AN INTERACTIVE

NATURAL RESOURCE INVENTORY

FOR FRANKLIN TOWNSHIP

Warren County, New Jersey

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INTRODUCTION

A Natural Resource Inventory (NRI) (sometimes referred to as an Environmental Resource Inventory) is a collection of text and visual materials characterizing the environmental resources of a municipality (ANJEC 2004). It includes detailed descriptions of the location, character and quality of those resources, which generally include wetlands, streams, aquifers, floodplains, prime agricultural soils, forests and open space (Johnson 1996). In addition, anthropogenic features and cultural and aesthetic resources—such as roads, population centers, zoning boundaries and historic sites—also influence a municipality's character and the quality and condition of its natural resources. For that reason, these elements also play an important role in the development of an NRI.

This NRI provides a characterization of the environmental resources of Franklin Township, Warren County, New Jersey. It is intended to be a neutral, unbiased document that reflects currently available data regarding the Township's natural resources, rather than an interpretation of that data or set of land use planning recommendations. However, in order to be a truly useful tool, an NRI must be more than an encyclopedia of facts or an atlas of natural resource features. It should serve as a complement to the municipal Master Plan and a guide for the Township's land development-related ordinances and land preservation initiatives, and other activities related to the preservation and enhancement of a community's resources. It may also be useful in upholding municipal zoning ordinances in court (ANJEC 2004).

With this in mind, the content, design and accessibility of information contained within this NRI is intended to allow for the easy—but thorough—identification and assessment of sensitive ecological, aesthetic and cultural features within Franklin Township. A comprehensive understanding of the Township's environmental resources will facilitate a more informed decision making process regarding planning activities, environmental impact analyses, open space acquisition and preservation efforts, and other activities which may have an impact on those resources.

The Franklin Township NRI is made up of individual sections, each of which focuses on a specific inventory of environmental and cultural resources. Each section includes a figure displaying the location(s) and extent of the resource discussed in the accompanying text. The figures and information are based upon the most current available geographic information systems (GIS) databases, many of which have been obtained from State and County agencies. In addition, a series of corresponding appendices complements each section and figure.

In an effort to provide Franklin Township with a useful and "user-friendly" NRI, the electronic version of this document also includes hyperlinks that allow instant access to associated information both within the NRI and its appendices and on the Internet (including County and State websites). Together, the figures, text, appendices and weblinks provide a rich, comprehensive and site-specific description of the Township's resources in the context of the County and State physical and regulatory landscapes.

With this NRI it is possible for the Environmental and Open Space Commission, Land Use Board, Township Committee, residents and prospective land developers to access and understand

the key features, resources and attributes of the Township on a site-specific scale. The information contained within this NRI is intended to educate, guide and benefit all those interested in the long-term protection, management and preservation of the resources of Franklin Township.

This NRI should be considered both a tool and a reference for Franklin Township to draw upon in any land development approval and/or planning process. Its use should therefore be promoted by the Environmental and Open Space Commission, Land Use Board and Township Committee, and it should be made available to residents and anyone seeking to develop lands within the Township. In addition, this is not meant to be a static document; periodic revision of this NRI will be necessary to ensure that the information contained herein is accurate, current and reflective of ongoing changes in land use and development within the Township.

REGULATORY LANDSCAPE

Local zoning, open space planning initiatives and land use and resource protection ordinances largely determine the intensity, magnitude and character of land development activities within a municipality. However, the State of New Jersey has also adopted a variety of important laws and regulations that directly affect land development activities at the municipal level. The following provides a brief overview of New Jersey's current regulatory landscape and its significance with respect to the protection of Franklin Township's natural resources.

The **New Jersey Municipal Land Use Law** (MLUL, N.J.S.A. 40:55D-1 et seq.) (http://www.state.nj.us/dep/hpo/3preserve/mlul.pdf), enacted in 1975, is the enabling legislation that grants state land use regulatory authority (e.g., zoning) to municipalities. The purpose of the MLUL is to encourage land use and land development procedures that ensure public health, safety, welfare and the protection and preservation of the Township's natural, cultural, historic and visual environment features and attributes. Pursuant to the MLUL, municipal planning boards in New Jersey are authorized to prepare and adopt a Master Plan "to guide the use of lands within the municipality in a manner which protects public health and safety and promotes the general welfare" (N.J.S.A. 40:55D-28). As specified in the MLUL, the Master Plan must include a "statement of objectives, principles, assumptions, policies and standards upon which the constituent proposals for the physical, economic and social development of the municipality are based," as well as a Land Use Plan Element based on those objectives and policies that indicates the location of current and potential future development and land uses (N.J.S.A. 40-55D-28). In addition, municipal planning boards have the option of developing additional Master Plan elements, which may include one or more of the following (N.J.S.A. 40-55D-28):

- Housing Plan Element
- Circulation Plan Element (transportation)
- Utility Service Plan Element (water supply and distribution facilities, drainage and flood control facilities, sewerage and waste treatment, solid waste disposal and other related utility planning, including a stormwater management plan)
- Community Facilities Plan Element (educational and cultural facilities, historic sites, libraries, hospitals, firehouses, police stations and other related facilities)
- Recreation Plan Element
- Conservation Plan Element (provides for the preservation, conservation, and utilization of natural resources, including energy, open space, water supply, etc.; and systematically analyzes the impact of each other component and element of the Master Plan on the present and future preservation, conservation and utilization of those resources)
- Economic Plan Element
- Historic Preservation Plan element (indicates the location and significance of historic sites and historic districts, identifies the standards used to assess worthiness for historic site or district identification, and analyzes the impact of each component and element of the Master Plan on the preservation of historic sites and districts)
- Appendices or separate reports containing the technical foundation for the Master Plan and its constituent elements
- Recycling Plan Element

Through the MLUL, Franklin Township has the authority to periodically update the Master Plan, Official Map, Land Use Regulations and all other development review procedures. The NRI should be an integral part of this process.

The **New Jersey State Planning Act** was adopted in 1985 (N.J.S.A. 52:18A-196 et seq.). It requires sound land use planning to conserve natural resources, provide housing and public services and promote economic growth. The guiding natural resource protection principle of the State Planning Act is that natural resources should be conserved because the protection of environmental qualities is "vital to the quality of life and economic prosperity." The NRI is a key tool in any such planning initiative as it identifies key resources and sets the tone for their protection. This was most recently reflected in the process on cross-acceptance associated with the latest update of the State Plan. Additional information about the State Plan is available online (http://www.nj.gov/dca/osg/plan/).

Of particular significance to Franklin Township is the 2004 adoption of the new State rules concerning stormwater management, including compliance with Phase II New Jersey Discharge Elimination Permit (NJPDES) requirements. In 2004, the State of New Jersey adopted the revised **Stormwater Management Rules** (N.J.A.C. 7:8), (http://www.nj.gov/dep/rules/adoptions/2004_0202_watershed.pdf) and **Municipal Stormwater Management Rules** (N.J.A.C. 7:14A), (http://www.state.nj.us/dep/dwq/714a.htm). The revisions to these rules also impacted other key State regulations affecting most land development in New Jersey, including the Residential Site Improvement Standards (RSIS) (N.J.A.C. 5:21), (http://www.nj.gov/dca/codes/nj-rsis/index.shtml), the Freshwater Wetlands Protection Act (N.J.A.C. 7:7A), (http://www.state.nj.us/dep/landuse/7-7a.pdf), the Flood Hazard Area Control Act (N.J.A.C. 7:13), (http://www.state.nj.us/dep/landuse/7-13.pdf) and the New Jersey Dam Safety Standards (N.J.A.C. 7:20), (http://www.state.nj.us/dep/nhr/engineering/damsafety/standard.pdf).

The NJ Stormwater Rules stipulate that municipal stormwater management plans must evaluate the extent to which the municipality's entire master plan (including the land use plan element), official map and development regulations (including the zoning ordinance) implement the principles expressed in N.J.A.C. 7:8-5.3(b). This evaluation must also be included (with updates, as appropriate) in the reexamination report adopted under N.J.S.A. 40:55D-89 (N.J.A.C. 7:8-4.2(c)8).

The NJ Stormwater Rules provide a framework and incentives for managing runoff and resolving nonpoint source impairment on a drainage-area basis for new development, redevelopment and existing developed areas. In addition, they establish a hierarchy for implementation of best management practice (BMP) stormwater management measures, with initial reliance on low impact development (LID) site design techniques to maintain natural vegetation and drainage patterns before incorporating structural measures. These new rules also establish runoff control performance standards for groundwater recharge, water quality, and water quantity; establish special protection area measures for pristine and exceptional value waters; provide regulatory consistency among local and State regulatory agencies; and provide safety standards for stormwater management basins.

Pohatcong Creek and its various tributaries, Category One (C1) waters under the NJ Surface Water Quality Standards, are subject to the 300-foot buffer required for C1 waterbodies and their tributaries under the Stormwater Rules. These buffers significantly limit not only the extent of development that can occur adjacent to the streams, but also the discharge of runoff from new development to these waterbodies.

Franklin Township is regulated under a NJPDES Stormwater Tier B General Permit (NJ municipalities are classified as Tier A or Tier B based on population density). The permit requires the Township to develop, implement and enforce a Stormwater Program made up of several Statewide Basic Requirements (SBRs). These include adopting a stormwater management plan and ordinance, ensuring compliance with Residential Site Improvement Standards for stormwater management, ensuring adequate long-term operation and maintenance of BMPs, ensuring that new storm drain inlets meet specific new design standards, distributing a public education brochure, and establishing a storm drain inlet labeling program. Each SBR has a deadline established by an implementation schedule included in the MSWMP.

As of February 2, 2004, the stormwater management design requirements pertaining to groundwater recharge, water quality and water quantity must be met for all projects regulated under RSIS. Furthermore, N.J.A.C. 7:8-4 requires that all municipalities within the State adopt a municipal Stormwater Management Plan. Each municipality is assigned a General Permit which mandates that this be completed no later than 12 months from the effective date of the permit authorization. Additionally, N.J.A.C. 7:8-4 mandates that stormwater control ordinances be adopted and implemented for all municipalities in the State no later than 12 months from the date of adoption of the Stormwater Management Plan. There are also specific provisions within N.J.A.C. 7:15 that must be satisfied by Franklin Township concerning existing nonpoint source pollution sources over a 60-month timeframe. Additional information on the stormwater rules can be found on the NJDEP's website: http://www.njstormwater.org.

Of great significance is the passage of the **Highlands Water Protection and Planning Act** (N.J.S.A. 13:20-1 et seq.) (http://www.nj.gov/dep/highlands/). The Highlands Act is a comprehensive plan to protect and promote water quality in the Highlands through regulated planning and conservation. The act establishes both Preservation and Planning Areas. Streams and rivers that flow through designated Preservation Areas of the Highlands Region are protected with 300 foot buffers. All Highlands areas are specifically exempted from the recently passed Smart Growth Law. Further explanation of the Highlands Act is presented in Section 16.

This NRI should be interpreted and used in the context of the State regulations summarized above. The data and Figures included herein can be used by the Township to facilitate the implementation of various land use, land preservation, resource protection and impact mitigation measures needed to meet the requirements of these regulations, as well as to satisfy Township planning and environmental ordinances and land development/land use design standards.

1: REGION, LOCATION AND BASEMAP

The Township of Franklin encompasses 15,076.66 acres (23.5 square miles) in the southwest corner of Warren County, New Jersey (Figure 1). The Township is bound on the south by the Musconetcong River, which also forms the Hunterdon-Warren County boundary, dividing Franklin from Bethlehem Township and Bloomsbury Borough. Another major waterway in the Township is the Pohatcong Creek which flows through the upper central portion of the Township. To the west, the Township is bordered by Greenwich Township, Warren County. The border with Washington Township, Warren County, lies to the east. Franklin Township includes three villages: Asbury, Broadway, and New Village.

Franklin Township is easily accessible from the east and west via State Route 57 (also known as the Morris Turnpike), which crosses the northern portion of the Township. Interstate 78 lies just to the south, connecting with US Route 22 west of the municipal boundary, in Greenwich Township. County Routes 632, 633 and 643 provide secondary access.

According to US Census data, the population of Franklin Township was recorded as 3,190 in 2005. This represents an increase of just over 25% from the 1990 population (2,404), compared to an increase of just under 12% for Warren County as a whole. The population growth in Franklin Township likely reflects the increase in developmental pressure spurred by suburban growth due to accessibility of major transportation routes, Routes 22 and 78, and the generally attractive quality of life perceived by those drawn to live in this rural community.

Forests and agricultural uses are the dominant land covers in Franklin Township, although the Township is also characterized by diverse geology, topography, soils and plant and wildlife communities. Environmentally sensitive features include significant areas of threatened and endangered species habitat, exceptional resource wetlands, and Category One (C1) waters (i.e., the Pohatcong Creek and its tributaries). Franklin Township lies within New Jersey's Watershed Management Area (WMA) 1, the Upper Delaware WMA, which drains the headwaters of the Musconetcong River.

Franklin Township is located primarily within the Highlands Planning Area, although portions of the municipality fall within the Preservation Area. In general, significant development will not be permitted in the Preservation Area unless specifically approved by the New Jersey Department of Environmental Protection (NJDEP) and the Highlands Council. Nearby natural resource features and recreational areas of significance include the Merrill Creek Reservoir, the Musconetcong River Reservation, and the Musconetcong River Wildlife Management Area. Recreational opportunities within the borders of Franklin Township include State-owned properties, County-owned Bread Lock Park, municipally-owned recreational fields and indoor facilities, as well as Board of Education playing fields.

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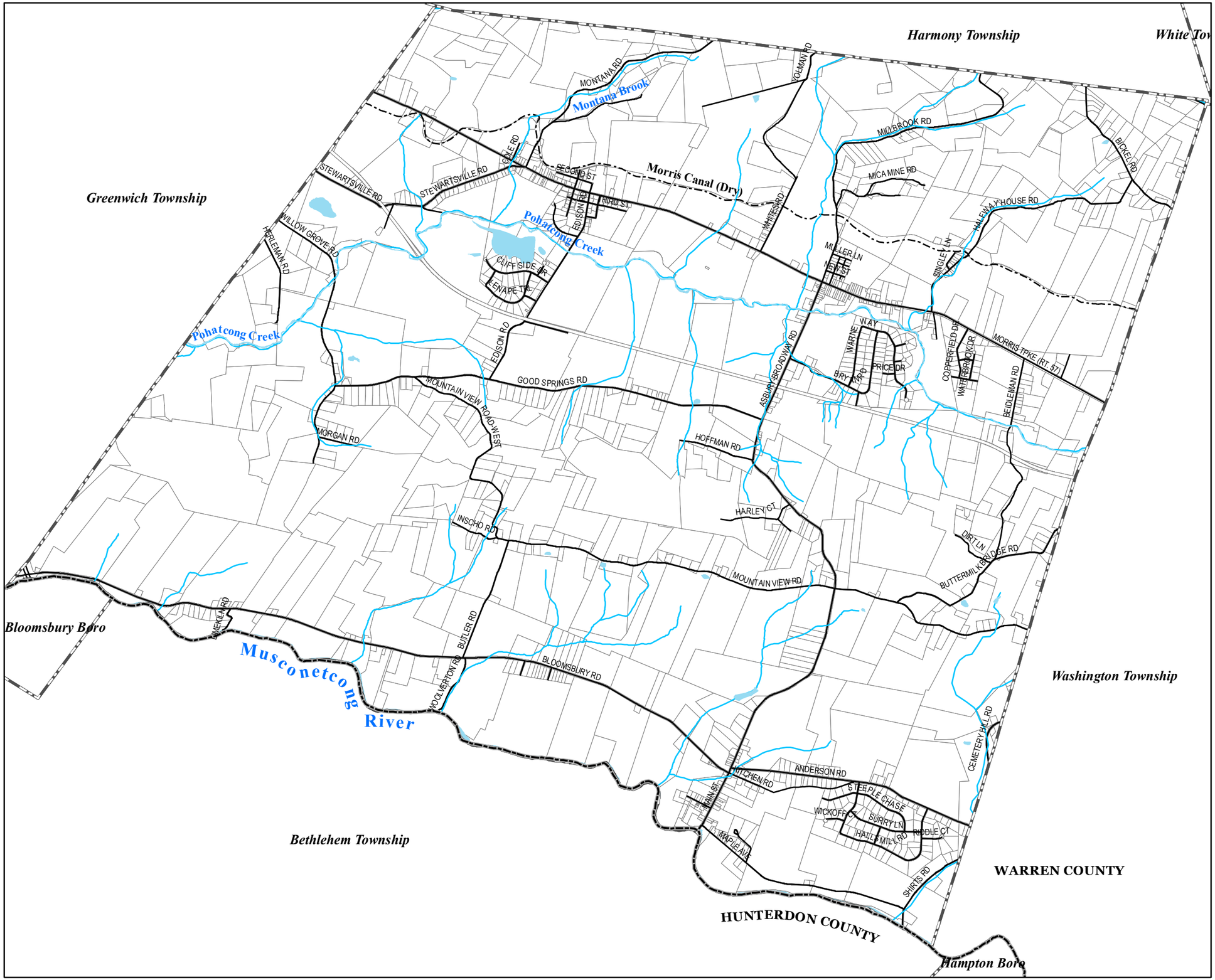

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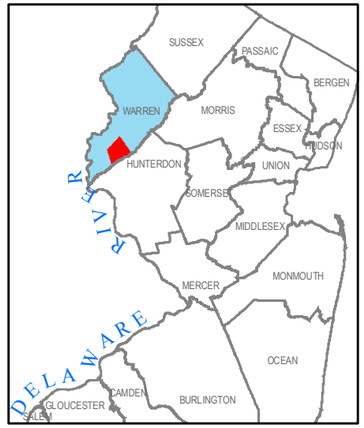
Princeton Hydro

NEW JERSEY COUNTY MAP



PRINCETON HYDRO, LLC.
1108 OLD YORK ROAD, SUITE 1
RINGOES, NEW JERSEY, 08551

N

0 1,500 3,000 Feet

1 inch equals 3,000 feet

SOURCES:
1. Parcel, roads and the Franklin Township Boundary data obtained from Warren County Planning Dept. "This map was developed using the Warren County New Jersey, Geographic Information System digital data, but this secondary product has not been verified by Warren County and is not county-authorized."
2. Surface water data obtained from the NJDEP, Division of GIS.

FIGURE 1
REGIONAL BASE MAP

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- County Boundary
- Municipal Boundaries
- Ponds/Lakes

Streams

- Streams
- Morris Canal (Dry)
- Roads
- Parcels

2: 2002 FALSE COLOR INFRARED AERIAL PHOTOGRAPH

The false color infrared aerial photography used in the preparation of this inventory was obtained from NJDEP (Figure 2). In 2002, NJDEP commissioned a flyover of the entire state to account for recent development changes and improve digital reproduction resolution. The aerial photography provides an overview of Franklin Township's Land Use/Land Cover (LU/LC), locations of larger surface waters, developmental features, agricultural sites, and main travel corridors, as they existed at the time of the flyover.

Aerial photography is an important tool in characterizing and creating an inventory of the natural and developmental features of a defined land mass. Aerial photos may also serve as the base coverage to develop topography, soils, and LU/LC maps. Advances in reproduction technology and refined classification methodology increase accuracy and precision of these mapping techniques. However, site specific use of these various map types is not recommended; they are intended only as guidelines. Field verification is still integral for site specific projects due to certain limitations in scale and continual change in LU/LC.

The value of aerial photographs when used alone is the ability to "flesh out" many maps and provide a comprehensive picture with great detail that integrates various individual coverage types. In this map it is possible to easily identify developed areas of the Township and even distinguish between residential and commercial development. With the false infrared, it is possible to distinguish agricultural lands from lawns, forests, and parks because different vegetation types emit different infrared wavelengths. For this reason, lawns and actively cultivated fields appear as dark red areas while forested and barren areas are more subdued. The map also helps to highlight areas of contiguous forested lands. Aerial photographs also serve as historical records that can be used comparatively with older photos to identify changes in LU/LC, infrastructure, and development over time. This is a commonly used diagnostic technique for the completion of Phase I environmental site assessments.

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Lopatcong Township

Harmony Township

White Tow

Greenwich Township

Bloomsbury Boro

Washington Township

Bethlehem Township

Hampton Boro

WARREN COUNTY

HUNTERDON COUNTY

Musconetcong River

Pohatcong Creek

Morris Canal (Dry)

MONTANA RD

Montana Brook

VOLMAN RD

MILLBROOK RD

Mill Brook

RICKEL RD

MICA MINE RD

HALF WAY HOUSE RD

STEWARTSVILLE RD

CODDLE RD

SECOND ST

THIRD ST

WHITES RD

WILLOW GROVE RD

HERLEMAN RD

CLIFFSIDE DR

LENA PETRO

MILLER LN

NEW ST

EDISON RD

GOOD SPRINGS RD

MOUNTAIN VIEW ROAD WEST

MORGAN RD

HOFFMAN RD

ASBURY BROADWAY RD

ARNE WAY

BRYAN RD

PRICE DR

COPPERFIELD DR

WATERBROOK DR

MORRIS TPKE (RT. 57)

BEIDLEMAN RD

HARLEY CT

DIRT LN

BUTTERMILK BRIDGE RD

MOUNTAIN VIEW RD

RIVER RD

BUTLER RD

BLOOMSBURY RD

MOUNTAIN VIEW RD

LOWER KLINE RD

ANDERSON RD

WICHEN RD

MAIN ST

MAPLE AVE

STEEPLECHASE

WICKOFF CT

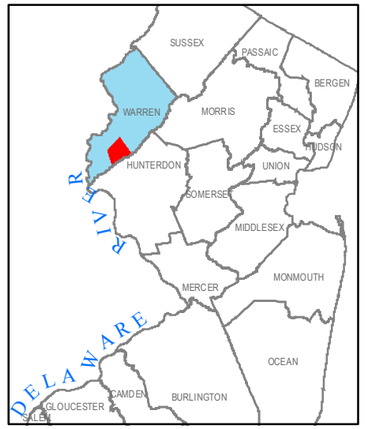
SURRY LN

HALLS MILL RD

RIDDLE CT

SHORTS RD

CEMETERY RD



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2. Surface water data obtained from the NJDEP, Division of GIS.
3. 2002 Aerial Photographs obtained from the NJ Image Warehouse website.

FIGURE 2
2002 AERIAL PHOTOGRAPH

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- County Boundary
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Streams

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Princeton Hydro

3: ELEVATION/HILLSHADE

This elevation relief depiction is based on the reclassified 10-meter Digital Elevation Model. This model is produced by ArcGIS utilizing the 3-D Analyst Module. The elevation database is supplied by NJDEP. This modeled view is useful for portraying the area's topography and conceptualizing slope. The hillshade image for Franklin Township is color coded to express relative differences in elevation and slope (Figure 3). Shades of blue and gray are representative of lower elevations, while brown shades are indicative of higher elevations. Green shades denote a range of mid- elevation values. Areas of changing colors are areas of significant relief, often times slopes in excess of 20%, which is the maximum slope at which development is allowed within parts of the Township that lie within the Highlands Preservation area. More uniform areas of color are relatively flat and lack significant topographic relief. The importance and relevance of slope is discussed in greater detail in the Steep Slopes section.

The unique topography of Franklin Township is derived from its varied geology characterized by faulting and folding. This produces sharp relief and a varied terrain with a difference of over 915 feet from the lowest to the highest point. The lowest elevation in the Township is 254 feet above mean sea level. Areas of low elevation lie along the Pohatcong Creek and Musconetcong River valleys. These areas are relatively flat characterized by low-lying valleys associated with sedimentary geological formations and agricultural lands. The highest elevation in the Township is 1,169 feet above mean sea level. The north and central portions of the Township are characterized by rugged ridgeline. The central ridgeline, called the Pohatcong Ridge separates the Pohatcong valley from the Musconetcong valley. The northern ridgeline contains Scotts Mountain which extends into Harmony Township. The topography that occurs in Franklin Township is referred to as karst topography due to the underlying limestone, sinkholes and depressions.

It is useful to view equal interval ranges from lowest to highest elevations to more easily discuss Township topography. The lowest and highest intervals respectively account for 42.7% and 8.7% of the Township. The lowest interval ranging from 254.4 to 411.7 feet accounts for the greatest percentage of Township area at 42.7%. The mean elevation of the Township is 531.6 feet. This information describes a land area punctuated by relatively low valleys and relatively high peaks.

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Elevation Statistics

Minimum Elevation: 254.4 Feet (MSL)
Maximum Elevation: 1169.79 Feet (MSL)
Mean Elevation: 531.6 Feet (MSL)

Lopatcong Township

Harmony Township

White Tow

Greenwich Township

Bloomsbury Boro

Washington Township

Bethlehem Township

Hampton Boro

Pohatcong Creek

Morris Canal (Dry)

Musconetcong River

MONTANA RD
COLE RD
STEWARTSVILLE RD
SECOND ST
THIRD ST
LAUREN DR
EDISON RD
CLIFFSIDE DR
LENAPE TRL
WILLOW GROVE RD
HERLEMAN RD
EDISON RD
GOOD SPRINGS RD
MOUNTAIN VIEW ROAD WEST
MORGAN RD
HOFFMAN RD
INSCHO RD
HARLEY CT
MOUNTAIN VIEW RD
BUTLER RD
BLOOMSBURY RD
HOOLEY TOWN RD
KITCHEN RD
MAIN ST
MAPLE AVE
ANDERSON RD
STEEPLE CHASE
WICKOFF CT
SURRY LN
HALLS MILL RD
RIDDLE CT
SHIRTS RD
CEMETERY HILL RD
DIRT LN
BUTTERMILK BRIDGE RD
POLLOCK RD
WHITES RD
MILLBROOK RD
MICA MINE RD
MULLER LN
NEW ST
SINGLE LN
HALFWAY HOUSE RD
BICKEL RD
WARNE WAY
BRYANT RD
PRICE DR
ASBURY BROADWAY RD
COPPERFIELD DR
WATERBROOK DR
BEIDLEMAN RD
MORRIS TPKE (RT. 57)

Digital Elevation Model

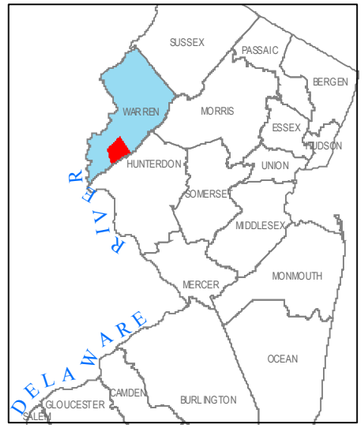
High : 1169.79 (feet/MSL)

Low : 254.41 (feet/MSL)

pH

Princeton Hydro

NEW JERSEY COUNTY MAP



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2. Surface water data obtained from the NJDEP, Division of GIS.
3. Hillshade of Township completed utilizing a 10 meter Digital Elevation Model (DEM) obtained from the NJDEP, Division of GIS.

FIGURE 3
ELEVATION / HILLSHADE MAP

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- County Boundary
- Municipal Boundaries
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4: STEEP SLOPES/ SLOPES ANALYSIS

The subject of steep slopes is important for two main reasons: the potential for excessive erosion and the physical limitation of development. Steep slopes present concerns for development, and careful planning is essential to avoid adverse impacts to the surrounding environment. Disturbance of existing vegetation on steep slopes often leads to excessive erosion. This is because the vegetation holds the soils in place and intact, mitigating the erosive forces of precipitation and wind. When vegetation is removed, the soils on steep slopes become less stable and prone to erosion. This in turn degrades water quality through high turbidity/poor clarity, sediment deposition, and additional pollutant loads of contaminants bound to soil particles. Excessive erosion may also lead to slope failure, posing a hazard to surrounding building and/or transportation corridors. Steep slopes are also treasured for their scenic and environmental qualities. Ravines and steep hillsides often provide impressive scenic vistas. These resources are important to the overall characteristics of the Township. Vegetation on slopes increases not only soil stability, but also wildlife habitat. Limited accessibility also enhances the attractiveness of this habitat to a variety of species, including plants. Steep slopes also serve as natural boundaries between land uses and districts within a community.

Franklin Township has specific regulations regarding development and construction grading on slopes, as included in the Land Use Ordinance (§90). This ordinance prohibits development in "critical areas", defined as having slopes of 20% or greater (§90-72C), and also defines the minimum buildable area in the Township as areas with slopes of less than 25%. The Highlands Act states there shall be no new development on slopes greater than 20% and places additional restrictions on slopes greater than 10%. These restrictions will become necessary in areas of the Township that fall within the Highlands Preservation Area and are recommended for areas of the Township that fall within the Highlands Planning Area. For more information on the Highlands Act, please refer to Section 16 and Figure 15.

The majority of Franklin Township, 82.8% by area, has slopes from 0% to less than 20%, which characterizes the Township as rolling with areas of high relief (Figure 4). Slopes greater than 25% characterize 10.8% of the Township area. And finally, slopes ranging from 20% to less than 25% account for 6.4% of Township land area. The northern and central sections of the Township are characterized by steep slopes and ridgelines. The Pohatcong ridge in the central portion of the Township is a continuous ridge that divides the Musconetcong River from the Pohatcong Creek. The ridge that runs along the northern portion of the Township consists of Scotts Mountain and is included in the Highlands Preservation Area. Together these two ridgelines provide habitat and scenic value and important watershed function.

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Lopatcong Township

Harmony Township

White Tow

Greenwich Township

Bloomsbury Boro

Washington Township

Bethlehem Township

WARREN COUNTY

HUNTERDON COUNTY

Hampton Boro

Pohatcong Creek

Montana Brook

Mill Brook

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BUNKLAND RD
BUTLER RD
WOOLVERTON RD
BLOOMSBURY RD
CEMETERY HILL RD
KITCHEN RD
ANDERSON RD
STEEPLE CHASE
WICKOFF CT
BURRY LN
HALLS MILL RD
RIDDLE CT
MAPLE AVE
SHIRTS RD

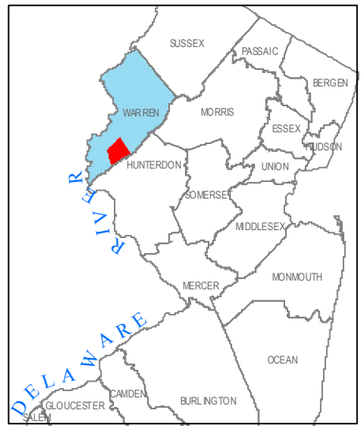
Slope Analysis

- 0 - 10%
- 10% - 20%
- 20% - 25%
- > 25%

pH

Princeton Hydro

NEW JERSEY COUNTY MAP



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1108 OLD YORK ROAD, SUITE 1
RINGOES, NEW JERSEY, 08551

0 1,500 3,000 Feet

1 inch equals 3,000 feet

SOURCES:

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2. Surface water data obtained from the NJDEP, Division of GIS.
3. Slopes were calculated with GIS utilizing a 10 meter Digital Elevation Model (DEM). Slope classifications based on Franklin Township ordinances.

FIGURE 4
SLOPES ANALYSIS

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- County Boundary
- Municipal Boundaries
- Roads
- Parcels
- Ponds/Lakes

Streams

- Streams
- Morris Canal (Dry)

5: BEDROCK GEOLOGY

Franklin Township is located entirely within and near the southern margin of the Highlands physiographic province (a geologic unit) (Figure 5). The Highlands province consists of rocks of Precambrian and Early Paleozoic metamorphic and igneous rocks throughout portions of northern New Jersey, Southern New York, and most of Connecticut. The Highlands province is highly fractured and faulted with intrusional suites and tectonic faulting zones.

Within the Highlands province, Franklin Township falls within the Reading Prong region. The Reading Prong is a series of geologic materials that are unique to the Highlands of New Jersey, New York, and Pennsylvania. These formations can be traced through New Jersey north to New England and south through Pennsylvania to the Blue Ridge Mountains. These rocks are generally resistant to erosion and result in steep, tall relief including many escarpments, sheer vertical rock faces, and deeply entrenched river valleys. These severe slopes are accentuated by the extensive faulting and folding of the materials, likely a result of tectonic plate motion. The Reading Prong has also been referred to as the Byram Intrusive Suite and the Lake Hopatcong Intrusive Suite.

Ambient radon concentration is a concern in New Jersey because radon concentrations can be naturally high in the native rock. Evidence suggests that sustained radon exposure can increase cancer rates. Geology is a prime determinant of radon concentration. USEPA and USGS designate Warren County as a Zone 1 radon area, the designation of highest priority. This zone has the potential for radon concentrations to exceed 4pCi/L. The EPA characterization solely represents potential, not actual, concentrations which can only be determined by onsite testing. Radon resistant features for structures include basement and slab vents and basement windows, which promote air exchange.

The bedrock figure enclosed herein is general and depicts overall constituents of the rock formation. As with any natural system, there are “gray areas”, and investigations should be conducted to determine the mineralogical constituents and physical properties of the underlying rock and the propensity for materials to form solution cavities. For large developments, geotechnical engineers should determine the stability of bedrock to support structures and determine the effects of the underlying geology.

Two geological formations are observed in Franklin Township: the intrusive suite of hard metamorphic and igneous rocks (collectively known as crystalline geology) and the ferrous-rich formation of sedimentary rocks that supported the iron mines of the region in the 19th Century. Reading Prong geology includes 42.48% of the Township; lithology (rock composition) includes gneiss, and amphibolite, but is dominated by Potassic Feldspar Gneiss. The low-lying sedimentary formation accounts for 57.52% of Township land and is associated with the Musconetcong River and Pohatcong Creek river valleys. Lithology of this formation includes limestone, shale, and sandstone, and is dominated by Allentown Dolomite. Sinkholes are a common feature of this type of karst geology, which is defined by the dissolution of the soluble lithology.

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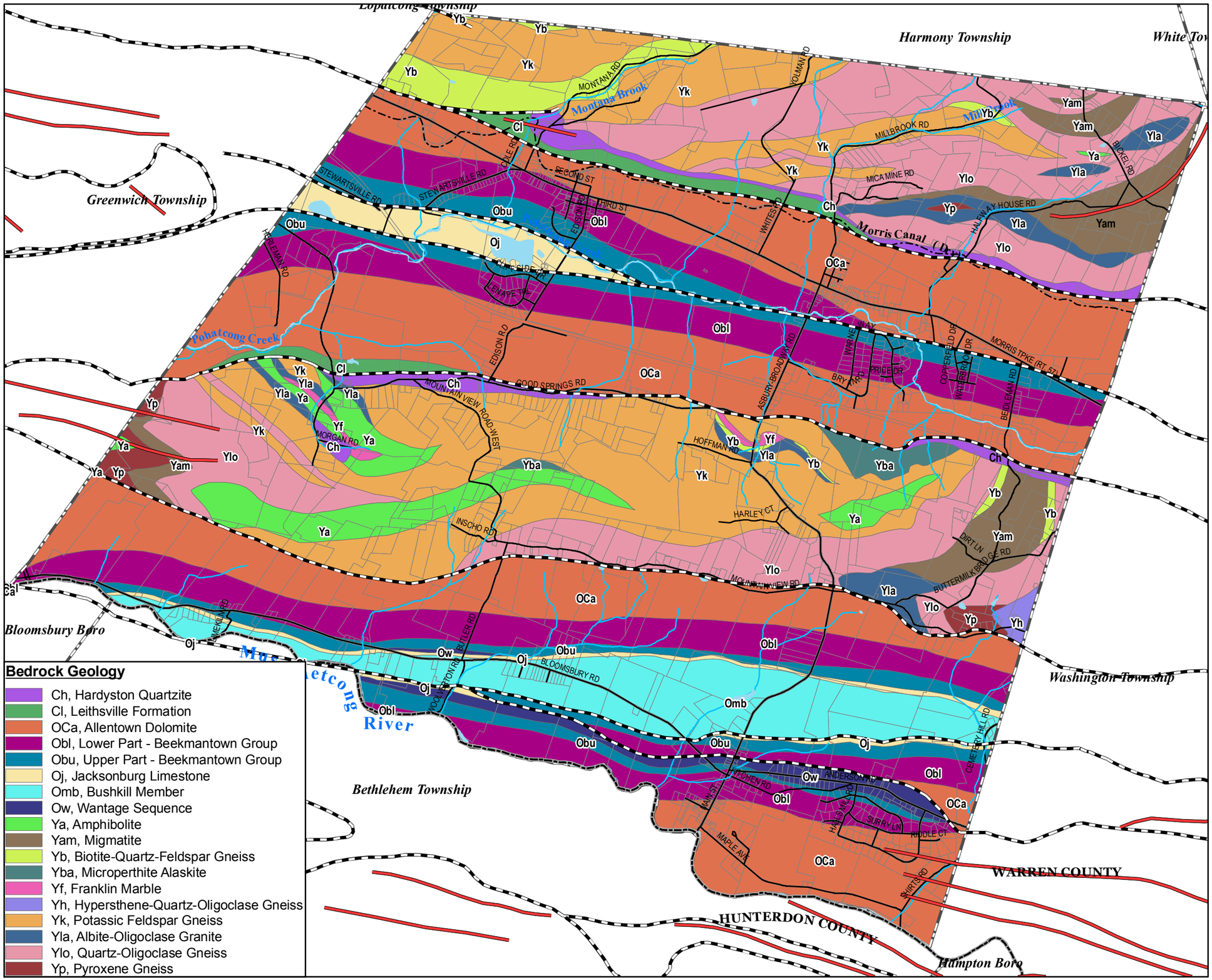
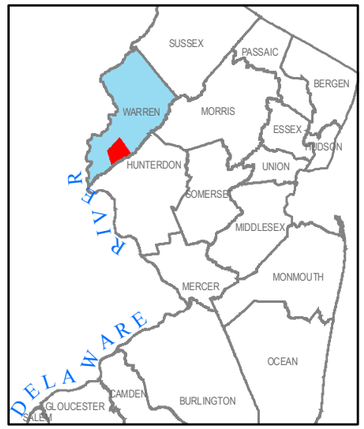


Bedrock Geology

- Ch, Hardyston Quartzite
- Cl, Leithsville Formation
- OCa, Allentown Dolomite
- Obl, Lower Part - Beekmantown Group
- Obu, Upper Part - Beekmantown Group
- Oj, Jacksonburg Limestone
- Omb, Bushkill Member
- Ow, Wantage Sequence
- Ya, Amphibolite
- Yam, Migmatite
- Yb, Biotite-Quartz-Feldspar Gneiss
- Yba, Microperthite Alaskite
- Yf, Franklin Marble
- Yh, Hypersthene-Quartz-Oligoclase Gneiss
- Yk, Potassic Feldspar Gneiss
- Yla, Albite-Oligoclase Granite
- Ylo, Quartz-Oligoclase Gneiss
- Yp, Pyroxene Gneiss

Princeton Hydro

NEW JERSEY COUNTY MAP



PRINCETON HYDRO, LLC.
1108 OLD YORK ROAD, SUITE 1
RINGOES, NEW JERSEY, 08551

0 1,500 3,000 Feet

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2. Surface water data obtained from the NJDEP, Division of GIS.
3. Bedrock Geology data obtained from the New Jersey Geological Survey.

FIGURE 5
BEDROCK GEOLOGY

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- Folds
- Faults
- County Boundary
- Municipal Boundaries
- Ponds/Lakes

Streams

- Streams
- Morris Canal (Dry)
- Roads
- Parcels

6: NRCS SSURGO SOILS

Soil materials consist of a variable and complex mixture of organic matter, sand, silt, and clay particles. Strata of similar physical and chemical composition form soil horizons. Soil formation occurs under the influence of climate, parent materials including bedrock, flora and fauna, topography and time. Collectively, these are known as the soil forming factors.

Soil units are the base classification code of soil nomenclature. The characterization process is directed by nationwide uniform procedures that account for particulate composition and size, stratification, and topography. These soil units are also extensively characterized by a number of performance characteristics reflective of the structure of that soil. These soil properties would include capability grouping for crop suitability, compaction, strength, shrink-swell potential, available water capacity, and permeability.

Soil plays a vital role in both ecosystem function and cultural development. Soil serves as the structural interface for vegetation and the source of vital nutrient generation; it filters and purifies stormwater, preventing groundwater contamination; it serves as the matrix for groundwater storage; and it stores large amounts of organic carbon. Cultural interaction with soils includes agricultural tillage, development, and engineering projects. Knowledge of soil properties is applied to farm and woodland management; in the selection of sites for roads, buildings, and other structures; and in determinations of suitability for agriculture, industry, recreation, and preservation.

The corresponding soils figure depicts the SSURGO soil units data for the Township of Franklin (Figure 6). SSURGO is the Soil Survey Geographic Database maintained by the Natural Resources Conservation Service (NRCS), which is a detailed geographical characterization of soils at a unit level. The associated soil types are generally described as dominantly deep, loamy; well-drained; generally stony, rocky, and gravelly soils; mainly on the Highlands and the adjacent Piedmont Plateau. The following soils types account for the majority of area in Franklin Township: Washington series (4,084.97 acres), Annandale series (2,342.26 acres) and Bartley series (1,580.68 acres).

File: P:\0420\Projects\0420006\GIS\MXD\Soils.mxd

Lopatcong Township

Harmony Township

White Tow

Greenwich Township

Bloomsbury Boro

Washington Township

Bethlehem Township

WARREN COUNTY

HUNTERDON COUNTY

Hampton Boro

Musconetcong River

Lopatcong Creek

Montana Brook

Morris Canal (Dry)

MONTANA RD

STEWARTSVILLE RD

SECOND ST

THIRD ST

CODLE RD

EDISON RD

HERLEMAN RD

CUFF SIDE DR

LENAPE TRL

MILLBROOK RD

MICA MINE RD

HALFWAY HOUSE RD

WHITES RD

BICKEL RD

GOOD SPRINGS RD

MOUNTAIN VIEW ROAD WEST

HOFFMAN RD

HARLEY CT

INSCHO RD

MOUNTAIN VIEW RD

BUTLER RD

BLOOMSBURY RD

SMEKLAND RD

WARNE WAY

PRICE DR

BRYANT RD

COPPERFIELD DR

WATERBROOK DR

MORRIS TPKE (RT. 57)

DIRT LN

BUTTERMILK BRIDGE RD

ASBURY-BROADWAY RD

MAIN ST

MAPLE AVE

KITCHEN RD

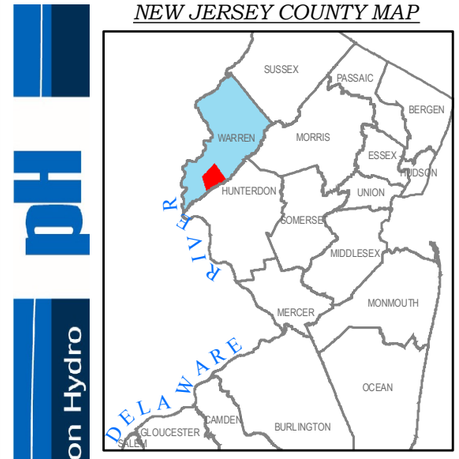
ANDERSON RD

HALLSMILL RD

RUNNER CT

SURRY LN

SHIRTS RD



NEW JERSEY COUNTY MAP

PRINCETON HYDRO, LLC.
1108 OLD YORK ROAD, SUITE 1
RINGOES, NEW JERSEY, 08551

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3. Soils data obtained from the USDA, Natural Resource Conservation Service (NRCS) website.

SSURGO Soils Series

- An, Annandale
- Ba, Bartley
- Bi, Birdsboro
- Ca, Califon
- Co, Cokesbury
- EP, Edneyville-Parker
- Ed, Edneyville
- Fr, Fredon
- Fv, Fluvaquents
- Ha, Hazen
- He, Hero
- Ly, Lyons
- MD, Mine Dump
- Mi, Middlebury
- NR, Nassau-Rock Outcrop
- Na, Nassau
- PT, Pits
- Pa, Parker
- Qu, Quarry
- RO, Rock Outcrop
- Wa, Wasaic
- Ws, Washington
- Wt, Water
- Wy, Wayland

FIGURE 6
NRCS SSURGO SOILS

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- County Boundary
- Municipal Boundaries
- Ponds/Lakes

Streams

- Streams
- Morris Canal (Dry)
- Roads
- Parcels

Princeton Hydro

7: ERODIBLE SOILS

Erosion is defined as the natural process by which wind, moving water, ice, and gravitational forces displace the solid and particulate materials of the land. Erosion of solid materials, including exposed bedrock, occurs on an extended geological time scale. Soil erodibility occurs on a much shorter time scale and with many more associated acute and chronic consequences. The determination of soil erodibility is a complex process that requires the consideration of soil type and texture. Clay and clayey soils are consistent (compacted, not loose), composed primarily of clay particles, and do not degrade rapidly under duress of erosional factors. Loam soils consist of 7 to 27 % clay particles, 28 to 50% silt particles, and less than 52% sand particles in order of increasing grain sizes. Loamy soils are not as consistent due to the presence of larger particulate silt and sand. In addition to texture and type, erodibility is influenced by atmospheric conditions such as temperature and precipitation, stormwater runoff velocities, slope, and vegetative cover. Anthropogenic factors also influence erosion rates, chief among these being land use, which can exacerbate erosional problems or improve them through conservation practices. Erosional problems include declines in agricultural productivity, channelized flow, streambank instability, waterway sedimentation buildup, and contaminant transport.

The model with the greatest acceptance and use to predict soil erodibility is the Universal Soil Loss Equation (USLE). USLE utilizes six different variables encompassing the influences discussed above to predict erodibility. The list of erodible soils within the Township of Franklin was obtained by the National Resource Conservation Service (NRCS). The NRCS has utilized the USLE, but modified it slightly to account for local conditions to produce erodibility codes for the soils of Warren County. The variables utilized are the following: Rainfall and Runoff Erosivity Factor, Soil Erodibility Factor, Slope Length Factor, Slope Steepness Factor, Cover Management Factor, and Erosion Control Factor.

The corresponding Figure displays the results of the NRCS modified USLE displayed as three categories: Highly Erodible Land (HEL), Potentially Highly Erodible (PHE), Not Highly Erodible (NHE) and Not Available (NA) (Figure 7). In general, the soils of Franklin Township are very susceptible to erosion. Highly Erodible soils cover 46% of the Township, while Potentially Highly Erodible Soils are found throughout 45% of the Township. Not Highly Erodible and undefined soils are found in just 9% of the Township area. Erosion within the Township is largely a function of slope and topography. HE soils are all located on slopes of at least 8%, all PHE soils are located on slopes between 0 and 15%, and NHE soils are located only on slopes less than 8%. Soils in the same series, such as the Parker soils, are differently affected by erosion according to slope.

Erosion can be minimized by limiting development on steep slopes and maintaining vegetative cover. The adoption of best-management practices in compliance with existing state and local watershed and stormwater ordinances can also minimize the effects of sediment loading attributed to erosion.

File: P:\0420\Projects\04200061G\SMXD\Erodible_Soils.mxd

Lopatcong Township

Harmony Township

White Tow

Greenwich Township

Bloomsbury Boro

Bethlehem Township

Washington Township

Hampton Boro

WARREN COUNTY

HUNTERDON COUNTY

Musconetcong River

Pohatcong Creek

Montana Brook

Mill Brook

Morris Canal (Dry)

MONTANA RD

VOLMAN RD

MILLBROOK RD

BICKEL RD

MICA MINE RD

HALFWAY HOUSE RD

STEWARTSVILLE RD

CODLE RD

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THIRD ST

EDISON RD

WHITES RD

MILLER LN

NEW ST

WILLOW GROVE RD

HERLEMAN RD

CLIFF SIDE DR

LENAPE TRL

EDISON RD

WARNE WAY

BRYAN RD

PRICE DR

COPPERFIELD DR

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MORRIS TPKE (RT. 57)

BEIDLEMAN RD

ASBURY-BROADWAY RD

GOOD SPRINGS RD

MOUNTAIN VIEW ROAD-WEST

MORGAN RD

HOFFMAN RD

HARLEY CT

INSCHO RD

DIRT LN

BUTTERMILK BRIDGE RD

MOUNTAIN VIEW RD

SWEKLA RD

BUTLER RD

WOOLVERTON RD

BLOOMSBURY RD

CEMETERY HILL RD

ANDERSON RD

MITCHEN RD

MAIN ST

STEEPLE CHASE

WICKOFF CT

SURRY LN

HALLSMILL RD

RIDDLE CT

MAPLE AVE

SHIRTS RD

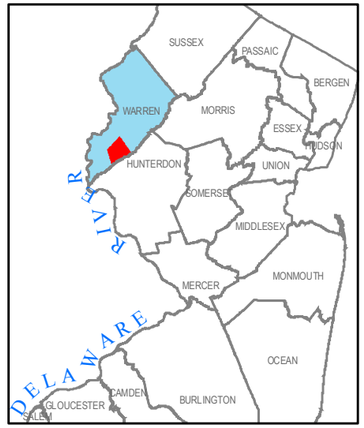
Erodible Soils

- Highly erodible land
- Potentially highly erodible land
- Not highly erodible land
- Erosion potential unknown

pH

Princeton Hydro

NEW JERSEY COUNTY MAP



PRINCETON HYDRO, LLC.
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FIGURE 7
ERODIBLE SOILS

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- County Boundary
- Municipal Boundaries
- Ponds/Lakes

Streams

- Streams
- Morris Canal (Dry)
- Roads
- Parcels

8: PRIME AGRICULTURAL SOILS / SOILS OF STATEWIDE IMPORTANCE

Open space preservation actions often target agricultural lands. The Highlands Protection Act also highlights the value of agricultural lands and promotes farmland preservation and the practice of agriculture. The initial step in conservation measures is the identification of land deemed valuable for protection. Agricultural productivity is directly influenced by soil characteristics; thus, agricultural lands are characterized by the soil. The Figure of Prime Farmland and Statewide Important Soils is a tool for identifying real and potentially valuable agricultural sites based on soils (Figure 8).

Prime and Unique Farmlands (7 CFR Part 657) (http://www.access.gpo.gov/nara/cfr/waisidx_04/7cfr657_04.html), an amendment to the federal Farmland Protection Policy Act, directs the State Conservationist under the Natural Resources Conservation Service (NRCS) to prepare a statewide list of soil mapping units that fit defined criteria as Prime Farmland and Important Soils. The identification system in New Jersey relies on previously published Land Capability Classification (LCC) data. Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The principal concerns in managing the soils for the production of crops are maintaining fertility, controlling erosion, and providing drainage. The groups are developed according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment.

Prime Farmlands include all those soils in Land Capability Class I and selected soils from Land Capability Class II. Prime Farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops that is available for agricultural uses. It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed according to acceptable farming methods. Prime Farmlands are not excessively erodible or saturated with water for long periods and infrequently flood or are protected from flooding.

Soils of Statewide Importance include those soils in land capability Class II and III that do not meet the criteria as Prime Farmland soils. These soils are nearly Prime Farmland and economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce yields as high as Prime Farmland if conditions are favorable.

Prime Farmland soils account for 46.14% of Township area. These soils are predominantly located in the plain adjacent to the Musconetcong River and Pohatcong Creek. Statewide important soils are more evenly distributed in these areas throughout the Township, but are also more fragmented. Statewide important soils account for 16.85% of Township area. While most of the prime farmland soils in the Township are actively cultivated or maintained as agricultural land, some of the remaining identified prime farmland and statewide important soils in other areas are not identified as agricultural lands, but as urban use.

File: P:\04201Projects\04200061GIS\MXD\Ag_Soils.mxd

Lopatcong Township

Harmony Township

White Tow

Greenwich Township

Bloomsbury Boro

Washington Township

Bethlehem Township

WARREN COUNTY

HUNTERDON COUNTY

Hampton Boro

Musconetcong River

Lopatcong Creek

Montana Brook

Mill Brook

Pohatcong Creek

Morris Canal (Dry)

MONTANA RD
COLMAN RD
MIDLBROOK RD
MICA MINE RD
BICKEL RD
STEWARTSVILLE RD
CODLE RD
SECOND ST
THIRD ST
EDISON RD
WHITESS RD
HALEWAY HOUSE RD
MILLER LN
NEW ST
WILLOW GROVE RD
HERLEMAN RD
CLIFF SIDE DR
LENAPE TRL
EDISON RD
WARNE WAY
BRY RD
PRICE DR
COPPERFIELD DR
WATERBROOK DR
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INSCHO RD
HARLEY CT
DIRT LN
BUTTERMILK RIDGE RD
MOUNTAIN VIEW RD
BOWLBY RD
WOOLVERTON RD
BUTLER RD
BLOOMSBURY RD
ANDERSON RD
KITCHEN RD
MAIN ST
STEEPLE CHASE
WICKOFF CT
SURRY LN
RIDDLE CT
HALLS MILL RD
MAPLE AVE
SHIRTS RD
CEMETERY HILL RD

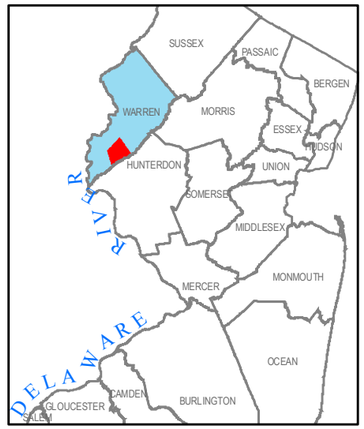
State Important Soils

- All areas are prime farmland
- Farmland of statewide importance
- Prime farmland if drained
- Areas not considered prime farmland

Princeton Hydro

pH

NEW JERSEY COUNTY MAP



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3. Soils data obtained from the USDA, Natural Resource Conservation Service (NRCS) website.

FIGURE 8
STATE IMPORTANT SOILS

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- County Boundary
- Municipal Boundaries
- Ponds/Lakes

Streams

- Streams
- Morris Canal (Dry)
- Roads
- Parcels

9: WATERSHEDS AND SUBWATERSHEDS

A watershed, or drainage basin, is defined as the entire land that drains water, sediment and dissolved substances to a body of water. Watershed boundaries are delineated by topography. In New Jersey, watersheds are referred to as the name of the water body to which the land area drains and the corresponding Hydrologic Unit Code (HUC). The HUC can range from 2 to 16 digits long- the longer the numeric code, the smaller the watershed area. NJDEP also has divided the state into 20 Watershed Management Areas (WMA) based on large scale drainage patterns and to address water quality and supply issues.

As pollution occurs upstream, the downstream water quality will become degraded. As floodplains are altered or filled, floodwaters will cause more damage. As the watershed becomes developed and the amount of impervious surface area increases, negative impacts on water quality will become noticeable. This is why it is best to manage natural resources on a watershed-based approach. Implementing techniques, rules and regulations on a larger scale will alleviate smaller, site-specific problems. Many areas in New Jersey have created local watershed associations comprised of concerned citizens to promote awareness and education of related environmental issues.

As shown in Figure 9, Franklin Township lies within 8 HUC-14 boundaries that are all part of WMA 1, the Upper Delaware River Watershed. The Pohatcong ridge separates the two main sub-watersheds in the Township: the Musconetcong River watershed and the Pohatcong Creek watershed. Local watershed associations that are affiliated with these watersheds include: the Musconetcong Watershed Association, and the Pohatcong Creek Watershed Association.

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Lopatcong Township

Harmony Township

White Tow

Greenwich Township

Bloomsbury Boro

Washington Township

Bethlehem Township

Hampton Boro

WARREN COUNTY

HUNTERDON COUNTY

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02040105140040

02040105140020

02040105140050

02040105140030

02040105140060

02040105160060

02040105160050

02040105160030

02040105160040

02040105020030

Montana Brook

Mill Brook

Pohatcong Creek

Pohatcong Creek

Morris Canal (Dry)

Musconetcong River

MONTANA RD

VOLMAN RD

MIDLBROOK RD

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THIRD ST

STEWARTSVILLE RD

STEWARTSVILLE RD

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HERLEMAN RD

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MULLER LN

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WERLA RD

BUTLER RD

WOOLVERTON RD

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CEMETERY HILL RD

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STEEPLE CHASE

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BURRY LN

HALLSMILL RD

MIDDLE CT

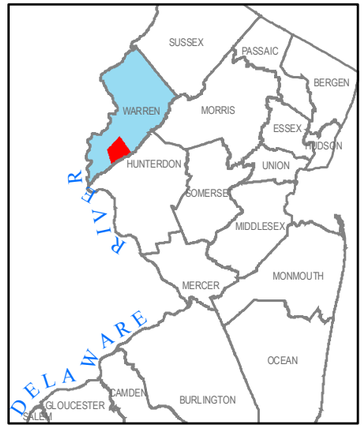
MAPLE AVE

SHIRTS RD

pH

Princeton Hydro

NEW JERSEY COUNTY MAP



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2. Surface water data obtained from the NJDEP, Division of GIS.
3. Hydrologic Unit Code (HUC) 14 Watershed data obtained from the NJDEP, Division of GIS.

FIGURE 9
HUC14 WATERSHEDS

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- County Boundary
- Municipal Boundaries
- Ponds/Lakes

Streams

- Streams
- Morris Canal (Dry)
- Roads
- Parcels
- HUC14 Watersheds

10: SURFACE WATERS AND NEW JERSEY WATER QUALITY STANDARDS

State surface waters are classified according to Surface Water Quality Standards (NJAC 7:9B) (http://www.state.nj.us/dep/wms//sgwqt/200610swqs.pdf), which were developed to improve impacted surface waters and to protect and maintain the high quality water resources. Waterways are classified in three ways according to their general quality and structure, the occurrence and structure of trout populations, and special resource protection status.

All flowing surface waters within Franklin Township are classified as FW2, which are all fresh waters not characterized as FW1 (not subjected to any man-made wastewater discharges or increases in runoff from anthropogenic activities). Designated uses within FW2 waterbodies include the maintenance, migration and propagation of natural and established biota (collection of organisms), contact recreation, industrial and agricultural water supply, public potable water supply, and any other reasonable uses. Within FW2 waters, toxic substances shall not be at levels toxic to humans or aquatic biota, all discharges shall be permitted pursuant to NJPDES, nutrients shall not be in concentrations that render waters unsuitable for designated use (except by natural causes), and there shall not be other changes in use or chemistry that are not deemed reasonable by the state.

In addition, surface water habitats within the State are classified in part on their ability to support trout and other species of fish. This classification is made because Salmonids (trout family) are reliable indicators of water quality; trout typically can survive in waters with high dissolved oxygen levels, low turbidity, metals, and temperatures. All streams within Franklin Township are characterized as either Trout Maintenance (TM) or Trout Production (TP). TP streams are those used by trout for spawning and/or nursery purposes, while those classified as TM are waters with the potential to support trout populations throughout the year. Trout Maintenance waters within the Township include the main stems of the Musconetcong River, and Pohatcong Creek. Trout Production streams include Halfway House Brook, Mill Brook, and Montana Brook. All tributaries to the Pohatcong in the Township are TP as well as one tributary of the Musconetcong.

Recognizing the stresses placed on river habitats in 1965, the U.S. Congress passed the National Wild and Scenic Rivers Act. In 1995, an Interagency Wild & Scenic Rivers Coordinating Council Charter gave coordination and administration duties of the Wild and Scenic Act to federal agencies like National Park Service, U.S. Forest Service, U.S. Fish and Wildlife Service and the Bureau of Land Management. Designation as a Wild and Scenic River falls under three categories: wild, scenic and recreation. Recently, portions of the Musconetcong River were included in the Wild and Scenic Rivers System through legislative action by New Jersey State Senators and Representatives and with support from local organizations. The process was finalized in December 2006. To date, two designations of the river have been approved along three segments of river: Segment A, Saxton Falls to the Rt. 46 Bridge, 3.5 miles, scenic; Segment B, Kings Highway Bridge to the railroad tunnels at Musconetcong Gorge, 20.7 miles, recreational; and Segment C, Hughesville Mill to the Delaware River confluence, 4.3 miles, recreational. Segment B of the Musconetcong River flows through Franklin Township.

11: C1 STREAMS AND BUFFER REQUIREMENTS

In the beginning of 2004, new Stormwater Quality rules were adopted, as mandated by the United States Environmental Protection Agency. NJDEP took additional steps to identify and protect high quality water resources. These special water resource protection areas are established along all waters designated Category One (C1), and perennial or intermittent streams that drain into or upstream of C1 waters. These areas are established for the protection of water quality, aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, and exceptional fisheries. The most notable regulation is the implementation of a 300 foot buffer zone on each bank of a C1 stream. Other rules deal with designated areas for future development, the creation of a stream corridor protection plan, and cleaner stormwater discharge into the special water protection area, or the C1 stream itself. For the official rules regarding the special water resources protection areas, please reference the New Jersey Register (N.J.A.C. 7:8-5.5(h)), (http://www.nj.gov/dep/rules/adoptions/2004_0202_watershed.pdf).

In addition, all streams located within the Highlands Preservation Area, are afforded 300 foot buffers per the Highlands Water Protection and Planning Act. Route 57/ Morris Turnpike bisects the Township and delineates the boundary between the Highlands Planning and Preservation Areas. Therefore, all stream segments north of Route 57 within the Township are protected by 300 foot buffers because they lie within the Highlands Preservation Area. Portions of the Musconetcong River also serve as a Highlands Preservation/Planning Area border in the southern section of the Township. Thus, the sections of the Musconetcong River that delineate this line, the western and eastern stretches within the Township, are protected by 300 foot buffers. The tributaries that flow through the central portion of the Township that are not classified as C1 waters and that lie within the Highlands Planning Area are not protected by 300 foot buffers. For more information on the Highlands Act, please refer to Section 16 and http://www.state.nj.us/dep/highlands and http://www.highlands.state.nj.us.

Approximately 19.45 stream miles are protected by the C1/300 stream buffer requirement within Franklin Township. (Figure 10). The C1 streams include: Halfway House Brook, Montana Brook, Mill Brook, one tributary to the Musconetcong River, and Pohatcong Creek and all its tributaries. All stream segments that are included in the Highlands Preservation Area are afforded 300 foot buffers and include: Halfway House Brook, Montana Brook, Mill Brook and the eastern and western stretches of the Musconetcong River.

File: P:\04201Projects\042006\GIS\MXD\C1_Waters.mxd

The Musconetcong River was designated as a Federal Wild and Scenic River in December of 2006

Lopatcong Township

Harmony Township

White Tow

Greenwich Township

Bloomsbury Boro

Bethlehem Township

Washington Township

WARREN COUNTY

HUNTERDON COUNTY

Pohatcong Creek

Montana Brook

Mill Brook

Morris Canal

Musconetcong River

MONTANA RD

VOLMAN RD

MORRIS TPKE (RT. 57)

STEWARTSVILLE RD

SECOND ST

THIRD ST

MILLBROOK RD

MICA MINE RD

VANSICKLE RD

HALFWAY HOUSE RD

BICKEL RD

WILLOW GROVE RD

HERLEMAN RD

CLIFFSIDE DR

LENAPE TRL

EDISON RD

WHITES RD

SINGLE LN

GOOD SPRINGS RD

MORGAN RD

HOFFMAN RD

ASBURY-BROADWAY RD

BRYAN RD

WARNE WAY

OBERLY CT

DICKENS LN

BEIDLEMAN RD

HARLEY CT

INSCHO RD

MOUNTAIN VIEW RD

DIRT LN

BUTTERMILK BRIDGE RD

BLOOMSBURY RD

BAMEKULA RD

BUTLER RD

WOOLVERTON RD

ANDERSON RD

STEEPLECHASE

KITCHEN RD

SCHOOL HOUSE LN

MAIN ST

MAPLE AVE

BURRY LN

HALL'S MILL RD

RIDDLE CT

CEMETERY HILL RD

SHIRTS RD

Streams

- C1
- C2

Stream Buffers

- 150
- 300

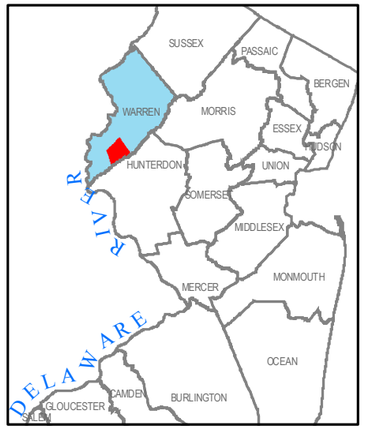
Category One (C1) waters are designated for purposes of implementing the antidegradation policies set forth at New Jersey Administrative Code (N.J.A.C.) 7:9B-1.5(d), for protection from measurable changes in water quality characteristics because of their clarity, color, scenic setting, other characteristics of aesthetic value, exceptional ecological significance, exceptional recreational value, exceptional water supply significance, or exceptional fisheries resource(s).

All streams listed as Category Two (C2) on this map that have associated stream buffers are receiving C1 protection due to the fact that they lie within the Highlands Preservation Zone.

pH

Princeton Hydro

NEW JERSEY COUNTY MAP



PRINCETON HYDRO, LLC.
1108 OLD YORK ROAD, SUITE 1
RINGOES, NEW JERSEY, 08551

0 1,500 3,000 Feet

1 inch equals 3,000 feet

SOURCES:

1. Parcel, roads and the Franklin Township Boundary data obtained from Warren County Planning Dept. "this map was developed using the Warren County New Jersey, Geographic Information System digital data, but this secondary product has not been verified by Warren County and is not county-authorized"
2. Streams data is a combination of both the USGS "Blue Line" Stream data (obtained from the NJ DEP, Division of GIS) and USDA, NRCS Soil Book Survey Stream data. Hardcopy Soil Survey Book pages were scanned and the images registered and rectified, and stream data were heads-up digitized

FIGURE 10
CATEGORY ONE WATERS WITH ASSOCIATED BUFFERS

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- County Boundary
- Municipal Boundaries
- Parcels
- Roads
- Ponds/Lakes

12: FEMA FLOOD HAZARD ZONES

A floodplain is the relatively flat area adjoining the channel of a natural stream which has been or may be covered by water. Floodplains are integral parts of the hydrologic cycle of a region for two key reasons. First, floodplains temporarily store floodwaters. During intense precipitation events and periods of high water, floodplains store excess runoff which is then slowly released. This storage capacity slows floodwater velocity and increases the ability of the river channel to discharge floodwater. The second important function of floodplains is the improvement of water quality. As stormwater runoff traverses the floodplain, established vegetation improves water quality by trapping sediments and pollutants before they enter the receiving water. Conversely, floodplains also store excess sediments which are deposited during flooding events. This deposition of nutrient rich sediments in floodplains has historically made farming of these areas attractive. Vegetation along the stream bank also anchors and stabilizes the soils, effectively reducing erosion and providing shade to maintain water temperatures. Floodplains are equally important as wildlife habitat for many rare species, and serve as nursery areas for many fish species.

The source data for the accompanying Figure was obtained from the Federal Emergency Management Agency (FEMA). Two standard flood zones commonly used to describe flood events are the 100-year and 500-year flood zone. The term "100-year flood zone is also known as the Special Flood Hazard Area. Characterization of flood zones is based upon flooding probability. Thus, a 100-year flood is described as a flood elevation that has a 1% chance of being equaled or exceeded each year. The Base Flood Elevation (BFE) is the height of the 100-year flood, or base flood, referenced to a controlled, vertical scale. The 100-year flood zone can be calculated using the BFE obtained from detailed area-specific hydraulic analyses. Conversely, the 100-year flood zone can be established without a BFE in less well-studied areas through approximations modeled on area topography. Terminology describing flood events in defined periods is misleading because these flood zones are based on exceedance probabilities not periodicity. Therefore, 100-year flood events may occur closely together within the space of a single year or on time scales greater than 100 years.

While floodplains may be aesthetically pleasing because of the proximity to water, these areas are not recommended for development. Development within floodplains alters storage capacity and flow characteristics elsewhere in the drainage system. While only 4.3% of Franklin Township lies within described FEMA flood zones, municipal officials should still address issues concerning floodplain management (Figure 11). In part this may be attributed to relatively steep slopes that confine floodplains to small areas. However, flood zones may probably be underestimated because smaller headwater tributaries may not be mapped. In addition, 500-year flood zones have not been established for most streams.

File: P:\0420\Projects\0420006\GIS\MXD\FEMA.mxd

Lopatcong Township

Harmony Township

White Tow

Greenwich Township

Bloomsbury Boro

Bethlehem Township

Washington Township

Hampton Boro

WARREN COUNTY

HUNTERDON COUNTY

Pohatcong Creek

Montana Brook

Mill Brook

Morris Canal (Dry)

Musconetcong River

MONTANA RD
VOLKMAN RD
MIDLBROOK RD
MICA MINE RD
BICKEL RD
CODLE RD
STEWARTSVILLE RD
SECOND ST
THIRD ST
EDISON RD
WHITES RD
HALEWAY HOUSE RD
MILLER LN
WILLOW GROVE RD
HERLEMAN RD
CLIFF SIDE DR
LENAPE TRL
MORRIS TPKE (RT. 57)
WARNE WAY
PRICE DR
BRY RD
COPPERFIELD DR
WATERBROOK DR
BEIDLEMAN RD
GOOD SPRINGS RD
MOUNTAIN VIEW ROAD WEST
ASBURY-BROADWAY RD
MORGAN RD
HOFFMAN RD
HARLEY CT
INSCHO RD
DIRT LN
BUTTERMILK BRIDGE RD
MOUNTAIN VIEW RD
LAKEVIEW RD
BUTLER RD
WOOLVERTON RD
BLOOMSBURY RD
CEMETERY HILL RD
ANDERSON RD
KITCHEN RD
MAIN ST
MAPLE AVE
STEEPLE CHASE
WICKOFF CT
SURRY LN
HALLSMILL RD
MIDDLE CT
SHIRTS RD

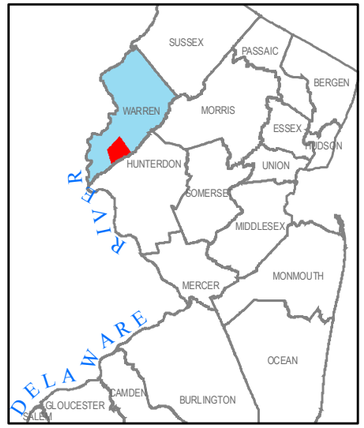
FEMA Flood Hazard Zones

- A — Zone A: Areas within the 100 Year Flood Zone, for which no Base Flood Elevations have been determined
- AE — Zone AE: Areas within the 100 Year Flood Zone, for which Base Flood Elevations have been determined.
- X500 — Zone X500: Areas within the 500 Year Flood Zone.
- X — Zone X: Areas outside the 500 Year Flood Zone.

pH

Princeton Hydro

NEW JERSEY COUNTY MAP



PRINCETON HYDRO, LLC.
1108 OLD YORK ROAD, SUITE 1
RINGOES, NEW JERSEY, 08551

N

0 1,500 3,000 Feet

1 inch equals 3,000 feet

SOURCES:
1. Parcel, roads and the Franklin Township Boundary data obtained from Warren County Planning Dept. "This map was developed using the Warren County New Jersey, Geographic Information System digital data, but this secondary product has not been verified by Warren County and is not county-authorized."
2. Surface water data obtained from the NJDEP, Division of GIS.
3. FEMA Q3 Flood Hazard data created by FEMA and obtained from the NJDEP, Division of GIS.

FIGURE 11
FEMA FLOOD HAZARD ZONES

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- County Boundary
- Municipal Boundaries
- Ponds/Lakes

Streams

- Streams
- Morris Canal (Dry)
- Roads
- Parcels

13: GROUNDWATER RECHARGE AREAS

Aquifers represent a geological unit, which can store and supply significant quantities of groundwater. Aquifer recharge is a function of groundwater recharge rates. Groundwater recharge represents the net amount of water that infiltrates the soil matrix to a point below the root zone of vegetation. Groundwater recharge necessarily accounts for the loss of gross precipitation due to evapotranspiration (physical and biological uptake), consumption, and surface runoff. These losses are determined by impervious cover, slope, and soil properties affecting percolation. The quantity of groundwater making it into the aquifer is based on the geology and aquifer pumping rates, but is less well modeled than groundwater recharge. Factors such as karst geology in sedimentary formations and fractured trap rock affect the transport of groundwater into aquifers.

Approximately 52% of the state's population receives its drinking water from groundwater. Franklin Township relies solely on groundwater sources because there are no publicly available water supply systems. Therefore, it is important to identify those critical areas in Franklin Township with the highest potential for groundwater recharge in order to protect and preserve this vital resource from contamination and land use practices that would negatively impact either the quality or quantity of available groundwater (Figure 12). The primary goal of the Highlands Protection Act, to preserve the ground and surface water resources of the area through tools to be identified in the Regional Master Plan, requires the characterization of groundwater recharge areas.

The data for this figure has been obtained from the New Jersey Geological Survey (NJGS). The NJGS has developed a model for mapping groundwater recharge areas. The model utilizes rainfall data from climate-meteorological monitoring stations, land use/land cover datasets (including impervious surface coverage, wetlands, agricultural, and residential and commercial development), geology, soil types and specific properties, and the extent of wetlands (streams, rivers, lakes, swamps, bogs, etc.). These data are combined to determine the potential in any area for groundwater recharge. This Figure is grouped according to ranks based on groundwater recharge rates. A single soil unit may have several ranks based on slope, proximity to wetlands, and land use.

In general, there is good groundwater recharge throughout Franklin Township. At 51.87% of Township area, groundwater recharge rates of 11 to 13 inches/yr are the predominant groundwater recharge rate. Additional recharge of varying rates from 17 to 12 inches is expected in 1.85% of the Township. Wetlands, open waters, and hydric soil areas are expected to contribute no measurable groundwater recharge; these areas account for 9.25% of Township area. Optimal recharge rates from 15 to 16 inches/yr are found in 38.10% of the Township.

File: P:\04201Projects\04200061GIS\MXD\GW_Recharge.mxd

Lopatcong Township

Harmony Township

White Tow

Greenwich Township

Bloomsbury Boro

Washington Township

Bethlehem Township

WARREN COUNTY

HUNTERDON COUNTY

Hampton Boro

Pohatcong Creek

Montana Brook

Mill Brook

Morris Canal (Dry)

Musconetcong River

MONTANA RD
VOLMAN RD
MILLBROOK RD
BICKEL RD
MICA MINE RD
HALFWAY HOUSE RD
STEWARTSVILLE RD
CODLE RD
SECOND ST
THIRD ST
EDISON RD
WHITES RD
MULLER LN
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CLIFF SIDE DR
LENAPE TRL
EDISON RD
WARNE WAY
BRYANT RD
PRICE DR
COPPERFIELD DR
WATERBROOK DR
MORRIS TPKE (RT. 57)
BEIDLEMAN RD
ASBURY-BROADWAY RD
GOOD SPRINGS RD
MOUNTAIN VIEW ROAD-WEST
MORGAN RD
HOFFMAN RD
HARLEY CT
INSCHO RD
DIRT LN
BUTTERMILK BRIDGE RD
MOUNTAIN VIEW RD
BUTLER RD
WOOLVERTON RD
BLOOMSBURY RD
CEMETERY HILL RD
ANDERSON RD
KITCHEN RD
MAIN ST
STEEPLE CHASE
WICKOFF CT
SURRY LN
HALLSMILL RD
RIDDLE CT
MAPLE AVE
SHIRTS RD

Groundwater Recharge

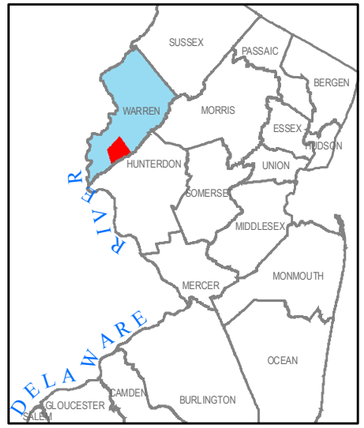
County Rank, County Rank Definition

- A, 17 to 12 in/yr
- B, 15 to 16 in/yr
- C, 11 to 13 in/yr
- D, 1 to 10 in/yr
- E, 0 in/yr
- L / W, Hydric Soils / Wetlands - No Recharge Calculated
- X, No Recharge Calculated

pH

Princeton Hydro

NEW JERSEY COUNTY MAP



PRINCETON HYDRO, LLC.
1108 OLD YORK ROAD, SUITE 1
RINGOES, NEW JERSEY, 08551

N

0 1,500 3,000 Feet

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SOURCES:

1. Parcel, roads and the Franklin Township Boundary data obtained from Warren County Planning Dept. "This map was developed using the Warren County New Jersey, Geographic Information System digital data, but this secondary product has not been verified by Warren County and is not county-authorized."
2. Surface water data obtained from the NJDEP, Division of GIS.
3. Groundwater Recharge data obtained from the New Jersey Geological Survey. Recharge calculated through NJGS GSR-32 report/program.

FIGURE 12
GROUNDWATER RECHARGE

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- County Boundary
- Municipal Boundaries
- Ponds/Lakes

Streams

- Streams
- Morris Canal (Dry)
- Roads
- Parcels

14: BEDROCK AQUIFERS

An aquifer is a geologic formation capable of supplying groundwater through wells. Aquifers are defined as porous, water-saturated layers of sand, gravel or bedrock that can yield an economically significant amount of water. Rain and storm water runoff infiltrate the soil and seep down into fissures, cracks and small interconnections and voids between individual grains in the underlying bedrock. There are three bedrock aquifers (Figure 13) in Franklin Township: (1) Jacksonburg Limestone, Kittany Supergroup and Hardyston Quartzite, (2) Igneous and Metamorphic Rocks, and (3) Martinsburg Formation and Jutland Sequence.

Jacksonburg Limestone, Kittatinny Supergroup and Hardyston Quartzite Aquifer account for the largest bedrock aquifer in Franklin Township (8101.0 acres or 53.7%). This aquifer is associated with the low lying portions of the Township. The rocks of this aquifer contain limestone and dolastone which is highly fractured and dissolvable in water. The abundance of fractures in the limestone gives it the ability to store and transmit large quantities of water making it a high yield aquifer. However, high transmissivities within this aquifer means that pumping may affect water levels in adjacent communities, particularly those lying in the direction of groundwater flow. In addition, the cavernous nature of limestone and the very qualities that make it a good aquifer can cause problems in well development where cavities are likely to contain large amounts of sediment and may require extensive treatment to clean the water. This aquifer is also sensitive to contamination due to the interconnection of various cavities

Aquifers made of igneous and metamorphic rocks amount to 6162.1 acres or 40.9% of the Township area. These are found along the Pohatcong ridgeline and the ridgeline along the Harmony Township boundary line. This type of aquifer is underlain by Precambrian igneous and metamorphic granites and gneisses. This aquifer has a characteristic tight, crystalline structure making them virtually incapable of storing or transmitting groundwater. However, these older formations are also heavily weathered and fractured, making it a relatively productive aquifer. The rock of this aquifer is less fractured in comparison to the Jacksonburg Limestone, Kittatinny Supergroup and Hardyston Quartzite aquifer, making it a low-yield aquifer.

Martinsburg Formation and Jutland Sequence aquifers account for the remaining 813.5 acres or 5.4% of the Township. This aquifer runs along the higher elevations of the Musconetcong valley in the Township. The rocks of this aquifer are sedimentary and consist of shales, sandstone and slates. This aquifer is also less fractured than the above two aquifers, making it a low-yield aquifer.

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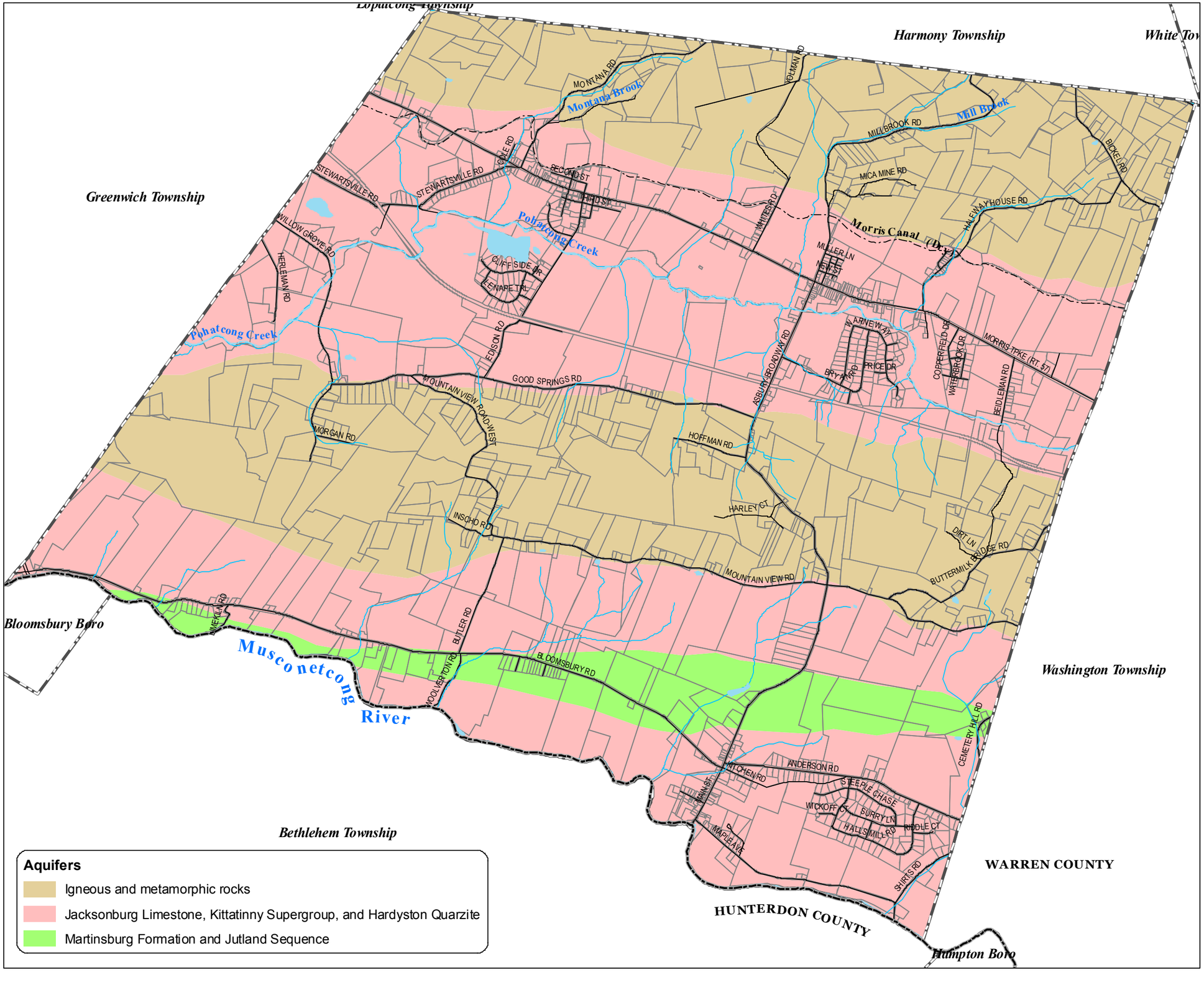
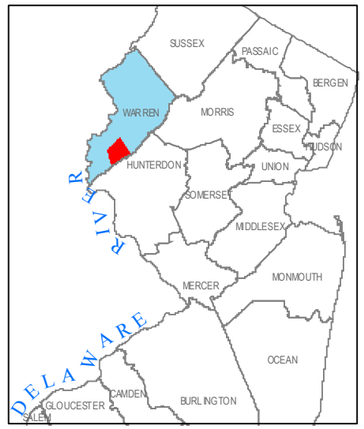


Aquifers

- Igneous and metamorphic rocks
- Jacksonburg Limestone, Kittatinny Supergroup, and Hardyston Quarzite
- Martinsburg Formation and Jutland Sequence

pH Princeton Hydro

NEW JERSEY COUNTY MAP



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1108 OLD YORK ROAD, SUITE 1
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2. Surface water data obtained from the NJDEP, Division of GIS.
3. Aquifer data obtained from the New Jersey Geological Survey.

FIGURE 13
BEDROCK AQUIFERS

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- County Boundary
- Municipal Boundaries
- Ponds/Lakes

Streams

- Streams
- Morris Canal (Dry)
- Roads
- Parcels

15: LAND USE / LAND COVER

Land Use/Land Cover (LU/LC) is a two-tiered classification system that systematically defines similar land areas according to land utilization and vegetative structure. Specifically, this is an EPA- and NJDEP-approved method known as the Anderson Classification (Anderson 1976). LU/LC is an important descriptor of any area because it documents natural features, anthropogenic activities and environmental characteristics.

In 1986, NJDEP commissioned an independent contractor to produce the original LU/LC digital data set. The data set was created by combining existing information about land use with current aerial photographs and digitizing the results. The 1986 NJDEP LU/LC database was subsequently updated in 1995, 2000 and most recently in 2002.

It should be emphasized that this LU/LC coverage (or any other coverage derived from LU/LC) has not been field-verified, either by NJDEP or Princeton Hydro, and thus may not be a wholly accurate representation of land uses and land covers within Franklin Township. Although better data and methods, combined with improved technology, made the 2000 and 2002 publications more accurate than previous versions, the use of LU/LC data for site-specific projects is inappropriate because of the limitations of resolution scales and ongoing changes in development patterns over the span of even a single year.

The value of the LU/LC coverage is its reasonably accurate portrayal of development and land cover patterns within the Township (e.g., high-density residential areas, commercial development and wetlands) and its easily manipulated hierarchical classification scheme. This data can be quite valuable in depicting—and sometimes predicting—development trends within the Township, especially when current information is compared with older data. In addition, LU/LC coverage can serve as a basis for estimating pollutant loads on an annual basis.

Based on the 2002 LU/LC dataset, Franklin Township comprises 52 separate LU/LC categories as defined by NJDEP (Figure 14). These diverse classifications are more easily discussed according to more generalized land types. Using this more general classification scheme, the largest land use type within the Township is agriculture, which covers 7,134.57 acres or 47.32% of the Township's land area. Forest is the second most predominant land type, with 5,242.23 acres (34.77%), followed by 1,693.35 acres (11.23%) of urban lands, 726.97 acres (4.82%) of wetlands and 129.05 acres (0.86%) of water (bridges over water, streams, canals, lakes and other waterbodies, both natural and artificial).

As illustrated on Figure 15, wide swaths of agricultural and forested lands dominate Franklin Township, with smaller "pockets" of urban lands distributed throughout the Township and concentrated around the larger transportation corridors. Wetlands tend to be closely associated with stream corridors, while other waterbodies tend to be more widely distributed throughout the municipality.

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Lopatcong Township

Harmony Township

White Tow

Greenwich Township

Bloomsbury Boro

Bethlehem Township

Washington Township

WARREN COUNTY

HUNTERDON COUNTY

Hampton Boro

Musconetcong River

Pohatcong Creek

Montana Brook

Mud Brook

Morris Canal (Dry)

MONTANA RD
STEWARTSVILLE RD
COLE RD
SECOND ST
THIRD ST
WILLOW GROVE RD
HERLEMAN RD
CLIFF SIDE DR
LENAPE TRL
EDISON RD
GOOD SPRINGS RD
MOUNTAIN VIEW ROAD WEST
MORGAN RD
HOFFMAN RD
INSCHO RD
SWEKLAR RD
BUTLER RD
COOLVERTON RD
BLOOMSBURY RD
MOUNTAIN VIEW RD
HOLMAN RD
MILLBROOK RD
MICA MINE RD
WHITES RD
MILLER LN
NEW ST
ASBURY-BROADWAY RD
HALFWAY HOUSE RD
BICKEL RD
BRYANT RD
PRICE DR
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COPPERFIELD DR
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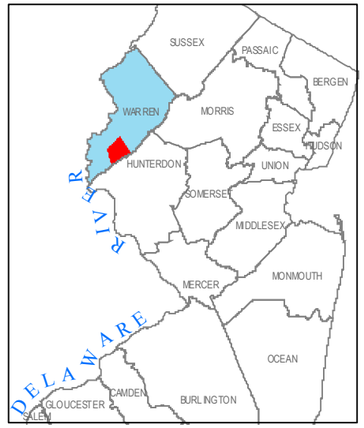
BUTTERMILK BRIDGE RD
CEMETERY HILL RD
KITCHEN RD
ANDERSON RD
MAIN ST
MAPLE AVE
STEEPLE CHASE
WICKOFF CT
SURRY LN
HALLS MILL RD
RIDDLE CT
STIRTS RD

Land Use/Land Cover

- Agriculture (7,134.5 Acres)
- Barren Land (150.4 Acres)
- Forest (5,242.2 Acres)
- Urban (1,693.3 Acres)
- Open Water (129.0 Acres)
- Wetlands (726.9 Acres)

Princeton Hydro

NEW JERSEY COUNTY MAP



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2. Surface water data obtained from the NJDEP, Division of GIS.
3. 2002 Land Use / Land Cover data obtained from the NJDEP, Division of GIS.

FIGURE 14
LAND USE / LAND COVER

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- County Boundary
- Municipal Boundaries

Streams

- Streams
- Morris Canal (Dry)
- Roads
- Parcels

16: HIGHLANDS PLANNING AND PRESERVATION AREA

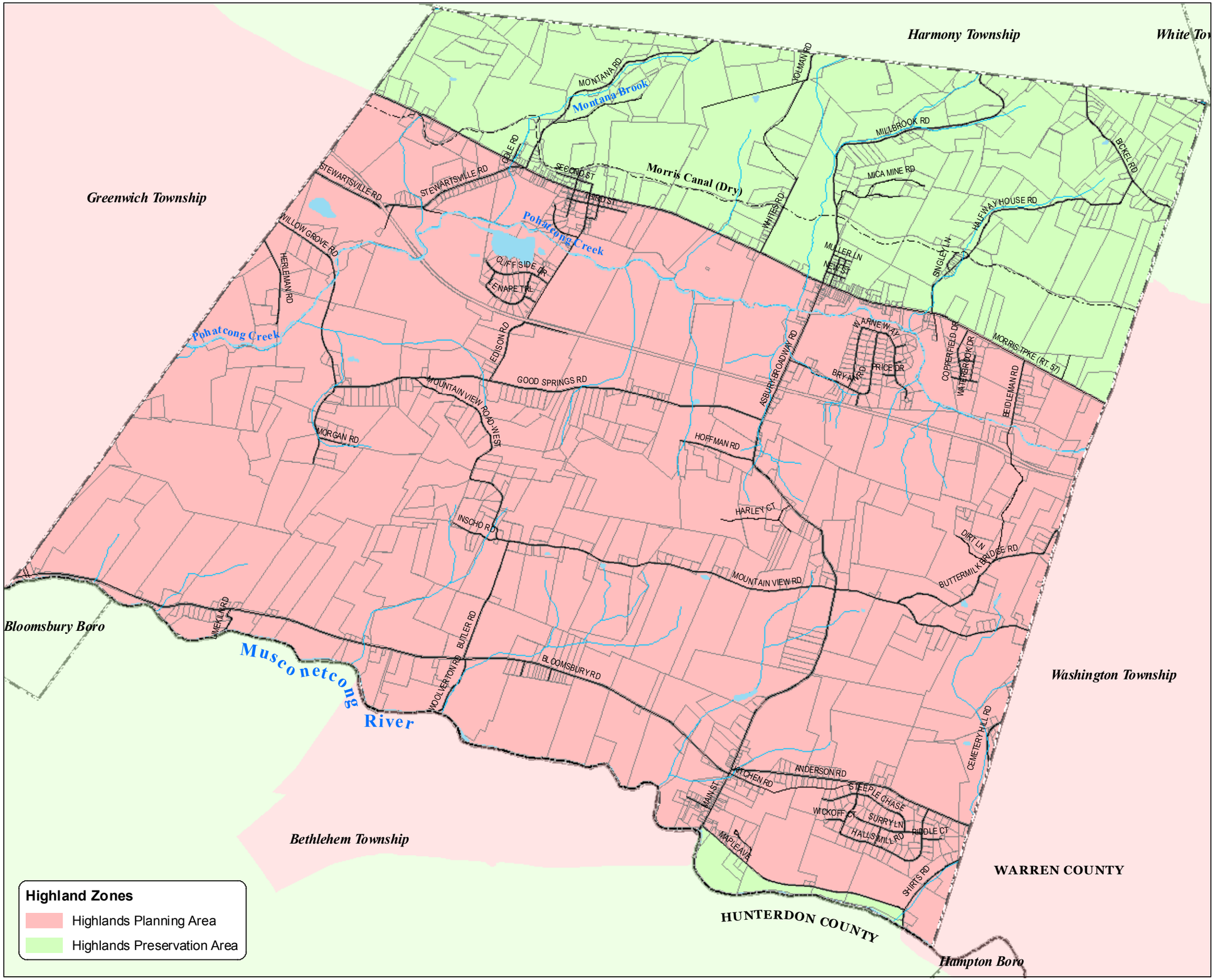
The Highlands Water Protection and Planning Act (Highlands Act, N.J.S.A. 13:20-1 et seq.) was signed into law in August 2004. The Act specifies the boundaries of the 800,000-acre New Jersey Highlands Region, including 88 New Jersey municipalities in the counties of Bergen, Hunterdon, Morris, Passaic, Somerset, Sussex and Warren (Rutgers Cooperative Extension 2005). The Highlands Region is a vital source of drinking water for more than half of New Jersey's 8.5 million residents, yielding approximately 379 million gallons of water daily. In addition, the region contains exceptional natural resources such as contiguous forest lands, wetlands, pristine watersheds and plant and wildlife species habitats. This area also includes many sites of historic significance and provides abundant recreational opportunities.

Rules implementing the Highlands Act were adopted in June 2005 as N.J.A.C. 7:38-1 et seq. All development in the Highlands Region is subject to the enhanced protections of these rules, with regional standards to be implemented through the Regional Master Plan (RMP). Within the region, the Act establishes two development zones: the Preservation Area, defined by its high ecological sensitivity, and the Planning Area, a more intensely developed zone. The strongest development and water quality protections in the Act are provided for development in the Preservation Area. Lands within the Highlands Preservation Area are subject to strict limitations on the amount of impervious cover; as well as limitations of development on steep slopes, in forested areas, flood zones and within 300 feet of all water bodies. In addition, all waters located within the Highlands Preservation Areas are afforded C-1 water quality protections.

As presented in Figure 15, the majority of Franklin Township is located within the Highlands Planning Area (75%), although a small portion (25%) lies within the Preservation Area. Under the Highlands Act rules, the Preservation Area is to be protected through enhanced environmental regulation, transfer and purchase of development rights, acquisition of environmentally valued real estate and regional planning. Municipal designation as a Preservation Area requires modification of local codes and development regulations to ensure compliance with the RMP (which is currently in a draft format and as of February 2007, still accepting public comment), including the regulation and approval of any major Highlands development (as defined by statute) by NJDEP. In contrast, municipalities within the Planning Area are encouraged—but not required—to achieve compliance with the RMP. The information contained in this NRI is intended to be used in concert with the Highlands rules in evaluating impacts within the Planning Area and assessing the benefits of site-specific measures such as the transfer and purchase of development rights, acquisition of environmentally sensitive lands, and related planning and land development activities.

Additional information about the Highlands Act is available at http://www.state.nj.us/dep/highlands and http://www.highlands.state.nj.us.

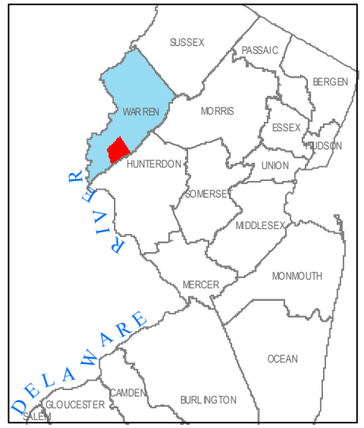
File: P:\0420\Projects\04200016\GIS\MXD\Regional_Base_Map.mxd



pH

Princeton Hydro

NEW JERSEY COUNTY MAP



PRINCETON HYDRO, LLC.
1108 OLD YORK ROAD, SUITE 1
RINGOES, NEW JERSEY, 08551

N

0 1,500 3,000 Feet

1 inch equals 3,000 feet

SOURCES:
1. Parcel, roads and the Franklin Township Boundary data obtained from Warren County Planning Dept. "This map was developed using the Warren County New Jersey, Geographic Information System digital data, but this secondary product has not been verified by Warren County and is not county-authorized."
2. Surface water and Highland data obtained from the NJDEP, Division of GIS.

FIGURE 15
HIGHLANDS AREAS

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- County Boundary
- Municipal Boundaries
- Roads
- Parcels
- Ponds/Lakes

Streams

- Streams
- Morris Canal (Dry)

17: STATE PLAN AND POLICY MAP

The New Jersey State Development and Redevelopment Plan, commonly known as the State Plan, is a planning tool promulgated by the State Planning Commission and the Office of Smart Growth. The stated purpose of the plan is to coordinate planning activities and establish statewide planning objectives in the following areas: land use, housing, economic development, transportation, natural resource conservation, agriculture and farmland retention, recreation, urban and suburban redevelopment, historic preservation, public facilities and services, and intergovernmental coordination (N.J.S.A. 52: 18A-200(f)) . The plan therefore is designed to provide a comprehensive development projection that balances growth and conservation. Approval of the plan is dependent on the Cross-Acceptance Process, whereby local governments and the community discuss the major aspects of the plan in a public forum, which must locally adopt county-wide plans before submission to the state.

The State Plan therefore is driven by the identification of land areas and designation of future land uses. These designated land areas are known as Planning Areas, which are distinct geographic and economic units based on level of development and important natural resources based on a variety of environmental criteria. Planning Areas are supplemented by Centers, which are targeted for development, and Environs, which are adjacent lands. In addition, the plan may identify other more specific land uses such as Parks and Natural Areas, or those which are more narrowly defined than Planning Areas. Each Planning Area has specific intentions and Policy Objectives that guide the application of Statewide Policies. Additional information is available online (http://www.nj.gov/dca/osg/plan/).

Four planning areas encompass portions of Franklin Township (Figure 16). These are Planning Area 4B (PA4B) Rural Environmentally Sensitive, Planning Area 5 (PA5) Environmentally Sensitive, Parks and Natural Areas (Parks) and Planning Area 4 (PA4) Rural. With nearly 10,425 acres falling within Planning Area 4B (PA4B) Rural Environmentally Sensitive Areas, this area comprises 69% of the Township. Land classified as PA4B contains valuable ecosystems or wildlife habitats and supports agriculture and other related economic development. Any development or redevelopment planned in the PA4B area should respect the natural resources and environmentally sensitive features of this area.

File: P:\0420\Projects\04200006\GIS\MXD\State_Plan.mxd

Harmony Township

White To

Greenwich Township

Bloomsbury Boro

Washington Township

Bethlehem Township

Hampton Boro

WARREN COUNTY

HUNTERDON COUNTY

Morris Canal (Dry)

Pohatcong Creek

Pohatcong Creek

Montana Brook

Musconetcong River

PA5

PA4

PA4B

PA5

PA5

PA4B

PA5

PARK

MONTANA RD
VOLKMAN RD
MILLBROOK RD
MICA MINE RD
HALFWAY HOUSE RD
BICKEL RD
STEWARTSVILLE RD
GOLF RD
SECOND ST
THIRD ST
WHITES RD
MILLER LN
NEW ST
SINGLE LN
WILLOW GROVE RD
HERLEMAN RD
CLIFFSIDE DR
LENAPE TRL
EDISON RD
W ARNEW AY
ASBURY BROADWAY RD
BRYANT RD
PRICE DR
COPPERFIELD DR
WATERBROOK DR
MORRIS TPKE (RT. 57)
BEIDLEMAN RD
GOOD SPRINGS RD
MOUNTAIN VIEW ROAD WEST
MORGAN RD
HOFFMAN RD
HARLEY CT
INSCHO RD
DIRT LN
BUTTERMILK BRIDGE RD
MOUNTAIN VIEW RD
RIVERLA RD
BUTLER RD
WOOLVERTON RD
BLOOMSBURY RD
CEMETERY HILL RD
ANDERSON RD
KITCHEN RD
STEEPLE CHASE
WICKOFF CT
BURY LN
HALLSMILL RD
RIDDLE CT
MAPLE AVE
SHIRTS RD
TRANSIT ST

Planning Areas

- PA5, ENVIRONMENTALLY SENSITIVE
- PA4, RURAL
- PA4B, RURAL ENV. SENSITIVE
- PARK, STATE PARK

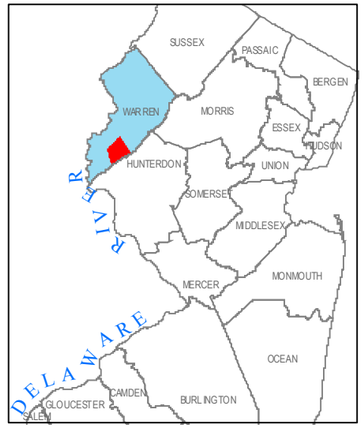
State Plan Features Not Shown

Smart Growth Areas: The entire Township lies outside the Smart Growth Area

Critical Environmental Sites: The Musconetcong River is considered a Critical Environmental Site.

Princeton Hydro

NEW JERSEY COUNTY MAP



PRINCETON HYDRO, LLC.
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N

0 1,500 3,000 Feet

1 inch equals 3,000 feet

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2. Surface water data obtained from the NJDEP, Division of GIS.
3. State Plan data obtained from the New Jersey Department of Community Affairs.

FIGURE 16
STATE PLAN POLICY

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- County Boundary
- Municipal Boundaries
- Roads
- Parcels
- Ponds/Lakes

Streams

- Streams
- Morris Canal (Dry)

18: OPEN SPACE AND PRESERVED LANDS

The Warren County Open Space Plan (1999) defines open space as land acquired and dedicated to remain undeveloped. These land areas may include waterbodies, ridgelines, steep slopes, woodlands, grasslands, and agricultural lands. These features make up the character of the area and should be considered whenever sites are evaluated for acquisition. Areas designated for open space can protect many natural resources, such as the quality and quantity of surface and groundwater, cultural and historic areas, and view sheds. Open space acquired now can serve to satisfy the recreational needs of residents as development occurs in the future.

The goals of farmland preservation are similar to other open space preservations efforts, which seek to limit development, preserve scenic views, promote agricultural land uses, maintain hydrologic functions, and preserve specialized ecotone habitats. Preserving farmland can ensure a community's agricultural character for generations despite the pressure to develop.

Preserving and obtaining open space and farmland is largely accomplished through two means: 1) implementation of regulatory constraints requiring that future developments be designed in a manner consistent with local, state, and federal guidelines related to preservation planning and 2) the acquisition of specific properties deemed important as open space by defined criteria. Franklin Township contracted Morris Land Conservancy to complete an up-to-date Open Space and Recreation Plan. This plan was completed in January 2006 and details the preservation methodology used by the Township, as well as an inventory of preserved lands and recommendations for further acquisition. In addition to the Open Space and Recreation Plan, the Highlands Act and the New Jersey State Development and Redevelopment Plan directly influence future development within the Township and guide preservation of lands.

Franklin Township has been very successful in preserving open spaces in the Township (Figure 17). With public support, the Township's open space trust fund has increased from two cents per one hundred dollars of assessed property value in 1999 to a rate of six and one half cents in 2005. Voters have consistently approved rate increases since the creation of the open space fund in 1999, but this latest increase to six and a half cents, the highest in Warren County, has been implemented by municipal ordinance number 2005-15. The Township has also been able to secure funds for purchasing open space from other sources, including: the State Agricultural Development Committee (SADC), the Warren County Agricultural Development Board (CADB) and from an SADC Planning Incentive Grant (PIG).

Franklin Township encompasses a total of 15,360 acres. Of this total, 2,427.49 acres or 15.8% of the Township is preserved open space land. Most open space acquisition has been focused on farmland preservation as an attempt to preserve the Township's agricultural heritage. In total, 36 parcels of farmland have been preserved for a sum of 1,791.32 acres. NJDEP- owned open space accounts for 159 acres and Warren County owned open space accounts for 174 acres. A 60-acre property is now pending purchase by the Township, 40 acres of which will be slated for active recreational use.

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Lopatcong Township

Harmony Township

White Tow

Greenwich Township

Washington Township

Bethlehem Township

Bloomsbury Boro

Hampton Boro

WARREN COUNTY

HUNTERDON COUNTY

Pohatcong Creek

Montana Brook

Mill Brook

Morris Canal (Dry)

Musconetcong River

MONTANA RD
VOLTMAN RD
MILLBROOK RD
MICA MINE RD
BICKEL RD
STEWARTSVILLE RD
GOLE RD
SECOND ST
THIRD ST
WHITES RD
HALFWAY HOUSE RD
MULLER LN
NEW ST
CLIFF SIDE DR
LENAPE TRL
WILLOW GROVE RD
HERLEMAN RD
EDISON RD
ARNEWAY
ASBURY BROADWAY RD
BRYANT RD
PRICE DR
COPPERFIELD DR
WATERBROOK DR
MORRIS TPKE (RT. 57)
BEIDLEMAN RD
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MOUNTAIN VIEW ROAD WEST
MORGAN RD
HOFFMAN RD
HARLEY CT
INSCHO RD
DIRT LN
BUTTERMILK BRIDGE RD
MOUNTAIN VIEW RD
RIVERLAND RD
BUTLER RD
WOOLVERTON RD
BLOOMSBURY RD
CEMETERY HILL RD
KITCHEN RD
ANDERSON RD
MAIN ST
STEEPLE CHASE
WICKOFF CT
BURRY LN
HALES MILL RD
RIDDLE CT
RAPELJE AVE
SHIRTS RD

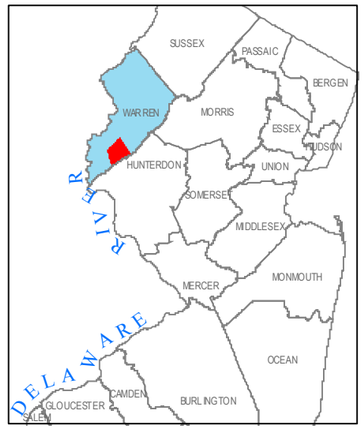
Open Space / Preserved Land

- County Property / Easement
- Municipal Property
- Non-Profit Property
- Preserved Farmland
- Semi-Public Property
- State Property

pH

Princeton Hydro

NEW JERSEY COUNTY MAP



PRINCETON HYDRO, LLC.
1108 OLD YORK ROAD, SUITE 1
RINGOES, NEW JERSEY, 08551

0 1,500 3,000 Feet

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2. Surface water data obtained from the NJDEP, Division of GIS.
3. Open Space data also obtained from the Warren County Planning Department. Data obtained in October of 2006.

FIGURE 17
OPEN SPACE AND PRESERVED LANDS

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- County Boundary
- Municipal Boundaries
- Parcels
- Roads
- Ponds/Lakes

Streams

- Streams
- Morris Canal (Dry)

19: DOCUMENTED HISTORIC SITES

The identification and preservation of historical sites is important in maintaining the cultural legacy of a defined area. The area of Franklin Township was settled around 1740, but it wasn't until the year 1839 that the Township became incorporated. Some of the more significant historic elements of the Township are identified on the Historic Features map (Figure 18) and presented in Appendix 18. Information presented in the Appendix is a combination of information retrieved from the National and State Register of Historical Places and from the Warren County Cultural Resources Survey.

The original inhabitants of the land were the Paleo-Indians, who hunted now extirpated elk, caribou and other mammals. The Leni Lenape Indians settled in the area up until European settlement in the 1800s. The first European settlers were predominantly Germans, Scottish, and Irish. These settlers cleared much of the valleys for subsistence agriculture which eventually gave way to grain and dairy farming. Settlement centered in the villages of Asbury, Broadway and New Village. Population and industry grew in the 1800s due to the construction of Route 57, Morris Turnpike, Morris Canal, and the Somerville-Easton railroad. A wide range of architectural styles are visible in the historical farmsteads, gristmills, and churches that still stand today to attest for Franklin Township's historical past.

There are several historic sites within Franklin Township, three of which are recognized by the State and National Register of Historic Places. The Asbury Historic District encompasses the area from Maple to Kitchen and School Streets and contains 148 buildings. This site is on both the State and National Register. The Township's first gristmill can be found in this historic district. The building that contains the Asbury Mill dates back to pre-Revolutionary times and was converted to a graphite mill in 1895. An essential conduit for the transportation of goods from the Township to urban centers during the mid-1800s to early-1900s was the Morris Canal. Listed on the State and National Register of Historic Places and listed in the Township ordinance as a Historic Preservation Area, the canal was a great engineering accomplishment of its day. Finally, a former farmhouse, the John Richey House, is also listed on the State and National Register. This house dates back to the 1800s and is privately owned.

Not listed on the State and National Register, is Warne's Gristmill, dating back to 1810. This mill was owned by the Warne family until 1935. Though not operational today, the building is in good condition and is located on 303-acres accompanied by a stone farmhouse, barns and outbuildings dating to the 17th Century.

Another area, The Plenge, exhibits evidence of the Paleo-Indian existence. This site is one of two major Paleo-Indian archeological site excavations in the state and one of the most important in the northeast. This site is eligible for National Landmark designation.

There are several other historic sites, including schools, churches, cemeteries, farms, and buildings that illustrate Franklin Township's agricultural and industrial past. The Warren County Cultural Resources Survey identifies over 100 such sites. Finally, both the Warren County Survey and the National Register identify sites within the Township that may be eligible for inclusion in the National Register. These sites are included in Appendix 18.

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Federal Historic Site

★ John Richey House

State Historic Site

Asbury Historic District

County Reviewed Sites

- Bridge
- Cemetery
- Church
- Farm
- Industrial
- Residence
- School

Greenwich Township

Bloomsbury Boro

Bethlehem Township

Hampton Boro

WARREN COUNTY

HUNTERDON COUNTY

Musconetcong River

Pohatcong Creek

Montana Brook

Mill Brook

Morris Canal (Dry)

B1,Bridge, Rt 57, c. 1922
B2,Bridge, Rt 57, New Village, c. 1922
C1,Cemetery/Asbury Presbyterian Cemetery, 1790-1880
C2,Cemetary, Rt 57, Broadway, c. unknown
C3,Cemetery/Asbury Presbyterian Cemetery, 1790-1880
CH1,Church/Asbury Methodist Episcopal Church, c. 1914
CH2,Church, New Village Union Chapel, c. 1920
CH3,Church/Asbury Presbyterian Church, c. 1868
F1,Farm, Bloomsbury Road, c. 1900
F10,Farm, Millbrook Road, c. 1880
F11,Farm, Rt 57, c. 1880
F12,Farm, Maple Ave, c. 1870
F13,Farm, Edison Road, c. 1820
F14,Farm, Good Springs Road, c. 1900
F15,Farm, Millbrook Road, c. 1890
F16,Farm, Mountain View Road, c. 1870
F17,Farm and Vet Office, Rt 57, New Village, c. 1820
F18,Farm, Bloomsbury Road, c. 1860
F19,Farm, Elisha Thatcher Home, c. 1817
F2,Farm, Bloomsbury Road, c. 1880
F20,Farm, Rt 57, Broadway, c. 1800
F21,Farm, Millbrook Road, c. 1900
F22,Farm, Bryan Road, Broadway, c. 1930
F23,Farm, Bryan Road, Broadway, c. 1930
F3,Grange, Millbrook Road, Broadway, c. 1930
F4,Farm, Bloomsbury Road, c. 1980
F5,Farm, Millbrook Road, c. 1870
F6,Farm, Millbrook Road, c. 1890
F7,Farm, Herleman Road, c. 1880
F8,Farm, Bloomsbury Road, c. 1880
F9,Farm, Bloomsbury Road, c. 1900
I1,Industrial/Mill, Main Street, Asbury, c. 1780
R1,Spring Run Farm/J. Apgar House (Residence), Bloomsbury Road, c. 1800
R2,Col. William McCullough Home/Residence, Main Street, Asbury, c. 1800
R3,American House/Residence, Main Street, Asbury, c. 1810
R4,Daniel Runkle House, Residence, Main Street, Asbury, c. 1840
R5,School/Converted Residence, School Street, Asbury, c. 1919
R6,Daniel Cole House/Residence, School Street, Asbury, c. 1840
R7,Warne-Castner House/Residence, Main Street, Asbury, c. 1800
R8,Mill/Converted to Residence, Halfway House Road c. 1800
R9,Former School Converted to Residence, Mountain View Road, c. 1852
S1,School, Rt 57, Broadway, c. 1920

Princeton Hydro

NEW JERSEY COUNTY MAP

PRINCETON HYDRO, LLC.
1108 OLD YORK ROAD, SUITE 1
RINGOES, NEW JERSEY, 08551

0 1,500 3,000 Feet

1 inch equals 3,000 feet

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2. Surface water data obtained from the NJDEP, Division of GIS.
3. Federal Historic data obtained from the National Park Service.
4. State Historic data obtained from the NJ DEP, Historic Preservation Office.
5. County Reviewed Historic Sites obtained from Franklin Township.

FIGURE 18
HISTORIC SITES

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- Parcels
- County Boundary
- Municipal Boundaries
- Ponds/Lakes

Streams

- Streams
- Morris Canal (Dry)
- Roads

20: SEPTIC SUITABILITY

Onsite wastewater treatment (septic) systems are the dominant form of wastewater treatment in many rural and suburban townships throughout the region. As such, septic suitability is a key factor in determining whether a parcel of land may be developed for residential or other purposes requiring onsite wastewater treatment. Septic suitability may therefore be better described in terms of septic restrictions. Septic restrictions are based upon those factors that limit the performance of septic systems. There are many physical factors that can limit performance and certain limitations imposed on the discharge of septic effluent in an effort to preserve natural resources; these factors are usually codified by regulations restricting septic system construction.

Septic effluent is nutrient rich, high in minerals and salts, has elevated organic content, and is laden with pathogens. If improperly treated, the seepage of wastewater into surface waters can negatively impact water quality. Septic discharge is also regarded as a threat to drinking water derived from surface or groundwater sources. It is the septic quality of the water, or the presence of toxic microbes including coliform bacteria, that pose a risk to human health.

Septic systems are performance limited by a variety of factors, most of which are linked to local soils and geologic properties. These include, but are not limited to, proximity to surface waters, slope, depth to seasonal high water tables, and soil composition. Soil composition is an important factor in determining wastewater percolation rates. Percolation describes the movement of surface waters infiltrating the soil to groundwater sources. Soils are limited by permeability, coarse rock fragments, compaction, stratification, and composition. Percolation rates may be neither too slow nor too fast if a soil is to provide a suitable level of wastewater treatment and renovation.

In the context of this report, septic suitability is limited strictly by soil properties, without regard to regulatory considerations as defined and detailed in NJAC 7:9A. Restrictions are classified according the NRCS use limitations of soil units described in county soil surveys. Restrictions are classified as moderate, severe, or undefined based on six (6) specific limitations as follows: 1) fractured rock or excessively coarse substrata, 2) massive rock or hydraulically restrictive substrata, 3) hydraulically restrictive horizon or permeable substratum, 4) excessively coarse horizon, 5) regional zone of saturation, or 6) perched zone of saturation. Restrictions are classified as severe, moderate or undefined. Four (4) soil types in the Township are unavailable and include mine dump, pits, quarry, rock outcrop, Edneyville-Parker series, and Fluvaquents. All undefined types are unsuitable for septic construction due to hydrology, lack of soil, or slope.

Franklin Township has limited suitability for septic system construction (Figure 19) 41.35% of the Township has moderate restrictions, while severe restrictions account for 42.16% of the area. Severe restrictions are closely associated with riparian corridors and identified wetlands. Undefined lands, which are not suitable for septic operation, account for the remaining 16.50% of area. These areas are limited to high ridgelines and surface waters.

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Lopatcong Township

Harmony Township

White Tow

Greenwich Township

Bloomsbury Boro

Bethlehem Township

Washington Township

WARREN COUNTY

HUNTERDON COUNTY

Hampton Boro

Musconetcong River

Pohatcong Creek

Montana Brook

Mill Brook

Morris Canal (Dry)

MONTANA RD
STEWARTSVILLE RD
OLDE RD
SECOND ST
THIRD ST
EDISON RD
WILLOW GROVE RD
HERLEMAN RD
CLIFF SIDE DR
LENAPE TRL
MOUNTAIN VIEW ROAD-WEST
GOOD SPRINGS RD
MORGAN RD
HOFFMAN RD
INSCHO RD
HARLEY CT
MOUNTAIN VIEW RD
BUTLER RD
WOOLVERTON RD
BLOOMSBURY RD
SMEDLEY RD
VOLMAN RD
MIDLBROOK RD
MICA MINE RD
BICKEL RD
WHITESS RD
HALEWAY HOUSE RD
MULLER LN
NEW ST
ASBURY-BROADWAY RD
WARNE WAY
BRY AVE
PRICE DR
COPPERFIELD DR
WATERBROOK DR
MORRIS TPKE (RT. 57)
BEIDLEMAN RD
DART LN
BUTTERMILK BRIDGE RD
CEMETERY MILL RD
KITCHEN RD
ANDERSON RD
MAIN ST
MAPLE AVE
STEEPLE CHASE
WICKOFF CT
SURRY LN
HALLSMILL RD
RIDDLE CT
SHIRTS RD

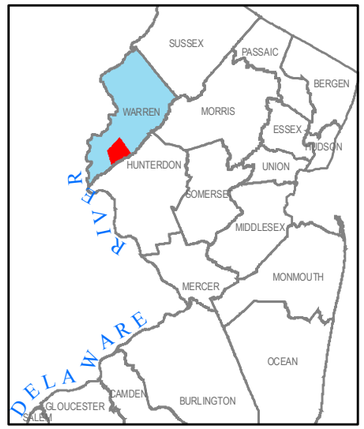
NJDEP Septic Suitability (NJAC 7:9a)

- Moderate Restrictions
- Severe Restrictions
- No Reported Restrictions

pH

Princeton Hydro

NEW JERSEY COUNTY MAP



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2. Surface water data obtained from the NJDEP, Division of GIS.
3. Slopes were calculated with GIS utilizing a 10 meter Digital Elevation Model (DEM) .

FIGURE 19
SOILS - SEPTIC SUITABILITY

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- County Boundary
- Municipal Boundaries
- Ponds/Lakes

Streams

- Streams
- Morris Canal (Dry)
- Roads
- Parcels

21: NJDEP WETLANDS

Legal classifications of wetlands are based on a functional definition of wetlands that is commonly called the three-parameter approach and is outlined in the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands*. The three parameters defining wetlands are hydric soils, hydrophytic vegetation that is typically adapted for life in saturated conditions, and area hydrology that is inundated or saturated by surface or groundwater at a frequency and duration to support hydrophytic vegetation. All three parameters must be met to qualify as a wetland. Therefore, areas with hydric soils are not wetlands if they do not meet hydrology and vegetation standards. Wetlands use in New Jersey is regulated by the Freshwater Wetlands Protection Act, N.J.S.A 13:9B-1 et seq (http://www.state.nj.us/dep/landuse/13_9b.pdf).

Formerly regarded as wastelands, wetlands are now recognized as important features of the landscape and provide many functions that are beneficial to people and wildlife. Wetlands are an important component of regional hydrology, storing excess stormwater runoff and serving as a link with groundwater resources. The ability to mitigate runoff quantity is mirrored in the ability to improve runoff quality. Wetlands improve water quality by trapping sediments, nutrients, and other pollutants released in the watershed; these contaminants are generally associated with agricultural, commercial, and residential development. This process is accomplished by plant and microorganism uptake, adsorption to soil particles, and physical filtering created by vegetation.

Wetlands are also critical to biological productivity. Wetlands are among the most productive ecosystems in the world, as evidenced by the wide variety of flora and fauna that they host. Wetland plants provide breeding and nursery sites and resting areas for migratory species. Wetlands are also the permanent home to some of New Jersey's threatened and endangered species. Decomposition of vegetation within wetlands plays an important role in many food webs, as decomposed organic matter forms the base of the aquatic and terrestrial food web.

The data source for the wetlands Figure is NJDEP. In 1986, NJDEP utilized local data and their new, larger scale aerial photographs to produce the wetland data utilized herein, which were updated again in 1995/1997. It is important to note that this data is not field verified and may significantly underestimate wetland area. In addition, the wetlands defined here are based on photographic interpretation, not on field verified surveys, which would follow the three-parameter approach of wetland definition and more accurately define wetland bounds. As such, the wetland boundaries displayed on this Figure are general and DO NOT preclude the need for formal delineation as part of any development, disturbance, or regulated activity.

Wetlands are estimated to comprise 727 acres of Franklin Township (Figure 20). The extent of wetlands is limited largely by the relatively steep topography of the Township. Wetlands are largely confined to riparian corridors and plateaus in the eastern portion of the Township. Deciduous wooded wetlands are the predominant wetland type in Franklin Township, accounting for 50% of all documented wetlands. Agricultural wetlands, the second most common wetland type, account for 38% of wetlands.

File: P:\0420\Projects\04200061\GIS\MXD\Wetlands.mxd

Lopatcong Township

Harmony Township

White Tow

Greenwich Township

Bloomsbury Boro

Washington Township

Bethlehem Township

WARREN COUNTY

HUNTERDON COUNTY

Hampton Boro

Musconetcong River

Pohatcong Creek

Montana Brook

Mill Brook

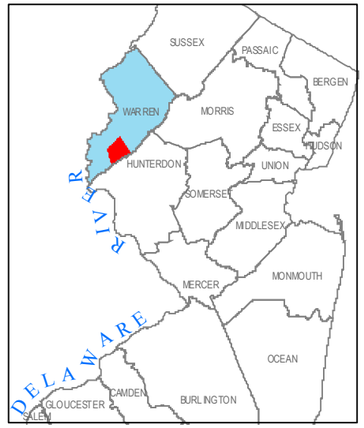
Morris Canal (Dry)

MONTANA RD
POLMAN RD
MILLBROOK RD
BICKEL RD
MICA MINE RD
STEWARTSVILLE RD
GOLF RD
SECOND ST
THIRD ST
WHITES RD
ANEWALT HOUSE RD
WILLOW GROVE RD
HERLEMAN RD
CLIFF SIDE DR
LENAPE TRL
MULLER LN
NEW ST
EDISON RD
GOOD SPRINGS RD
MOUNTAIN VIEW ROAD WEST
MORGAN RD
ASBURY BROADWAY RD
ARNEWALT
BRYANT RD
PRICE DR
COPPERFIELD DR
WATERBROOK DR
MORRIS TPKE (RT. 57)
BEIDLEMAN RD
HOFFMAN RD
HARLEY CT
INSCHO RD
DIRT LN
BUTTERMILK BRIDGE RD
MOUNTAIN VIEW RD
RIVERLAN RD
BUTLER RD
WOOLVERTON RD
BLOOMSBURY RD
CEMETERY HILL RD
ANDERSON RD
KITCHEN RD
MAIN ST
MAPLE AVE
STEEPLE CHASE
WICKOFF CT
BURRY LN
HALESVILLE RD
RIDDLE CT
SHIRTS RD

The presence or absence of wetlands on this map does not preclude the need for a formal delineation and a NJDEP Letter of Interpretation in any land development project

Princeton Hydro

NEW JERSEY COUNTY MAP



PRINCETON HYDRO, LLC.
1108 OLD YORK ROAD, SUITE 1
RINGOES, NEW JERSEY, 08551

0 1,500 3,000 Feet

1 inch equals 3,000 feet

SOURCES:
1. Parcel, roads and the Franklin Township Boundary data obtained from Warren County Planning Dept. "This map was developed using the Warren County New Jersey, Geographic Information System digital data, but this secondary product has not been verified by Warren County and is not county-authorized."
2. Surface water data obtained from the NJDEP, Division of GIS.
3. Wetlands data is a sub-set of the 2002 Land Use/ Land Cover data obtained from the NJDEP, Division of GIS.

FIGURE 20
NJDEP WETLANDS

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend
- County Boundary
- Municipal Boundaries
- Roads
- Parcels
- NJDEP Wetlands (726.9 Ac.)
- Ponds/Lakes

Streams
- Streams
- Morris Canal (Dry)

22: UPLAND FORESTS

Upland forests consist of vegetation types commonly thought of as prototypical forests, which excludes wetland forests types such as swamps. The following description of upland forests is based on a subset of NJDEP LU/LC data, utilizing Type 95 LU/LC descriptions. Upland forests include all upland areas covered by woody vegetation. The vegetation can consist of primarily deciduous, coniferous or a mixture and include scrub/shrub and brush areas as well as mature tree stands of various densities. Also included in this category are early stage forest successional stands, commonly referred to as old fields, which are included because of their potential development into forests.

Upland forests are the dominant ecosystem in this part of New Jersey barring development and agricultural land use changes. Forested lands are currently and historically valued for aesthetic, recreational, ecological, and economic value. From an ecological perspective, forests are important because they provide rich habitat for indigenous and migratory wildlife including mammals, birds, and herptiles. Familiar wildlife utilizing forests in New Jersey include White-Tailed Deer (*Odocoileus virginianus*), Black Bear (*Ursus americanus*), Red Fox (*Vulpes vulpes*), Wild Turkey (*Meleagris gallopavo*), migratory Warblers (Parulidae), Timber Rattlesnake (*Crotalus horridus*), and myriad others. Forests also contain a diverse plant assemblage composed of various subgroups based on height or strata. The upland forest community of Warren County is typically composed of various Oaks *(Quercus* sp.), Maples (*Acer* sp.), Hickory (*Carya* sp.), Beech (*Fagus grandifolia*), Eastern Red Cedar (*Juniperus virginiana*), and Eastern Hemlock (*Tsuga canadensis*). Shrub and understory layers have largely been decimated through over-browsing by deer. Forests contribute to area hydrology by increasing infiltration rates of precipitation into groundwater and minimizing sheet erosion due to runoff. Forests remain economically valuable because of timber production and recreational uses including hiking, bird watching, and hunting. Forest preservation is vigorously pursued by many conservation groups representing varied interests including those discussed above.

Forested lands cover 5,233.99 acres, or 34.7% of Franklin Township (Figure 21). Upland forests are concentrated along the ridgeline areas of the Township but are also distributed in small to medium patches in the low- lying areas. While upland forests are the second largest land cover, the largest land cover, agriculture, is concentrated in large swaths in the low- lying areas of the Township.

Deciduous forests with greater than 50% crown closure, the intermingling of canopy branches, is the predominant forest type within Franklin Township, accounting for 3,808.52 acres or 72.3% of upland forest area. This is a high quality forest type with an assemblage of climax species. Eleven (11) additional forest types are recognized in the Township, varying by assemblage, crown closure, and use, such as plantations, which are uniform stands planted for commercial harvest. Forests with coniferous species or mixed coniferous and deciduous species account for 9.67% of forested land mass.

File: P:\0420\Projects\04200061GIS\MXD\Upland_Forests.mxd

Lopatcong Township

Harmony Township

White Tow

Greenwich Township

Bloomsbury Boro

Bethlehem Township

Washington Township

WARREN COUNTY

HUNTERDON COUNTY

Hampton Boro

Montana Brook

Mill Brook

Pohatcong Creek

Pohatcong Creek

Morris Canal (Dry)

Musconetcong River

MONTANA RD

VOLMAN RD

MILLBROOK RD

BICKEL RD

MICA MINE RD

HALFWAY HOUSE RD

STEWARTSVILLE RD

STEWARTSVILLE RD

CODE RD

SECOND ST

THIRD ST

EDISON RD

WHITES RD

WILLOW GROVE RD

HERLEMAN RD

CLIFF SIDE DR

LENAPE TRL

MULLER LN

NEW ST

EDISON RD

WARNE WAY

BRY RD

PRICE DR

COPPERFIELD DR

WATERBROOK DR

MORRIS TPKE (RT. 57)

BEIDLEMAN RD

ASBURY BROADWAY RD

GOOD SPRINGS RD

MOUNTAIN VIEW ROAD WEST

MORGAN RD

HOFFMAN RD

HARLEY CT

INSCHO RD

DIRT LN

BUTTERMILK BRIDGE RD

MOUNTAIN VIEW RD

OLDWICK RD

BUTLER RD

WOOLVERTON RD

BLOOMSBURY RD

CEMETERY HILL RD

ANDERSON RD

KITCHEN RD

FRANK ST

MAPLE AVE

STEEPLE CHASE

WICKOFF CT

BURRY LN

HALL MILL RD

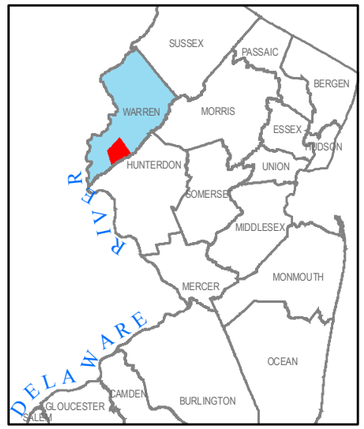
RIDDLE CT

SHIRTS RD

PRINCETON HYDRO

Princeton Hydro

NEW JERSEY COUNTY MAP



PRINCETON HYDRO, LLC.
1108 OLD YORK ROAD, SUITE 1
RINGOES, NEW JERSEY, 08551

0 1,500 3,000 Feet

1 inch equals 3,000 feet

SOURCES:

1. Parcel, roads and the Franklin Township Boundary data obtained from Warren County Planning Dept. "This map was developed using the Warren County New Jersey, Geographic Information System digital data, but this secondary product has not been verified by Warren County and is not county-authorized."
2. Surface water data obtained from the NJDEP, Division of GIS.
3. Upland Forests data is a sub-set of the 2002 Land Use/Land Cover data obtained from NJDEP, Division of GIS.

FIGURE 21
UPLAND FORESTS

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- County Boundary
- Municipal Boundaries
- Ponds/Lakes

Streams

- Streams
- Morris Canal (Dry)
- Roads
- Parcels
- Upland Forests (5,242.2 Ac)

23: NJ LANDSCAPE PROJECT AND NATURAL HERITAGE PROGRAM

The New Jersey Natural Heritage Program identifies the state's most significant natural areas through a comprehensive inventory of rare plant and animal species and representative natural communities. Specifically, the Natural Heritage Database compiles information of the distribution, biology, status, and preservation needs of identified species and communities. Imperiled species tracked by the database are identified by Federal and State Endangered Species Act, Endangered Plant Species Act, Endangered and Nongame Wildlife Act, and additional rare unlisted species under investigation. The database is continually updated and serves as the comprehensive source of information on rare plants, animals, and natural communities in New Jersey. This information can be used to identify areas of high natural diversity, locate rare species, and supplement field surveys conducted to assess project impacts on natural diversity and critical areas. The Natural Heritage Data is presented in two formats: as a grid or as identified communities with delineated boundaries known as Natural Heritage Priority Sites. Additional information about the NJ Heritage Program is available online (http://www.state.nj.us/dep/parksandforests/natural/heritage/index.html).

In 1994, the Landscape Project was developed by NJ Division of Fish and Wildlife's Endangered and Nongame Species Program (ENSP), and was adopted to utilize a landscape level approach to imperiled species protection. The landscape approach focuses on large tracts of land, called landscape regions, which are ecologically similar in regards to their plant and animal communities composed of critical wildlife areas. Critical wildlife areas in New Jersey include forest, grassland, forested wetland, emergent wetland and beach/dune. Utilizing a combination of land cover data and an extensive database of rare species locations, the Landscape Project has identified and mapped areas of critical importance for imperiled species within each landscape region. Critical habitat patches are delineated based on the species present and conservation status; areas with federally threatened or endangered species receive the highest ranking, followed by state endangered, state threatened and finally lands suitable for listed species habitat. Ultimately, these Figures assist state, local and private agencies in prioritizing conservation acquisitions, guide regulators and planners, provide citizens with conservation tools, and identify contiguous habitats. Additional information can be found online about the New Jersey Landscape Project (www.state.nj.us/dep/fgw/ensp/landscape/lp_report.pdf) and New Jersey's threatened and endangered species (www.state.nj.us/dep/fgw/tandespp.htm).

The Landscape Project identifies five habitat types of significance: grassland, forest, forested wetland, emergent wetland and beach/dune. Grasslands must meet a minimum size of 18 hectares to be recognized by the Landscape Project. Forests must meet a minimum core size of 10 hectares to be considered, different criteria apply for Pinelands Preservation Areas. Any size patch of forested wetlands, emergent wetland and beach/dune qualify for consideration for the Landscape Project. The Landscape Project also identifies three wildlife species of significance: bald eagle, urban peregrine falcon, and wood turtle. A ranking system, summarized in the table below, is used to identify areas of habitat and species.

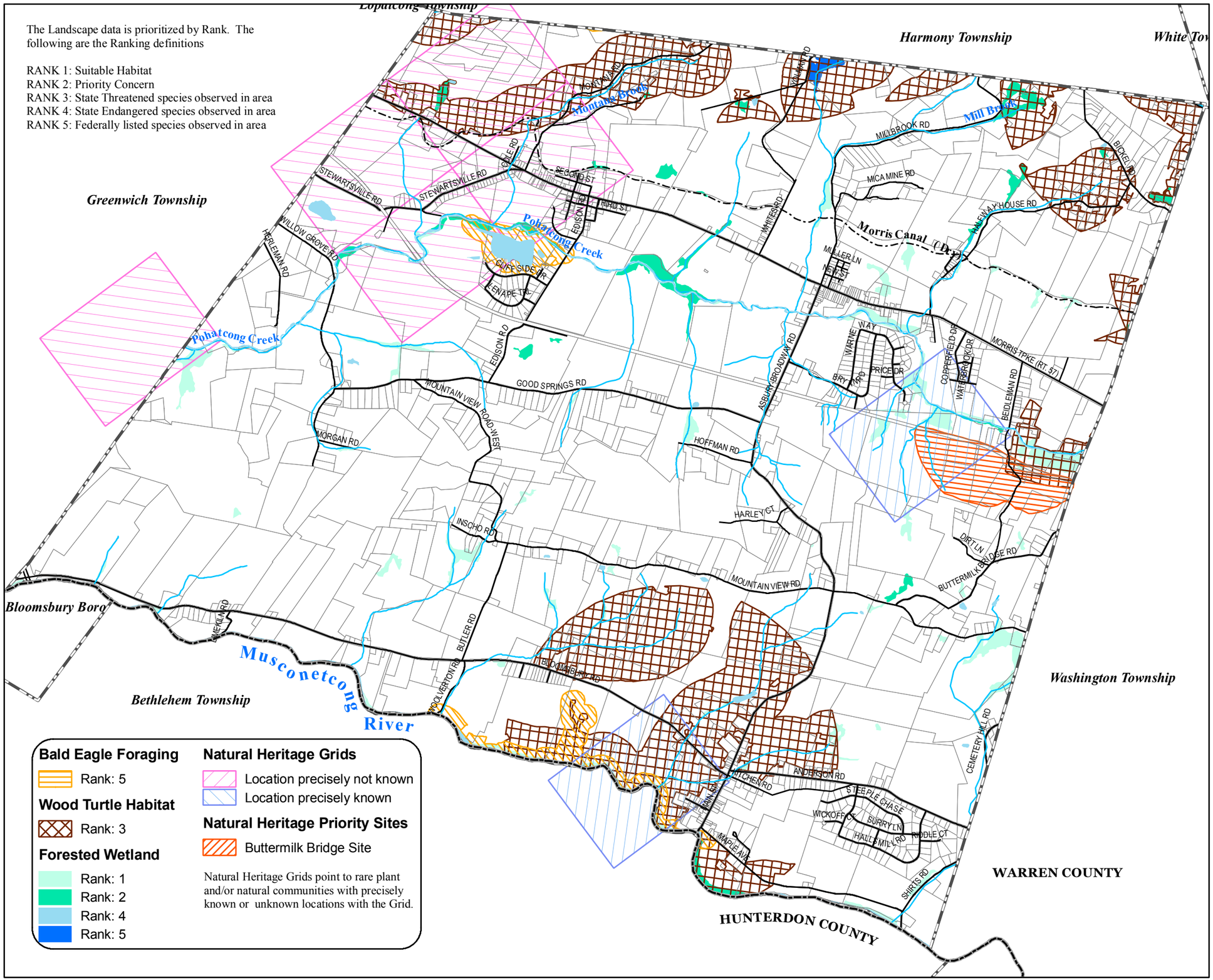
Rank	Title	Description
1	Suitable Habitat	patches that meet habitat-specific suitability requirements such as minimum size criteria for endangered, threatened or priority wildlife species, but that do not intersect with any confirmed occurrences of such species
2	Priority Concern	patches containing one or more occurrences of at least one non-listed State priority species
3	State Threatened Species observed	patches containing one or more occurrences of at least one State threatened species
4	State Endangered Species observed	patches with one or more occurrences of at least one State endangered species
5	Federally Listed Species observed	patches containing one or more occurrences of at least one wildlife species listed as endangered or threatened on the Federal list of endangered and threatened species.

In total, the Landscape Project identified four major critical habitat areas in Franklin Township, comprising 14,926 acres ((Figure 22A) and (Figure22B)). The most critical areas were grassland and forested habitat, 7,429.93 and 5,307.3 acres respectively. Within these categories Rank 4 Grassland (state endangered species observed in area) and Rank 5 Forest (federally listed species observed in area) accounted for the largest areas. State Threatened Wood Turtle and Federally Threatened Bald Eagle habitat types respectively accounted for 1,829.78 and 207.69 acres. This classification represents not the potential value, but the realized value of Franklin Township's varied ecosystems and high quality wildlife habitat. Finally, one Natural Heritage Priority site, listed as Buttermilk Bridge, was identified in the Township at a size of 172.77 acres. This site is the only known location of an undisclosed state listed endangered plant.

File: P:\0420\Projects\0420006\GIS\MXD\Landscape_Data.mxd

The Landscape data is prioritized by Rank. The following are the Ranking definitions

RANK 1: Suitable Habitat
RANK 2: Priority Concern
RANK 3: State Threatened species observed in area
RANK 4: State Endangered species observed in area
RANK 5: Federally listed species observed in area



Bald Eagle Foraging
Rank: 5

Wood Turtle Habitat
Rank: 3

Forested Wetland
Rank: 1
Rank: 2
Rank: 4
Rank: 5

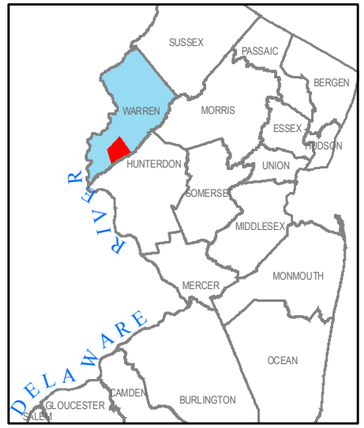
Natural Heritage Grids
Location precisely not known
Location precisely known

Natural Heritage Priority Sites
Buttermill Bridge Site

Natural Heritage Grids point to rare plant and/or natural communities with precisely known or unknown locations with the Grid.

pH Princeton Hydro

NEW JERSEY COUNTY MAP



PRINCETON HYDRO, LLC.
1108 OLD YORK ROAD, SUITE 1
RINGOES, NEW JERSEY, 08551

0 1,500 3,000 Feet

1 inch equals 3,000 feet

SOURCES:
1. Parcel, roads and the Franklin Township Boundary data obtained from Warren County Planning Dept. "This map was developed using the Warren County New Jersey, Geographic Information System digital data, but this secondary product has not been verified by Warren County and is not county-authorized."
2. Surface water data obtained from the NJDEP, Division of GIS.
3. Landscape data obtained from the NJ Division of Fish and Wildlife, Endangered and Non-Game Species Program.

FIGURE 22A
LANDSCAPE PROJECT DATA & NATURAL HERITAGE DATA

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

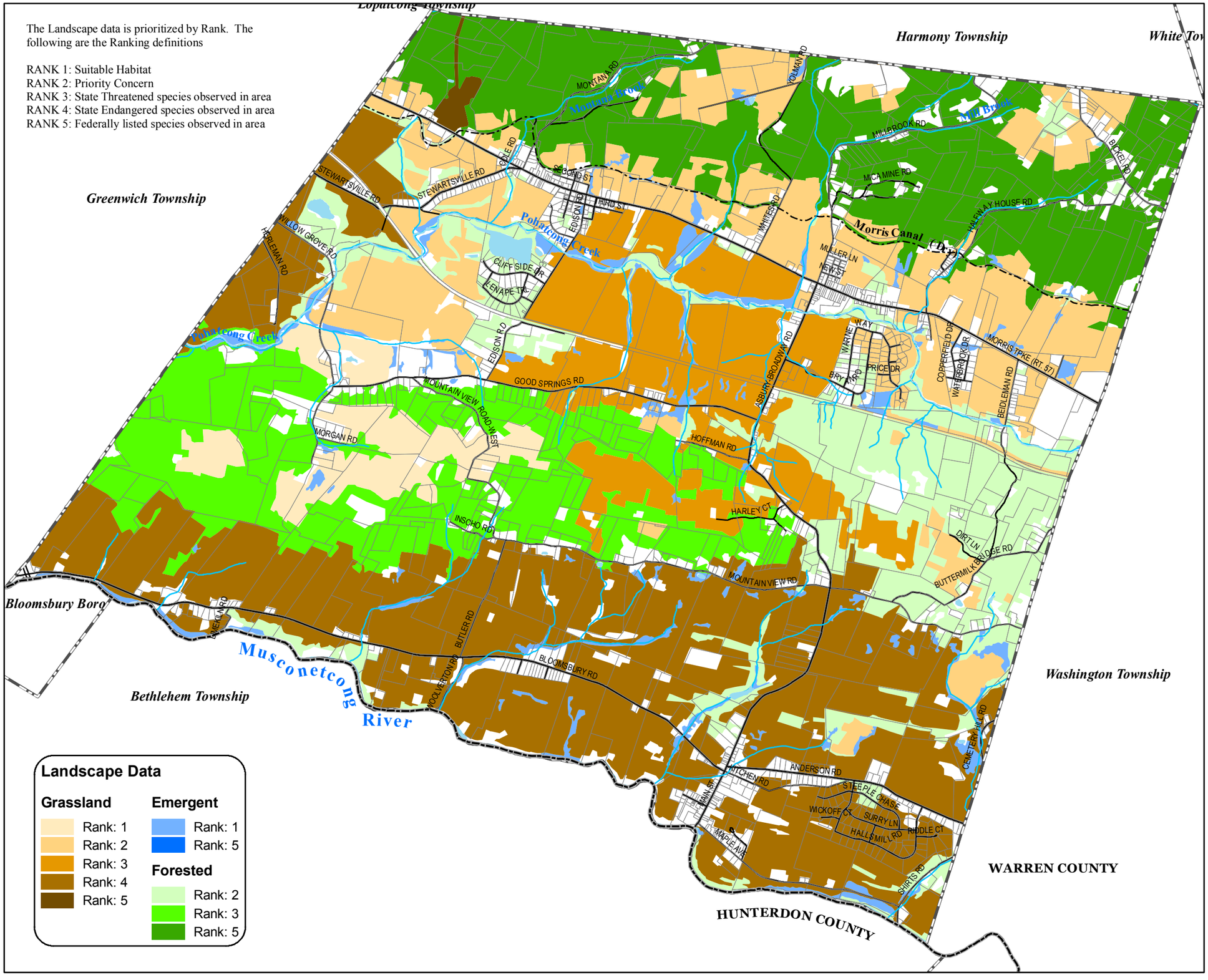
Legend
County Boundary
Municipal Boundaries
Roads
Parcels
Ponds/Lakes

Streams
Streams
Morris Canal (Dry)

File: P:\0420\Projects\0420006\GIS\MXD\Landscape_Data2.mxd

The Landscape data is prioritized by Rank. The following are the Ranking definitions

RANK 1: Suitable Habitat
RANK 2: Priority Concern
RANK 3: State Threatened species observed in area
RANK 4: State Endangered species observed in area
RANK 5: Federally listed species observed in area



Landscape Data

Grassland
- Rank: 1
- Rank: 2
- Rank: 3
- Rank: 4
- Rank: 5

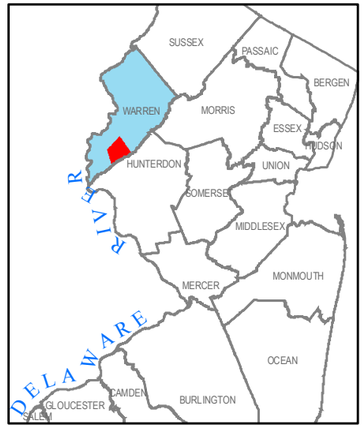
Emergent
- Rank: 1
- Rank: 5

Forested
- Rank: 2
- Rank: 3
- Rank: 5

pH

Princeton Hydro

NEW JERSEY COUNTY MAP



PRINCETON HYDRO, LLC.
1108 OLD YORK ROAD, SUITE 1
RINGOES, NEW JERSEY, 08551

0 1,500 3,000 Feet

1 inch equals 3,000 feet

SOURCES:
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2. Surface water data obtained from the NJDEP, Division of GIS.
3. Landscape data obtained from the NJ Division of Fish and Wildlife, Endangered and Non-Game Species Program.

FIGURE 22B
LANDSCAPE PROJECT DATA

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend
- County Boundary
- Municipal Boundaries
- Parcels
- Roads
- Ponds/Lakes

Streams
- Streams
- Morris Canal (Dry)

24: VERNAL POOLS

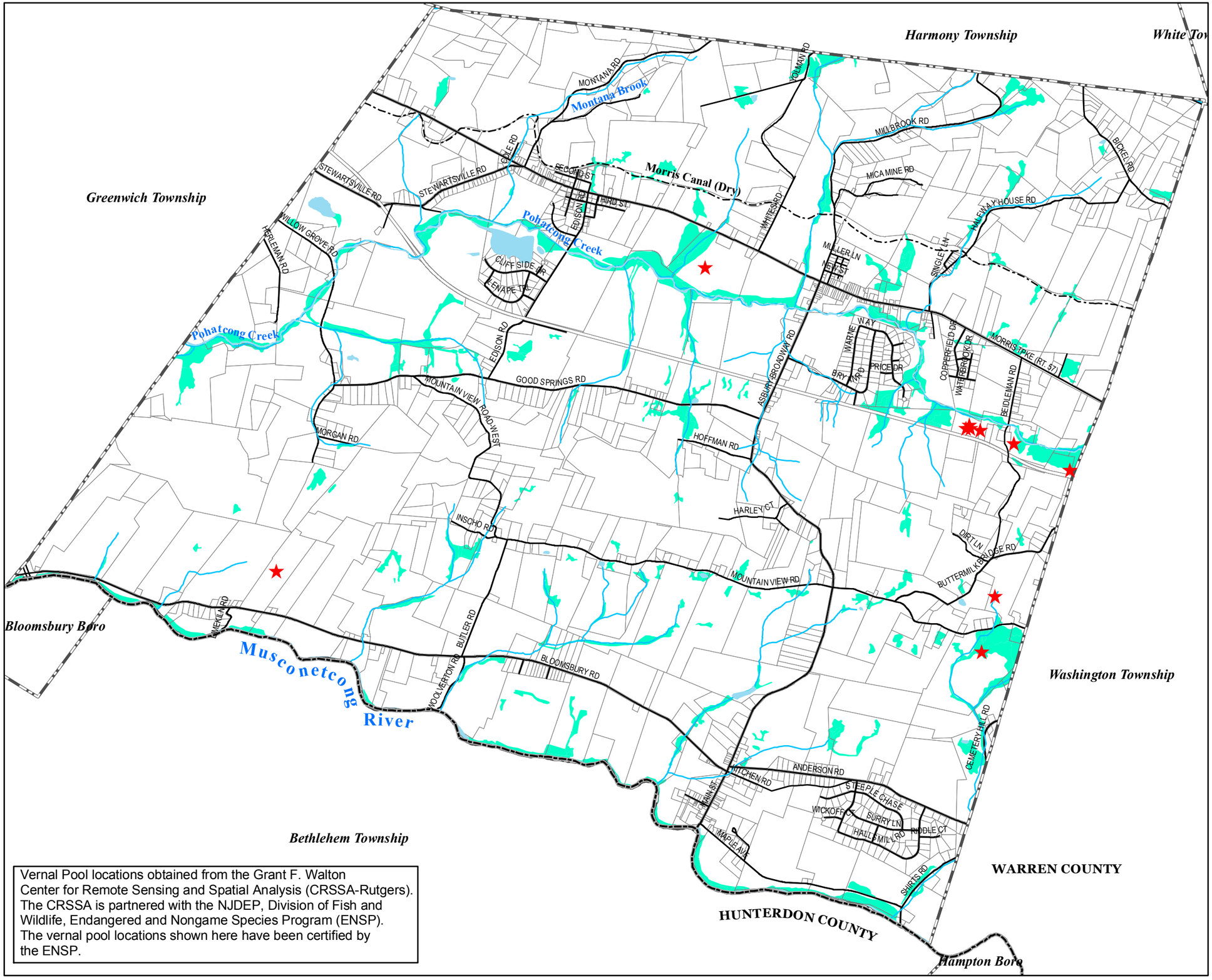
Vernal pools are narrowly defined ephemeral wetlands that are characterized by hydrologic features and ecological function. These pools are confined basins or depressions lacking means by which the standing water in the pool can drain. To be classified as a vernal pool, standing water must be present in the pool for at least two continuous months between March and September in a year of normal rainfall. Ecologically, vernal pools must harbor documented obligate or facultative vernal habitat species (as listed by NJDEP) and be free of fish populations or dry up for some period during the year. Obligate species may be defined as those species that are dependent on vernal pool habitats at some stage of the life cycle, while facultative species are those species that frequently utilize vernal pools but are capable of reproducing outside of vernal pools.

Vernal pools are recognized as disproportionately diverse habitats within generalized upland settings. In particular, they are associated with various obligate species across taxa that are recognized as threatened or endangered. Characteristic obligate species include amphibians such as the mole salamanders (*Ambystoma spp*.), and Wood frog (*Rana sylvatica)*, but are equally important to facultative wildlife such as state threatened Wood turtle (*Glypternys insculpta)*.

Statewide, the number of vernal pools has declined drastically because of increased development and the lack of specific regulatory protection afforded larger, more typically defined wetlands. With the approval of the Freshwater Wetlands Protection Act Rules in 2001, vernal pools became specifically protected. The NJDEP's Endangered and Nongame Species Program established the Vernal Pool Project, which is a dedicated effort to map and survey vernal pools throughout the state. Much of the NJDEP's mapping efforts have been completed through trained volunteer surveys and a partnership with Rutgers University's Center for Remote Sensing and Spatial Analysis. Additional information can be found online (http://www.state.nj.us/dep/fgw/ensp/vernalpool.htm) and (http://www.dbcrssa.rutgers.edu/ims/vernal/).

Vernal pools represent a unique natural resource. Filling, altering, draining or otherwise compromising the hydrological or ecological function of vernal pools should be avoided and any such activity is subject to NJDEP review and approval. The vernal pools located in the Township are presented in (Figure 23) with additional information appearing in Appendix 23. Zero of the possible 21 vernal pools that occur in Franklin Township have yet to be certified by the NJDEP Endangered and Nongame Species Program.

File: P:\0420\Projects\0420006\GIS\MXD\Vernal_Pools.mxd

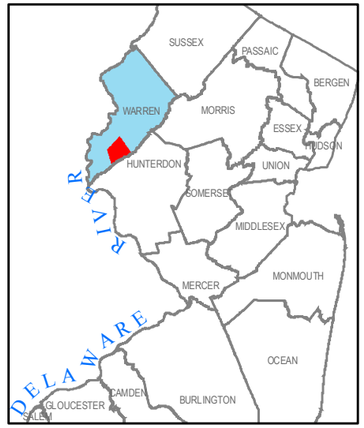


Vernal Pool locations obtained from the Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA-Rutgers). The CRSSA is partnered with the NJDEP, Division of Fish and Wildlife, Endangered and Nongame Species Program (ENSP). The vernal pool locations shown here have been certified by the ENSP.

pH

Princeton Hydro

NEW JERSEY COUNTY MAP



PRINCETON HYDRO, LLC.
1108 OLD YORK ROAD, SUITE 1
RINGOES, NEW JERSEY, 08551

N

0 1,500 3,000 Feet

1 inch equals 3,000 feet

SOURCES:
1. Parcel, roads and the Franklin Township Boundary data obtained from Warren County Planning Dept. "This map was developed using the Warren County New Jersey, Geographic Information System digital data, but this secondary product has not been verified by Warren County and is not county-authorized."
2. Surface water data obtained from the NJDEP, Division of GIS.
3. Vernal Pool locations obtained from Rutgers University.

FIGURE 23
VERNAL POOLS

NATURAL RESOURCE INVENTORY
FRANKLIN TOWNSHIP
WARREN COUNTY, NEW JERSEY

Legend

- Vernal Pools
- County Boundary
- Municipal Boundaries
- Roads
- Parcels
- NJDEP Wetlands (726.9 Ac.)
- Ponds/Lakes

Streams

- Streams
- Morris Canal (Dry)

REFERENCES

Anderson, James R., et al. 1976. A Land Use And Land Cover Classification System For Use with Remote Sensor Data: Geological Survey Professional Paper 964. Edited by NJDEP, OIRM, BGIA, 1998, 2000, 2001, 2002, 2005.
http://www.state.nj.us/dep/gis/digidownload/metadata/lulc02/anderson2002.html

Association of New Jersey Environmental Commissions. 2004. The Environmental Resource Inventory: ERI. Mimi Upmeyer Resource Paper Collection. Mendham, NJ.
http://www.anjec.org

Johnson, Andrew W., Joanne R. Denworth and Daniel R. Trotzer. 1996. The EAC Handbook: A Guide for Pennsylvania's Municipal Environmental Advisory Councils. Pennsylvania Environmental Council, Philedelphia, PA.
http://www.dep.state.pa.us/dep/local_gov/EACHandbook/Ntbook10.htm

NJ Department of Environmental Protection. 2004. New Jersey Integrated Water Quality Monitoring and Assessment Report. Trenton, NJ.
http://www.state.nj.us/dep/wmm/sgwqt/wat/integratedlist/integratedlist.html

Rutgers Cooperative Extension. 2007. Summary of the New Jersey Highlands Water Protection and Planning Act.
http://www.rce.rutgers.edu/Highlands

Morris Land Conservancy. 2006. Open Space and Recreation Plan for the Township of Franklin. Boonton, NJ.

Wild and Scenic Rivers. 2007. http://www.rivers.gov/

Bureau of Freshwater and Biological Monitoring – Reports on Fisheries and Macroinvertebrates. http://www.nj.gov/dep/wmm/bfbm/

NJDEP Bureau of Geographic Information Systems. 2006. http://www.nj.gov/dep/gis/.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. U.S. Fish and Wildlife Service Office of Biological Service, FWS/OBS-79/31.

Donahue, Miller & Shickluna. 1983. *Soils: Fifth Edition.* Englewood Cliffs, N.J. Prentice Hall. 1983.

Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual (Federal Manual for Identifying and Delineating Jurisdictional Wetlands) Technical Report Y-87-1*. US Army Engineer Waterways Experiment Station, Vicksburg, MS.

Mitsch, W. J. and J.G. Gosselink. 1986. *Wetlands*. Van Nostrand Reinhold Company, NY.NJDEP New Jersey Geological Survey. 2006. http://www.state.nj.us/dep/njgs/

NJDEP. New Jersey State Development and Redevelopment Plan. 2006. http://www.nj.gov/dca/osg/plan/stateplan.shtml

NJDEP. Guidance for the Highlands Water Protection and Planning Act. 2006. http://www.state.nj.us/dep/highlands/

NJDEP. Division of Fish and Wildlife. Checklists of New Jersey Wildlife. 2006. http://www.state.nj.us/dep/fgw/chklists.htm

NJDEP. Division of Fish and Wildlife. NJ's Threatened and Endangered Species. 2004. http://www.state.nj.us/dep/fgw/tandespp.htm

NJDEP.Division of Fish and Wildlife. NJ's Vernal Pools. 2005. http://www.njfishandwildlife.com/ensp/vernalpool.htm

NJDEP. Division of Parks and Forestry. Natural Heritage Program. 2004. http://www.state.nj.us/dep/parksandforests/natural/heritage/

NJDEP. Division of Parks and Forestry. Special Plants of NJ. 2006. http://www.state.nj.us/dep/parksandforests/natural/heritage/spplant.html

NJDEP. Division of Watershed Management. 2007. http://www.state.nj.us/dep/watershedmgt/index.htm

NJDEP. Office of Natural Lands Management. An Overview of Nonindigenous Plant Species in NJ. (n.d.). http://www.state.nj.us/dep/parksandforests/natural/InvasiveReport.pdf

Richard E. Killingsworth and Jean Lamming. 2001. *Development and Public Health: Could our Development Patterns be Affecting our Personal Health?* Urban Land, Sacramento, California

Rutgers Cooperative Research & Extension. 2006. http://www.rce.rutgers.edu/

United States Department of Agriculture, Soil Conservation Service (USDA SCS). 1981. *Soil Survey Manual, Volume 430(1)*. United States Government Printing Office, Washington, D.C.

United States Department of Agriculture. (n.d.) Official Soil Series Descriptions. http://ortho.ftw.nrcs.usda.gov/osd/osd.html

Warren County Planning Department. 1999. Warren County Open Space Plan. http://76.162.120.189/planning/open_space_plan.html

APPENDIX 1

REGIONAL BASEMAP INFORMATION

Franklin Township	
Area (acres)	15,360
Population, 2005 US Census	3,190

Major Roads

Anderson Road
Asbury- Broadway Road
Bloomsbury Road
Buttermilk Bridge Road
Edison Road
Good Springs Road
Halfway House Road
Main Street
Millbrook Road
Mountain View Road
NJ Route 57
Stewartsville Road

APPENDIX 2

2002 AERIAL PHOTOGRAPH

The red tone of color infrared aerial photographs is almost always associated with live vegetation. Very intense reds indicate vegetation which is growing vigorously and is quite dense. An irrigated alfalfa field would be an example of such vegetation. An evergreen forest, which may be quite densely vegetated, will not appear as a similar bright red because its level of growth activity is less, compared to irrigated alfalfa. Knowledge of the vigor and density of vegetation is important to the interpretation of the red colors on color infrared aerial photography. As the vigor and density of vegetation decreases, the tones may change to light reds and pinks. If plant density becomes low enough the faint reds may be overcome by the tones of the soils on which the plants are growing. The ground areas in this case will appear in shades of white, blue, or green depending on the kind of soil and its moisture content. As plant vigor decreases, the vegetation will show as lighter shades of red and pink, various shades of greens, and possible tans. Dead vegetation, wheat stubble as an example, will often be shades of greens or tans.

Bare soils will appear as shades of white, blue, or green in most agricultural regions. In general, the more moist the soil the darker the shade of that particular soil color. Composition of the soil will affect the color tones shown on the photographs. Dry sand will appear white and, with more moisture, may be very light gray or possibly light tan. Clayey soils will generally be darker in color than sands and tend toward tans and bluegreens. Again, wetter clays will be darker shades of the same tones. Soils high in organic matter, like silts and loams will be even darker in color, and usually in shades of blues and greens.

Man-made features will show in the tones that relate to the materials they are made of. Asphalt roads, for example, will be dark blue or black, gravel or dirt roads will show as lighter colors, depending on the soil materials involved in their composition, and concrete roads will appear light in tone, assuming clean concrete. The buildings and streets of towns can be considered in a similar manner, their color dependent on the material they are made of.

Water will appear as shades of blue, varying from nearly black to very pale blue. Clear, clean water will appear nearly black. As the amount of sediment increases, the color becomes increasingly lighter blue. Very shallow water will often appear as the material present in the bottom of the stream. For example, a very shallow stream with a sandy bottom will appear white due to the high level of reflection of the sand.

Orthophotography has a +/- 4.0 ft. horizontal accuracy at 95% confidence level, National Standard for Spatial Data Accuracy (NSSDA), for a 1.0 foot Ground Resolution Distance (GRD). Horizontal accuracy determined as 1.7308 times the RMSE circular error. This requirement will not be applicable in areas where the ground is obscured on the aerial photography by foliage, prevalent smoke, or dense shadow

APPENDIX 3

ELEVATION RELIEF

Elevation Metrics (feet above mean sea level)

Mean	Minimum	Maximum
531.6	254.4	1169.7

Elevation Range	ACRES	%
254 – 411.7	6543.78	43.40
411.7 – 547.6	3652.77	24.23
547.6 – 701.3	1858.28	12.33
701.3 – 876.5	1782.89	11.83
876.5 – 1169.7	1238.95	8.21
Total	15076.67	100

APPENDIX 4

SLOPE ANALYSIS

Slope Percent Interval	ACRES	%
0-10	8982.6	59.5
10-20	3706.6	24.6
20-25	871.8	5.8
25+	1515.6	10.1
TOTAL	15076.6	100

APPENDIX 5

BEDROCK GEOLOGY

Symbol	Geology	Description	ACRES	%
	Sedimentary			
Cl	Leithsville Formation	dolomite, dolomitic sandstone, siltstone, and shale	183.68	1.22%
Obl	Lower Part	dolomite and minor limestone	2111.10	14.01
Obu	Upper Part	dolomite and minor limestone	939.03	6.23
OCa	Allentown Dolomite	dolomite, and less abundant quartzite and shale	4082.47	27.09
Oj	Jacksonburg Limestone	shaly linestone, arenaceous limestone, and dolomite-cobble	360.22	2.39
Omb	Bushkill Member	shale, slate, less abundant siltstone, and minor dolomite lens	814.21	5.40
Ow	Wantage Sequence	limestone, dolomite, conglomerate, siltstone, and shale	178.56	1.18
		Total	8669.27	57.52
	Crystalline			
Ch	Hardyston Quartzite	Beds of arkose, conglomerate and sandstone, thoroughly cemented with silica	249.39	1.65
Ya	Amphibolite	amphibolite, fine- to medium-grained	425.30	2.82
Yam	Migmatite	mixed amphibolite and gneiss	512.05	3.40
Yb	Biotite-Quartz-Feldspar Gneiss	gneiss, fine- to coarse-grained	273.54	1.82
Yba	Microperthite Alaskite	granite, medium- to coarse-grained	83.74	0.56
Yh	Hypersthere-Quartz-Oligoclase Gneiss	gneiss, medium-grained	29.89	0.20
Yf	Franklin Marble	gneiss, fine- to medium coarse-grained	31.14	0.21
Yk	Potassic Feldspar Gneiss	gneiss, medium-grained	2356.27	15.64
Yla	Albite-Oligoclase Granite	granite, medium- to coarse-grained	286.88	1.90
Ylo	Quartz-Oligoclase Gneiss	gneiss, medium- to coarse-grained	2058.79	13.67
Yp	Pyroxene Gneiss	gneiss, fine- to medium-grained	92.94	0.61
		Total	6399.93	42.48

APPENDIX 6

NRCS SSURGO SOILS

SSURGO SOILS

SYMBOL	SOIL SERIES	DESCRIPTION		ACRES	%
AnB2	ANNANDALE	Annandale gravelly loam, 3 to 8 percent slopes		515.47	3.42
AnC2	ANNANDALE	Annandale gravelly loam, 8 to 15 percent slopes, eroded		977.23	6.48
AnD2	ANNANDALE	Annandale gravelly loam, 15 to 25 percent slopes, eroded		779.54	5.17
AsC	ANNANDALE	Annadale very stony loam, 8 to 15 percent slopes		11.64	0.08
AsD	ANNANDALE	Annandale very stony loam, 15 to 25 percent slopes		58.38	0.39
			Total	2342.26	15.54
BaA	BARTLEY	Bartley loam, 0 to 3 percent slopes		186.74	1.24
BaB	BARTLEY	Bartley loam, 3 to 8 percent slopes		1170.43	7.76
BbC	BARTLEY	Bartley gravelly loam, 8 to 15 percent slopes		172.22	1.14
BdB	BARTLEY	Bartley stony loam, 3 to 8 percent slopes		51.27	0.34
			Total	1580.66	10.50
BhnB	BIRDSBORO	Birdsboro silt loam, 2 to 6 percent slopes		0.02	<0.01
CbB	CALIFON	Califon gravelly loam, 3 to 8 percent slopes		361.88	2.40
CbC2	CALIFON	Califon gravelly loam, 8 to 15 percent slopes, eroded		530.29	3.52
CcB	CALIFON	Califon very stony loam, 3 to 8 percent slopes		33.21	0.22
CcC	CALIFON	Califon very stony loam, 8 to 15 percent slopes		50.80	0.34
			Total	976.18	6.48
CoA	COKESBURY	Cokesbury loam, 0 to 3 percent slopes		4.56	0.03
CoB	COKESBURY	Cokesbury loam, 3 to 8 percent slopes		27.38	0.18
CsB	COKESBURY	Cokesbury very stony loam, 3 to 8 percent slopes		133.80	0.89
			Total	165.74	1.10
EdB	EDNEYVILLE	Edneyville gravelly loam, 3 to 8 percent slopes		489.79	3.25
EdC	EDNEYVILLE	Edneyville gravelly loam, 8 to 15 percent slopes, eroded		185.96	1.23
EeB	EDNEYVILLE	Edneyville extremely stony loam, 3 to 8 percent slopes		43.05	0.29
EeC	EDNEYVILLE	Edneyville extremely stony loam, 8 to 15 percent slopes		319.35	2.12
			Total	1038.15	6.89
EPD	EDNEYVILLE-PARKER	Edneyville-Parker outcrop association, steep		657.66	4.36
FNAT	FLUVAQUENTS	Fluvaquents and Udifluvents, 0 to 3 percent slopes, frequently flooded		0.48	<0.01
FrA	FREDON	Fredon loam, 0 to 3 percent slopes		2.04	0.01
HbA	HAZEN	Hazen loam, 0 to 3 percent slopes		192.97	1.28
HbB	HAZEN	Hazen loam, 3 to 8 percent slopes		71.69	0.48
HbC	HAZEN	Hazen loam, 8 to 15 percent slopes		5.58	0.04
HfA	HAZEN	Hazen gravelly loam, 0 to 3 percent slopes		55.88	0.37
HfB	HAZEN	Hazen gravelly loam 3 to 8 percent slopes		39.74	0.26
			Total	365.86	2.43

SYMBOL	SOIL SERIES	DESCRIPTION		ACRES	%
HkA	HERO	Hero loam, 0 to 3 percent slopes		115.96	0.77
HkB	HERO	Hero loam, 3 to 8 percent slopes		82.57	0.55
HrA	HERO	Hero gravelly loam, 0 to 3 percent slopes		18.63	0.12
HrB	HERO	Hero gravelly loam, 3 to 8 percent slopes		10.25	0.07
			Total	227.41	1.51
LyA	LYONS	Lyons silt loam, 0 to 4 percent slopes		89.15	0.59
LzB	LYONS	Lyons very stony silt loam, 3 to 8 percent slopes		8.63	0.06
			Total	97.78	0.65
Md	MIDDLEBURY	Middlebury loam		259.95	1.72
NaC	NASSAU	Nassau rocky silt loam, 8 to 15 percent slopes		269.38	1.79
NbB	NASSAU	Nassau shaly silt loam, 3 to 8 percent slopes		432.83	2.87
			Total	702.21	4.66
NFD	NASSAU-ROCK OUTCROP	Nassau-Rock outcrop complex, 15 to 25 percent slopes		45.84	0.30
NFE	NASSAU-ROCK OUTCROP	Nassau-Rock outcrop complex, 25 to 45 percent slopes		78.35	0.52
			Total	124.19	0.82
PbD	PARKER	Parker gravelly sandy loam, 15 to 25 percent slopes		149.46	0.99
PbE	PARKER	Parker gravelly sandy loam, 25 to 40 percent slopes		341.09	2.26
			Total	490.55	3.25
RPF	ROCK OUTCROP	Rock outcrop- Parker-Edneyville association, very steep		1476.13	9.79
RWD	ROCK OUTCROP	Rock outcrop-Wassaic complex, 15 to 25 percent slopes		6.77	0.04
			Total	1482.90	9.83
WaA	WASHINGTON	Washington loam, 0 to 3 percent slopes		302.99	2.01
WaB	WASHINGTON	Washington loam, 3 to 8 percent slopes		3064.77	20.32
WaC2	WASHINGTON	Washington loam, 8 to 15 percent slopes, eroded		618.18	4.10
WaD2	WASHINGTON	Washington loam, 15 to 25 percent slopes, eroded		99.03	0.66
			Total	4084.97	27.09
WmB	WASSAIC	Wassaic gravelly loam, 3 to 8 percent slopes		16.28	0.11
WnC	WASSAIC	Wassaic rocky gravelly loam, 8 to 15 percent slopes		20.22	0.13
WnD	WASSAIC	Wassaic rocky gravelly loam, 15 to 25 percent slopes		4.69	0.03
WOB	WASSAIC	Wassaic- Rock outcrop complex, 3 to 8 percent slopes		58.53	0.38
WOC	WASSAIC	Wassaic-Rock outcrop complex, 8 to 15 percent slopes		56.57	0.38
WOD	WASSAIC	Wassaic-Rock outcrop complex, 15 to 25 percent slopes		30.22	0.20
			Total	186.51	1.23
Wp	WAYLAND	Wayland silt loam		18.38	0.12
DmP	MINE DUMP	Mine Dump		153.35	1.02
Pd	PITS	Pits, sand and gravel		5.90	0.04
QU	QUARRY	Quarry		50.33	0.33
WATER	WATER	Water		63.18	0.42

APPENDIX 6

NRCS SOILS SERIES DESCRIPTIONS

ANNANDALE –Consists of deep, gently sloping to strongly sloping, well-drained, loamy soils that formed in old glacial drift or colluvium of highly weathered granitic gneiss. Angular fragments of gneiss, as much as 2 feet in diameter, make up as much as 25 % of the profile. In the landscape these soils occupy high positions.

BARTLEY- Consists of very deep, moderately well drained soils that formed in glacial drift or colluvium and underlying residuum derived mainly from limestone and granitic gneiss. They occur on broad, nearly level to strongly sloping till plains and in heads of drains, with slopes ranging from 0 to 15 percent. These soils have a fragipan in the lower part of the solum.

BIRDSBORO –Consists of deep, nearly level to strongly sloping, well-drained soils that have a stratified sandy or gravelly substratum. These soils formed in deposits of mostly silt loam alluvium derived from material weathered mainly from shale and sandstone. They are on stream terraces above the flood level of the Raritan River and other smaller streams.

CALIFON – Consists of deep, nearly level to gently sloping, moderately well drained to somewhat poorly drained soils. They have a mottled clayey subsoil that is gravelly in places. These soils formed in gneissic glacial till or colluvium. They are on upland flats and concave slopes in the Highlands.

COKESBURY – Consists of deep, nearly level to gently sloping, poorly drained, loamy soils that formed in material weathered from gneissic rock.

EDNEYVILLE – Consists of deep, gently sloping to steep, well-drained, gravelly soils that formed over granite gneiss bedrock.

FREDON- Consists of very deep, poorly and somewhat poorly drained soils formed in glaciofluvial materials. Fredon soils are on outwash terraces. Saturated hydraulic conductivity is moderately high or high in the solum and high or very high in the substratum. Slope ranges from 0 to 8 percent.

HAZEN- Consists of very deep, well drained soils that formed in stratified gravelly or cobbly glacial deposits. They are shallow and moderately deep to a lithologic discontinuity. They occur on nearly level to steep slopes of kames and terraces. Slope ranges from 0 to 45 percent. Permeability is moderately rapid or moderate in the solum and rapid or very rapid in the substratum.

HERO- Consists of very deep, moderately well drained soils formed in loamy over sandy and gravelly glacial outwash. They are nearly level and gently sloping soils on glaciofluvial landforms, and are typically in slight depressions and broad drainageways.

Slope ranges from 0 to 8 percents. Permeability is moderate or moderately rapid in the surface layer and subsoil and rapid or very rapid in the substratum.

LYONS- Consists of very deep, poorly and very poorly drained soils on upland till plains in depressions and low areas in the landscape. They are occasionally in areas of seeps on gently sloping landscapes. They formed in calcareous till derived from limestone, calcareous shale and sandstone. Slope ranges from 0 to 5 percent.

MIDDLEBURY- Consists of very deep, moderately well drained nearly level soils formed in recent alluvium. These soils are on floodplains. Permeability is moderate in the surface layer, soil and upper part of the substratum, and rapid or moderately rapid in the lower part of the substratum. Slope ranges from 0 to 3 percent.

NASSAU- Consists of shallow, somewhat excessively drained soils formed in till. They are nearly level to very steep soils on bedrock controlled glacially modified landforms. Bedrock is at a depth of 10 to 20 inches. Slope ranges from 0 to 70 percent.

PARKER – Consists of deep, gently sloping to steep, somewhat excessively drained, gravelly or cobbly soils that formed in material weathered from granite gneiss. They occur on uplands and are underlain by gneiss bedrock.

PITS, GRAVEL – Former or current pits used for surface mining of gravel and fine stones.

WASHINGTON – Consists of deep, gently sloping to strongly sloping, well-drained soils. They formed in glacial drift that contained large amounts of limestone and gneiss and chert gravel.

WASSAIC- Consists of moderately deep, well drained soil formed in loamy till. They are on bedrock controlled till plains. Bedrock is at depths of 20 to 40 inches. Permeability is moderate or moderately slow in the subsoil and substratum. Slope ranges from 0 to 50 percent.

WAYLAND- Consists of very deep, poorly drained and very poorly drained, nearly level soils formed in recent alluvium. These soils are in low areas or slackwater areas on floodplains. Saturated hydraulic conductivity is moderately high or high in the mineral soil. Slope ranges from 0 to 3 percent.

APPENDIX 7

ERODIBLE SOILS

LABEL		ACRES	%
Highly erodible land		6990.04	46.36%
Potentially highly erodible land		6846.58	45.41
Not highly erodible land		1086.70	7.21%
Erosion potential unknown		153.35	1.02%
	TOTAL	15076.67	100%

Highly Erodible Soils		ACRES	%
AnoC2	Annandale gravelly loam, 8 to 15 percent slopes, eroded	977.23	6.48
AnD2	Annandale gravelly loam, 15 to 25 percent slopes, eroded	779.54	5.17
AsD	Annandale very stony loam, 15 to 25 percent slopes	58.38	0.39
BbC	Bartley gravelly loam, 8 to 15 percent slopes	172.22	1.14
CbC2	Califon gravelly loam, 8 to 15 percent slopes	530.29	3.52
EdC	Edneyville gravelly loam, 8 to 15 percent slopes	185.96	1.23
EPD	Edneyville-Parker-Rock outcrop association, steep	657.66	4.36
NaC	Nassau rocky silt loam, 8 to 15 percent slopes	269.38	1.79
NbB	Nassau shaly silt loam, 3 to 8 percent slopes	432.83	2.87
NFD	Nassau-Rock outcrop complex, 15 to 25 percent slopes	45.84	0.30
NFE	Nassau-Rock outcrop complex, 25 to 45 percent slopes	78.35	0.52
PbD	Parker gravelly sandy loam, 15 to 25 percent slopes	149.46	0.99
PbE	Parker gravelly sandy loam, 25 to 40 percent slopes	341.09	2.26
RPF	Rock outcrop- Parker-Edneyville association, very steep	1476.13	9.79
RWD	Rock outcrop-Wassaic complex, 15 to 25 percent slopes	6.77	0.05
WaC2	Washington loam, 8 to 15 percent slopes, eroded	618.18	4.10
WaD2	Washington loam, 15 to 25 percent slopes, eroded	99.03	0.66
WnC	Wassaic rocky gravelly loam, 8 to 15 percent slopes	20.22	0.13
WnD	Wassaic rocky gravelly loam, 15 to 25 percent slopes	4.69	0.03
WOC	Wassaic-Rock outcrop complex, 8 to 15 percent slopes	56.57	0.38
WOD	Wassaic-Rock outcrop complex, 15 to 25 percent slopes	30.22	0.20
	Total	6990.04	46.36

Potentially Highly Erodible Soils		ACRES	%
AnB2	Annandale gravelly loam, 3 to 8 percent slopes, eroded	515.47	3.42
AsC	Annandale very stony loam, 8 to 15 percent slopes	11.64	0.08
BaA	Bartley loam, 0 to 3 percent slopes	186.74	1.24
BaB	Bartley loam, 3 to 8 percent slopes	1170.43	7.76
BdB	Bartley stony loam, 3 to 8 percent slopes	51.27	0.34
BhnB	Birdsboro silt loam, 2 to 6 percent slopes	0.02	<0.01
CbB	Califon gravelly loam, 3 to 8 percent slopes	361.88	2.40
CcB	Califon very stony loam, 3 to 8 percent slopes	33.21	0.22
CcC	Califon very stony loam, 8 to 15 percent slopes	50.80	0.34
CoA	Cokesbury loam, 0 to 3 percent slopes	4.56	0.03
CoB	Cokesbury loam, 3 to 8 percent slopes	27.38	0.18
CsB	Cokesbury very stony loam, 3 to 8 percent slopes	133.80	0.89

EdB	Edneyville gravelly loam, 3 to 8 percent slopes		489.79	3.25
EeB	Edneyville extremely stony loam, 3 to 8 percent slopes		43.05	0.29
EeC	Edneyville extremely stony loam, 8 to 15 percent slopes		319.35	2.12
HbB	Hazen loam, 3 to 8 percent slopes		71.69	0.48
HbC	Hazen loam, 8 to 15 percent slopes		5.58	0.04
HfB	Hazen gravelly loam, 3 to 8 percent slopes		39.74	0.26
HkB	Hero loam, 3 to 8 percent slopes		82.57	0.55
HrB	Hero gravelly loam, 3 to 8 percent slopes		10.25	0.07
LyA	Lyons silt loam, 0 to 4 percent slopes		89.15	0.59
LzB	Lyons very stony silt loam, 3 to 8 percent slopes		8.63	0.06
WaB	Washington loam, 3 to 8 percent slopes		3064.77	20.33
WmB	Wassaic gravelly loam, 3 to 8 percent slopes		16.28	0.11
WOB	Wassaic-Rock outcrop complex, 3 to 8 percent slopes		58.53	0.39
		Total	6846.58	45.41

Not Highly Erodible Soils			**ACRES**	**%**
FNAT	Fluvaquents and Udifluvents, 0 to 3 percent slopes, frequently floods		0.48	<0.01
FrA	Fredon loam, 0 to 3 percent slopes		2.04	0.01
HbA	Hazen loam, 0 to 3 percent slopes		192.97	1.28
HbC	Hazen gravelly loam, 0 to 3 percent slopes		55.88	0.37
HkA	Hero loam, 0 to 3 percent slopes		115.96	0.77
HrA	Hero gravelly loam, 3 to 8 percent slopes		18.63	0.12
Md	Middlebury loam		259.95	1.72
Pd	Pits, sand and gravel		5.90	0.04
QU	Quarry		50.33	0.33
WaA	Washington loam, 0 to 3 percent slopes		302.99	2.86
WATER	Water		63.18	0.42
Wp	Wayland silt loam		18.38	0.12
		Total	1086.70	7.21

Erosion potential unknown		**ACRES**	**%**
DmP	Mine Dump	153.35	1.02

APPENDIX 8

IMPORTANT SOILS OF NEW JERSEY

LABEL		ACRES	%
All areas are Prime Farmland		6956.01	46.14
Farmland of Statewide Importance		2540.74	16.85
Unknown		153.35	1.02
Not Prime Farmland		5369.99	35.62
Prime Farmland if Drained		56.57	0.38
	TOTAL	15076.66	100.00

All Areas are Prime Farmland		ACRES	%
AnB2	Annandale gravelly loam, 3 to 8 percent slopes	515.47	3.42
BaA	Bartley loam, 0 to 3 percent slopes	186.74	1.24
BaB	Bartley loam, 3 to 8 percent slopes	1170.43	7.76
BhbB	Birdsboro silt loam, 2 to 6 percent slopes	0.02	<0.01
CbB	Califon gravelly loam, 3 to 8 percent slopes	361.88	2.40
EdB	Edneyville gravelly loam, 3 to 8 percent slopes	489.79	3.25
HbA	Hazen loam, 0 to 3 percent slopes	192.97	1.28
HbB	Hazen loam, 3 to 8 percent slopes	71.69	0.48
HfA	Hazen gravelly loam, 0 to 3 percent slopes	55.88	0.37
HfB	Hazen gravelly loam, 3 to 8 percent slopes	39.74	0.26
HkA	Hero loam, 0 to 3 percent slopes	115.96	0.77
HkB	Hero loam, 3 to 8 percent slopes	82.57	0.55
HrA	Hero gravelly loam, 0 to 3 percent slopes	18.63	0.12
HrB	Hero gravelly loam, 3 to 8 percent slopes	10.25	0.07
Md	Middlebury loam	259.95	1.72
WaA	Washington loam, 0 to 3 percent slopes	302.99	2.01
WaB	Washington loam, 3 to 8 percent slopes	3064.77	20.33
WmB	Wassaic gravelly loam, 3 to 8 percent slopes	16.28	0.11
	Total	6956.01	46.14

Farmland of Statewide Important Soils		ACRES	%
AnC2	Annandale gravelly loam, 8 to 15 percent slopes, eroded	977.23	6.48
BbC	Bartley gravelly loam, 8 to 15 percent slopes	172.22	1.14
BdB	Bartley stony loam, 3 to 8 percent slopes	51.27	0.34
CbC2	Califon gravelly loam, 8 to 15 percent slopes, eroded	530.29	3.52
EdC	Edneyville gravelly loam, 8 to 15 percent slopes	185.96	1.23
HbC	Hazen loam, 8 to 15 percent slopes	5.58	0.04
WaC2	Washington loam, 8 to 15 percent slopes, eroded	618.18	4.10
	Total	2540.73	16.85

Unknown		ACRES	%
DmP	Mine Dump	153.35	1.02

Not Prime Farmland		ACRES	%
AnD2	Annandale gravelly loam, 15 to 25 percent slopes, eroded	779.54	5.17
AsC	Annandale very stony loam, 8 to 15 percent slopes	11.64	0.08
AsD	Annandale very stony loam, 15 to 25 percent slopes	58.38	0.39
CcB	Califon very stony loam, 3 to 8 percent slopes	33.21	0.22
CcC	Califon very stony loam, 8 to 15 percent slopes	50.80	0.34
CoA	Cokesbury loam, 0 to 3 percent slopes	4.56	0.03
CoB	Cokesbury loam, 3 to 8 percent slopes	27.38	0.18
CsB	Cokesbury very stony loam, 3 to 8 percent slopes	133.80	0.89
EeB	Edneyville extremely stony loam, 3 to 8 percent slopes	43.05	0.29
EeC	Edneyville extremely stony loam, 8 to 15 percent slopes	319.35	2.12
EPD	Edneyville-Parker Rock outcrop association, steep	657.66	4.36
FNAT	Fluvaquents and Udifluvents, 0 to 3 percent slopes, frequently flooded	0.48	<0.01
FrA	Fredon loam, 0 to 3 percent slopes	2.04	0.01
LyA	Lyons silt loam, 0 to 4 percent slopes	89.15	0.59
LzB	Lyons very stony silt loam, 3 to 8 percent slopes	8.63	0.06
NaC	Nassau rocky silt loam, 8 to 15 percent slopes	269.38	1.79
NbB	Nassau shaly silt loam, 3 to 8 percent slopes	432.83	2.87
NFD	Nassau-Rock outcrop complex, 15 to 25 percent slopes	45.84	0.30
NFE	Nassau-Rock outcrop complex, 25 to 45 percent slopes	78.35	0.52
PbD	Parker gravelly sandy loam, 15 to 25 percent slopes	149.46	0.99
PbE	Parker gravelly sandy loam, 25 to 40 percent slopes	341.09	2.26
Pd	Pits, sand, and gravel	5.90	0.04
QU	Not prime farmland	50.33	0.33
RPF	Rock outcrop Parker-Edneyville association, very steep	1476.13	9.79
RWD	Rock outcrop Wassaic complex, 15 to 25 percent slopes	6.77	0.04
WaD2	Washington loam, 15 to 25 percent slopes, eroded	99.03	0.66
WnC	Wassaic rocky gravelly loam, 8 to 15 percent slopes	20.22	0.13
WnD	Wassaic rocky gravelly loam, 15 to 25 percent slopes	4.69	0.03
WOB	Wassaic- Rock outcrop complex, 3 to 8 percent slopes	58.53	0.39
WOD	Wassaic-Rock outcrop complex, 15 to 25 percent slopes	30.22	0.20
WATER	Water	63.18	0.42
Wp	Wayland silt loam	18.38	0.12
	Total	5369.99	35.62

Prime Farmland if Drained		ACRES	%
WOC	Wassaic-Rock outcrop complex, 8 to 15 percent slopes	56.57	0.38

APPENDIX 9

HUC14 WATERSHED INFORMATION

HUC 14 #s	Subwatershed	WMA ID	WMA	Region
02040105140020 02040105140030 02040105140040 02040105140050 02040105140060	Pohatcong Creek	01	Upper Delaware River Watershed	Northwest
02040105160040 02040105160050 02040105160060	Musconetcong River			

MAJOR STREAMS

Halfway House Brook
Mill Brook
Montana Brook
Musconetcong River
Pohatcong Creek

APPENDIX 10

SURFACE WATER QUALITY STANDARDS OF NEW JERSEY/C1 WATERS

Anti-Degradation Classification	Linear Stream Miles
Category One	19.45

Stream/Tributary	Class	Trout	C1	Category
Halfway House Brook	FW2	TP	C1	FW2-TP (C1)
Mill Brook	FW2	TP	C1	FW2-TP (C1)
Montana Brook	FW2	TP	C1	FW2-TP (C1)
Musconetcong River	FW2	TM		FW2-TM
Trib to Musconetcong River	FW2	TP	C1	FW2-TP (C1)
Pohatcong Creek	FW2	TM	C1	FW2-TM (C1)
Trib to Pohatcong Creek	FW2	TP	C1	FW2-TP (C1)

Stream/Tributary	Category	Buffer	
Halfway House Brook	FW2-TP (C1)	300'	Highlands Preservation Area/ C1
Mill Brook	FW2-TP (C1)	300'	Highlands Preservation Area/ C1
Montana Brook	FW2- TP (C1)	300'	Highlands Preservation Area/ C1
Musconetcong River	FW2-TM	300' (sections)	Highlands Preservation Area
Trib to Musconetcong River	FW2-TP(C1)	300'	C1
Pohatcong Creek	FW2-TM (C1)	300'	Highlands Preservation Area/ C1
Tribs to Pohatcong Creek	FW2-TP (C1)	300'	C1

Wild and Scenic Designation
Musconetcong River

APPENDIX 11

FEMA FLOOD HAZARD ZONES

ZONE	LABEL		ACRES	%
A	Within 100-year flood.	No Base Flood Elevations determination	47.49	0.32
AE	Within 100-year flood.	Base Flood Elevations (BFE's) determined	434.62	2.89
X500	Within 500-year flood.		175.01	1.16
X	Outside Flood Zone		14405.26	95.64
		Total	15062.38	100.00

APPENDIX 12

GROUNDWATER RECHARGE

COUNTY RANK[1]	POTENTIAL RECHARGE RATE (IN/YR)	ACRES	%
A	17 to 12 in/yr	278.25	1.85
B	15 to 16 in/yr	5744.25	38.10
C	11 to 13 in/yr	7819.62	51.87
D	1 to 10 in/yr	356.32	2.36
E	0 in/yr	48.96	0.32
L	Hydric Soils- No recharge calculated	70.06	0.46
W	Wetlands/Open Water – No recharge calculated	639.13	4.24
X	No recharge calculated	120.06	0.80
		15076.66	100.00

Associated Soil Types

SERIES	SYMBOL	HYDROLOGIC SOIL GROUP PER USDA WARREN COUNTY SOIL SURVEY[1]	RANGE OF PERMEABILITY (IN/HR) AT DEPTHS OF 24-60 AS PER USDA WARREN COUNTY SOIL SURVEY
ANNANDALE	AnB2	C	0.06-0.6
ANNANDALE	AnC2	C	0.06-0.6
ANNANDALE	AnD2	C	0.06-0.6
ANNANDALE	AsC	C	0.06-0.6
ANNANDALE	AsD	C	0.06-0.6
BARTLEY	BaA	C	0.06-0.6
BARTLEY	BaB	C	0.06-0.6
BARTLEY	BbC	C	0.06-0.6
BARTLEY	BdB	C	0.06-0.6
BIRDSBORO	BhbB	N/A	N/A
CALIFON	CbB	C	0.06-0.2
CALIFON	CbC2	C	0.6-0.2
CALIFON	CcB	C	0.6-0.2
CALIFON	CcC	C	0.6-0.2
COKESBURY	CoA	D	0.6-0.6
COKESBURY	CoB	D	0.6-0.6
COKESBURY	CsB	D	>0.2
EDNEYVILLE	EdB	B	2.0-6.0
EDNEYVILLE	EdC	B	2.0-6.0
EDNEYVILLE	EeB	B	2.0-6.0
EDNEYVILLE	EeC	B	2.0-6.0
EDNEYVILLE-PARKER	EPD	B	6.0-20.0
FLUVAQUENTS	FNAT	N/A	N/A
FREDON	FrA	C	2.0-20.0
HAZEN	HbA	B	6.0-20.0
HAZEN	HbB	B	6.0-20.0
HAZEN	HbC	B	6.0-20.0

HAZEN	HfA	B	6.0-20.0
HAZEN	HfB	B	6.0-20.0
HERO	HkA	B	>6.0
HERO	HkB	B	>6.0
HERO	HrA	B	>6.0
HERO	HrB	B	>6.0
LYONS	LyA	D	0.06-0.2
LYONS	LzB	D	0.06-0.2
MIDDLEBURY	Md	B	0.6-6.0
NASSAU	NaC	C	0.6-2.0
NASSAU	NbB	C	0.6-2.0
NASSAU-ROCK OUTCROP	NFD	C	0.0
NASSAU_ROCK OUTCROP	NFE	C	0.0
PARKER	PbD	B	6.0-20.0
PARKER	PbE	B	6.0-20.0
ROCK OUTCROP	RPF	B	0.0
ROCK OUTCROP	RWD	B	0.0
WASHINGTON	WaA	B	0.6-6.0
WASHINGTON	WaB	B	0.6-6.0
WASHINGTON	WaC2	B	0.6-6.0
WASHINGTON	WaD2	B	0.6-6.0
WASSAIC	WmB	B	0.2-2.0
WASSAIC	WnC	B	0.2-2.0
WASSAIC	WnD	B	0.2-2.0
WASSAIC	WOB	B	0.2-2.0
WASSAIC	WOC	B	0.2-2.0
WASSAIC	WOD	B	0.2-2.0
WAYLAND	Wp	D	0.06-0.2

[1] County Rank designations (A-X) do not equate to USDA Hydrologic Soil Group designations.

APPENDIX 13:

BEDROCK AQUIFERS

NAME	ACRES	%
JACKSONBURG LIMESTONE, KITTATINNY SUPERGROUP AND HARDYSTON QUARTZITE AQUIFER	8101.0	53.7
IGNEOUS AND METAMORPHIC AQUIFER	6162.1	40.9
MARTINSBURG FORMATION AND JUTLAND SEQUENCE AQUIFER	813.5	5.4
TOTAL	15076.6	100.0

APPENDIX 14

LAND USE / LAND COVER

TYPE02	ACRES	%
AGRICULTURE	7134.57	47.32
BARREN LAND	150.48	1.00
FOREST	5242.23	34.77
URBAN	1693.35	11.23
WATER	129.05	0.86
WETLANDS	726.98	4.82
TOTAL	15076.66	100

LU02	TYPE02	LABEL02	ACRES	%
1110	URBAN	RESIDENTIAL, HIGH DENSITY, MULTIPLE DWELLING	6.72	0.04
1120	URBAN	RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY	41.94	0.28
1130	URBAN	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	177.45	1.18
1140	URBAN	RESIDENTIAL, RURAL, SINGLE UNIT	1089.61	7.23
1200	URBAN	COMMERCIAL/SERVICES	98.29	0.65
1300	URBAN	INDUSTRIAL	45.42	0.30
1400	URBAN	TRANSPORTATION/COMMUNICATIONS/UTILITIES	16.37	0.11
1410	URBAN	MAJOR ROADWAY	1.57	0.01
1419	WATER	BRIDGE OVER WATER	0.66	0.01
1461	WETLANDS	WETLAND RIGHTS-OF-WAY (MODIFIED)	3.79	0.03
1463	URBAN	UPLAND RIGHTS-OF-WAY UNDEVELOPED	42.33	0.28
1499	URBAN	STORMWATER BASIN	21.20	0.14
1600	URBAN	MIXED URBAN OR BUILT-UP LAND	2.48	0.02
1700	URBAN	OTHER URBAN OR BUILT-UP LAND	103.27	0.68
1710	URBAN	CEMETARY	6.36	0.04
1750	WETLANDS	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	8.47	0.06
1800	URBAN	RECREATIONAL LAND	16.82	0.11
1804	URBAN	ATHLETIC FIELDS (SCHOOLS)	23.52	0.16
1850	WETLANDS	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	0.82	0.01
2100	AGRICULTURE	CROPLAND AND PASTURELAND	6823.77	45.26
2140	WETLANDS	AGRICULTURAL WETLANDS (MODIFIED)	276.25	1.83
2150	WETLANDS	FORMER AGRICULTURAL WETLAND-BECOMING SHRUBBY, NOT BUILT-UP)	4.27	0.03
2200	AGRICULTURE	ORCHARDS/VINEYARDS/NURSNRIES/HORTICULTURAL AREAS	50.93	0.34
2300	AGRICULTURE	CONFINED FEEDING OPERATIONS	39.43	0.26
2400	AGRICULTURE	OTHER AGRICULTURE	220.45	1.46
4110	FOREST	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	762.54	5.06
4120	FOREST	DECIDUOUS FOREST (>50% CROWN CLOSURE)	3808.52	25.26
4210	FOREST	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	8.23	0.05
4220	FOREST	CONIFEROUS FOREST (>50% CROWN CLOSURE)	27.92	0.19
4230	FOREST	PLANTATION	23.73	0.16
4311	FOREST	MIXED FOREST (›50% CONIFEROUS WITH 10-50% CROWN CLOSURE)	24.83	0.16
4312	FOREST	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	57.04	0.38
4321	FOREST	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	36.28	0.24
4322	FOREST	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	26.54	0.18
4410	FOREST	OLD FIELD (< 25% BRUSH COVERED)	72.05	0.48

LU02	TYPE02	LABEL02	ACRES	%
4420	FOREST	DECIDUOUS BRUSH/SHRUBLAND	60.68	0.40
4430	FOREST	CONIFEROUS BRUSH/SHRUBLAND	40.10	0.27
4440	FOREST	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	293.76	1.95
5100	WATER	STREAMS AND CANALS	84.80	0.56
5200	WATER	NATURAL LAKES	0.68	.01
5300	WATER	ARTIFICIAL LAKES	42.90	0.28
6210	WETLANDS	DECIDUOUS WOODED WETLANDS	365.11	2.42
6231	WETLANDS	DECIDUOUS SCRUB/SHRUB WETLANDS	28.79	0.19
6232	WETLANDS	CONIFEROUS SCRUB/SHRUB WETLANDS	2.86	0.02
6233	WETLANDS	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	10.25	0.07
6234	WETLANDS	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	11.47	0.08
6240	WETLANDS	HERBACEOUS WETLANDS	13.20	0.09
6251	WETLANDS	MIXED WOODED WETLANDS (DECIDUOUS DOM.)	1.13	0.01
7300	BARREN LAND	EXTRACTIVE MINING	4.54	0.03
7400	BARREN LAND	ALTERED LANDS	84.75	0.56
7430	WETLANDS	DISTURBED WETLANDS (MODIFIED)	0.57	0.01
7500	BARREN LAND	TRANSITIONAL AREAS	61.19	0.41
		TOTAL	15076.66	100

APPENDIX 15

HIGHLANDS AREAS

HIGHLANDS AREA	ACRES	%
Highlands Preservation Area	3785.95	25.11
Highlands Planning Area	11290.71	74.89
Total	15076.66	100.00

APPENDIX 16

STATE PLAN POLICY

PLANNING AREA	CODE	ACRES	%
Rural	PA4	76.45	0.51
Rural Environmentally Sensitive	PA4B	10424.94	69.15
Environmentally Sensitive	PA5	4418.69	29.31
Parks and Natural Areas	Parks	156.57	1.03
	Total	15076.65	100.00

APPENDIX 17

OPEN SPACE AND PRESERVED LANDS

OPEN SPACE TYPE	ACRES
County Property / Easement	185.21
Municipal Property	17.09
Non-Profit Property	47.01
Preserved Farmland	1791.32
Semi Public Property	113.75
State Property	273.12
TOTAL	2427.49

Warren County Owned Open Space

BLOCK	LOT	OWNER	Type	ACRES
39	1	Warren County	County Property / Easement	74.17
39	1.01	Warren County	County Property / Easement	9.76
39	2.01	Warren County	County Property / Easement	1.47
39	5.01	Warren County	County Property / Easement	0.47
39	3.01	Warren County	County Property / Easement	4.41
39	3.05	Warren County	County Property / Easement	4.37
39	3.03	Warren County	County Property / Easement	1.35
19	2	Warren County	County Property / Easement	5.15
18	27	Warren County	County Property / Easement	29.82
11	1	Warren County	County Property / Easement	51.92
8	42	Warren County	County Property / Easement	2.30
			Total	185.21

Municipal Owned Open Space

BLOCK	LOT	OWNER	Type	Acres
56	21	Franklin Twp	Municipal Property	6.18
45	15	Franklin Twp	Municipal Property	0.35
17	36	Franklin Twp	Municipal Property	5.66
16	1201	Franklin Twp	Municipal Property	3.35
16	11	Franklin Twp	Municipal Property	1.56
			Total	17.09

Non-Profit Owned Open Space

BLOCK	LOT	OWNER	Type	Acres
47	6	Musconetcong Watershed Association	Non-Profit Property	47.01
			Total	47.01

Farmland Preservation

BLOCK	LOT	OWNER	Type	Acres
61	4	John Schuster	Preserved Farmland	96.20
61	3	John Schuster	Preserved Farmland	72.24
59	9	Warren Rod and Gun Club	Preserved Farmland	37.58
59	8	Warren Rod and Gun Club	Preserved Farmland	3.65
59	7	Warren Rod and Gun Club	Preserved Farmland	14.54
58	27	Warren Rod and Gun Club	Preserved Farmland	20.76
58	7	Trout, Henry	Preserved Farmland	50.27
58	5	Warren Rod and Gun Club	Preserved Farmland	19.44
58	4	Trout, Henry	Preserved Farmland	75.85

58	3	Trout, Henry	Preserved Farmland		37.48
58	2	Norman Falk	Preserved Farmland		49.85
57	27.02	Oostdyk, John	Preserved Farmland		4.93
57	27	Sigler, Ronald	Preserved Farmland		53.56
57	25	Oostdyk, John	Preserved Farmland		7.29
56	39	Steinhardt, Lincoln	Preserved Farmland		78.24
56	38	Steinhardt, Lincoln	Preserved Farmland		119.47
57	29	Arvystas, Michael	Preserved Farmland		48.41
57	26	Oostdyk, John	Preserved Farmland		68.84
57	24	Oostdyk, John	Preserved Farmland		15.38
57	23	Oostdyk, John	Preserved Farmland		45.15
57	22	Sigler, Ronald	Preserved Farmland		104.37
57	20	Sigler, Ronald	Preserved Farmland		82.39
57	19	Sigler, Ronald	Preserved Farmland		90.22
57	10	Peter Joseph	Preserved Farmland		87.32
53	4	Leyburn, Robert	Preserved Farmland		5.70
53	3	Fox, Elliot & Engborg	Preserved Farmland		19.61
51	3	Leyburn, Robert	Preserved Farmland		53.07
51	2	Fox, Elliot & Engborg	Preserved Farmland		82.38
49	2	Schnetzer Farms	Preserved Farmland		2.72
48	13	Schnetzer Farms	Preserved Farmland		46.65
48	10	Schnetzer, M	Preserved Farmland		17.24
48	5	Schnetzer, M	Preserved Farmland		124.57
45	14	Augusta, Joseph & Mary	Preserved Farmland		28.01
45	12	Dischler, Jill & Robert	Preserved Farmland		27.91
45	11	Augusta, Joseph & Mary	Preserved Farmland		83.96
9	12	Barbara Fisher Bigelow	Preserved Farmland		16.08
				Total	1791.32

Semi Public Property Open Space

BLOCK	LOT	OWNER	Type		Acres
1	24		Semi Public Property		18.27
1	21		Semi Public Property		6.52
1	20		Semi Public Property		88.96
				Total	95.48

State Owned Open Space

BLOCK	LOT	OWNER	Type		Acres
59	3	Fish, Game & Wildlife (FGW)	State Property		19.78
56	33	FGW	State Property		59.08
53	5.01	FGW	State Property		5.23
53	2.03	FGW	State Property		38.51
52	1.02	Parks and Forestry (PF)	State Property		33.94
52	1.01	PF	State Property		0.58
48	32		State Property		54.10
12	11	NJ DEP	State Property		4.64
12	7.01	PF	State Property		12.19
8	41	NJ DEP	State Property		0.48
8	39	NJ DEP	State Property		19.02
8	20	NJ DEP	State Property		25.57
				Total	273.12

APPENDIX 18

DOCUMENTED HISTORIC SITES

	Site Name	Block	Lot
State and National Register	John Richey House (NR#02000216)	48	13
	Asbury Historic District, c. 1776 (#93000132)		
	Morris Canal (#74002228)		
Eligible for National Register as per NJ State Historic Preservation Officer	Scotts Mountain District		
Eligible for State and National Register as per Warren County Cultural Resources Survey	Stone residence located Mountain View Road, c. 1770	47	902
	Residence located at Mountain View Road, c. 1780	46	25
	Elisha Thatcher House, c. 1817	27	5
	George Richey Farm, Bloomsbury Road, c. late 18th, early 19th Cent.	N/A	N/A
	Richey-Dunham House, Cemetary Road, c. 1810	N/A	N/A
	Vliet Limekiln, Limekiln Road, Asbury, mid & late 19th Cent.	N/A	N/A

Identified Historic Structures as per Warren County Cultural Resources Survey

Location	Block	Lot	Location	Block	Lot
Residence, Rt 57, New Village, c. 1890	1	1.01	Residence, Rt 57, New Village, c. 1900	1	3
Residence, Rt 57, New Village, c. 1900	1	5	Residence, R.57, New Village, c. 1920	39	3
Residence, Montana Road, c. 1900	3	1.02	Residence, Montana Road, c. 1900	3	1.01
Residence, Halfway House Road, c. 1930	15	14	Residence, Halfway House Road, c. 1930	18	35
Residence, Halfway House Road, c. 1900	11	50	Farm, Halfway House Road, c. 1800	11	50
Mill/ Converted to Residence, Halfway House Road, c. 1800	11	49	Farm, Halfway House Road, c. 1880	13&14	45&20
Residence, Bickel Road, c. 1900	11	42.01	Residence, Rt 57, New Village, c. 1880	2	3
Residence, Rt 57, New Village, c. 1880	2	4	Residence, Rt 57, New Village, c. 1880	39	10
Residence, Rt 57, New Village, c. 1920	2	6	Possible Mill/ Converted to Residence, Rt 57, New Village, c. 1820	2	8
Bridge, Rt 57, New Village, c. 1922	2	9	Residence, Rt 57, New Village	2	10
Commercial/Store, Rt 57, New Village, c. 1870	2	11&12	Commercial/Store, Rt 57, New Village, c. 1920	34	21
Residence, Stewartsville Road, New Village, c. 1880	34	24	Residence, Stewartsville Road, New Village, c. 1880	39	12
Residence, Stewartsville Road, c. 1900	34	25	Residence, Stewartsville Road, c. 1900	34	23
Residence, Stewartsville Road, c. 1870	34	24.01	Residence, Stewartsville Road, c. 1900	34	25.02
Residence, Stewartsville Road, c. 1890	39	9	Residence, Rt 57, New Village, c. 1890	3	2,3
Residence, Rt 57, New Village, c. 1890	34	15,16,17	Church, New Village Union Chapel, c. 1920	3	5
Residence, Rt 57, New Village, c. 1800	34	13.01	Residence, Rt 57, New Village, c. 1900	34	
Residence, Rt 57, New Village, c. 1920	3	8	Residence, Rt 57, New Village, c. 1880	3	9
Residence, Rt 57, New Village, c. 1880	34	13	Residence, Rt 57, New Village, c. 1920	3	27
Residence, Rt 57, New Village, c. 1920	3	29	Commercial, Rt 57, New Village, c.1920	37	6-11
Residence, Thatcher Ave, New Village, c. 1920	38	1,2	Residence, Thatcher Ave, New Village, c. 1880	36	25
Residence, Thatcher Ave, New Village, c. 1920	35	2	Residence, Thatcher Ave, New Village, c. 1920	34	4
Residence, Rt, 57, New Village, c. 1920	6	1	Residence, Thatcher Ave, New Village, c. 1920	7	9
Residence, Thatcher Ave, New Village, c. 1940	3	44	Residence, Thatcher Ave, New Village, c. 1850	5	5
Residence, Thatcher Ave, New Village, c. 1900	5	6	Residence, Thatcher Ave, New Village, c. 1930	8	3
Residence, Rt 57, New Village, c. 1875	6	24	Residence, Rt 57, New Village, c. 1920	31	1
Residence, Edison Ave, New Village, c. 1925	31	23	Residence, Edison Ave, New Village, c. 1900	36	21
Residence, Rt 57, New Village, c. 1920	7	11	Farm & Vet Office, Rt 57, New Village, c. 1820	7	14

Residence, Rt 57, New Village, c. 1890	30	13	Residence, Rt 57, New Village, c. 1880	7	5.01
Farm, Edison Rd, c. 1820	34	7.03	Residence, Edison Road, c. 1920	34	7.01
Industrial, Edison Road, c. 1940	27&41	11.01, 12.01	Residence, Edison Road, c. 1850	45	2
Residence, Good Springs Road, c. 1880	45	2.01	Residence, Good Springs Road, c. 1890	44	1
Residence, Franklin Road, c. 1890	43	5.01	Residence, Willow Grove Road, c. 1880	58	31.01
Residence, Willow Grove Road, c. 1830	41	7	Residence, Willow Grove Road, c. 1890	41	8
Residence, Willow Grove Road, c. 1870	41	9.04	Residence, Willow Grove Road, c. 1870	42	5
Residence, Willow Grove Road, c. 1870	41	4	Residence, Willow Grove Road, c. 1910	41	21
Farm, Herleman Road, c. 1880	42	10	Farm, Rt 57, c. 1880	9	23
Farm, Rt 57, Broadway, c. 1800	9	23.01	Residence, Millbrook Road, Broadway, c. 1930	24	5
Residence, Rt 57, Broadway, c. 1800	24	3	Residence, Rt 57, Broadway, c. 1900	25	5
Residence, Rt 57, Broadway, c. 1900	25	4	Residence, Rt 57, Broadway, c. 1890	25	3
Cemetary, Rt 57, Broadway, c. unknown	25	1	Commercial, Rt 57, Broadway, c. 1930	18	24
Residence, Rt 57, Broadway, c. 1910	18	23	Residence, Rt 57, Broadway, c. 1920	18	22
Residence, Rt 57, Broadway, c. 1900	18	21	Residence, Rt 57, Broadway, c. 1900	18	20
Residence, Rt 57, Broadway, c. 1900	18	19	Residence, Rt 57, Broadway, c. 1900	18	18
Residence, Rt 57, Broadway, c. 1880	18	17	School, Rt 57, Broadway, c. 1920	18	14
Residence, Rt. 57, Broadway, c. 1930	18	10	Residence, Rt 57, Broadway, c. 1820	15	13
Residence, Halfway House Road, c.1880	16	19	Bridge, Rt 57, c. 1922	18	1
Abandoned Residence, Rt 57, Broadway, c. 1870	17	1	Residence, Rt 57, Broadway, c. 1915	17	3
Residence, Rt 57, Broadway, c. 1880	17	4	Residence, Rt 57, Broadway, c. 1930	17	8
Residence, Rt 57, Broadway, c. 1860	17	14	Residence, Rt 57, Broadway, c. 1880	17	14.01
Residence, Rt 57, Broadway, c. 1910	17	16	Residence, Rt 57, Broadway, c. 1780	17	17
Residence, Rt 57, Broadway, c. 1930	17	20	Residence, Rt 57, Broadway, c. 1930	17	21
Residence, Rt 57, Broadway, c. 1870	17	22	Residence, Rt 57, Broadway, c. 1890	26	23
Residence, Rt 57, Broadway, c. 1890	26	24, 26,27,28	Church, Broadway Methodist Church, c. 1940	26	26
Residence, Rt 57, Broadway, c. 1930	26	29	Residence, Rt 57, Broadway, c. 1890	26	30
Residence, Asbury Road, c. 1930	26	4	Residence, Millbrook Road, Broadway, c. 1935	17	32
Residence, Millbrook Road, c. 1900	17	34-38	Residence, Millbrook Road, Broadway, c. 1820	26	7-8
Residence, Millbrook Road, c. 1880	26	9	Residence, Millbrook Road, c. 1930	26	10
Residence, Buttermilk Bridge Road, c. 1920	46	37	Residence, Buttermilk Bridge Road, c. 1920	47	5
Residence, Mountain View Road, c. 1860	68	37.01	Residence, Mountain View Road, c. 1800	46	25
Former School Converted to Residence, Mountain View Road, c. 1852	46	25	Farm, Mountain View Road, c. 1870	57	22
Residence, Mountain View Road, c. 1880	57	24	Residence, Mountain View Road, c. 1880	57	28
Residence, Franklin Road, c. 1870	58	17	Residence, Bloomsbury Road, c. 1930	59	6
Residence, Bloomsbury Road, c. 1930	58	6	Farm, Bloomsbury Road, c. 1880	58	4
Spring Run Farm/J. Apgar House (Residence), Bloomsbury Road, c. 1800	61	7.01	Farm, Bloomsbury Road, c. 1900	61	5
Farm, Bryan Road, Broadway, c. 1890	16	21.02-.03	Residence, Millbrook Road, Broadway, c. 1880	46	1
Residence, Millbrook Road, c. 1930	46	8	Farm, Millbrook Road, c. 1890	27	6
Grange, Millbrook Road, Broadway, c. 1930	46	9	Farm, Elisha Thatcher Home, c. 1817	27	5
Farm, Good Springs Road, c. 1900	27	4.02	Farm, Millbrook Road, c. 1890	46	16
Residence, c. 1940	46	16.01	Residence, Millbrook Road, c. 1880	46	18
Residence, Millbrook Road, c. 1935	46	19	Farm, Millbrook Road, c. 1870	48	1
Residence, Millbrook Road, c. 1880	57	13,14	Farm, Bloomsbury Road, c. 1860	48	19
Residence, Maple Ave, c. 1820	51	3	Farm, Maple Ave, c. 1870	52	1

Residence, Shirts Road, c. 1870	52	2.01
Farm, Bloomsbury Road, c. 1900	57	34.02
Residence, Bloomsbury Road, c. 1900	56	32
Residence, Bloomsbury Road, Asbury, c. 1880	56	30
Farm, Bloomsbury Road, Asbury, c. 1880	57	1
Farm, Millbrook Road, c. 1900	48	20
Residence, Millbrook Road, c. 1880	48	21
Residence, Millbrook Road, c. 1880	48	23
Farm, Millbrook Road, c. 1880	57	8.02
Residence, Millbrook Road, c. 1880	57	6
Residence, Main Street, c. 1880	57	4
Residence, Main Street, c. 1880	57	2
Commercial, Asbury-Anderson Road, c. 1910	48	27
Residence, Main Street, Asbury, c. 1890	50	1
Residence, Kitchen Street, Asbury, c. 1890	50	9
Residence, Main Street, Asbury, c. 1823	54	26
Residence, Main Street, Asbury, c. 1870	54	24
Residence, Main Street, Asbury, c. 1890	54	22
Residence, Main Street, Asbury, c. 1870	54	19
Warne-Castner House/Residence, Main Street, Asbury, c. 1800	54	17
Residence, Main Street, Asbury, c. 1920	54	14
Residence, Main Street, Asbury, c. 1890	54	11
Residence, Maple Ave, Asbury, c. 1900	54	9
Residence, Maple Ave, Asbury, c. 1850	54	6
Residence, Maple Ave, Asbury, c. 1850	54	4
Residence, Maple Ave, Asbury, c. 1870	54	2
Industrial/Mill, Main Street, Asbury, c. 1780	55	1
Residence, Main Street, Asbury, c. 1860	55	4,5
Residence, Main Street, Asbury, c. 1870	55	7
Residence, School Street, Asbury, c. 1880	55	8
Residence, School Street, Asbury, c. 1870	55	12
Cemetery/Asbury Presbyterian Cemetery, 1790-1880	56	1,2
Residence, School Street, Asbury, c. 1920	56	4
Residence, School Street, Asbury, c. 1860	56	7
School/Converted Residence, School Street, Asbury, c. 1919	56	9
Residence, Main Street, Asbury, c. 1840	56	
Residence, Main Street, Asbury, c. 1880	56	14
Residence, Main Street, Asbury, 1880-1920	56	16
Residence, Main Street, Asbury, c. 1870	56	18
Residence, Main Street, Asbury, c. 1920	56	20
Residence, Main Street, Asbury, c. 1920	56	24
Richey-Dunham House/Residence, c. 1810	N/A	N/A
Asbury Graphite Mill/Industrial, 1880-1920	N/A	N/A
McKinley Burying Ground/Cemetery, Broadway	N/A	N/A
Farm, Bloomsbury Road, c. 1980	57	31.02
Residence, Bloomsbury Road, c. 1920	56	35
Residence, Bloomsbury Road, Asbury, c. 1900	56	31
Residence, Bloomsbury Road, Asbury, c. 1870	56	29
Residence, Millbrook Road, c. 1860	48	20
Farm, Millbrook Road, c. 1880	48	30
Residence, Millbrook Road, c. 1870	48	22
Residence, Millbrook Road, c. 1900	48	24
Residence, Millbrook Road, c. 1870	48	26
Residence, Millbrook Road, c. 1880	57	5
Residence, Main Street, c. 1870	57	3
Residence, Main Street, c. 1890	57	1
Residence, Asbury-Anderson Road, c. 1930	50	5
Residence, Kitchen Street, Asbury, c. 1840	50	7
Industrial/Mill, Main Street, Asbury, c. 1844	N/A	N/A
Daniel Runkle House, Residence, Main Street, Asbury, c. 1840	54	25
Residence, Main Street, Asbury, c. 1890	54	23
American House/Residence, Main Street, Asbury, c. 1810	54	20
Residence, Main Street, Asbury, c. 1880	54	18
Chruch/ Asbury Methodist Episcopal Church, c. 1914	54	16
Residence, Main Street, Asbury, c. 1880	54	12
Residence, Maple Ave, Asbury, c.1890	54	10
Residence, Maple Ave, Asbury, c.1880	54	8
Residence, Maple Ave, Asbury, c. 1870	54	5
Residence, Maple Ave, Asbury, c. 1850	54	3
Residence, Maple Ave, Asbury, c. 1870	54	1
Col. William McCullough Home/Residence, Main Street, Asbury, c. 1800	55	3
Residence, Main Street, Asbury, c. 1870	55	6
Daniel Cole House/Residence, School Street, Asbury, c. 1840	55	9
Church/ Asbury Presbyterian Church, c. 1868	55	11
Residence, School Street, Asbury, c. 1840	55	19
Residence, School Street, Asbury, c. 1870	56	3
Residence, School Street, Asbury, 1790-1880	56	5
Residence, School Street, Asbury, c. 1870	56	8
Residence, Main Street, Asbury, c. 1870	56	11
Residence, Main Street, Asbury, c. 1910	56	
Residence, Main Street, Asbury, c. 1850	56	15
Commerical, Main Street, Asbury, c. 1890	56	17
Residence, Main Street, Asbury, c. 1850	56	19
Residence, Main Street, Asbury, c. 1830	56	22
Residence, Main Street, Asbury, c. 1870	56	28
Vliet Limekiln/Industrial, Asbury, 1790-1880	N/A	N/A
Farm, 1790-1880	N/A	N/A

APPENDIX 19

SEPTIC RESTRICTIONS

SEPTIC RESTRICTIONS	ACRES	%
Severe Restrictions	6331.68	42
Moderate Restrictions	6206.98	41
Not Designated Under NJAC 7:9A	2538	17
Total	15076.66	100

Limiting Zone Designation

Soil Series	Sc	Sr	Hr	Hc	Wr	Wp
ANNANDALE			III			
BARTLEY			III			II
BIRDSBORO	II				I, II	
CALIFON			III			
COKESBURY			III			III
EDNEYVILLE	I, II					
FREDON					III	
HAZEN	I, II					
HERO	II				II	
LYONS	II	II			II, III	
MIDDLEBURY					III	
NASSAU	II	III				
PARKER	II					
WASHINGTON	I, II					
WASSAIC	II	III				
WAYLAND		III			II, III	

KEY:	Symbol	Severity
	I	Low Restrictions
	II	Moderate Restrictions
	III	Severe Restrictions

KEY:	Symbol	Type of Limiting Zone	Depth (ft)	Class
			>5	I
	Sc	Fractured Rock or excessively coarse substrata	0-5	IISc
			>9	I
			4-9	IISr
	Sr	Massive Rock of hydraullicay restrictive substratum	0-4	IIISr
			>9	I
			4-9	IIHr
	Hr	Hydraulically Restrictive horizon, permeable substratum	0-4	IIIHr
			>5	I
	Hc	Excessively Coarse horizon	0-5	IIIHc
			>5	I
			2-5	IIWr
	Wr	Zone of saturation, regional	0-2	IIIWr
			>5	I
			2-5	IIWp
	Wp	Zone of saturation, perched	0-2	IIIWp

APPENDIX 20

NJDEP WETLANDS

LU02	TYPE02	LABEL02	ACRES	%
1461	WETLANDS	WETLAND RIGHTS-OF-WAY (MODIFIED)	3.79	0.52
1750	WETLANDS	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	8.47	1.17
1850	WETLANDS	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	0.82	0.11
2140	WETLANDS	AGRICULTURAL WETLANDS (MODIFIED)	276.25	38.00
2150	WETLANDS	FORMER AGRICULTURAL WETLAND-BECOMING SHRUBBY, NOT BUILT-UP)	4.27	0.59
6210	WETLANDS	DECIDUOUS WOODED WETLANDS	365.11	50.22
6231	WETLANDS	DECIDUOUS SCRUB/SHRUB WETLANDS	28.79	3.96
6232	WETLANDS	CONIFEROUS SCRUB/SHRUB WETLANDS	2.86	0.39
6233	WETLANDS	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	10.25	1.41
6234	WETLANDS	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	11.47	1.58
6240	WETLANDS	HERBACEOUS WETLANDS	13.20	1.82
6251	WETLANDS	MIXED WOODED WETLANDS (DECIDUOUS DOM.)	1.13	0.16
7430	WETLANDS	DISTURBED WETLANDS (MODIFIED)	0.57	0.08
		TOTAL	726.98	100

APPENDIX 21

UPLAND FORESTS

LU02	LABEL02	ACRES	%
4110	DECIDUOUS FORES (10-50% CROWN CLOSURE)	762.54	14.57
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	3808.52	72.77
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	27.92	0.53
4230	PLANTATION	23.73	0.45
4311	MIXED FOREST (›50% CONIFEROUS WITH 10-50% CROWN CLOSURE)	24.83	0.47
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	57.04	1.09
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	36.28	0.69
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	26.54	0.51
4410	OLD FIELD (< 25% BRUSH COVERED)	72.05	1.38
4420	DECIDUOUS BRUSH/SHRUBLAND	60.68	1.16
4430	CONIFEROUS BRUSH/SHRUBLAND	40.10	0.77
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	293.76	5.61
	TOTAL	5233.99	100

APPENDIX 22

LANDSCAPE HABITAT AND NATURAL HERITAGE DATA

Landscape Project

Forest		ACRES
Rank 2: Priority Concern		1644.62
Rank 3: State Threatened species observed in area		1596.86
Rank 5: Federally listed species observed in area		2065.83
	Total	5307.31

Forested Wetland	ACRES
Rank 3: State Threatened species observed in area	1829.78

Emergent Wetland		
Rank 1: Suitable Habitat		359.04
Rank 5: Federally listed species observed in area		0.02
	Total	359.06

Grassland	ACRES
Rank 1: Suitable Habitat	451.94
Rank 2: Priority Concern	1903.78
Rank 3: State Threatened species observed in area	1338.98
Rank 4: State Endangered species observed in area	3697.13
Rank 5: Federally listed species observed in area	38.10
Total	7429.93

Listed Species Habitat		ACRES
Wood Turtle (State Threatened)		1829.78
Bald Eagle (State Threatened & Endangered)		207.69
	Total	2037.47

Natural Heritage Database

Natural Heritage Grid	Cells in Township
Location Precisely Known	1
Location Precisely Not Known	2

Natural Heritage Priority Sites	ACRES
Buttermilk Bridge (within Franklin Twp)	172.77

APPENDIX 23

VERNAL POOL LOCATIONS

ID	X (UTM)	Y (UTM)	Vernal Pool?	Certified[1]
283rvh	494862	4508213	Yes	0
285rvh	494739	4503153	Yes	0
286rvh	498147	4506921	No	0
287rvh	499426	4508138	Yes	0
12473rvh	497603	4509351	Yes	0
1248rvh	492845	4505771	Not Surveyed	0
1249rvh	493115	4506023	Not Surveyed	0
1250rvh	491948	4507347	Not Surveyed	0
12540rvh	497635	4509338	Yes	0
1257rvh	497605	4509304	Yes	0
1258rvh	497706	4509404	Yes	0
1259rvh	497999	4509588	Yes	0
1261rvh	498528	4509867	Yes	0
1263rvh	498775	4507300	No	0
1264rvh	498222	4506832	No	0
1265rvh	497236	4506432	No	0
1266rvh	495936	4506528	Not Surveyed	0
2526rvh	499074	4508562	Yes	0
2527rvh	499808	4508373	Yes	0
2528rvh	492971	4508828	Not Surveyed	0
2529rvh	492774	4508888	Not Surveyed	0

[1] Certified 1-Yes, 0- Not Certified