permitted without the variance.

Sweetwater Village (SV)

The following uses shall be permitted in Sweetwater Village:

1. Single family detached residential. 1 structure (residential) per acre.

2. Agricultural, forestry, campground uses, subject to site plan approval by Planning Board.

3. Educational uses (see Note 6).

4. Place of worship (see Note 11).

5. Parks, playgrounds, playfields, or recreational uses of land and/or township owned or operated buildings subject to site plan approval by the Planning Board.

6. Marinas and river related commercial uses as defined in Note 9.

7. The following uses are conditionally permitted subject to review by the Planning Board and the conditions as outlines in the reference note.

a. In-Home professional.

b. In-Home or cottage industry work.

c. More than one principle use structure on the same lot, i.e., separate building for a business that is operated and administered by the resident of the Residential Program.

d. Up to 3 family structure, mother-daughter or single resident occupancy (SRO) apartment. This is to facilitate and support making housing opportunities affordable.

8. All commercial uses, accessory uses, and conditional uses with the exception of the Land Transfer Program which are provided for anywhere in the Mullica Township Land Ordinance shall be permitted use in the Village, subject to approval by the Mullica Township Planning Board.

9. All uses in the Sweetwater Village are subject to the provisions of N.J.A.C. 7:50-5.27 which provides:

a. Any of the uses set forth in I(1) through (8) of this section are authorized in a Pinelands Village, provided that:

1. Public Service infrastructure necessary to support the use is available, or can be provided without any development in the PA and FARR Zones; and

2. The character and magnitude of the use is compatible with existing structures and uses in the Village.

b. No residential dwelling units or nonresidential use shall be located in a parcel of less than one acre unless served by a centralized waste water treatment plant.

c. Any municipal variance approval which grants relief from the density or lot area requirements for a residential or principal nonresidential use in the SV District shall require that Pinelands Development Credits be used for all dwelling units or lots in excess of that permitted without the variance.

Elwood Village (EV)

Land within Elwood Village is intended to be a center for development. In order to promote orderly development of property, all development in Elwood Village is subject to Planning Board approval except conforming single family detached residences.

Uses permitted in Elwood Village shall include:

1. Single family detached residential, with a bulk zoning minimum requirement of 1 residential unit per 1-1/2 acre.

2. Agricultural, forestry, campground uses.

3. Planned residential development, as per Note 16.

4. Educational uses (See Note 6).

5. Place of worship (See Note 11).

6. Parks, playgrounds, playfields, or recreational uses of land and/or township owned or operated buildings subject to site plan approval by the Planning Board.

7. A one acre minimum lot size is required for all development subject to Section 1014.B.

8. Recreational uses: public and/or private commercial golf course, driving range, health club, bowling alley.

9. The following uses shall be permitted in the Elwood Village subject to Planning Board Approval:

- a. Duplex
- b. Mother/daughter
- c. In-House professional
- d. In-Home or cottage industry work
- e. Service related commercial use

10. All development in the Elwood Village is subject to requirements set forth in the Land Development Ordinance of Mullica Township regarding certain infrastructure requirements including but not limited to sidewalks, curbs, street lights, pedestrian access and access for disabled persons.

11. All commercial uses, accessory uses, and conditional uses with the exception of the Land Transfer Program which are provided

for anywhere in the Mullica Township Land Use Ordinance shall be a permitted use in the Village, subject to approval by the Mullica Township Planning Board.

12. Any municipal variance approval which grants relief from the density or lot area requirements for a residential or principal nonresidential use in the EV District shall require that Pinelands Development Credits be used for all dwelling units or lots in excess of that permitted without the variance.

Weekstown Village (WV)

Land located in Weekstown Village may be used for:

- 1. Single family dwelling detached structures, with one primary structure (residential) per 5 acres.
- 2. Educational uses (see Note 6).
- 3. Places of worship (see Note 11).
- 4. Parks, playgrounds, playfields, or recreational uses of land and/or township owned or operated building subject to site plan approval by the Planning Board.
- 5. Agriculture and forestry.
- 6. Camping.
- 7. A one acre minimum lot size is required for all development subject to 1014.B.
- 8. All commercial uses, accessory uses, and conditional uses

with the exception of the Land Transfer Program which are provided for anywhere in the Mullica Township Land Use Ordinance shall be a permitted use in the Village, subject to approval by the Mullica Township Planning Board.

9. All uses in the Pinelands Village are subject to the provisions of N.J.A.C. 7:50-5.27 which provides:

a. Any of the uses set forth in I(1) through (8) of this section are authorized in a Pinelands Village, provided that:

1. Public service infrastructure necessary to support the use is available, or can be provided without any development in the PA and FAR Zones; and

2. The character and magnitude of the use is compatible with existing structures and uses in the Village.

b. No residential dwelling units or nonresidential use shall be located in a parcel of less than one acre unless served by a centralized waste water treatment plant.

c. Any municipal variance approval which grants relief from the density or lot area requirements for a residential or principal nonresidential use in the WV District shall require that Pinelands Development Credits be used for all dwelling units or lots in excess of that permitted without the variance.

10. The following uses are conditionally permitted subject to review by the Planning Board and the conditions as outlined in the referenced note.

a. In-Home professional.

b. In-Home or cottage industry work.

c. More than one principle use structure on the same lot, i.e., separate building for a business that is operated and administered by the resident of the Residential Program.

d. Up to 3 family structure, mother-daughter or SRO apartment. This is to facilitate and support making housing opportunities affordable.

Forest Area Residential District (FAR)

"PERMITTED USES"

1. Agriculture.
2. Agricultural employee housing as an element of, and necessary to, an active agricultural operation and subject to Planning Board approval.

3. Forestry.
4. Fish and wildlife management.

5. Low intensity recreational uses, provided that:

a. The parcel proposed for low intensity

recreational use has an area of at least fifty (50) acres;

b. The recreational use does not involve the use of motorized vehicles except for necessary transportation;

c. Access to bodies of water is limited to no more than fifteen (15) linear feet of frontage per one thousand (1000) feet of water body frontage;

d. Clearing of vegetation, including ground cover and soil disturbance, does not exceed five (5) percent of the total parcel; and

e. No more than one (1) percent of the parcel will be covered with impermeable surfaces.

6. Expansion of intensive recreational uses, provided that:

a. The intensive recreational use was in existence on February 7, 1979 and the capacity of the use will not exceed two times the capacity of the use on February 7, 1979;

b. The use is necessary to achieve recreational use of a particular element of the existing Pinelands environment; and

c. The use is environmentally and aesthetically compatible with the character of the Pinelands Forest Area and the characteristics of the particular basin in which the use is to be located, taking into consideration the proportion of cleared and developed

land, ambient water quality, ecologically sensitive areas and unique resources, and will not unduly burden public services.

7. Campgrounds, not to exceed one (1) campsites per gross acre, provided that the campsites may be clustered at a net density not to exceed ten (10) campsites per acre and provided the campground is duly licensed by the Township.

Campgrounds are subject to Planning Board approval.

8. Continuation of existing resource extraction operations in accordance with the standards of N.J.A.C. 7:50-6, Part IV.

9. Public service infrastructure intended to primarily serve only the needs of the Pinelands. Centralized waste water treatment and collection facilities shall be permitted to service the Forest Area District only in accordance with Section 701.2.2b.

10. Street, Identification, and Directional Signs.

11. Accessory uses.

12. Detached single family dwellings on 3.2 acre lots in accordance with Section 1014.

13. Detached single family dwellings at a density of one (1) dwelling unit per twenty (20) acres.

14. Detached single family dwellings on one (1) acre lots, in accordance with Section 1014.B.

15. Institutional uses including but not limited to schools in accordance with Note 6, half-way houses, mental health care facilities, private health care facilities, libraries, schools, theaters, museums, all consistent with the provisions of N.J.A.C. 7:50-2.11, and subject to Planning Board Approval.

16. Home occupation in accordance with Note 3.

CONDITIONAL USES:

1. Pinelands resource related industrial uses, excluding resource extraction and uses that rely on sand or gravel as raw products, provided that:

a. The parcel proposed for development has an area of at least five (5) acres.

b. The principal raw material for the proposed use is found or produced in the Pinelands; and

c. The use does not require or will not generate subsidiary or satellite development in a Forest Area District.

2. Agricultural commercial establishments, excluding supermarkets, restaurants, and convenience stores, provided that:

a. The principal goods or products available for sale were produced in the Pinelands; and

b. The sale area of the establishment does not exceed five thousand (5000) square feet.

3. Roadside retail sales and services establishments, provided that:

a. The parcel proposed for development has roadway frontage of at least one hundred twenty-five (125) feet;

b. No portion of any structure proposed for development will be more than three hundred (300) feet, measured along a line parallel to the roadway, from the closest part of a roadside retail sales and service establishment structure that was in existence on February 7, 1979; and

c. The proposed use will not unduly burden public services, including but not limited to water, sewer, and roads, nor will it interfere with the residential quality of the immediate neighborhood.

4. Continuation of existing resource extraction operations in accordance with the standards of N.J.A.C. 7:50-6, Part IV.

Far Land Transfer Program (FARR)

1. In accordance with the provision of N.J.A.C. 7:50-5.30 which permits the establishment of a Land Transfer Program in a Forest Area, the Land Transfer Program provided for herein is designed to permit an equitable distribution of the allowable development units while insuring flexibility for property owners to sell and/or purchase parcels which contain

less than the minimum required lot area or which may be otherwise unsuitable for development.

2. The Mullica Township Land Transfer Program for the Forest Area Residential Zone is permitted a conditional use subject to Planning Board Approval which approval shall be granted upon compliance by the applicant with the following conditions:

3. Residential dwelling units on lots of four (4) acres or more are permitted in the FARR areas in accordance with the provisions of this land transfer program, provided that the owner shall acquire and provide proof of ownership or sufficient non-contiguous acres located in FAR district outside the FARR areas of Mullica Township to meet the twenty (20) acre minimum bulk requirement.

4. Subdivision in the FARR areas to achieve the four (4) acre minimum contiguous improved portion of the parcel shall be permitted, subject to all rules and regulations under the Major Subdivision Section of the Mullica Township Ordinance.

5. The development transfers shall comply with all applicable provision of N.J.A.C. 7:50-5:30.

6. Each four (4) acre or larger lot sought to be improved must be shown by the applicant to be eligible for a permit (permissible) for a single realty unit septic system in accordance with the applicable regulations of the New

Jersey Pinelands Commission, the New Jersey Department of Environmental Protection Energy, the Atlantic County Board of Health, and any other agency having jurisdiction over the design and/or installation of septic systems for the property.

7. The lot proposed for development otherwise meets the minimum standards of Article VII of this Ordinance.

8. The non-contiguous portion of the land necessary to complete the twenty (20) acre non-contiguous property necessary to meet the twenty (20) acre minimum shall be located in the FAR Zone outside the FARR areas as shown on the Township Zoning Map.

9. In the FARR areas of the FAR Zone, owners of property less than four (4) acres but greater than one (1) acre as of January 14, 1981, shall not be required to comply with the four (4) acres of contiguous property set forth as a minimum for development pursuant to the FAR Zone Transfer Program.

10. The applicant who satisfies the minimum lot acreage density requirement (20) acres pursuant to the Land Transfer Program set forth in the section must deed restrict both parcels of land to preclude further development not in accordance with the section or with the New Jersey Pinelands Comprehensive Management Plan. The portion of the non-

contiguous property which is not subject to improvement or development shall be permanently dedicated through recordation of a restriction on the deed to the property as open space as provided in Section 11 below with no further development permitted. The deed restriction shall be in a form to be approved by the Planning Board attorney and the Pinelands Commission. In accordance with N.J.A.C. 7:50-5:30(b)(4) the restricted non-contiguous property may be used only for agriculture, forestry, or low intensity recreational use.

11. The non-contiguous parcel utilized to complete one (1) total parcel of acreage (20 acres or more) for purposes of this section may not be transferred, encumbered, assigned, leased, rented, or used for any purpose inconsistent with its utilization as part of the development parcel. In accordance with N.J.A.C. 7:50-5:30(b)(4) the restricted non-contiguous property may be used for agriculture, forestry, or low intensity recreational use.

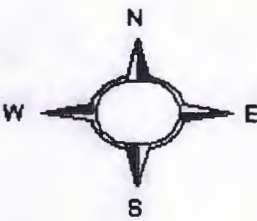
12. Any property used as a non-contiguous assemblage for purposes of this section may not be transferred or assigned in any manner separately from the portion of the non-contiguous parcel which is developed.

13. A property once transferred to complete the assemblage of a non-contiguous buildable parcel pursuant to this section may not be used to complete an assemblage of any other non-contiguous parcel pursuant to the provision of this section.

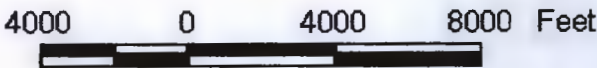
14. A non-contiguous parcel assembled pursuant to the provisions of this paragraph may not thereafter be segregated or subdivided. However, an owner of the non-contiguous property may rent or lease the property consistent with the uses permissible in accordance with N.J.A.C. 7:50-5:30(b)(4), which include uses for agricultural, forestry, or low intensity recreational uses.

MULLICA TOWNSHIP ZONING MAP

MULLICA TOWNSHIP ZONING



- Roads
- County
 - Municipal
 - Other
 - State
 - Train
- Lakes
- Streams
- Zoning
- AP
 - EV
 - FAR
 - FARR
 - NV
 - PA
 - PT
 - RD
 - SV
 - WV
- Municipal Boundary



Produced in cooperation with Atlantic County GIS, Professional Cartographer & PLDGP.

HISTORIC AND CULTURAL

MULLICA TOWNSHIP HAS A
RICH AND COLORFUL PAST.
LOCATED ALONG THE MULLICA
RIVER AND NEAR A MAJOR
ROUTE TO PHILADELPHIA, THE
AREA HAS A LONG HISTORY OF
INDUSTRY AND COMMERCE
DATING FROM THE
REVOLUTIONARY WAR ERA.

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HISTORIC AND CULTURAL

Mullica Township has a rich and colorful history. This chapter contains descriptions of Mullica's historic places as well as past and current photographs; interspersed with the historic locations are "tid-bits" of information, some factual, and some quite fictional.

The Township's population before the white man came were the Delaware Indians—the Lenni Lenape or "original people." There were three main tribes: the Unami (Turtles), Unalachtos (Turkeys) and Minsi (Wolves). These were divided into sub-tribes such as the Navesinks, Assanpinks, Matas, Shackamaxons, Chichequaas (Cheesequakes), Raritans, Nanticokes, Nariticongs, and Hackingsackies. Some of these are still names of local areas.

Mullica Township was formed from the western section of Galloway Township and included, in addition to its current boundaries, much land that later became a large part of the cities of Hammonton and Egg Harbor. It came into existence officially at a meeting held at Pleasant Mills on February 21, 1838.

Mullica's Name

Following are excerpts from correspondence between Erkki

Poikonen of Finland and James F. Turk of the Harrison Township Historical Society:

"...I expect to be able to send to you material presently being translated in the US from Finnish to English proving beyond any doubt that the name Mulikka originates in Finland and that the Mulikka family indeed was Finnish..."

"...Of the 12 separate expeditions which were made to the colony between 1638 and 1656...the last expedition, which arrived on the Delaware in March 1656, membered 105 persons, out of which 92 were Finns..."

A second letter is titled in this manner:

*MULIKKA VILLAGE PYLKONMAKI,
FINLAND
MULLICA HILL, MILLICA
TOWNSHIP, MULLICA RIVER, NJ*

The letter continues:

"Dear Mr. Turk,

"Referring to my visit and our meeting in Mullica Hill in October as well as to my letter of November 25, 1988, please find enclosed documentation confirming the connection between my home village and your Mullica names...includes references to the Mulikka family of Karanka in Karstula (Karstulan Karangasta) in two

connections when studying the origin of the Finns in Norway and Delaware... Excerpts of History of Old Saarijarvi by Reino Kallio...regarding the Mulikka stay in the present day Mulikka village in 1564 - 1696...Page from Keski-Suomi (Middle Finland) book... with Pylkonmaki scene and statement that the pioneers of Mullica Hill USA

originated in Mulikka village in Pylkonmaki...Pages from PYLKONMAKI book...with many references to Mulikka family, Mulikka village, Mulikka school, etc....Illustrated article from newspaper...regarding connection between Mulikka Pylkonmaki and Mullica USA...."

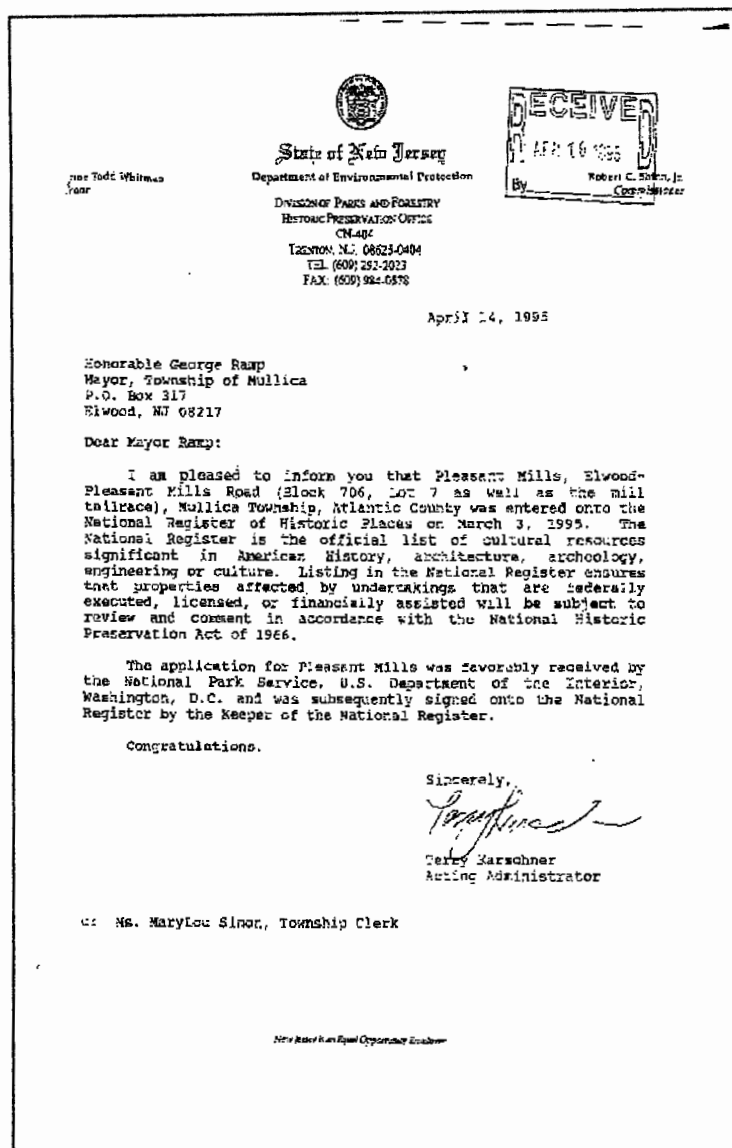


THE PAPER MILL

The mill was built by Elijah Clark in 1763 as a warehouse originally for smugglers and then for privateersmen. It later served as a wool reclaiming mill, cotton mill, paper mill and theatre playhouse. William McCarthy bought the mill in 1832 as a paper mill. Salt hay was used at the

mill in the manufacture of butcher paper, a coarse brown paper used primarily by butchers for the wrapping of their meats back in the days before modern sanitary restrictions. By 1835, according to mill records, the mill was turning out nearly a ton of paper daily. The structure was rebuilt in 1880 and stands to this day.

ENTRANCE OF THE PAPER MILL INTO THE NATIONAL HISTORIC REGISTER



PINELANDS SMUGGLERS LAUNCH AN INDUSTRY

To evade customs at the ports of Philadelphia, Greenwich, Toms River, Burlington and Perth Amboy, smugglers would transport their goods across the sandy roads of the Pinelands in flat-wagons, securely hidden under large loads of salt hay. Thus many an illegal cargo escaped detection by roaming customs officials.

Once the goods were delivered to buyers, the salt hay was no longer of use to the smugglers, who promptly dumped it. Enterprising shopkeepers found other uses for the hay, leading to the eventual beginning of salt hay farming as a legitimate enterprise along the Jersey coastlands. Salt hay farming today continues in several coastal spots.

One of the earliest references to salt hay meadows was made in 1685 by Thomas Budd, who owned much of the Pines. He stated that he believed the meadows off the Barrens were excellent grazing lands for cattle because "of the abundance of salt grass." This contention was supported by pioneer farmers of Cape May, Ocean and Atlantic Counties, who swam their cattle across small stretches of water separating the mainland from the off-shore islands (or used raft-like barges where the water was deep) and allowed them to roam free. Although this land was officially owned by the Jersey Proprietors, farmers ignored the jurisdiction.

However, it was the activities of the smugglers which started a demand for salt meadow hay and farmers, who previously had cut some at various times for bedding of their horses, began to see its commercial value. They constructed makeshift landings on the mainland and ferried the hay across the meadows in flat scows. The best of the salt meadows yielded as much as three tons to the acre, from two cuttings per season. Although there was a total of seventy-four statutes on the books of New Jersey between 1697 and 1783 regulating the use of meadowlands, those involved in the new possibilities of saltgrass paid little heed to them.

When the first glass factories began operation in the deep Pines along the Mullica River, there was a

big demand for salt hay for the packing of glassware and pottery. Rough roads pocked with tree stumps were the only lanes of communication between the Pinelands and the markets of Philadelphia and New York, and the shipment of glass over these roads was a decided risk. Therefore the early glass houses of the Pines depended upon the currents of the Mullica.

Glass was packed at such landings as Hermann City, Crowleytown, and Bulltown, and shipped by water to waiting merchants in the two large urban centers. The demand for packing grass accelerated with the demand for glassware. Then banana firms in Newark and New York City began using salt hay as packing for banana shipments, creating one of the first markets out of the Southern Jersey territory.

Ice houses in the vicinity found salt hay of particular benefit as insulation, and many times sent their own people to gather the grass, which proved a cheap means of keeping ice stocks during the warmer months. However, this system did not prove profitable, and soon the ice houses were customers of farmers who began to spend more of their time on the salt meadows. Some eventually became known as salt hay farmers who gained their entire livelihood from the business.

The paper mill at Harrisville used salt hay in the making of so-called "butcher paper," a course

brown paper used primarily by butchers for the wrapping of their meats back in the days before modern sanitary restrictions. William McCarthy, who bought the mill in 1832, found a ready supply of salt hay in the Wading River area. According to mill records, it was turning out nearly a ton of paper daily by 1835. McCarthy's hay was brought by barges to the Landing (Lower Bank, Burlington County) about a mile below the mill and conveyed from there by mule team. Salt hay farmers were getting three dollars per ton for their efforts. The usual

Mullica River barge was of twenty-ton capacity.

Many of the flat-decked craft of the Mullica, commonly called hay scows, existed up to about 1935. The scow varied in size, the most common being thirty-three feet long and about twelve feet wide. They drew very little water even when fully loaded. This made them perfect for the shallow Mullica and its tributaries. There are still some to be seen pulled up on the mud banks of the river, now rotting hulks, victims of time, storm and tide.



Rare old photo of salt hay gathering on the meadows of South Jersey, an industry launched by the needs of smugglers.



KATE AYLESFORD MANSION

The mansion was built by Elijah Clark in 1763. Charles Peterson, a Victorian novelist, wrote a book about the American Revolution in South Jersey entitled *The Heiress of Sweetwater*. The locale was in and around Pleasant Mills, Batsto and Sweetwater and the heroine was named Kate Aylesford. So real did he paint his characters and so closely did he follow actual events, that many people to this day believe that there was a real Kate Aylesford. For many years the Elijah

Clark mansion was known as the Kate Aylesford House.

One of the characters in the book was the outlaw Mulliner, who broke into a party at the mansion and danced with the pretty hostess, while his followers held other guests at gunpoint. No doubt some of the legends of the real Mulliner had their beginnings with author Peterson.

A BANDIT

The Dancing Bandit" as told by William McMahon in Pine Barren: Legend, Lore and Lies:

"Although not as widely known as the headless horseman of Sleepy Hollow, the ghostly horseman of the Pines has been a legend in South Jersey for 200 years. He is said to be the dancing Pines robber Joseph Mulliner, about whom many stories are told.

Mulliner and his gang operated in the Barrens during the time of the American Revolution and made their headquarters in a swamp in the vicinity of what is now Egg Harbor City. At the forks of the Mullica there is a large oak tree with spreading branches, overlooking the water. According to local legend, it was from this tree that highwayman Joseph Mulliner was hanged and left to dangle, after his capture by a posse of patriots and farmers angered beyond tolerance by his raids upon their homes and lands. Some residents of nearby Sweetwater cut the body down, the legend continues, and buried it in a lonely spot beside the road leading to the village. It has been reported on occasion that the thundering beat of a horse's hoofs has been heard along the road, and a lone celebrator returning from a party nearby told of hearing the hoofs and feeling a cold wind pass him by. Another ghostly legend tells of a rider in a long black cape emerging periodically from the dark waters of the Mullica, carrying its ashen-faced head under an arm.

Mulliner was a tall, handsome, swaggering Englishman with a passion for elaborate uniforms, ornate swords

and an ever-present brace of pistols in his wide leather belt. He was a complex character who loved to dance and attend parties (uninvited, of course), all the while heading the worst bunch of cutthroats that ever infested the South Jersey woodlands. Mulliner and his band of about forty men were supposedly loyal to King George I I I, but there is abundant evidence that they were loyal only to themselves. Tories as well as patriots suffered at their hands. But because of this so-called allegiance to the English crown, they were widely known by the name "refugees."

Taking advantage of the fact that all able-bodied men were away defending New Jersey as part of the Continental Army in Trenton, New Brunswick, Monmouth and Princeton, Mulliner and his band would swoop down on an unprotected farm house, burning and pillaging without fear of resistance. Anything that could not be carried away was set afire.

However, when he was not engaged in plunder, Mulliner liked nothing better than to be the uninvited guest at social affairs in private homes and taverns of the area. A tale is told of how he learned of a wedding taking place at a tavern in old Washington (now a part of the Wharton Tract) and decided to invite himself to the festivities.

Approaching the back of the place, he nearly tripped over a young girl lying on the grass, crying. When she saw the giant outlaw she ran for

the building. Mulliner decided he'd better delay his appearance.

After a while he entered quietly, and stood at the rear of those gathered there. A wedding was in progress. The bride was none other than the girl he had encountered outside. Furthermore, the groom was an old foe who had boasted he would kill Mulliner on sight. The outlaw, feeling the girl was being forced into this marriage, gave a wild whoop, fired his two pistols in the air and sent the wedding guests scrambling for cover. In the excitement, the groom disappeared.

Mulliner replaced his pistols, assured everyone that he was there for no harm, and invited them all to eat and drink, leading the way himself. He also ordered the fiddler to play. After a few whirls around the floor with the reluctant bride-to-be, he backed out the door and jumped upon his horse, which had been held in



readiness by a member of his band. Here the tale ends without explanation as to what happened to the frightened bridegroom or the

bride. We know Mulliner got away unharmed.

Another legend that always surfaces in any discussion of Mulliner concerns a raid by his gang, minus its leader, on a farm near Washington owned by a widow named Bates. Her four sons were serving in the Continental army. According to the story, the marauders stole her pigs and poultry and then entered the house to cart away furniture and anything else of value they might find. Widow Bates attempted to fight them off so they took her, tied her to a nearby tree, and burned her home to the ground.

Neighbors rallied to her aid as they do in the Pines, and reconstructed the dwelling, even donating furniture and food. Mulliner, it was reported, had no prior knowledge of the raid and was upset by the actions of his men. One morning, a bag of coins amounting to several hundred dollars was found hanging outside the Bates cabin window. It was always believed that these coins were placed there by Mulliner to show his disapproval of the actions of his followers. There is, of course, some doubt about the story.

It was his love of dancing and playing the dandy that led to Mulliner's undoing. When the British troops departed and the war ended the men of South Jersey came home. Learning of the activities of Mulliner and his gang, they formed a company of rangers under an old Indian fighter

named Captain Baylin, and went seeking the Pines robbers.

One night Mulliner, up to his usual tricks at an inn in New Columbia (now Nesco), was whirling the girls about the dance floor and drinking heavily. One of the men present slipped out a back way and contacted Captain Baylin, who arrived with his rangers, surrounded the place, captured Mulliner's guards and took the outlaw from the dance floor.

The rangers escorted their bound prisoner on a horse to Burlington and turned him over to the authorities there. Mulliner was placed in the Burlington jail and charged with banditry and treason. It did not take a court long to find him guilty. He was hanged in the yard of the prison in August, 1781. Without its leader, the gang scattered and peace once more reigned in the Pines.



INDIAN CABIN MILL INN

Outlaw Joe Mulliner was captured here in 1781. It is now a private home.

An old Scotsman once told me, "Scotland had a glorious history until some danged historian came along and pointed out that it was mostly legend." So it goes with the story of Mulliner. We have seen from the above that the so-called hanging tree at the Forks never served that purpose, at least so far as Mulliner is concerned. His death came at the hands of legal authority after trial and conviction. Whether or not the body was brought back and buried at Sweetwater is also debatable. According to historian

Watson Buck, Mulliner's body was indeed brought back from Burlington and interred along the Pleasant Mills-Nesco road. In 1850, he says, a party of drunken woodsmen from Batsto dug up the bones, but Jesse Richards, Batsto ironmaster, had them returned to their original resting-place. A gun club in the vicinity first marked the alleged grave with a wooden slab, and it now bears an official State historic sign. But there are skeptics who question what lies beneath the marker."

ST. MARY'S CEMETERY



This is the oldest Catholic cemetery in South Jersey. It originally accompanied a wood frame church built in 1827, St. Mary's of the Assumption, or more commonly known as St. Mary's in the Pines. St. Mary's was the first Catholic Church south of Trenton and the first in what is now Atlantic County. Catholic workers at the Batsto Furnace and Iron Works, many of them from Ireland and Germany, built the church in 1827 on land donated by their employer, Jesse Richards, an Episcopalian who also helped the project financially. Before St. Mary's was built, the Catholic workers worshipped in private homes. Mass was celebrated whenever a priest journeyed by stagecoach or horseback from Philadelphia, a trip which entailed forty-two miles of sand roads and a ferry ride. After the church opened, Richards provided rooms for the visiting priests at his home, according to historical accounts. His daughter took charge of the altar.

St. Mary's held its last service in December 1860, by which time the congregation had dwindled to eleven worshippers. The church was boarded up in 1865 and completely abandoned in 1885. It was destroyed in a forest fire in April 1900. The cemetery contains the graves of the Revolutionary War-era workers at Batsto, the furnace that made much of the ammunition used in the war. The graveyard contains about thirty-

five headstones, many of them with fading inscriptions. Franz and Mary Froehlinger, parents of the late Joseph Fralinger, originator of the famous Fralinger's Salt Water Taffy in Atlantic City, are buried there. The oldest tombstone dates to 1835. The last burial was in 1906.

SWEETWATER

Sweetwater was founded on 1707 by Scotsmen. The town was given its name after a scene in the novel entitled *The Heiress of Sweetwater*, by Charles Peterson. It was once a haven for privateers who fought against the British. The British were stopped here on the way to Batsto after attacking Chestnut Neck.

WEEKSTOWN

Weekstown was established by the Weeks family.

THE FORKS

The confluence of the Batsto and Mullica Rivers is known as the Forks. This was a major shipping and commercial area from the mid 1700 period to mid 1800 that served the iron mills, glass works, paper mills, charcoal makers and saw mills along the rivers. The Forks was established as a military post in the Revolutionary

War. The post housed a battalion of

infantry and a battery of field pieces.



PLEASANT MILLS-BATSTO CHURCH AND CEMETERY

Built by Elijah Clark in 1763 as a log-cabin structure, the early church was known as Clark's Meeting House. The original cabin was replaced by the present wood building in 1808. The present church was dedicated by the Rev. Francis Asbury, the first Methodist bishop of the United States.

Religious revivals were an important happening in the Pines, primitive as some may have been. To most of the early inhabitants, religion was an emotional experience, many times more emotional than religious. Because of the rugged life led by these people, they needed the promise of a better world elsewhere. Funerals were always dress-up affairs to speed the departed to a more abundant life in the hereafter. When a log church or meeting house was available, the traveling preacher would make use of it, if the local wardens

would let him; otherwise he improvised. Such was the case of the Batsto-Pleasant Mills church. Dr. Charles Pitman (for whom Pitman was named) was famed for his two-and-a-half-hour sermons. He found the little log cabin church inadequate for the needs of the large crowds he attracted, and used a hay wagon drawn up outside for his pulpit. The wagon was supplied by Jesse Richards, operator of the Batsto Iron Furnace, who was usually host to the man of the bible, no matter what his religious affiliation, following services.

Although the Batsto church seems today off the beaten track, it attracted a number of well known preachers of early Jersey days. John Brainerd who, like his brother David before him, devoted his life to the conversion of the Lenni Lenape to Christianity, preached at this spot in 1774. It is recorded that a group of Indians were among his listeners. Rev. Philip Fithian, a Presbyterian minister who was one of the "Indians" in the famous Greenwich tea burning party of the Revolution, mentions in his journal having preached at "Clark's Log Meeting House."



In the cemetery adjoining the church is buried one of its most colorful

trustees, Simon Lucas, who occupied that post along with William Richards

and Jesse Richards of the Batsto Iron family. Also among those buried here is the Revolutionary War privateer Captain Jack Van Dyke, Master of the brigantine "Gypsy Lane."

A CONTRARY CUSS

The following is a description of Simon Lucas by old-time historian, Charles F. Green:

"Old Simon Lucas," said Green, "was a contrary cuss. He could be very much a tyrant with his congregation, as illustrated by his words from the pulpit when a young lady's brooch pin offended him. He denounced her so forcibly she left the church in tears. On another occasion he bent a bit. Every spring the Atsion creek would be the scene of a large run of herring. Everyone went after the fish, even to the extent of closing down the iron furnaces. Well, on this Sunday there was an unusually heavy run of herring and the male population of the area turned out with hooks and lines. Jesse Richards, of the Batsto works, and his daughter passed by the creek on their way to church. The young miss, shocked at the scene on the Sabbath, said, 'Father, you should stop those men from fishing!' Richards replied, 'Don't know if I have the right, but I'll ask Simon Lucas. He should know.' On the way back from church, Richard's daughter inquired, 'Papa, did you ask Mr. Lucas about the fishing?' 'Yes,' answered her father. 'What did he say?' 'Well, he said the

time to catch herring was when the herring was here!' "

BATSTO AND WHARTON STATE FOREST

Batsto is the site of the 1781 forge that was part of the Batsto Iron Works. The iron works first forged cannonballs, among other items, for the Revolutionary War. Batsto later became a glassworks and was eventually bought by Joseph Wharton.

The greed of civilization has always been at the door of the Barrens. The iron masters looked upon the woods as a means of keeping their furnaces blazing; likewise the glass men. When a section of timber was depleted, another was tackled until the wooded sections began disappearing at an alarming rate. The death of the iron industry in the 1850s saved the remaining trees, although charcoal makers for many years after caused their share of destruction.

In the late 1800s the Pines were again threatened when industrialist Joseph Wharton of Philadelphia acquired 90,000 acres, intending to tap the enormous watershed and sell its water to the city of Philadelphia. His plan was thwarted when state legislators became aware of the dangers and prohibited the transfer of New Jersey water to Pennsylvania. Frustrated, Wharton's heirs sold their holdings to the state in 1953.

The land was immediately marked for public use.



HILDA S. FRAME SCHOOLHOUSE

This early schoolhouse in the Nesco area was named after Hilda S. Frame in appreciation of her life-long service to the education of the Township's children. The school is currently used for a head-start program.

OLD SCHOOL DAYS

The following is excerpted from an Atlantic City Press article by Pat Arney:

"In the old days, teachers struck children to discipline them and students were put off the schoolbus and forced to walk home if they misbehaved on the bus.

That was the picture former student Francis 'Bud' Walker, now a 68-year-old retiree who still lives in the township, painted for a combined class of about 45 third graders....

'Did you get detention?' one third-grader asked Walker, whose mother, Lillian, worked in the district from 1934 to 1972, first as a teacher

and later as principal of the Elwood School.

'I didn't get detention because my mom would tell my dad and I'd get detention in the basement with a belt,' Walker answered.

Until the fifth grade, his mother was the only teacher he'd had, he said. 'But I didn't call her "Mom." I had to call her Mrs. Walker.' ... There were only two children in his class and 26 in the whole school, said Walker, who attended the Nesco and Weekstown schools between 1935 and 1943.

He said he didn't know whether teachers were legally allowed to strike children in those days, 'but I got hit a lot.'

He was held to a higher standard because his mother was a teacher, he said. She broke two yardsticks on him.

'I got blamed for everything,' Walker said. 'I did a lot, but a lot I didn't do.'

If a student misbehaved on the bus, 'they just opened the door and put you out,' he said.

Walker told a story about the Nesco School's 'town dog' named Butch, who was allowed to come into the school and stay in the classroom. 'One weekend they forgot Butch and he got stuck in the school all weekend,' he said. 'By Monday, he had chewed all the mullions out of the windows trying to get out to go to the bathroom. He wouldn't mess in the school.'

Walker showed the children a hand bell—the kind a teacher would ring to open school - that he found on a pile of scrap metal at the one-room Weekstown School when he was a student there just before World War II started.

At the time, the U.S. government was sponsoring a contest to collect scrap metal for a battleship-building program, he said. The states that collected the most scrap metal would have a battleship named after them. Walker wanted the bell, but his mother wouldn't let him take it unless he substituted something else, he said. So he replaced it with carloads of iron grates that his father, a boilermaker, removed from locomotives.

New Jersey won the scrap-metal contest and that's how the USS New Jersey - the most decorated battleship in the Navy's history - got its name, he said.

The students peppered Walker with such questions as, 'Did they have earrings back then?' and 'What was your favorite subject?'

Walker's answers were, respectively: 'My goodness, no,' and 'Play period.'

'Why were things so cheap?' one girl asked.

'Because nobody had any money,' he said. 'Ice cream was a nickel a dip, and not many people had money for ice cream.'

Frances Perry, 91, a Hammonton resident who taught here from 1954
The original Elwood School



The original Elwood School

Elwood School that used to be across the street from the present school.

'I'm sure you'd like to know about the toilets,' Perry said, drawing chuckles from the audience.

'In those days there were no inside toilets,' Perry said. The outhouse for the boys was on one side of the school and the outhouse for the girls on the other side.

'Ooooooh,' the students gasped."

to 1971...spoke to a combined class of nearly 90 fourth graders. She showed them the hand bell from the old



GERTRUDE LAUER SCHOOL

This original two-room schoolhouse was erected in 1910. The school was named for a much-loved teacher of several generations of Mullica Township children. It is still used for second-grade classes.

INDIAN CABIN ROAD

Indian Cabin Road was named for being the location of the last remaining Native American residence in the area.

COLUMBIA

Now a part of Nesco, there is evidence as far back as 1865 that this was once a town and is probably how Columbia Road was named. Below is a

tax certificate from the year 1865 for taxes paid to Mullica Township. The certificate indicates that appeals could be filed at Columbia Hall, Columbia.

<p><i>Mr. Eliphalet Whittlesey</i> Your Tax in Mullica Township for the year 1865, is <i>Twelve</i> Dollars and <i>Seventeen</i> Cents. Returnable the 20th of December. Appeal on Tuesday, the 21st day of November, at COLUMBIA HALL, COLUMBIA, at two o'clock, P. M.</p>											
<p><small>Taxes not paid when due, draw TWELVE PER CENT. INTEREST per annum until paid; to be collected with the Tax.</small></p>											
Real Tax	No. of Acres	Valuation	Personal	Dogs	State Tax	County Tax	School Tax	County Town Bonds	Township Bonds	Township Tax	TOTAL
1		300			80	1.32	1.29	1.03	5.31	1.50	\$ 12 00 25
<p><small>*By the law passed at the last session of the Legislature, the Tax on Married men is \$1, on Single, \$2.</small></p>											
<p>ELIPHALET WHITTLESEY, Collector Received Payment, <i>In full and with interest</i> ELWOOD, Collector <i>Eliphalet Whittlesey</i></p>											

AMATOL TRACT

Amatol emerges from history as the last of the forgotten towns of the Garden State's Pine Barrens—a true ghost town. Amatol can likewise be identified as New Jersey's last "company town," one that came into existence under peculiar circumstances, lasted for about six months, then vanished from the face of the earth.

Amatol, a World War I enterprise, was a large munitions plant with accompanying employee housing

designed to supply twenty-five percent of all shells ordered or needed by the U.S. Army Ordnance Department. Amatol was built in 1918 by the Atlantic Loading Company, a firm with headquarters in New York City and which was incorporated in the state of Maine in December, 1917 by O.J. Salisbury of Salt Lake City, Utah. The town and village together were named after the explosive utilized at the plant, ammonium nitrate and trinitrotoluel (TNT) combined in an 80-20 mix—Amatol.

The corporation bought 6,000 acres of land from a Daniel Frazier of

Hammonton. The transaction made Frazier a wealthy man and he later built a mansion on the mainline of Philadelphia. The location selected was comparatively isolated, yet along both the Pennsylvania and Reading railroad lines, providing ample transportation facilities for men and material. Other factors favoring the location were easily worked soil, a subterranean supply of excellent water, and a moderate climate. The tract was located between East Hammonton and Elwood in Mullica Township, along Route 30 (White Horse Pike), and extended northeast almost as far as Columbia Road in Nesco, and southeast between the Elwood-Weekstown and Elwood-Pleasant Mills Roads. The latter area contained the village about two miles distant from the plant.

The land on which Amatol was to be located was purchased on Saturday, March 4th, 1918 and work commenced on Sunday, March 5th. When construction got underway, a high-tension power line was brought in from the Missouri Avenue Plant of the Atlantic City Electric Company. The line was thirty-three miles long, carrying 66,000 volts. During construction there were 700 cars of lumber on wheels at one time. A force of 300, located partly in Philadelphia and partly at Amatol, was needed to take care of procurement. During construction, between 3,000 and 5,500 people worked at Amatol. The village of Elwood was not informed

that the plant and personnel were coming. There was a heavy initial burden on the community that was reflected by long lines at the post office and a lack of hotel rooms in town. These facilities were less taxed as the new complex constructed a post office and adequate housing.

Of the 5,500 construction workers, 1,800 were enlisted men. These men helped clear the land, built the fence that surrounded the industrial section, and patrolled the perimeter of the property. The civilian personnel included both men and women. The women not only cooked and cleaned but were secretaries and land surveyors. Some taught school for those workers that brought families. Most of the civilian laborers came from the Lower East Side of New York City. (A local paper noted that residents were worried about the influx of people but that there was no trouble.) However, the South Jersey Republican dated March 9th, 1918 relates that "the wages offered for ordinary help, 35 cents per hour and up to something over a hundred dollars per month, are attracting help from (Hammonton) farms and those employed in clerical positions. Local stores are already feeling the effects of the 'boom' so close by, while the factories have lost many of their hands."

Standard gauge railroad tracks connected all factory buildings with one another and so did twelve miles of

huge conveyor belts. Fifty miles of track covered the complex; ten locomotives and thirty passenger cars were needed to accommodate traffic. Shuttle trains consisting usually of a locomotive and two or three cars were used to carry workers from their quarters to work and back. Thirty-two miles of roadway and five miles of wooden walks facilitated additional transportation. Traffic at Amatol was at times quite heavy, considering the reported availability of 553 horses, 75 trucks, 95 passenger autos and 13 passenger buses. One mobile paywagon completed the list of vehicles, which required 21 railroad structures and 12 stables for shelter.

The industrial area was set up as camps with each section having a name. There were 642 buildings that housed many functions including receiving, pouring and coding, drilling and cleaning, assembling, packing, powder filling, TNT storage, and primer and booster magazine storage. Because of the hazardous operations involved, buildings were separated by 200 feet to minimize danger should fire or explosion occur. The plant looked like a wartime concentration camp, surrounded as it was with heavy wire fence topped with several strands of barbed wire. Guardhouses, located every 500 feet, were elevated above the fence and each was equipped with a searchlight and manned by armed guards around the clock. Ultimately the plant complexes covered an area of 2,550 acres; the

town itself was built on 350 acres at a safe distance (two miles) from the explosive plant. By July 31st, 1918, enough factory buildings, residential areas, utilities, etc. had been completed to start operations as the largest shell loading plant in the United States.

Plant operations consisted of loading, assembling, and packing fixed ammunition. This meant the hauling of TNT, ammonium nitrate, and smokeless powder. To carry through these operations with the least possible danger, and with the speed required by the needs of war, flawless organization, production methods, and equipment was required. Atlantic Loading Company, it was claimed, combed the nation for some of the finest experts in various fields to administer and run the plant. An assembly-line technique for shell loading was developed here, a method that speeded up production considerably. The plant utilized a power belt conveyor system developed by AMATOL engineers permitting continuous movement of shells through the various operations. Also developed at the plant was a safer method of melting TNT and mixing it with the ammonium nitrate. The plant never experienced any major explosions. The facility loaded shells from 75 mm. to ten-inch drop bombs, depth bombs, rifle grenades, hand grenades and boosters. The normal total capacity of the plant was projected at 60,000 shells per day.

Called a "wartime marvel of American Engineering Achievement", the plant's theme of "Speed-Simplicity-Results" earned the respect of professionals in many fields.

The town was planned to house a possible population of 25,000 residents. It was designed as an attractive community rather than just a group of housing units, and gave the impression of a well-kept suburban development. In recognition of the fact that Amatol would have to be dismantled sooner or later depending entirely on future developments of the war, all construction was of a temporary nature. The recovery and salvage of much construction material was anticipated.

Shortly before the end of World War 1, in October of 1918, a peak of 3800 soldiers lived and worked at Amatol. Their safety and well being was assured by three central heating systems and two auxiliary generating stations. Water supply capacity was given at 1,750,000 gallons daily. The town had its own sewerage treatment plant consisting of septic tanks and large sand filter beds with the effluent "finding its way eventually to tidewater". (This can only mean that the effluent was channeled into the Mullica River Basin.) Seven hospital buildings with 150 beds took care of all medical needs, while social activities were concentrated at the local theatre.

A FIRE

While trucks were used extensively in the enterprise at Amatol, there were 553 horses on the site as well. Fire took its toll of this phase of the operation as this account in the July 13th issue of the "South Jersey Republican" attests:

Two Of the huge horse barns at Amatol, property of the Atlantic Loading Company, the largest shell loading plant in the country, just below Hammonton, took fire about half past ten last Friday night, and burned to the ground with about forty head of fine big horses. Hammonton was notified, and sent its chemical apparatuses and men; Egg Harbor quickly got on the job.

As soon as the fire was discovered, the horses were released, thus saving many of them. The poor frightened animals took refuge in the woods, and several came tearing through Hammonton, as far up the road as Berlin and Medford. Searching parties rounded them up and they were returned the next day. Two of the animals were injured in collision and had to be shot.

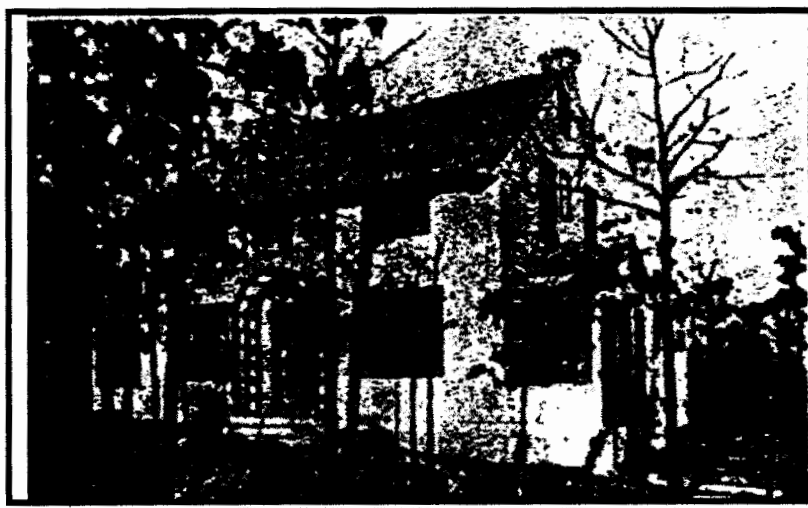
"While the buildings can be replaced, the suffering of the poor animals will remain long in the minds of witnesses and those who love dumb animals.

"The cause was laid to an enemy, but later developments showed that a mixture of befuddled brain, match and tobacco were responsible."

A week later, the "Republican" commented editorially on the fire in this way:

There are two stories told about the Amatol fire, last Friday night, and neither one is enough to convince sober-minded men that saloons are not a menace to a community. Both stories agree on one fact, that a drunken man laid down to

rest in or near the barns, with a lighted pipe or cigarette. The only complicating feature is the present location of the Man in question. One story is that he was apprehended, and sentenced to ninety days in jail; the other, that he was burned to a crisp, and is now preparing a good warm abode for the like of those who sold him the rum.



Living accommodations included single residences, multiple houses, workman's houses, 119 dormitories, bunkhouses and a YMCA. The type of accommodations assigned depended on one's position in the hierarchy; presumably the single dwellings went to the supervisory personnel. There were eighteen eating places, and an ice plant with a thirty-ton daily capacity. For the dormitory dwellers there was a mess hall with two wings, each of which sat 800 persons. The main cafeteria measured 25,000 square feet and could provide 6,000 meals per hour. A total of 15,000 to

20,000 meals were actually served daily. With an eye on efficiency and economy, Amatol's food supply was partly provided by local pig farmers. Three hundred pigs, of which 200 were thoroughbred, were fed 3,500 pounds of waste daily, mostly in the form of cooked food—leftovers from the eating places. A schoolhouse, churches, a ball field, two firehouses and a post office completed the public structure of the town. A total of 386 telephones served the community.

Those bent on a shopping spree didn't have to go very far, as twenty-one

commercial stores catered to their taste providing a wide variety of merchandise. The pride and joy of the town was Liberty Court. This was a shopping mall that included a first-class restaurant, record shop, haberdashery, grocery, menswear store, jewelry store and other shops along with a post office and the Liberty Theatre with seating for 950 people, and a Chinese restaurant. This was located on a court and promenade that was lighted at night, and, although somewhat smaller,

antedated the huge suburban malls of today.

The need for office buildings became apparent in light of the fact that it took thirty-eight people to man the accounting department. They in turn had to take care of 197 industrial service employees and 500 guards. One hundred and eleven town employees plus a conglomeration of some 247 cooks and miscellaneous help made up the balance. 1,001 operators, 2,000 enlisted men and 34 supervisors ran the plant itself.



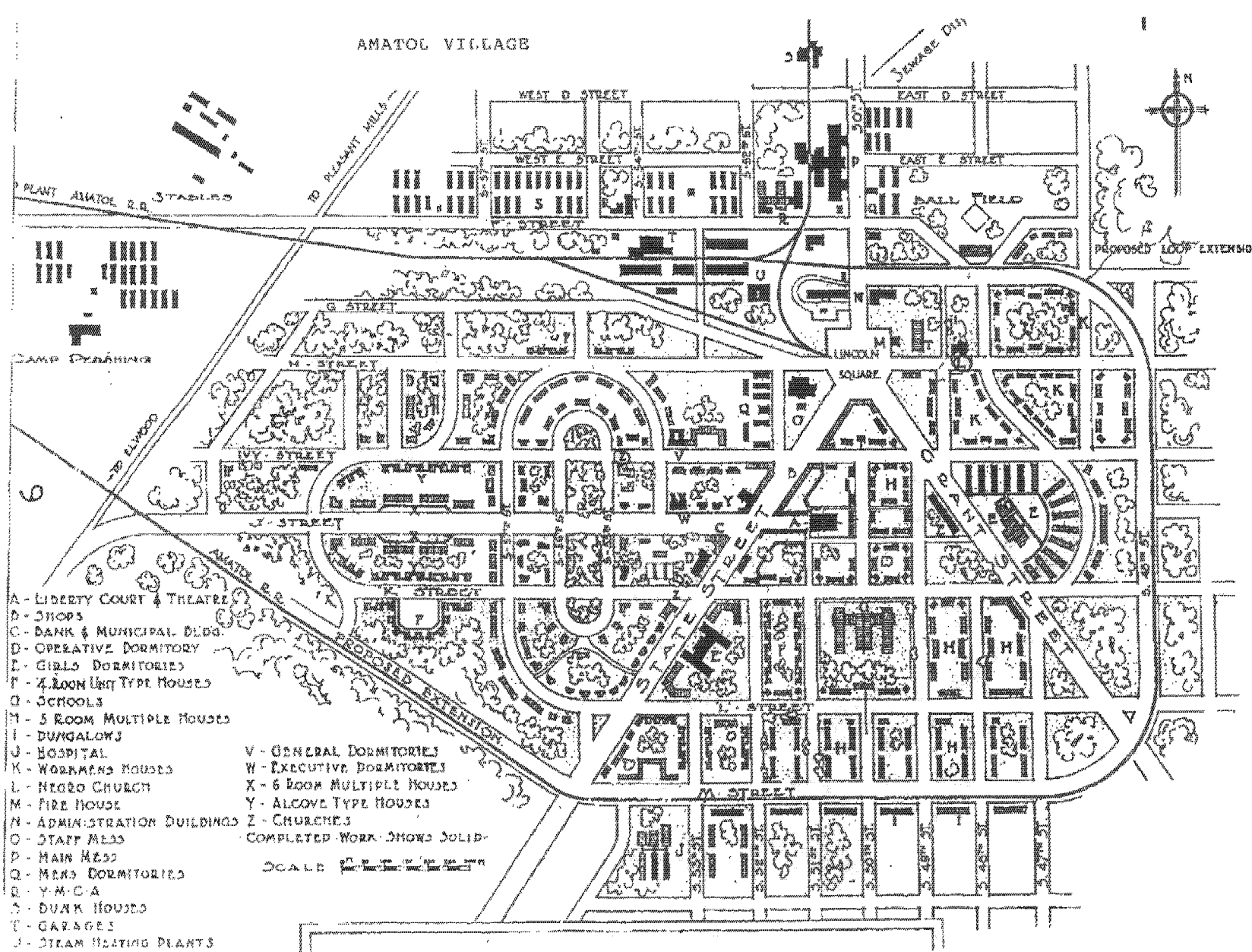


Triple house multiple type



Above type two-family frame construction

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MYSTERY CEMETERY

The following article was written for the "Batsto Citizens Gazette" in 1990 by J. G. Wilson:

"It is easy enough to affix an aura of mystery to a cemetery. This is especially true of a cemetery in the Pine Barrens where most burial grounds lay claim to origins that are at best obscure. This particular cemetery is located on the edge of the Amatol Tract, that 6,000 acre piece of real estate where the U.S. Army Ordnance Department operated a huge shell loading plant for a while in 1917-18. I wrote this some years ago in the hope of coming up with the answer to some questions. But in the passage of time little has surfaced. This is a second try. The cemetery is located about 100 yards from Moss Mill Rd. at the extreme south end of what was once the Amatol tract. This area is next to a small neat-as-a-pin settlement of black Jews with a woodland road separating the pine and scrub oak woods and the houses. The road apparently goes nowhere and if followed it is soon swallowed by the Amatol scrub. The graves are there, however, in neat rows, most of them little more than rotted- down cedar markers, by now devoid of any decipherable legend. Hunters who roamed this area in the old days, Jimmy Myers, George Lobley, Gilpin Wescoat, Tom Lockard, to name a few, often spoke of this cemetery in

the woods but know nothing of its origin. A widely accepted theory was held by a few to the effect that this was a cemetery created by the flu epidemic that raged in this area in 1917 and 18, carrying many to early graves.

But this area was settled before the War and was part of the area known as Magnolia. In fact there was a railroad station on the Pennsylvania line near this place. Apparently it was a regular stop and it was labeled 'Magnolia' ... A portion of the Amatol [plant] nearby the cemetery was labeled 'Camp Magnolia.' It was assumed that this settlement in the sprawling Amatol tract was occupied by black soldiers who supplied the muscle, teamsters, stablemen and others needed to keep the establishment functioning. Most of the flu victims came from this portion of Amatol. The next move was obvious. I have contacted historians in the Ordnance Department and other branches of the service who might have served at Amatol in 1917-18, but received a couple of rather terse notes to the effect this armed service takes a dim view of doing genealogical research. I wrote back a couple of times explaining I was not into genealogy and wanted only to find out if any Army personal who served at Amatol died there and if so were they buried there. Again I drew a blank. Now I have made mention of wooden markers. There are two stone markers there too. They deepen the

mystery. One marks the resting place of an 18 year-old woman. It is made of limestone and is inscribed with enough lettering to tell us the woman died on March 5, 1862. Unfortunately, the column is broken and the name cannot be determined. It is a large marker and elaborately carved. Near this is a small stone gravestone and bears the name Charles Williams, Co. A., 4th J.J. Infantry. Now what is left? Was this once a church graveyard? No available records indicate a church ever stood near this particular point. Where do we go from here or must the mystery remain?

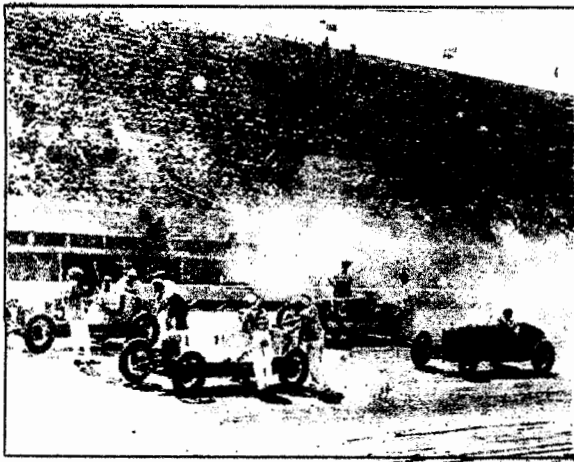


Amatol was ninety percent completed when the Armistice took effect on November 11th, 1918. The signing of the armistice caused suspension of the construction work. Actual shell loading was carried out from August to November of 1918, just a four-month period. When the operation closed down, all of the support area had been built, but only part of the residential area had been constructed. It is doubtful if the

plant ever achieved its design capacity.

In March of 1919, the federal government bought the property. What was built in nine months took three years to tear down. Although the land was cleared, there was no indication that any housing was built to the west of the present-day 57th Street. The housing to the east of 57th Street was intentionally demolished before 1924. The Atlantic Loading Company owned all the buildings. Individual houses were sold and removed from the property before 1921. None of the remaining structures in the village remained on site. It is possible that some of the Amatol houses lasted from 1918 until 1921. What remain today are cellar holes and a few brick piers. As late as 1924, 4,000 pounds of ordnance were destroyed on the property.

Eventually, the tract went back into private ownership. The factory site on Moss Mill Road became the site of the largest wooden auto-racing track in existence in the 1920's. Named the Great Atlantic City Speedway, it took six million feet of lumber to build.



THE SPEEDWAY

Atlantic City Press Article:

By Stephen R. Levine

Staff Writer

"A.C.'s car-racing heyday was short.

On the grounds of Amatol, a defunct World War I munitions plant in Mullica Township, one of the greatest racetracks of the 1920's came and went in less than five years.

Two hundred and sixty-three freight cars hauled the boards—6 million feet of lumber for a 1.5-mile track built nearly 70 years ago.

It was the Atlantic City Motor Speedway, a huge pine bowl in Mullica Township that was briefly known as the fastest automotive racetrack in the world. It was also known by different names: Amatol for the grounds where it was built, the Atlantic City Raceway, and, simply, Speedway.

But as racing fans from around the region join fans around the world to watch the Indianapolis 500 today, the vast majority will be unaware of

what was, and what could have been, in their own backyard.

'It was a very fast tract, perhaps the fastest,' said Donald Davidson, a racing historian with the United States Auto Club, Indy's parent organization.

Davidson said that besides being fast, the Atlantic City track was larger than most of the 30 or more other board tracks that sprang up around the country in the 1920's, most of which were one to one-and-a-quarter miles in length.

He said the circuit of woodframe tracks held competitions that led to Indianapolis, which then, as now, was the Super Bowl of auto racing.

Eldon DeVilliers, 84, of Somers Point, helped build the great Atlantic City speedway.

It was DeVilleers' understanding that industrialist Charles M. Schwab, known today for the financial services organization that bears his name, was somehow booted from Indianapolis and came to Atlantic City to start his own rival track.

'It was meant to be competition for Indianapolis,' he said. 'It was exciting, you bet your life.'

Built in 1926, the track drew thousands of visitors per race to watch the top racers of the day compete.

With space for more than 100,000 spectators and more than 5,000 cars, the track was built for crowds as well as speed.

On May 1, 1926, the 300-mile inaugural drew more than 80,000 fans and 16 of the top drivers of the day: Peter DePaolo, Bennett Hill, Bob McDonough, and Harry Hartz among them.

Locally, it may have been the greatest one-day event in history.

The Atlantic City 'Evening Union' wrote that "special trains, arriving from Atlantic City, Philadelphia and New York in intervals of a few minutes flung thousands to the course.

The P.R. T. (Philadelphia Rapid Transit Company) sent 250 buses loaded with fans. The Absecon Bus company sent a fleet from the shore."

The 'Evening Union', a forerunner to The Press of Atlantic City, printed a special Speedway Edition right on the grounds.

'For hours the White Horse Pike and the dozen new roads feeding the speedway were teeming with cars three abreast and endless throngs of men and women all twining their feet and minds to the huge bowl in which new records were waited,' the paper wrote.

They didn't have long to wait.

Within hours at least three world records were shattered: the first by McDonough for driving 75 miles in less than 33 minutes, the second by Earl Devore for going 150 miles at an average speed of 134.54 mph, and the third by McDonough for driving 200 miles at an average speed of 133.9 mph.

Hartz, who had taken Indy the year before, won the Atlantic City openers as well.

Davidson said Atlantic City's speedway, like the other board tracks, had inherent high costs and risks because it was made of wood.

Fire was always a threat, especially when the wood became streaked with oil and gas. And the tracks were difficult to maintain and brake on.

'They'd splinter,' he said. 'They'd get hit very hard in the winter and deteriorate very fast.'

In 1928, the Atlantic City track was sold, along with most of the boards from the oval and grandstand. The rest were later carried off by souvenir seekers.

Built near grounds now occupied by Troop A of the New Jersey State Police in Hammonton, the track, despite its celebrated heyday, has virtually disappeared.

The land on which it was built once was famous for the World War I Amatol munitions plant, but little now remains of either the plant or the speedway.

Seventy years of vegetation cover the inner oval and the track itself is absorbed in a maze of white sand fire roads...."

DUMP SITE PROPOSED AT AMATOL

1984 Sun article:

"The solid waste has hit the fan.

It's no longer a battle between just the citizens of Mullica Township and the Atlantic County Utilities Authority.

Now the citizens have a new, influential ally, Terrence D. Moore, executive director of the NJ. Pinelands Commission.

This should come as something of a surprise to Mullica residents who are fighting the Authority's bid to develop a county-regional landfill on the township's pristine Amatol tract.

During rallies this past week, one of which drew 1,000 people, a fifth of the township's total population - anti-dump activists not only rallied against the utilities authority but the Pinelands Commission as well.

Ill feeling toward the Pinelands Commission runs rampant in Atlantic County towns under pinelands jurisdiction. The commissioners are seen as absentee carpetbaggers whose regulations callously usurp local land use laws.

Now, though, that attitude may change some, at least in Mullica.

'We have given no approval (of the Amatol site) and have told the county they are going to have a tough time getting it through the Pinelands Commission,' said Moore in an interview Wednesday.

Moore expressed sympathy for Mullica's people.

...Moore says that a solid waste agency can develop a landfill in Pinelands areas only if it can show

that no other site in the region is suitable.

'They have yet to demonstrate that to us,' says Moore.

According to the Pinelands executive both the county authority and its consultants were warned weeks ago that the commission's environmental scientists do not favor selection of the Amatol site.

The problem, says Moore, is that Amatol is a recharge area...

The ironies abound.

The surface of the 700-acre portion of Amatol proposed as the dump site is 22-feet above the seasonal water table peak. The authority's consultants deemed that as a plus, since any escaping leachate from the dump would have a long journey before reaching groundwater. With the state-of-the-art monitoring the authority promises it will employ, any such problem could be rectified before pollution could occur. But Moore maintains that land over such a deep groundwater reserve...[copy unreadable here] to replenish the aquifer system. It wouldn't do to have such an ample sponge blocked off, says Moore.

Moore isn't certain what the alternative site should be. The decision, after all, is not his to make. But he points out that one of the last four sites to be considered, the one called Betsy Scull, situated in Egg Harbor Township, has a more suitable water table.

'You don't want the water table to be too deep or too shallow,' said

Moore. 'At Betsy Scull it's ten feet, which is ...[copy unreadable] they have at the proposed Cape May regional site....'

Making the situation seem all the more ironic, is that the county's consultants, Rogers, Golden and Halpern of Philadelphia, have worked with the commission before and are familiar with pinelands regulations.

Asked about these seeming contradictions during a press conference called by the authority Wednesday, Pat Kennedy, a spokesman for the consultants, responded with a shrug and a wry smile.

Fact is, says Kennedy, when you take everything into account, Amatol is the only answer.

...Kennedy says the Pinelands Commission is almost reflexive in its distaste for landfill development on any land it regulates. But as the consultant points out on a map, there is very little land in Atlantic County

that does not fall under either Pinelands or CAFRA regulations. The consultants toyed around with putting the dump somewhere on a two-by-three mile expanse along the county's southwestern border, but Kennedy says that, while that land was burdened with neither Pinelands or CAFRA restrictions, much of the soil was inadequate there or had been developed for agriculture.

Howard Fritz Hanernam, utilities authority president, is satisfied that the consultants did the best they could in preparing their site selection study, saying the facts should speak for themselves in their newly released report.

And the report cites clear advantages in choosing Amatol over Betsy Scull...."

Note: Amatol was not chosen for the landfill site.



NEW JERSEY STATE POLICE BARRACKS

Known as the Hammonton Barracks, New Jersey State Police Troop A was formerly housed in this remodeled administration building of the Amatol complex. The site is now vacant.

LETTER TO THE TOWNSHIP COMMITTEE

Bud Walker wrote in 1990:

"As a resident of Mullica Township I felt it was my responsibility to bring to your attention the planned demolition of one of the most Historic buildings in Mullica Township.

The building I'm speaking of is the Administration Building of the Atlantic Loading Company at Amatol. Now known as the State Police Barracks, this building is the last visible evidence of the large town and plant located on this site, a town that was designed to house and care for a population of 25 thousand. Amatol and the Atlantic Loading Company produced more than 25% of the shells, mortars and hand grenades used in World War One. As an example of how important this plant was, the 6000 acres was fenced with a guard house every 500 feet that was manned 24 hours a day.

Camp Columbia located on the site housed more than a thousand troops who were responsible for the security at Amatol.

The last evidence of so much history should be saved: This building belongs on our National Register of

Historic Buildings and should remain as a memorial to those who gave their lives for our country. Possible use for the building could be for the creation of a veteran's cemetery.

Enclosed is an article from the Wall Street Journal showing what effort one town is making to save a McDonalds, which was built in the 50's. The State Police Barracks was built in 1916 - 1917 and has greater historic significance than a McDonalds. So why not save a piece of our local history for future generations.

*Yours truly,
[Bud Walker]"*

Note: The building was not demolished. It formerly housed NJSP Troop A. It is now vacant.

TOTEM LAKES

The Totem Lakes development was built in the early 1960's during the "suburban craze." The ad reads: "TOTEM LAKES, Located in the Sweetwater section of Mullica Township, is adjacent to historical Wharton Estates which has recently been purchased by the State of New Jersey and is to be maintained as a State Park. This area is known for its scenic beauty, pine scented air, cedar water and historical background. Here, TOTEM LAKES is developing two thousand acres of pineland into South Jersey's most beautiful residential community. Miles of canals for boating, five large lakes for

swimming or winter ice skating. Streams teeming with fish waiting for the line. Long walks for those who enjoy the seclusion of woodlands and nature at her best. See the tots play on the white sandy beaches or romp in the playground in complete safety. Meet your neighbors at the Club House for an evening of games or dancing. All this but most important of all, a house built on a large wooded plot that can truly be called a HOME."

Today Totem Lakes exists as a community in Mullica Township.

BUTTERHOF FARM

The Butterhof Farmhouse is a fine, solid Jersey Bog Stone home erected in 1854 on farm land that is still being farmed productively.



Butterhof Farmhouse

MULLICA TOWNSHIP HISTORIC SITE LOCATION MAP

MULLICA TOWNSHIP HISTORIC SITES MAP

Roads
 County
 Municipal
 Other
 State
 Train



4000 0 4000 8000 Feet




Prepared in cooperation with Atlantic County GIS, Planning & Community Development.

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